Kalita Humphreys Theater

Dallas Theater Center

MASTERPLAN REPORT

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DILLER SCOFIDIO + RENFRO

VOLUME 2

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Fisher Dachs Associates
New York, NY

Threshold Acoustics LLC
Chicago, IL

Reed Hilderbrand LLC
Cambridge, MA

Harboe Architects
Chicago, IL

Silman Engineering
New York, NY

BOKAPowell
Dallas, TX

Syska Hennessy Group
Los Angeles, CA

Pacheco Koch
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TECHNICAL NARRATIVES

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EXISTING CONDITIONS
KALITA HUMPHREYS THEATER

Exterior: General

Facades
The exterior facades of the building are coated concrete. Refer to structural section for concrete condition assessment. The coating at the later addition to the building are heavily soiled with localized delamination at cracks and seams. The coating at the original building has localized soiling at the top of walls and around service entries. There is impact damage near the loading dock and pattern cracking at the parapets – refer to structural for further condition assessment.

Soffits
Exterior soffits are painted cement plaster with control joints aligned with the building grid. The 1960s addition has a painted steel bevel at the concrete edge. At all other soffits, the bevel is concrete. The soffits are in good to fair condition, the steel bevel is severely corroded.

Doors
Service doors are painted flush hollow metal doors with painted hollow metal frames. They are in fair to poor condition with peeling and meeting paint. The doors have non-original chrome pulls and painted hinges. The door closer is in poor condition as it is corroded.

The basement shop doors are painted flush hollow metal doors with non-original chrome hardware in fair to poor condition. There are areas of corrosion, many abandoned fastener homes, corroded steel hinges, and a deformed astragal.

The fire exit doors from the House are painted flush hollow metal doors and frames with original bronze hardware. They are in fair condition with worn paint and overpainted bronze elements. There is one original closer and one non-original closer.

The door to Paul Baker's office is a painted flush hollow metal door with a single glazed lite, a painted hollow metal frame, and original bronze hardware. It is believed to be the original door relocated to the new position of the exterior wall as part of the 1963 addition. The door is in good to fair condition with fading and UV damaged paint and overpainted hardware.

Building Name Sign
The building name is comprised of bronze lettering inset within a concrete wall at the north entry. The lettering is in good condition.

Windows
Windows in the basement addition are painted steel frame casement windows. They are in fair to poor condition with cracked window putty, chipped and missing paint, and corroded steel sash.

For glass storefront system conditions, see interior lobby section. For conditions of clerestory windows typical of the building, see interior section.

Lighting
At the south entry ramp, light fixtures with plastic shades covering concealed lamps are in fair condition with some broken or missing plastic shades.

Light fixtures at the south entry landing are surface-mounted painted metal shades. The fixtures are in poor condition with corroded metal, worn paint, and deformed metal shades.

There are recessed down lights installed at the south entry soffit with round metal trim and glass lenses. These fixtures are in good to fair condition with some damage to the metal finish and some corrosion.

Recessed wall lights are installed outside of the stage fire exit and loading dock with painted metal louvers concealing a lamp. These fixtures are in fair condition with non-original fasteners replacing originals and worn and missing paint finishes.

Recessed down lights with round bronze trim and glass lenses are located in the soffit near the loading dock and at the north entry soffit. They are in fair condition with corroded bronze.

Roofing
At roof terraces, the built-up roofing material is painted red and is in fair to poor condition. The horizontal surfaces are worn with some areas completely missing. Vertical flashings have failed due to severe delamination.

Non-accessible flat roofs are hot fluid applied with stem ballast with modified bituminous roofing material at flashings. The flat roofs are at the end of their serviceable life.

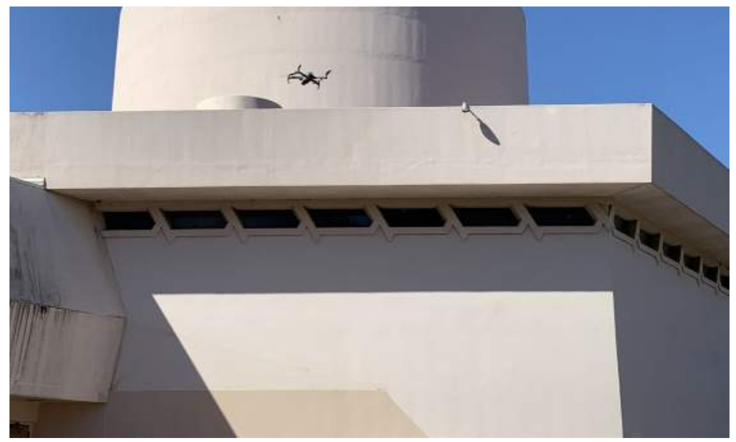
There are two acrylic skylights into spaces below, one of which has a cracked acrylic outer lens.


Existing conditions of flat roofs and roof terraces


Typical existing conditions of coated concrete facades, soffits, clerestory windows, and exterior doors are visible on the northwest facade.

EXTERIOR EXISTING CONDITIONS

Delaminated coatings and deteriorated concrete is typical at overhang edges. Exterior lighting and mechanical vents in soffits in fair condition.



Several different exterior finish colors are present on the Kalita.

Exterior hollow metal doors are in fair condition with failed paint.

Built up roofing on terraces in fair to poor condition.

Concrete at the education wing addition is heavily soiled and cracked.

Bronze lettering on the building sign is in good condition, though is causing some soiling to the surrounding concrete.

Steel frame windows at the added basement offices are in good to fair condition.

Flat roofing is at the end of its serviceable life.

EXISTING CONDITIONS: KALITA HUMPHREYS THEATER

Exterior: South Entry

Pavers and Steps
The south entry has red concrete at the walkway and non-colored concrete at the steps and landing. The pavers at this entry are in poor condition with cracked steps, corroded reinforcing at stair nosings, and previous cementitious patches that are spalling. The red pavers are in fair condition as they have become worn and faded with minor cracks.

Handrails
Handrails at the south entry stair are painted steel. They are in poor condition with deformed and bent rail sections, heavy corrosion, and chipped and missing paint.

Handrails at the south entry ramp are painted steel in fair condition with some corrosion and chipped paint.

Fountain
The fountain is comprised of painted steel elements with a concrete pedestal and pool. It is in poor condition with severely corroded steel, missing paint, and discolored finishes of the concrete. The fountain also causes damage to the storefront framing and glass due to chlorine spray.

Air Well Grates
Painted metal grating at air wells are in fair to poor condition with missing paint and corroded steel.

Exterior: North Entry

Pavers and Steps
The pavers at the north entry are red concrete in fair condition with a worn red finish and minor cracking.

Retaining walls
The painted concrete retaining walls and planters are in fair condition with worn and missing paint, chipped and spalling concrete at top edges and corners, as well as several other cracks. There is an area of previous concrete repairs with a non-matching finish texture.

Handrails
The north entry handrails are painted aluminum handrails in fair to poor condition. There are loose elements and elements that bend with load.

Fountain
The fountain is a painted steel bowl set on a painted concrete pedestal and pool with metal grating. The fountain is in poor condition with severely corroded steel and missing paint at the bowl as well as staining on the concrete. There are missing coverplates

North entry existing condition

South entry existing condition

EXTERIOR EXISTING CONDITIONS


Exterior red-stained concrete pavers are soiled, cracked, and previously repaired.


Concrete retaining walls are in fair condition with failing paint and areas of delaminiated concrete.

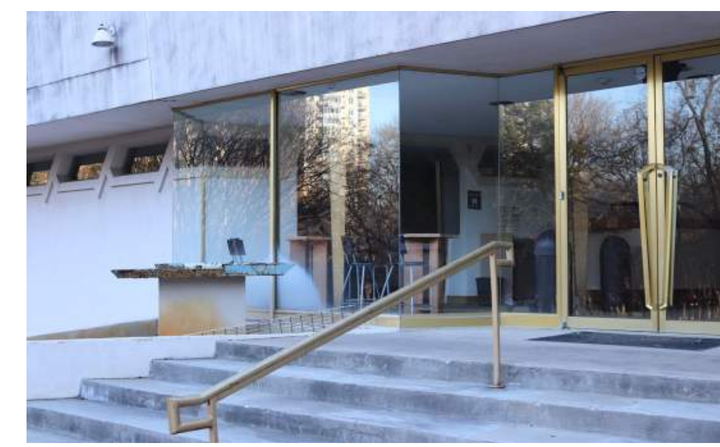

The non-original handrails are unstable.


Generally the fountains are in fair to poor condition.


Exterior red-stained concrete steps are in poor condition.


Generally exterior entry elements are soiled.


Retaining walls and planters are in fair condition.


The non-original south entry paving, handrails, and fountain are in fair to poor condition.

EXISTING CONDITIONS: KALITA HUMPHREYS THEATER

The following narrative describes the existing condition of building materials and elements present within the Kalita Humphreys Theater. All condition assessment notes were derived from visual observations cross checked with available construction documentation. Materials and finishes of all building elements should be inventoried and investigated using material testing to inform thorough restoration recommendations.

Ground Floor

Historic Lobby & Ticket Booth

Description
The current lobby space is the result of major modifications made to the building between 1965 and 1990. It is a large space that is divided down the middle by an original exterior wall into two distinguishable spaces sharing a use. The historic lobby footprint encompasses only the half of the lobby from the entry into the auditorium to the original exterior concrete wall. The ticket booth is adjacent to the north entry.

Walls
The walls in the lobby are textured plaster applied to the structural concrete. The concrete walls and plaster finishes are in good condition with few areas of chipped paint.

Flooring
The lobby floor is concrete covered with brown carpet that extends up the wall to form a wall base. The carpet is in fair condition with general signs of traffic wear and areas of staining.

Ceiling
The ceiling is a rough textured acoustic plaster. It is believed that the existing finish has been applied directly over the original painted textured plaster that is still visible around columns. The ceiling is in good condition with some areas of discoloration. The ceiling in the ticket booth is painted plaster. It is not textured to match the adjacent lobby ceiling. It is in good to fair condition.

Columns
Columns are painted concrete cast with decorative detailing. Columns are in good condition with some chipped paint.

Millwork
At the outside walls of the historic lobby, enclosures concealing mechanical vents have a resinous wood edging at the top of the half-height wall and a wood shelf recessed below the edge. Bronze painted aluminum grilles are fixed into the shelf. There is also a resinous finished wood counter at the ticket windows. The bar and merchandise counters and woodwork are in poor condition with scratched and worn finishes and loose elements. The mechanical enclosures are in fair condition with scratches and worn finishes. The wood panel near the theater entry door is slightly displaced. The mechanical grilles are in fair condition with worn and missing paint finishes. The built in wood counters and shelves in the ticket booth are in fair condition with some scratches and typical worn finishes.

Windows
There are painted, textured concrete framed single-pane windows along the west exterior wall. The plaster finish acts as the interior glazing stop. The windows are in good condition with few signs of wear.

Doors
There are resinous finished flush wood doors with bronze hardware opening from the lobby to the theater as well as the ticket booth. The wood doors are in good to fair condition with worn bronze finishes and tape residue and scratches on the wood.

Lighting
Recessed down lights have a lens flush with the ceiling surface and a gold anodized aluminum ring of trim. There are small, aluminum trimmed down lights with no lenses at the bar. There are stair lights built into the risers with aluminum light grilles diffusing light down. Surface mounted, painted metal spot lights are installed around the curved wall. Exit signs are painted black plastic. All lighting is in good to fair condition with minor scratches. The recessed lights have discolored bronze trim. The stair lights have missing fasteners. Exit signs are in good condition.

Stairs
The concrete stair to the basement is finished with carpeted risers and treads and has a metal handrail, further investigation is required to determine the specific metal material as the current condition does not match what is indicated in the 1989 drawings. The carpet is in fair condition and handrail is in good condition.

Overall view of the historic lobby space looking south.

Overall view of the historic lobby looking northwest.

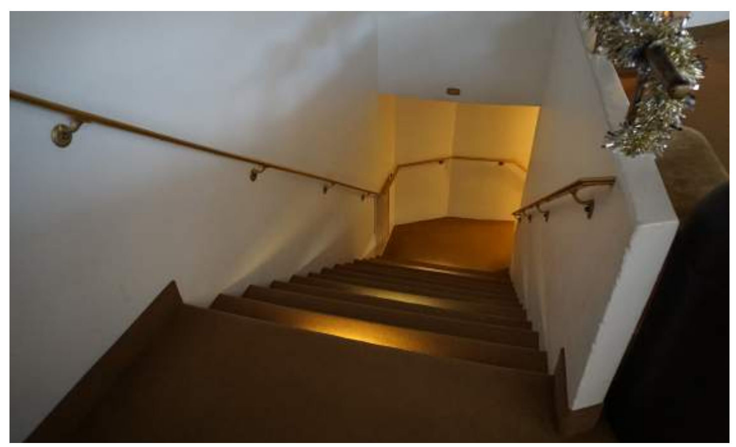

Textured plaster ceilings with smooth circles around columns.


Half-height walls to conceal mechanical ducts at perimeter.


Three original columns delineating the original location of the exterior glass doors.


Ticket counter within historic lobby.


Cast concrete windows with single pane glass, typical of the building.


Rebuilt stairs in original location provide access to the basement level.


Circular flush-mount lense lighting typical of the building seen at right. MEP and life safety devices are randomly placed across lobby ceiling.


Overall view of ticket

Lobby Addition

Description
The original lobby was reconfigured in 1989 with the enclosure of the space directly south of it. This addition included a refreshment bar, a gift shop counter, and altered points of entry. The three original entry doors were removed, and the east wall of the lobby was moved farther east to enclose the south end of the terrace. A new vestibule was added outside of the box office window, two double doors were added to the east wall of the new lobby enclosure, and a new entry stair and terrace were added at the west end of the new addition with two double doors in the west wall of the new lobby enclosure. The updated configuration doubled the amount of space available in the lobby. The exterior wall from the original 1959 construction runs through the middle of the enlarged lobby space with an opening made in the south west corner. The original 3 columns remain at the east boundary of the original construction.

Walls
The walls in the lobby are sand filled paint on plaster applied to the structural concrete. Concrete walls concentrated in the original northern portion of the lobby date from the original 1959 construction and largely retain their material integrity. A portion of the original exterior concrete wall was removed to create an opening into the enlarged lobby. A non-original arched opening has been made in the curved north wall to allow access to the added stair leading to the lower level. The concrete walls of the southern stair mass date from 1983 and are non-original. The concrete walls and plaster finishes are in good condition with few areas of chipped paint.

Flooring
The lobby floor is concrete covered with brown carpet that continues up the wall to create a wall base. Behind the bar, the floor is red vinyl composite tile. The carpet is in good condition with few areas of staining. The vinyl floor is in poor condition with chipped and scratched tiles and open joints.

Ceiling
The ceiling is a rough textured acoustic plaster. It is believed that the existing finish has been applied directly over the original painted textured plaster that is still visible around columns. The ceiling is in good condition with some areas of discoloration.

Columns
Columns are painted concrete cast with decorative detailing. Columns are in good condition with some chipped paint.

Millwork
Various millwork elements are located throughout the lobby. The bar and merchandise areas both have plastic laminate countertops with resinous finished wood cabinets. The bar and merchandise counters and woodwork are in poor condition with scratched and worn finishes and loose elements.

Storefront Glazing & Doors
The floor to ceiling storefront glazing is gold anodized aluminum framed with gold anodized aluminum doors, door pulls, and stops. The glazing system is in fair condition with minor finish scratches and some areas of missing finish at pivots and door pulls. There is slight displacement at the base frame. The condition is more deteriorated with significant staining adjacent to the west fountain due to the chlorinated water splashing on the glazing and frame.

Doors
There is a resinous finished flush wood door with bronze hardware opening from the lobby to the stair tower. In the hallway leading to the restroom and ticket booth, there are flush painted metal doors with painted metal frames and bronze hardware. Original construction drawings did not indicate The wood door is in fair condition with worn metal knobs and a residue on the wood. The metal doors are in fair condition with scratched paint and worn hardware finishes.

Lighting
Recessed down lights have a lens flush with the ceiling surface and a built in ring. There are small, aluminum trimmed down lights with no lenses at the bar. Additional down lights with painted trim and no lenses are installed at the merchandize counter. Exit signs are black plastic.
All lighting is in good condition with minor scratches. Exit signs are in good condition.

Overall view of the added lobby space looking north.

Overall view of the added lobby looking southeast

INTERIOR EXISTING CONDITIONS

Non-original vestibule with what are believed to be original exterior doors.

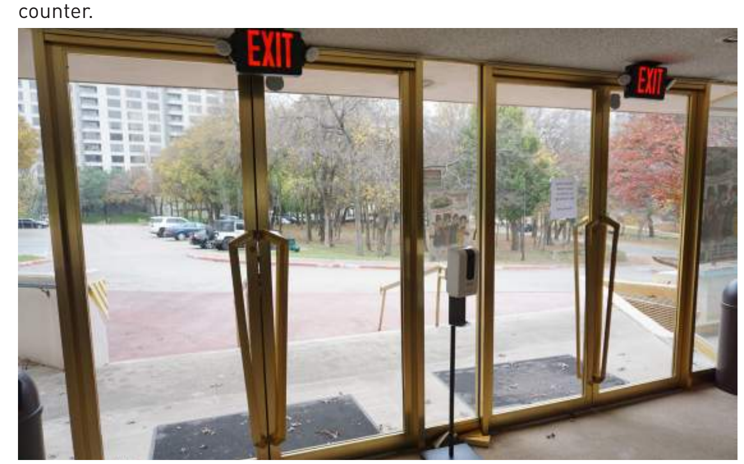

Non-original refreshment bar and opening in original concrete wall.


Laminate finishes on refreshment bar and red vinyl tile floor behind the counter.


Original donors list fixed to wall inside of vestibule.


Added columns to support the education wing above.

Non-original counter.



New glass doors at south entry are replicated from the original doors.


Detail of non-original glass storefront meeting ceiling and columns.

Auditorium

Description
The auditorium is entered at the northwest corner of the lobby with the high end of the seating rake at the west edge of the space. The space is defined by the geometry of the circular stage, with the seating radiating out from that point and the ceiling reflecting the radiation of the seating. The rake slopes down to the circular projecting stage at the east side of the space. Two slightly raised triangular sections of seating at the north and south sides of the auditorium cover two original vomitory staircases, one of which has been completely enclosed. A small balcony huge the west end of the space, accessed by a narrow staircase at both the north and south ends. The only windows in the space run along the west exterior wall and have painted plywood shade panels that can be opened and closed. The ceiling over the auditorium has openings to accommodate theater lighting, and each circular section is canted for acoustics. The revolving stage is situated under a cantilevered fly loft with a concrete semi-circular wall at the background of the stage structurally supporting the loft.

Flooring
The existing red carpet is in fair to poor condition with frayed seams, significant soiling and heavy wear at stairs.

Seating
The existing automatic-lift seats have painted metal frames, resinous finished wood arm rests, and red velvet seats and backs. Each seat also has a bronze plate seat numbers and some have an acknowledgement plaque. The seats are in good to fair condition. There is minor wear on the wood arm rests and the bronze plates are scratched. The painted metal frames and seat upholstery are in generally good condition. Some of the auto-lift seats do not operate.

Walls & Ceiling Beneath Balcony
The walls and ceiling are a painted textured plaster with three different textures visible, indicating areas of repair. Original walls have a large partial sweep, added walls at original planter locations have a heavier sand finish, and walls at the stairs to the balcony have a lighter sand finish. Around window openings, there are areas of delaminated or missing plaster. There are localized areas of chipped and separated paint finish. There are also areas of touched up paint with a different gloss level.

Main Theater Ceiling
The semi-circular ceiling over the theater seating is a painted, textured acoustical plaster added over the original finish. There is a painted metal edge of lighting coffers

Wood Trim & Millwork
The resinous finished plywood enclosure concealing ductwork along the west exterior wall has minor scratches, water stains, and worn finishes. There is a resinous finished wood veneer partial height wall behind the last row of seating and around the control booth that is in poor condition with scratched and worn finishes and areas of varying veneer failure such as delaminating, chipped or altogether missing veneer. The resinous wood railing around both raised seating areas at the left and right of the stage are in fair condition with select areas of chipped and scratched wood.

Window Shutters
The wood window shutters have a painted triangle accent and are attached to the windows with bronze piano hinges and have bronze triangle catches and bronze rod with painted wood block shutter hold-opens. All elements of the shutter system are in good to fair condition. There are few scratches on the wood finish, many sagged hinge connections, and several bronze elements have tarnished finishes. There are select areas of damaged or missing veneer.

Mechanical Louvers
Various mechanical louvers throughout the space are in fair condition. Painted louvers with operable blades at the far west wall have chipped and worn paint and some deformed blades. Painted metal grilles in the floor in front of the stage have chipped and worn paint and missing fasteners. The painted metal grilles in walls have chipped and missing paint.

Lighting
Recessed down lights with glass lenses below the balcony have 2 different designs: one is a larger fixture with the lens flush with the ceiling surface and has a built in ring, the other is a smaller diameter with a lens recessed above the ceiling surface and painted metal trim. The two types of fixtures are both in good condition. There are step lights installed along wall to the balcony that have painted metal trim and acrylic lenses. Similar recessed wall lights have louvers over the acrylic lens that diffuses the light downward. On the balcony level, there are recessed down lights that have no lens covers, and the steps have a strip light under the stair nosings.

Handrails
The aluminum handrails at the balcony steps with a painted steel bar and wall brackets are in good condition with minor scratches on aluminum finishes.

Doors
At side platforms, resinous finished flush wood doors are hung on painted hollow metal frames with bronze hold opens and bronze push plates with thumb turns. The doors and hardware are in good condition with few scratches in the resinous finish and areas of worn bronze finishes. Doors into the theater and lounge are resinous finish flush wood doors with bronze push plates, bronze hold opens, and bronze frames and concealed closers are in good to fair condition with scratched resinous finishes and worn bronze finishes.

Exit Signs
Black plastic exist signs with integral lights are in good condition.

*Refer to the Technical Narrative Audio-Visual section for sound and theatrical lighting conditions.

Overall view looking south.

INTERIOR EXISTING CONDITIONS


View looking southwest beneath overhead balcony.


Detail of existing ceiling.


Existing seating, carpet, and floor rake. View looking west.

Original vomitory stairs covered for additional seating above.


Existing balcony.


Existing condition of the stage.


Stairs up to balcony are angled to align with the design grid.

Committee Room

Description
The committee room is situated to the north of the auditorium and is accessed through a set of flush wood panel double doors. The space has windows typical of the building at two exterior walls, and the windows have shade panels that match those in the auditorium. Wood built-in shelving lines the walls beneath the windows, and a bar at the east end of the space is finished in wood to match. A circular opening in the south wall would have originally been glass to view into the auditorium, and additional wood shelving originally spanned across the length of the wall above the seating.

Walls
The walls are painted textured plaster finished with a large swirl pattern. The walls are in good condition with varied texture.

Floor
The concrete floor is covered with brown carpet that is in fair condition with areas of soiling. The floor behind the bar is a red painted concrete in fair condition with very worn paint.

Ceiling
The ceiling is painted textured acoustic plaster. The ceiling is in good condition.

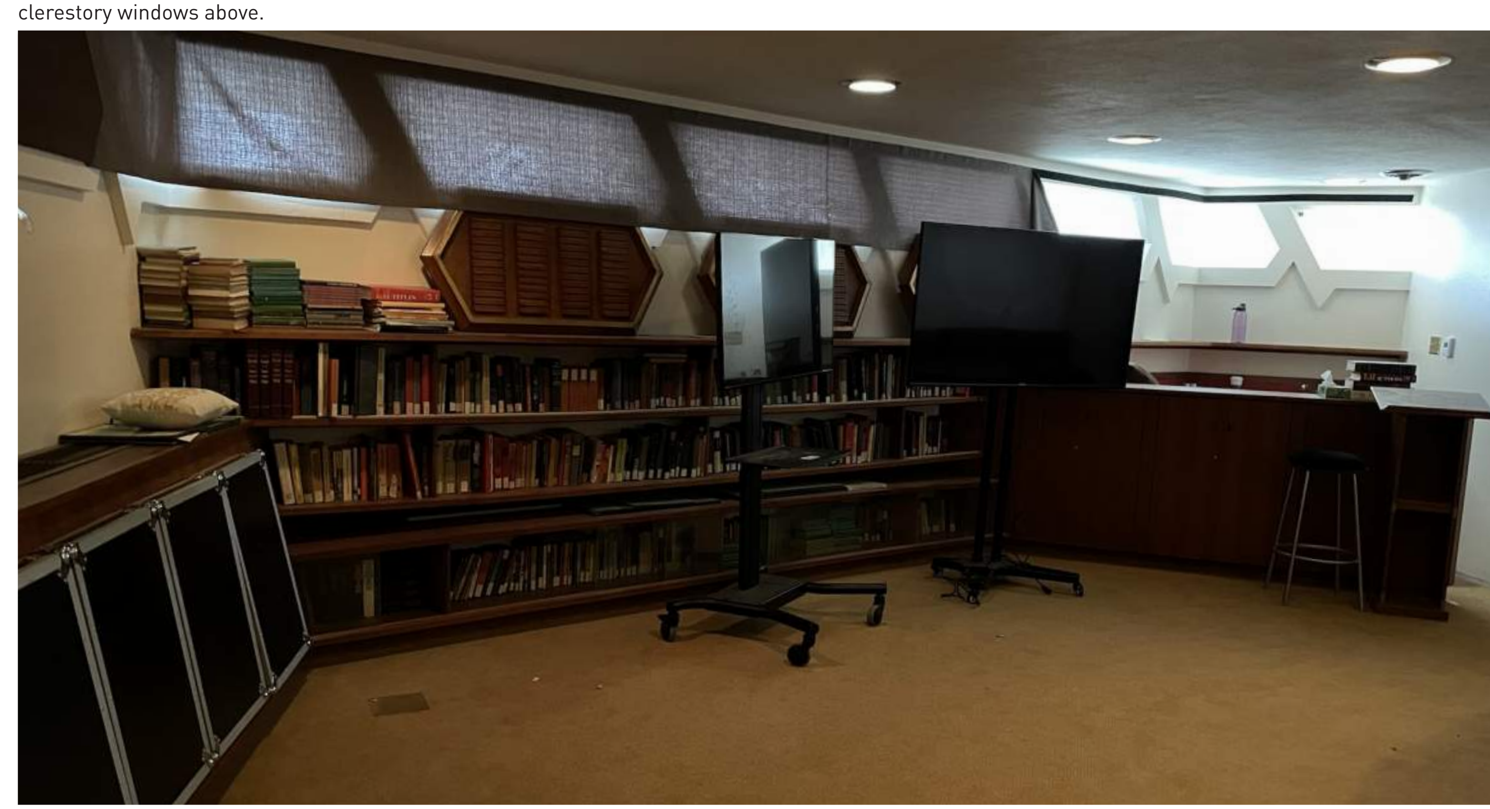
Millwork
There are resinous finished wood shelves lining the north wall, mechanical vent enclosure lining the west wall with bronze plated aluminum grilles, and built-in banquette seating lining the south wall. There is a resinous finished wood bar with laminate countertop. The wood bar cabinets have bronze door pulls and hinges. There are painted plywood shutters with the same detailing and hardware as those in the theater installed over the west windows. Most of the millwork throughout the space is in good condition. The bar is in fair condition with some chipped veneer, scratches and splattered paint on the varying surfaces. The bronze plated aluminum grilles are worn. The wood shutters are in fair condition with some veneer delaminating.

Lighting
Recessed down lights in have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

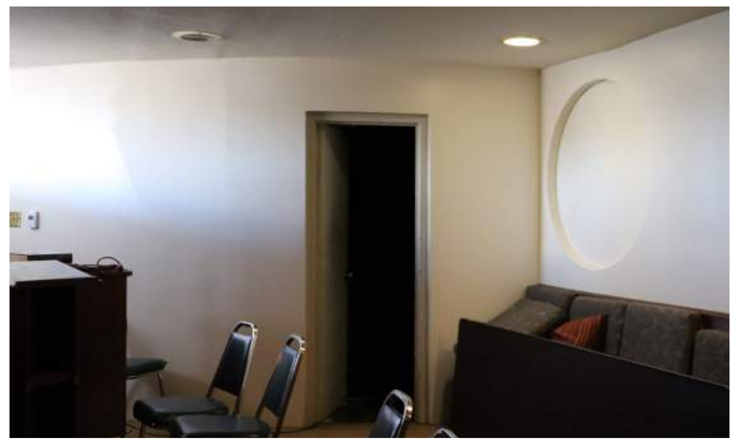
Doors
A resinous finished flush wood door with bronze push plates and frame, a concealed closer, and painted metal grilles leads to the theater. A painted flush hollow metal door and frame with a non-original metal knob leads to the stage. The wood door and its hardware are in fair condition with few scratches and worn finishes. The hollow metal door is in fair condition with chipped and worn paint.

Windows
Cast in place concrete framed windows typical of the building line the exterior walls. The windows are in good condition. There is one area of plaster finish at a window head that has been refinished with plaster that does not match the original.


West wall of committee room lined with mechanical enclosure with typical clerestory windows above.


View of bar located in east corner of the space.

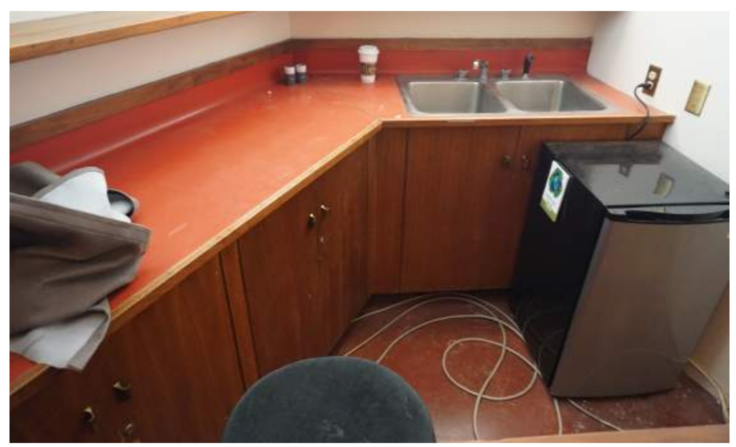

Reconstructed banquette along south wall.


Infilled circular opening.


Original hardware on wood cabinets below bar.


Original switch and outlet covers present throughout room.


Original bookshelves along north wall.


Original wet bar with red stained concrete floor.


Original light fixtures typical of the building.


Plywood panels over four windows, fabric curtain over others.

Backstage Corridor

Description
The backstage corridor at the ground level is accessible from the small hallway off of the lobby as well as from doors at either side of the stage. Material finishes, lighting, and doors are typical of other spaces in the building.

Walls
The walls are plaster painted with sand-filled paint. The walls are in good to fair condition with few marks.

Floor
The floor is red vinyl composite tile with vinyl wall base. The floor is in poor condition with several cracked or missing tiles. The wall base is in fair condition.

Ceiling
The ceiling is plaster painted with sand-filled paint. The ceiling is in good condition.

Lighting
Recessed down lights have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

Doors
Doors off of the corridor are resinous finished flush wood doors with bronze knobs and hardware hung on painted hollow metal frames. The doors are in good to fair condition with worn hardware, few scratches, and tape residue. There are several pieces of hardware missing. The door frames are in fair condition with chipped paint.

Back of House Stairs

Walls
The walls are plaster painted with sand-filled paint. The walls are in fair to poor condition with water damaged and missing areas.

Stair Assembly
The stair has painted steel plate treads, painted steel risers, and painted steel railing. The stair is in good condition, and the paint finishes are in fair condition with areas of worn and missing paint.

Dressing Rooms

Description
There are two dressing rooms accessible from the backstage corridor at the ground level. and four at the mezzanine level. Dressing rooms throughout the building typically have a built-in counter and mirrors with shelving above, as well as a sink in each room. Material finishes, lighting, and doors are typical of other spaces in the building.

Walls
The walls are plaster painted with sand-filled paint. The walls are in good to fair condition with few marks.

Floor
The floor is red vinyl composite tile with vinyl wall base. The floor is in poor condition with several cracked or missing tiles. The wall base is in fair condition.

Ceiling
The ceiling is plaster painted with sand-filled paint. The ceiling is in good condition.

Millwork
There are original resinous finished wood built-in shelves and counters in most of the dressing rooms. The built-ins are in fair condition with worn finishes. Two of the dressing rooms do not have original built-ins and instead have new shelves. The built-ins are in good to fair condition with few scratches.

Sinks
There is one porcelain sink with chrome faucets in each dressing room. The sinks are in good condition.

Lighting
Recessed down lights have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

Doors
See description in Backstage Corridor Section.

Green Room

Description
The green room is centered along the ground floor backstage corridor. It has built-in seating at the perimeter of the space. Later incorporated built-in shelving along one wall of the space is finished in wood veneer to match the typical wood finished found within the building.

Walls
The walls are plaster painted with sand-filled paint. One wall has resinous finished walnut veneer modified to create an access panel. The walls are in good to fair condition with few marks. The walnut is in fair condition with areas of worn finish.

Floor
The floor is red vinyl composite tile with vinyl wall base. The floor is in fair condition with some cracked tiles. The wall base is in fair condition.

Ceiling
The ceiling is plaster painted with sand-filled paint in good condition.

Millwork
There is a resinous finished wood built-in seating feature with vinyl upholstered cushions lining two walls. The built-ins are in fair condition with areas of worn resinous finishes.

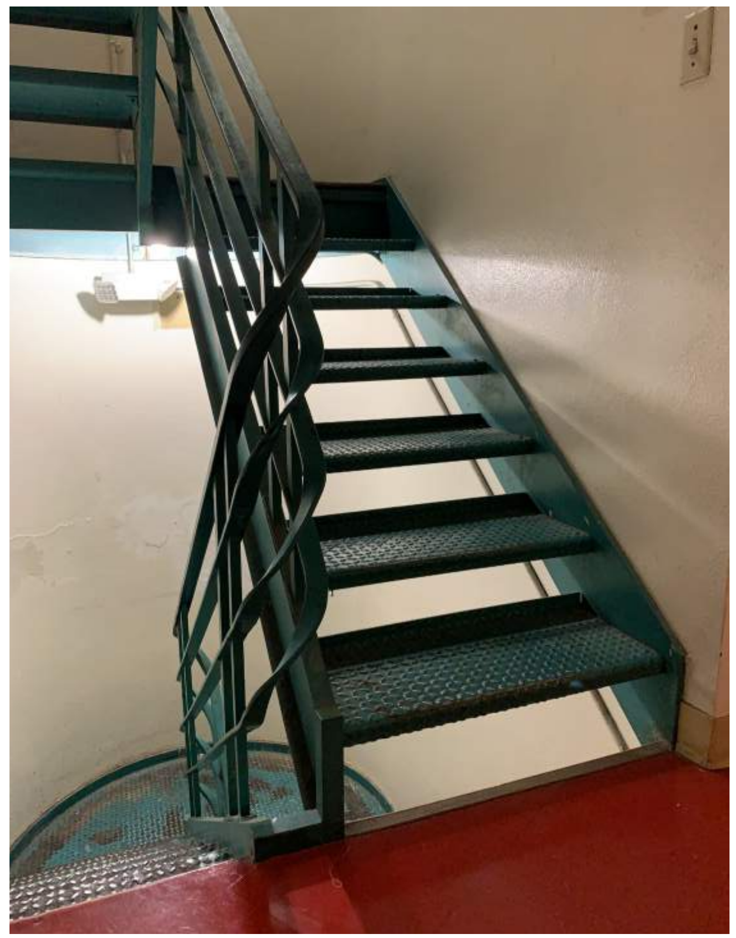
Lighting
Recessed down lights have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

Doors
See description in Backstage Corridor Section.


View of ground floor backstage corridor

INTERIOR EXISTING CONDITIONS


View of ground floor backstage corridor


Original steel stair at back of house spaces.


Typical condition of back of house dressing rooms


Overall view of green room seating.


Condition of dressing rooms with non-original built ins.


View of wood veneer wall

EXISTING CONDITIONS: KALITA HUMPHREYS THEATER

Addition: Mezzanine Corridor

Walls
The previously exterior walls are painted and in good condition. Walls added as part of the addition are painted drywall in pair condition. There are several cracks and previous repairs.

Flooring
The concrete floor is covered with carpet in good condition.

Ceiling
The ceiling is painted gypsum in fair condition with some cracks.

Doors
There is an original door from the balcony. It is a painted flush bronze door with painted bronze hardware. The doors are in good condition with minor scratches in the paint finish.

Millwork
There is a resinous finishes veneer wood wet bar with lower and upper cabinets and a laminate counter. It is in fair to poor condition with missing and worn veneer and separating laminate pieces.

Lighting
Lighting in the space is typical of the building, recessed down lights with metal rings and glass lenses. The lights are in fair condition with some fixture elements missing or loose.

Addition: Black Box Room

Walls
The walls are painted plaster and are in poor condition with holes and water damages at the exterior wall.

Flooring
The resinous finished wood floor is in fair to poor condition with scratches and heavily worn areas.

Ceiling
The ceiling is painted panel roof deck in good condition.

Lights
Light fixtures in the black box room have painted metal shades with exposed lamps, and they are in good condition. There are additional strip fluorescent lights.

Doors
The doors are flush wood with bronze hardware. They are in poor condition with many scratches in the wood.

Addition: Classroom

Walls
The walls are painted plaster in fair condition with several holes and scratches. The original exterior walls are painted, and the original call back speaker is still installed in the exterior wall.

Flooring
The floor is a resinous finished wood floor in poor condition that is very worn and scratched. The dance mat is in fair condition with some tears at the seams.

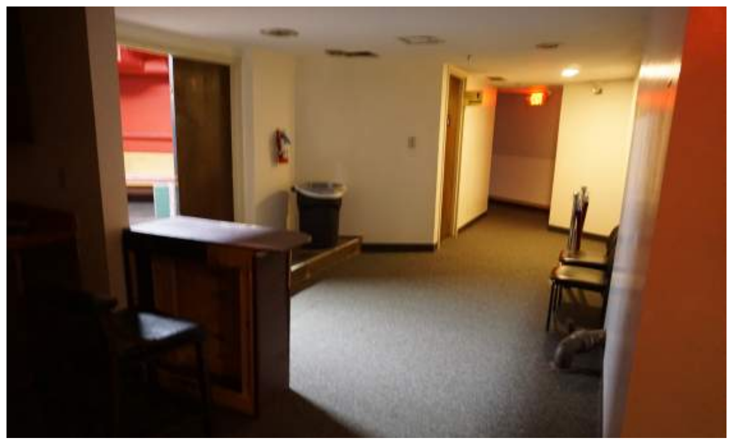
Ceiling
The ceiling is painted plaster in fair condition. There is painted exposed ductwork at the ceiling plane.

Lights
Lights in the space are painted metal with exposed lamps and are in good condition. There is also a strip of florescent lights.

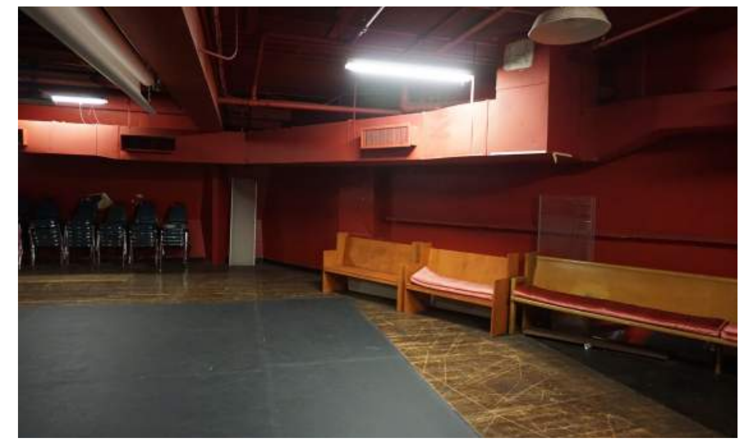
Doors
Doors are painted and resinous finished wood doors with bronze hardware. They are in fair condition with several scratches and worn finishes.


Overall view of black box room.

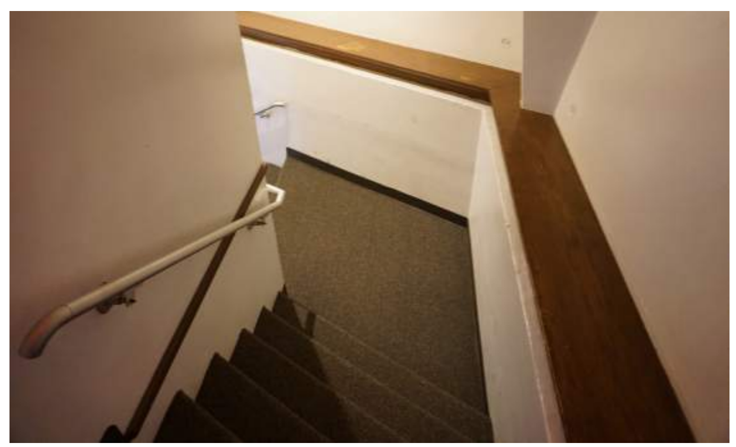

Overall view of classroom.


Addition corridor.


Corridor at outer edge of education wing.


Addition classroom.


View of built-ins in corridor.


Stair at outer edge of education wing.


Black box room.


Corridor looking toward auditorium balcony.

Workroom

Description
The workroom currently houses laundry machines and sinks. It is located at the north side end of the open dressing room space.

Walls
The walls are plaster painted with sand-filled paint. The walls are in good to fair condition with some scratching and wear.

Flooring
The sealed concrete floor is in good condition.

Ceiling
The ceiling is plaster painted with sand-filled paint. The ceiling is in fair condition with areas of non-matching plaster repairs.

Windows
The windows are the elongated concrete-framed windows typical of the building and are in fair condition. The concrete is painted with sand-filled paint, and the glazing is single pane fixed glass. Some areas of plaster and paint around windows is peeling and delaminating.

Closet
The original sand-filled plaster wall finish is visible within the workroom closet. The closet has a painted wood door in fair to poor condition.

Open Dressing Room

Description
The open dressing room currently has half-height movable partitions and one recently added enclosed room at the north corner of the space.

Walls
The walls are plaster painted with sand-filled paint and are in good condition. There are also non-original full and partial height painted gypsum walls in fair condition with areas of soiled and worn paint.

Flooring
The sealed concrete floor is in fair condition with some chipped finishes. There is a large section of carpet installed over the concrete, and the carpet is in good condition.

Ceiling
The plaster ceiling is painted with sand-filled plaster. It is in good to fair condition with areas of non-matching patches.

Windows
Windows along the exterior walls are typical of the building and are in good condition.

Storage Rooms

Description
There are two storage rooms situated within the curved volumes above the ramps at each end of the floor. The storage space situated within the south curved volume was at one point used as the library where DTC's collection of literature was housed. There is also a storage area that doubles as a corridor accessing the Education Wing.

Flooring
The sealed concrete floor is in good to fair condition with some chipped finishes and paint splatter.

Walls
The walls in the corridor are concrete finished with plaster painted with sand-filled paint and are in good to fair condition. The walls in the storage rooms are painted concrete.

Ceiling
The corridor ceiling is sand-filled painted plaster and is in good to fair condition. There is a non-matching plaster patch. The storage room ceilings are exposed and painted underside of the roof deck panels. There is one skylight in each room.

Millwork
There are painted wood shelves in good to fair condition.

Lighting
Lights in the corridor are porcelain socket bare bulbs in fair condition. Lights in the storage spaces are strip fluorescent lights in good condition.

Windows
Windows along the exterior walls are typical of the building and are in good to fair condition. The glass has been painted at the wall shared with the addition.

Doors
The doors are painted flush bronze hollow metal with bronze hardware and a painted hollow metal frame. The doors are in fair condition with scratched and chipped finishes and some overpaint.


Overall view of south storage room.


View of open dressing room at the plenum level.

INTERIOR EXISTING CONDITIONS


Plenum storage space.

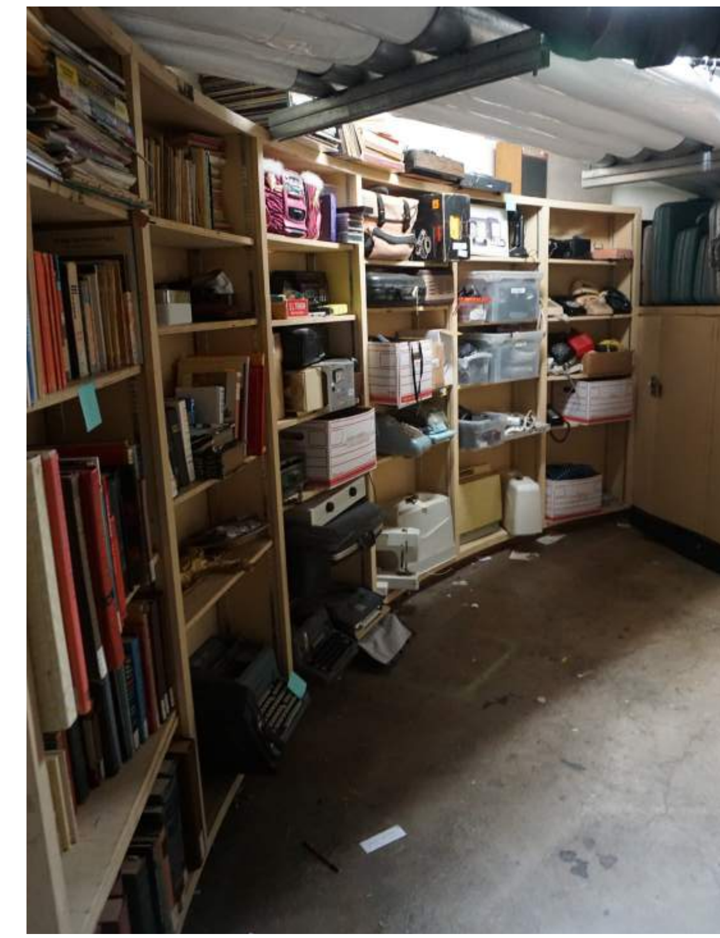

View of plenum level work room.


View of open dressing room.


Plenum storage space.


View of plenum level work room.


View of open dressing room.


View of storage space previously used as the DTC library.

Basement Shop & Mechanical Room

Description
The basement is generally an open space used as a shop to fabricate props, backdrops, and other production materials. The mechanical room is an enclosed space at the south of the shop space.

Floor, Walls, Ceiling
The floor, walls, and ceiling in the basement are all exposed concrete in good condition. There is an area of acoustic tile below the stage revolve that is in fair condition with some tiles missing.

Doors
Doors are painted hollow metal doors with bronze hardware and are in fair condition.

Tool Room

Floor
The carpet in the tool room is in poor condition with many stains and heavy wear.

Walls
The walls are plaster painted with sand filled textured paint and are in good condition.

Ceiling
The ceiling is plaster painted with sand filled textured paint and is in good condition.

Lighting
The light fixtures are typical of the building and are in poor condition with missing trim and lens covers.

Paul Baker's Office

Description
Paul Baker's office is tucked on the basement level, accessible by stairs leading up into the basement and out to the exterior. Before the additional basement offices were added, Baker's office would have been directly accessible from the exterior. It has a small adjoining space that was previously a bathroom but was converted early on to house his personal secretary's desk. This alteration also involved creating an opening in the wall such that visitors could speak to the secretary without entering the office.

Floor
The carpet is in fair to poor condition with stains and heavy wear.

Walls
The walls are sand filled textured paint in good condition.

Ceiling
The ceiling is sand filled textured paint in good condition.

Doors
The door is a resinous finished flush wood panel door with a painted hollow metal frame, aluminum knob, and bronze hinges. The door is in good condition with some residue and scratches.

Windows
There are fixed obscured glass window with painted metal frames at the previously exterior original wall. One window has had the glass divided into two pieces with a lead came.

Millwork
There is a resinous finished wood counter with cabinets and shelves built in. The millwork is in good to fair condition with some scratches and worn finishes.

Lighting
The basement is lit by suspended fluorescent strip lights that are in good condition.

Basement Corridor

Description
The basement corridor connects several administrative spaces located along the west edge of the basement, including Paul Baker's office, the non-original office addition, and the bathrooms.

Walls
The walls are painted textured plaster where original and a painted flat plaster where non-original.
The walls are in good condition with varied texture.

Floor
The concrete floor is covered with brown carpet that is in good condition.
Ceiling
The ceiling is painted plaster and is in good condition.

Millwork
There is a laminate counter for a pay phone booth. The counter is in fair condition with areas of chipped laminate.

Lighting
Recessed down lights have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

Doors
Doors off of the corridor are resinous finished flush wood doors with bronze knobs and hardware. The doors are in good to fair condition with worn hardware and few scratches.

Coat Room

Description
The coat room is a non-original space added in 1989. It is a small room with a counter and opening covered by a curtain.

Walls
The walls are painted with sand-filled paint. The walls are in good to fair condition.

Floor
The concrete floor is covered with brown carpet. The carpet is in poor condition with many tears and holes.

Ceiling
The ceiling is plaster painted with sand-filled paint. The ceiling is in poor condition with large areas of peeling.

Windows
There is an obscured glass window with a painted metal frame. The window is in good condition.

Lighting
Recessed down lights have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

Doors
The coat room door is a flush panel wood door with a painted hollow metal frame in fair condition with typical signs of wear.


Overall view of basement workshop.


Overall view of basement workshop.


Built-ins in Paul Baker's Office.


View of Paul Baker's Office.

Lobby Restroom

Description
The non-original lobby restroom was added to provide an accessible restroom. It is a single occupancy bathroom at the end of the hallway across from the entry to the ticket booth.

Walls
The walls are plaster on concrete with a sand-filled paint finish. They are in fair condition with varying finish textures, indicative of previous repairs.

Flooring
The bathroom floor is VCT in good condition. The wall base is also vinyl and is in poor condition with typical delaminated and deformed conditions.

Ceiling
The ceiling is painted plaster in good condition.

Plumbing Fixtures
There is a porcelain sink with a chrome faucet in good condition. The porcelain toilet and chrome flush valve are in good condition.

Bathroom Accessories
There is a stainless steel toilet paper dispenser, stainless steel grab bars, and a plaster paper towel dispenser. The accessories are in good condition, except one grab bar that is loosely attached to the wall. The mirror is missing reflectivity at the perimeter.

Education Wing Restrooms

Floor
The floor is a red epoxy in good condition.

Walls
The walls are painted gypsum in good condition.

Ceiling
The ceilings are painted gypsum in good condition.

Toilet Partitions
Toilet partitions are painted metal in good condition.

Plumbing Fixtures
Toilet and sinks are porcelain with chrome fittings and are in good condition.

Doors
The restroom doors are resinous finished flush wood doors with bronze hardware. They are in fair condition with very worn finishes.

Lights
The lights are recessed down lights with metal trim. They are in poor condition as they are all missing the glass lenses.

Back of House Restrooms

Ground Level

Walls
The walls are plaster painted with sand-filled paint. One wall has resinous finished walnut veneer modified to create an access panel. The walls are in fair to poor condition with water damaged areas.

Floor
The floor is red vinyl composite tile with vinyl wall base. The floor is in fair condition with some cracked and missing tiles. The wall base is in fair condition.

Ceiling
The ceiling is plaster painted with sand-filled paint and is in good condition.

Toilet Partitions
Toilet partitions in the restrooms are painted metal, including a painted metal shower enclosure. The partitions are in fair condition with areas of worn resinous finishes.

Lighting
Recessed down lights have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

Doors
See description in Backstage Corridor Section.

Back of House Restrooms
Mezzanine Level

Walls
The walls are plaster painted with sand-filled paint. The walls are in fair to poor condition with water damaged areas.

Floor
The floor is sealed concrete in good condition.

Ceiling
The ceiling is plaster painted with sand-filled paint. The ceiling is in good condition.

Toilet Partitions
Toilet partitions in the restrooms are painted metal, including a painted metal shower enclosure. The partitions are in good condition.

Lighting
Recessed down lights have a bronze trim and glass lens, typical of lighting throughout the building. Lights are in good condition.

Doors
The bathroom doors are resinous finished wood flush panel doors with bronze hardware. The doors are in good condition with few scratches and slight wear on the bronze hardware.

Basement Restrooms

Description
The basement restrooms are the main public restrooms servicing the theater. They are not original to the building, and were reconfigured to their current condition in 1989.

Walls
The walls are painted textured plaster and are in good condition.

Floor
The floor is red vinyl composite tile and wall base is vinyl. The floor is in fair condition. There are some cracked and scratched tiles and some loose wall base.

Ceiling
The painted plaster ceiling is in good condition.

Toilet Partitions
The painted metal toilet partitions are in good condition.

Plumbing Fixtures
There is a porcelain sink with chrome faucet and a porcelain toilet with chrome flush valve. Plumbing fixtures are in good condition, aside from some paint drips on chrome fittings.

Bathroom Accessories
There is a stainless steel toilet paper dispenser, stainless steel grab bars, and a plaster paper towel dispenser. The accessories are in good condition, except one grab bar that is loosely attached to the wall.

Lighting
Bathroom lighting matches the typical lighting of building in good condition.

Doors
The bathroom doors are resinous finished flush wood doors with bronze hardware. Doors are in fair to poor condition with many scratches and discolored and worn hardware.


View of basement restroom.

Diller Scofidio + Renfro
New York, NY

Fisher Dachs Associates
New York, NY

Threshold Acoustics LLC
Chicago, IL

Reed Hilderbrand LLC
Cambridge, MA

Harboe Architects
Chicago, IL

Silman Engineering
New York, NY

BOKAPowell
Dallas, TX

Syska Hennessy Group
Los Angeles, CA

Pacheco Koch
Dallas, TX

STRUCTURAL

STRUCTURAL: EXISTING THEATER

Introduction

The Kalita Humphreys Theater (Kalita Theater) is a landmark structure designed by Frank Lloyd Wright and built between 1955 and 1959. The theater will be preserved, restored, and renovated as part of Dallas Theater Center project, which will create a multi-stage art campus on the existing site including new expansion buildings. Information presented in this report pertains to the existing historic theater building, however this work is part of a larger site redevelopment master plan including existing and new construction.

The existing structure of the Kalita Theater is primarily concrete with some steel trusses and steel floor framing. The structure features multiple levels of cantilevered balconies and a large, central cantilevered drum over the theater stage. Silman worked closely with the design team throughout the Master Plan, both to review the existing conditions at the Kalita Theater and to perform analysis of proposed design options and modifications to existing structure.

This report presents the results of our investigation and analysis, and includes a description of the existing structural system, summary of observed structural conditions, and a description of the structural work associated with the proposed design modifications.

Investigation

In preparation for the master plan, Silman reviewed existing documentation and conducted an on-site investigation.

Existing documentation

Silman reviewed drawings, photographs, previous reports, specifications, correspondence, and promotional materials provided by the project team. Lanmar Services also scanned the building to create a Revit model in April and May of 2022. Existing documentation includes:

- Dallas Theater Center Construction Drawings, circa 1958, Avery Library Archives Frank Lloyd Wright Collection, including scans of drawings and progress sketches. High resolution scans of the architectural and structural drawings were also provided.
- Dallas Theater Center Study Images, various dates, Avery Library Archives Frank Lloyd Wright Collection including working architectural and detail sketches
- Dallas Theater Center Specifications, circa 1958
- Films of the original theater construction, courtesy SMU Archives
- Drawings for various modifications and additions after construction, produced by Taliesin Associated Architects, courtesy of DTC and local archives
- Photographs from the original construction and opening of the theater
- Dallas Theater Center Master Plan Report, 2010, prepared by Booziotis & Company Architects
- Kalita Humphreys Theater Facilities Assessment & Rehabilitation Recommendations, 2019, prepared by Architexas
- Various other notes, correspondence, photographs, slides, and promotional materials provided by DTC

The high-resolution original construction drawings were especially useful for understanding the existing building (**Image 1**).

Field Investigation

Silman visited the Kalita Theater several times during the master plan to review the building and meet with other members of the team. On February 9th - 11th 2022, there was a detailed review of the existing building by the structural team to observe existing conditions and the bulk of the field data was gathered during this visit. Silman walked through all accessible spaces in the building, including the public areas, house and stage, back-of-house spaces, mechanical rooms, and roofs. Silman viewed the large majority of spaces but did not access the upper fly loft, roof above the drum, or exterior walls where they were not visible from grade or upper balconies.

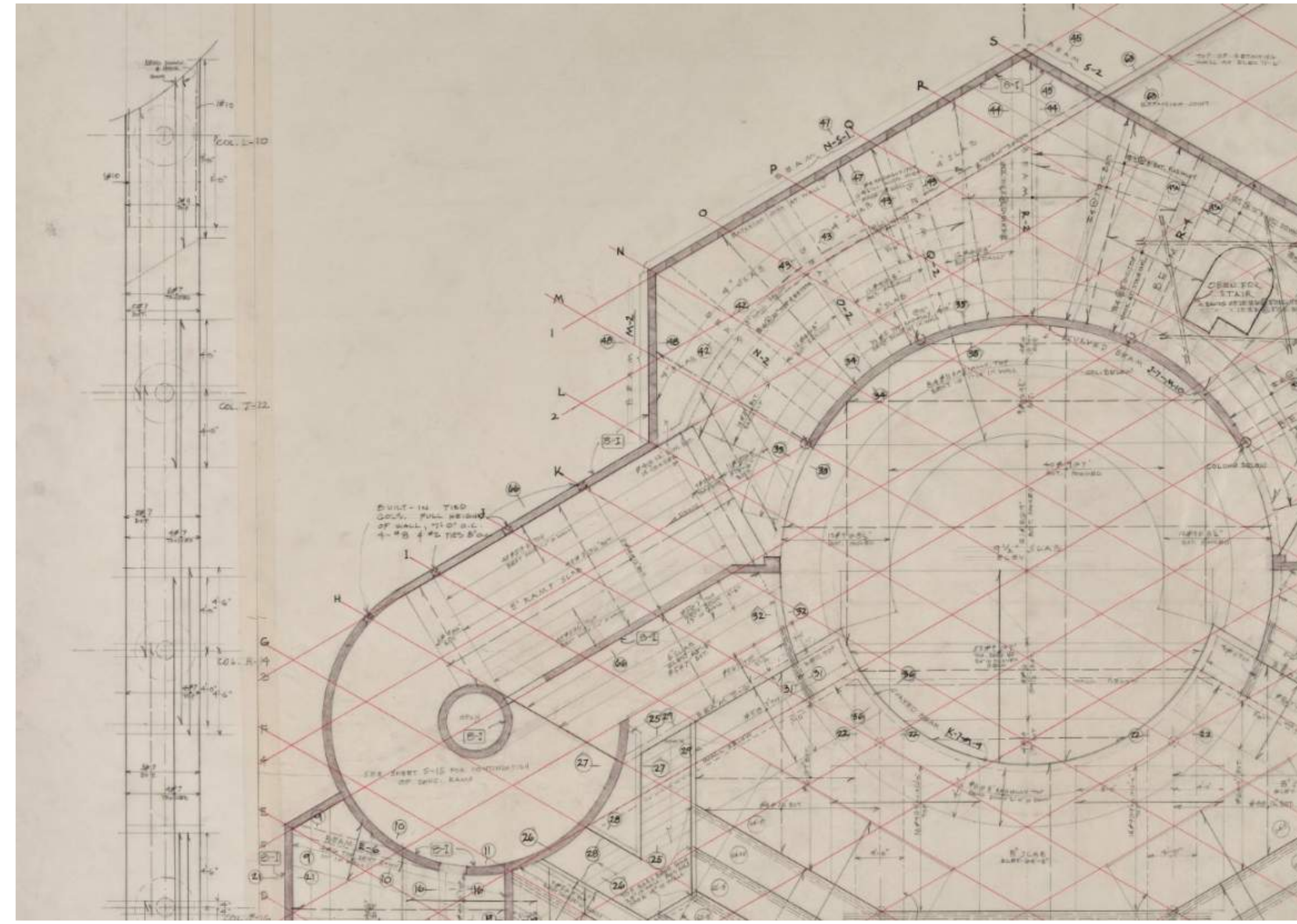


Image 1
S-16 Main Floor Structural Plan Excerpt, courtesy of Avery Library Archives.

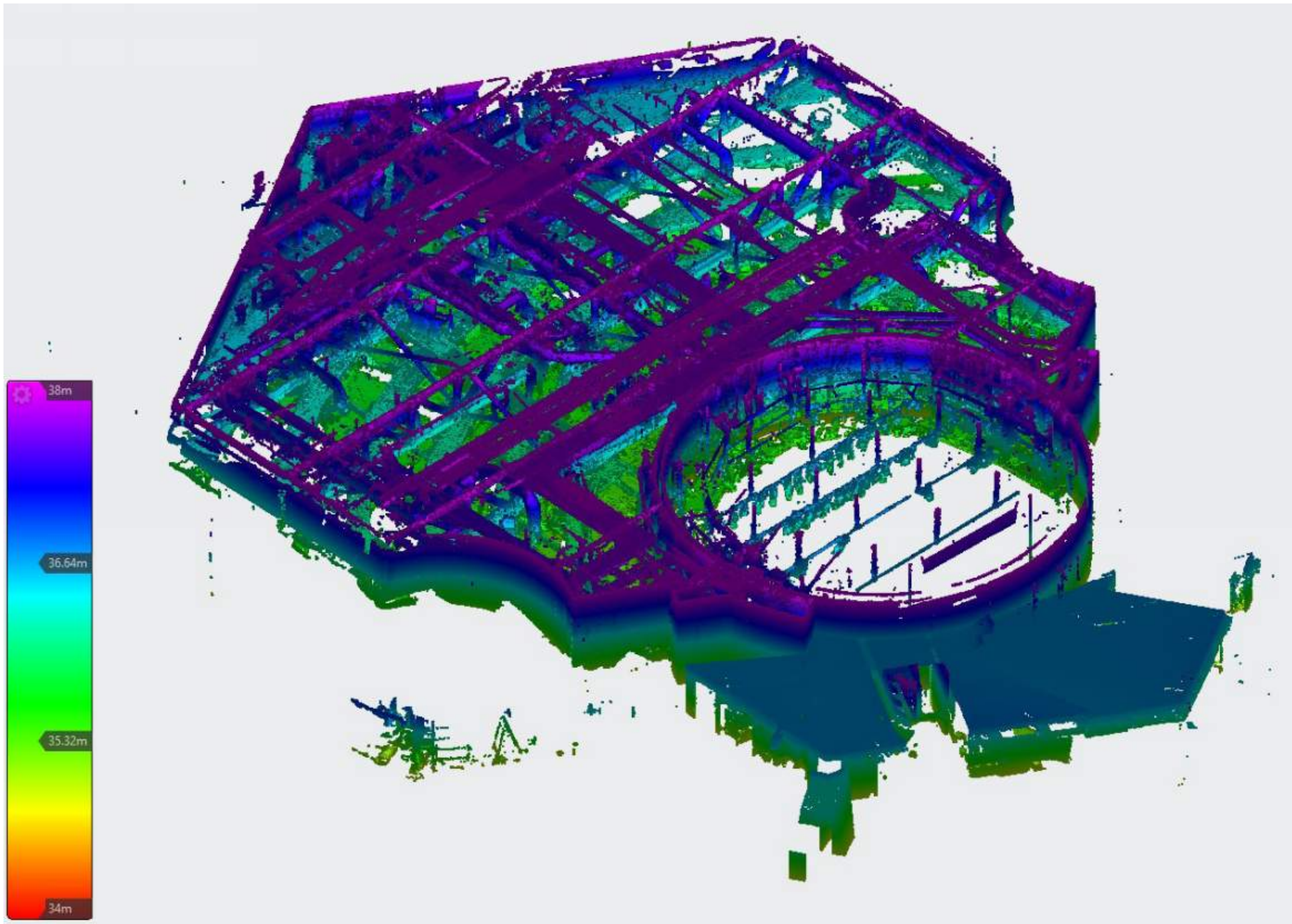


Image 2
Excerpt from laser scan point cloud showing plenum and roof structure above house.

<u>Laser Scan Documentation and Building Models</u>

Due to the complexity of the building and the need for accurate as-found documents, the investigation phase included a full laser scan of the building. Lanmar Services scanned the theater interior and exterior in April 2022 to create a stitched point cloud of the entire theater, including all accessible spaces. The point cloud was used to create a "best-fit" Revit model of the entire structure, including the existing walls, exposed structure, and house seats. Information from existing drawings was used to verify and contextualize the modeled structure, but sizes and dimensions shown in the model match the existing, as-built condition as much as possible.

Structural Description

The following section includes a brief building chronology as it pertains to major structural changes, a description of the existing building structure, and a summary of building conditions as surveyed in the field.

<u>Building Chronology</u>

The structure of the Kalita Theater is largely unchanged from the original construction in 1959. The primary structural modification was a Taliesin Associated Architects (TAA) addition over the original theater lobby (1968) and subsequent enclosure of the porte-cochère as additional lobby space (1989). During the 1989 renovation, additional interior stairs and site walls were also modified. In the late 1970s, structure of the house interior was also modified by extending the balcony structure outward to create additional rows of seats. Other extant renovations include the enclosure of office space at the southwest face of the building (prior to 1968) and a change in slope of the house floor; however these are considered non-structural changes. The enclosure of office space include a new slab on grade and non-structural partitions built up to the underside of existing cantilevered structure. The change in slope of the house floor (1983) was accomplished with a wood overbuild and is likely reversible.

Known changes to the building's structure can be summarized as follows:

1959: Original construction of the theater is completed

1968: TAA addition constructed over the original roof balcony at the east side of the building. The addition included new shallow structural footings just below grade, new concrete walls, and new steel framed floors with concrete on metal deck (**Image 3**). The original roof parapet was removed, leaving the balcony floor in place. Wall structure for the addition is light frame steel studs with interior plaster and exterior stucco.

1978: Extension of the balcony within the house, including the removal of the previous balcony railing, and installation of a new steel truss. Per 1977 drawings, the new truss is supported on new truss hangers near the control room and a new posts near the balcony stairs.

1989: This restoration included enclosure of the porte cochère as lobby space and various interior renovations. Structural modifications associated with this addition included:

- Various site walls and stairs at the building exterior,
- New interior stair providing access between the basement and lobby
- New floor framing covering interior stairs within the lobby and over the original planter at the stage left (south) side of the house

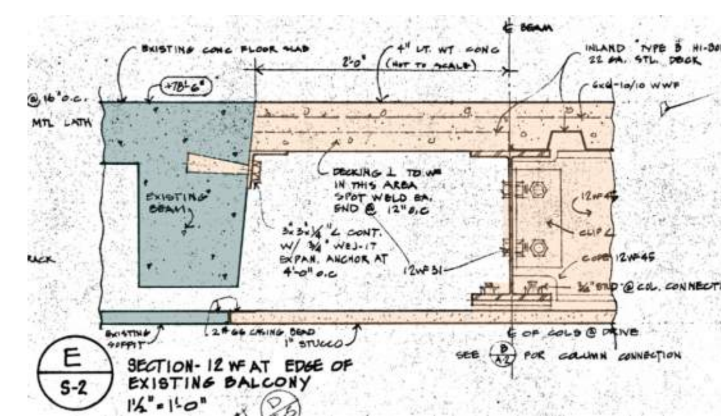


Image 3
1968 drawing showing interface of original concrete construction and addition framing

STRUCTURAL: EXISTING THEATER

Existing Structure Description

Most of the theater structure is from the original construction in 1959. Foundations of the original structure are shallow concrete spread footings, typically 8" to 12" thick extending 2' below grade. Construction photos show various stone outcroppings on the site, especially at the east side near the lobby. Basement walls of the original structure are cast-in-place concrete retaining walls, typically 8" thick. In some areas, tied concrete columns were cast integrally within the wall thickness. The basement slab is shown as 4" thick throughout.

The main level of the theater is a cast-in-place concrete slab supported on interior concrete beams, interior columns, and foundation walls. The concrete house floor is 6" thick minimum, with additional concrete to form 5" steps at 2'-3" intervals. The stepped concrete slab slopes downward toward the stage and is supported on interior 12" diameter columns and two wide, flat concrete beams that span downstage-upstage. The interior columns have conical caps. The circular stage floor is dropped below the adjacent slabs and supported on curved edge beams and circular concrete columns (**Image 4**).

Image 4
Construction of original dropped floor stage, courtesy of DTC Theater Archives

Other framed floors are two-way concrete slabs supported on concrete walls. Slab thicknesses shown on original drawings range between 4" and 9 ½". In some areas, bars were laid out radially to match the building geometry (as opposed to perpendicular layouts). Portions of the main level cantilever out beyond the foundation walls. These cantilevered portions are supported on deep, tapered, cantilevered beams supported on the foundation walls. At the rear of the house, the deep tapered beams are supported on triangular pilasters cast integral with the foundation wall. Upper-level walls are also supported on the edge of cantilevered beams. These walls have additional horizontal reinforcement so that they behave like beams spanning horizontally between the cantilever beams. This likely creates "ring action" restraining the perimeter of the cantilevered levels.

The structure of exterior cantilevered balconies has not been confirmed. Original structural drawings show the mezzanine and upper terraces all framed with steel beams and insulation and waterproofing applied directly over metal decking. Original drawings show the parapet wall as a 5" cast wall supported on vertical steel tees welded to a steel edge beam (**Image 5**). Based on field observation and construction photos, both the parapets and the horizontal surfaces are appear to be concrete. Steel balcony framing could also not be identified in the construction photos and videos, and concrete forms are seen at some balconies.

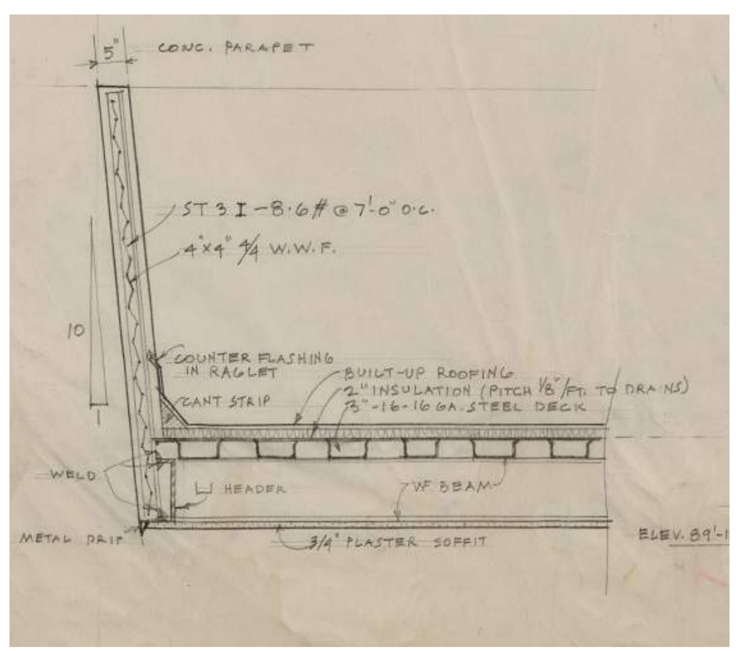


Image 5
Typical parapet section from original structural drawing S-22. Note that this parapet and cantilever balcony construction has not been confirmed. Courtesy of Avery Library

This suggests that the steel balcony structures were swapped for concrete, or that concrete encased steel was added. The 1968 additional drawings also show attachment of the new structure to "existing" concrete beams and slab, where the original drawings show a perimeter channel in this location. This discrepancy merits further research, and Silman recommends conducting probes, surface scanning (GPR or SPR), or considering pachometer testing to confirm this structure. Structure should be confirmed to accurately assess the weigh supported on cantilevers below, or to allow for design of modifications and appropriate repairs.

The roof structure is primarily from the original building construction, including the steel framing, iron grid and likely the tectum panels. Above the house, the decorative ceiling and roof are both supported on four long-span roof trusses spanning across the house (stage right to stage left). The trusses are made up of steel tees at the top and bottom chords, and diagonal double-angle web members. The trusses are currently wrapped for fireproofing. This fireproofing material likely contains asbestos based on the era of construction. Based on laser scan documentation, sizes of the truss members should be abated and exposed to confirm sizes. Above each of the ramp "wings", roofing is supported on small steel beam. Above the central drum, large W21 beams support the roof structure and hanging loads below. These beams are supported on bearing ledge in the concrete wall. Roof structure throughout is a thin tectum system supported on bulb tees spanning between steel framing or roof trusses.

Exterior and interior structural walls are all cast-in-place concrete. Few walls extend from the roof all the way to foundations. The battered walls supporting the primary roof trusses and the walls of the ramped "wings" also extend from the roof level through to foundations. These walls extending to grade form the building's primarily lateral force resisting system. Most other exterior walls transfer out along the height of building, forming the buildings unique massing. Structure of the cantilevered balconies and parapet walls is described above. The exterior walls that transfer to "inboard" walls are typically supported on deep cantilever concrete beams. These concrete beams are hidden below soffit panels at the exterior of the building. In some places, the concrete walls are also detailed as beams spanning between these cantilever beams. Below the mezzanine and below the uppermost exterior balcony, the exterior wall features a continuous clerestory window that interrupts the concrete wall. Each solid cast portion contains a solid 2" x 1.25" solid bar integrally cast into the wall that transfers the load through the window openings like a column (**Image 6**).

The theater stage is housed within a concrete cylinder (or drum) that extends above the house roof. The drum is a full circle below the house floor (housing the rotating stage), is a semi-circle at the stage level, and continues upward as a full circle above the stage proscenium level. At the basement, this drum is supported on concrete columns and the concrete slab edge. The base of the drum is detailed as a curved beam spanning between columns. At the backstage half, the bottom of the drum is also restrained by large cantilever beams supporting an exterior wall. Above the stage, the drum cantilevers out to form the proscenium. The back of the drum is restrained by the intermediate back-of-house floors and is also heavily reinforced to act as a continuous element.

The load path of the building is complex due to the multiple layers of cantilevers and floor plans that shift throughout the building. Additionally, floors in various areas step, so lateral loads are also transferred through vertical elements to multiple piecemeal diaphragms. Silman has developed annotated floor plans and plan overlays showing the load path from the roofs, various balconies, down through to foundations. Very few walls extend from the roof down through foundations. Full-height walls include portions of the "wing" walls on either side of the stage and portions of the battered house walls. These walls can be found in the house at the stairs leading up to the mezzanine. Portions of these walls support the roof trusses and extend all the way to foundations. The annotated structural plans are attached as an appendix to the report.

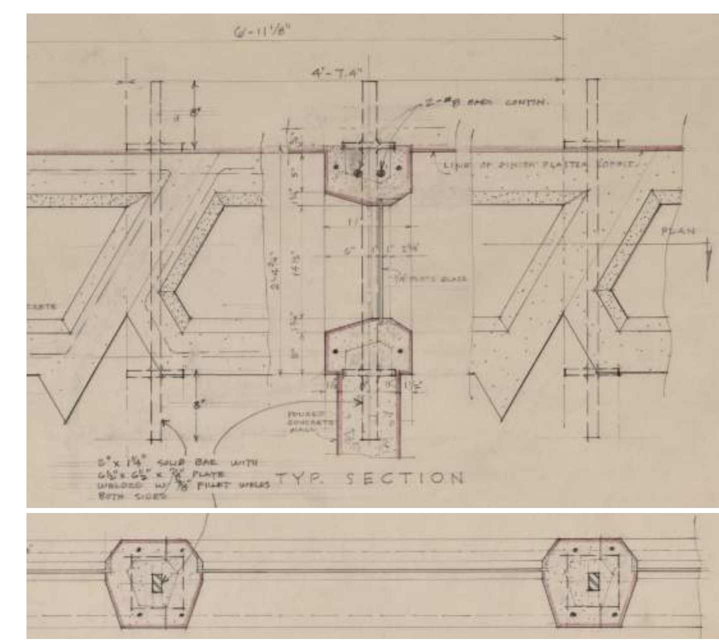


Image 6
Detail drawings of clerestory windows, including steel bar reinforcement and cast profile. Courtesy of Avery Library

Structural Conditions

The visible structure of the Kalita Theater is in good to fair condition. This initial phase did not include a comprehensive structural conditions survey; however, typical conditions were noted during the field investigations. Overall, the concrete is in good condition with some areas of hairline cracking, surface spalling, and staining. These conditions are not unusual for the building's age. At the building exterior, ferrous inserts were evident at areas of staining (**Image 7**). These were noted primarily at upper floors and the drum. At the parapet, vertical hairline cracks were noted at a regular spacing (**Image 8**). Cracks such as these may align with steel reinforcement or may be caused by temperature and shrinkage. At the building interior, some areas of cracking and were noted at exposed concrete floors in the backstage spaces. Again, these conditions are not abnormal for the age of structure, and conditions do not suggest that there is an underlying systemic structural issue.

Image 7
Ferrous staining at drum exterior, viewed from roof

Conditions of the building additions were in worse condition than the original structure. At the office added at the south side of the building, differential settlement and/or inappropriate attachments have created a gap between the original and added structural. At the 1960s addition, staining of finishes is apparent suggesting there may be water infiltration. The poor conditions at the additions are likely caused by or at least exacerbated by the lower quality construction materials used. Exposing the interface between new and existing will be especially important to confirm how much the previous modifications damaged the original structure.

Image 8
Cracking in exterior parapet

Code Review

The proposed project will conform to the current Dallas building code, which references the 2015 International Building Code (IBC) with Dallas amendments. As of June 2022, the current Dallas building code also references the 2021 IEBC with Dallas amendments.

The original building specifications note that the project conformed to provisions of the 1955 Uniform Building Code. While this code will not govern or guide the design of the proposed modifications, the antiquated building code should be referenced to shed light on the original design intent such as loading requirements and analysis methods.

Any new additions (such as a below grade expansion) will be designed to conform to the current 2015 IBC with Dallas Amendments. Within the historic building, provisions of the IEBC will guide any building modifications, including the appropriate classification of work and corresponding evaluation of any required structural reinforcement. Structural evaluation is required when the structural load demand increases (for both changes in use or for conformance with the current building code) OR when the existing structural capacity decreases. The IEBC generally allows alterations without reinforcement in the following cases:

- When additional gravity loading (dead, live, or snow) does not increase by more than 5%
- When the member demand-capacity ratio does not increase by more than 5% under gravity loads.
- When the member demand-capacity ratio does not increase by more than 10% under lateral loads (wind and seismic).

Where load increases and/or capacity reductions exceed these thresholds, the structure will need to be altered to comply with the current building code. Further assessment is also needed to determine whether the building alterations comprise a "substantial structural alteration" under a Level 3 alteration, or a change in occupancy. To be classified as a "substantial structural alteration", the overall project work area must exceed 50% of the building floor area, and the structural work area must exceed 30% of the floor area. If classified a "substantial structural alteration," the building's lateral system must be analyzed and (if required) upgraded to conform to the current building code. Based on the current scope of the theater renovation, a full lateral upgrade of the structure is not anticipated. However, new openings and new discontinuities caused by floor and wall openings will impact the existing building's lateral capacity. These new openings and structural changes should be analyzed for global impacts on lateral stability.

The IEBC does allow exemptions for historic buildings, subject to approval by the code official. This typically includes acceptance of existing live load capacities and approval of operational controls that limit live loading. While the goal of any structural project is to meet appropriate life-safety standards, design of alterations must also consider historic preservation needs and maintaining architectural and material integrity.

Structural Design Overview

Goals of the proposed project are two-fold:

- To restore the original theater by removing the addition and reinstating the original massing and theater features, and
- To adapt the interior for use as a contemporary theater space

The following section describes structural modifications associated with the architectural and theatrical restoration and rehabilitation. Silman assumes that the building generally matches the configuration shown in original construction drawings and renovation drawings. Discrepancies between the observed condition and the original documentation are also noted in sections below.

As the structure is a system of integral concrete walls, slabs and beams that are often expressed architecturally, modifications of the concrete will require close coordination. Careful coordination of all penetrations is critical as they are through primary structural systems. Advanced reinforcing techniques including post tensioning and Carbon Fiber Reinforced Polymer (CFRP) fabrics are anticipated.

Removal of Taliesin Addition

Scope of the proposed project includes the removal of the 1968 TAA addition to restore the original building massing. Structural scope of this removal includes careful selective demolition of previous addition structure – including roofs, walls, floors, columns, and foundations – and reconstruction of the original parapet wall.

Per 1968 drawings, the original parapet was cut flush with the slab surface. Where the perimeter of the new addition aligned with the original balcony extents, a new light-gauge steel stud wall was constructed directly on top of this edge. Where new floor structure attached to the edge of the original balcony, clip angles or ledger angles were attached to the previously exposed parapet face for continuity of the floors. When the addition is removed, the re-exposed beam and slab edge will need to be patched. In limited areas, it may need to be chipped back and re-poured to allow for proper welded or doweled attachment of the new parapet walls. New parapet walls shall be 5" cast concrete walls, matching the original construction.

Since the exact configuration of the original balcony floor is unknown, probes are recommended to further the develop the design of attachments and appropriate repair details.

Within this investigation, future use of the balcony should be considered. The removal of the addition will re-expose the original balcony terrace, and the load capacity of this structure is unknown. If the balcony will be open to the public, structure in this area will need to meet a 100psf minimum public assembly live load capacity. Depending on results of this analysis, reinforcement may be required to meet this capacity.

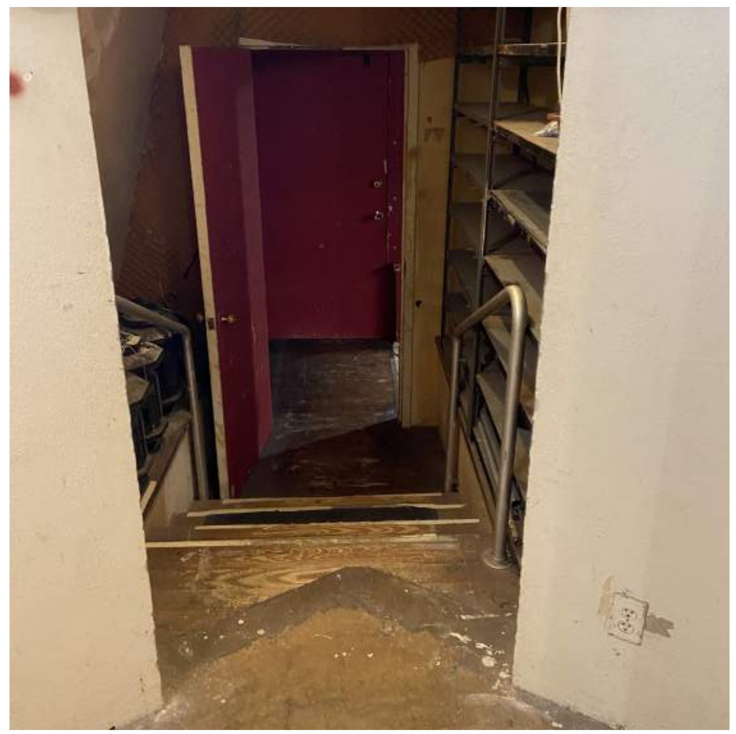


Image 9
Opening in original wall, 1968 addition in background

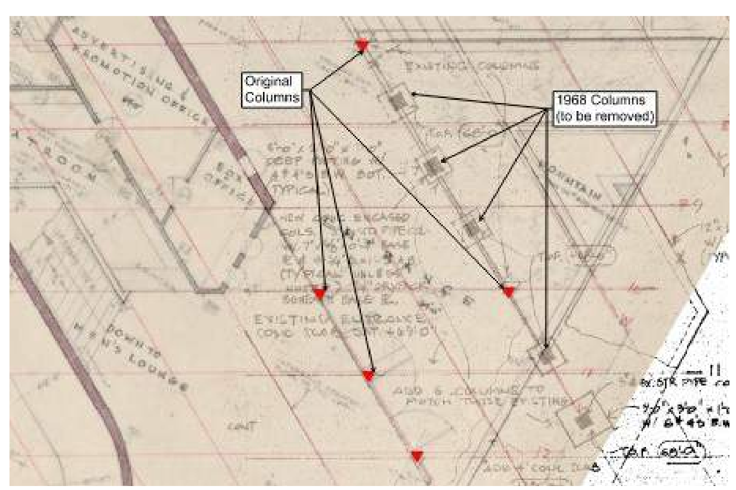


Image 10
Overlay of original building and 1968 plans showing original exterior columns enclosed within lobby addition

The porte-cochere and lobby extension were built at structures on grade with shallow spread footings. Removal of the addition will include the removal of the previously added slab on grade, shallow foundations, and walls. Care shall be taken to leave the original columns in place.

Removal of the addition will also re-expose original building walls. The previously cut corner wall opening will be infilled, including replication of the decorative cast window pattern along the clerestory window.

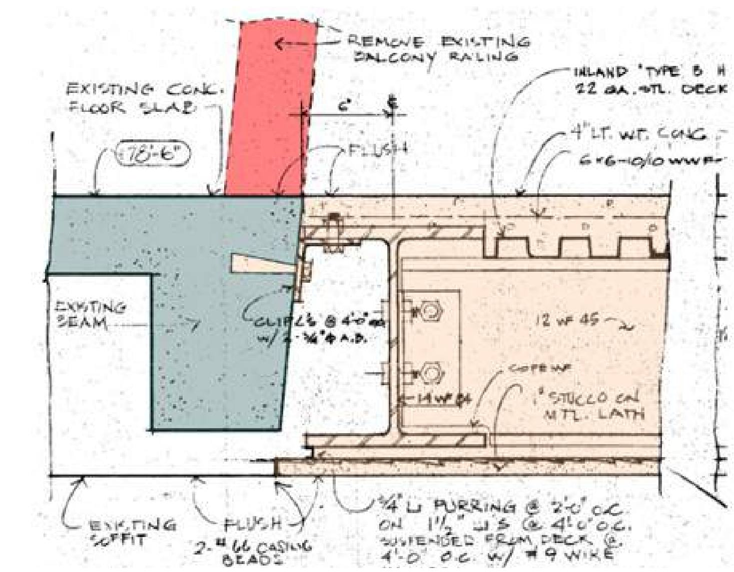


Image 11
1968 section detail showing removal of existing balcony railing in red

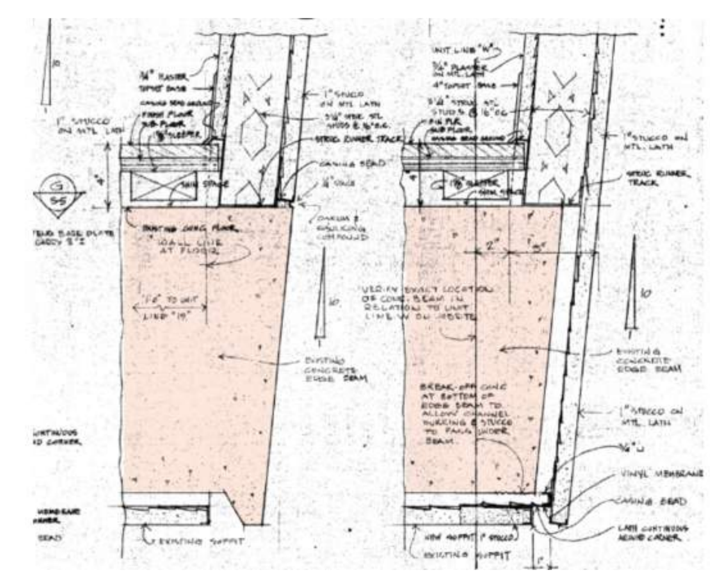


Image 12
1968 section detail showing new wall atop existing construction

Proposed Below Grade Lobby Extension

As part of the larger site redevelopment, the scope of the project includes a below grade expansion adjacent to the Kalita providing additional lobby, circulation, and service spaces. The proposed expansion would be below the existing lobby and connect to other site buildings via a below-grade tunnel. Where the below-grade addition meets the existing basement, openings will be required through the original foundation walls.

The proposed opening is in the foundation wall below the existing lobby.

Original drawings show that the existing foundation walls are 8" or 12" cast-in-place concrete walls reinforced with #4 and #5 bars at a regular spacing. The walls are supported on shallow concrete spread footings. Original drawings show these areas have concentric spread footings which are either 1'-6" or 3'-8" in width. The wall footings below most of the basement are typically lower than the footings at the proposed openings. At this lobby extension, the footings are about 8-ft higher than the typical basement footing elevation level.

Due to the cantilevered upper floors, the building load is collected into just a few walls at the base of the foundation. At the proposed opening, the wall extends up one level to support the floor of the original mezzanine level balcony. This area has since been enclosed within the 1960s addition. The wall supports the mezzanine floor and main floor framing, therefore cutting a new opening through the foundation walls will require temporary shoring and reinforcement of the structural foundation wall.

A variety of options can be considered for structural wall reinforcement. Larger openings, such as those bigger than the width of the doorway may be feasible with the addition of steel lintels and HSS support posts on new foundations. The concrete may be able to be chipped and repoured with additional reinforcement to support the opening, though this reinforcement approach is significantly more invasive and would likely Where the new structure will be lower than the existing foundations, underpinning may also be required to avoid undermining existing foundations. Due to its size, the proposed basement opening is a major structural intervention.

House and Stage Modifications

The following section describes changes proposed for the house interior, stage, and drum.

Seating Replacement

The proposed rehabilitation also includes replacement of the house seating and changing the rake of the house floor to improve sightlines. The concrete house floor was originally cast integrally with surrounding structure, including cantilevered floors, the circular stage floor, and walls supported on the house floor slab edge. The proposed change in slab slope would require cutting and removing a portion of the house floor and then recasting a new slab about 6˝ lower. The existing house floor is a framed concrete structure supported on basement walls, interior columns, and interior flat, wide beams. The slab was cast with a stepped top and flat, sloping underside.

Due to the continuity of the concrete structure, and complexity of the loads supported on the edge of the house floor, removal and replacement of the concrete structure will likely require shoring at the rear house, shoring of the mezzanine balcony, and could also require shoring of the upper drum. In addition to the temporary shoring, replacement of the house floor may also require post-tensioning to restore the load transfer between the new slab and the structure to remain. The exterior soffits will require removal and replacement to allow for direct support of the structure.

To understand the continuity of load path and implications of slab removal, it is helpful to study the edge conditions around the perimeter of the house, and the support conditions at the middle of the house floor.

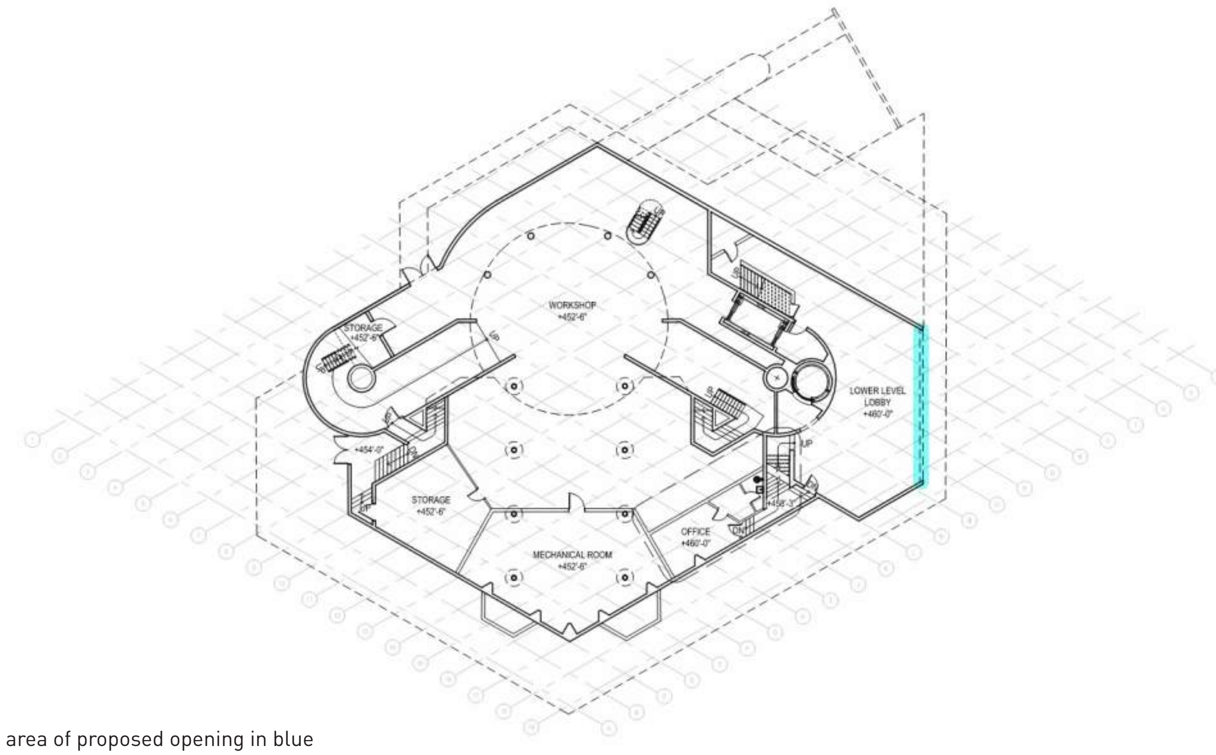


Image 13
Plan showing area of proposed opening in blue

Image 14
Current lobby with wall above proposed opening highlighted in blue

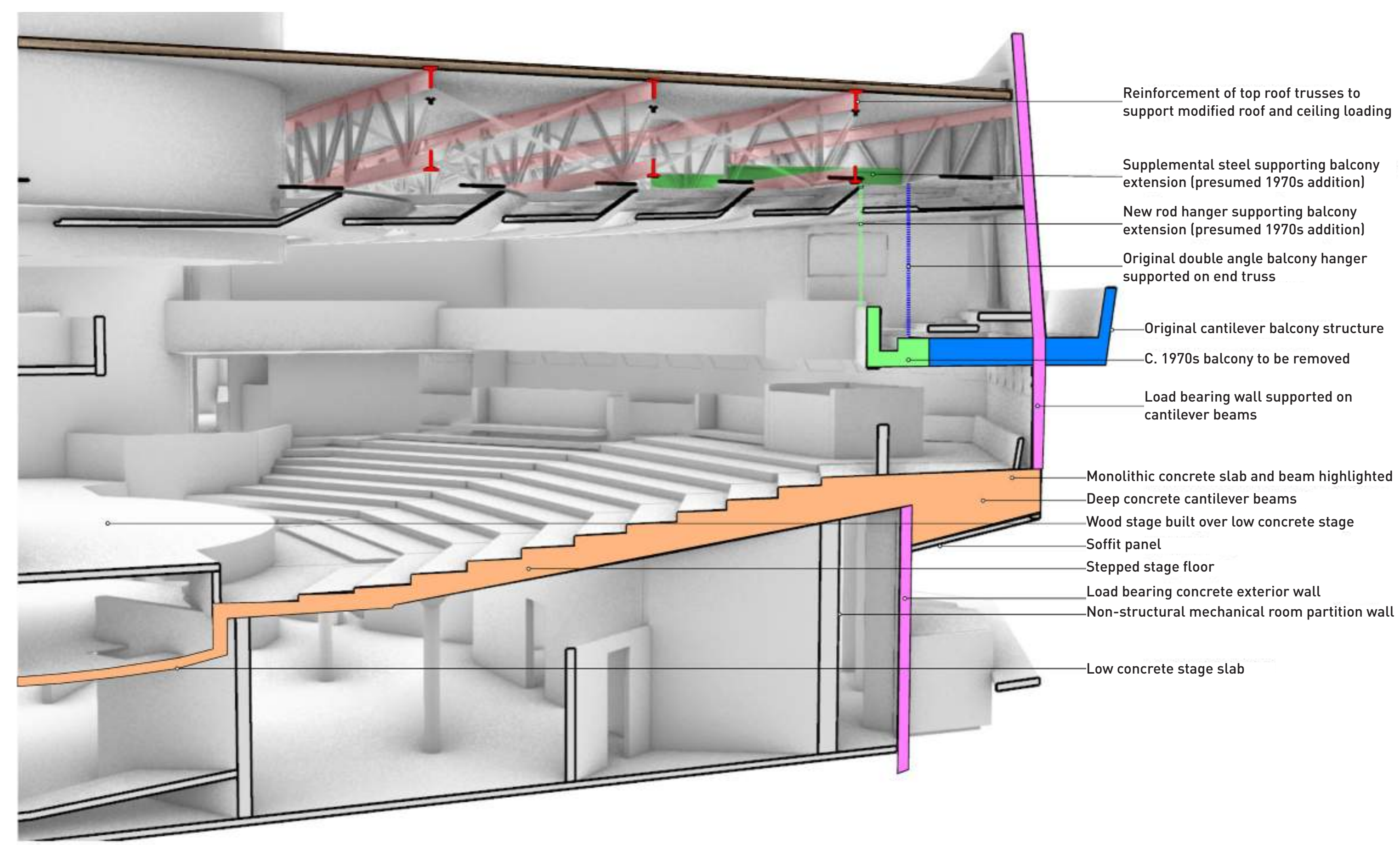


Image 15
Diagram showing proposed structural changes in house

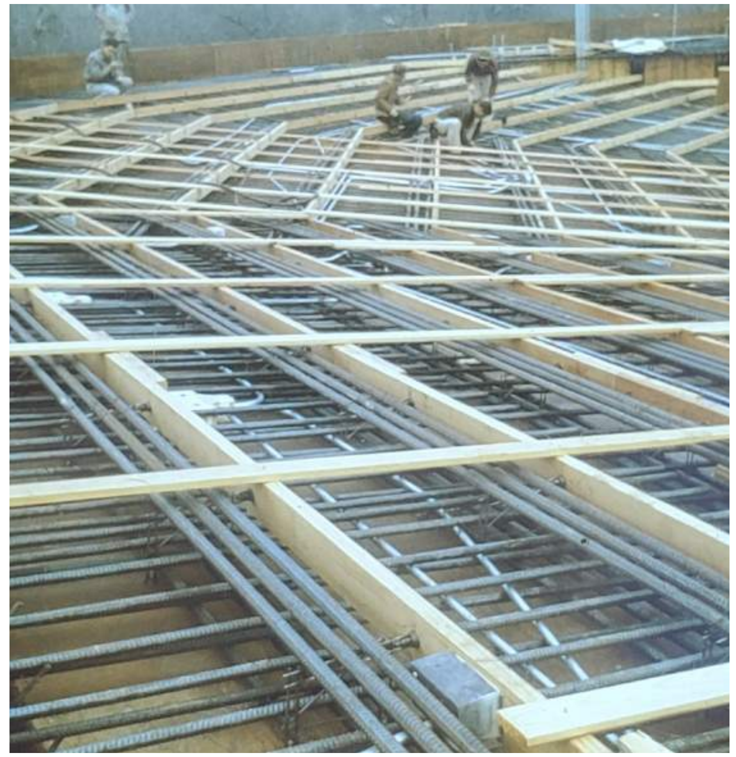
STRUCTURAL: EXISTING THEATER

At the front of the house, the concrete slab was cast integrally with concrete stage floor. This concrete stage floor is dropped lower than the house floor to accommodate the depth of the rotating stage equipment. The step between the stage floor and the house floor is detailed as a beam, which curves around from stage right to stage left, matching the curve of the stage. Original structural drawings show an "apron" of radial reinforcement. These bars are embedded 4'-6" into the house floor and then turn down into the edge beam. If the house floor will be lowered along this edge, the stage floor will also need to be shored and recast to restore continuity with the new lowered slab. To avoid this additional concrete work, the edge of the disturbed house slab can be pulled away from the stage edge beam, leaving the apron of reinforcement intact. The new house floor will need to be detailed to accommodate this concrete step down.

At the rear of the house, the concrete slab cantilevers beyond the foundation walls to support the clerestory rear exterior wall. In turn, this clerestory wall also supports the cantilevered mezzanine balcony and roof above. The cantilevered portion of the house floor is supported on deep beams that align with large pilasters in the foundation walls. Reinforcement supporting cantilever also runs over the foundation wall, tying the slab into the remainder of the house floor. It should be assumed that the deep beams and rear house wall will be shore to prevent movement or overstress of the reinforcement when the house floor is removed.

At the interior of the house, the slab is supported on wide flat beams and interior columns. To lower the slab, the beams and columns will need to be removed to accommodate the new slope and recast. This will require some rework of the conical column caps as well.

At the sides of the house, the slab is supported on interior walls and beams. At most locations, the slab meets a wall that continues up and down. However, on either side of the stage, the slab cantilevers over a foundation wall and then steps up to meet another framed slab. To avoid shoring and re-work of this beam, the extents of removal can be limited to the area inboard of the supporting foundation wall.



Images 16, 17
Construction photos of the house floor showing reinforcement in the slab and initial slab pour. Courtesy of Avery Library.

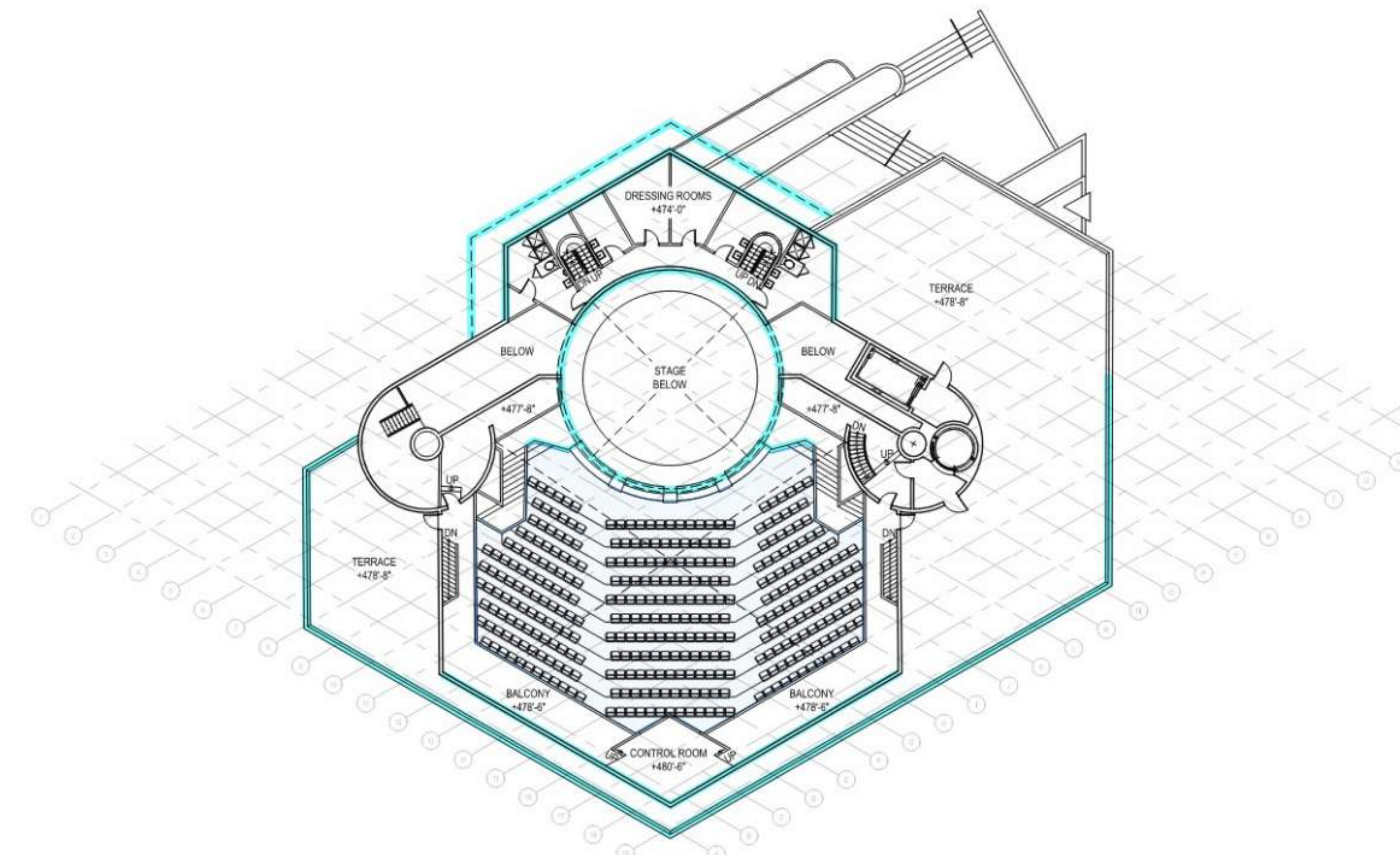


Image 18
Plan diagram showing extents of shoring required for removal of house floor highlighted in blue

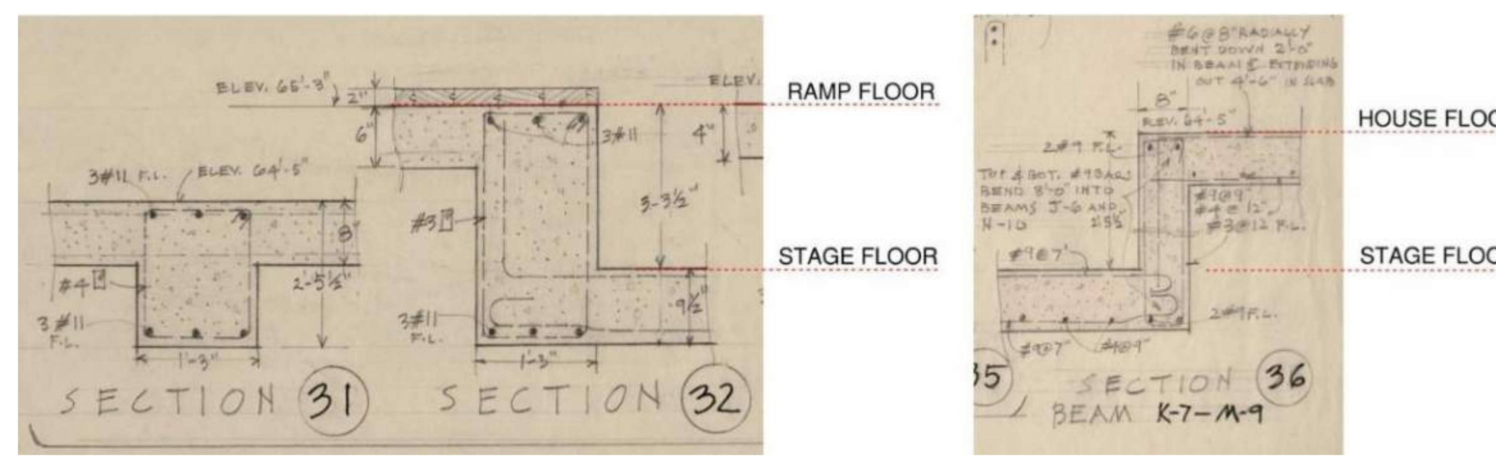


Image 19
Markup of original plans showing existing structural layout, slab steps and beams. Courtesy of Avery Library.

STRUCTURAL: EXISTING THEATER

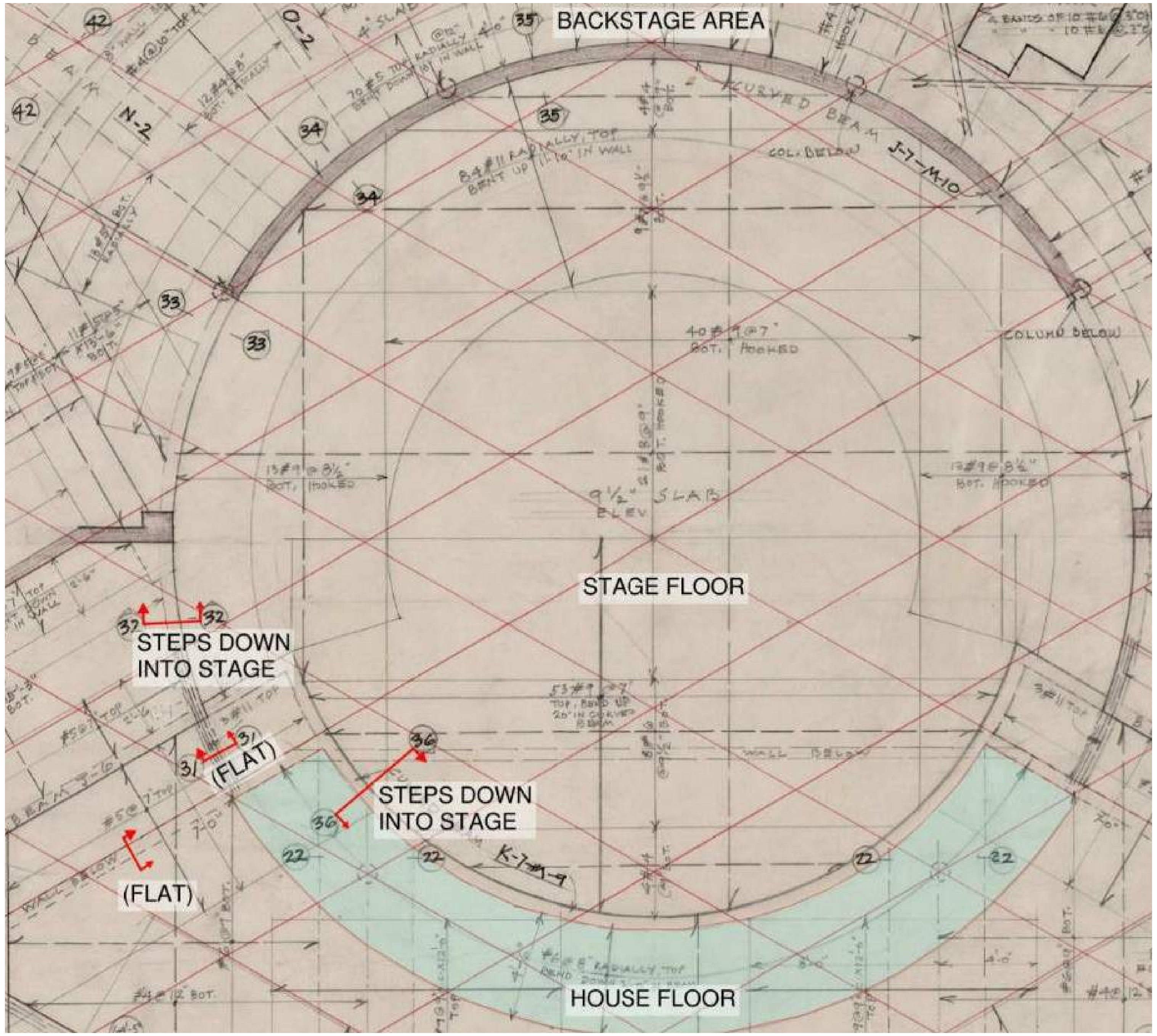


Image 20
Markup of original plans showing existing structural layout, slab steps and beams. Courtesy of Avery Library.

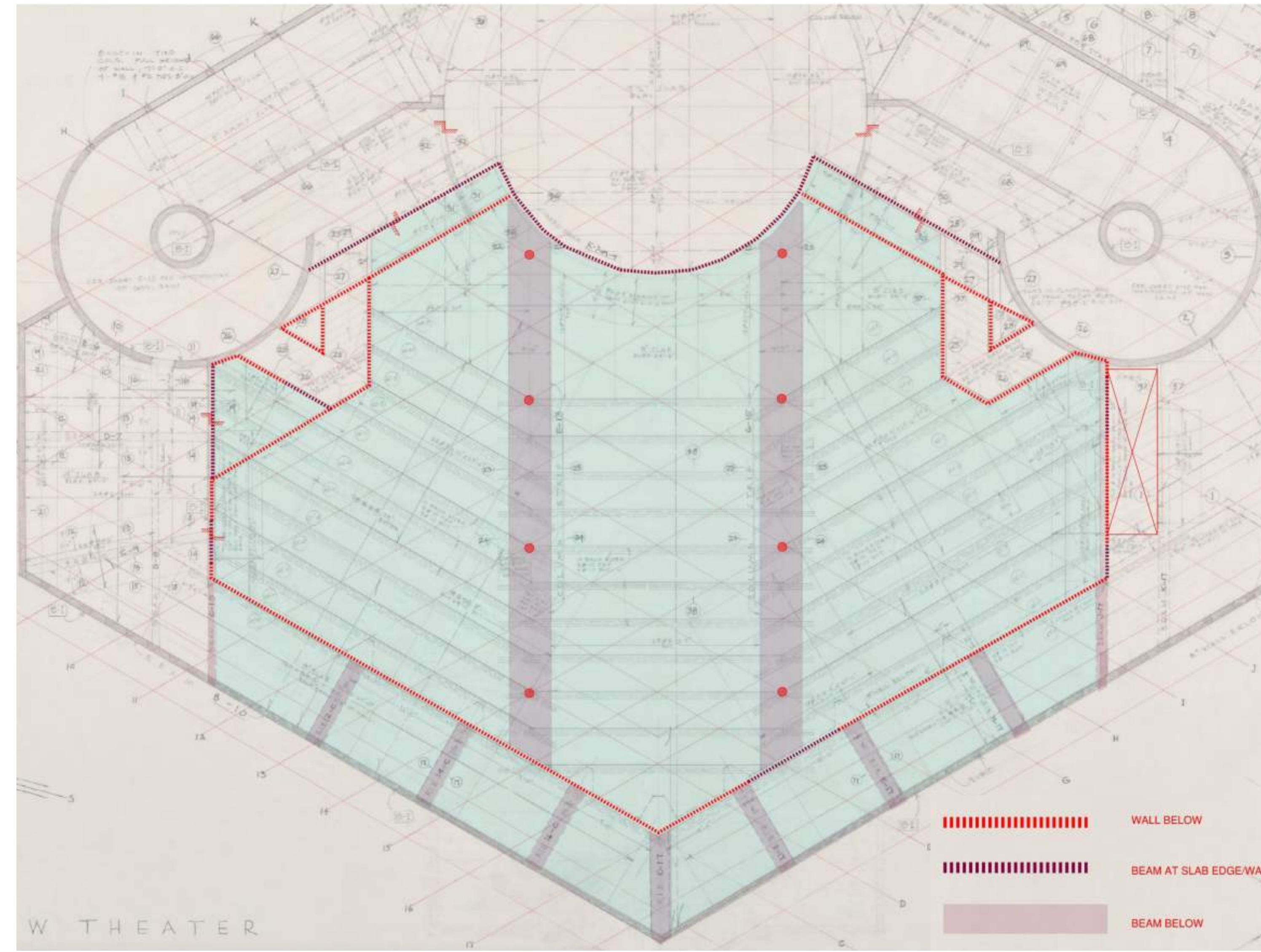


Image 21
Markup of original plans showing existing structural layout, slab steps and beams. Courtesy of Avery Library.

STRUCTURAL: EXISTING THEATER

Reinstatement of Historic Balcony

Scope of the project also includes removal of the 1970s balcony extension to restore the original condition. Based on the original construction photos and drawings, structure of the balcony is either concrete or concrete encased steel. (See earlier discussion in the structural description section noting the discrepancy between the drawings and field observations.) Around 1978, the floor area of the balcony was extended for additional seating. There is limited information on the structure of this condition, but based on architectural drawings, the balcony extension comprises trusses hidden within the balcony handrail. This truss spans between new hangers near the control room and new posts, hidden within the stair walls below. The central hangers were supported on new steel beams installed between two roof trusses within the plenum. Reinstating the historic balcony would involve removal of the hangers, handrail trusses, hangers, and posts. It should be confirmed that the original hangers near the control room are still in place. Additionally, a new handrail will be installed at the restored balcony edge. Original drawings show this handrail as pipe supports furred with plaster. New attachments of the handrail shall be coordinated with the condition of the exposed edge. Based on construction photos, this edge is concrete.

Image 22
Construction of the house balcony and installation of roof trusses

Reinforcement of House Roof Trusses

In addition to the house floor modifications, scope also includes several changes to the roof and ceiling that will change the structural loading. The existing roof is supported on four primary roof trusses – three long trusses and one short truss – that span clear across the house and are supported on the battered concrete walls. This scope includes the replacement of the roof structure, addition of theater equipment including lighting, and potential for other structural or load changes associated with the restoration and rehabilitation of the theater ceiling.

Preliminary structural analysis of the trusses shows that they do not have excess capacity for additional loading and may be under-designed for contemporary code loading. Analysis of the trusses was based on steel member sizes shown in the original drawings, and actual dimensions will need to be confirmed during design after the asbestos fireproofing is properly abated. The trusses will need to be reinforced to carry the new design loading, including a heavier concrete-on-metal deck roof assembly and additional lighting, equipment, and potentially personnel access loading.

The trusses can be reinforced by welding or bolting additional steel to the truss members. For pricing purposes, it can be assumed that steel tees will be welded to the full length of top and bottom chords at all four trusses. Depending on the magnitude of the load increases, only partial reinforcement of the bottom and top chords may be required. Silman's analysis of the roof trusses is summarized in the following graphics.

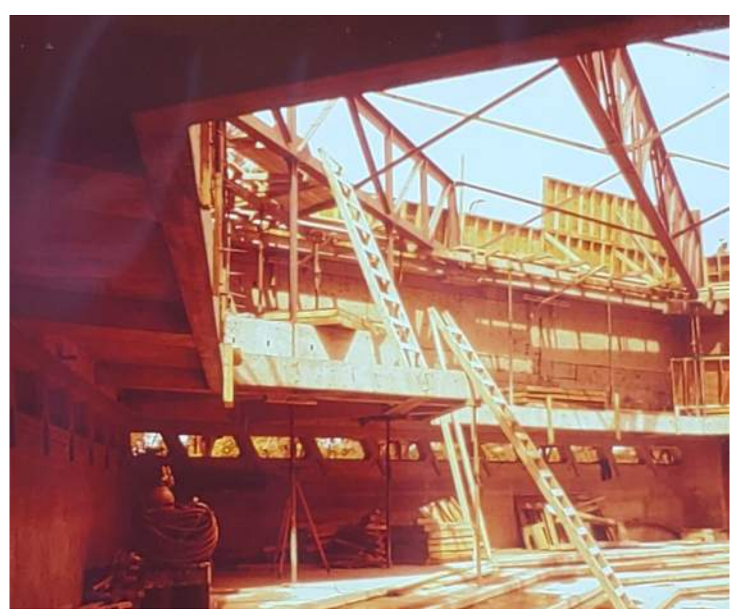


Image 23
Construction of the house balcony and installation of roof trusses

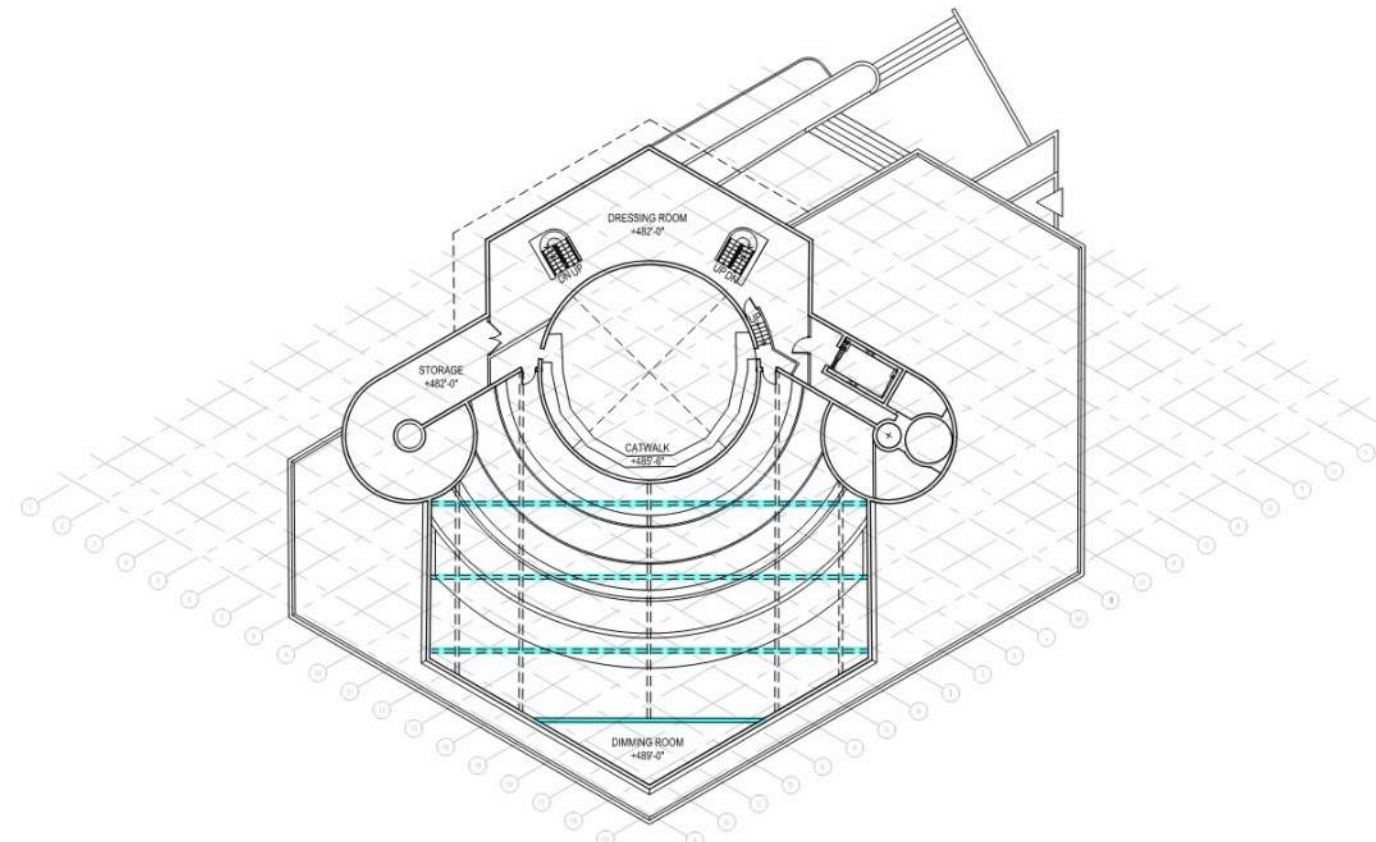


Image 24
Plan diagram with four primary roof trusses highlighted

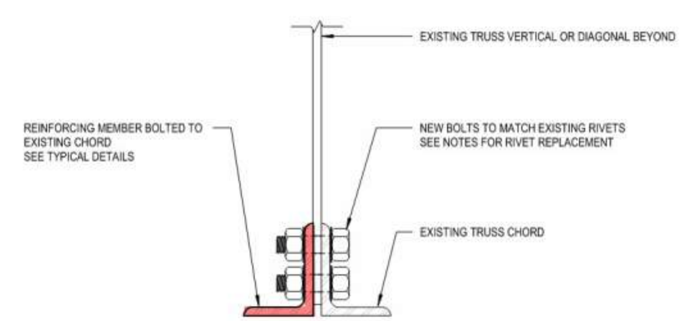


Image 25
Typical bolted reinforcement detail

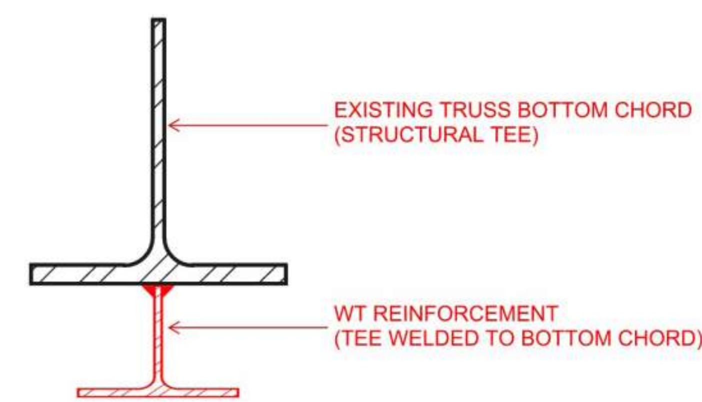


Image 26
Typical WT reinforcement detail

STRUCTURAL: EXISTING THEATER

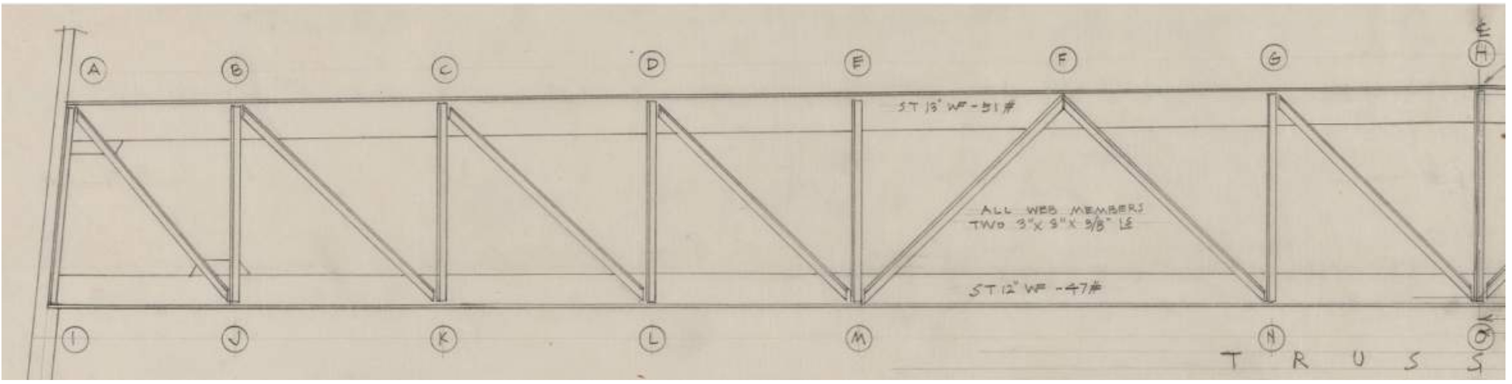


Image 27
Half truss excerpt from original drawings showing structural tees at the top and bottom chords and intermediate double angle web members

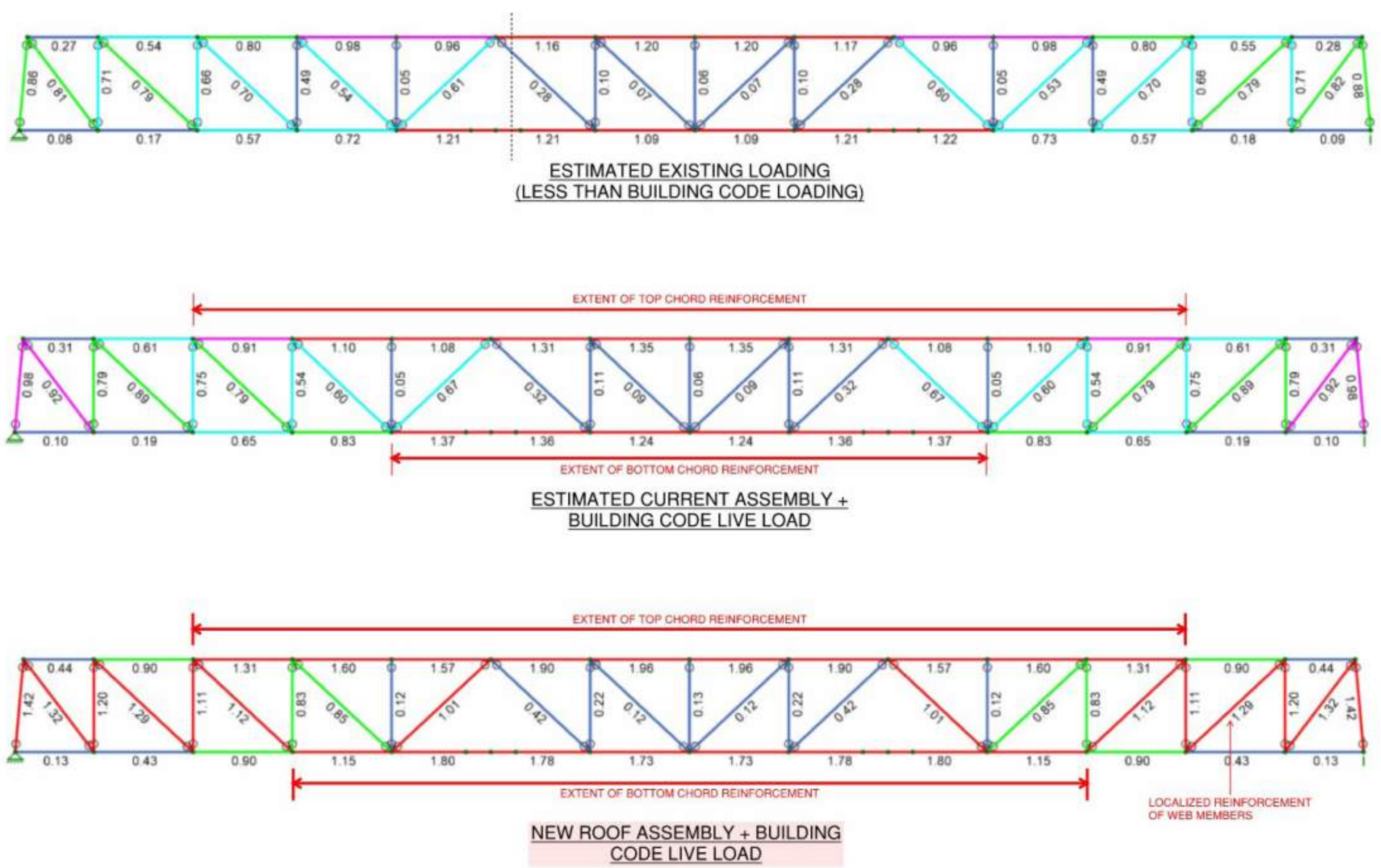


Image 28
Analysis model with loading representing original and existing (assumed) design loading. Bottom image represents the approximate proposed loading. Red members indicate overstressed truss members that will require reinforcement to meet design code loading

Image 29
Existing attic condition. Roof trusses are fireproofed.

STRUCTURAL: EXISTING THEATER

New Elevators

Scope of the proposed work includes two new elevators: a back-of-house freight elevator and one for public use. The elevators are both planned for the southern "wing" off the stage area. This area currently houses a lift, staircases, and storage at the upper levels. This area was modified early on, even within the original construction period and does not include a continuous concrete ramp like the other wing. The new back-of-house freight elevator will replace an existing stage lift, and the passenger elevator will replace a staircase added in the 1980s renovation. Structural scope associated with the new elevators will include removal and selective demolition of the previous lift, equipment, and 1980s construction. New elevator scope can be assumed to include new CMU elevator shaft walls bearing on new shallow foundations, new concrete framed landings as required, and new elevator overrun structure at the roof level.

The house and mezzanine levels are fairly clear of structure due to previous modifications, however floor and wall openings will likely be required at the upper levels. Openings through concrete floors will require structural reinforcement such as new steel beams, re-support of floors on new masonry walls, and/or CFRP reinforcement of walls. This portion of the building includes walls that are continuous from roof to grade level. These continuous walls make up the building's primary lateral force resisting system, therefore partial removal of these walls will reduce the capacity of the lateral force resisting system. If this removal (considered with other wall removals) exceeds the allowable threshold for modifications, further seismic analysis and wall reinforcement may be required.

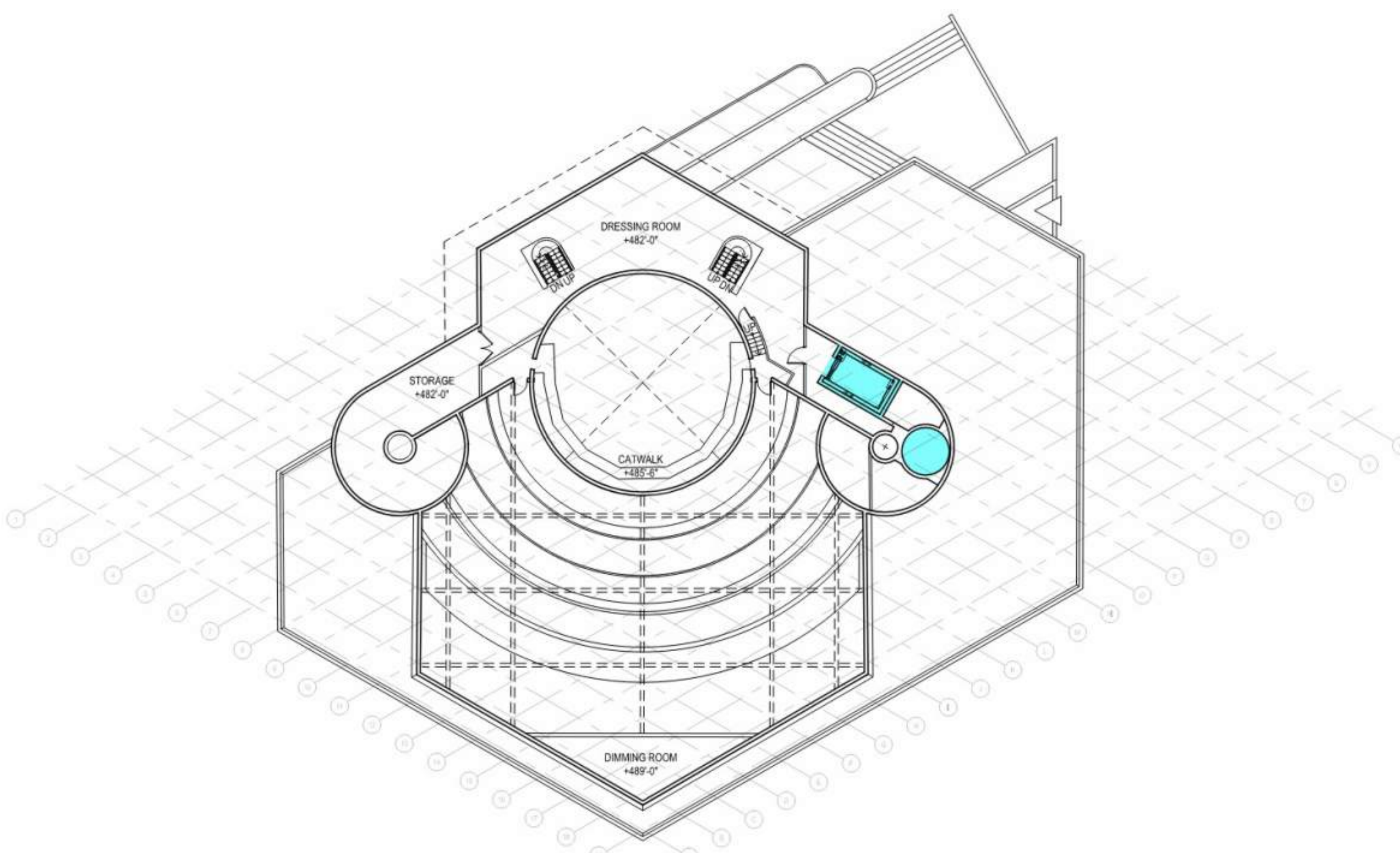


Image 30
Plan diagram showing location of new elevators

MEP Upgrades

The proposed project will also include various mechanical, electrical, and plumbing upgrades, including new equipment and new distribution systems. Structural capacity of framed floors should be verified once units are selected. New dunnage and/or structural reinforcement may be required for heavier units that are not located in basements or on grade.

Coordination of new mechanical openings will be particularly important for this building. Due to the complexity of the cascading cantilevers, special attention should be paid to maintaining continuity of reinforcement. Load of the upper levels is collected into a few exterior and interior foundation walls. Openings through these walls should be avoided. Similarly, the floor structure supports gravity loads but also likely sees some axial load where the floors restrain cantilever elements, such as areas where the floor slab ties into the backstage side of the cantilever drum. The deep cantilever beams supporting upper stories will also need to be avoided when routing ductwork, conduit, and piping. MEP distribution shall be routed through existing shafts and shafts in the new seating floor wherever possible, and all new openings should be assessed structurally and thoroughly coordinated before openings are cut. In places where openings are required, CFRP reinforcement or supplemental concrete or steel reinforcement may be required to maintain structural integrity around new openings. For smaller openings or localized openings for ducts, opening support may be feasible with steel channels bolted to the face of the wall or the introduction of grouted steel sleeve.

Repair of Existing Building Conditions

The exterior coating on the concrete is critical to the long term performance of the building. It should be assumed that the existing coating will be removed and a new breathable high performance coating will be applied to sound material per the manufactures recommendation.

Silman recommends that the future project includes an allowance for repair of existing concrete and steel. This should include the selection of appropriate repair mortars, specification of "re-pour" repairs, steel corrosion repairs. All concrete repairs shall also be compatible with the restoration of historic finishes. Where ferrous attachments are causing staining, the metal shall be carefully removed before the concrete and finishes are patched.

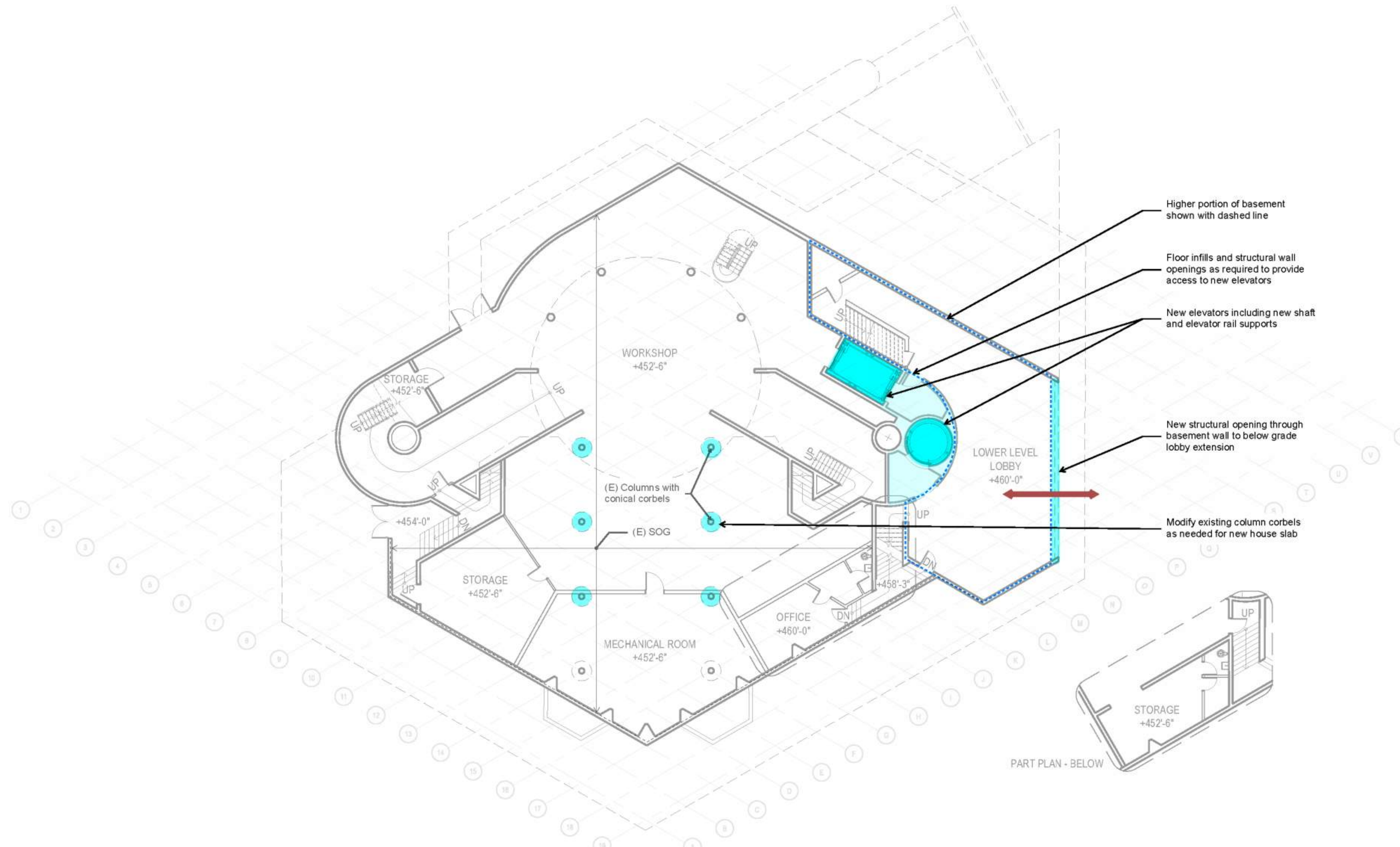
Silman also recommends an allowance for pachometer and SPR testing of sensitive concrete elements such as the thin parapets and large cantilever beams to confirm (1) whether existing cracking aligns with the reinforcement pattern and (2) whether any voids, delamination, or corrosion are ongoing and hidden within the concrete. This study may be focused at problem areas, or completed at representative areas throughout the structure. It may also be appropriate to remove soffit panels to identify any conditions meriting repair at the cantilevered structure.

Other Program and Circulation Upgrades

Scope of the proposed project also includes various modifications to program and circulation spaces. Some of these will require new openings through floors or walls. Several new openings are anticipated through the south wing walls near the new passenger elevator at the mezzanine level. Existing floor infills will also be removed in the house and lobbies to re-expose original staircases. New openings shall be properly supported with new lintels, supplementary reinforcing and/or carbon fiber. Removal of previous structural infills shall include allowances for patching and restoring structure where it was previously damaged or altered. This would include concrete slab and wall patching at previous attachments. For openings near the passenger elevator, specialty concrete and/or steel work will likely be required to achieve the openings in the curved concrete walls to the terrace spaces.

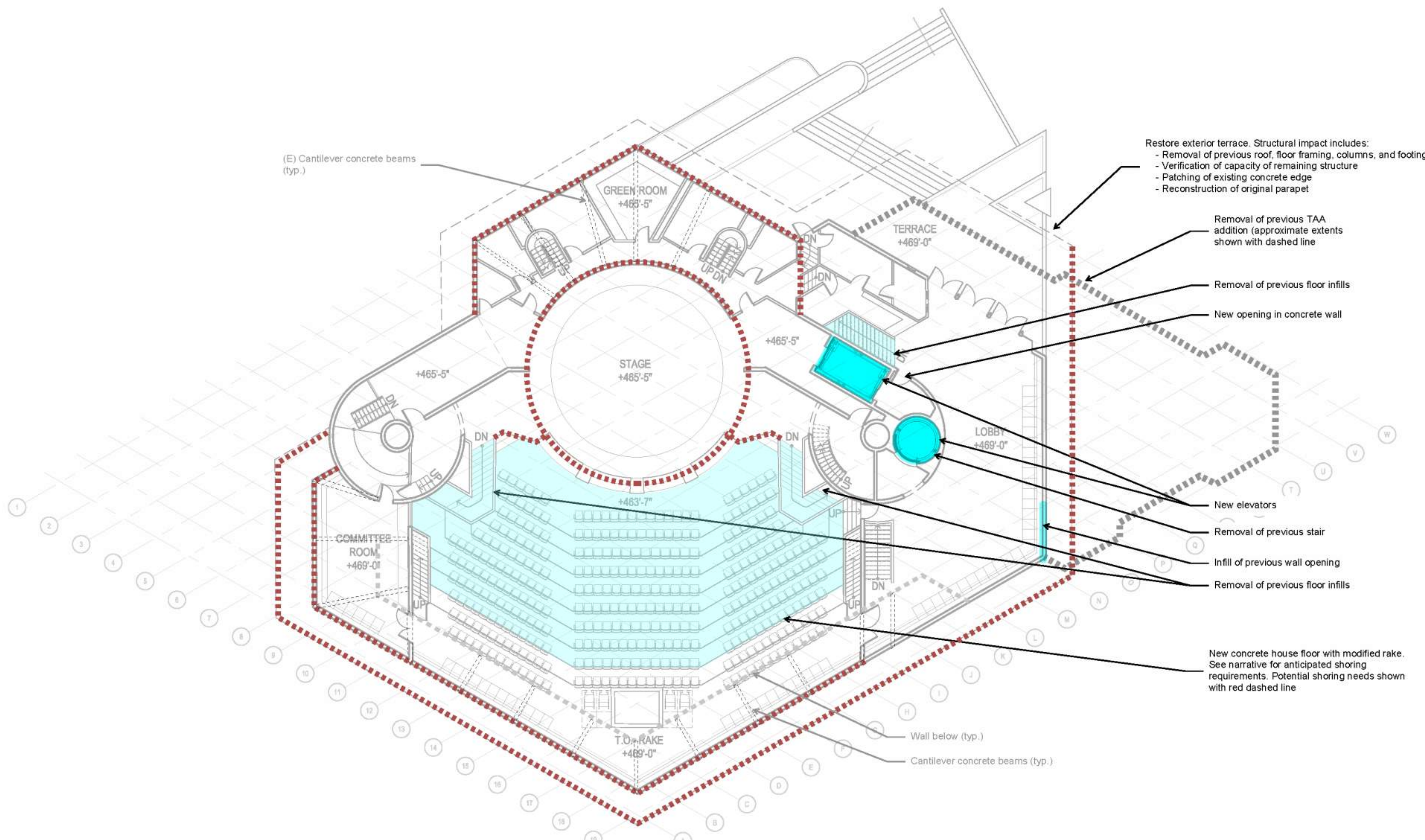
Other Structural Considerations

The logistics and sequencing of the work will be critical to prevent cracking of the concrete during load transfers and removals. Monitoring and project specific special inspections (in addition to the code required special inspections), will be recommended during construction. The contractor will need to have an engineer on their team for the final sequencing and temporary shoring and bracing so they can direct the logistics.



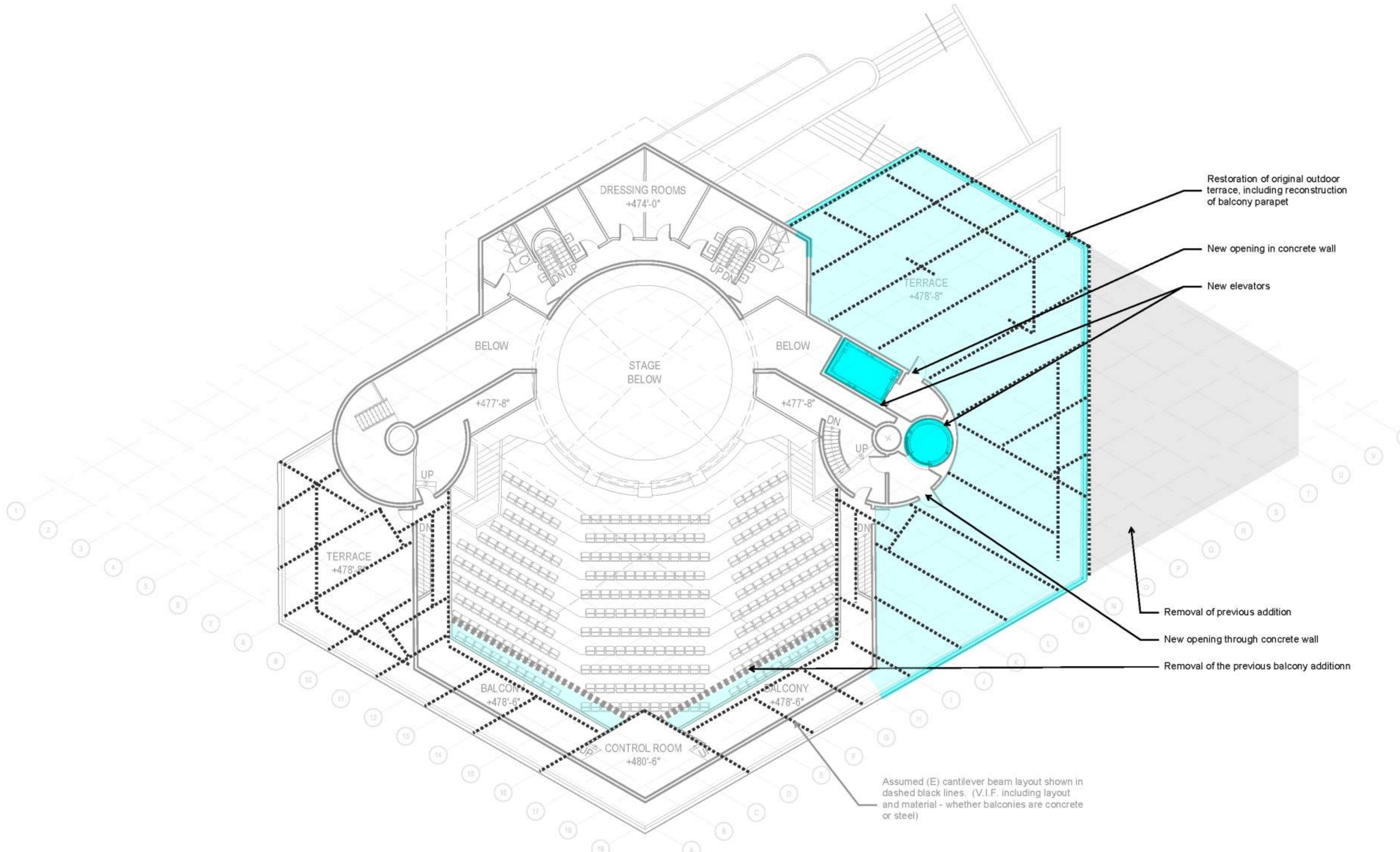
Kalita Humphreys Theater
Lower Lobby Level: Proposed Structural Framing Plan

STRUCTURAL: EXISTING THEATER



Kalita Humphreys Theater
Lobby + Stage Level: Proposed Structural Framing Plan

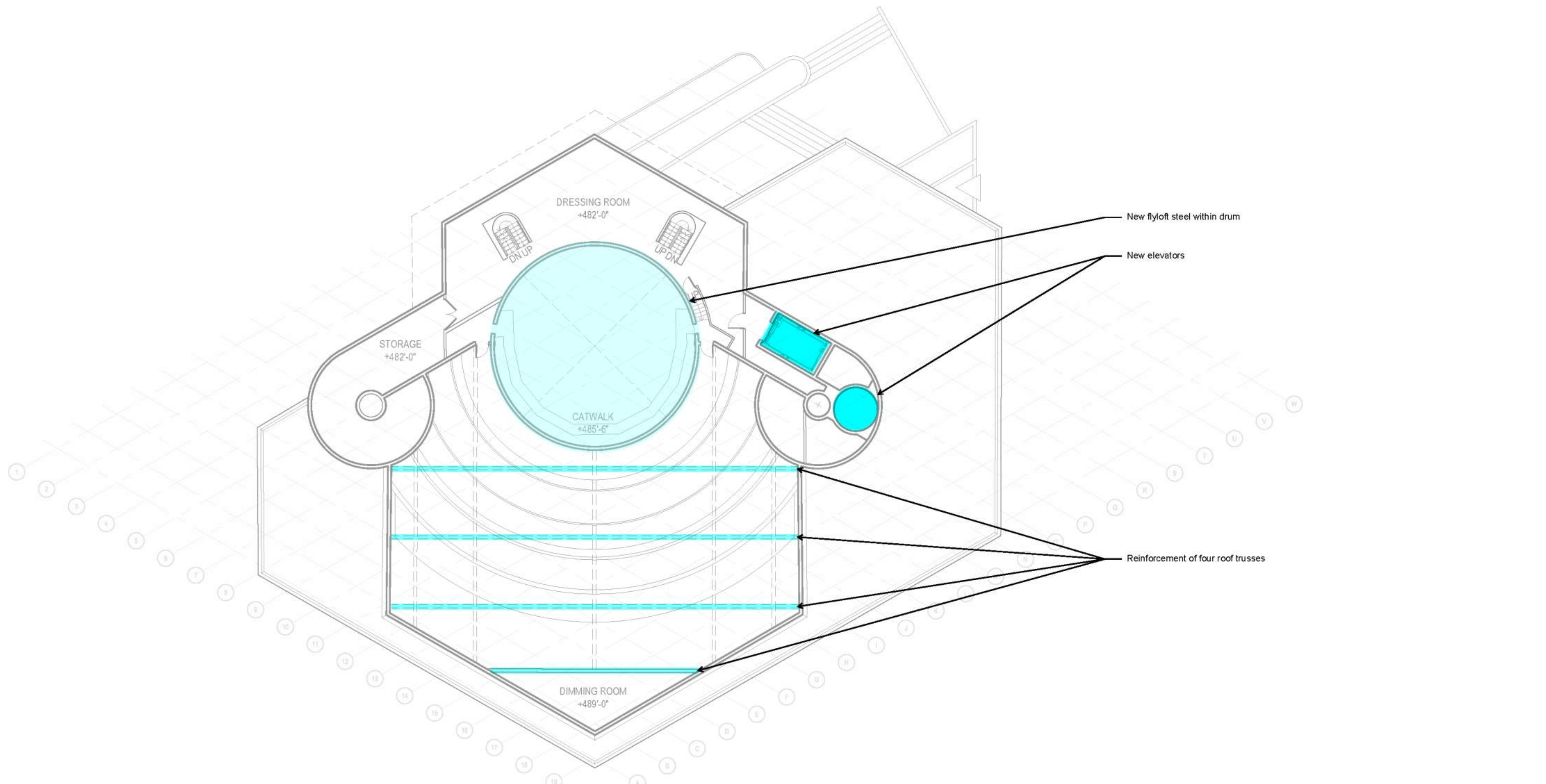
SCALE: 0' 8' 16' 32'



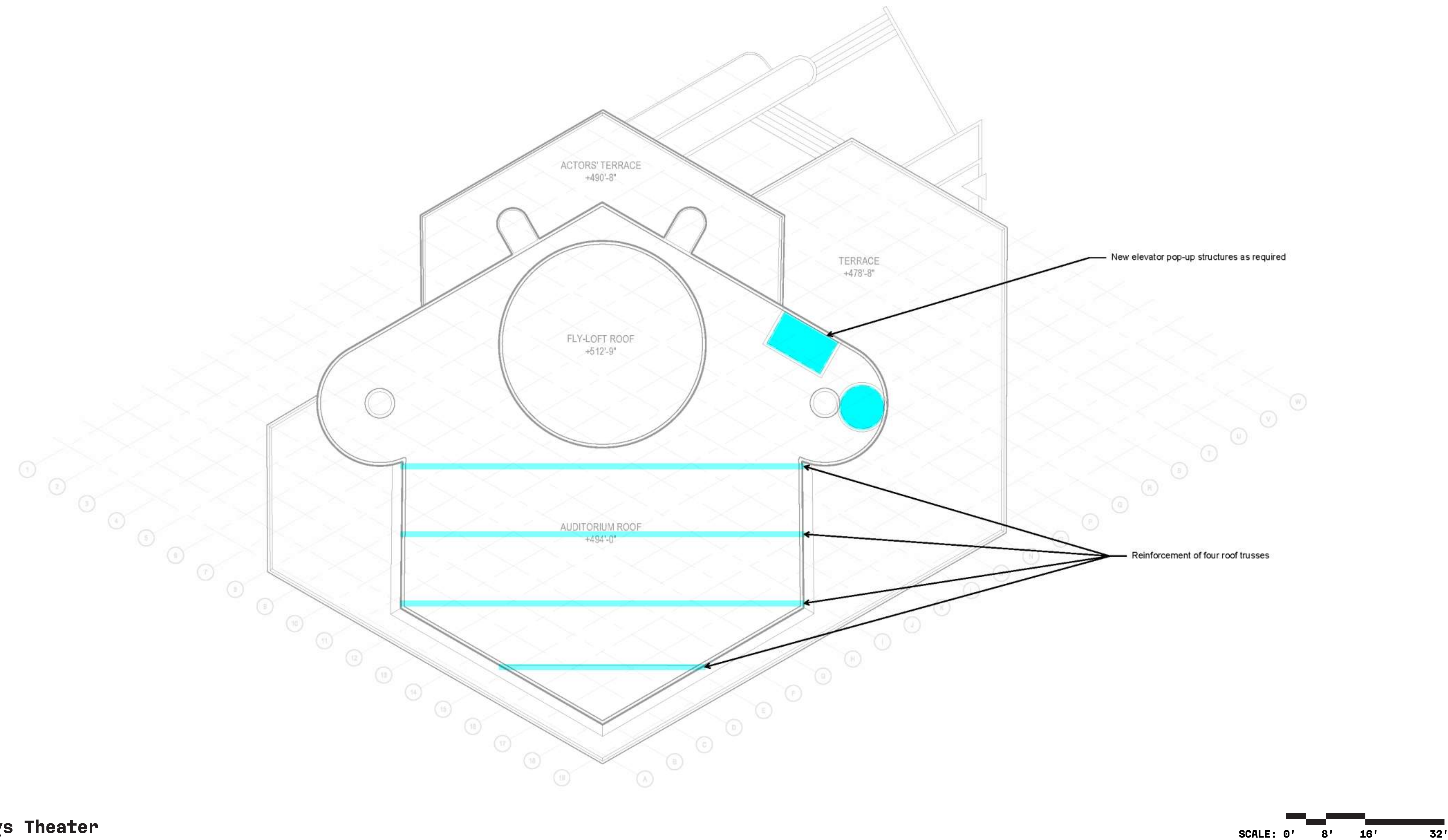
Kalita Humphreys Theater
Mezzanine Level: Proposed Structural Framing Plan

SCALE: 0' 8' 16' 32'

STRUCTURAL: EXISTING THEATER



Kalita Humphreys Theater
Catwalk Level: Proposed Structural Framing Plan



Kalita Humphreys Theater
Roof Level: Proposed Structural Framing Plan

Rehearsal + Education Pavilion

The northernmost new building is the Rehearsal + Education Pavilion. It is a five-story structure with a 5,500 sf footprint and roughly 25,000 sf of floor space overall. It will be constructed of heavy timber and Cross Laminated Timber (CLT) panels. The vertical structural system will consist of large glue-laminated (glulam) timber members forming a diagrid on the exterior facade (for pricing these can be assumed as 8.5"x15" members), and a reinforced concrete stair and elevator core on the interior. The floors will be CLT structural slabs supported on a glulam timber beams. The CLT panels typically get a 3" concrete topping reinforced with welded wire fabric (for estimating purposes assume the CLT panels are CrossLam 245V or equivalent, between 9 and 10" thick). We assume this will be the typical floor throughout the structure. For reference, CLT is an engineered wood panel that consists of multiple layers of dimensional lumber orientated at right angles to form structural panels while glulam beams and columns consist of layers of dimensional lumber elements bonded together with structural adhesive to create a single structural element.

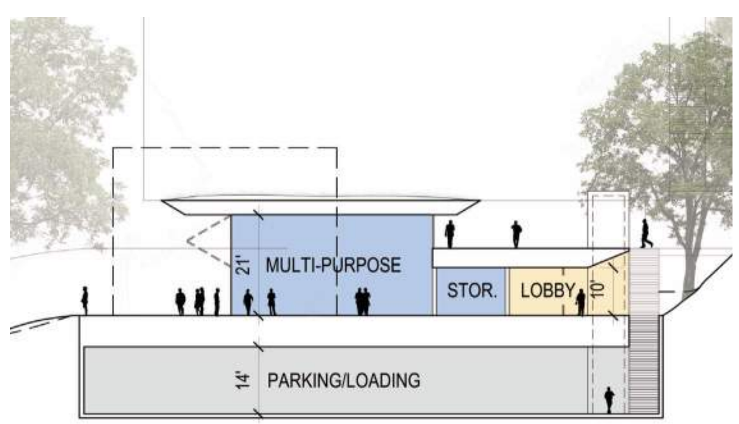
Code analysis will need to be performed to verify that the proposed timber system will meet the local codes. We have found this system is allowed by code in most US jurisdictions and heavy timber structures are being adding into more codes all the time.

Rehearsal + Education Pavilion conceptual rendering by DS+R

It should be noted that CLT is largely a proprietary mass timber material and Silman will outline product specifications in the future Contract Documents that will allow for a variety of manufacturers to bid the project. During construction, Silman will collaborate with the selected mass timber manufacturer in reviewing their product information, including any signed and sealed calculations and drawings by the contractor's or manufacturer's NYS licensed professional engineer.

This structure will have CLT terraces and stairs wrapping the structure on the outside, cantilevering off the external grid structure. The second floor will be the primary rehearsal space so it will be roughly 1.5 times taller than the other floors. An especially large stepping terrace will surround the building at the first floor to provide a connection to the Katy Trail. We do not have a geotechnical report on the site, but in our experience expansive clays can be found in this area near the surface. The terrace structures on or near grade here and elsewhere on the site may require sacrificial forms below to absorb the expansion of any clays, or the removal of any expansive clays down to the top of rock. We do not know if these clays are present, but they can result in an expense for near grade structures if they are here.

There will be a partial cellar under the building that will be created by excavating one level into the decomposed limestone and surrounding the space with reinforced concrete walls – cast or shotcrete walls are both options. Over-excavation for a temporary retention system may be needed if the rock is prone to sliding into the excavation. It is our expectation the building foundations will be spread footings bearing on the decomposed rock. Here we are far above the level of ground water so dewatering should not be necessary.



Multi-Purpose Pavilion section by DS+R

Multi-Purpose Pavilion

The Multi-Purpose Pavilion is situated between the Rehearsal + Education Pavilion and the Kalita Humphreys Theater. This new pavilion structure will be one-story tall, and the footprint will be approximately 5,000 sf. The front two thirds of the building will have 20-foot-high ceilings with large operable doors along the front facade. The roof will cantilever out beyond the front facade and will be planted with an extensive green roof of grasses. This upper roof is not expected to be occupied. The long cantilever will be best suited to a steel girder structure. Steel columns and "back arm" beams may be incorporated in the side walls and perhaps the facade between hangar type doors. The rear third of the building will have a lower ceiling and an occupiable roof. The structure here may be simple steel framing or even CMU or light gauge steel bearing walls to maintain a lightweight structure. Both levels of roof will require a 3" concrete topping slab on metal deck to accept the green roof (high) and occupied roof (low). The steel tonnage is expected to be 25-30 psf based on the spans and cantilever of the roof.

This structure will sit on a parking structure below. We expect the steel columns and structural walls will rest on a concrete slab that forms the roof of the parking structure below. Because the structure is only one story tall, a deep transfer level in not required here, though any primary structure that can land above columns in the parking structure will result in savings.

Northern Underground Parking and Utility Corridor

Beneath the Multi-Purpose Pavilion, there will be one-story of underground parking and loading dock and an adjacent utility corridor which will be excavated into the decomposed limestone rock that we believe covers much of the site. It is worth noting that we do not have a geotechnical report for this entire site, but we do have information from previous projects in the area and from the original Kalita Humphreys Theater construction. Being high on the site and only excavating down one level we anticipate this can be built as a simple cut and cover excavation – depending on the competence of the existing rock some over-excavation or bracing may be needed. If the rock is not decomposed and the bedding planes are horizontal, the space may be able to be cut right out of the stone. We would expect 12" concrete walls surrounding the space with interior concrete columns on a roughly 30x30 foot grid with a 20" transfer slab with 5 psf rebar running over the top.

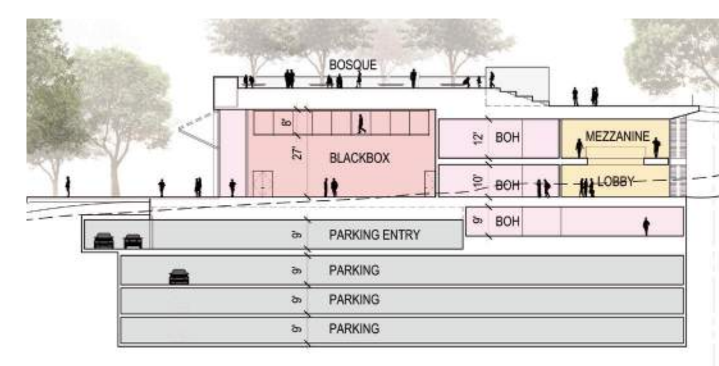
Blackbox Theater

The next three structures, two theaters and the associated parking garage, can be thought of as one large structure in many ways, but we will describe the unique features of each here. The Blackbox Theater has two stories of back of house and a 100-seat one-story theater space in the front.

The structure at the theater auditorium will be steel columns around the perimeter with long span steel girders or trusses at the roof (the large span over the theater space inclines us to think this will make sense as a steel structure, but other solutions can be explored as well). The roof of the theater will be planted with trees and will be occupiable. Therefore, a concrete slab will need to be present under the roof. We will run long spanning metal deck with a 3" concrete topping slab between steel girders/trusses that will support the rooftop "park". To support these loads, we anticipate the girders/trusses will need to be at least 36" deep and will have an estimated weight of 30-40 psf. It can be expected that these steel members will be supporting various theatrical equipment (lighting, catwalks, speakers, etc.) as well. If girders are used, assume they will have numerous large beam penetrations to allow MEP systems to run through the beams in the auditorium ceiling.

For the back of house structure, 8" reinforced CMU bearing walls may be utilized for cost and acoustic reasons along with metal joists and 3" concrete topping slab on 2" metal deck floors. The cladding of this structure is expected to be Corten steel. To provide a stable substrate to support this facade, a reinforced CMU or light gauge steel backup assembly could be used. More CMU walls may be present around the auditorium space to create an acoustic "box within a box" so more CMU should be estimated than exterior and demising walls.

This structure will rest on a thick concrete transfer slab that covers four levels of below grade parking.



Blackbox theater section by DS+R

Proscenium Theater

The Proscenium Theater has a three-story back of house component adjacent to a 200-seat one-story theater auditorium – all topped with a one level restaurant. This structure will make use of brick and masonry arches as much as possible. Like the Blackbox Theater, the long spanning roof over the auditorium will be steel girders or trusses that are supported by steel columns along the perimeter of the space. Assume 20-30 psf for steel framing at these levels. Elsewhere reinforced CMU walls will support light gauge members and metal deck with 3" concrete topping for floor assemblies. More CMU walls may be present around the auditorium space to create an acoustic "box within a box" so more CMU should be estimated than exterior and demising walls. An allowance should be held for additional framing to create the catwalks, rigging, and lighting grids typically found over proscenium theater stages.

The restaurant level at the top will be a steel and glass structure set back from the perimeter of the building below. The steel structure above the auditorium will have to be sized to support this transfer of the loads from above. The exterior will feature some unique brick masonry arches and elements. These will mostly be connected back to a steel sub-structure, but it is possible that some true masonry arches could be constructed as part of the exterior of this structure.

Southern Parking Garage and New Lobby

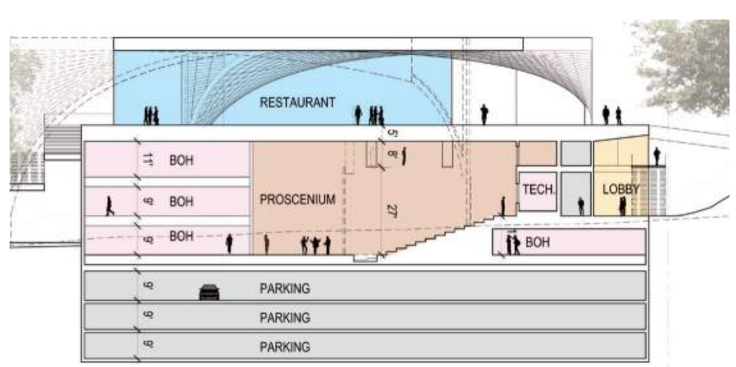
The new lobby is the upper portion of this underground structure that will connect to the Kailta. Here the construction can be assumed to be similar to the parking garage under the Multi-Purpose Pavilion. There will be concrete walls and roof created in a space dug out of the decomposed rock. This will meet the existing theater at the cellar level and a joint will be provided between the new and existing structure.

The parking structure under the two theaters will have 380 spaces and extend four levels below grade. In this area of the site, we believe ground water is roughly 15-20 feet below grade, so this excavation will extend well into the water. It is expected that if the rock is heavily decomposed and loose this excavation could utilize a slurry wall type construction to create a bathtub for the parking levels. If the rock is solid enough that it cannot be dug easily, then we could use the rock itself as a temporary retention system. This approach will require a substantial temporary dewatering operation.

The entire below grade structure will be concrete with columns on a 30'x30' grid with 10.5" concrete slabs and 6 psf of rebar for estimating purposes (the uppermost floor will be 24" thick due to transfer of the loads from above). The perimeter may be overcut to provide a drainage mat and a temporary retention system to prevent the rock from sliding into the site depending on the competence of the rock and the method of creating the excavation chosen. For pricing purposes, assume there will be caissons down into rock in the foundation of the excavated structure to resist the uplift that will likely result from the water's buoyancy force here. A permanent dewatering system could be used to prevent an uplift pressure from ever developing on the lowest level slab, but we cannot rely on that dewatering system for an entire building so some caissons will likely be needed here. The ground water is high in salinity so it is particularly corrosive. Any drainage or dewatering design and estimate should take this into account.

The top of the parking structure will be a reinforced concrete transfer slab. This slab will have a step in it winding around the loading and parking area below and the proscenium stage above. The four foot step in this approximately 30" slab will create a number of large beams at this junction. We will utilize these where possible to transfer loads from the theaters above into the sub-surface structure of the garage.

If a flood event could reach any entrance to the garage, an allowance for flood gates at that entrance should be included in pricing.



Proscenium theater section by DS+R

Pedestrian Bridge

The bridge is a unique element that spans from a hillside near the Rehearsal + Education Pavilion west over Turtle Creek. The bridge will be approximately 250 feet long and 10 feet wide.

The structure could be any number of systems – traditional girder, box girder, suspension, cable-stayed, or others. The foundations for the ends of the bridge will depend on the type of bridge, but for cost estimating purposes, assume there may be caissons drilled into the rock to provide anchorage. The bridge will need to provide at least 14 feet clear above the roadway below.


Pedestrian bridge conceptual rendering by DS+R

STRUCTURAL: DESIGN CRITERIA

Applicable Codes & Standards

The project will be governed by the following codes:

- 2015 International Building Code (IBC) with Dallas Amendments
- 2021 International Existing Building Code (IEBC) with Dallas Amendments

The following standards will be followed as specified by the governing codes:

- ASCE 7-10 Minimum Design Loads (and Associated Criteria) for Buildings and Other Structures
- ACI 318-14 Building Code Requirements for Structural Concrete
- ACI 530-13 Building Code Requirements for Masonry Structures
- NDS-2015 National Design Specification (NDS) for Wood Construction with 2015 Supplement
- AISC 360-10 Specification for Structural Steel Buildings
- ASCE 41-13 Seismic Evaluation and Retrofit of Existing Buildings

Structural Loads

The loads presented below assume the structures are Risk Category III (ASCE 7-10, Table 1.5-1, IBC Table 1604.5).

Live Loads

The following values are specified by the applicable codes and standards:

Occupancy or use	Live load	
	Uniform (psf)	Concentrated (lbs)
Public assembly: lobbies and circulation	100	
Public assembly: fixed seating	60	
Stage floor	150	
Projection and control rooms	50	
Balconies and decks	100 or matching occupancy served	
Walkways and elevator platforms	60	
Offices	50 + 15 psf partitions	
Catwalks	40	300
Roof	20	

Snow Loads

The following loads and parameters are specified by the applicable codes and standards:

- Ground Snow Load (ASCE 7-10, Figure 7-1) — p_g = 5 psf
- Terrain Category/Surface Roughness Category (ASCE 7-10, §26.7) — B
- Exposure Factor (ASCE 7-10, Table 7-2) — C_e = 1.0
- Thermal Factor (ASCE 7-10, Table 7-3) — C_t = 1.0
- Importance Factor (ASCE 7-10, Table 1.5-2) — I_s = 1.1
- Flat Roof Snow Load (ASCE 7-10, Eqn. 7.3-1)* — p_r = 6 psf

*Note: Values are reported for the existing building size, configuration, and massing. Design loads for new structures will be determined using massing and structural configuration once determined.

Wind Loads

- Basic Wind Speed (by jurisdiction) — V = 120 mph
- Wind Directionality Factor (ASCE 7-10, Table 26.6-1) — K_d = 0.85
- Exposure Category (ASCE 7-10, §26.7) — B
- Topographic Factor (ASCE 7-10, §26.8) — K_{zt} = 1.0
- Gust Effect Factor (ASCE 7-10, §26.9) — G = 0.85
- Enclosure Classification (ASCE 7-10, §26.10) — Enclosed
- Internal Pressure Coefficient (ASCE 7-10, Table 26.11-1) — GC_{pi} =±0.18
- Velocity Pressure (ASCE 7-10, Eq. 27.3-1)* — q_z = 28 psf
- Design Wind Pressure (MWFRS)* — p = 23 psf

*Note: Values are reported for the existing building size, configuration, and massing. Design loads for new structures will be determined using massing and structural configuration once determined.

Seismic Loads

The seismic parameters dependent on soil shall be confirmed by a geotechnical engineer. The seismic force-resisting system has been assumed as ordinary reinforced concrete shear walls.*

- Soil Site Class (Assumed) — D
- Short Period Mapped Spectral Acceleration (USGS) — S_S = 0.096 g
- One Second Period Mapped Spectral Accel. (USGS) — S_1 = 0.052 g
- Short Period Design Spectral Acceleration — S_{DS} = 0.102 g
- One Second Period Design Spectral Acceleration — S_{D1} = 0.083 g
- Seismic Design Category (ASCE 7-10, §11.6) — B
- Seismic Importance Factor (ASCE 7-10, Table 1.5-2) — I_e = 1.25
- Response Modification Coeff. (ASCE 7-10, Table 12.2-1) — R = 4
- Overstrength Factor (ASCE 7-10, Table 12.2-1) — Ω_0 = 2.5
- Deflection Amplification Factor (ASCE 7-10, Table 12.2-1) — C_d = 4

*Note: Values are reported for the existing building size, configuration, and massing. Design loads for new structures will be determined using massing and structural configuration once determined.

For non-structural components:

- MEP systems are to be braced against seismic forces and provided with appropriate joints to allow seismic movement.
- All masonry partitions will require positive attachment to the structure.
- Non-structural components to meet life safety performance level in design level earthquake per ASCE IBC Chapter 34 and ASCE 7-10 Chapter 13.

Serviceability

The serviceability criteria shall be the most restrictive of either those in applicable code reference, or those presented below:

Gravity Deflections

- For roof members live/snow load deflection shall not exceed l/240, and the dead + live load deflection shall not exceed l/180.
- For floor members the live load deflection shall not exceed l/360, and the dead + live load deflection shall not exceed l/240.
- For members supporting plaster ceilings the live load deflection shall not exceed l/480, and the dead + live load deflection shall not exceed l/360.
- For members supporting masonry walls the dead + live load deflection shall not exceed l/600.

Lateral Deflections

- Allowable story drift due to seismic is 0.015 x story height ASCE 7-10, Table 12.12-1).
- Allowable lateral deflection due to wind shall be h/400 typically, or h/600 for walls with sensitive finishes, where h is the story height.

Vibrations

No criteria have been provided to limit vibrations for sensitive equipment or sensitive historic fabric. Where human comfort is the criteria for limiting pedestrian induced motion, floor framing vibration due to footfall vibrations will be verified. Where vibrations are caused by running machinery, they should be isolated by damping devices or by the use of independent foundations.

Structural Material Specifications

For new structural elements, it is assumed the provided materials will meet the following specifications:

Concrete

• Compressive Strength	f'_c = 4000 psi typical, 3000 psi at slab on deck, 5000 psi and higher if required for design
• Concrete Density	Y = 150 pcf normal weight, 115 pcf lightweight
• Reinforcing Bars	ASTM A615 Grade 60
• Welded Wire Fabric	ASTM A1064 (65 ksi min. yield)

Steel

• Wide Flange	ASTM A992
• Hollow Structural Sections	ASTM A500, Grade B
• Structural Pipe Sections	ASTM A53, Grade B
• Channels, Angles & Plates	ASTM A36
• High Strength Bolts	ASTM A325
• Welding Electrodes	AWS 5.1, Class E70xx

Masonry

Concrete block shall be of lightweight aggregate and conform to the following standards: solid/hollow block: ASTM C90, Grade N1. Unless otherwise noted on plans and/or elevations, concrete block unit strength shall be 1900 psi min. Mortar shall be ASTM C270, Type S. Grout shall be ASTM C476 with a 2000 psi minimum compressive strength.

Diller Scofidio + Renfro
New York, NY

Fisher Dachs Associates
New York, NY

Threshold Acoustics LLC
Chicago, IL

Reed Hilderbrand LLC
Cambridge, MA

Harboe Architects
Chicago, IL

Silman Engineering
New York, NY

BOKAPowell
Dallas, TX

Syska Hennessy Group
Los Angeles, CA

Pacheco Koch
Dallas, TX

ACOUSTICS & AUDIO VISUAL

Acoustics Introduction

The following section addresses the acoustic design features of the Kalita Humphreys' Theatre and Campus Expansion.

The Kalita Humphreys Theater (KHT) currently serves a variety of professional and community-based groups. Dallas Theater Center (DTC) is embarking on this project with a goal of restoring the Frank Lloyd Wright Theatre and increasing Dallas Theater Center's connection to both the surrounding areas and its engagement with the larger Dallas Theater community.

The Program for the Restoration of the Kalita Humphreys Theater and the Campus Expansion includes:

- Restored Kalita Humphreys Theater, 450-seat existing theater
- Expansion spaces include:
  - 250-seat Proscenium Theater
  - 100-seat (maximum) Studio Theater
  - A suite of shared back-of-house accommodations
  - Lobby space and exterior circulation spanning the campus, which includes box office space, concessions, and administrative offices
  - Event/Banquet Space for 300 visitors, which may double as lobby or circulation space
  - Rehearsal rooms
  - A large classroom divisible into three smaller rooms
  - New administration area for DTC staff
- Theaters and the Event Space will be available for rental by corporations, individuals, or community groups to host meetings and events

The discussions and recommendations summarized herein describe requirements for interior room acoustics, sound isolation, as well as the control of noise and vibration from building systems to support the theatre performance, rehearsal and education as well as event hosting.
The primary purposes of this document are as follows:

- Confirm acoustic priorities and criteria for the project.
- Describe acoustic construction requirements for coordination with architectural, structural, civil and MEPF design work.
- Inform the development of cost estimates.
- Inform the architectural development of documents in terms of the following:
  - Special acoustic systems recommended for the new Theatres and Rehearsal Rooms, such as variable acoustic systems.
  - Aspects of construction that affect the isolation of unwanted noise from sensitive areas of the building and from outdoor noise sources, specifically the flyover events from Dallas Love Field Airport.
  - Finish material recommendations and options for acoustically critical and sensitive spaces.
- Inform the development of MEPF documents through the establishment background noise criteria for specific spaces based on good acoustic practice as well as general design recommendations for mechanical and electrical systems to meet these criteria.

Acoustic recommendations are presented in the following sections:

- Acoustic Evaluation of the Kalita Humphreys Theater
- Acoustic Design Approach - Expansion Spaces: This section of the report provides a general introduction and addresses certain specific room acoustic and sound isolation features for the performances, rehearsal, education and gathering spaces in the site expansion.
- Room-by-Room Design Criteria: This table summarizes the general requirements for each space within the expansion and includes recommendations for background noise levels and finishes.
- MEP System Noise Control Godliness: These guidelines present recommendations for the design of the interiors portion of these systems in order to achieve the recommended background noise levels.

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KHT Existing Acoustic Conditions Measurements and Analysis

On 10 February 2022, Threshold Acoustics performed a series of measurements to document the existing acoustic conditions at Dallas Theatre Center's Kalita Humphreys Theater. The measurements included:

1. Room acoustic responses
2. Background noise measurements in the theater
3. Sound levels from aircraft fly overs

Reverberation Time Measurements, Room Impulse Responses and Energy Time Curves

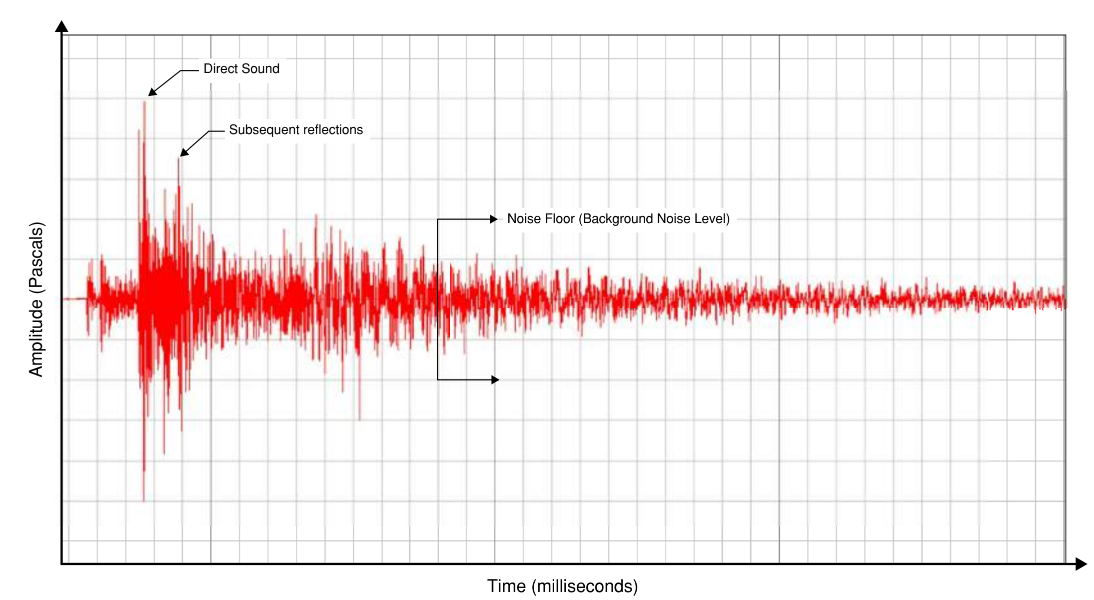
An omnidirectional, 12-sided loudspeaker was used to reproduce a digitally generated sound sweep across the audible frequency spectrum. From this measurement we generated impulse responses, see Figure 1, a graphic representation of direct sound and reflections received at each microphone, which indicates the strength of the reflected sound from surfaces in the space as well as how long the sound persists in the Theater. The collected data gives us an objective understanding of the subjective acoustic behavior that we observed in the room and further allows us to determine what specific surfaces and geometries in the existing space contribute to the acoustic behaviors at each test location.

Five stage positions were tested to understand how performer location impacts the aural experience for the audience . Eight microphone location were placed throughout the house for a total of 40 measurements conditions, from actors positions on the same side of the room as the patron, example from an upstage left actor to a patron in seat J12, to an cross-room conditions from downstage left to C5. See Figure 2 indicating the various loudspeaker source positions and audience receiver locations.

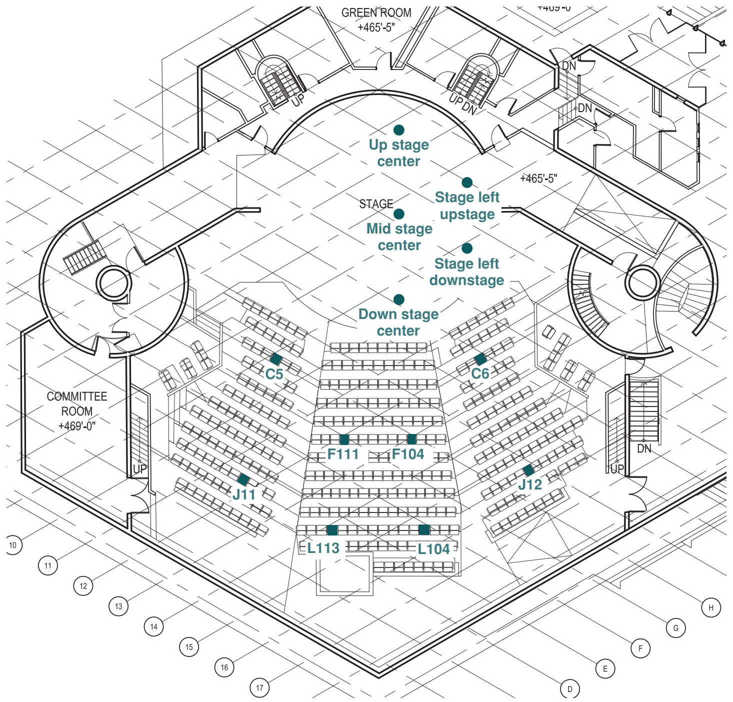
The data gathered in the impulse responses was used to calibrate an acoustic model constructed in Odeon, a room acoustic modeling software program. With an acoustic model calibrated to a built room's measured response, we are able to model a room's anticipated acoustic signature when changes are made to the room's shape or surface materials. A room impulse response is the recording of a room behavior between a given source (loudspeaker) and receiver positions (microphones), captured as an audio file. If we were to play back this audio file, it would sound like a very loud, short burst of sound (like a handclap or percussive sound) which would decay away to nothing. This is essentially a depiction of the room's acoustic signature.

Figure 1 illustrating an impulse response, is a graphical representation of this captured audio file. The notable parts of the graph include:

- The x-axis represents time, measured in milliseconds
- The y-axis represents the amplitude of sound, or how loud it is
- Close to the start of the sound wave is typically the highest amplitude (loudest) peak. This is the direct sound coming from the source on stage and arriving at the receiver position, the listener's ear.
- There are then subsequent peaks after the direct sound peak. These are reflections from floor, wall, and ceiling surfaces arriving at the microphone (listern) after the direct sound.
- These reflections lose energy, or decay, as sound travels, and ultimately they settle into the background noise in the room.



Acoustics Figure 1
Impulse Response



Acoustics Figure 2
Acoustic measurement positions - sources on stage, receivers in audience

We are able to convert this graph mathematically to an Energy Time Curve (ETC) which presents the same information in an easier to dissect graphic. In an Energy Time Curve (ETC) graphic, shown in Figure 3, we plot the square of the values in the pressure wave shown in the impulse response, and we more easily visualize the decay of energy, which typically approximates a straight-line function and relates more directly to the way that we hear these reflections in relation to one another.

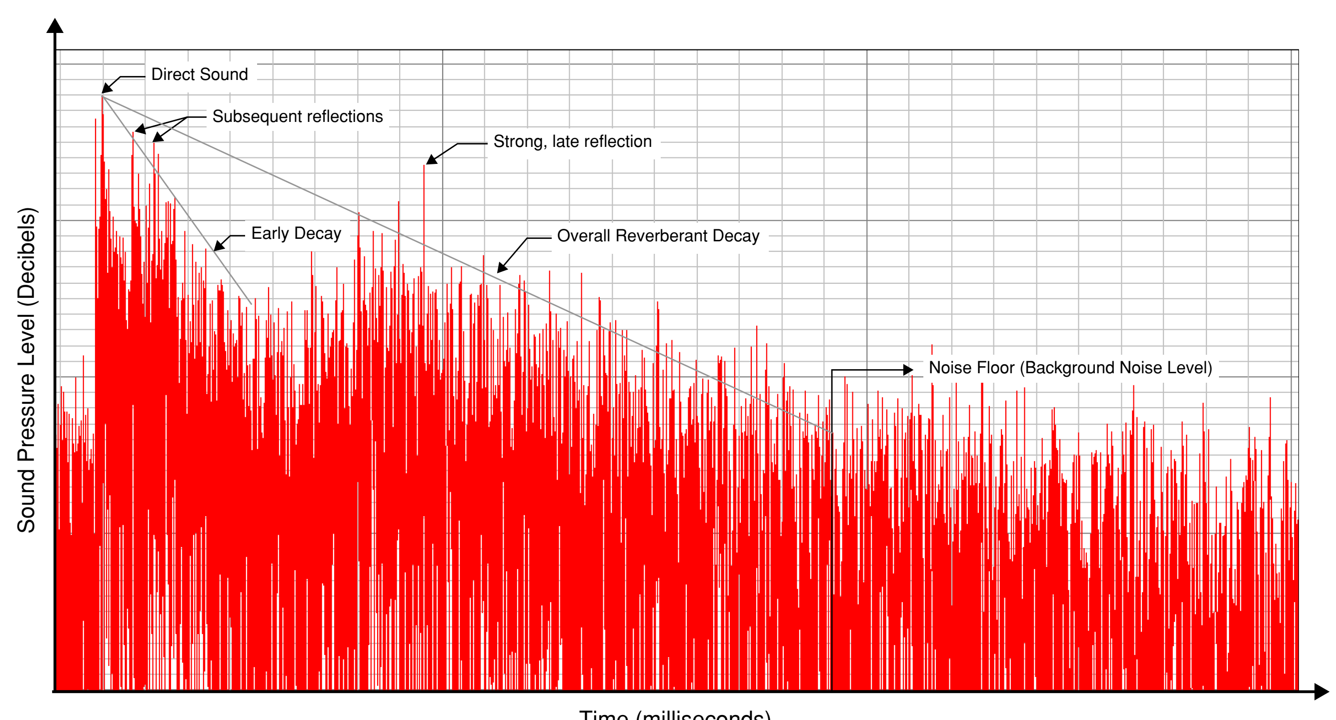
There are similar features in the impulse response and the energy time curve, in that each vertical line represents reflected energy, each of which decays over time, however the presentation of the information allows some additional criteria to be determined:

- We can calculate the reverberation time directly as the slope of the decay. The reverberation time is the time required for sound to decay 60 dB after a sound source has stopped. Reverberation is controlled by the volume of a spaces relative to the total absorption of all surface materials within the space.
- The relative level of successive reflections is now represented in decibels (dB) allowing us to understand their degree of audibility.
- The transition from signal to noise is more readily apparent.
- We can determine which of the reflections arriving after the direct sound provide useful support, supplementing the direct sound. See Figure 4. Reflections arriving with the first 30 milliseconds (ms) after the direct sound support the unamplified voice in spoken word. Reflections arriving between 30 and 45 ms are marginal in their value in supporting speech intelligibility. Reflection arriving after 45 ms begin to degrade speech intelligibility. Reflections arriving after 60ms are destructive and perceived as echoes.

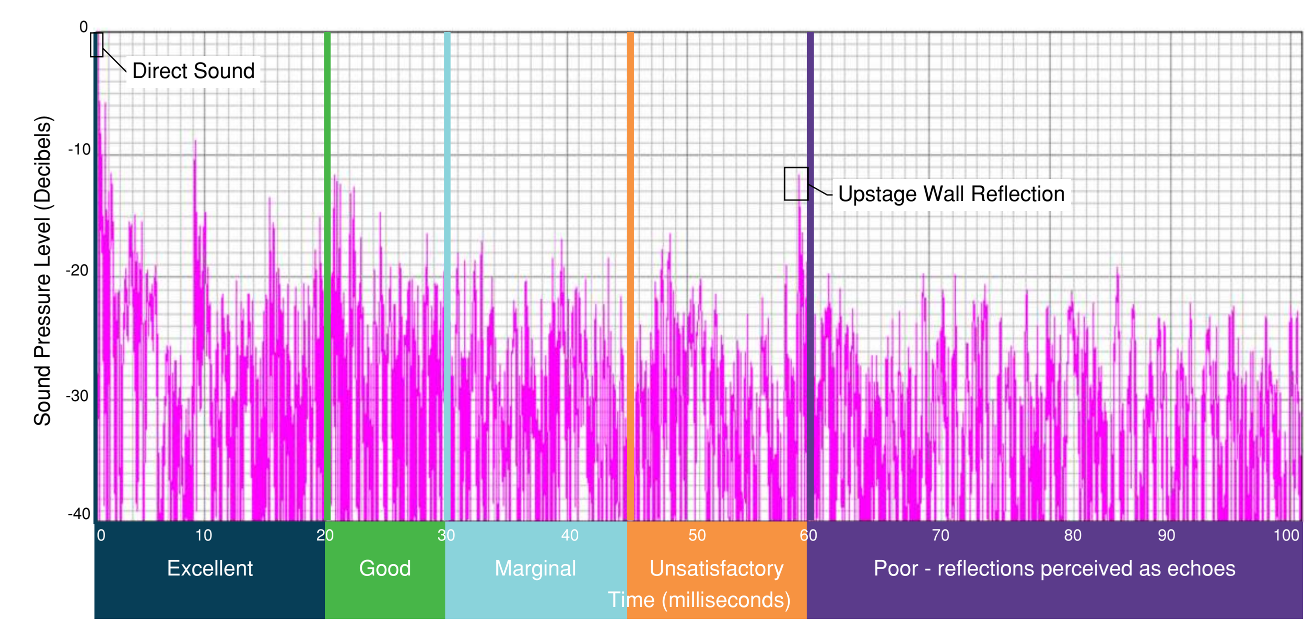
Using the Energy Time Curve (ETC) above in partnership with the 3-D acoustic model of the space we can identify where reflections occur. This process of analyzing the ETCs in tandem with the drawings and model provides us the tools to understand how sound behaves in the Kalita Humphreys Theater.

In the following pages we have chosen a select few source to receive paths to illustrate the impact of the architecture on the acoustic character of the theatre. A view in in the 3-D model shows the position of the sound source on stage, the actors position, and a receiver position, or audience's ear. The direct sound is indicated with a solid line. Reflection paths are shown as dashed lines and are labeled with a path number in the 3-D model. The reflection are labeled in the Energy Time Curve, allowing us to see the corresponding time of arrival at the listeners ear and relative dB levels.

This process of analyzing the Energy Time Curves in tandem with the acoustic model provide us the tools to understand why audience members have difficult hearing the actor on stage even while the relative size of the theatre and the distance relationship between stage and audience would suggest good hearing conditions.



Acoustics Figure 3
Energy Time Curve



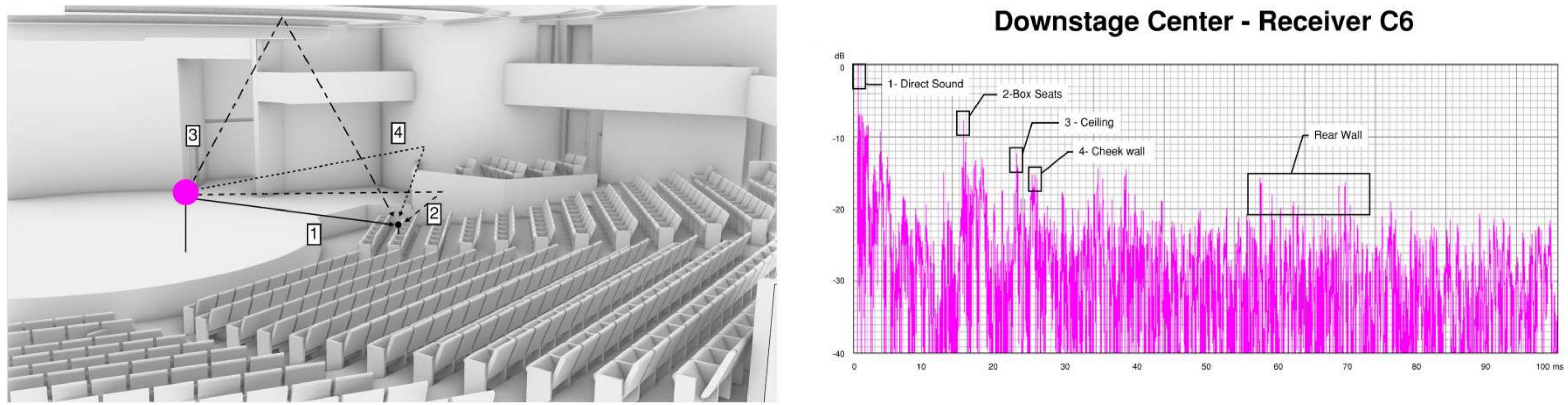
Acoustics Figure 4
Energy time curve labeling the impact of time of arrival on the ability to understand spoken word

ACOUSTICS

Downstage center source to receiver C6

Useful reflections arrive at the listener's ear within the first 30ms from the walls of the box seats, the ceiling overhead and the side check walls, within the time frame that is good for supporting speech. There is an initial time delay, defined as the time between the arrival of the direct sound and the first reflection, of 17ms. The smaller the initial time delay gap, the more supportive to speech intelligibility. This gap is within an acceptable range, but should be less given the intimate size of the Katlia.

There are a series of reflections arriving from the rear wall between 60-70 ms, the time frame in which the reflections are perceived as an echoes.



Acoustics Figure 5
Downstage center source to receiver C6 acoustic model and energy time curve

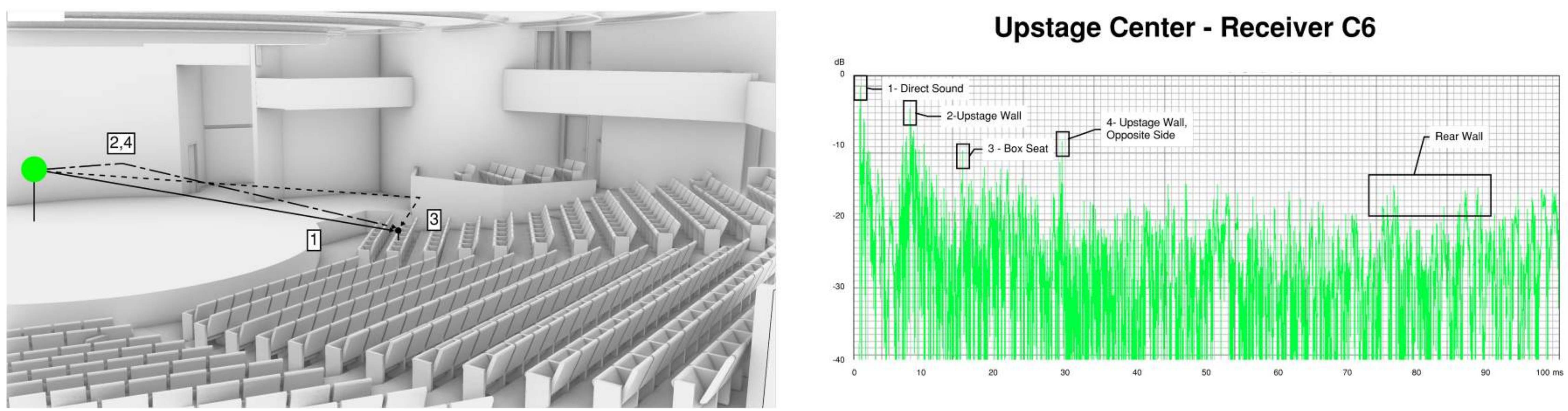
Upstage center source to receiver C6

As the actor moves upstage, the time it takes for the direct sound to reach the listener's ear is longer than it was for the downstage actor position to the same seat. Because the source and receiver are further away from each other, the sound level, in dB, of the direct sound will be lower in absolute level. The closer actor will sound louder even if both actors speak at the same volume.

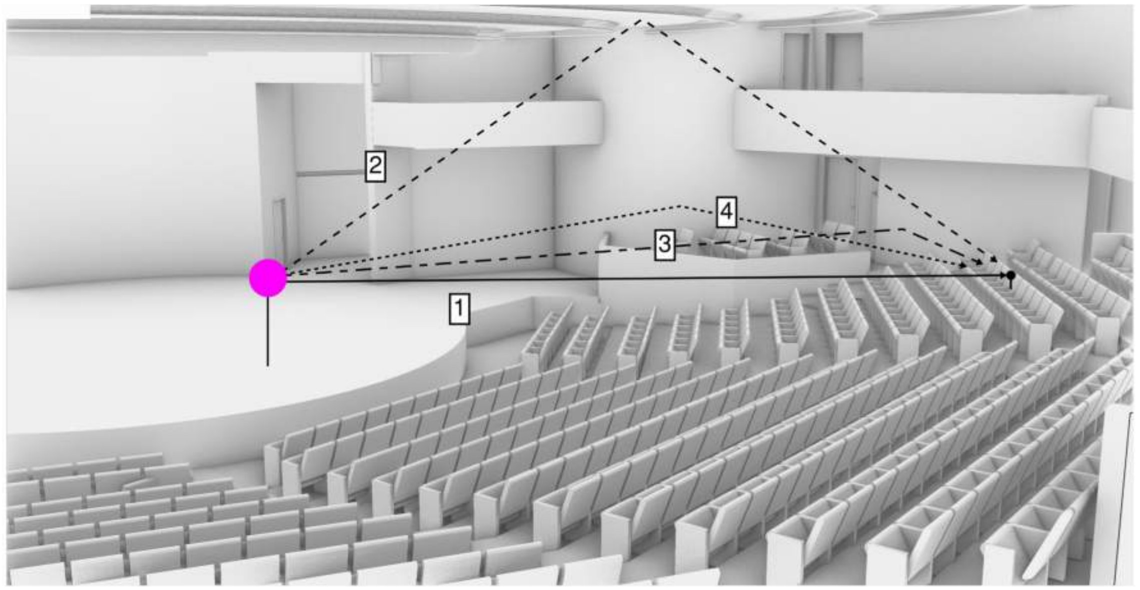
With the move upstage, the actor is now closer to the side of the stage wall on stage left and the reflection from this surface arrives closer in time to the direct sound, providing a useful 8ms initial time delay gap.

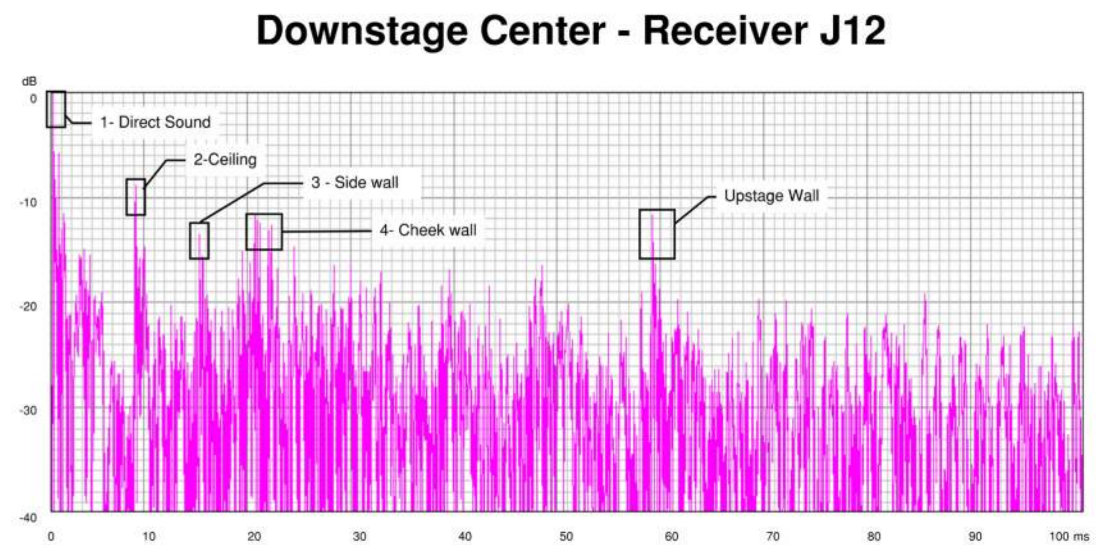
The rear wall reflections arrive even later in time when compared to above, but the levels are lower and they are more likely to blend into the noise floor.

Note the lack of reflections present from the ceiling for patron seated in the front part of the room when the actor is positioned upstage. This will be illustrated in a later section.



Acoustics Figure 6
Upstage center source to receiver C6 acoustic model and energy time curve





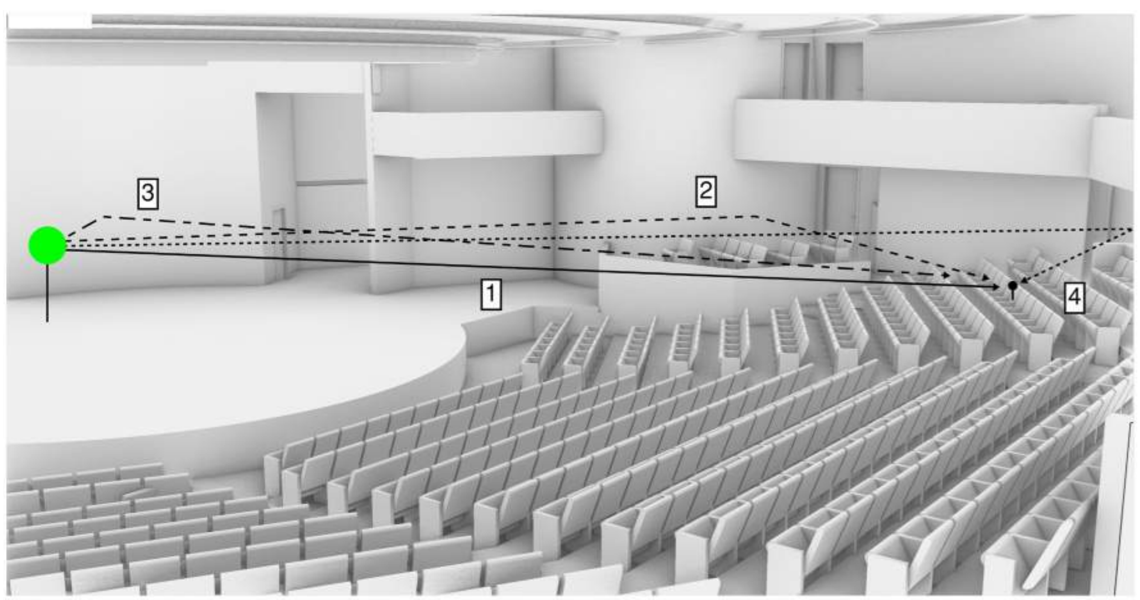
Acoustics Figure 7
Downstage center source to receiver J12 acoustic model and energy time curve

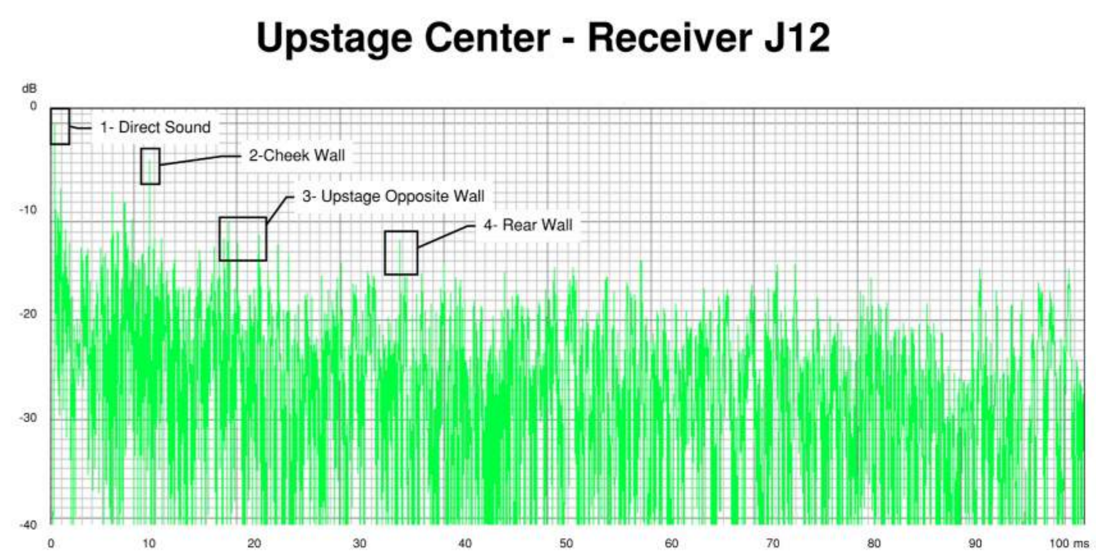
Downstage center source to receiver J12

Useful reflections arrive at the listener's ear within the first 22ms from the walls of the box seats, the ceiling overhead and the side check walls, within the time frame that is excellent for supporting speech. There is an initial time delay gap is 8ms.

The rear wall reflection at this location is very distinct reflections arriving at 58ms, and at a level 10 dB about the noise floor. Sound levels are measured on a logarithmic scale and a 10 dB difference in sound level is perceived as twice as loud. The level, at 11 dB down from the direct sound, is louder than the side wall and cheek wall reflection arriving at the 15 and 20ms. The rear wall echo is louder that the supporting reflections.

The ceiling reflection provide the first arriving reflection, arriving 9ms after the direct sound.





Acoustics Figure 8
Upstage center source to receiver J12 acoustic model and energy time curve

Upstage center source to receiver J12

Suportive reflections for this paring are thin.

The rear wall reflections is arriving, at 34ms, in the marginal range that blurs the speech intelligibility.

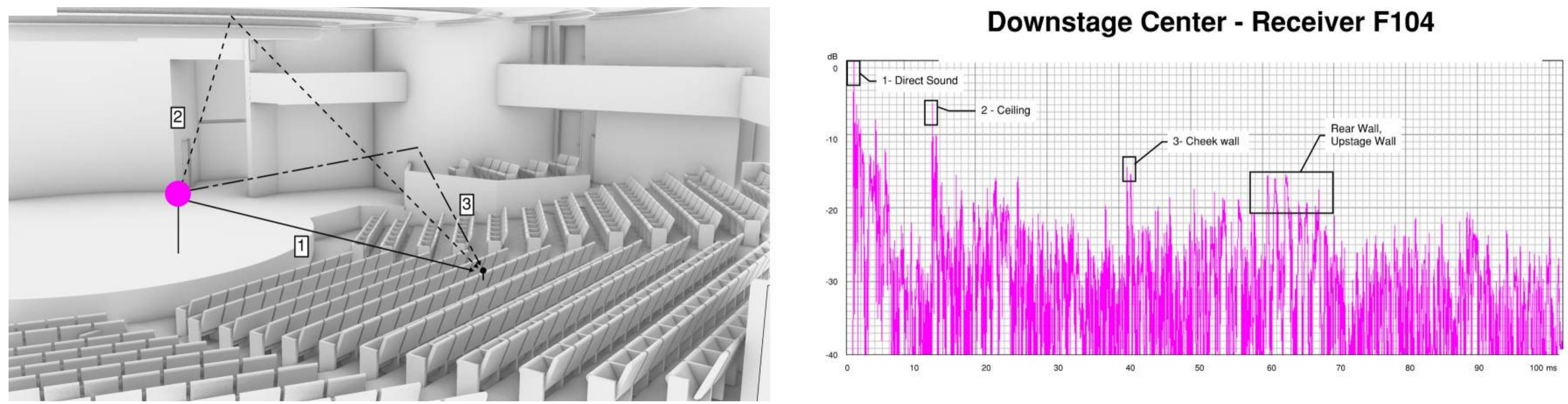
Again, note the lack of reflections present from the ceiling for patrons in the front part of the room when the actor is positioned upstage. This will be illustrated in a later section.

Downstage center source to receiver F104

As we move to the seats in the center of the room. we can see the negative impacts of a wide, fan shaped room. As structural systems advanced and could provide longer spans for building spaces, theatre designers pushed rooms wider to bring audiences closer to the stage to create more visual intimacy at the expense of acoustic intimacy. In the center of the room, the side walls are so far away, their time arrival no longer support the direct sound but rather they move into the time frame that blurs speech intelligibility, in this case, arriving at 40 ms.

Thankfully, there is an ceiling reflection arriving at 12ms to support the direct sound. Unfortunately, if the actor were to walk only a few steps up or down stage, there will be a gap in the coverage provided by the ceiling at the lighting slots. This issue will be address in later sections.

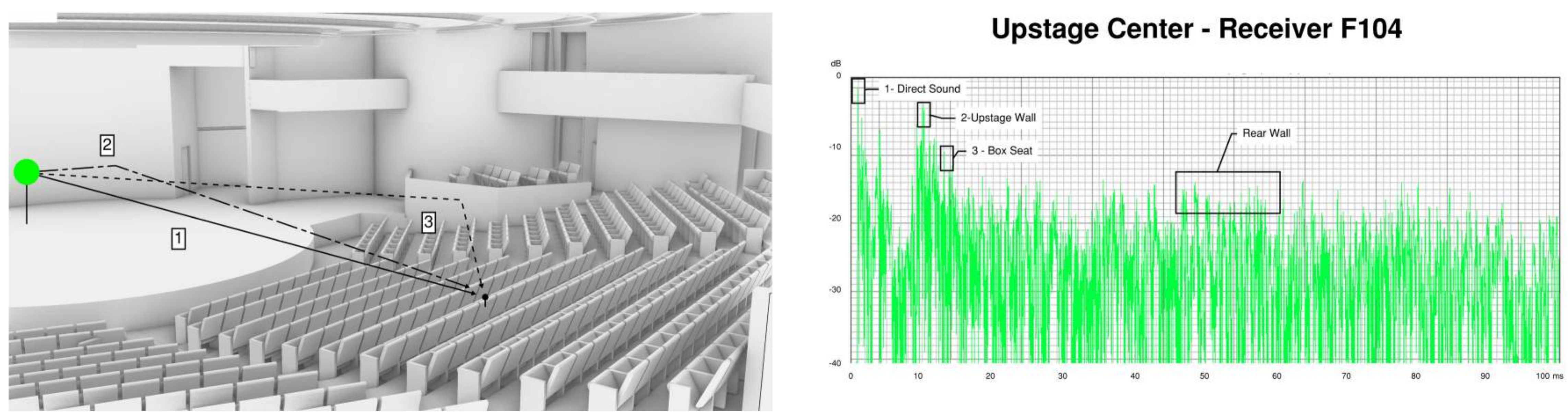
The rear and upstage wall provide reflection in the 58 to 66 ms range. With these and the later side wall reflections,a patrons seated at this seat in the center of the room hears more distracting reflections that useful.



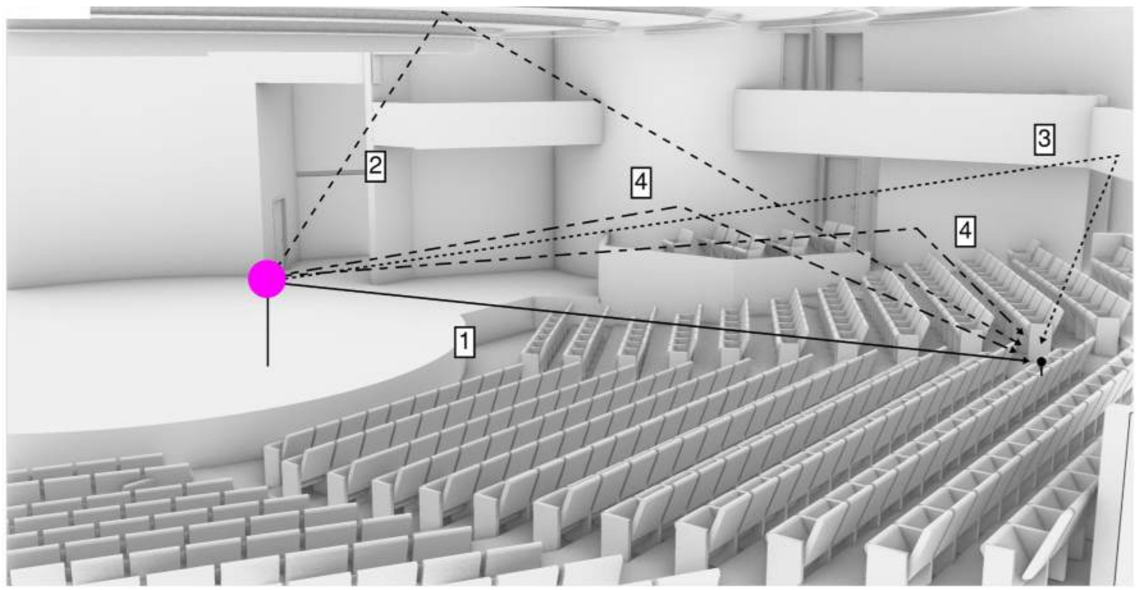
Acoustics Figure 9
Downstage center source to receiver F104 acoustic model and energy time curve

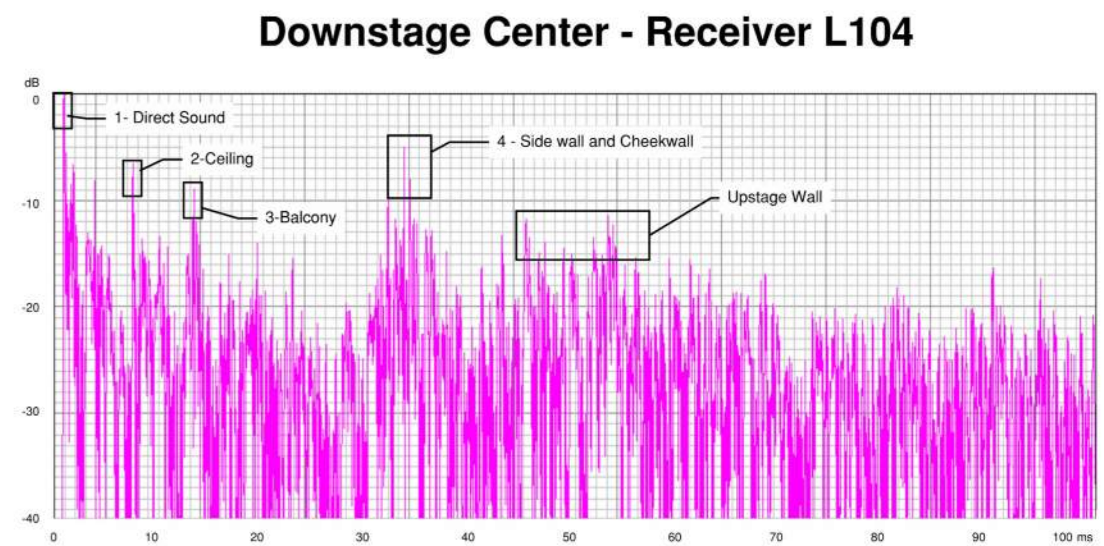
Upstage center source to receiver C6

As the actor moves upstage, the side walls of the stage can fill in some early reflections. Note the lack of overhead reflection. If there is a set piece installed, removing the upstage wall form play, this seat looses its only supportive surface.



Acoustics Figure 10
Upstage center source to receiver F104 acoustic model and energy time curve



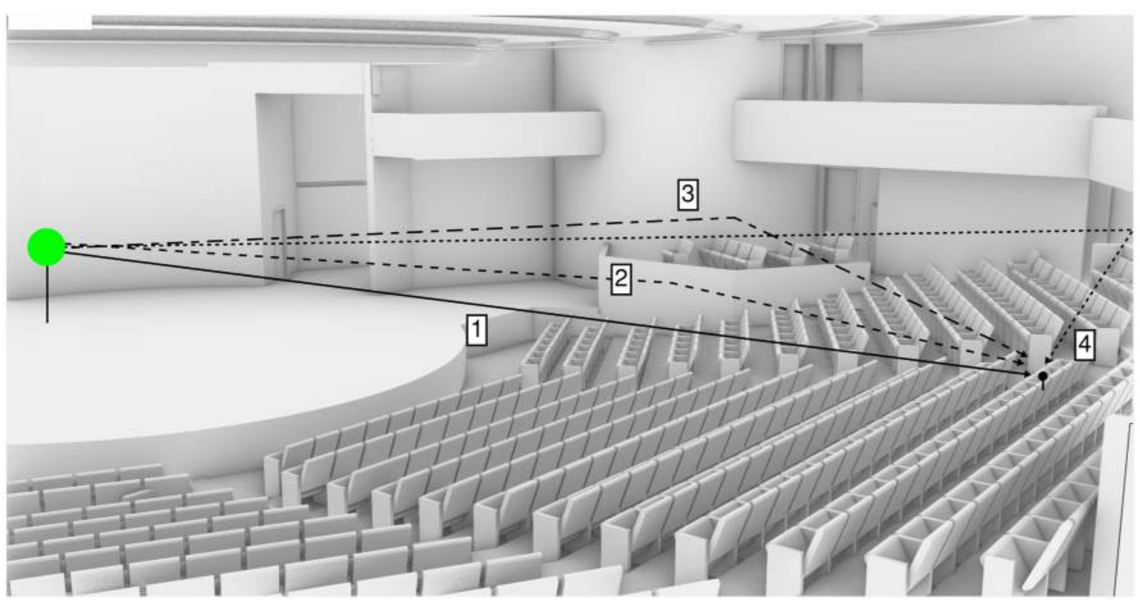


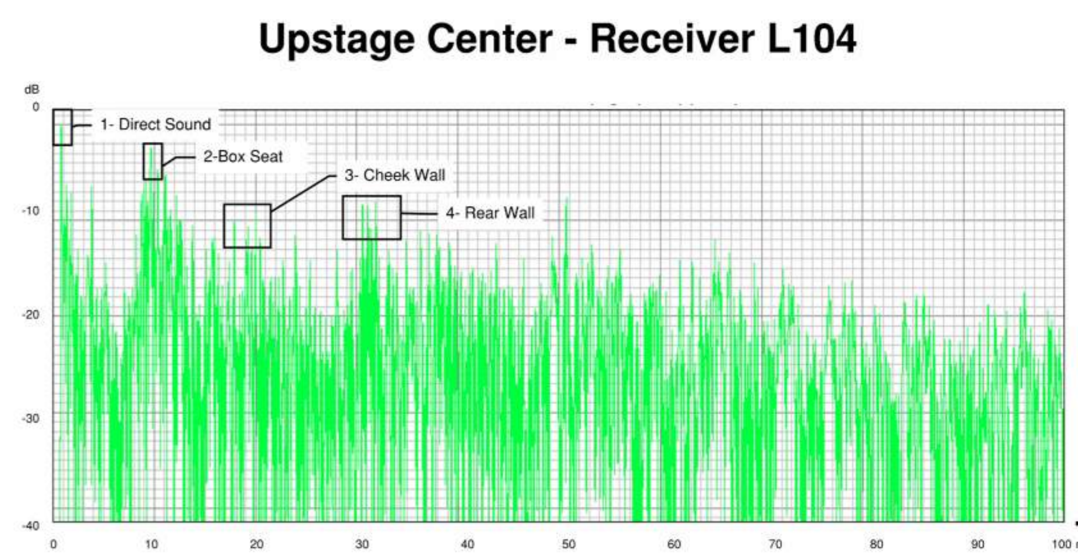
Acoustics Figure 11
Downstage center source to receiver L104 acoustic model and energy time curve

Downstage center source to receiver L104

As we move back in the audience chamber, the difference in distance between the direct sound's path and the path to side walls is reduced when compared to the seat F104 in the front center of the room, but the path is still long enough that the side wall paths labeled 4 arrives at 35 ms, rather than 40ms arrives within a time frame that degrades speech intelligibility especially given the sound level of the reflection at only 5dB below the direct.

Reflection path 3 is mislabel, and should show as reflecting of the rear portion of the side wall rather than the balcony face.





Upstage center source to receiver L104

Moving the actor upstage, again, elongates the path for the direct sound, thereby reducing the gap between the direct and reflected sound. There is more reflected activity supporting the direct sound, but the rear wall reflection will muddle the speech intelligibility.

Acoustics Figure 12
Upstage center source to receiver L104 acoustic model and energy time curve

The Acoustic Character of a Partial Thrust, Partial Proscenium Theater

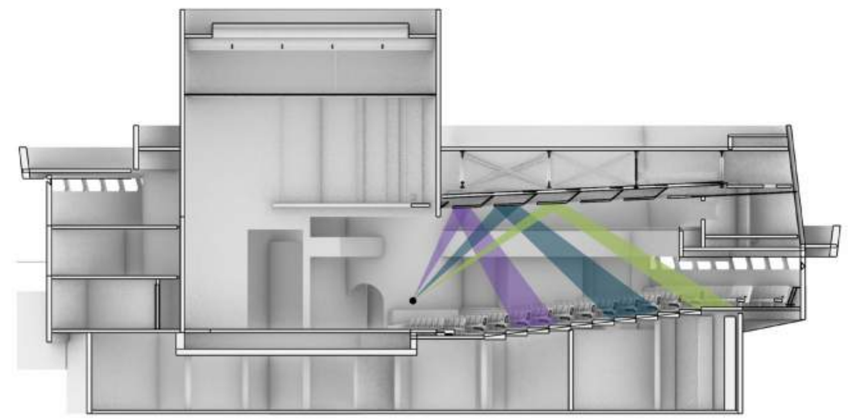
There are two primary goals of the thrust theater plan in the pursuit of theatrical intimacy. One is to smudge the lines between stage platform and audience chamber. The second is to bring as much of the audience as close to the stage as possible. In pursuit of this theatrical intimacy, acoustic intimacy is challenged. The theater format brings the audience close to the actors on stage, so the distance between the actor and patrons is as close as it can possibility be. This spacial relationship is beneficial when the actor is projecting directly to patron. But this benefit is quickly lost amongst a series of challenges presented by the form.

The first challenge comes in the positions of the actors as they play to one another. In a proscenium theater form, the actors are placed is in front of the audience to take advantage of the human vocal projection patterns which are straight ahead. When staging requires a back to be turned, it is understood that the sound the actor can project is greatly diminished. In a thrust theatre, the mere presence of audience members wrapping the stage places some audience members in less than ideal relationship to our vocal projection patterns.

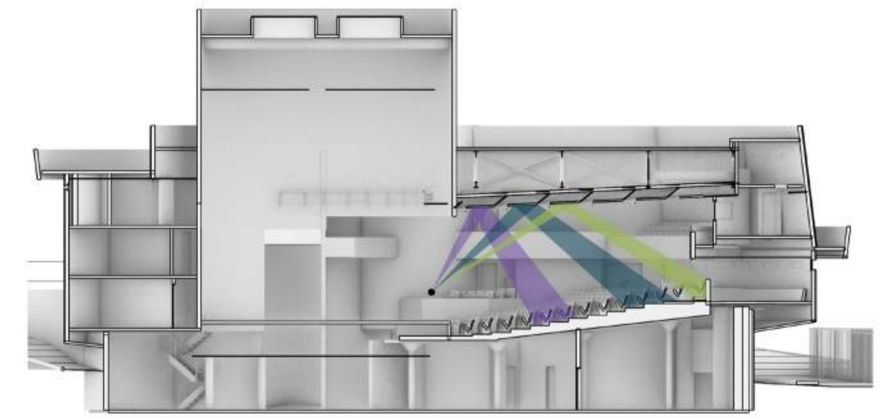
Enter the need for supporting surfaces. Shaping the surfaces around the stage, especially those overhead, offers a means to project sound to the side and behind the performer. With Kalita's drum fly zone, there are no locations available for creating overhead, cross-stage supporting surfaces.

Where there is a ceiling available over the audience chamber, the ceiling does provide a surface that reflects sound back down the audience in a somewhat useful but discriminate manner. The gaps in the ceiling plane to accommodate theatrical lighting creates striated reflection partners of coverage. See the reflection diagrams in Figures 13 to 15 for the original, existing and proposed modifications. The location of the ceiling does not change in each of the iterations that follow, but the height of the stage and seating risers do change, slightly modifying ceiling reflection.

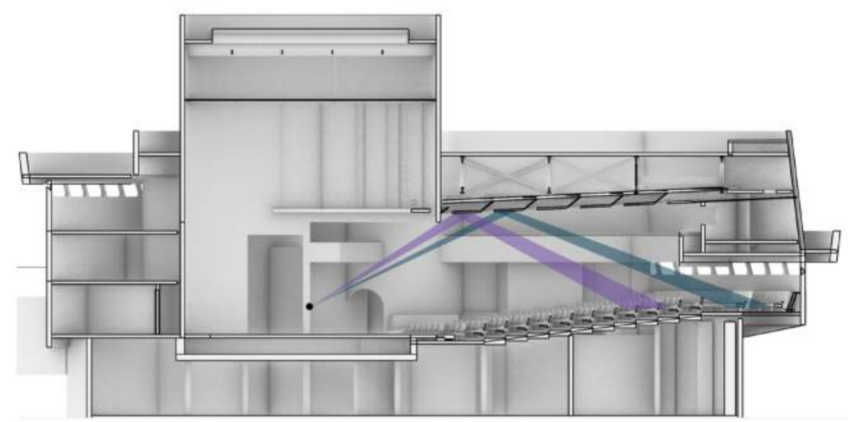
The most important item to note in the illustrations is the very limited area of seating that receives a ceiling reflection for each actor position on stage. A patron may be seated in a covered area in one moment, but should the actor step upstage or downstage, the coverage will disappear. Also note the very limited area covered by the seating at each performer position. With a midstage and upstage sources, for example, only the first and second rings of the ceiling provide a reflection to the audience on the main floor. Reflections off the third ceiling ring drive into the circulation and balcony.



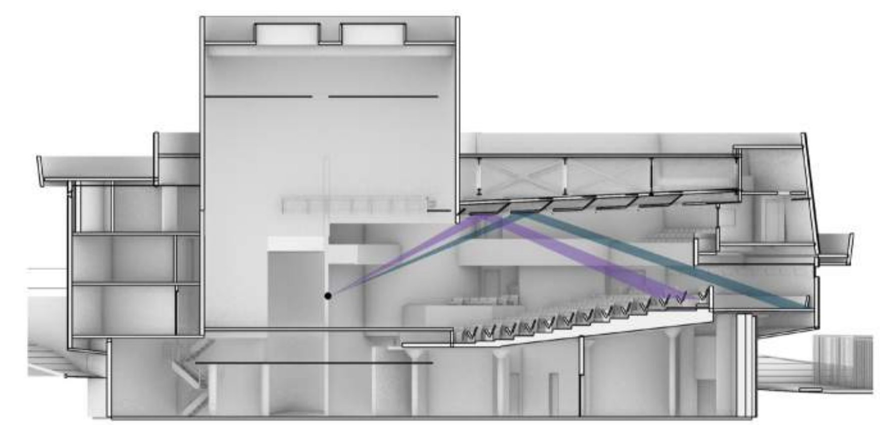
Acoustics Figure 13
Original Audience Ceiling Reflections - Downstage Source



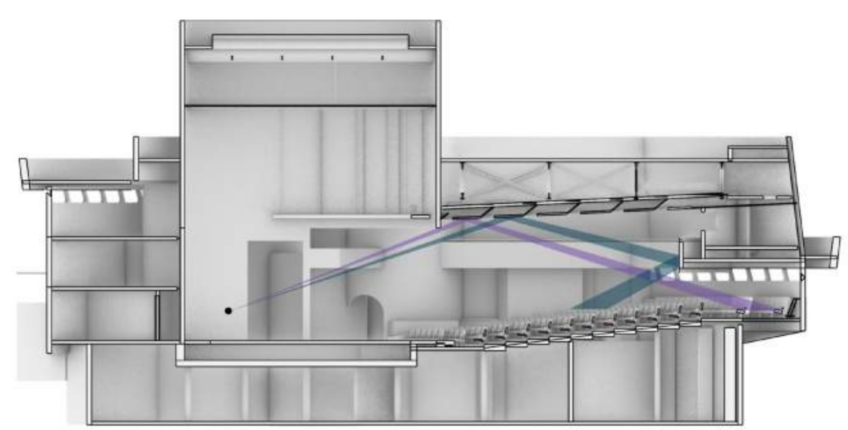
Acoustics Figure 16
Current Audience Ceiling Reflections - Downstage Source



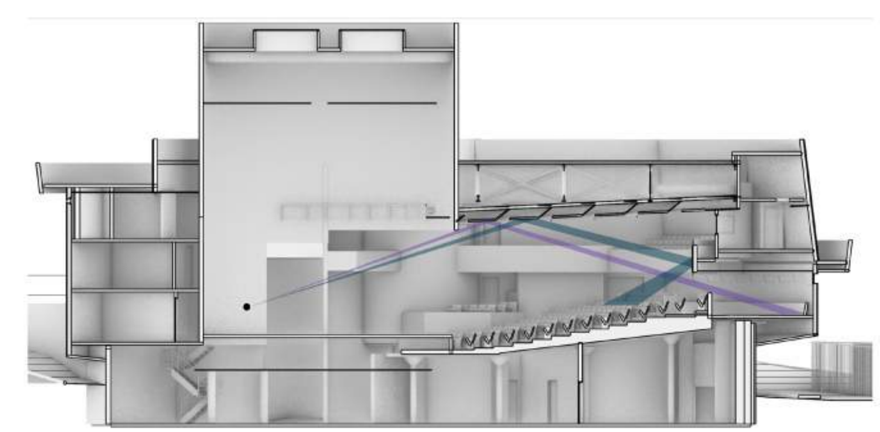
Acoustics Figure 14
Original Audience Ceiling Reflections - Midstage Source



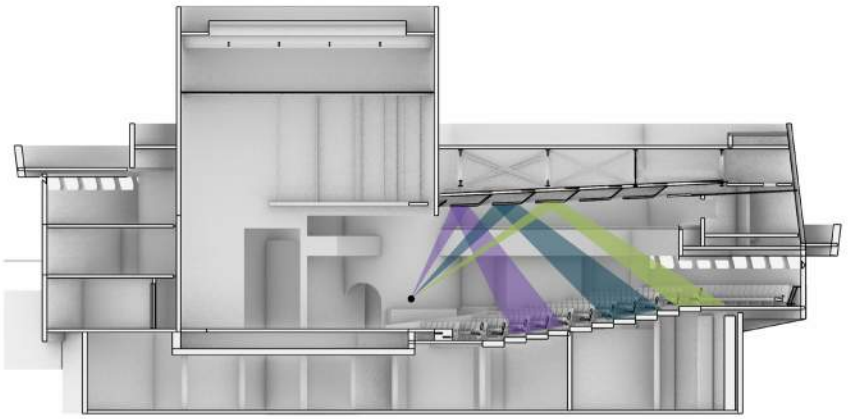
Acoustics Figure 17
Current Audience Ceiling Reflections - Midstage Source



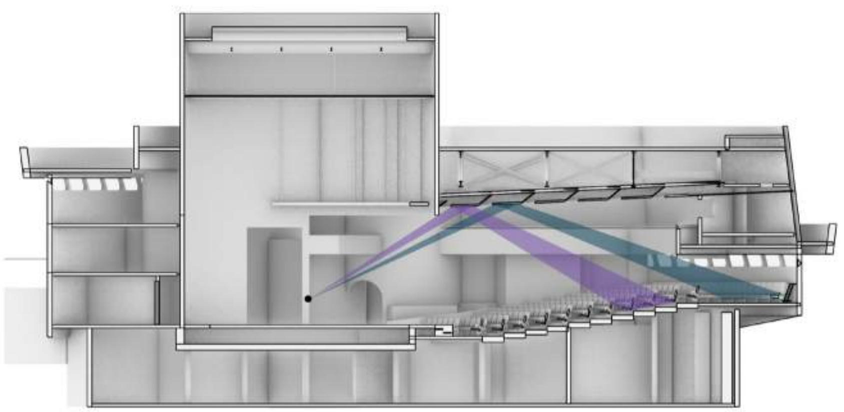
Acoustics Figure 15
Original Audience Ceiling Reflections - Upstage Source



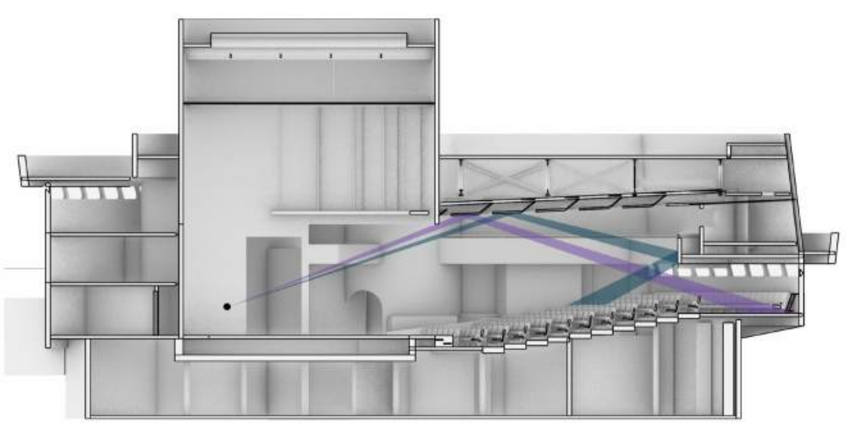
Acoustics Figure 18
Current Audience Ceiling Reflections - Upstage Source



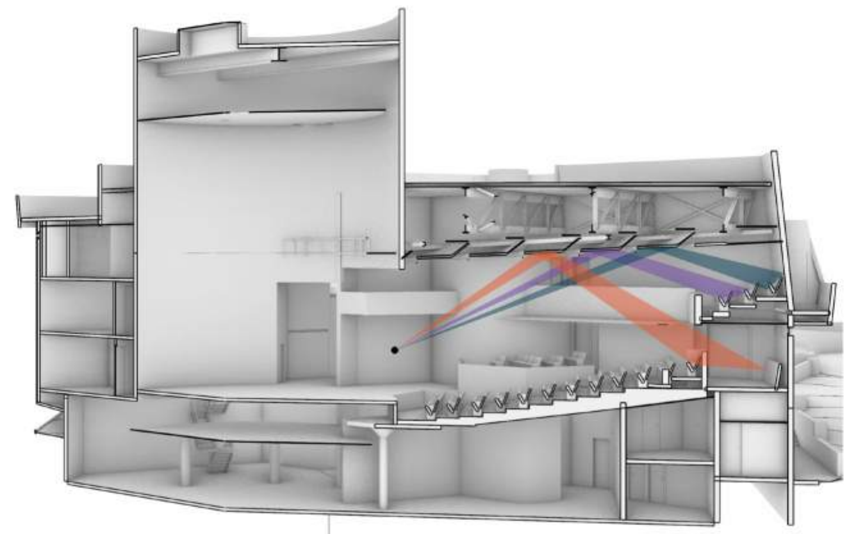
Acoustics Figure 19
Proposed Audience Ceiling Reflections - Downstage Source



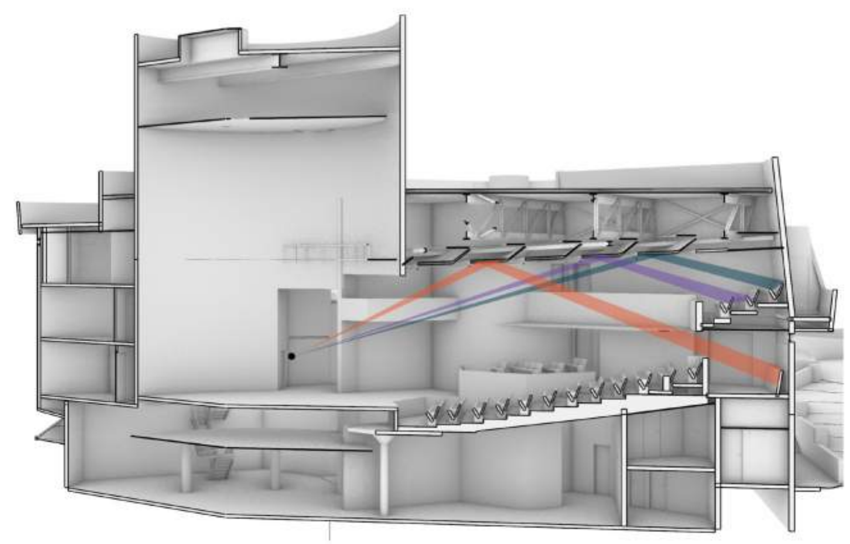
Acoustics Figure 20
Proposed Audience Ceiling Reflections - Midstage Source



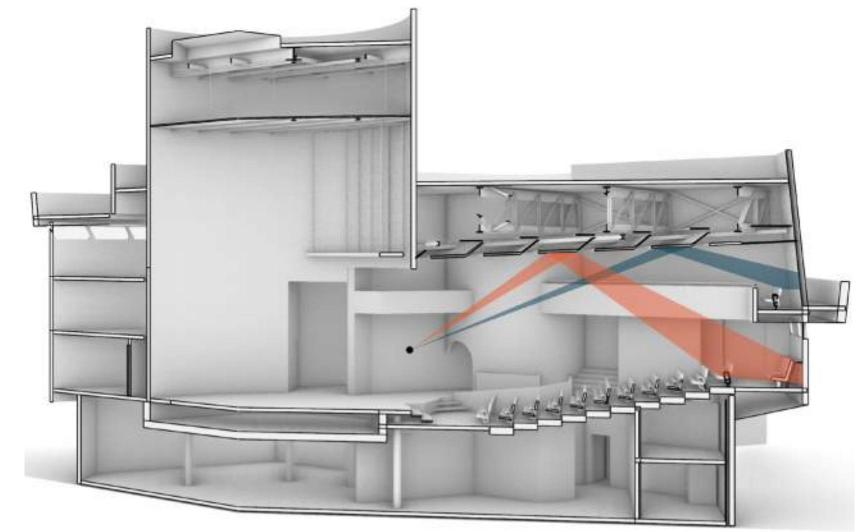
Acoustics Figure 21
Proposed Audience Ceiling Reflections - Upstage Source



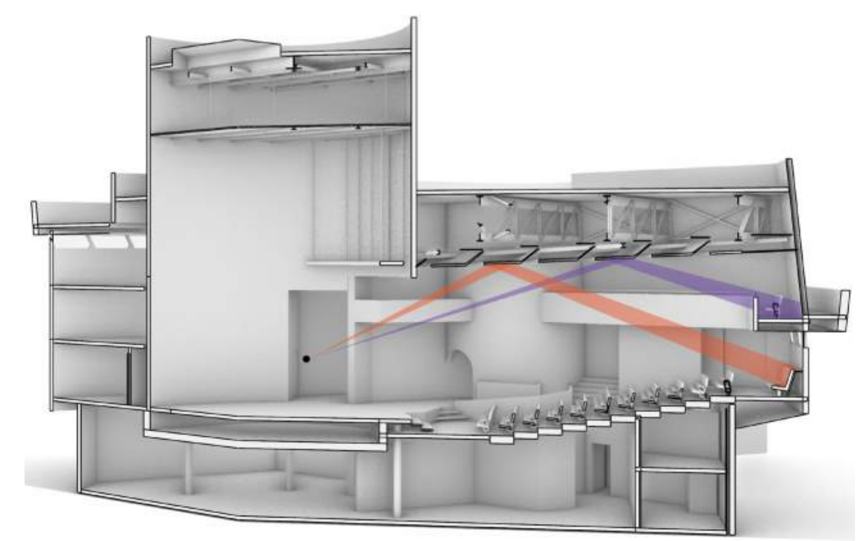
Acoustics Figure 22
Current Balcony and Audio Mix Ceiling Reflections - Downstage Source



Acoustics Figure 23
Current Balcony and Audio Mix Ceiling Reflections - Midstage Source



Acoustics Figure 24
Proposed Balcony and Audio Mix Ceiling Reflections - Downstage Source



Acoustics Figure 25
Proposed Balcony and Audio Mix Ceiling Reflections - Midstage Source

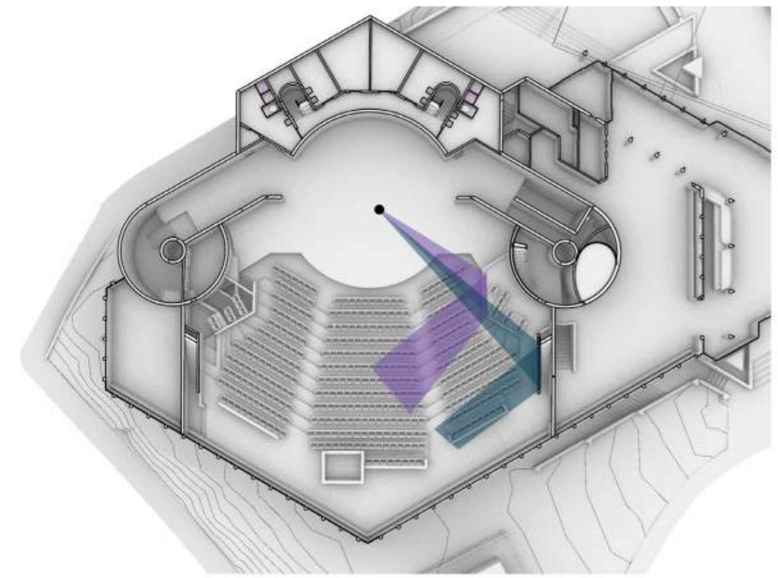
ACOUSTICS

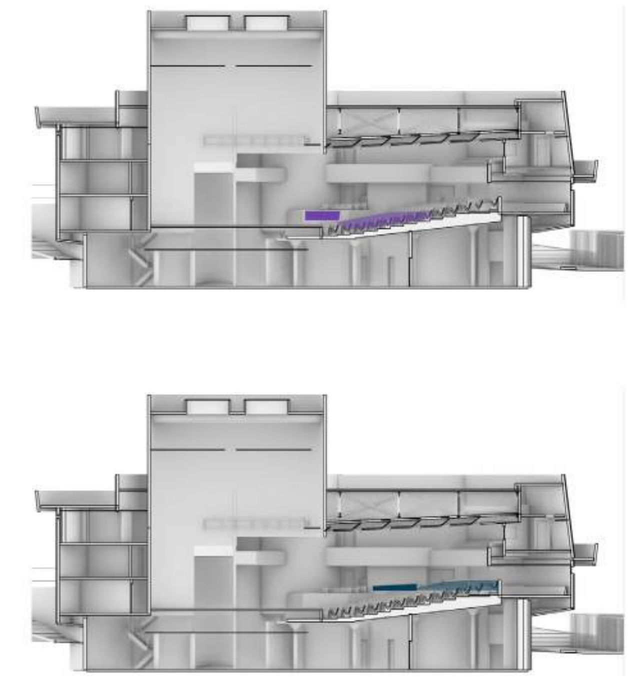
Side wall surfaces are also important in supporting the direct sound for a performer on the path to the patron's ears. In Figure 26, we provide both a plan with reflection coverage produced by the side wall along with a section showing how each zone of the wall creates that reflection.

Not unlike the ceiling reflection diagrams, the side wall graphics illustrate clearly limited the seating area coverage by the side walls. In the down stage performer position, nearly half of the seats receive no support form the side walls. As the performers move upstage, the patrons covered decreases yet further.

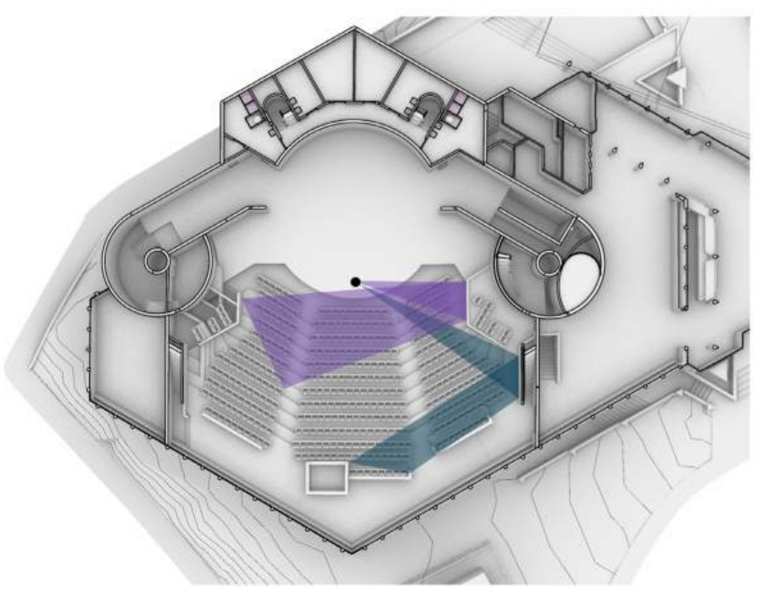
Pair the limited side wall coverage with striated ceiling coverage and the two aligns with the pattern of splotchy, inconsistent, singular reflection energy seen in the energy time curves analysis. Add into the mix, the non-frontal relationship of performer to patron inherent in a partial thrust condition and the result is a room which looks by its scale to be an intimate space, yet in experience, is acoustically challenged.

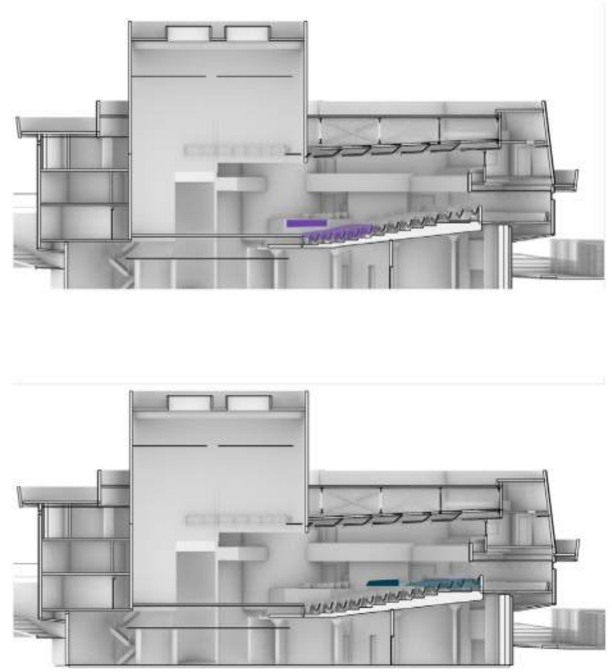
The ultimate success in the space will be achieved with the application of a well designed audio system to lift the natural voice.



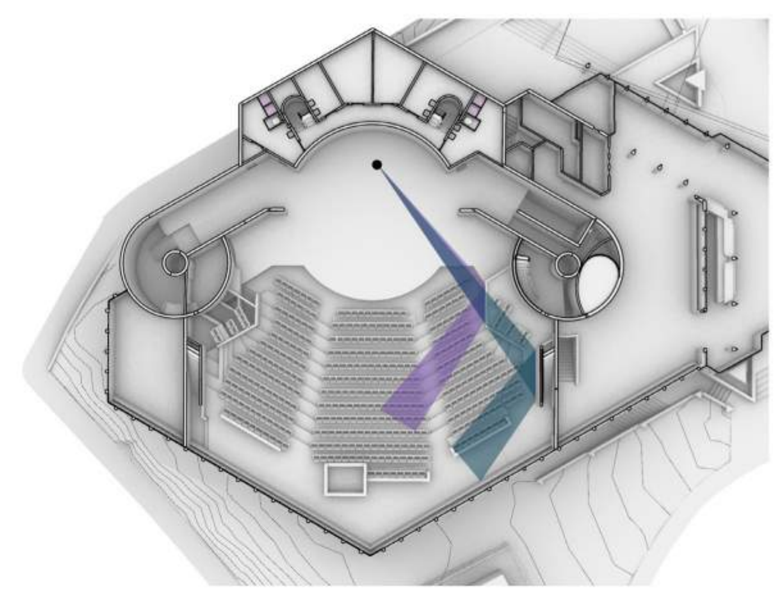


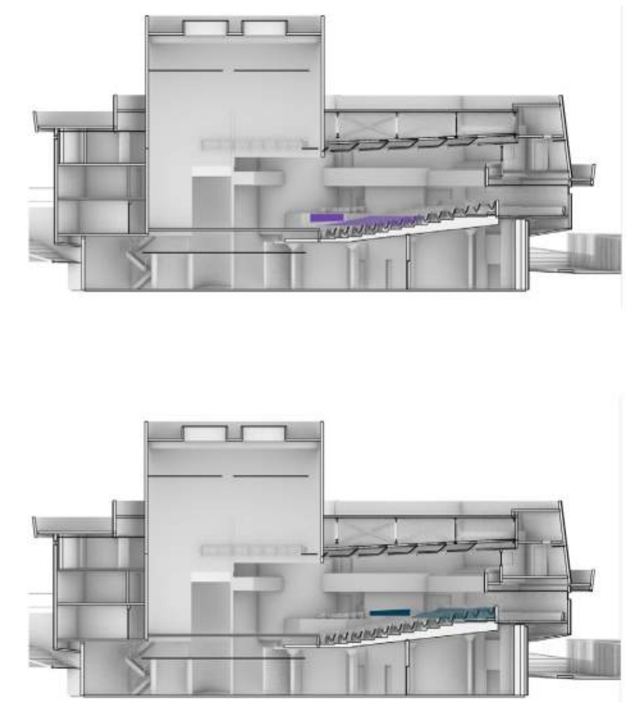
Acoustics Figure 27
Current- Midstage Source



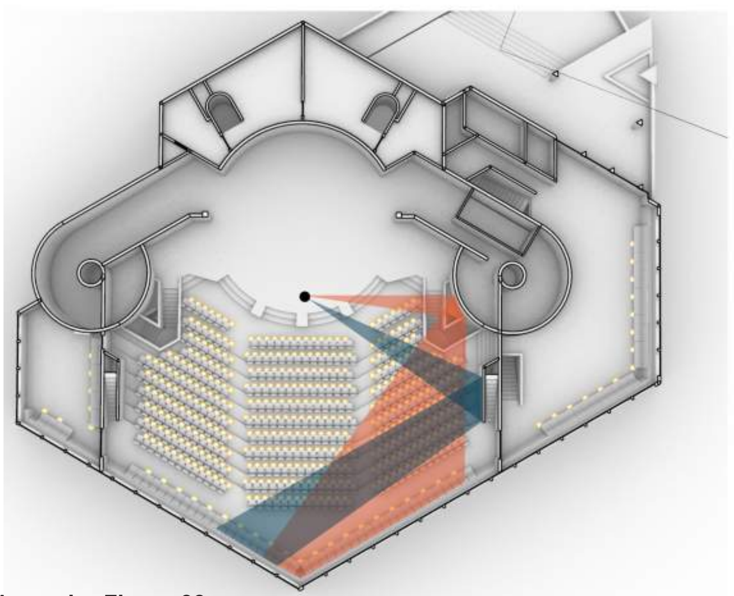


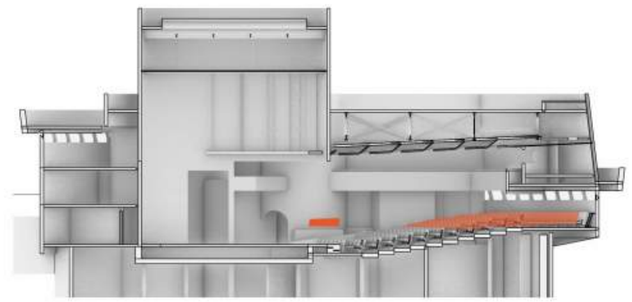
Acoustics Figure 26
Current - Downstage Source

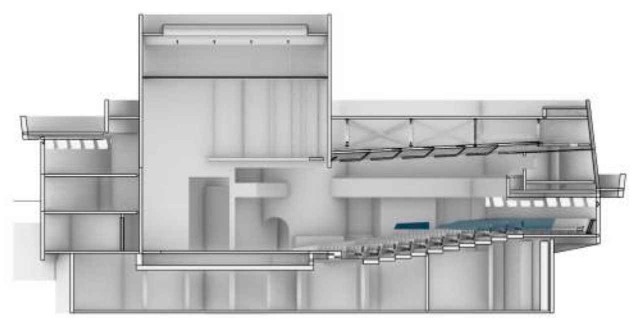




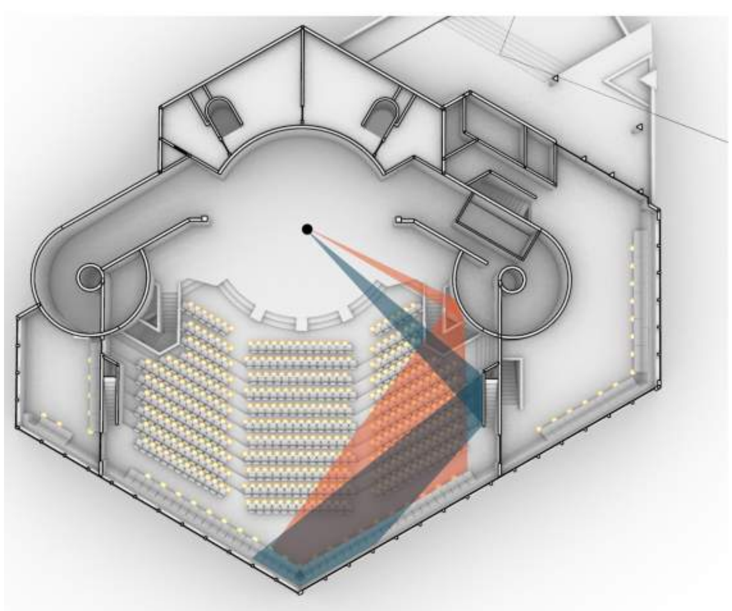
Acoustics Figure 28
Current - Upstage Source

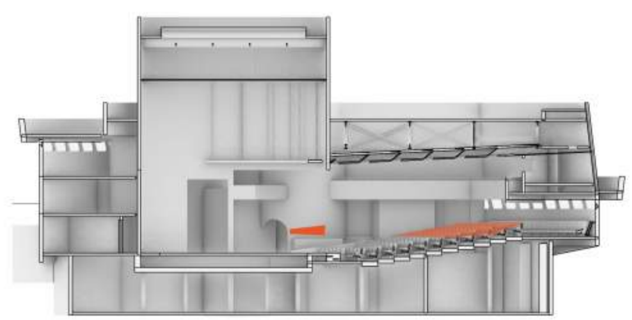


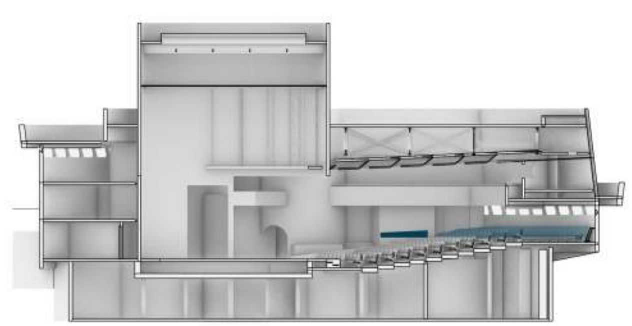




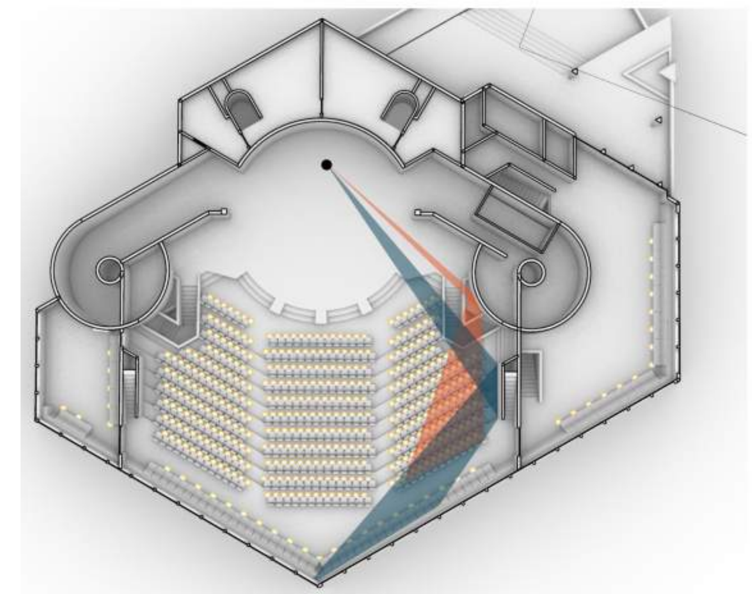
Acoustics Figure 29
Proposed - Downstage Source

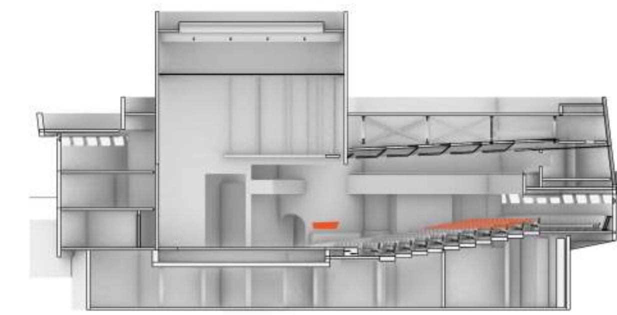


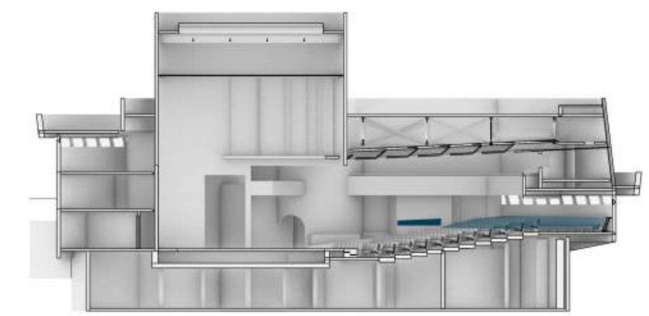




Acoustics Figure 30
Proposed - Midstage Source







Acoustics Figure 31
Proposed - Upstage Source

Exterior Sound Levels from Aircraft Fly Overs

Airplane fly overs were audible inside the theater during our measurements and during the production of Our Town. The theater's proximity to Dallas Love Airport subjects it to constant noise impacts from overhead fly overs. Dallas Love Field Airport offers roughly 490 aircraft operations daily, predominantly 50% commercial aircraft. During typical production hours (evenings, Saturday matinees), aircraft depart Dallas Love Airport at a rate of one fly over event every 5 minutes.

When standing along Sylvan Drive, the aircraft is audible for roughly 30 seconds as it flies over the theater.

We took several 30-second fly over measurements and a single 10-minute ambient noise measurement on February 11, 2022, between 10:30 and 11:00am, with a B&K 2270-meter. Aircraft measured were departing Dallas Love Field Airport and according to the app FlightAware, aircraft passed overhead at approximately 2,000 ft in elevation.

Average noise levels were 63dBA and consistent between planes (all measured planes were 737 twin jet-type). The 30-second flyover measurements were taken along Sylvan Drive, whereas the 10-minute recording was taken on the roof of the Kalita Humphreys theater.

The ambient noise levels are roughly 10 dBA quieter than individual fly over events, meaning that fly overs are perceived to be twice as loud as the average background noise levels.

Fly Over Events Leq Sound Levels (dB)

	16	31.5	63	125	250	500	1000	2000	4000	8000
Ambient exterior noise	58	58	56	56	52	51	48	40	27	21
Average fly over event noise	58	60	62	65	64	62	58	50	33	21
Level of fly over above ambient	0	3	6	9	13	11	10	11	6	0

Acoustic Design - Proscenium Theater

Program Use and Room Acoustic Characteristic

The 250-seat Proscenium Theater will present dramatic and musical theatrical performances. With the primary acoustic objectives of supporting the voice in spoken word in drama and song for musical theater, the room will be designed to support the both the amplified and unamplified voice.

For the unamplified voice, the selection of finish materials are recommended with an emphasis is placed on maintaining speech intelligibility, support for the performers, acoustic intimacy, and control of excessive reverberance. For amplified performances, speech intelligibility and control of excessive reverberation are the primary considerations.

To support the spoken voice, hard surfaces will be shaped to provide reflection of the performers voice arriving within a relatively short amount of time relative to that of the direct sound. Supportive surfaces at the side walls and at ceiling reflectors under the catwalks will distribute these useful first order reflections to the audience chamber.

An audio mix position will be located in the last two rows of the parterre level. The rear wall surface behind the audio mix will be finished with finish incorporating both diffusion and absorption

Finishes

Audience Chamber Floor – The audience chamber floor shall be a hard, reflective surface under the audience seating to provide a sense of immediacy around the audience members and to support the sounds of laughter and applause. Carpeting may be installed in the aisle to provide control of foot fall noise and provide traction as the audience members navigate the space.

Auditorium Side Walls – Unsealed split-faced CMU will create a solid, flat surface to provide a simple reflection surface in the horizontal plane, supporting the direct sound of an actor's voice as it projects from the stage area into the audience chamber. The split faced finish of the CMU will provide diffusion at high frequencies to soften a harsh reflection without coloring the frequency necessary for speech ineligibility. It will also reduce the impact of flutter echo between the parallel side walls.

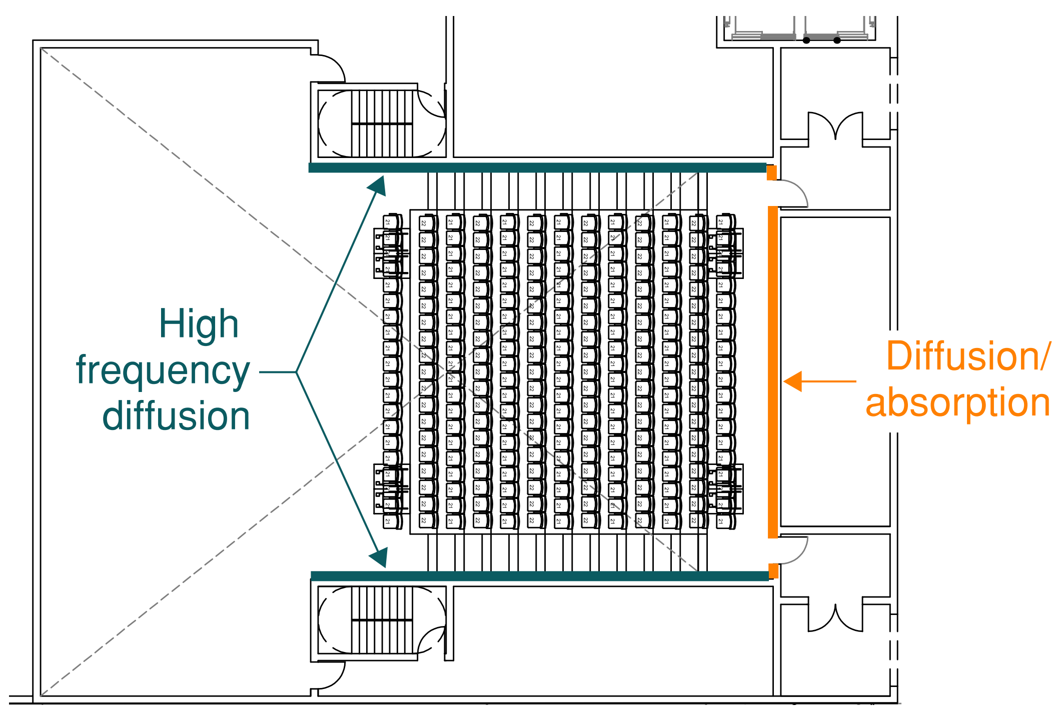
Auditorium Rear Walls – A mix of sound diffusion and sound-absorptive finishes will be provided for echo and reverberation control.

Ceiling - To control the level of reverberation within the audience chamber, absorption will be added to the underside of the structural ceiling. Assume a 2" thick fiberglass or recycled cotton product mounted with a coverage area equal to 50% of the total ceiling area in the audience chamber.

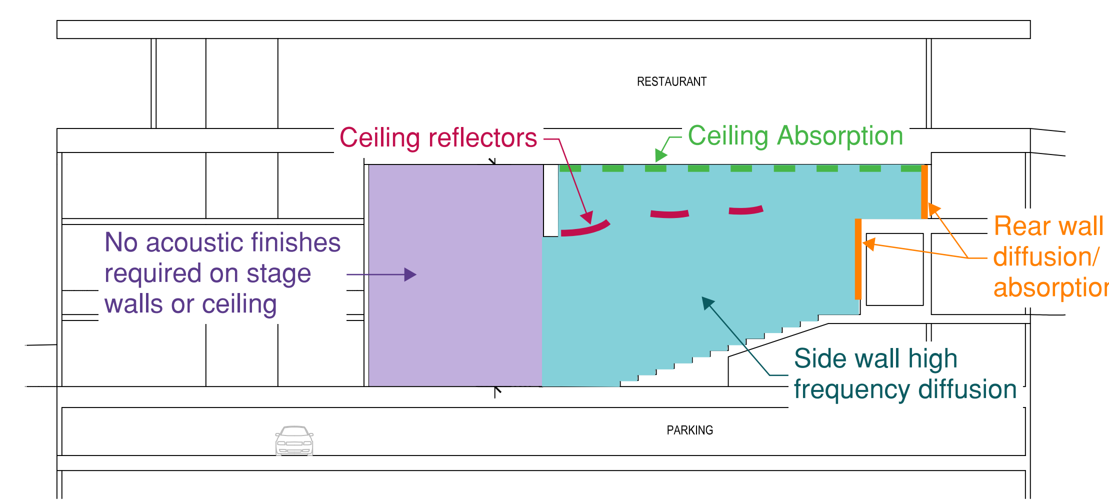
Ceiling Reflectors – Ceiling reflectors at the forestage and incorporated under or between the catwalks in the audience chamber will provide a simple reflection surface in the vertical plane, supporting the direct sound of an actor's voice as it projects from the stage area into the audience chamber. Reflector will run the transverse length of the audience chamber and have a minimum depth of 8' with a curved radios of 20º. The construction will be 3-ply 5/8" gypsum board, or one layer 3/4" MDF laminated to each side of 2-inch paper honeycomb .

Stage Floor – The stage floor will be coordinated with the Theatrical Consultant.

Stage Walls and Ceiling - Stage walls and ceiling require no acoustic treatment.



Acoustics Figure 32
Proscenium Theater Plan - Finishes



Acoustics Figure 33
Proscenium Theater Section - Finishes

Sound Isolation

A complete box-in-box construction will be employed to isolation the Theatre from the airborne noise and vibration imparted into the building's structure from the parking garage below and the rest of the performance pavilion's activities.

Walls – The walls surrounding the Theatre and Stage will consist of 12" thick grouted CMU. There will be a 2" Acoustic Isolation Joint (AIJ) separating the Theatre and Stage from the rest of the building. Directly adjacent spaces are anticipated to have their own interior wall surface on the non-isolated side of the AIJ.

Floor - An isolated concrete slab will be provided at the base of the Proscenium Theatre atop a thick, stiff concrete structural floor to control air and structure borne noise from the parking garage below.

Ceiling/Roof – The roof structure of the Theatre and Stage will be a minimum 100psf concrete. A spring isolated, gypsum board barrier ceiling complete the interior box of the Proscenium Theatre to isolate activities from the Restaurant above.

Doors – Sound and light lock vestibules are required at each entrance to the Audience Chamber and Stage

Solid core or heavy gauge fiber-filled doors will be provided incorporating acoustical gasketing with cam-lift hinges or raised thresholds. At entrances with no sound and light lock, STC-rated door will be required. Coordinate fire separation line to allow push/pull hardware on interior doors to the auditorium and panic hardware on the outer doors of the sound and light locks only.

Oversized STC-rated doors will be required between the Stage and Back of House/Loading.

Booth Window - STC 35 operable window system at the Control Booth.

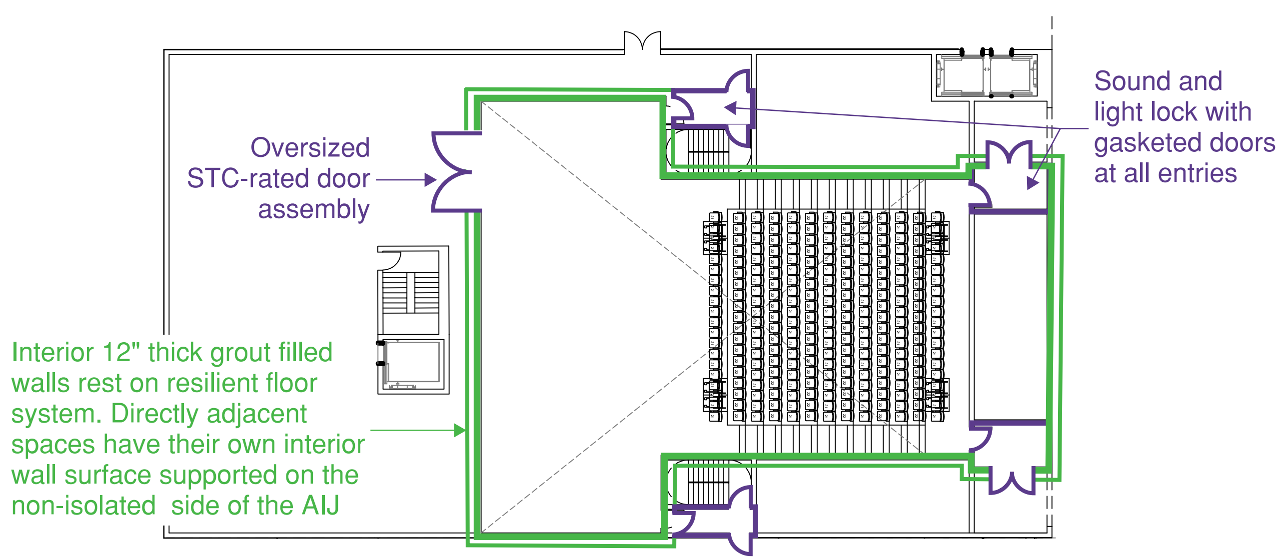
Hatches – Smoke and exhaust hatches will be STC rated and/or designed with additional acoustic separation (attenuators, transfer ducts, etc.)to mitigate exterior noise infiltration.

Background Noise

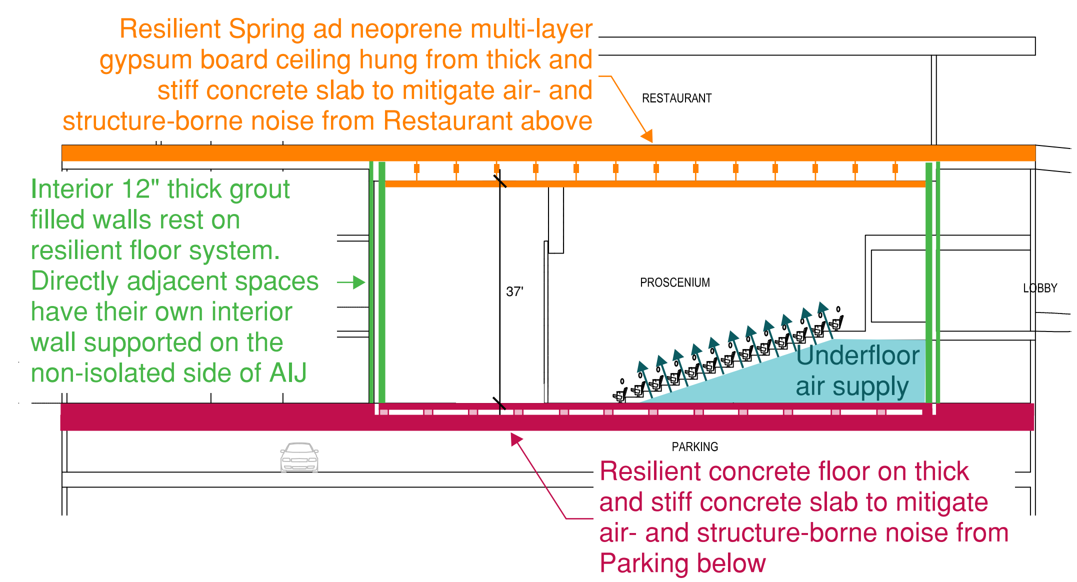
The background noise level design criteria is RC 20.

Audience Chamber Ventilation - We recommend the use of an underfloor displacement system for the Theater with its fixed seating configuration. Air is supplied into a plenum created under the seating risers and is distributed through diffusers in the floor or via perforated seat pedestals. Air is returned high in the room. The inherently slow-moving air, the elimination of overhead supply duct work, and reduction in cooling capacity compared to the requirements of comparable overhead systems allow for much more efficient control of system noise.

The air distribution in the stage house



Acoustics Figure 34
Proscenium Theater Plan - Sound Isolation



Acoustics Figure 35
Proscenium Theater Section - Sound Isolation

Acoustic Design - Studio Theater

Program Use and Room Acoustic Characteristic

The 100-seat Studio Theater will host dramatic and musical theatrical performances. The space is reconfigurable with a series of demountable platform. With the primary acoustic objectives of supporting the voice in spoken word in drama; the room will be designed to support the both the amplified and unamplified voice, in any configuration the theater might be set..

For the unamplified voice, the selection of finish materials are recommended with an emphasis is placed on maintaining speech intelligibility, support for the performers, acoustic intimacy, and control of excessive reverberance. For amplified performance, speech intelligibility and control of excessive reverberation are the primary considerations.

To support the spoken voice, hard surfaces will be shaped to provide reflection of the performers voice arriving within a relatively short amount of time relative to that of the direct sound. Supportive surfaces at the side walls and at ceiling reflectors under the catwalks will distribute these useful first order reflections to the audience chamber.

An audio mix position will be located in the last two rows of the parterre level. The rear wall surface behind the audio mix will be finished with finish incorporating both diffusion and absorption

Finishes

Walls - Exposed unsealed split face CMU with 2-inch tectum absorptive panels on the walls from 2' to 14' AFF between Unistrut at 4' spacing.

Ceiling - 2-inch (50mm) thick black duct liner surface applied to 50% of ceiling surface area.

Ceiling Reflectors - Assume acoustic reflectors hung from the underside of catwalks or underside of ceiling covering 40% of the ceiling area with a minimum width of 4' width. 2-ply 5/8" gypsum on framing.

Stage Floor – The stage floor will be coordinated with the Theatrical Consultant.

Sound Isolation

A complete box-in-box construction will be employed to isolate the Studio Theatre from the airborne noise and vibration imparted into the building's structure from the parking garage below and the rest of the performance pavilion's activities.

Walls – The walls surrounding the Theatre and Stage will consist of 12" thick grouted CMU. There will be a 2" Acoustic Isolation Joint (AIJ) separating the Studio Theatre from the rest of the building. Directly adjacent spaces are anticipated to have their own interior wall surface on the non-isolated side of the AIJ.

Floor - An isolated concrete slab will be provided at the base of the Studio Theatre atop a thick, stiff concrete structural floor to control air and structure borne noise from the parking garage below.

Ceiling/Roof – The roof structure of the Theatre and Stage will be a minimum 100psf concrete. The extent and intensity of green roof and additional roofing materials may offset this requirement.

Glazing – The opera glazing walls to the exterior will require a two rows of the assembly separated by an airspace.

Booth Window - STC 35 operable window system at the Control Booth.

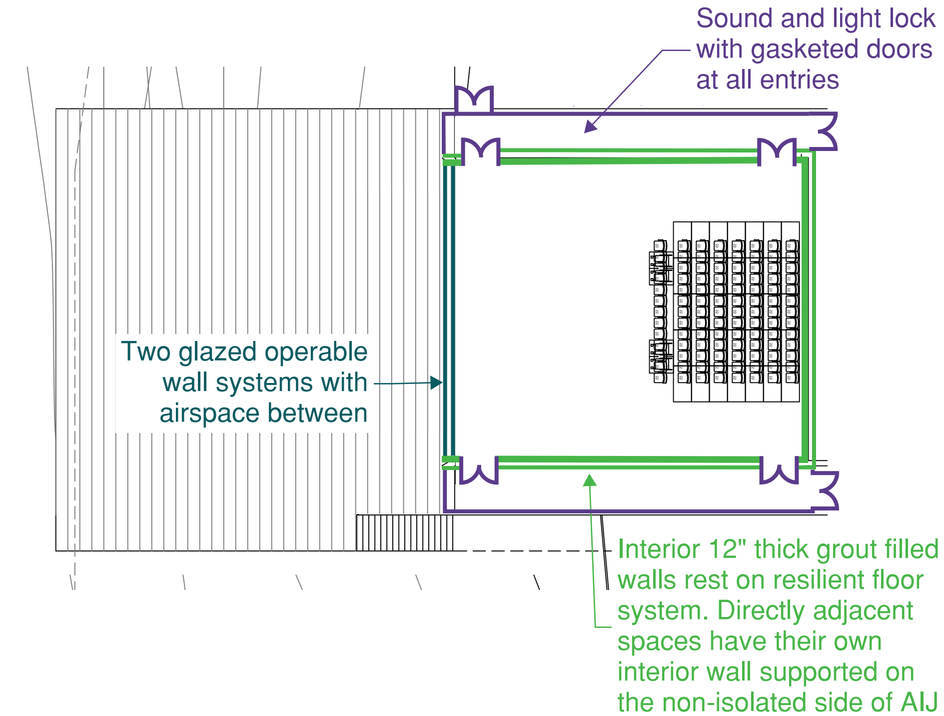
Doors – Sound and light lock vestibules are required at each entrance. Solid core or heavy gauge fiber-filled doors will be provided incorporating acoustical gasketing with cam-lift hinges or raised thresholds. At entrances with no sound and light lock, STC-rated door will be required. Coordinate fire separation line to allow push/pull hardware on interior doors to the auditorium and panic hardware on the outer doors of the sound and light locks only.

Hatches – Smoke and exhaust hatches will be STC rated and/or designed with additional acoustic separation (attenuators, transfer ducts, etc.)to mitigate exterior noise infiltration.

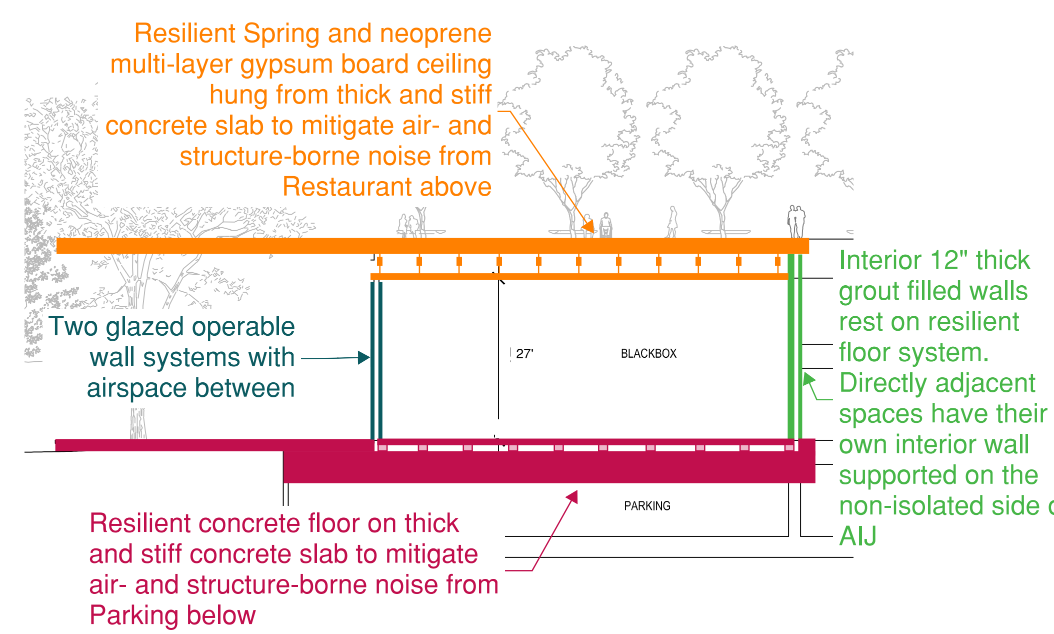
Background Noise

The background noise level design criteria RC 20.

Ventilation will be provided through distributed ductwork overhead and return grilles will be located above doors.



Acoustics Figure 36
Studio Theater Plan - Sound Isolation



Acoustics Figure 37
Studio Theater Section - Sound Isoaltion

Acoustic Design - Rehearsal Rooms

Program Use and Room Acoustic Characteristic

The primary use of the rehearsal rooms will be spoken word and singing. The selection of finish materials are recommended with an emphasis is placed on maintaining speech intelligibility, support for the users, acoustic intimacy, and control of excessive reverberance.

Finishes

Walls - 50% of available wall surfaces covered in 2" thick fabric wrapped panels, tectum, or similar --

Ceiling - 2" thick black duct liner surface applied to 50% of ceiling surface area.

Stage Floor – The stage floor will be coordinated with the Theatrical Consultant.

Sound Isolation

The Rehearsal building will be packed with activity in section on each floor and in plan adjacencies requiring box in box construction, with the assumption this building will utilize thick concrete structural floors, and gypsum board wall constructions

Interior walls - multiple layers of gypsum board on separate studs.

Floor - Resilient wood floor systems utilizing fiberglass pads.

Ceiling/Roof –In the rehearsal room B, located under the mechanical penthouse, a spring/neoprene barrier ceiling will provide additional air-borne noise isolation

Glazing – STC 45 glazing systems.

Doors –

Background Noise

The background noise level design criteria is RC 25.

Acoustic Design - Education Pavilion

Program Use and Room Acoustic Characteristic

Flexible spaces providing support for a variety of functions, such as education, banquets, conferences, and VIP events. The large pavilion maybe divided into three spaces through the use of operable partitions.

Finishes

Walls -

Ceiling - 2" thick black duct liner surface applied to 50% of ceiling surface area.

Floor - Finish per architect.

Sound Isolation

Walls –

Operable walls - STC 45 minimum, STC 50 preferred.

Floor -Resilient wood floor system on top of

Ceiling/Roof –

Glazing –

Doors –

Background Noise

The background noise level design criteria RC 30.

Acoustic Design - Lobbies

Program Use and Room Acoustic Characteristic

In addition to providing a gathering space for larger groups before, during and after performances, the lobby will also house special events including meetings and rentals. Lobby spaces are often finished with hard, smooth, reflective surfaces; terrazzo concrete, gypsum board, and glazing. The combination of a large volume and hard surfaces results in extremely "live" or reverberant spaces, often to the point of being described as noisy.

A lobby's room signature should be slightly lively to support a level of excitement for patrons but should not be so reverberant as to make it difficult to hear an amplified speaker at a fund-raising event or cause patrons to continually raise their voices to talk over the din of the crowd noise to be heard by a companion.

Finishes

Walls - Absorptive and diffusive materials will be included in the finish selections to control the buildup of sound energy to an animated, not cacophonous, room response.

Ceiling - Assume an absorption material with an NRC of 0.85. The absorption and diffusion treatment on the south walls is yet to be detailed.

Glazing - Glazing system achieving a minimum STC 43 performance.

Background Noise

The background noise level design criteria RC 35.

General Sound Isolation Considerations

Recommendations have been developed based on the low-, mid-, and high-frequency isolation performance of specific wall assemblies. Substitution of a different assembly with a similar STC-rating is not equivalent.

Partition assemblies are presented as minimum options. Wherever more substantial construction is required for fire ratings or other reasons, this will be acoustically acceptable.

Unless otherwise noted, partition recommendations assume the following:

- Gypsum board is to be 5/8" thickness, 42pcf density (normal weight).
- Studs are to be 3-5/8" thickness, 24ga., at 16" o.c. (note that heavier gauge studs may necessitate the use of resilient clips to maintain acoustic separation).
- Batt insulation is to be fiberglass at 3-1/2" thickness or mineral wood at 3" thickness.
- Acoustic sealant is to be provided at head and base

Acoustically Sensitive Rooms (see Room-by-Room Criteria table for a list of ASR's) also require the following:

- Building service penetrations will need to be fully packed with insulation and closed with acoustic sealant (details to be coordinated in future design phases)
- Electrical boxes on opposite sides of the wall must be separated by at least 24" and sealed with backbox putty.

Double stud or CMU and separated stud walls assume a complete separation between studs, with no rigid ties between studs or between studs and CMU. Where bracing is required, a resilient sway brace should be used.

Where an Acoustic Isolation Joint (AIJ) is described, the goal is to provide a continuous gap in the building structure and all interior fit out construction.

- The structural gap should be a minimum of 2"
- The gap may be reduced in some areas of the fit out construction to minimize the visual gap, but without rigidly crossing the joint.
- Some vertical structural loads may be carried through custom-designed natural rubber bearing pads. These will be custom-designed as the design progresses.

Acoustics Table X: Room by Room Acoustic Design Criteria

This table summarizes the basic design approach for each room type's background noise levels as a basis for sound isolation criteria and finishes to inform the Concept Design level pricing.

Room Name	Description/Program Use	Finishes: Walls	Finishes: Floors	Finishes: Ceiling	Noise Criteria[1]	Doors[2]	Additional Notes
Lobbies	See description in Acoustic Design Approach section						
Public Circulation and BoH Circulation	Circulation	--	--	Absorptive material with a performance of NRC 0.85 (min)	NC 30	Gasketed	
Box Office/ Information	Patron assistance, ticket sales	30% of two walls covered in 1" thick sound absorption providing an NRC of 0.80 or higher	Carpet	Surface area covered in sound absorptive treatment with an NRC 0.9 or higher	RC 30	--	
Proscenium Theatre Audience Chamber and Stage	See description in Acoustic Design Approach section						
Studio Theatre	See description in Acoustic Design Approach section						
Sound and Light Locks	Buffer space between the theaters and the adjacent circulation spaces protecting the theater from noise and light.	100% of the two largest walls covered with 1" thick, 6-7 lb. density, fabric wrapped fiberglass.	--	Absorptive material with a performance of NRC 0.85 (min)	RC 25	--	
Lighting Control, Stage Management, Sound, Interpretation and Follow Spot Booths	Dedicated control rooms supporting technical production in the Proscenium and Studio Theaters	100% of rear wall covered in 2" fabric wrapped panels or similar	--	Black Fiberglass ACT with an NRC 0.85 or higher	RC 25	Gasketed	Operable STC 35 rated windows to the performance venue.
Stage Receiving	Stage Receiving	--	--	NRC 0.85 minimum spray applied K-13 or 2-inch (50mm) thick fireproofing, or 2" thick duct liner	RC 40	Gasketed	
Loading Dock	Loading Dock	--	--	NRC 0.85 minimum spray applied K-13 or 2-inch (50mm) thick fireproofing, or 2" thick duct liner	RC 40	--	
Pit Musicians Room	Remotely located room for pit musicians.	All walls covered in 50/50 mix of 2" fabric wrapped abosption and 2" thick tuned absorption/ diffusion panels.	Carpet	Absorptive material with a performance of NRC 0.85 (min)	RC 20	STC 52	
Performer Lounges/ Green Room	Prep, warm up, and gathering space for performers prior or during the performance.	30% of two adjacent walls covered in 1" thick tackable fabric wrapped panels	--	ACT (NRC 0.70 - 0.80) or similar absorptive finish	RC 35	Gasketed	
Dressing Rooms	Dressing rooms, accommodating multiple performers, makeup counters, costume racks, mirrors, shower and sink	30% of two adjacent walls covered in tackable, 1-inch (25mm) fabric wrapped panels	--	ACT (NRC 0.70 - 0.80) or similar absorptive finish	RC 30	Gasketed	

Notes

1. All Noise Criteria are assumed to have a Neutral sound spectrum per ASHRAE's RC rating system definition. The following special construction requirements apply to rooms with noise criteria of RC 30 or below: all wall/floor/ceiling penetrations for building services must be sealed airtight to the standard of a two-hour fire rating; and all electrical back boxes must be wrapped with firestop putty.
2. Gasketed doors assume a 1-3/4" solid wood or insulated-core hollow metal door with gaskets applied to a standard frame except where otherwise noted (later efforts will coordinated hardware and gasketing requirements). Gaskets assume an applied gasket on the frame and a fixed bottom seal that closes on a raised threshold. STC-rated doors are provided as a complete frame/leaf/gasket set. STC-rated doors may be provided in solid wood up to STC-50; doors greater than STC-50 will be steel doors, thought these may be clad in wood veneer

Acoustics Table X: Room by Room Acoustic Design Criteria This table summarizes the basic design approach for each room type's background noise levels as a basis for sound isolation criteria and finishes to inform the Concept Design level pricing.							
		Finishes					
Room Name	**Description/Program Use**	**Walls**	**Floors**	**Ceiling**	**Noise Criteria[1]**	**Doors[2]**	**Additional Notes**
Dressing Rooms	Dressing Rooms	30% of two adjacent walls covered in tackable, 1" thick fabric wrapped panels	--	ACT (NRC 0.70 - 0.80) or similar absorptive finish	RC 35	Gasketed	
Rest Rooms	Rest Rooms	--	--	ACT (NRC 0.70 - 0.80) or similar absorptive finish	RC 40	--	
Wardrobe Maintenance Room, Wig Maintenance, Laundry	Room for wardrobe fitting and maintenance, as well as styling and maintenance for wigs and human hair.	--	--	ACT (NRC 0.70 - 0.80) or similar absorptive finish	RC 35	--	
Run Props Room/Prop & Catering Kitchen	Run Props Room/Prop & Catering Kitchen	--	--	ACT (NRC 0.70 - 0.80) or similar absorptive finish	RC 35	--	
Vocal/Coaching Studios	Vocal rehearsal, coaching and warm up spaces	Two walls will be angled at 6° to mitigate the parrallel walls surfaces. Two walls covered with 2" thick, fabric wrapped fiberglass panels for 3'-0" to 7'-0" AFF.	Carpet	Gypsum board resilient ceiling hung at 6° off horizontal.	RC 30	Gasketed	Box-in-box construction to allow for simultaneous use. Walls: Isolated double independent stud with multiple layers of gypsum board on each side Ceiling: Cap multi-layered gypsum board Floor: Floating wood floor system on fiberglass or neoprene mounts.
Private Offices, Meeting and Conference Rooms	Offices around the building will be used by full time staff and visiting production staff when applicable.	30% of two adjacent walls covered in tackable, 1" thick fabric wrapped panels	Carpet	ACT (NRC 0.70 - 0.80) or similar absorptive finish	RC 30	--	
Rehearsal Rooms	See description in Acoustic Design Approach section						
Eduction/Community Rooms	See description in Acoustic Design Approach section						
Mechanical, Electrical Plumbing and It Rooms	Rooms housing MEP and IT equipment.	50% of available surface area covered in 2"duct liner	--	100% of available surface area covered in 2" duct liner	Run Props Room/Prop & Catering Kitchen	--	Walls - Isolated multi-layer gypsum double stud wall or CMU wall assemblies Floors - Slab breaks were possible. Smaller MEP closets and rack rooms and those equipment rooms on grade will not require isolated floors. Doors – Gasketing unless opening directly to sound sensitive areas or with particularly loud equipment may require STC-rated door assemblies.

Notes

1. All Noise Criteria are assumed to have a Neutral sound spectrum per ASHRAE's RC rating system definition. The following special construction requirements apply to rooms with noise criteria of RC 30 or below: all wall/floor/ceiling penetrations for building services must be sealed airtight to the standard of a two-hour fire rating; and all electrical back boxes must be wrapped with firestop putty.
2. Gasketed doors assume a 1-3/4" solid wood or insulated-core hollow metal door with gaskets applied to a standard frame except where otherwise noted (later efforts will coordinated hardware and gasketing requirements). Gaskets assume an applied gasket on the frame and a fixed bottom seal that closes on a raised threshold. STC-rated doors are provided as a complete frame/leaf/gasket set. STC-rated doors may be provided in solid wood up to STC-50; doors greater than STC-50 will be steel doors, thought these may be clad in wood veneer

Mechanical, Electrical, Plumbing, Fire Protection, and Low Voltage System Noise Control Introduction

The following guidelines summarize our preliminary recommendations for the acoustic features of the design of MEPF systems for the Renovation of the Kalita Humphreys Theater and Expansion of Dallas Theater Center's Campus. The recommendations provided here-in are intended to inform the design team and cost estimators of best practices that would be applied to the in the site and building's designs at a conceptual levels

The connection between a performer and audience demands that nothing impede the sound reaching the listeners' ears. Central to this pursuit is the limitation of background noise in the performance and rehearsal spaces. Absolute silence is not required in most spaces in the building, but the background noise level must be low enough so that it meets the following criteria:

- Background noise in a theatre space must be at least 20 decibels quieter than the actor's voice (10 to 15dB quieter at lower frequencies) so that all the details of the actor's delivery can be clearly distinguished throughout the room.
- Background noise in performance spaces must also be quiet and balanced so not to distraction the audience listening to the performers on stage.
- Background noise in Rehearsal Halls and Practice Rooms must be quiet enough to hear the subtlety of fellow ensembles members' playing/singing/speaking, but also high enough to mask some sound from adjacent spaces.
- Background noise in Recording Spaces must be as low as possible to maximize the dynamic range of the recording.
- Background noise in Classrooms and Community Rooms must be at least 15 decibels quieter than the instructor's and students' voices (5 to 10dB quieter at lower frequencies) to allow speech to be heard with clarity.
- In lobbies, offices, lounges, and other similar spaces background noise should be low enough so that occupants can clearly and easily communicate with one another without distraction but also high enough, so private conversations are not easily heard throughout the entire space.

Design Criteria

Based on our understanding of the program requirements for this project we recommend the background noise levels illustrated in Acoustic Figure 1: Room Criteria Curves be adopted. Criteria are specified in terms of the Room Criteria (RC) system as defined by ASHRAE and assume a neutral and non-tonal spectrum. Rooms with noise criteria less then RC-35 are designated "Acoustically Sensitive Rooms" and will carry specific requirements for penetrations of ductwork, conduit, and piping.

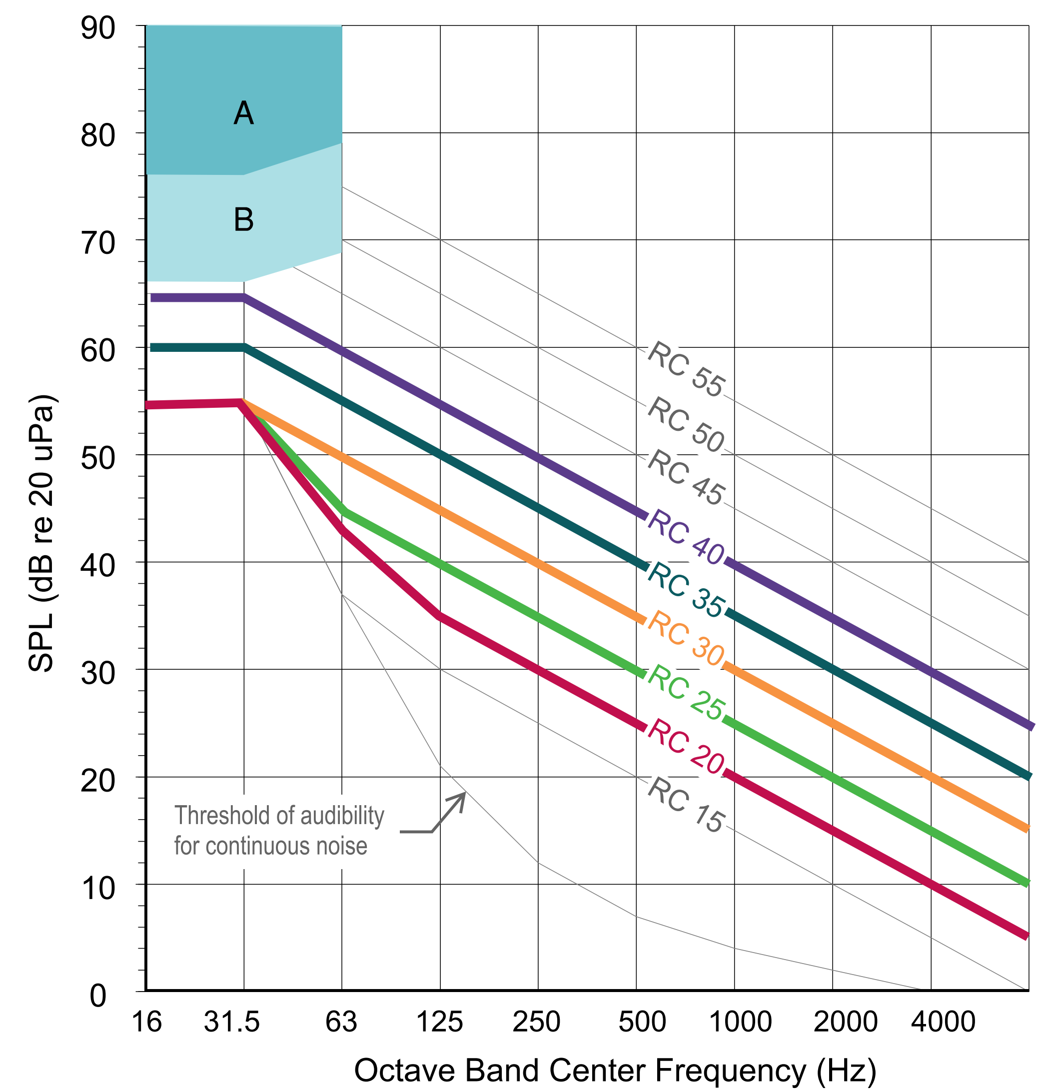
RC 20
KHT Theater
Proscenium Theater
Studio Theater
Pit Musician Room

RC 25
Sound Locks
Control Booths
Rehearsal Rooms
Coaching Studios
Coaching Offices

RC 30
Education/Community Rooms
Box Office
Private Offices
Meeting Rooms
Conference Rooms
Star Dressing Room
Stage Receiving
Classroom
Community Room

RC 35
Lobbies, Public Circulation
Event Spaces
Stage Receiving
Wig, Make-up, and Costume Rooms
Off Stage Quick Toilet
Prop Pantry
Green Rooms
Chorus Dressing Rooms
Locker Rooms
Open Offices
Café, Restaurant

RC 40
Dimmer and Amplifier Rooms
Rest Rooms



The RC value of an environment is determined by the arithmetic average of the sound pressure levels measured at 500, 1000 and 2000 Hz. This average value gives rise to a straight line with a slope of 5 dB per octave to classify the space and how the noise profile might approximately interfere with speech.
The environment may also be classified as neutral (N), hissy (H), rumbly (R), or with perceptible vibration (V):

- Neutral: Measured values at and below 500Hz do not exceed the RC curve by more than 5dB at any octave, and measured values at and above 1000Hz do not exceed the RC curve by 3dB at any octave
- Hissy: Measured values at 1000Hz and above exceed the RC curve by more than 5dB in any octave
- Rumbly: Measured values at and below 500Hz exceed the RC curve by more than 5dB in any octave
- Region A: Strongly perceptible vibrations of lightweight wall and ceiling systems
- Region B: Potential for perceptible vibration of lightweight wall and ceiling systems

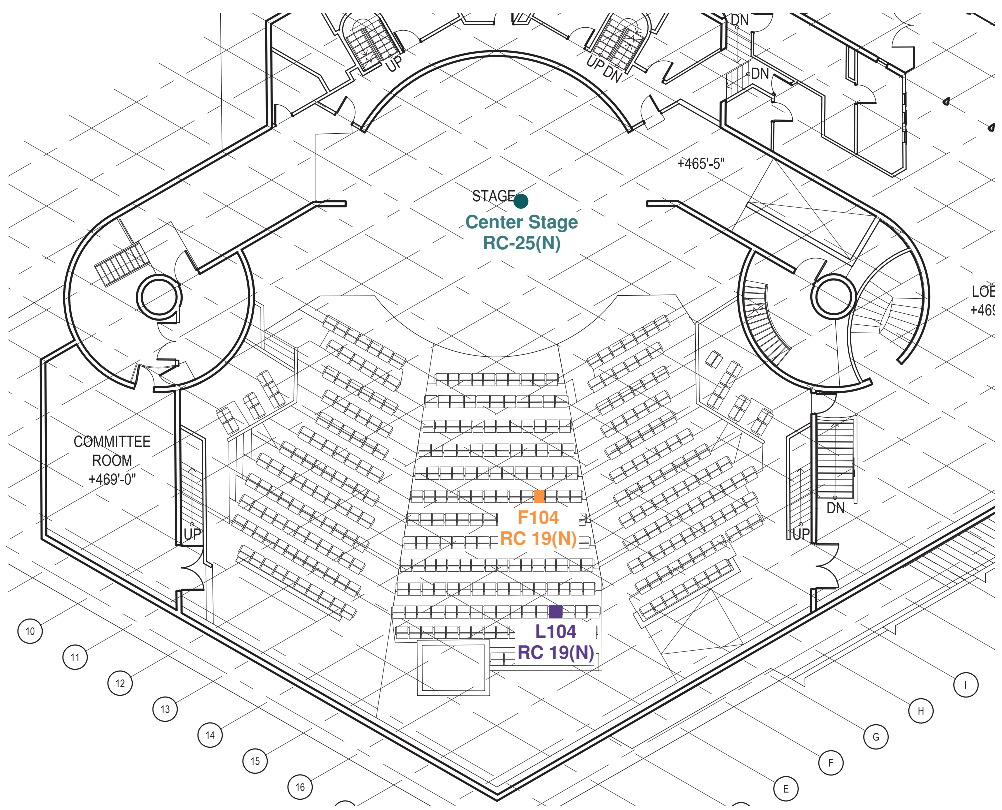
Acoustics Figure 38
Background noise Levels Recorded in Kalita Humphreys Theatre with the mechanical system on

Background Noise Measurements in Kalita Humphrey

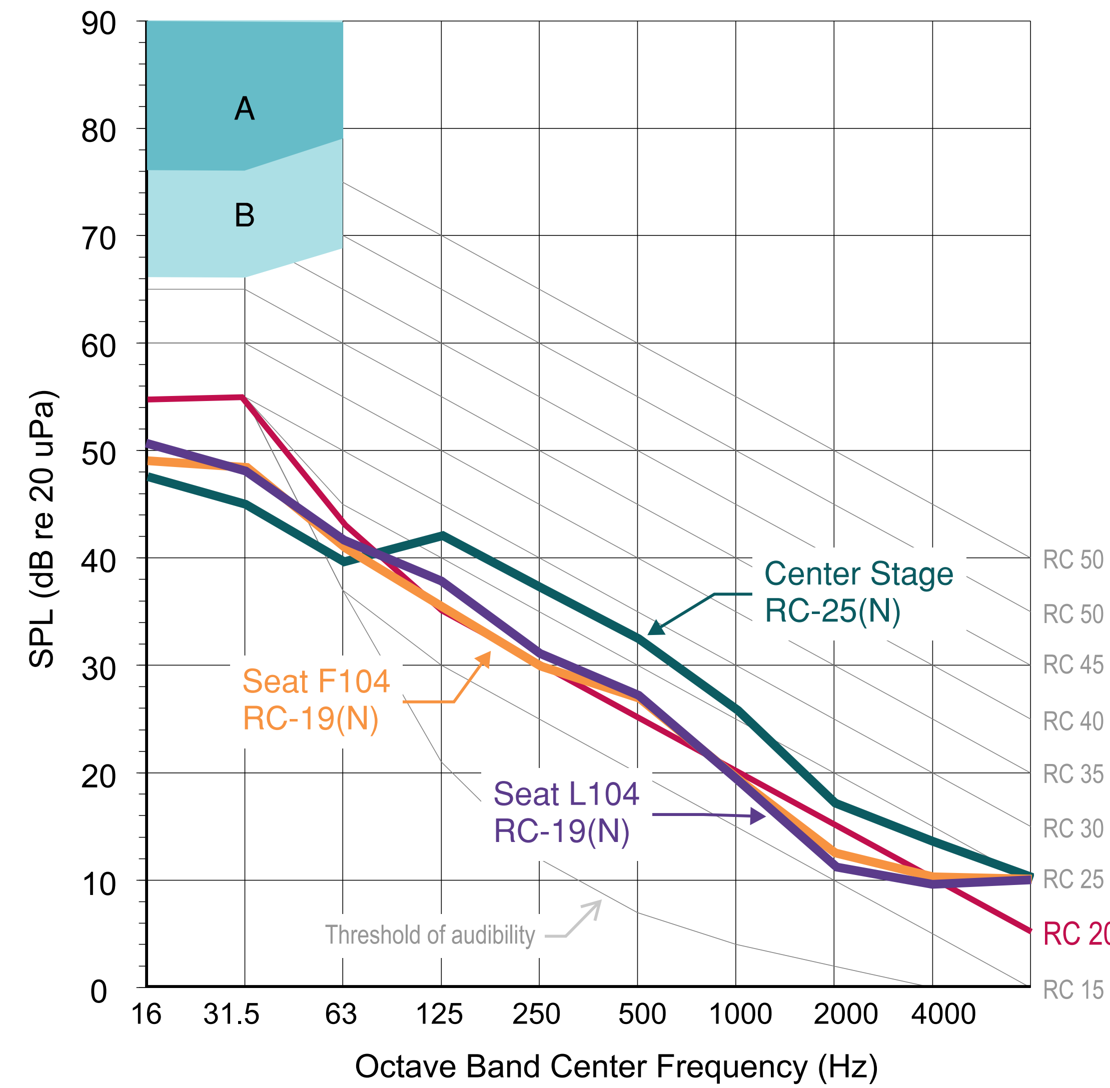
We measured the background noise levels in the Theater due to mechanical and electrical systems. The sound level meter used to measure noise levels was a B&K 2270-meter, serial number 3005813. The device is an ANSI Type 1 accredited and calibrated microphone and processor unit that records full frequency data every 125 milliseconds. Each measurement was recorded over 30 seconds, unless noted otherwise.

Noise from ductwork over the audience chamber is virtually inaudible. There is audible hum from piping over the stagehouse. The precise noise source could not be determined at the time of our visit. This equipment causes elevated noise levels on stage that is audible from the audience seating. The background noise level in the audience chamber is very consistent and in line with criteria for drama theaters and our design goal of RC 20 (N).

We were unable to turn off the HVAC during our site visit but expect the interior levels to be quieter with the HVAC off. During productions, fan whine is audible from theatrical light fixtures. Those were not measured as part of this benchmarking.



Acoustics Figure 39
Background Noise Measurement Locations



The RC value of an environment is determined by the arithmetic average of the sound pressure levels measured at 500, 1000 and 2000 Hz. This average value gives rise to a straight line with a slope of 5 dB per octave to classify the space and how the noise profile might approximately interfere with speech.
The environment may also be classified as neutral (N), hissy (H), rumbly (R), or with perceptible vibration (V):

- Neutral: Measured values at and below 500Hz do not exceed the RC curve by more than 5dB at any octave, and measured values at and above 1000Hz do not exceed the RC curve by 3dB at any octave
- Hissy: Measured values at 1000Hz and above exceed the RC curve by more than 5dB in any octave
- Rumbly: Measured values at and below 500Hz exceed the RC curve by more than 5dB in any octave
- Region A: Strongly perceptible vibrations of lightweight wall and ceiling systems

Acoustics Figure 40
Background noise Levels Recorded in Kalita Humphreys Theatre with the mechanical system on

Building Planning and Architectural Considerations for MEP Equipment Rooms

The following are general guidelines for the locations of Mechanical and Electrical Rooms:

- The preferable location for an MER is on-grade, with the use of a slab on grade, at least one structural bay away from the nearest Acoustically Sensitive spaces, as this significantly simplifies the consideration of structure-borne noise from the equipment. If the ground floor slab utilizes a carton form (or similar) construction rather than a slab on-grade, structure-borne vibration considerations will follow the same recommendations for those of equipment located on upper levels.
- If equipment is located on upper levels, position it near major beams and supporting columns. Keep span lengths to a minimum. Locating equipment at mid-spans or on long spans increases the difficulty in controlling the noise in the building structure.
- Where equipment must be located on rooftops, it is recommended that they be separated from Acoustically Sensitive spaces by at least two structural bays. Rooftop equipment should be located over main girders with structure in the immediate area of the equipment stiffened to not less than 7 Hz resonant frequency. Depending on noise levels radiated by the equipment, a concrete slab may be required to sufficiently reduce airborne noise levels within the occupied space below.
- Avoid locating Mechanical and Electrical Rooms either horizontally or vertically adjacent to Acoustically Sensitive spaces. Buffer spaces of less sensitive spaces, hallways, storage, etc. between offer effective and inexpensive construction to provide isolation between the higher sound levels of the Mechanical and Electrical Room and the Acoustically Sensitive spaces. If Mechanical and Electrical Rooms are adjacent, robust, built up wall, floor and ceilings systems will be required.
- Equipment room doors should not open into sound sensitive spaces. The level of treatment required for Mechanical and Electrical Room doors may require seals or sound rated door systems, depending on their locations.
- Fresh air and exhaust air openings should not lead to occupied outdoors areas or spaces where noise can re-enter the building through windows, doors, or vents.
- Provide housekeeping pads, at least 4" (100 mm) thick under floor mounted mechanical and electrical equipment to provide local mass and stiffness.
- Consideration should be given to the proximity of equipment to property lines where noise ordinances may present additional restrictions on equipment noise levels.
  - Chapter 30 of the Dallas City Code address noise concerns. While there is no specific language addressing maximum acceptable background noise levels at a neighbor's property line, the chapter does include the following SEC. 301. LOUD AND DISTURBING NOISES AND VIBRATIONS. A person commits an offense if he makes or causes to be made any loud and disturbing noise or vibration in the city that is offensive to the ordinary sensibilities of the inhabitants of the city. (Ord. Nos. 13744; 24835; 26022)
  -

Considerations for System Configurations and Equipment Types

The type of air distribution system and the equipment used to condition and move air through the building has a profound effect on the extent of noise and vibration control that must be incorporated into the system. The following design intent should be included in the costing assumptions for this project

- A unitized rooftop air conditioning unit (RTU) limits the footprint of mechanical equipment located inside the building and therefore reduces the area that may require extensive acoustic isolation. However, the roof is typically the most flexible portion of the building structure, and it can be very difficult to provide effective isolation from the RTU from adjacent spaces. If an RTU option is pursued, the equipment and its penetrations must be located far from any acoustically sensitive rooms, likely separated by a complete structural break. RTU's and other heavy rooftop equipment should be located over main girders with structure in the immediate area of the RTU stiffened to not less than 7 Hz resonant frequency. Depending on noise levels radiated by the equipment, a concrete slab may be required to sufficiently reduce airborne noise levels within the occupied space below.
- A system including a central station air handling unit and remotely located chilled water equipment (water-cooled chiller and cooling tower or air-cooled chiller) requires more building space dedicated to mechanical equipment, but each piece of equipment can be selected based on low-noise requirements and often results in the quietest equipment. The ability to customize only one piece of the system, such as the AHU when extremely quiet fan systems are required for the Kalita, Proscenium, and Studio Theaters, or for the chiller or cooling tower to control the noise propagated to the neighboring properties and within the park setting that we will enjoy by patrons for its bucolic setting or when activated with outdoor performances, can save cost compared to a custom RTU with requisite noise control elements applied. A chiller, however, can be a significant source of noise and vibration and must be located remotely from Acoustically Sensitive rooms. Stiffen structure beneath rooftop AHU's, cooling towers, and chillers as described above for RTU's.
- Regardless of system type, we recommend a unit incorporating a fan array (with 4 to 5 supply fans) serving Acoustically Sensitive spaces. This type of unit typically generates significantly lower noise levels than comparably sized unit with centrifugal or plug fans.
- If an air handling unit is configured with a separate return fan, the return fan requires a similar level of noise control consideration as the supply portion of the unit.
- Whenever possible, the use of an underfloor displacement system for performance spaces with fixed seating is recommended. Air is supplied via an underfloor plenum via diffusers in the floor or via perforated seat pedestals. The inherently slow-moving air, the elimination of overhead supply ductwork, and reduction in cooling capacity compared to the requirements of comparable overhead systems allow for much more efficient control of system noise. For the pricing efforts:
  - As the concrete slab of the audience chamber in the Kalita Humphrey Theatre is replaced to reinstate the original stage configuration and improve audience sightlines to the stage, slab openings will be incorporated to create an underfloor displacement system.
  - A displacement system is assumed at the Proscenium Theatre.
  - Overhead supply is assumed in the Studio Theatre.

Mechanical System Noise & Vibration Control Recommendations

The following noise and vibration control techniques are to be assumed in the costing exercises and will inform the development of future design work:

- Fans should be sized for Fan Efficiency Grade consistent with ASHRAE 90.1 while keeping fan wheel rpm as low as possible.
- Terminal devices (diffusers, grilles, and chilled beams) should be selected at a manufacturers' NC-rating that is 10dB lower than the background noise criterion specified for the room. For example, rooms with a background noise criterion of RC 35 should have diffusers specified for NC-25.
- Internal duct lining criteria (assuming there are no restrictions on the use of glass fiber in the ductwork):
  - All ductwork serving rooms with a noise criterion less than RC 30.
  - Within 30' (10m) upstream and downstream of fans and air handling units serving with noise criteria of RC 30 or greater.
  - At least 10' (3m) downstream of VAV and Fan-Powered Boxes.
  - All transfer ducts.
  - Return air stub ducts and shaft intakes.
  - Where internal lining is used, assume 1" (25mm) thick lining except when any cross-sectional dimension (length, width, or diameter) is greater than 24" (600mm) in which case 2" (50mm) thick lining should be used. Fire dampers should be selected as the type with blades that retract fully out of the airstream.
- The following additional design strategies are recommended for use in spaces with background noise criteria below RC 30:
  - Assume the use of a 5 foot long sound attenuator at the supply and return for all AHU's as well as all Fan Coil and VAVs serving spaces with a noise criterion less than RC 30.
  - Air flow should be balanced using static pressure regain to eliminate volume control dampers to the extent possible; where dampers are unavoidable, these should be located outside the footprint of the space and at least 6' (2m) upstream of diffusers.

- If vestibules serving these rooms are be configured without active ventilation, a small pressure-relief duct is recommended to avoid door suction.
- Terminal boxes should be located outside the footprint of these spaces and shall provide sufficient duct path before entering the space to attenuate the noise they generate.
- Exposed ductwork, if used, should be round duct.
- Duct elbows should be radiused without turning vanes or using full-length turning vanes.
- Flexible ductwork connections at diffusers should be acoustically rated, with a perforated inner sheet metal wall wrapped by insulation.
- All duct penetrations through walls of rooms with noise criteria of less than RC 30 should be sleeved and oversized, packed with glass fiber insulation, and sealed with a non-hardening caulk in a manner consistent with fire ratings and other life safety considerations. See the attached penetration detail sketches.

-

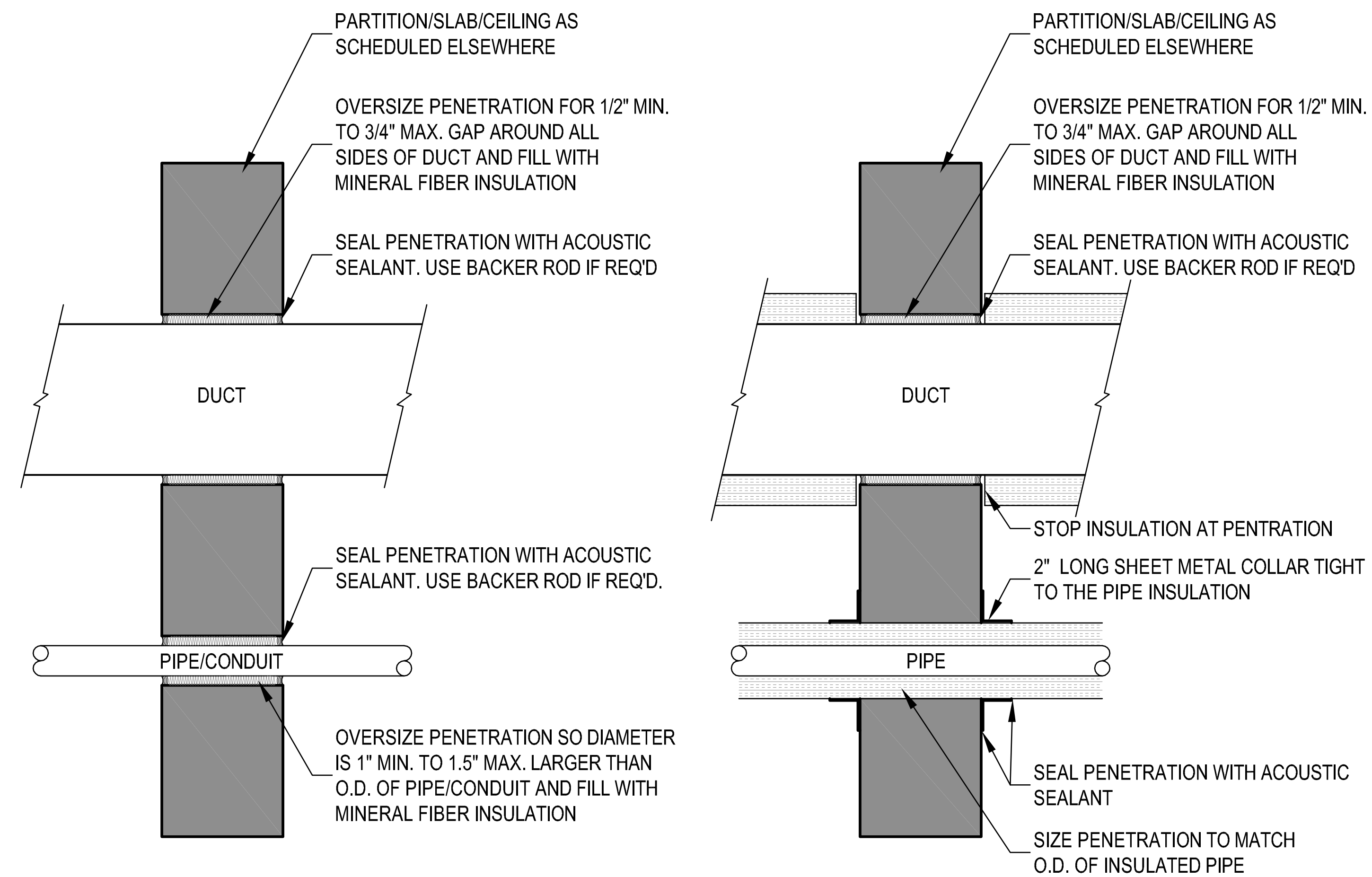
Mechanical System Noise & Vibration Control Recommendations

- In planning equipment locations and mounting conditions, we recommend the vibration isolation described in Table X be assumed for mechanical equipment:
- In preparing preliminary duct layouts, we recommend the velocity guidelines found Table 1 be used to size ducts, while also considering the following:
  - Where variable air volume systems are used, ducts should be sized assuming the system is operating at full capacity.
  - Velocities should not increase or decrease by a factor more than 2:1 along any main or branch.

Table 1 Velocity Guidelines [FPM (m/s)]

Noise Criteria	At End of Open Slot[1]	Face/Neck of Grille/Diffuser[2]	Within 10' (3 M) of Grille/ Diffuser	Within 20' (6 M) of Grille/ Diffuser	Within 50' (15 M) of Grille/ Diffuser	Exposed ducts in Room[3]
RC 15 supply	350 (1.8)	n/a2	350 (1.8)	425 (2.2)	850 (4.4)	800 (4.1)
RC 15 return	350 (1.8)	n/a2	350 (1.8)	500 (2.5)	1,000 (5.1)	800 (4.1)
RC 20 supply	500 (2.5)	300 (1.5)	500 (2.5)	550 (2.8)	1,100 (5.6)	800 (4.1)
RC 20 return	500 (2.5)	350 (1.7)	500 (2.5)	650 (3.3)	1,300 (6.6)	800 (4.1)
RC 25 supply	550 (2.8)	350 (1.8)	550 (2.8)	700 (3.6)	1,400 (7.2)	800 (4.1)
RC 25 return	550 (2.8)	425 (2.2)	650 (3.3)	800 (4.1)	1,600 (8.2)	800 (4.1)
RC 30 supply	700 (3.6)	425 (2.2)	700 (3.6)	850 (4.1)	1,700 (8.6)	900 (4.6)
RC 30 return	700 (3.6)	500 (2.5)	800 (4.1)	900 (4.6)	1,800 (9.1)	900 (4.6)
RC 35 supply	800 (4.1)	500 (2.5)	800 (4.1)	1,000 (5.1)	2,000 (10.2)	1,200 (6.1)
RC 35 return	800 (4.1)	600 (3.0)	900 (4.6)	1,100 (5.6)	2,000 (10.2)	1,200 (6.1)
RC 40 supply	900 (4.6)	600 (3.0)	900 (4.6)	1,100 (5.6)	2,000 (10.2)	1,200 (6.1)
RC 40 return	900 (4.6)	700 (3.6)	1000 (5.1)	1,200 (6.1)	2,000 (10.2)	1,200 (6.1)

Notes
1. Velocities up to 25% higher may be permissible with smooth transitions to diffusers, slots, or grilles.
2. Most manufacturers' diffusers will not be suitable for RC 15 spaces. Open slots are preferred for overhead supply, and air pedestals are preferred for underfloor supply.
3. Ducts exhibiting higher velocities will need to be enclosed in soffits, wrapped in lagging, or be constructed of significantly heavier construction than might otherwise be required.



Acoustics Figure 41
Penetration details without (left) and with external insulation (right)

Electrical System Noise & Vibration Control

Electrical systems should be installed in a manner that minimizes transmission of objectionable vibration into the building structure. Required isolation will include, but is not limited to, the resilient mounting of transformers, dimmer racks, motor starters, remote light fixture ballast cabinets, variable frequency motor controllers and related conduit.

- Use flexible connections for all electrical connections to isolated equipment.
- Electrical boxes on opposite sides of the same partition should be configured as follows:
  - Boxes should be separated by at least 16" (400mm) within partitions separating spaces with a noise criterion of RC 30 or greater.
  - Boxes should be separated by at least 3' (1m) within partitions separating spaces with a noise criterion less than RC 30.
  - Firestop putty should be specified for all electrical back-boxes and other devices recessed into partitions enclosing rooms with noise criteria of less than RC 30.
- Lighting ballasts or step-down transformers should not be located within any rooms with noise criteria of less than RC 30. They can be remotely located as allowed by the fixture design.
- Fluorescent lighting ballasts should be electronic.
- Exit light fixtures should be LED, incandescent or fluorescent with electronic ballasts within rooms with noise criteria of less than RC 30. Do not use HID fixture.
- All conduit penetrations through partitions of rooms with noise criterion of less than RC 30 should be sealed to prevent the transfer of sound; they should be packed with mineral fiber insulation and sealed with a non-hardening caulk in a manner consistent with fire ratings and other life safety considerations.
  - Loose cable may not be passed through partitions – cable must be in a conduit when serving the space with a noise criterion below RC 30.
  - An acoustic cable pass may be deemed acceptable – to be determined on a case-by-case basis.
  - See the penetration details sketches.
- Assume vibration isolation treatments per Table X.

Plumbing Systems Noise & Vibration Control

Acoustic considerations for plumbing systems are not extensive, but some care should be taken with respect to plumbing fixture location and control of fixture generated noise as follows:

- With the exception of a slop sink on Stage, plumbing fixtures for toilets, concessions, water fountains, janitor's closets, etc. should not be located directly on the walls of the rooms with noise criterion less than RC 30. If building layout requires fixtures within this proximity, limit fixtures to lavatories only if possible. A secondary, independently supported wall may be required for plumbing line support.
- Routing for vent lines from areas below rooms with noise criteria of less than RC 30 should be located outside the space or be located within enclosed chases within those areas to prevent air-borne sound transfer through the open pipe.
- Circulating water piping and rain leaders should not pass through rooms with noise criteria of less than RC 30. If such routing must occur, piping should be enclosed in a gypsum chase or insulated and wrapped with mass-loaded vinyl.
- PVC pipe should be avoided for all pipes that pass through rooms with a noise criterion less than RC 30.
- All pipe penetrations through walls of rooms with noise criteria of less than RC 30 should be sleeved and oversized, packed with glass fiber insulation, and sealed with a non-hardening caulk.
- All pipe penetrations through partitions of rooms with noise criterion of less than RC 30 will be sealed to prevent the transfer of sound; they will be packed with glass fiber insulation and sealed with a non-hardening caulk in a manner consistent with fire ratings and other life safety considerations. See the attached penetration details sketches.
- In planning equipment locations and mounting conditions, we recommend the vibration isolation described in Table X be assumed for mechanical equipment

Fire Protection System Noise & Vibration Control

Acoustic considerations for fire protection systems are not extensive, but some care should be taken with respect to fire pump type, location, and operation and sounder type:

- Where wet sprinkler systems are used for rooms with noise criteria less than RC 30, jockey pumps should be sized to maintain pressure in the system while minimizing the frequency of operation of the pump.
- Initialization devices, annunciators, and visual and audible devices should not emit or transfer noise from one room to another except during system activation in an emergency. This may require more extensive home run circuiting for annunciators than is typical.
- It has been our experience that local codes restrict the use of vibration isolation on fire protection systems. If codes allow, however, the recommendations detailed for plumbing noise and vibration control are to be followed.
- All pipe penetrations through partitions of rooms with noise criteria of less than RC 30 should be sealed to prevent the transfer of sound; they should be packed with mineral insulation and sealed with a non-hardening caulk in a manner consistent with fire ratings and other life safety considerations. See the penetration details sketches.

Low Voltage (IT, Telecommunications, Controls and AV) System Noise & Vibration Control

All conduit penetrations through partitions of rooms with noise criterion of less than RC 30 should be sealed to prevent the transfer of sound; they should be packed with mineral fiber insulation and sealed with a non-hardening caulk in a manner consistent with fire ratings and other life safety considerations.

Loose cable may not be passed through partitions – cable must be in a conduit when serving the space with a noise criterion below RC 30.

An acoustic cable pass may be deemed acceptable – to be determined on a case-by-case basis.

See the attached penetration details below.

Penetration with No External Insulation Penetration with External Insulation

Sketch Notes:

1. Details to be coordinated with fire rating requirements.
2. Where penetrations occur through multi-wythe partitions, apply sealant at outer face of each wythe.

Equipment	Base	Isolator²	Additional Notes
Cooling Towers	Steel Frame1	Restrained Spring Mounts	Static deflection varies by fan speed
Chillers	Steel Frame1	Restrained Spring Mounts	Static deflection varies by chiller type
Boilers	Steel Frame1	Restrained Spring Mounts	--
Pump/Compressor – Centrifugal	Inertia Base	Spring Mounts	Size of inertia base determined by pump HP
Pump/Compressor – Inline	Inertia Base (none if hanging)	Spring Mounts or Hangers	Size of inertia base determined by pump HP
Motors (if on separate base)	Steel Frame1	Spring Mounts or Hangers	--
Fans, AHU's & RTU's	Steel Frame1 or Curb	Spring Mounts or Hangers	Curbs w/integral springs acceptable for rooftop equipment AHU's with internal fan isolation may be installed on external neoprene pads in lieu of springs
Condensing Unit	Steel Frame1 or Curb	Restrained Spring Mounts	Curbs w/integral springs acceptable for rooftop equipment
Fan-Powered Boxes and FCU's	None	Spring Hangers	For FPB/FCU > 2,500cfm only; no isolation required for smaller units
Passive Devices (Expansion Tanks, Heat Exchangers, Deaerators, etc.)	None	Neoprene Mounts or Hangers	
Ductwork and Piping Within 30ft. of Equipment	None	Spring Hangers & Flex Connectors at Equipment	Exception is for piping with diameter < 1" which may be wrapped in neoprene and clamped instead
Ductwork & Piping within 8ft. of crossing isolated construction or under a room with noise criteria of < RC 25	None	Neoprene Hangers or All-Direction Wall Mounts	Exception is for piping with diameter < 1" which may be wrapped in neoprene and clamped instead
Transformers	Steel Frame1	Neoprene Mounts or Hangers	--
Motors (if on separate base)	Steel Frame1	Spring Mounts or Hangers	--
Dimmer Racks	Steel Frame1	Neoprene Mount	--
Audio System Racks	Steel Frame1	Neoprene Mount	--
Motor Control Centers	Steel Frame1	Neoprene Mount	--

Equipment	Base	Isolator²	Additional Notes
Emergency Generators	Steel Frame	Restrained Spring Mounts	--
Enclosures/Cabinets containing relays, transformers, ballasts, or choke coils	Steel Frame1	Neoprene Mount	--
Conduit Within 30ft. of Equipment	None	Spring Hangers & Flex Connectors at Equipment	Exception is for conduit with diameter < 1" which may be wrapped in neoprene and clamped instead Flexible conduit acceptable for conduit <2" diameter (minimum 18" length); Neoprene flexible connector required for larger conduit
Conduit within 8ft. of crossing isolated construction or under a room with noise criteria < RC 25	None	Neoprene Hangers or All-Direction Wall Mounts and Flex Connector	Exception is for conduit with diameter < 1" which may be wrapped in neoprene and clamped instead Minimum length of 18" of flexible conduit where used at crossing of isolated construction
Boilers	Steel Frame1	Restrained Spring Mounts	--
Pump/Compressor – Centrifugal	Inertia Base	Spring Mounts	Size of inertia base determined by pump HP
Pump/Compressor – Inline	Inertia Base (none if hanging)	Spring Mounts or Hangers	Size of inertia base determined by pump HP
Sump & Ejector Pumps	None	Neoprene Pads	
Passive Devices (Expansion Tanks, Heat Exchangers, Deaerators, etc.)	None	Neoprene Mounts or Hangers	
Piping Within 30ft. of Equipment	None	Spring Hangers & Flex Connectors at Equipment	Exception is for piping with diameter < 1" which may be wrapped in neoprene and clamped instead
Piping within 8ft. of crossing isolated construction or under a room with noise criteria < RC 25	None	Neoprene Hangers or All-Direction Wall Mounts	Exception is for piping with diameter < 1" which may be wrapped in neoprene and clamped instead

Notes:

1. Steel frame bases may not be required for equipment that can be supported on point loads
2. Isolation requirements may be relaxed for on-grade installations of some equipment

Audio Visual Systems Program Assumptions

The Kalita Humphreys Theater (KHT) currently serves a variety of professional and community-based groups, but Dallas Theater Center (DTC) is embarking on this project with a goal of increasing the Kalita Humphreys Theater's connection to both the surrounding areas and to its singular history as Frank Lloyd Wright's only freestanding theater building. The addition of new spaces for theater and community use expands opportunities to engage more broadly with visitors and performers. Some key assumptions are listed below, which inform our proposed improvements to audio/video systems and related infrastructure.

- The spaces and scope of work for AV systems are listed below:
  - Kalita Humphreys Theater, 450-seat existing theater to be renovated with all new AV systems and infrastructure
  - New 250-seat Proscenium Theater with an in-house mix position, enclosed control booth, and dedicated dressing rooms (two 2-person, four 16-person)
  - New 100-seat (maximum) Studio Theater with an enclosed control room and four dedicated 4-person dressing rooms
  - A suite of shared back-of-house accommodations, including a renovated loading dock (with connectivity for remote production/broadcast truck parking), VR Streaming & Production space, and shops for various theatrical trades
  - Lobby space and exterior circulation spanning the campus, which includes box office space, concessions, and administrative offices
  - Event/Banquet Space for 300 visitors, which may double as lobby or circulation space when not in use otherwise
  - Two rehearsal rooms (approx. 3,000 nsf each), with each accommodating a play area comparable to the Proscenium Theater or Studio Theater
  - Two smaller coaching rooms for instruction and rehearsal
  - A large classroom divisible into three smaller rooms with operable partitions
  - New administration area for DTC staff, to include a large conference room and two private meeting rooms.
- Dallas Theater Center is the primary user of the Kalita Humphreys, utilizing the existing space for production of dramatic and musical theater works. Many of DTC's productions are hosted currently at the Wyly Theatre in Dallas, but with the new Studio Theater and Proscenium Theater, some of that program will move back to the KHT campus.
- All three theaters and the Event Space will be available for rental by corporations, individuals, or community groups to host meetings and events.
- The renovated campus is expected to host year-round DTC productions alongside simultaneous performances produced by local theater companies and performing arts organizations. DTC's expectation is to program all major spaces year-round, minimizing downtime.
- Classrooms are expected to host year-round educational programs led by DTC or by outside users.
- Connectivity and awareness of activity throughout the site is a primary goal. Systems should support increased audience awareness and facilitate new, creative uses of the spaces and the campus overall.
- Each of the performance and rehearsal spaces should aim to accommodate 80% of its typical uses with built-in systems and infrastructure. For performance spaces, the intent is that any outside user group could produce a full theatrical show using systems and equipment owned by DTC. For the addition 20% of uses, DTC will supplement with additional production equipment.
- As a general rule, Threshold will specify equipment that conforms to existing DTC stock and expertise. This is particularly important with loose and/or portable equipment like intercom beltpacks and assistive listening receivers; more flexibility is allowed with major production equipment like mixing consoles or loudspeakers (though hardware is likely to be sourced from consistent manufacturers across the KHT campus).
- Wireless communication for production staff is expected in the areas immediately surrounding the performance spaces. Consistent coverage for these systems across campus is not required.
- For streaming and distribution across the internet, DTC will coordinate and arrange the necessary web hosting and content management.
- There is a desire to enable campus-wide video production and broadcast, with the capability to source live content from any of the performance spaces on the campus. Because simultaneous use in this context is unlikely, an as-yet-unaccounted-for centralized video production control room has recently entered discussions. It is not currently captured in the building program, but the equipment required to operate within such a framework is included in the AV Budget Estimate.
- In the event of an emergency in any of the performance or rehearsal spaces, the AV systems will mute audio and blank out and video playback, allowing the emergency evacuation systems provided by others to be seen and heard.

Vocabulary

In order to describe AV functionality in a concise way, Threshold utilizes the following terms. Each relates to a specific function that the AV systems must support based on the anticipated program for each space. Functions are not necessarily mutually exclusive, nor do they relate directly to any specific piece or pieces of equipment.

AV Table 1: AV Vocabulary	
AV Function	**Description**
Audio/Video Playback	Playback of pre-recorded audio/video material
Presentation Sound Reinforcement	Amplification of presenter or performer to reach larger audiences
Performance Sound Reinforcement	High-quality, high-impact amplification of multiple vocal and instrumental sources.
Audio/Video Feed Transmission	Distribution of live audio/video from performance venues to spaces not directly connected to the performance area.
Audio/Video Feed Reception	Hearing live audio and viewing live video transmitted from within performance spaces.
Two-way Communication	Communication system for technical staff (Production Intercom).
Assistive Listening	Direct broadcast of audio material to belt packs or hearing aids; required by ADA when Sound Reinforcement/Audio Playback are involved
Video Conferencing	Video & Audio conference with remote participants
Audio/Video Capture	Recording of audio and/or video
Audio/Video Streaming	Broadcasting a live audio/video feed over the internet or local network
Performance Recording	Live or in-studio professional recording
Paging	Making announcements that are heard in another space
Digital Signage	Wall-mounted displays that can be used to show promotional images or signage graphics.
Remote Monitoring/Control	Viewing and monitoring the status of AV equipment in another space
Active Narration	Live description of on-stage action, broadcast into space for reception by belt packs/ headphones, often using multi-channel versions of an assistive listening system.
Spatial/Immersive Audio/Video	Ability to create immersive or experimental environments that use audio and video in unique and flexible ways.
Temporary Infrastructure Use	Large open pathways to run temporary audio video signal cable and power cable to support audio video functions that are not permanently installed.
Easy Use	Simple sound reinforcement, playback, or video playback/presentation video that can be carried out by untrained or inexperienced users.

AV System Descriptions

Kalita Humphreys Theater (including Control Booths, Rack Rooms, dedicated Back-of-House and Lobby)

The Kalita Humphreys Theater is undergoing this renovation not only to upgrade its technical capabilities, but above all to recapture the architectural vision the Frank Lloyd Wright had at its inception. Threshold's overarching goal through this process is to incorporate the below production systems in a context that respects the original intent of the building's design.

The program for this space is expected to include the following AV functions and systems to support them:

- Audio/Video Playback – permanent loudspeaker systems with connections for playback devices (laptops, CD/media, Bluetooth, mobile devices, etc.) allow users to play pre-recorded sound. Similarly, a permanent projector and projection screen can be used to display video from a laptop or other source.
    - Infrastructure is distributed around the room that allows for more show-specific technology, such as surround or effects loudspeakers, scenic projectors, manned cameras, or a variety of other equipment.
- Performance Sound Reinforcement – With a program that ranges from spoken word to musical theater performance, the theater's sound system enables live control of multiple sources using a digital mixing console positioned at the mix position or in the control booth, with a loudspeaker system that can accommodate traditional musical theater mixing practices (i.e., a left-center-right configuration).
    - The exact loudspeaker system design is not determined yet, but the aim is to provide audiences with clear and intelligible sound that draws focus toward the action on stage and limits distraction or discomfort.
    - While existing systems at the Wyly are composed of Meyer Sound loudspeakers, other options are up for consideration for this renovation.
    - A digital mixing system with Dante connectivity allows flexibility and the opportunity to integrate with a variety of other equipment throughout the facility.
- Audio/Video Feed Transmission – Audio from a permanent room microphone (for unamplified activities) and/or the mixing console as well as video from a permanent house camera (either a default on-center overview of the stage or a camera mix created by video production staff) are fed to the dedicated back-of-house spaces, technical areas (booth, stage wings, etc.), and lobby areas.
- Two-way Communication – A wired partyline intercom facilitates communication among technical staff in the areas where they are often positioned, like the control booth and tech table position. In the stagehouse and back-of-house areas below and behind it, wireless intercom coverage allows staff to roam while staying connected.
- Assistive Listening & Active Narration – Audio from the room microphone or console is fed, by default, to a transmitter that broadcasts a signal to viewers with assistive listening devices. For events that require a live description or narration, a second transmitter can be used simultaneously to broadcast this narration over another channel.
    - There are a number of options to implement this function, with considerations related to initial investment, meaningful accommodations, and demand among the public that may drive this project toward a particular technology. Among those potential options, an Induction Loop (often shortened as "loop" or "T-coil") system is the most cost intensive, but provides to some patrons a completely transparent accessibility experience. Threshold has been directed to budget for this option while its impacts to the project are understood by the rest of the team.
    - In the vein of accessibility systems, a live caption feed can be displayed on the projection walls, provided the captions themselves are either generated live (by an operator/stenographer) or pre-programmed and synchronized/cued during a performance.
- Audio/Video Capture – Three Pan-Tilt-Zoom (PTZ) cameras with 4K resolution are positioned with views of the stage, forestage, and wings. The house camera feeds and other video content can be captured on a hard drive for archival or production purposes.

- A live production video switcher that enables seamless transitions and mixing of video content during a performance can be deployed at the booth, including two monitors that display program and preview/multiview video feeds.
- Production monitors can connect to SDI video infrastructure to allow performers to see a low-latency view of a conductor.
- Large-scale image magnification is a possibility, with live camera feeds being displayed on a projection system described later in the section.

- Audio/Video Streaming – The same audio/video feed described above can be distributed to the facility network or the internet (via a web hosting platform provided by DTC) using a streaming encoder. Alternative sources can be selected for the stream.
  - Streaming feeds will be the primary means for production staff to monitor the activities in a given space from on- or off-campus.
- Paging – Stage management and box office staff can make a live audio announcement into the lobby or back-of-house, where pages are heard through distributed ceiling or wall loudspeakers.
- Digital Signage – In the lobby and public circulation spaces, a number of distributed wall-mounted displays not only provide latecomers with a view of the stage inside the theater, but during non-showtimes they can be switched over to a roll of digital signage content created by DTC to highlight coming attractions or other promotions.
- Spatial/Immersive Audio/Video – the unique configuration of the KHT stage and forestage wings invites use of the walls as part of the dramatic scene. Along with connections as described earlier for temporary special effects loudspeakers, a series of projectors can be deployed to create a seamless or blended video canvas that stretches across the front of the room.
  - Multiple projectors and specialty processing are required to achieve this result, and ongoing maintenance of the systems will be necessary to ensure its continued function. In particular, blended projectors must have their images aligned periodically to account for small shifts that accumulate over time.
  - The intent is to serve this need with a portable set of projectors and a rolling control rack/station that can be deployed elsewhere if desired. Cable infrastructure and rigging accommodations are provided in the Kalita Humphreys.
- Temporary Infrastructure Use – While infrastructure is distributed to key technical areas and terminated at connection panels, the Theater also contains an empty pathway for cable to be pulled through in the event that there is an unanticipated need for cabling or connectivity.
- Easy Use – Particularly for presentation-oriented events with simple technical requirements, a touch screen controller mounted in the stage wing gives untrained presenters control over a limited number of wired or wireless microphones as well as the video projection system.

250-seat Proscenium Theater (incl. Control Booths, Rack Rooms, dedicated Back-of-House and Lobby)

The program for this space is expected to include the following AV functions and systems to support them:

- Audio/Video Playback – permanent loudspeaker systems with connections for playback devices (laptops, CD/media, Bluetooth, mobile devices, etc.) allow users to play pre-recorded sound. Similarly, a permanent projector and projection screen can be used to display video from a laptop or other source.
  - Infrastructure is distributed around the room that allows for more show-specific technology, such as surround or effects loudspeakers, scenic projectors, manned cameras, or a variety of other equipment.
- Performance Sound Reinforcement – With a program that ranges from spoken word to musical theater performance, the theater’s sound system enables live control of multiple sources using a digital mixing console positioned at the mix position or in the control booth, with a loudspeaker system that can accommodate traditional musical theater mixing practices (i.e., a left-center-right configuration).
  - The exact loudspeaker system design is not determined yet, but the aim is to provide audiences with clear and intelligible sound that draws focus toward the action on stage and limits distraction or discomfort.
  - While existing systems at the Wyly are composed of Meyer Sound loudspeakers, other options are up for consideration for this renovation.
  - A digital mixing system with Dante connectivity allows flexibility and the opportunity to integrate with a variety of other equipment throughout the facility.
- Audio/Video Feed Transmission – Audio from a permanent room microphone (for unamplified activities) and/or the mixing console as well as video from a permanent house camera are fed to the dedicated back-of-house spaces, technical areas (booth, stage wings, etc.), and lobby areas.
- Two-way Communication – A wired partyline intercom facilitates communication among technical staff in the areas where they are often positioned, like the control booth and tech table position. In the stagehouse and back-of-house areas below and behind it, wireless intercom coverage allows staff to roam while staying connected.
- Assistive Listening & Active Narration – Audio from the room microphone or console is fed, by default, to a transmitter that can be heard with a belt pack and headphones or a t-coil enabled hearing aid. For events that require a live description or narration, a second transmitter can be used simultaneously to transmit this narration over another channel.
- Audio/Video Capture – One Pan-Tilt-Zoom (PTZ) camera with 4K resolution is positioned with a view of the stage. The house camera feed and other video content can be captured on a hard drive for archival or production purposes.
  - A live production video switcher that enables seamless transitions and mixing of video content during a performance can be deployed at the booth, including two monitors that display program and preview/multiview video feeds to switch between the house camera and additional portable cameras.
  - Production monitors can connect to SDI video infrastructure to allow performers to see a low-latency view of a conductor.
  - Large-scale image magnification is a possibility, with live camera feeds being displayed on a projection system described later in the section.
- Audio/Video Streaming – The same audio/video feed described above can be distributed to the facility network or the internet (via a web hosting platform provided by DTC) using a streaming encoder. Alternative sources can be selected for the stream.
- Streaming feeds will be the primary means for production staff to monitor the activities in a given space from on- or off-campus.
- Paging – Stage management and box office staff can make a live audio announcement into the lobby or back-of-house, where pages are heard through distributed ceiling or wall loudspeakers.
- Digital Signage – In the lobby and public circulation spaces, a number of distributed wall-mounted displays not only provide latecomers with a view of the stage inside the theater, but during non-showtimes they can be switched over to a roll of digital signage content created by DTC to highlight coming attractions or other promotions.
- Temporary Infrastructure Use – While infrastructure is distributed to key technical areas and terminated at connection panels, the Theater also contains an empty pathway for cable to be pulled through in the event that there is an unanticipated need for cabling or connectivity.
- Easy Use – Particularly for presentation-oriented events with simple technical requirements, a touch screen controller mounted in the stage wing gives untrained presenters control over a limited number of wired or wireless microphones as well as the video projection system.

100-seat Studio Theater (incl. Control Booths, Rack Rooms, dedicated Back-of-House and Lobby)

The program for this space is expected to include the following AV functions and systems to support them:

- Audio/Video Playback – Audio and video sources can be connected and played back through loudspeaker and video projection systems, which are suspended from the rigging structure overhead.
  - A single permanent projector and motorized screen is oriented to serve an audience in the End-stage seating configuration, accessible via control system.
- Performance Sound Reinforcement – A set of portable full-range loudspeakers and subwoofers serve a variety of audience configurations with high-quality live sound, controlled by a digital mixing console (running Dante) that can be deployed anywhere in the room to best suit the show’s needs.

- A core set of five room configurations will be established, with each being served by some combination of permanently installed loudspeakers; essentially, a preset can be triggered to configure the audio systems to match one of these audience layouts. Any configurations outside of this set must be served by temporarily deployed equipment.

- Audio/Video Feed Transmission - Audio from a semi-permanent room microphone (for unamplified activities) and/or the mixing console as well as video from a dedicated house camera are fed to the dedicated back-of-house spaces, technical areas (booth, stage wings, etc.), and lobby areas.
- Two-way Communication – A wired partyline intercom facilitates communication among technical staff in the areas where they are often positioned, like the control booth and tech table position. In the stagehouse and back-of-house areas below and behind it, wireless intercom coverage allows staff to roam while staying connected.
- Assistive Listening & Active Narration – Audio from the room microphone or console is fed, by default, to a transmitter that can be heard with a belt pack and headphones or a t-coil enabled hearing aid. For events that require a live description or narration, a second transmitter can be used simultaneously to transmit this narration over another channel.
- Audio/Video Capture – One Pan-Tilt-Zoom (PTZ) camera with 4K resolution is positioned with a view of the stage. The house camera feed and other video content can be captured on a hard drive for archival or production purposes.
    - A live production video switcher that enables seamless transitions and mixing of video content during a performance can be deployed at the booth, including two monitors that display program and preview/multiview video feeds to switch between the house camera and additional portable cameras.
    - Production monitors can connect to SDI video infrastructure to allow performers to see a low-latency view of a conductor.
    - Large-scale image magnification is a possibility, with live camera feeds being displayed on a projection system described later in the section.
- Audio/Video Streaming – The same audio/video feed described above can be distributed to the facility network or the internet (via a web hosting platform provided by DTC) using a streaming encoder. Alternative sources can be selected for the stream.
    - Streaming feeds will be the primary means for production staff to monitor the activities in a given space from on- or off-campus.
- Paging – Stage management and box office staff can make a live audio announcement into the lobby or back-of-house, where pages are heard through distributed ceiling or wall loudspeakers.
- Digital Signage – In the lobby and public circulation spaces, a number of distributed wall-mounted displays not only provide latecomers with a view of the stage inside the theater, but during non-showtimes they can be switched over to a roll of digital signage content created by DTC to highlight coming attractions or other promotions.
- Temporary Infrastructure Use – While infrastructure is distributed to key technical areas and terminated at connection panels, the Theater also contains cable hooks/cable management in the event that there is an unanticipated need for cabling or connectivity.
- Easy Use – Particularly for presentation-oriented events with simple technical requirements, a touch screen controller mounted in the stage wing gives untrained presenters control over a limited number of wired or wireless microphones as well as the video projection system.

Shared Lobby and Event Space

The portions of the lobby that are shared between venues, as well as the large area dedicated to Event and Banquet use, are generally used with loose furniture and temporary equipment. Events in this space may be associated with a performance or other activity in the performance areas, or they may be entirely self-contained. Banquet seating for up to 300 can be accommodated.

The program for this space is expected to include the following AV functions and systems to support them:

- Audio/Video Playback
    - Installed loudspeakers are distributed throughout the lobby in zones, with one zone dedicated to the Event Space. Background music can be played into this zone using a dedicated connection for a mobile device. Additionally, portable loudspeakers and a portable mixing console can be set up and used for this same purpose.
    - Video can be played back in two ways: either an alternative source is distributed to the lobby displays (taking over from digital signage or latecomer video), or a temporary projector and folding screen are deployed and configured per event.
- Presentation Sound Reinforcement – at its most basic, a simple announcement through a wired or wireless microphone can be heard over the distributed loudspeakers. A more complicated production is possible using the mixing console and portable loudspeakers mentioned above.
- Audio/Video Feed Reception – An internal network can deliver audio and video from any of the performance spaces to the Event Space, where it can be displayed for remote viewing.
- Assistive Listening – An assistive listening transmitter that is installed in the portable mixing console rack gets deployed and can provide the local area with an FM signal to be picked up by the belt packs used throughout the building.
- Digital Signage – a number of distributed wall-mounted displays show a roll of digital signage content created by DTC to highlight coming attractions or other promotions.
- Easy Use – basic audio announcements using the dedicated wired or wireless microphone connections are controlled at a simple wall panel interface. Video systems are not accessible without trained staff.

Rehearsal Rooms (two rooms total)

The two Rehearsal Rooms replicate the playing area of the Proscenium Theater and the Studio Theater. To support the use of these spaces for rehearsals, the program is expected to include the following AV functions and systems:

Audio/Video Playback

- A wall- or grid-mounted loudspeaker system allows for music or other audio to be played back for rehearsal.
    - Video playback is supported by a permanent projector and motorized screen in each room.
    - Assistive Listening – A dedicated transmitter serves each room with assistive listening. Refer to the notes in previous sections.
- Audio/Video Streaming – A PTZ camera in the room (HD resolution) and mix of wireless microphones are transmitted to the internet (via a web hosting platform provided by DTC) using a streaming encoder. Alternative sources can be selected for the stream.
- Video Conferencing – Remote participants can call in and be heard over the loudspeakers in the room, while viewing the video stream remotely (thereby avoiding audio compression/cancellation effects that often make listening remotely difficult).

Coaching Rooms (two rooms total)

Smaller private teaching rooms provide space for solo instruction or private rehearsal. The program is expected to include the following AV functions and systems:

- Audio/Video Playback – A large-screen display on the wall, with integrated loudspeakers and a simple button control, allows users to connect a laptop or other device to display and play back audio.
- Video Conferencing – The display includes a camera and microphone to capture the local participants for a video conference, feeding a USB connection that a laptop can connect to.

Classroom (one space divisible into three separate rooms)

The classroom is a large, divisible space that in its most open configuration can seat up to 100 occupants. While it will most often be used for educational programs and rental users, it also may host Board Meetings for DTC and should be outfitted appropriately. The program is expected to include the following AV functions and systems:

- Audio/Video Playback – Each division of the room has an independent video projection system and installed loudspeakers to facilitate presentation of pre-recorded content from a laptop or portable device.
- Audio/Video Streaming – A PTZ camera in the room (HD resolution) and mix of wireless microphones are transmitted to the internet (via a web hosting platform provided by DTC) using a streaming encoder. Alternative sources can be selected for the stream.
- Video Conferencing – Remote participants can call in and be heard over the loudspeakers in the room, while viewing the video stream remotely (thereby avoiding audio compression/cancellation effects that often make listening remotely difficult).
- Room Combining – When the operable partitions are deployed or retracted, a control screen allows users to divide or separate audio/video systems to align with the room configuration.

AV Budget Estimate

The table below describes Threshold's estimate of the budget that should be held for each space. Project-wide cost estimates should carry these numbers through the design phases, with costs for other trades (electrical power and AV raceway, mechanical systems, et al.) estimated by others. Notable exclusions and inclusions are listed below:

- The estimates included here are for fully integrated, installed, tested, and commissioned systems provided by a professional AV Integrator. The figures are ROM (rough order of magnitude) numbers and do not represent precision greater than ±10%.
- The estimates assume normal work conditions/hours and are subject to market conditions.
- The estimates do not include winches, rigging, technical power and cable raceways/conduit/junction boxes, taxes, bonding, mark-ups, contingencies, inflation, or allowance for unusual contractual requirements included in the specification General Conditions. They also do not include other low-voltage systems that need to be accounted for by others including, but not necessarily limited to IT, telecom, and security systems.
- Custom furniture/millwork is not included.
- The estimates do not include architectural modifications required to accommodate AV equipment integration.
- Equipment prices are based on information available as of 2022.

AV Table 2: AV Budget		
Space Name	**Notes**	**AV Budget Estimate**
Kalita Humphreys Theater		$800,000.
Proscenium Theater		$300,000.
Studio Theater		$250,000.
Event Space		$50,000.
Rehearsal Rooms	Two rooms total	$90,000.
Coaching	Two rooms total	$20,000.
Classrooms		$275,000
	Total	**$1,785,000.**

Electrical Infrastructure Requirements for AV Systems

These are general guidelines intended to assist the electrical engineer with the design and documentation of the electrical infrastructure requirements associated with the audio & video systems. A stable, isolated, low noise power supply is a key element in the success of the final audio & video system performance. The guidelines are organized into (3) three sections:

- Clean Technical Power (CTP)
- Isolated Technical Ground (ITG)
- Audio System Raceway (ASR)

Recommended Responsibility

The following matrix delineates Threshold's recommended responsibility for various elements of the AV systems infrastructure, presented here for review and coordination. "Furnished By" means that the noted party will be responsible for procuring the necessary components and parts, which will be transferred (if necessary) to the party noted under the "Installed By" heading.

Note: "&" indicates that AV contractor must provide installation criteria and oversight during execution.

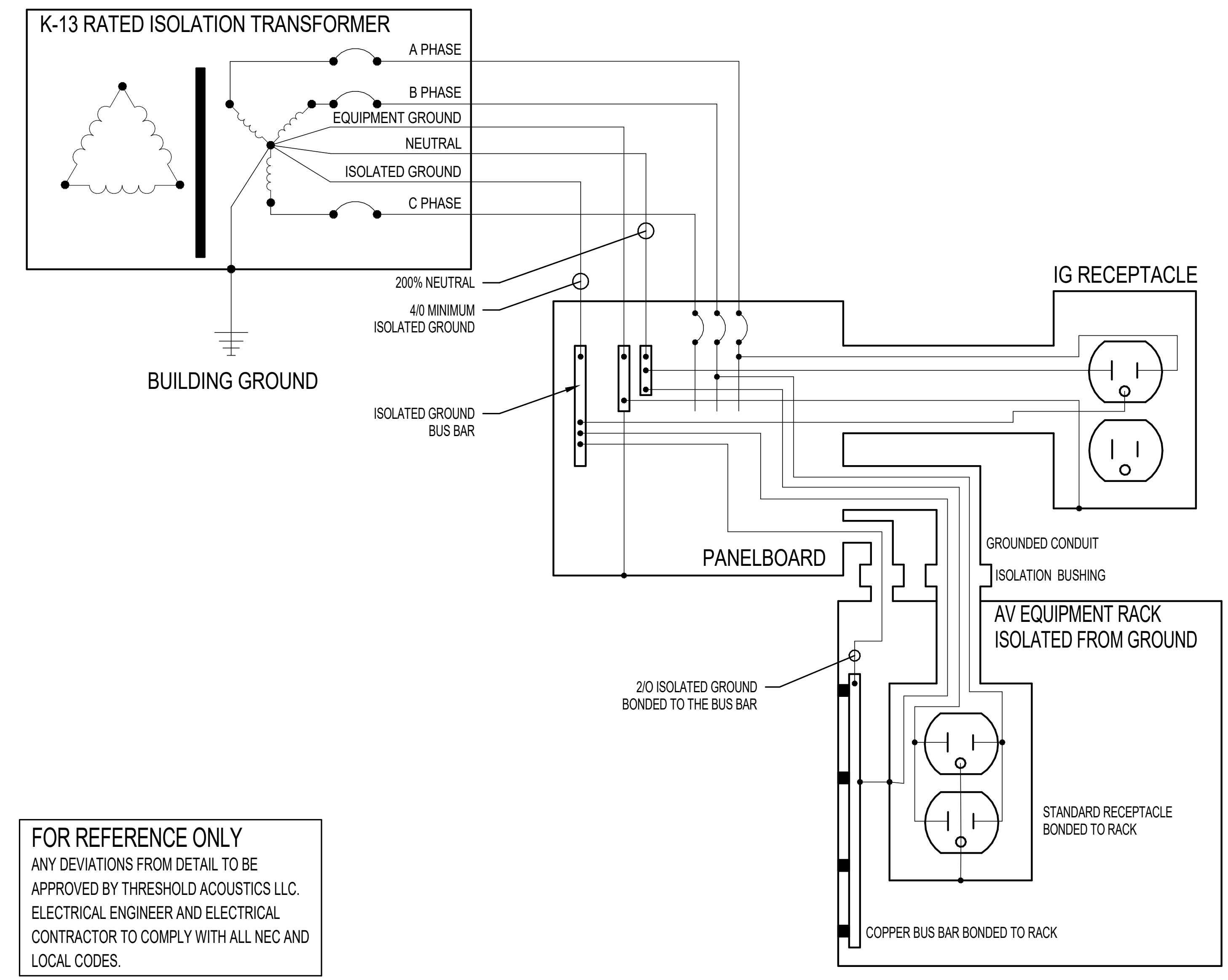
AV Table 3: Responsibility Matrix						
Scope Item	**Furnished by**			**Installed by**		
	G.C.	**E.C.**	**AV**	**G.C.**	**E.C.**	**AV**
Main Power Service Panel Boards and Circuit Breakers		X			X	
Main Power Service Conduit and Conductors		X			X	
Main Power Service Terminations					X	
Clean Technical Power (CTP) Transformers		X			X	
Transformer Conduit and Conductors		X			X	
Transformer Terminations					X	
CTP Isolated Ground Conduit and Conductors		X			X	
Isolated Ground Terminators					&	
CTP Distribution Panel Boards and Circuit Breakers		X			X	
Distribution Panel Board Conduit and Conductors		X			X	
Distribution Panel Board Terminations					X	
CTP Standard Load Centers and Circuit Breakers		X			X	
Standard Load Center Conduit and Conductors		X			X	
Standard Load Center Terminations					X	
CTP Custom Sequencing Panel Boards and Circuit Breakers		X			X	
Custom Sequencing Panel Board Conduit and Conductors		X			X	
Custom Sequencing Panel Board Terminations					&	
CTP Company Switches		X			X	
Company Switch Conduit and Conductors		X			X	
Company Switch Terminations					X	
CTP Outlet Devices for Branch Circuits delivered to AV Systems Equipment Racks			X			X
Outlet Device Back Boxes		X			X	
Outlet Device Wall Plates		X			X	
Branch Circuit Conduit and Conductors		X			X	
Branch Circuit Termination					X	

AV Table 3 Continued: Responsibility Matrix						
Scope Item	**Furnished by**			**Installed by**		
	G.C.	**E.C.**	**AV**	**G.C.**	**E.C.**	**AV**
AV Systems Equipment Racks and Devices			X			X
Metallic Conduit between AV Devices		X			&	
Conduit Insulation Bushings between Metallic Conduit and AV Equipment Racks		X			&	
AV Equipment Rack Cabling			X			X
AV Equipment Rack Terminations			X			X
AV Device Back Boxes and Floor Boxes		X			&	
AV Device Metallic Conduit		X			&	
AV Device Cabling			X			X
AV Device Termination			X			X
Standard Floor Box Lids		X			X	
Custom Floor Box Lids	X			X		
Empty Conduit (For Temporary Use)		X			X	
AV Systems Raceway		X			&	
AV Systems Cable Tray		X			X	
AV Systems Cable Sleeves		X			X	
AV Systems Pull Boxes		X			X	
AV Conduit Riser Diagram		X				

Clean Technical Power

The following items outline the general requirements associated with delivering a clean and stable power source for the audio & video systems (See Figure 1):

- The Audio & Video Systems require its own K-rated Isolation Transformer. The transformer must be shielded for common mode noise attenuation, attenuate triplen harmonic currents from the line, have oversized neutrals, and have a minimum of a K13 rating.
- All Audio & Video System CTP devices (outlets, circuits, panelboards, company switches, etc.) must be fed from the Audio & Video System's CTP Isolation Transformer.
- Only Audio & Video System CTP devices may be fed from the CTP system (no exceptions).
- Only those circuits and outlets identified as Audio & Video System CTP may be connected to the CTP panelboard.
- All Audio & Video System CTP outlets require a separate 20-amp circuit breaker and cannot be combined with additional CTP outlets.
- Each Audio & Video System CTP circuit requires its own neutral conductor home run to the CTP panel board.
- Each Audio & Video System CTP circuit requires its own isolated ground conductor home run to the CTP panel board.
- Wire sizes of branch circuit conductors shall be 10 AWG for hot and neutral conductors and 8 AWG for the isolated ground (equipment ground is to be sized according to code).
- Each CTP receptacle requires an orange-colored isolated ground outlet.
- All conductors terminating at duplex receptacles require crimped spade lugs. Spade lugs must be secured under the mounting screws. No push-in connections are allowed.
- All Audio & Video System CTP circuits must run in conduit separate from all non-CTP circuits.



AV Figure 1
Clean Technical Power isolated ground typical wiring and distribution

AV Table 4: Loads
The following table outlines the estimated Audio & Video System electrical power loads and their typical locations: (Exact device locations will be shown on the Audio & Video System Device Location Drawings during the Design Development Phase). These load estimates will be revised as the design progresses.

Load Location	Load Type	Device	QTY	Est Connected Load	Total Est Connected Load	Notes
Kalita Humphreys – Amplifier Rack Room	AV Equipment	20A Circuit	8	1500	12000	
Kalita Humphreys – Control Room / Mix Position	AV Control Equipment	20A	2	1500	1500	50% diversity
Kalita Humphreys	Main Projector	NEMA L6-30R	1	2000	2000	
Kalita Humphreys	Portable AV Equipment	20A	8	600	4800	
Kalita Humphreys	Scenic Projectors	NEMA L6-30R	4	1600	6400	
Proscenium Theater – Amplifier Rack Room	AV Equipment	20A Circuit	6	1500	9000	
Proscenium Theater – Control Room / Mix Position	AV Control Equipment	20A	1	1500	1500	
Proscenium Theater	Main Projector	NEMA L6-30R	1	2000	2000	
Proscenium Theater	Portable AV Equipment	20A	8	500	4000	
Studio Theater – Amplifier Rack Room	AV Equipment	20A Circuit	6	1500	9000	
Studio Theater – Control Room / Mix Position	AV Control Equipment	20A	1	1500	1500	
Studio Theater	Main Projector	NEMA L6-30R	1	2000	2000	
Studio Theater	Portable AV Equipment	20A	8	500	4000	
Lobby/Event Space	AV Equipment	20A	4	1200	4800	
Rehearsal Rooms	Main Projector	20A	2	1400	2800	
Rehearsal Rooms	Portable AV Equipment	20A	4	1500	6000	
Coaching Rooms	Display	20A	2	500	1000	
Classroom	AV Rack Equipment	20A Circuit	4	1500	4500	
Classroom	Main Projector	20A	3	1400	4200	
				Total W	**83000**	**Estimated Connected Load**

AV Table 5: Devices
The following tables list the major Audio & Video CTP devices and their requirements:

Device	Location	Supply Size/ Configuration	Notes
Isolation Transformer	Main Electrical Room	120/208 volt 3-phase, 5 wire with double neutrals, equipment ground and ITG.	Acceptable Manufacturers: Controlled Power Company Series Ultra-K, Square D – NLP series
Distribution Panel	Main Electrical Room	120/208 volt 3-phase, 5 wire with double neutrals, equipment ground and ITG.	Acceptable Manufacturers: Square D – ILINE series
Panelboards	Equipment Rack Room	120/208 volt 3-phase, 5 wire with double neutrals, equipment ground and ITG.	Acceptable Manufacturer: Square D – NOQD series
Company Switch	Stage Wing	200 Amp safety switch, 120/208 volt 3-phase, 5 wire with equipment ground and ITG.	Acceptable Manufacturer: LexProducts or Union Connector

Grounding

The Audio & Video systems require an Isolated Technical Ground System (ITG). This ITG is in addition to the building's other grounding systems (building, safety, or equipment). The term "Equipment Ground" is used in this document and refers to the building's safety ground system. The Equipment Ground is installed as it would be in any other non-audio/video system with the exception that it does not connect to any "Audio/Video" equipment, equipment racks, outlets, or terminals. The ITG is entirely separate from the Equipment Ground and provides a totally isolated ground path from all audio & video clean power devices and the ITG source. The ITG source is typically the Isolation Transformer where the master technical ground connects to the neutral bus, equipment bonding jumper and ground electrode system. The ITG must remain isolated from building ground except at this point. The purpose of ITG system is to provide a stable reference for audio & video circuits, minimizing the introduction of noise into the audio & video systems. The following items outline the general requirements associated with delivering an isolated technical ground for the audio & video systems (see Figure 1):

- All Audio & Video System equipment racks must be electrically isolated from the Building's Equipment Ground.
- Each Audio & Video System equipment rack requires an isolated #2/0 AWG grounding conductor to the Audio & Video Systems CTP panelboard.
- Each Audio & Video System CTP panelboard must have its own ITG junction box.
- Each Audio & Video System CTP panelboard requires a minimum #4/0 AWG from its ITG buss to the distribution panel/isolation transformer.
- All Audio & Video System CTP conduits shall be bonded to the distribution panel board, company switches, panelboards, receptacle boxes and outlet boxes as part of the equipment grounding system.
- The Audio & Video System CTP conduit shall not be connected to the ITG system.
- Each CTP branch circuit requires its own #8 AWG isolated ground conductor home run to the Audio & Video Systems CTP panel board (the equipment ground is to be sized according to code).
- The Electrical Engineer must review these recommended guidelines and the typical wiring shown in Figure 1 for compliance with all code and safety requirements.

AUDIO & VIDEO RACEWAY SYSTEM

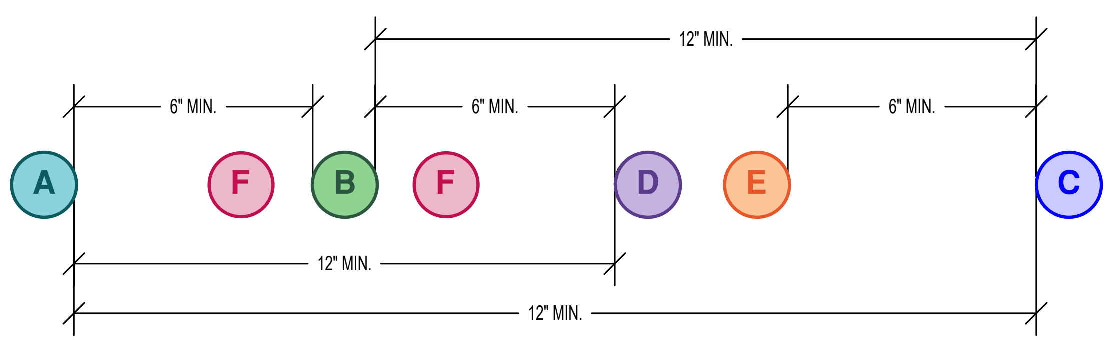
All the Audio & Video System cabling must be housed in a continuously grounded ferrous metallic Audio & Video System Raceway. PVC conduit is not acceptable. The raceway system serving the Audio & Video Systems must be designed with regard to Group Divisions, Routing & Separation, and Sizing.

Group Divisions

The audio & video systems have a wide range of signal levels and require that cable of different signal levels be installed in different conduits. The following table defines and describes these groups.

AV Table 6: AV Raceway Grouping Divisions

Group	Description	Level	Bandwidth
A	Microphone level audio circuits	below –30 dBu	20 Hz to 20 kHz
B	Line level audio circuits, Communication Circuits (Intercom)	-30 dBu to +24 dBu	20 Hz to 20 kHz
C	Speaker level audio circuits, including low impedance types and high impedance types (70 volt).	Greater than +24 dBu	20 Hz to 20 kHz
D	Control Circuits Data Circuits	0-28 Volt into <50kOhms 2 Volt peak-to-peak into 100 Ohms	-- 0Hz to 100 MHz
E	Video	1 Volt peak-to-peak into 75 Ohms	0 Hz to 10 MHz
F	Fiber Optic Circuits	50/125 Micrometer OM3/OM4	500-3500 MHz-km @ 850 nm



AV Figure 2
Generic AV system raceway conduit seperation example

Routing & Separation

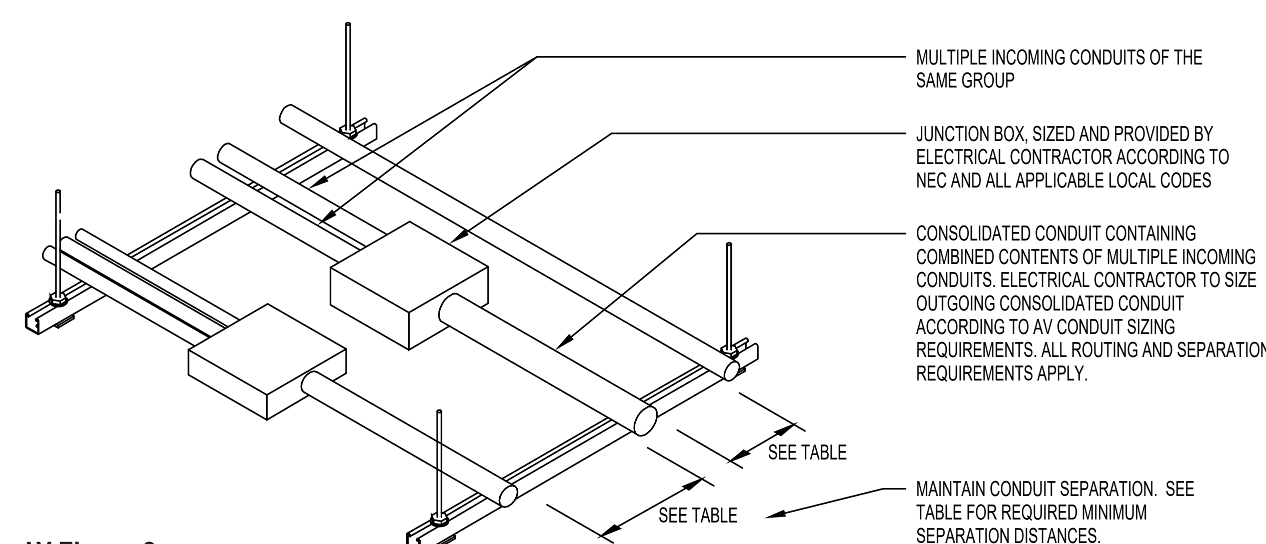
Audio & Video system raceways should not be indiscriminately routed through a facility. Even when enclosed in continuously grounded ferrous metallic conduit system, audio & video circuits are still susceptible to electrical noise and require specific conduit separations from other groupings and services to minimize these interferences. The following table defines the required minimum separations between the Group Divisions utilizing EMT conduit.

AV Table 7: Minimum separations between the Group Divisions utilizing EMT conduit.

Group	A	B	C	D	E	F
A	Adjacent	6 inches	12 inches	12 inches	12 inches	Adjacent
B	--	Adjacent	12 inches	6 inches	6 inches	Adjacent
C	--	--	Adjacent	6 inches	6 inches	Adjacent
D	--	--	--	Adjacent	Adjacent	Adjacent
E	--	--	--	Adjacent	Adjacent	Adjacent
F	--	--	--	--	--	Adjacent
Electronic Dimmer Controlled Lighting, Switched Power Sources & High Current Sources	36 inches	12 inches	6 inches	12 inches	12 inches	Adjacent
Convenience Outlet Power Service	12 inches	6 inches	Adjacent	6 inches	6 inches	Adjacent
All Other Power Services	24 inches	12 inches	6 inches	12 inches	12 inches	Adjacent

Notes:

- Unusually heavy current sources (100 Amps or greater) or long parallel runs (greater than 10 feet) with the power services may dictate greater separations to avoid interference with the audio system.
- Ninety-degree crossings in close proximity are acceptable between groups A through F



AV Figure 3
Example of consolidation of multiple conduits of the same group

Conduit Sizing

The sizing of the conduit will be based on the NEC standard of 40% fill, which applies to three or more non-lead covered cable, installed in the same conduit. The following list outlines the Audio & Video Raceway System's general requirements:

- The minimum conduit size allowed is ¾ inch
- Pull boxes must be dedicated to a given conduit/cable group
- There can be no more than four 90-degree bends in a given run between pull boxes.

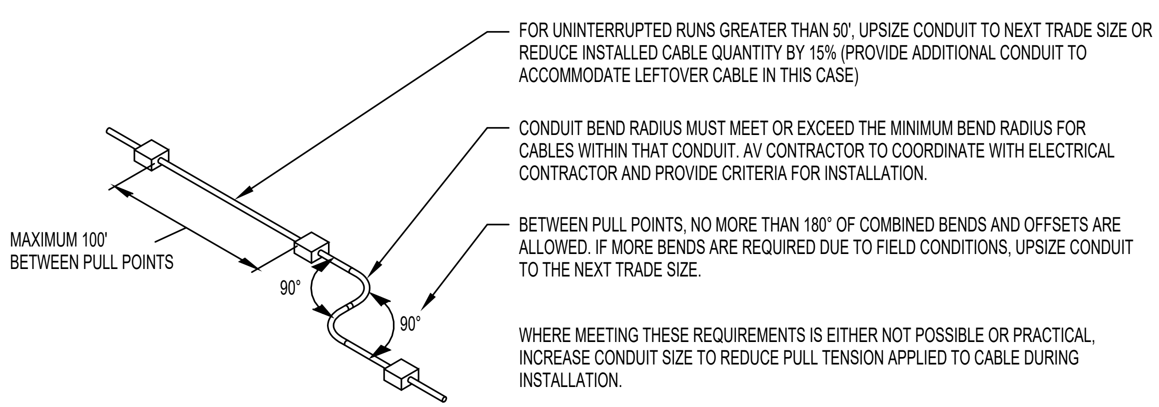
The following steps are used to determine the conduit size for a particular run of audio cable:
Square the O.D. of each cable and total the results (refer to the cable manufacturer specifications).

- Multiple the total by the factor listed in the table below.
- Find the permissible area of the conduit type used that is equal to or greater than the total area calculated in steps 1 & 2. (Reference NEC 1999 Chapter 9 for permissible area of various conduit types and sizes).

AV Table 8: Conduit Sizing		
No. of Conductors	**% of Cross Section of Conduit allowed for Conductors**	**Factor**
1	53	.5927
2	31	1.0134
3 or more	40	.7854

Notes:

- For conduit runs of 50 to 100 feet the installed number should be reduced by 15% or the next larger size of conduit should be used.
- If more than 180-degrees of bends and offsets are to be used in a conduit run or if the run exceeds 100 feet a pull box should be inserted.



AV Figure 4
Raceway must include adequate pull points and limit total bends between them to accommodate installation of cable.

HVAC Infrastructure Requirements for AV Systems

The Audio & Video System equipment is sensitive to high temperature and humidity, requires 24-hour environmental control and necessitates a separate air handling system or zone. The rooms containing audio & video equipment racks must be maintained at an ambient temperature between 50- and 80-degrees Fahrenheit, and a relative humidity not to exceed 60%.

TABLE 9: AV EQUIPMENT HEAT LOADS The following are the anticipated average heat loads for the AV equipment during typical use.				
Load Type	**QTY**	**Est. BTU/hr**	**Total Est. BTU/hr**	**Notes**
Kalita Humphreys Rack Room	1	8000	8000	
Kalita Humphreys Main Projector	1	5500	5500	
Kalita Humphreys Scenic Projectors	4	4000	16000	
Proscenium Theater Rack Room	1	6000	6000	
Proscenium Theater Main Projector	1	4000	4000	
Studio Theater Rack Room	1	6000	6000	
Studio Theater Main Projector	1	4000	4000	
Rehearsal Room Projector	2	4000	8000	
Classroom Projector	3	4000	12000	

Notes:

- The projected heat loads do not include normal requirements for lighting or personnel.
- These estimates will be revised as the design progresses.

Diller Scofidio + Renfro
New York, NY

Fisher Dachs Associates
New York, NY

Threshold Acoustics LLC
Chicago, IL

Reed Hilderbrand LLC
Cambridge, MA

Harboe Architects
Chicago, IL

Silman Engineering
New York, NY

BOKAPowell
Dallas, TX

Syska Hennessy Group
Los Angeles, CA

Pacheco Koch
Dallas, TX

MECHANICAL, ELECTRICAL, PLUMBING

I. Mechanical Systems

A. General

The intent of this Mechanical, Electrical, Plumbing and Fire Protection (MEPFP) Narrative for the Kalita Humphreys Theater Development, located at 3636 Turtle Creek Blvd in Dallas, Texas, is to define the performance requirements for MEPFP systems and support the Architectural master planning of the Development. This Narrative can be used as a base line by the Design-Build sub-contractors who will develop the design and be the Engineer -of- Record (EOR).

Refer to the Architectural, Structural, Acoustical, Civil, Integrator and all other disciplines for all MEPFP Requirements, Spatial requirements and additional intent that must be adhere to in developing the MEPFP Design.

The Kalita Humphreys Development will have new heating, ventilation, and air conditioning (HVAC) systems. The new HVAC systems will be designed to meet all project requirements in compliance with all State and City Codes.

Several HVAC options were evaluated and considering the nature of the project, acoustical and overall design planning, the team elected to pursue a 4-pipe central cooling and heating plant that will serve the entire development as indicated on the Architectural Concept plans and renderings. Please refer to Architectural Plans for proposed location of cooling Towers, Boilers, chillers and other HVAC Equipment.

The cooling heating and ventilation to various spaces will be provided via custom or semi-custom air handling units that will be located indoor in mechanical rooms or other designated areas/spaces s directed and planned by the Architect.

The MEP Design must employ sustainable and green code design strategies in accordance with the City of Dallas and the State of Texas, including decarbonization and electrification. HVAC strategies including underfloor distributing for the Theater, displacement, radiant cooling and heating slabs.

The LEED Certification level for this project is yet to be determined.

B. Design Criteria

1. Codes and Standards

C. The HVAC systems shall be designed to conform as a minimum, with the following latest codes and standards as adopted by the State and City at time of permitting

1. International Mechanical Code.

2. International Plumbing Code.

3. International Building Code.

4. The National Electrical Code (NEC).

5. State of Texas Codes and Standards.

6. Americans with Disabilities Act (A.D.A)

7. The following standards:

a. American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE).

b. American National Standards Institute (ANSI).

c. National Fire Protection Association (NFPA).

d. Underwriters' Laboratories, Inc. Listing Service (U.L.).

e. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

f. American Society of Testing and Materials (ASTM).

g. Occupational Safety & Health Act (OSHA).

h. Environmental Protection Agency (EPA).

8. Climatic Design Conditions

a. Summer: 101.6°F DB, 76.1°F MCWB (ASHRAE 0.4% cooling design)

b. Winter: 24.7°F DB (ASHRAE 99.6% heating design)

9. Indoor Design Temperatures

Space Type	Cooling Temp	Heating Temp	Ventilation
Occupied Areas	72 ± 2°F	68 ± 2°F	All occupied spaces ventilated per code and LEED requirements
Lobbies and Circulation Areas	74 ± 2°F	68 ± 2°F	All enclosed spaces ventilated per code and LEED requirements
IT/Electrical/Sound Equipment Rooms	78°F ± 2°F unless equipment vendor specifies otherwise	None	None
Elevator Machine	80°F ± 2°F	None	None

Rooms	unless code specifies otherwise		

10. Ventilation Rates

a. All occupied areas: Per Code, ASHRAE and LEED requirements. The most stringent shall govern.

b. Restrooms: Minimum of 10 air changes per hour or 120 CFM/fixture, whichever is larger.

c. Storage Rooms: 0.15 CFM minimum unless 100% outside air is required based on storage and commodities.

i. Janitor's closets: 6 air changes per hour.

ii. Electrical rooms that do not house transformers.

d. For public spaces, demand control ventilation will be provided.

11. Occupancy Schedules

Operating hours of the building are expected to vary considerably on a day-to-day, week-to-week basis. Rooms and areas expected to vary significantly from those different functional spaces nearby will be served by a system that can be programmed or controlled to accommodate its schedule.

12. Occupancy HVAC Loads

The design occupancy loads are used to determine outside air ventilation requirements and heat generated by occupants (i.e., cooling load). The values are based on code requirements unless more stringent design values are used for the project.

It is anticipated that occupancy densities may exceed the design values listed for short periods of time, but sustained periods of excess capacity are not accounted for with design or code requirements.

Space Type	Occupancy Density (people/1000 sf)	Occupant Sensible Load (btu/h/per)	Occupant Latent Load (btu/h/per)
Auditorium/Theater Seating	As per the Architectural layouts or the fire safety plans, whichever is greater	245	105
Stage		250	250
Black Box		250	250
Multi-Purpose Hall		245	155
Rehearsal		250	250
Restaurant		275	275
Lobby		250	200
Office Area		245	155
Other	10 (or as required by code)	as appropriate	as appropriate
Notes: Based on 2018 IMC, ASHRAE 62.1.			

13. Lighting and Equipment Loads

The design internal loads include heat added to conditioned spaces by lighting, electric receptacles, or other process loads as applicable. The rates are based on design targets, specific design layouts, or industry standard values.

Note that lighting design & receptacle wattages below are for HVAC load estimates only. These will be coordinated with actual lighting design and power requirements as the design progresses.

Space Type	Lighting (w/sf)	Equipment (w/sf)	Other Process (w/sf)
Auditorium/Theater Seating	Actual watts provided by lighting consultant	Actual watts provided by Theater Consultant	N/A
Stage	Actual watts provided by lighting consultant		N/A
Black Box	Actual watts provided by lighting consultant		N/A
Multi-Purpose Hall	Actual watts provided by lighting consultant		N/A
Rehearsal	Actual watts provided by lighting consultant		N/A
Follow Spot / Control Room	1.1		N/A
Back of House area	1.1	1.0	N/A
Lobby	1.3	1.2	N/A
Office	1.1	1.5	N/A
Other	1.0	0.5	N/A

14. Outside Air Ventilation

All enclosed spaces shall be ventilated per code to maintain healthy indoor air quality during all operating hours. Ventilation rates will be in accordance with all applicable code requirements: IMC, ASHRAE Standard 62.1 or LEED requirements, whichever is more stringent.

Demand control ventilation (DCV) is an energy efficiency measure used in high occupancy spaces that monitors indoor air quality and provides specific ventilation airflows as necessary to maintain healthy and comfortable conditions. The strategy conserves a significant amount of energy when spaces are occupied at less than peak rates.

Exhaust ventilation will be provided for restrooms, toilets, janitors' closets in accordance with code.

15. Acoustical Considerations

a. Please refer to Acoustical consultant report for Acoustical Requirements that must be complied with.

b. The HVAC systems will be designed in conformance with the guidelines established and provided by the Acoustical Consultant to maintain the required NC levels of each space.

c. Sound attenuators, duct liners and acoustical duct wraps will be added as recommended by the Acoustical Consultant's design review.

d. Design air velocities will be based on the acoustical consultant's guidelines.

e. All pipework, ductwork and equipment serving acoustically sensitive areas will be provided with vibration isolation as specified by the Acoustical Consultant.

16. Building Envelope Loads

a. The building envelope will be designed to minimize heat transfer and, hence, heating and cooling loads. The result is reduced capacity of installed heating and cooling equipment and energy savings throughout the year.

b. The thermal properties (i.e., U-values and SHGC) of walls and glazing will be, as a minimum, in conformance with the requirements of the International Energy Code and the Local energy Codes.

17. Energy Conversation / Sustainability Design

a. The design of efficient HVAC systems and reducing the building energy consumption below that of ASHRAE Standard 90.1 is part of the requirements of this project. The following are proposed measures that will contribute to this goal and will be included in the design:

D. Outside air economizer: All the air handling units will be provided with 100% outside air economizers, permitting "free cooling" when outside air conditions are appropriate.

E. Building Energy Management System: The control system will be Direct Digital Control (DDC) with electrical controllers and electric actuators. This is a computer-based control and automation system for the temperature control of the HVAC equipment and for energy optimized operation of mechanical systems for the building. The Building Management System will also control the interface with the lighting, security, and life safety systems.

F. Carbon Dioxide Sensing: A carbon dioxide sensing system will be utilized in each high occupancy area. This system will control the outside air volumes brought to spaces to maintain carbon dioxide concentrations below mandated levels.

G. Variable Speed Drives (VFD's):

1. Variable speed drives will be used on the pumps serving the condenser water system and the building main chilled water system to reduce pump energy costs during periods of low cooling demand.

2. The heating hot water pumps will use VFD's to adjust the hot water flow rates as demand dictates and in conjunction with the staging of boilers.

3. All air handling units will be equipped with VFD's on both supply and return fans.

a. Pipe and duct insulation minimum thicknesses will be designed to exceed the Code minimum requirements.

b. The building envelope thermal insulation will exceed the Code/ASHRAE minimum requirements.

c. Fenestration: Insulated, Low-E solar heat gain coefficient (SHGC) glazing, and internal blinds and/or external sun control or shades will be considered as part of the design.

d. Premium efficient motors will be provided for equipment.

e. For all AHUs, reduced coil face velocity design for low air pressure drop to save fan horsepower all year.

f. Displacement Ventilation: The auditorium and existing theater will use a displacement ventilation system with higher temperature supply air delivered from floor mounted diffusers located under the occupant seats.

g. Ventilation heat recovery: Thermal wheel will be provided in all AHUs to recover heat from the return air and exhaust air.

h. A heat recovery chiller: a heat recovery chiller will be included as part of the refrigeration plant that will simultaneously provide heating and cooling. Heating hot water will be utilized to heat domestic water and for space heating.

i. Provide air filtration media for all the air handling units that have a Minimum Efficiency Reporting Value (MERV) of 13 or better. Provide also activated carbon air filters for a better indoor air quality because of the proximity to roads.

j. An independent commissioning Agent will be hired to perform commissioning services.

k. Provide fundamental and enhanced commissioning services including design review of 50% CD documents, develop & implement construction document plan, review of submittals, training of operations staff and 10-month post occupancy review.

H. Central Plant

1. This new building will have a new, stand-alone central plant to serve the heating and cooling needs of the project. The cooling will be provided will be provided by a roof-mounted cooling tower and water-cooled chillers. The heating will be provided by a HRC and high-efficiency electric boilers.

2. Cooling Plant

a. The central cooling plant will consist of one air-cooled closed-circuit cooling tower, condenser water circulating pumps, one water-cooled chiller, one water-cooled heat recovery chiller (HRC), chilled water circulating pumps and the associated controls and distribution piping throughout the building.

b. The heat recovery chiller (HRC) will be designed to provide variable simultaneous heating and cooling. The HRC will be sized to provide around 30-35% of the peak heating load (space and domestic hot water) when it is in heating mode. All necessary accessories will also be provided to get a fully operational system, such as a plate heat exchanger (between the condenser water and the chiller), control valves, dedicated pumps to maintain pressure differential across the evaporator…etc.

c. Chilled water temperatures: 42°F / 56°F.

d. The cooling towers will be located on the roof of the rehearsal/classroom building. The chillers will be in the basement in a dedicated room.

e. Two condenser pumps will be in the chiller room in the basement/Parking Garage under the Multi-Purpose Hall. The pumps configuration is duty/standby.

f. Two chilled water pumps will be in the chiller room in the basement/Parking Garage under the Multi-purpose Hall. The pumps configuration is duty/standby.

g. Cooling tower will be provided with variable speed premium efficiency motors and corrosion resistant basin. It will also be provided with the following:

i. Basin heater

ii. A liquid-solids separation system for the basin filtration

iii. Chemical water treatment

3. The chilled water system will be provided with chemical water treatment as well as dirt/air separator, expansion tank and all associated controls to achieve the design parameters.

4. Heating Plant

a. The heating plant will consist of one heat recovery chiller and two high efficiency hot water electric boilers. The HRC is the primary heating source. Boilers shall be low NOx meeting EPA Requirements

b. The heating system will provide hot water for the air handling units and VAV boxes and the domestic hot water heat exchangers.

c. Heating hot water temperatures: 140°F / 100°F.

d. Each boiler will be sized to provide 50% of the heating load.

e. Two heating water pumps will be located in the boilers room in the basement. The pumps configuration is duty/standby.

f. The heating hot water system will be provided with chemical water treatment as well as dirt/air separator, expansion tank and all associated controls to achieve the design parameters.

I. Air Systems Overview

1. General

a. Supply air delivered to the spaces will be based on either space thermal requirements or ventilation air requirements, whichever is larger.

b. Air handling units will be installed either in the basement or on the roof of Level 3. As an energy efficient measure, all air handling units will be provided with variable speed drives. The location of rooftop units will be coordinated with the building's architecture and the acoustical consultant to eliminate any noise transmission to the noise critical spaces. The units will also be functionally located for accessing fresh air supply for the building. All equipment will be suitably isolated to preclude noise transmission to adjacent occupied areas.

c. The air handling units will be custom or semi-custom, with double wall enclosures with the following components:

i. Supply and return air fans.

ii. Filter bank, including pre-filter, final filter and carbon filter.

iii. Hot water heating coils.

iv. Chilled water coils.

v. 100% economizer section.

vi. CO_2 demand control.

vii. Heat recovery (thermal wheel or air-to-air heat exchanger within the unit)

viii. Units will be fully internally vibration isolated or be provided with vibration isolator curbs to reduce the noise transmission.

2. New Auditorium – Seating Area

a. The seating area will be served by one AHU that will be located in a mechanical room in the basement/Parking Garage.

b. Air distribution:

i. Main Seating Area

1) Conditioned air will be supplied to the air plenum under the seats via ductwork. Air will be supplied to the space through displacement diffusers under the seats.

2) Air will be returned at high level from the back of the theater. The free area of the return air opening will be sized using an air velocity less than 200 FPM (to be verified by the Acoustics Consultant).

ii. Balcony

1) Conditioned air will be supplied to the air plenum under the seats via ductwork. Air will be supplied to the space through displacement diffusers under the seats. For the areas where the seats are not fixed (movable – on both wings of each balcony), the air will be supplied via side wall diffusers at low level.

2) Air will be returned at high level from the back of the theater. The free area of the return air opening will be sized using an air velocity less than 200 FPM (to be verified by the Acoustics Consultant).

iii. Multiple sensors (thermostats, humidistats, and CO_2 sensors) will be provided. A minimum of two of each sensor and take average readings for controlling temperature, space humidity and outside air quantity. Locations of various sensors will be coordinated with the Architect.

iv. For each AHU, the sequence of operation will include a dehumidification mode and a 100% air economizer. The dehumidification will be achieved by sub cooling the mixed air and then heat it to the required temperature to maintain the space set point temperature.

v. The supply air temperature (to space): 65-68°F (cooling) and 68-72°F.

3. Auditorium – Stage Area

a. The Stage spaces will be served by one AHU that will be located in a mechanical room in the basement/Parking Garage.

b. Conditioned air will be supplied to the space at high level on both sides of the Stage.

c. Air will be returned to the AHU at low level at the back wall of the Stage.

4. Main Lobby

a. The Main Lobby will be served by an AHU that will be located in a mechanical room in the basement/Parking Garage.

b. Conditioned air will be supplied to the space at high level. The supply diffuser will be selected with high throw to suite the height of the space.

5. Black Box

a. The Black Box will be served by an AHU that will be located in a mechanical room in the basement/Parking Garage.

b. Conditioned air will be supplied to the space at high level and will be returned to the AHU via grilles at low level.

6. Back of House and Ancillary Spaces

a. The Back of house areas and other ancillary spaces (i.e., dressing rooms, green rooms, coaching studios, offices, music library…etc.) will be served by a variable air volume system; one AHU and variable air volume (VAV) boxes.

b. Air will be supplied to various zones via VAV boxes complete re-heat coils. Re-heat coils will a minimum of two rows.

c. Air will be supplied via ceiling diffusers and will be returned via ceiling grilles and ceiling plenum.

d. Piano Storage: Humidification will be required for the Piano Storage room located in the basement. Wall-mounted electric canister type of humidifier will be utilized to maintain the desired humidity levels in the space.

7. Rehearsal / Classroom Building

8. The Rehearsal room will be served by a separate dedicated AHU that will be located on the roof.

a. Conditioned air will be supplied to the space at high level.

b. Air will be returned to the AHU via ducted ceiling return grilles.

9. Restaurant

10. The Restaurant will be served by a separate dedicated AHU that will be located in the basement/Parking Garage.

a. Conditioned air will be supplied to the space at high level and returned to the AHU via ducted ceiling return grilles. Part of the supply air will be used as make-up air to the kitchen.

b. For the kitchen (if included):

i. Grease exhaust duct and a fan will be provided to serve the cooking hood in kitchen. Horizontal length of grease exhaust duct will generally be no longer than 75 feet and will be provided with proper slope and fire protection system. Make-up air will also be provided to the kitchen from the adjacent restaurant space.

ii. Electrostatic pollution-control unit will be provided to serve the kitchen to remove grease and odor prior to discharging to outside.

11. Existing Theater Building

a. Theater and Stage:

i. The seating area and the Stage will be served by one AHU (or two smaller AHUs) that will be located in the mechanical room in the basement.

ii. Conditioned air will be supplied to the air plenum under the seats via ductwork. Air will be supplied to the space through displacement diffusers under the seats.

iii. Air will be returned at high level from both sides of the seating area. The free area of the return air openings will be sized using an air velocity less than 200 FPM (to be verified by the Acoustics Consultant).

iv. Multiple sensors (thermostats, humidistats, and CO2 sensors) will be provided. A minimum of two of each sensor and take average readings for controlling temperature, space humidity and outside air quantity. Locations of sensors will be coordinated with the Architect.

v. For each AHU, the sequence of operation will include a dehumidification mode and a 100% air economizer. The dehumidification will be achieved by sub cooling the mixed air and then heat it to the required temperature to maintain the space set point temperature.

vi. The supply air temperature (to space): 65-68°F (cooling) and 68-72°F.

1) Lobby, Back of House and Ancillary Spaces:

vii. The Lobby, BOH and Ancillary Spaces will be served by the following systems:

1) 4-pipe fan coil units (FCU) to provide space cooling and heating. The FCUs will be located above ceiling and ducted.

2) A dedicated outdoor air supply (DOAS) unit to provide the outdoor ventilation requirements as per Code. The unit will be located in the new basement/Parking Garage.

12. Multi-Purpose Hall

a. The Multi-Purpose Hall will be served by a separate dedicated AHU that will be located in a mechanical room in the basement/Parking Garage.

i. Conditioned air will be supplied to the space at high level.

ii. Air will be returned to the AHU via ducted ceiling return grilles.

13. Parking Garage

a. The parking garage ventilation is a push-pull ventilation system.

b. Provide ventilation at the rate of 0.75 CFM/sq. ft. The exact ventilation rate for smoke control will be as per the Code Consultant's Smoke Control Rational Analysis.

c. The parking garage will be provided with and exhaust fan(s) discharging air to outside at, a minimum, ten feet above grade and not within ten feet of any building openings. The make-up air will be provided by dedicated supply fans and the entrance ramp. All fans will be complete with VFDs. The fans will be UL listed for smoke control application.

d. Carbon monoxide sensors will be provided to monitor the garage air quality and control variable speed fans.

e. The exhaust fans and the associated make-up air fans will be running continuously at low speed in normal conditions to provide general ventilation and circulate air within the parking garage. The speed of fans will be increased as necessary in response to increased carbon monoxide levels in the ambient air as detected by the carbon monoxide monitoring system.

J. Split Unit Air Conditioning Systems

1. The following areas/spaces will be served by individual split-unit air conditioning systems (air-cooled outdoor unit + indoor unit):

a. Electrical rooms containing transformer(s)

b. Telephone equipment rooms

c. IT rooms

d. AV rack room

e. Elevator machine rooms

K. CHW Fan Coil Units

1. The following areas/spaces will be served by 2-pipe CHW fan coil units:

a. Orchestra pit. FCU will be located outside and away from the Pit. Sound attenuators will be provided to maintain the recommended noise levels of the space.

b. Lighting and sound control booth

c. Follow spot rooms

d. Catering rubbish room

L. Exhaust Systems

1. The following areas/spaces will be provided with exhaust ventilation:

   a. Restrooms

   b. Janitor's closets

   c. Sump pump room

   d. Electrical rooms that do not house transformers

   e. Kitchen prep / Pantry

2. The exhaust air quantities will be based on ASHRAE recommended air changes or as recommended by specialty consultants.

M. HVAC Materials of Construction

1. Air Distribution

   a. All air ducts will be constructed as recommended in SMACNA Duct Construction and Leakage Test Standards, latest version. Materials of construction for general air distribution ductwork will be G90 galvanized steel.

2. Piping

   a. All piping will be constructed as recommended by ANSI, ASME, NFPA and/or the governing building code. The piping will be supported following the guidelines in MSS Standard Practice SP-58 and SP-69.

   b. Chilled water piping will be constructed of either Type K copper tubing for 2-inches (50 mm) and smaller, and Schedule 40 black steel piping for 2-1/2-inch (65 mm) and larger pipe sizes. The piping system (pipe, joints, fittings, valves etc.) will be able to withstand a system pressure of 125 psig and temperature ranges of 40o F - 200o F.

   c. Hot water piping will be constructed of either Type K copper tubing for 2-inches (50 mm) and smaller and Schedule 40 black steel piping for 2-1/2-inch (65 mm) and larger pipe sizes. The piping system (pipe, joints, fittings, valves etc.) will be able to withstand a system pressure of 125 psig and temperature ranges of 40o F - 250o F.

   d. Hydronic system supply and return piping 2-inches and smaller (nominal) will be designed for a water velocity of not more than 4 feet-per-second. Hydronic piping 2-1/2-inches and larger will be designed for a friction loss of not more than 4 feet (of head) per 100 feet of pipe. These criterions are based on ASHRAE's recommended maximum flow rates for Type L copper and Schedule 40 steel piping.

3. Insulation

   a. Ductwork insulation will be constructed of one of the following:

      i. Indoor: Semi-rigid fibrous glass with factory applied reinforced aluminum foil vapor barrier with an insulation R-Value of 4.2.

      ii. Indoor: Flexible fibrous glass with factory applied reinforced aluminum foil vapor barrier with an insulation R-Value of 4.2.

      iii. Outdoor: Foamed plastic of closed cell structure with an insulation R-Value of 6.3. Insulation will be enclosed in a double-wall duct system.

   b. Piping insulation will be constructed of one of the following:

      i. Indoor: Cellular glass with factory applied vapor barrier jacket, molded to conform to piping. Maximum thermal conductivity "k" of 0.23 Btu/in/ft2/ oF/hr at 75o F.

      ii. Outdoor: Cellular glass with factory applied vapor barrier jacket and additional aluminum jacket, molded to conform to piping. Maximum thermal conductivity "k" of 0.23 Btu/in/ft2/ oF/hr at 75o F.

N. Building Automation System

1. A new smart and secured building automation system (BAS) will be provided to monitor and control HVAC systems serving the expansion. The BAS will provide facilities personnel with monitoring, control, alarming, and scheduling of major systems.

O. Maintenance

1. All mechanical systems and devices will be designed to facilitate regular maintenance functions. There will be adequate service clearance to all equipment, which enhances movement of personnel and equipment. Equipment will be kept out of congested and difficult to reach locations. Equipment requiring maintenance will be kept out of hazardous areas to the greatest extent possible.

2. Adequate clearance will be provided at all equipment to enable removal and replacement of equipment without requiring prior disassembly.

P. Commissioning

Commissioning for the Performing Arts Center project will not be a single event, but a process. The process will ensure that systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. Post occupancy problems will be minimized through proper staff training, facility documentation and quality assurance.

The commissioning process will follow code requirements and LEED prerequisites, as applicable. It will include the following specific tasks related to the HVAC, indoor lighting, and water heating systems:

1. Owner's project requirements (by City)
2. Basis of design (by DB team) including HVAC, indoor lighting, and water heating systems and associated controls
3. Design review will include a coordination meeting during schematic design and a review of construction documents
4. Commissioning measures shown in construction documents (by DB team)
5. Commissioning plan (by DB team) that describes the process and identifies responsible parties and timelines for specific tasks
6. Functional performance testing (by DB team)
7. Documentation and training (by DB team) including a systems manual and training of the City's facilities operators
8. Commissioning report (by DB team) that summarizes the process and resulting operational performance of building systems
    a. A successful commissioning process improves the function of a business organization by improving facilities operations and efficiency and providing them with the proper tools, data and procedures that save energy, time and money over the life of the building.

Q. Acceptable Manufacturers for Major Equipment

1. Air Handling Units
    a. AAON
    b. Springfield
    c. Carrier
    d. Trane
    e. Or equal
2. Cooling Towers
    a. BAC
    b. Evapco
3. Chillers
    a. Trane
    b. Carrier
    c. Or equal
4. Heat Recovery Chiller
    a. Multistack
    b. Or equal
5. Electric Boilers
    a. Cleaver-Brooks
    b. Or equal
6. Pumps
    a. Armstrong
    b. Bell & Gossett
    c. PACO
    d. Or equal
7. Fans

a. Greenheck

b. Loren Cook

c. Or equal

8. Variable Refrigerant Flow system (VRF)

a. LG

b. Daikin

c. Mitsubishi

d. Or equal

9. Motors (high efficiency)

a. Westinghouse

b. Gould

c. Lincoln

d. Or equal

10. Variable Frequency Drives

a. Danfoss

b. Reliance

c. Allen-Bradley

d. Or equal

II. Electrical Systems

A. Load Analysis

1. The following floor power loads will be used for the design of the electrical distribution system (refer to attached load calculation spreadsheet for lighting and power normal and emergency load requirements):

Space Type	Load (W/SF)
Performing Arts	100
Administration/Office	20
Public Spaces	20
Exterior Spaces	10
Conference Room	20
Kitchen	40
Equipment Rooms	5

B. Electrical Service

1. The electrical service will be sized based on program requirements and coordinated with the utility company

2. The utility service is envisioned to be provided via new pad mount transformer on the site.

3. The new pad mount transformer will be located as planned and coordinated with Architect.

4. Further coordination with utility will determine exact pad size and service conduit duct routing.

C. Service and Distribution Equipment

1. The main service switchgear will supply power at 480Y/277V. Switchgear will distribute power through distribution/branch circuit panelboards and transformers located through the building in proximity to major loads.

2. Power distribution from the switchgear will be as follows:

a. 480Y/277-volt branch circuit panels to serve non-theatrical building lighting and light mechanical equipment (fan coil units, exhaust fans, etc.).

b. 480-volt power to distribution/branch circuit panelboards for mechanical equipment.

c. 208Y/120-volt power via step down 480 -208/120-volt transformers to distribution/branch circuit panelboards to serve dimmed lighting, kitchen loads, special receptacle outlets in lobby areas, loading docks, etc. and general use receptacle outlets throughout the facility.

d. 480Y/277-volt power to normal side of the automatic transfer switches (ATS) for emergency and standby loads.

e. 208Y/120-volt power via step down 480-208/120-volt transformers to distribution panelboards to serve company switches to meet special power needs for courtyards and loading docks, etc.

f. Electrical rooms will be located near the loads that they serve. Refer to Architectural Plans for location of Electrical Rooms.

g. Avoid locating switchgear and critical equipment in areas/spaces that may be subject to Flood.

h. Theatre

i. All power requirements for the stage and theatrical system must be coordinated with the theatrical consultant.

ii. 20-amp, 120-volt, duplex convenience outlets will be located at 30’ on center along perimeter walls.

3. Black Box, Event Spaces, Rehearsal

a. The Black Box, Rehearsal and Multi-Purpose Spaces, and Reception Room will have floor boxes flush mounted, through the spaces to maintain flexibility. Floor boxes will have separate compartments for electrical, communication and audio-visual services.

b. Each floor box will be provided with the following:

c. Two each 20-amp, duplex, 120 volt, 3-wire receptacles and 20 amp.

d. Low voltage and Audio-Visual connections as required (per low voltage consultant)

i. (1) 100 amp and (2) 60-amp, 208/120 volt, 3-phase, 4-wire circuits will be terminated into company switches with 100- and 60-amp main circuit breakers and E1016 Cam-Lok receptacles for show power, located close to stage area and at another end of the room to accommodate larger productions.

ii. In the Rehearsal room only, a ceiling receptacle system will be provided. The system will be on 4 x 4-foot grid with one independent 30-amp, 208/120 volt, 3-phase, 5-wire, twist-lock, individually switched receptacle, aligned with bottom of ceiling trusses and accessible for use with accent lighting and signs.

iii. 20-amp, 120 volt, NEMA 5-20R duplex convenience outlets and 30A, 208/120-volt outlets will be located at 30’ on center along perimeter walls.

iv. Convenience outlets will be located on any wall 24” or wider.

4. Exterior Courtyard and Public Lobby

a. Convenience outlets on any wall 24” or wider.

b. 20-amp, 120-volt NEMA 5-20R duplex convenience outlets and 30A, 208/120-volt outlets at 30’ on center along perimeter walls.

c. Outdoor rated, weatherproof, floor boxes will be located in the courtyard for larger productions.

d. 60-amp, 208/120 volt, 3-phase, 4-wire outlets for FS carts in areas not obstructing exiting.

e. 100-amp, 480/277 volt, 3-phase, 5-wire power connections.

5. Outdoor Terraces, Gardens

a. Convenience outlets on any wall 24” or wider.

b. 20-amp, 120-volt NEMA 5-20R duplex convenience outlets and 30A, 208/120-volt outlets at 30’ on center along perimeter walls.

6. Catering Kitchen

a. 20-amp, 120-volt NEMA 5-20R duplex convenience outlets at 30’ on center along perimeter walls.

b. Power requirements will be coordinated with equipment designer.

7. Loading Dock

a. One (1) 30-amp, 208/120 volt, 3-phase, 4-wire, NEMA L21-30R weatherproof receptacle outlet at truck bay.

b. 20-amp, 120 volt, NEMA 5-15R weatherproof receptacles located 30’ on center.

c. (1) 60 amp, 208Y/120 volt, 3-phase, 5-wire circuits terminated into a company switch with 60-amp main circuit breaker and E1016 Cam-Lok receptacles for broadcast media trucks.

8. Back of House Corridors

   a. On walls, 20-amp, 120 volt, NEMA 5-15R duplex convenience outlets located 30' on center.

9. Storage and Work Rooms

   a. On walls, 15-amp, 120 volt, NEMA 5-15R duplex convenience outlets located 30' on center.

D. Emergency Power

1. In case of loss of normal power, emergency power will be provided by a 480Y/277-volt diesel engine generator set. The generator will be visually concealed and located away from occupied spaces. The emergency system required by NEC will include complete fuel, cooling, exhaust and starting systems as well as an automatic transfer switch and distribution/branch circuit panelboard for emergency loads.

2. Generator will be sized to meet code required emergency and standby loads at 480Y/277V. The generator shall meet applicable EPA, State and City requirements.

3. Fuel Capacity and Run Time shall be per code and local Fire Marshal.

4. Equipment and systems connected to the emergency power system will include, but are not limited to, the following:

   a. Exit signs and egress lighting in public areas, corridors, stairwells and exit paths.

   b. Sewage Ejector Pumps

   c. Smoke Control/Evacuation System, as required (refer to the Rational analysis Report).

   d. Elevators

   e. Fire Pumps

   f. Other Loads required by NEC, State, and Local Codes or Developer.

E. Lighting

1. Illumination levels will be provided as recommended by Illuminating engineering Society Handbook, and as designed by the Lighting Designer and the Architect.

2. Architectural lighting in the main lobby and theater will be controlled by the theatrical house dimming system. Architectural lighting and control system will be as designed by the Lighting Designer and the Theatrical Lighting Consultant. Power connection will be provided to house dimming rack as required.

3. Non-dimmed LED fixtures will be provided in storage, custodian, mechanical and electrical rooms.

4. Dimmable light fixtures will be provided in all other areas. Dimming will be by wall-mounted slide-to-off dimmers, excluding and theatrical dimming, which will be controlled through theatrical control system.

5. Three and four- way controls will be provided to allow switching from entry locations.

6. All egress lighting and exit signs will be served by the Life Safety emergency power panel being served by new emergency generator.

7. Exterior security lighting will operate dusk-to-dawn via photocell control. Non-security exterior lighting will operate dusk-to-prevent time via a combination photocell/time switch controller.

F. Lighting Control system

1. Building will have a lighting control system which will consist of a new lighting control relay panel with programmable time clock and relays located in each electrical room.

2. Systems to be integrated into Building Management System.

3. All lighting circuits excluding theatre lighting fed from dimmer racks will be routed through the lighting control system.

4. All enclosed rooms will be control via occupancy sensors.

5. The after-hour override switches will consist of low voltage switches with local display operation light at switch and will be provided in all spaces without occupancy sensors.

6. Any daylight areas will be provided with photocells and have automatic daylight harvesting controls that will dim the lights when sufficient daylight is available.

7. All lighting in Theatre, Sound Lock Lights and Theatre lobby will be routed through and controlled by theatrical dimming/relay system.

G. Equipment and Device Materials and Properties

1. Switchgear, Distribution/Branch Circuit Panelboards
    a. All equipment sizes and layouts will be based upon Eaton Cutler Hammer equipment.
    b. All bussing shall be copper including phase, neutral and ground busses.
    c. Neutral bussing shall be 100% rated.
    d. All equipment shall be fully rated, series rating is not acceptable.
    e. Switchgear and Distribution Panelboards over 600-amp rating shall be floor mounted, Transformers
    f. All equipment sizes and layouts shall be based upon Eaton Cutler Hammer equipment.
    g. Copper windings, 100 degree C rise, low noise energy efficient type.
    h. Transformers shall be 480-208Y/120 volt unless otherwise noted.
    i. Transformers shall be mounted on the floor.
    j. Transformers shall have vibration isolation pads and flexible connections to and from the equipment.
2. Raceways and Fittings
    a. Outdoors
        i. Exposed: GRC.
        ii. Concealed, Aboveground: RNC, Type EPC-40-PVC.
        iii. Underground: RNC, Type EPC-40-PVC, direct buried.
        iv. Connection to Vibrating Equipment: LFNC.
    b. Indoors
        i. Exposed, Not Subject to Physical Damage: EMT.
        ii. Exposed, Not Subject to Severe Physical Damage: EMT.
        iii. Exposed and Subject to Severe Damage: GRC.
        iv. Concealed: EMT.
        v. Connection to Vibrating Equipment: FMC, except LFMC in damp or wet locations.
        vi. Damp or Wet Locations: GRC.
3. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
4. Raceway Fittings: Compatible with raceways and suitable for use and location.
    a. Rigid and Intermediate Steel Conduit: Threaded rigid steel conduit fittings.
    b. PVC Externally Coated, Rigid Steel Conduits: Fittings listed for use with this type of conduit.
    c. EMT: Compression, steel fittings. Set Screw fittings are not acceptable.
    d. Flexible Conduit: Fittings listed for use with flexible conduit.
5. Wire and Cabling
    a. THHN/THWN and XHHW type insulations only.
    b. MC cable will not be acceptable, except in specific areas when allowed by the engineer.
    c. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
    d. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
6. Boxes
    a. Boxes and Enclosures, Aboveground, Exterior: Type 3R.
    b. Boxes and Enclosures: Type 1, except where noted.
    c. Metal Outlet and Device Boxes: Aluminum.
    d. Nonmetallic outlet and device boxes.
    e. Metal Floor Boxes: Cast metal, fully adjustable.

f. Nonmetallic Floor Boxes: Non-adjustable, round.

g. Luminaire Outlet Boxes: Non-adjustable, designed for attachment of luminaire weighing 50 lb (23 kg).

h. Hinged-Cover Enclosures: Metal.

i. Vibration isolation pads will be provided as per the Acoustics Consultant guidelines.

j. A dedicated empty conduit and back box system for the AV Sound equipment as specified by the Theater Consultant.

H. Equipment Access

1. All major equipment (generator, switchgear, etc.) will be located at or near the street or loading dock to simplify service access.

2. Distribution equipment will be located in electrical rooms accessible by facilities personnel only. Electrical rooms will be located in back of house areas as much as possible.

III. Plumbing Systems

A. General

Domestic (potable) water, sanitary sewer and storm water systems will be new services and connected to the city main utilities.

New equipment will include water heaters, pumps, piping distribution, fixtures, grease interceptors, sewage ejector pits and pumps and sump pits and pumps.

B. Design Criteria

1. Codes and Standards

The HVAC systems shall be designed to conform as a minimum, with the following latest codes and standards adopted by the State and City at Permit:

a. International Building Code

b. International Plumbing Code

c. The National Electrical Code (NEC).

d. State of Texas Codes and Standards.

e. Americans with Disabilities Act (A.D.A)

f. County Health Department

g. Energy Conservation/sustainable Design – LEED

h. Local Codes and Standards

i. The following standards:

i. National Fire Protection Association (NFPA).

ii. American National Standards Institute (ANSI).

iii. Underwriters' Laboratories, Inc. Listing Service (U.L.).

iv. American Society of Testing and Materials (ASTM).

v. Occupational Safety & Health Act (OSHA).

vi. Environmental Protection Agency (EPA).

2. Domestic cold water (DCW) systems design criteria

   a. Domestic cold water piping system materials shall be copper type “L” for installations above ground and type “K” for installations below ground.

   b. Fittings, couplings, valves, appurtenances, etc. shall comply with the requirements of NSF/ANSI 372.

   c. Domestic cold water piping distribution system shall be sized to maintain a maximum velocity of six (6) feet per second at design flow conditions with a maximum friction loss of 3 psi/100 ft.

   d. Domestic cold-water systems will be designed to prevent water hammer conditions by providing shock arrestors for quick closing valves. Each group of fixtures will be provided with isolation valves for each zone. Pressure regulation will be provided where domestic water pressure is anticipated to exceed 80 psi.

   e. Domestic cold-water system will be designed to provide a minimum of 35 PSI to all plumbing fixtures.

   f. Domestic cold-water system will be designed based on city water street pressure of 90 PSI located on Fay Ave.

3. Domestic hot water (DHW) systems design criteria

   a. Domestic hot water piping system materials will be copper type “L” for installations above ground and type “K” for installations below ground.

   b. Fittings, couplings, valves, appurtenances, etc. will comply with the requirements of NSF/ANSI 372 (low lead).

   c. Domestic hot water piping distribution system will be sized to maintain a maximum velocity of four (4) feet per second at design flow conditions with a maximum friction loss of 3 psi/100 ft.

   d. Domestic hot water recirculation system (as applicable) will be sized to maintain a maximum velocity of 1.5 feet per second at design flow conditions with a maximum friction loss of 3 psi/100 ft.

   e. Domestic hot water system will be designed to provide a minimum of 10 PSI to all plumbing fixtures.

   f. The sizing for hot water heaters recovery rate is based on a minimum city water temperature of 50°F.

   g. Hot water will be provided to fixtures at the following temperatures:

      i. Public lavatories: 95°F

      ii. General building fixtures: 110°F

      iii. Showers: 110°F

      iv. Kitchen sinks: 120°F

      v. Kitchen and concession equipment such as dishwashers and triple compartment sinks: 140°F

4. Sanitary drainage (SAN) & Sanitary Vent (V) systems design criteria

   a. Sanitary drainage piping system material will be cast iron, service weight with no hub fittings and shielded no-hub couplings.

   b. Sanitary drainage piping systems will be designed to flow at 2% grade to be consistent with the minimum requirements of the International Plumbing Code.

   c. Floor drains and floor sinks adjacent to plumbing fixtures of frequent use will be provided with a mechanical trap primer valve connected to the cold-water supply of such plumbing fixture; floor drains and floor sinks located in remote areas where plumbing fixtures of frequent use are not available will be provided with electronic trap primer systems.

5. Grease Waste (GW) drainage system design criteria

   a. A grease waste system and interceptor are contingent on catering kitchen requirements and FEWD review and may not be required.

   b. Grease waste drainage piping system material will be cast iron, service weight with no hub fittings and shielded no-hub couplings.

   c. Grease waste drainage piping systems will be designed to flow at a minimum grade of 2%.

6. Storm drainage (SD) & Overflow Storm Drain (OSD) system design criteria

a. Storm and storm overflow drainage piping systems will be designed to flow at 1% grade to be consistent with the minimum requirements of the International Plumbing Code.

b. Storm and storm overflow drainage design will be based on a rainfall in accordance with the local Code and the requirements of City of Dallas. It is recommended that 100-year rain fall data be used to size the storm drainage system.

c. Storm and storm overflow drainage piping system material will be cast iron, service weight with no hub fittings and shielded no-hub couplings.

d. Each roof and overflow roof drain will be designed not to exceed the maximum area required for a 6" conductor per IPC.

7. Plumbing Fixtures design criteria

a. Plumbing fixtures must be IAPMO approved; the system components of the plumbing fixtures must also comply with the requirements of NSF/ANSI 372 (low lead) as dictated per IPC.

b. Fixtures will be provided to comply with the minimum requirements of the Code.

c. Plumbing fixtures flows will be as follows:

i. Lavatory faucets for public use: 0.4 GPM

ii. Lavatory faucets metering: 0.20 gallons per cycle

iii. Kitchen faucets: 1.75 GPM

iv. Water closets: 1.28 GPF

v. Urinals: 0.125 GPF

vi. Hose bibs for maintenance and window washing 5 GPM

C. Plumbing System Description

1. Plumbing fixtures

a. Fixtures will be vitreous china, suitable for public use, with chromium plated brass trim and individual stop valves.

b. Drinking fountains with integral filters and chiller/compressors will be provided throughout the building.

c. Plumbing fixture groups will have isolating zone valves to allow disruption of service only where required for maintenance or repairs.

d. Water closets and urinals in public restrooms will be vitreous china wall hung, siphon jet or wash out pattern with low-flow water conserving electronic hard wired type piston flush valves. Water closets in single use restrooms will be vitreous china floor mounted tank type, gravity flush low-flow water conserving lever handle actuated.

e. Hose bibs with-out keyed handle will be provided in every mechanical room and adjacent to every sewage ejector as required per IPC.

f. Hose bibs with keyed handle will be provided in every bathroom for general maintenance.

g. Wall hydrants with keyed handle will be provided around the exterior perimeter of the building envelope at every 200 ft, near each interceptor, and near each recycling/dumpster area.

h. Appropriate "Barrier Free" fixtures will be provided for handicapped use.

i. Sinks provided by the kitchen equipment contractor will be provided with chromium plated supply fixtures stops and traps.

j. Public lavatories will be provided with single temperature hard wired electronic activated faucets with flow restrictors.

2. Domestic Water system Description

a. Under the Civil Engineering Package or Scope of Work, the civil engineer will be responsible to provide domestic water system at point of connection, 5'-0" outside the building. The metered water with reduced pressure backflow preventer will be extended from point of interface with Civil and will be distributed through mains, risers, and branches to plumbing fixtures and equipment. System will be designed to prevent water hammer conditions by providing water hammer arrestors for quick closing valves.

b. Domestic hot water will be generated via a plate heat exchanger. The primary heating will be provided by the central heating plant. The heat exchanger and associated accessories and controls will be located in the domestic heater room in the basement/Parking Garage. Hot water will be provided to all the public and private fixtures. All water piping, subject to heat loss or sweating will be provided with fiberglass insulation and a fire-retardant jacket.

c. Hot water will be provided to public toilet rooms, single use restrooms, back of house areas, and catering kitchen by a hot water loop system through mains, risers and branches to plumbing fixtures and equipment.

d. Hot water temperature will be maintained for distribution piping by using thermostatically controlled hot water recirculation pumps for each zone controlled by time clocks or as acceptable per code.

e. Breakroom/pantry rooms and concessions will have filtered cold water to refrigerator, ice maker, and coffee makers.

f. Hose bibb, with vacuum breakers, will be provided, as required, at grade for the landscaping requirements.

g. All underground piping will be protected by a polyethylene encasement sleeve.

3. Sanitary Drainage and Vent Systems Description

a. Plumbing fixtures above grade will be drained by gravity through soil stacks and house drains to five (5) feet outside building. Plumbing fixtures located below the city sewer main will be drained by gravity to duplex sewage ejectors on emergency power and pumped into gravity house drain.

b. Drains in truck loading areas will be run through sand and oil and sediment interceptors before connection to the sanitary system.

c. Sewer lateral size will be 6". Size to be confirmed at later stage based on sewage pump size.

d. Cleanouts will be provided per IPC for the engineered waste systems in the multipurpose areas.

e. Adequate gradients will be maintained for all horizontal drainage systems to ensure a minimum scouring velocity of 2 feet per second to self-clean the interior walls of the pipes. Cleanouts will be provided per Code.

f. A grease interceptor (if required) for the catering kitchen will be located below slab at Trash Recycling. Final sizing of the grease interceptor will be based on the total drainage fixture units per the International Plumbing Code.

g. Backwater valves will be provided for areas where house drain lines are below City sewer mains.

4. Storm and Storm Overflow Drainage System Description

a. Roofs, balconies, terraces, and canopies will be drained by gravity via roof drains through inside leaders and house drains to five (5) feet outside building.

b. Separate overflow drains will be provided adjacent to each roof drain. Each branch overflow drain will discharge on the sidewalk outside the building in a location where it can be monitored by the building maintenance personnel.

c. Storm drain system design to be based on the requirements of the City of Dallas.

d. A dedicated sand and oil interceptor to be provided for loading dock areas where storm water may accumulate oil or sand from vehicles and collected from trench and parking drains.

IV. Fire Protection Systems

A new service will be provided per IFC and NFPA 13 Chapter 8. Services to be combined within the theater building and manifolded together with isolation zone valves.

A. Codes and Standards

1. Fire protection system shall be designed to meet the requirements of the following codes and standards:

a. International Building Code 2018 Edition

b. International Fire Code 2018 Edition

c. National Fire Protection Association (NFPA)

d. Owner's Fire Insurance Underwriter

e. Division of State Architect Code Amendments

f. Local Codes and Standards

B. Design Criteria

The automatic sprinkler system for the building will be designed to meet Insurance Underwriters' required design densities and flow rates for the following Hazard Classifications:

Light Hazard	Main lobby, auditorium seating areas, offices, rehearsal rooms, and toilet rooms.
Ordinary Hazard - Group 1	Catering service areas.
Ordinary Hazard - Group 2	Receiving, storage areas, meeting rooms, building materials storage, loading docks, and stage/proscenium.

C. Sprinkler System

1. Fire water service will supply water to a hydraulically designed automatic fire sprinkler system. The water pressure will be assessed further during the design stage to determine whether a fire pump is required or not. The sprinkler system will include automatic sprinklers risers, sprinkler zone valves, flow switches, tamper switches, and interconnectivity with the fire alarm systems.

2. Fire main will be installed from the fire service to the individual zones required for the building. Branches to the individual sprinkler systems will be provided with supervised control valves and water flow switches as well as a system drain/test connection. All control valves and water flow switches will be annunciated at the life safety control panel located within the fire command center.

3. All isolating and sectionalizing valves on the fire protection system will be provided with tamper switches which will be annunciated at the life safety control panel.

4. The stage/proscenium will be protected by sprinklers. A Class III 1-1/2" fire hose and valve cabinet will be provided for service to the stage area, as directed by IFC 905.3.4 and NFPA 13 and NFPA 14 for Class II or III standpipes. The proscenium opening shall be protected by fire curtain. Final protective measure to be determined by the Code Consultant (Refer to the Rational analysis Report).

5. Fire Department Connection(s) will be provided at the building's exterior to enable the Fire Department to pump water directly into the system should the need arise. The number of Fire Department Connections will be determined by the Local Fire Department who will devise a strategy on how to approach the site during a fire call.

6. Fire department roof outlets to be provided as required by NFPA 14.

V. Technology (Low Voltage) Systems

A. General:

1. The approach to the technology systems is a holistic and treats the campus and all the theatres as a complete site that will share distribution and functions such as security monitoring as a whole. Individual buildings and the systems within will be segmented appropriately and will be linked to the other buildings via a common infrastructure.

B. Security Systems

1. General

a. The security program design shall develop mitigation strategies for a comprehensive security approach; creating secure envelopes around points of entry and defined assets to provide a holistic, physical and technical approach to security that complements the owner's operational security elements.

b. Security systems for the project shall consist of an Access Control System (ACS), a Video Surveillance System (VSS), Intrusion Detection System (IDS), Emergency Phone system, and Mass Communication System. These systems will all be IP based and connected to the client IT Network. Network configuration for security systems will be coordinated with the client's IT department and network integrator to ensure security systems are appropriately segregated and secure on the network. Any field processing panels hard wired to field devices will reside in designated IT closets/rooms. All server and storage components will be rack mounted in IDF closets and coordinated with the IT design team. Further coordination with the client Security team to ensure compatibility with existing systems deployed elsewhere will occur prior to 100% construction documents.

c. The security systems will be primarily monitored from a central security operations center that will have visibility into all theatres and common areas such as parking, grand lobby, site, and amenity area.

2. Access Control Systems (ACS)

a. The Access Control System (ACS) shall consist of hard-wired components to not only control access through designated portals but also to serve as part of an intrusion detection system that will generate alarm conditions upon receipt of transmissions from system sensors.

b. Areas of Protection

i. Specific portals that shall be card reader controlled shall be coordinated with the project team. At minimum, the following areas will be access controlled:

1) Exterior Doors

2) All utility rooms

3) Secured areas such as MPOE, TR, IT suite, etc. shall be card reader controlled with keypads for dual authentication

4) All doors in common hallways.

5) Instructional spaces such as classrooms.

6) Back of house theatrical spaces (including FOH control booths)

7) Offices shall have infrastructure for future card readers but will only be equipped with access controls per input from individual users.

c. Hardware and Component

i. ACS shall incorporate the existing client credential technology by utilizing client standard card readers using OSDP communications.

ii. All field components shall be rated for heavy duty industrial/commercial use.

iii. Doors utilizing electrified hardware for access control will use hardware that is rated as "fail secure" unless otherwise required by local code and requirements.

iv. Coordination with other project entities shall be completed to ensure door components such as locking mechanisms, closers, hinges, ADA crash bars. etc. is seamlessly integrated with the ACS and all functions subsequently tested/verified.

d. System Parameters

i. Access control system will be a networked system of controllers serving all access- controlled points.

ii. ACS will interface with the Video Surveillance System for automatic call up of video images upon ACS events.

iii. ACS will interface with the Video Surveillance System to receive alarm conditions generated by any standard video analytics.

iv. The system shall be accessible over the IT network to allow users with sufficient privilege access from any workstation on the IT network with proper authentication.

v. Coordination with electrical design shall ensure ACS has sufficient power back-up and redundancies.

e. System Configuration

i. ACS shall be capable of being centrally monitored and administered by the client.

ii. The ACS system shall have full integration with Microsoft Active directory.

iii. ACS shall be configured per owner requirements to restrict access through controlled portals based on time, day, and/or area.

iv. ACS shall be configured to group access-controlled portals into customizable classifications based on personnel titles/positions/responsibilities or by area designations depending upon owner requirements.

v. All ACS events shall be logged in the system for a minimum of 2 years.

C. Video Surveillance System (VSS)

1. The Video Surveillance System (VSS) shall consist of components to provide the ability to conduct real time visual monitoring of designated areas, archive images for future recall on demand, and to perform real time and automatic scene processing that will generate notifications upon detection of pre-defined activity.

2. Hardware and Components

a. The VSS shall incorporate current camera technology that has the following minimum requirements:

i. Capture and transmit 1080p Resolution frames (minimum).

ii. Capture and transmit 30 frames per second at 1080p resolution.

iii. Utilize standard compression technology (H.264 minimum).

iv. Encompasses industry standard cybersecurity protections to include configurable login/passwords, encrypted connections, and port security.

v. Low light capabilities.

vi. True high dynamic range.

b. Cameras shall have built-in analytic capabilities to include:

i. Motion detection.

ii. Virtual trip line detection.

iii. Directional movement.

c. Cameras shall be capable of operating within the extreme temperature and humidity ranges of the installed environment without additional mechanical components (i.e., heaters, blowers).

d. Cameras shall have vandal resistant housings.

e. Fixed cameras shall have vari-focal lenses to provide flexibility of exact installation locations as well as for future camera viewing adjustments.

f. Building exterior coverage shall consist of roof level PTZ cameras on each building corner along with muti-sensor cameras every fifty (50) feet of building perimeter wall.

g. VSS recording appliances shall be compliant with manufacturer recommended specifications for performance, capacity, and reliability.

h. VSS equipment shall incorporate standard cybersecurity protections to include login/passwords, data encryption (storage and in transit), standard OS.

3. General Areas Coverage

a. Specific areas that shall be viewable by installed cameras shall be coordinated with the project team. At minimum, the following areas will be covered by the VSS:

i. All access controlled and monitored portals.

ii. Box offices and other cash handling/ transactional areas.

iii. Public/reception areas and lobbies.

iv. External Building approaches.

v. Parking including entrances, exits and Pay on Foot (POF) transactional area.

vi. Site walkways and grounds (exact coverage TBD).

vii. Other areas to be determined as project design progresses.

b. Cameras shall be located to capture subject areas at defined minimum resolutions according to one of the following defined requirements:

i. Detection – ability to determine general activity in covered area (10 pixels per foot).

ii. Recognition – ability to discern people and objects in covered area (20 pixels per foot or greater).

iii. Identification – ability to determine specific features of people and objects in covered area (50 pixels per foot or greater).

4. System Parameters

a. VSS will be a networked system of cameras, servers, and storage providing visual coverage and recording of designated areas and part of a single system.

b. VSS will interface with the Access Control System for automatic call up of video images upon ACS events.

c. VSS will interface with the ACS to transmit alarm conditions generated by video analytics.

d. The system shall be accessible over the IT network to allow users with sufficient privilege access from any workstation on the IT network with proper authentication.

e. Coordination with electrical design shall ensure VSS has sufficient power back-up and redundancies.

f. Archived camera images shall be available for a minimum of 30 days or as required during design. Storage shall be sized for 25% expansion capabilities.

5. System Configuration

a. VSS shall be capable of being centrally monitored and administered by the client.

b. VSS shall be configured to continuously record or record on motion at user defined resolution and framerates.

c. VSS shall be configured to generate alarm conditions based on video analytic parameters such as motion, virtual trip line, directional movement, etc.

d. VSS capabilities and access to images (live and recorded) shall be configurable depending upon user role. Certain users may only require live viewing or access to certain camera images.

D. Intrusion Detection System (IDS)

1. The Intrusion Detection System (IDS) shall consist of components to provide the ability to conduct real time visual monitoring of unauthorized access within the building. It will work in conjunction with the ACS and VSS to enhance the overall security coverage.

2. Hardware and Components

a. The IDS may include the following components:

i. Door Position Sensors

ii. Glass break Sensors

iii. Motion detectors

iv. Duress Alarms

v. Tamper Switches

3. Intrusion detectors shall report back to the Access Control system as a separate zone of the system and report alarms and errors in the same as normal ACS alarms or issues:

a. Where possible the IDS will utilize the corporate LAN to communicate with the rest of the security monitoring system.

4. Detailed Areas of Protection

a. All building entrances/exits.

b. Areas vulnerable to unauthorized access to be coordinated with the project team.

c. Other areas in coordination with Owner during design.

E. Emergency Phones (Blue Light Phones)

1. Provide ADA compliant emergency phones around site and within parking lot.

2. Emergency Phone configuration to follow campus IT and security standards and be integrated into security systems.

3. Emergency phone functionality and devices shall be coordinated with the owner.

F. Parking Systems

1. The Parking Revenue and Control System (PARCS) shall consist of new entrance and exit plaza components including gates, ticket readers and issuing kiosks, pay on foot stations and will be a complete turnkey system compatible with existing theatre standards.

2. The PARCS system is a standalone system. It will include integration with the ACS and VSS security systems for monitoring and credentialing.

3. The PARCS system will be primarily monitored from the Parking Management Office with additional monitoring from the SOC. The exact monitoring strategy is to be developed.

G. Parking Guidance System (PGS)

1. The Parking Guidance System (PGS) will provide guests with information to quickly and efficiently find a place to park.

2. The PGS system will include lights color coded above each stall to indicate if the space is available or occupied.

3. The PGS system will include message boards to indicate open spaces on each floor or lot

VI. Audiovisual Systems:

A. General

1. Introduction

a. Theatrical spaces are not included in this section and will be developed elsewhere

b. Infrastructure versus Equipment

i. Though the actual amount of purchased equipment for initial installation may change, the intent is to provide complete infrastructure planning for eventual fit out. If proper infrastructure provisions have been made, equipment can be added later as requirements change, without jeopardizing the integrity of the overall audiovisual systems design.

ii. Infrastructure can be thought of as part of the overall building design. Audiovisual infrastructure refers to the necessary base building provisions such as operable walls, power outlets, conduit, junction boxes, projection screens, drapes, projector mounting support, etc., needed to make a room audiovisual functional. It must be planned and included for initial occupancy, whether the audiovisual equipment is purchased or not.

iii. Infrastructure items are not part of the audiovisual specifications. They are specified by the Architect & Electrical Engineer with input from the AV designer, furnished and installed by the general or electrical contractor as part of the base building and are not included in the audiovisual contractor's scope of work.

iv. Equipment refers to particular audiovisual devices which have specific costs and capabilities associated with them. Equipment can be thought of as furniture; various choices can be made about its quality and quantity.

v. Equipment will be specified by AV designer and furnished and installed by an audiovisual contractor sub under the General Contractor. It is important that equipment and infrastructure are planned simultaneously.

B. Dedicated, Portable and Future Provision

1. The recommendations for equipment are presented on a system-by-system basis. This is not a technical specification and does not provide details such as manufacturer or model

number. The information supplied is a summation to be combined with the budget material in order to make financial project decisions.

2. Equipment is referred to as having one of the following installation statuses: dedicated, portable, or future provisions

3. Dedicated: Indicates that the equipment will likely be used frequently and is permanently dedicated or installed in a specific room.

4. Portable: Indicates that the equipment is needed less frequently and can be shared with other meeting rooms and can be stored in a central Equipment Pool. "Portable" equipment may also be located and specified in a specific room but would be available for use in other areas of the building.

5. Future Provisions: Indicates that the capability may not be required initially, but infrastructure and systems design provisions should be made to accommodate equipment at some time in the future.

C. Codes and Standards

1. All work performed under the scope shall conform to the following codes and standards where applicable. When a conflict occurs, the Audiovisual Systems Integrator/Contractor is directed to follow the most stringent requirements.

a. Local Electrical Code

b. National Fire Protection Association, including NFPA 72

c. NFPA 70 National Electrical Code current and applicable sections (Including But Not Limited To)

d. Article 250 Grounding

e. Article 800 Communications Circuits

f. Underwriters Laboratories, Inc.

g. UL Listed

h. UL Approved

i. American Disabilities Act (ADA)

j. Texas Building Code

k. AVIXA International Standards (formerly known as Infocomm)

l. ANSI/INFOCOMM A102.01:2017 – Audio Coverage Uniformity in Listener Areas

m. ANSI/INFOCOMM 2M-2010 – Standard Guide for Audiovisual Systems Design and Coordination Process

n. ANSI/INFOCOMM 3M-2011 – Projected Image System Contrast Ratio

o. ANSI/INFOCOMM 4-2012 – Audio Visual System Energy Management

p. ANSI/INFOCOMM 10-2013 – Audiovisual System Performance Verification

q. ANSI/INFOCOMM V202.01:2016 - Display Image Size for 2D Content in Audiovisual Systems

r. Coordination with other trades

D. Support structures

1. Video displays: For all applications, the ceiling or wall shall be able to structurally support 5 times the total weight of the display system, mounting hardware and any audiovisual equipment at the display location. Wall mounting blocking shall span a minimum of 3-studs within the wall.

2. Loudspeakers: For all applications, the ceiling or wall shall be able to structurally support 5 times the total weight of the loudspeaker system, mounting hardware and any audiovisual equipment at the speaker location. All speaker locations shall also tie to the structure with a safety rigging cable.

3. Shock/Dynamic Loading: The support structure design shall consider forms of dynamic or shock loading.

E. Estimated power loads

1. Estimated power loads will be developed during design.

F. Mechanical loads

1. Heat loads required within each room/system configuration will be developed during design.

G. Rooms and systems summary

1. General requirements
    a. Screen image size required per AV standard must be unobstructed for all seating.
        i. Avoiding (or raising) pendant lights
        ii. Having sufficient ceiling height
        iii. Utilizing flush mount electric ceiling drop-down screens
    b. Lighting near the projection screen or monitor will be zoned separately from the room lighting to help reduce reflection
    c. Lighting and shade controls shall be integrated into local AV system control panel.
    d. Sound systems shall operate at 25dB above typical ambient noise level
    e. Matrix switcher shall be provided when there are two or more projectors or displays
    f. Audiovisual system shall be integrated with Mass Notification and/or Fire Alarm Systems for audio override in the event of an emergency announcements or fire alarm conditions.
    g. Contractor shall include a minimum of (6) six hours for training of school staff on the operation and support of the audiovisual system.
2. Assistive Listening Systems
    a. Rooms with permanent systems seating 50 or more shall be equipped with dedicated assistive listening systems.
    b. The building will be provided with two radiofrequency based portable systems that can be checked out for use in smaller rooms as required.
    c. All systems will be provided with small rack-mount RF transmitters, receivers, chargers, batteries, neck loops, headphones, storage case and other accessories as required.to provide a complete and working system
3. Classrooms
    a. Houses between 32 and 50 students
    b. Computer application may be used for the control system vs. A separate control panel. A wall panel location will still be required and available for future.
    c. Instructor Station located on the front of the room.
        i. Instructor Station off to one side, located close to the wall as possible without effecting clearances or creating tripping hazards in single projector classrooms. Infrastructure shall be wall mounted.
        ii. Instructor Station in the center-front of the room in dual projector classrooms. Infrastructure shall be in a Floor box.
    d. Instructor Station houses AV equipment, Computer and control panel.
        i. Instructor Station requires (1) 5-20R dedicated quadruplex circuit
        ii. Dedicated cabling from Instructor Station to each projector location
        iii. 6-port CAT6 for connection to district network
        iv. 3.5mm stereo output for connection to portable assistive listening system
        v. Conduits shall be separated by signal type and voltage levels. AV cabling to be routed in 1-1/4" conduits for most applications. 1" may be substituted in select locations. Conduit separations are as follows:
    e. Microphone level
    f. Control
    g. Line-level signal distribution
    h. Loudspeaker level
    i. Ceiling mounted projector and projection screen will be used for image projection.
        i. Pole-style mount to structured ceiling supporting 5:1 weight ratio
        ii. Projector requires (1) 5-15R dedicated duplex circuit
        iii. Dedicated cabling back to presenter location
    j. Audio reproduction shall be via ceiling mounted speakers. Instructor audio shall be via wireless microphone. Lecture Capture shall be available.

i. Loudspeakers are to be daisy-chained in a 70V configuration in a single zone

ii. Wireless microphone system shall include:

1) (1) clip-on microphone and (1) handheld microphone

2) Charging dock to reside at Instructor Station

iii. Classroom shall have access to the following sources

iv. OFE Laptop/computer via HDMI

v. HDMI input available for other portable sources

vi. Streaming (Casting) wireless input

vii. Feed from the theatrical system router

k. Control panel shall be programmed for full control of AV system on/off, source switching, and environmental controls such as lighting and shades.

4. Meeting Rooms

a. Video Presentation via appropriately sized Flat screen.

i. Wall mount to structured wall backing supporting 5:1 weight ratio across a minimum of (3) three studs

ii. An in-wall enclosure will be installed behind the display

iii. Display location requires (1) 5-15R dedicated quadruplex circuit

iv. Dedicated cabling back to AV Rack location

v. Dedicated conduit from in-wall enclosure to AV rack location

b. AV rack coordinated into the millwork where it cannot fit behind screen.

i. AV rack in millwork to include rails for rollout and service

c. Millwork houses AV equipment and computer.

i. AV Rack requires (1) 5-20R dedicated quadruplex circuit

ii. Dedicated cabling from equipment location to the display

iii. 6-port CAT6 for connection to IT network

iv. Conduits shall be separated by signal type and voltage levels. AV cabling to be routed in 1-1/4" conduits for most applications. 1" may be substituted in select locations. Conduit separations are as follows:

3) Control

4) Line-level signal distribution

5) Loudspeaker level

v. Ventilation for AV equipment in millwork requires ventilation that will be coordinated in design.

d. Audio system to use ceiling speakers for program/presentation audio only

i. Loudspeakers are to be daisy-chained in a 70V configuration in a single zone

e. Sources will be local input at table for presentation only

i. AV input shall be routed from table to AV rack located in millwork

ii. Table connectivity to be coordinated with furniture vendor

iii. EC to provide conduit stub-up to support AV cabling between table leg and AV credenza rack

f. Control panel residing on table shall be programmed for full control of AV system on/off, source switching, and environmental controls such as lighting and shades.

H. Audiovisual Responsibility Matrix

Item	Designed By	Furnished By	Installed By
Audiovisual related conduits, standard back boxes, floor boxes, specialty backboxes, stub-ups, cable tray (if necessary), electric power.	Electrical Engineer with design requirements provided by Audiovisual Designer	Electrical Contractor	Electrical Contractor
Audiovisual related telecom outlet backbox location and mounting height coordination w/ architecture & furniture.	Architect with design requirements provided by Audiovisual Designer	Communications Contractor	Communications Contractor
Audiovisual dedicated outlet backbox location and mounting height coordination w/ architecture & furniture.	Architect with design requirements provided by Audiovisual Designer	Electrical Contractor	Electrical Contractor
Table cable cubby, hatches, drawers, etc.	Architect with design requirements provided by Audiovisual Designer	Furniture Vendor	Furniture Vendor
Supplemental cooling for Audiovisual equipment rooms.	Mechanical Engineer with design requirements provided by Audiovisual Consultant	Mechanical Contractor	Mechanical Contractor
Supplemental cooling within equipment cabinets, credenzas and millwork.	Architect with design requirements provided by Audiovisual Designer	Audiovisual Contractor	Audiovisual Contractor
Telecom service ordering and coordination	Owner with design requirements provided by Audiovisual Designer	Owner	Owner
Data network related equipment to support Audiovisual LAN/WAN Ethernet requirements	Owner with design requirements provided by Audiovisual Designer	Owner	Owner
Lighting in AV provisioned spaces	Lighting Consultant with input from Audiovisual Designer	Electrical Contractor	Electrical Contractor
Structural ceiling support for ceiling mount AV devices (e.g., displays, screens, lifts, projectors)	Audiovisual Designer with coordinated effort with Architect	General Contractor	General Contractor
Acoustical treatment for AV provisioned spaces	Architect and/or Acoustical Consultant with input from Audiovisual Designer	General Contractor	General Contractor
Audiovisual related furniture (e.g., Instructor Station, Conference Table, Millwork, Credenzas, etc.)	Architect with design requirements provided by Audiovisual Designer	Furniture Vendor and/or General Contractor	Furniture Vendor and/or General Contractor
Mobile document cameras	Owner with design requirements provided by Audiovisual Designer	Owner	Owner
Telephone and tabletop audio conferencing equipment not directly connected to Audiovisual systems	Owner	Owner	Owner
AV racks and cabinets	Audiovisual Designer	Audiovisual Contractor	Audiovisual Contractor
Power distribution units	Audiovisual Designer	Audiovisual Contractor	Audiovisual Contractor
Audiovisual equipment	Audiovisual Designer	Audiovisual Contractor	Audiovisual Contractor
Flat Panel Display	Audiovisual Designer	Audiovisual Contractor	Audiovisual Contractor
Projectors and Mounts	Audiovisual Designer	Audiovisual Contractor	Audiovisual Contractor
Assistive Listening Systems	Audiovisual Designer	Audiovisual Contractor	Audiovisual Contractor

VII. Structured Cabling System

A. Telecommunications

1. General

a. The following systems are included as part of the IT/Telecommunications systems design.

B. Inside Building Cable Infrastructure: This will be applied to all theatres, classrooms, office areas, Data center and building support systems connectivity, including all workstations, security devices, and common area wireless access points. This subsystem consists of the structured cable plant including the horizontal cabling to the outlet, inter-cabinet connectivity, and devices such as CCTV cameras and WAPs; backbone cabling which interconnects the Entrance Facility, Telecommunications Rooms (Data Center, and TRs), termination hardware, equipment racks and support accessories.

1. Horizontal Cabling Distribution System: This subsystem includes the cabling required for implementation of network connectivity to the workstations

2. Backbone Cabling Distribution System: This subsystem includes the hardware and cabling required for implementation of backbone connectivity between telecommunication rooms and support spaces.

C. Outside Plant Cable Infrastructure: This will be applied cabling and infrastructure which interconnects the Entrance Facility, to the each of the buildings and site amenities

D. Pathway and Spaces: This subsystem includes the Pathways and spaces including cable tray, sleeves, and conduits will be required to support the horizontal cabling routed between the telecommunication rooms and the workstation outlets.

E. Network System: This subsystem includes the active equipment for supporting the data network. The owner/IT staff will procure all active equipment. All active network equipment will be configured by the owner/IT staff.

F. Cabling Administration: This subsystem includes a unique identification label for all termination panels and cabling

G. Wireless Data System: This subsystem includes the access points required for wireless system that will be connected to the standard data system via the structured cable plant. The Wi-Fi system, including heat maps will be configured by the predictive heat map that provides locations for placing the interior and exterior WAPs. Once wall types are confirmed coordination with Aruba will be needed for acquiring heat maps.

H. The Low voltage design for the building will be based on the following Codes:

1. Country, state and local health, safety and building codes

2. Local State Electrical Code (same as NFPA 70)

3. National Fire Protection Association - NFPA 13, 14, 20, 22, 24, 54, 70, 72, 75, 96, 101, and 418 Standards.

4. Federal Communications Commission Title 47 - FCC Part 15, FCC Part 68

5. National Electrical Code - Article 770 Optical Fiber Cables, Article 800 Communications Circuits

6. National Electrical Manufacturers Association (NEMA)

7. Safety and Health Standards - OSHA 29 CFR 1926/1910

8. Underwriters Laboratories, Inc. - UL Listed, UL Approved.

9. Local Fire Authority Standards.

10. Occupational Safety and Health Association (OSHA)

I. The telecommunication system and all related connections shall be designed to conform, as a minimum, to the following standards:

1. TIA/EIA-526-7-A Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant

2. TIA-526-14-C Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; IEC 61280-4-1 edition 2, Fiber-Optic Communications Subsystem Test Procedure- Part 4-1: Installed cable plant- Multimode attenuation measurement

3. ANSI/TIA-568-D.0 Generic Telecommunications Cabling for Customer Premises

4. ANSI/TIA-568-D.1 Commercial Building Telecommunications Cabling Standard

5. ANSI/TIA-568-D.2 Balanced Twisted-Pair Telecommunications Cabling and Components standard

6. ANSI/TIA-568-D.3 Optical Fiber Cabling Components Standard

7. ANSI/TIA-569-D Telecommunications Pathways and Spaces

8. ANSI/TIA-606-C Administration Standard for Commercial Telecommunications Infrastructure

9. ANSI/TIA-607-C Commercial Building Grounding and Bonding Requirements for Telecommunications

10. ANSI/TIA/EIA-492AAAC Detail Specification for 850nm Laser Optimized 50 Micron Core Diameter/125 Micron Cladding Diameter Class 1a Graded Index Multimode Optical Fibers

11. ANSI/TIA/EIA 492AAAD Detail Specification for 850-NM Laser-Optimized, 50-um Core Diameter/125- um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber

12. TIA/EIA-758-B Customer Owned Outside Plant Telecommunications Infrastructure Standard

13. TIA/EIA-862-B Structured Cabling Infrastructure Standard for Intelligent Building Systems

14. TIA/EIA 942-B Telecommunications Infrastructure Standard for Data Centers

15. TIA-1152 Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

16. BICSI Telecommunications Distribution Methods Manual (TDMM), 13th Edition Building Industry Consulting Services International (BICSI) or most current

17. FCC Part 15 – Federal Communications Commission document relating to allowable radiated emissions.

18. ISO 9000 – Manufacturing Quality Control Standard (Certification)

19. Institute of Electrical and Electronic Engineers (IEEE) 802.3 and 802.11 standards.

J. Spaces

1. General Architectural requirements

Architectural	
Size	Dependent on requirements of space, and in accordance with TIA 569-D and Owner IT Standards sizing requirements
Ceiling	10' minimum clearance AFF, no dropped ceiling
Doors & Access	Lockable access by access control system. Door hinged to open outward. Camera Surveillance. Door shall be a minimum of 42" wide and 84" high, a Data Center may require a double door no smaller than 72" wide and 90" high. No posts shall be installed between doors
Locks & Security	Access card required to enter room. VSS required within the room
Occupancy	Frequent to Rarely.
Floor Type	Anti-static VCT in White.
Floor Load	Floor loading (static and dynamic) capacity shall be sufficient to bear the distributed and concentrated loads of the installed equipment, the rated distributed load shall be greater than 250 lb-ft/ft2 and the rated concentrated load shall be greater than 1000 lb-ft/ft2.
Floor Void	Dependent on building
Windows	None
Walls & Partitions	Dust proof finish. White non gloss paint shall be applied to all walls Walls capable of equipment support. White vinyl base shall be provided on all walls. AC grade fire retardant plywood finish applied to three walls Room shall have a minimum 1 Hour Fire Rating or 2-hour fire rating if used for Fire Life Safety systems (as local code requires)
Seismic	Per AHJ requirements.
HVAC	
Heat Load	W/m² to be determined during design
Humidity Control	Require 20-80% non-condensing, 24hrs/day for 365days/year.
Temperature Control	Require 72F+/- 3F, 24Hrs/day. System sized to maintain between 64 and 57F at AHSRAE 1% Design Temperature
Ventilation	Require fresh filtered air frequently to pressurize space.
Power	
Power Distribution	Two dedicated 20-amp 110V circuits from the ER technical Power terminated on (1) quad 5-20 outlet and (1) L6-30R outlet with Orange electrical outlets per rack.
Convenience Power Outlets	Wall mounted at 6' intervals and at plywood panels, 120 volts.
Emergency Power	Only the rack circuits provided for this room to be on UPS unless

	building is powered by generator.
Telecommunications Ground	Required in all rooms, installed at 7' (2.1m) above finished floor. Each rack, cabinet or section of cable tray shall be grounded to the grounding bus bar. Grounding Busbar 20' by 4" shall be connected to the main electrical service entrance
Power strips	Two (2) power strips will be supplied per rack, monitored via IP
Uninterruptible Power Supply (UPS)	Required, either room based, or rack based, if room-based receptacles shall be red and labeled with UPS circuit number.
Power Load	To be determined during design
Lighting	80-foot candles Lux at 39" AFF on the face of equipment in Racks. Light fixtures to be chain mounted from ceiling
Fire Protection	
Sprinklers	Per code with dry pipe or pre-action preferred if possible. If not, available protective wire cages should be used, and system should require both smoke and heat to discharge.
Extinguishers	CO2 extinguisher to be Wall mounted adjacent to the Door. Should be UL listed Class C type unit.
Fire stopping	All penetrations through fire rated barriers to be fire stopped using approved methods and materials. EZ path sleeves to be used for Cable pathways.

Low voltage spaces, such as the Telecommunications Room and Service Entrance Room, should be completed and handed over to the client approximately two months prior to scheduled substantial completion of the project, this allows for installation and configuration of network equipment. At the point of hand over each room should be as a minimum be secure, dust free clean, have all cabling and contractor supplied equipment installed, be installed with permanent Power and HVAC services.

2. Minimum Point of Entry/ (MPOE/BDF):

a. This building will have a dedicated room that will act as the service entrance for telecommunications providers and campus connectivity to the building. The room will house service provider disconnects and racks to allow for network distribution throughout the building.

b. Service provider spaces shall be located near the edge of the building. Ideal location is dependent on utility incoming location. Combined Service provider Entrance room should be a minimum of 120SF to allow for partitioning of areas per service provider requirements.

c. The BDF will house all horizontal and backbone cabling termination hardware and racks. All horizontal cabling will be terminated on rack mounted copper patch panels.

d. The standard workstation outlet in the building requires three (3) plenum rated CAT6A grounded F/UTP cables. Wireless access point outlets in the office space require two (2) plenum rated CAT6A GROUNDED F/UTP cables.

e. The room will need to house the following systems to support the building services

i. All network cabling termination and switches for structured cabling system.

ii. Incoming service provisions both Service provider and campus based, including any associated firewalls and routers

iii. Wireless control servers, routers, and firewalls.

iv. Security control Servers

6) Access control system

7) Video surveillance system including required storage

f. Minimum clearance requirement of 36" is required both in front and behind each rack, taking into account any wall mounted equipment.

K. Incoming Cabling Distribution System

1. Backbone Optical fiber cabling will be 24 SM connected to each Theater BDF

2. Copper backbone cabling shall be minimum of 25-pair Category 3 cable. Copper backbone shall be terminated on wall mounted 110 blocks with protector blocks.

L. Horizontal Cabling Distribution System

1. Standard outlet

a. The standard workstation outlet in the office space requires three (3) CAT6A grounded F/UTP cables. Wireless access point outlets in the back of house and common spaces require two 4-pair CAT6A grounded F/UTP (UFTP) cables.

b. All copper telecommunication cables shall terminate per the T-568B wiring scheme. Horizontal cables and copper backbone cables in the telecom rooms will terminate to patch panels. The network switches, furnished and installed by the owner, will tie into the patch panels via CAT6A grounded F/UTP. CCTV cabling will terminate on dedicated category 6A patch panels, & WAP cabling will terminate on dedicated Category 6A patch panels.

c. Each outlet will be configured with a 1.25" conduit and a two gang backbox. A workstation may be located in an office, conference room, system furniture, or other selected building space.

d. Each typical workstation user outlet will be configured 3 blue 8P8C jacks.

2. Cable Routing Criteria

a. Horizontal cable bend radii for category cable to be a minimum of four times the outside cable diameter.

b. Fiber backbone cable bend radii to be a minimum of ten times the outside cable diameter while at rest. During cable pull a minimum bend radius of 20 times the cable O.D. shall be maintained.

c. Cable waterfalls shall be utilized for all cable transitions to ensure bend radius is not exceeded.

d. Horizontal cables are to be run a minimum of six inches from 110 VAC power distribution cables unless in steel channels.

e. All power and telecommunications cables are to cross perpendicularly where crossings are necessary.

f. A minimum separation of twelve inches shall be maintained between telecommunications cables and fluorescent light ballasts.

g. Where cables are to be run in system furniture raceways, telecommunications cables are to be run in separate physical channels within the furniture system. Cabling should be installed in this raceway in compliance with ANSI/TIA/EIA-569-D and the manufacturer's installation guidelines. Where power and telecommunications cables are to cross paths within the furniture system, cables are to cross perpendicularly.

h. The cables routed to system furniture shall enter the furniture cluster through a column, wall, or poke-through.

i. All conduits larger than 2" shall have a minimum bend radius of ten times the outside diameter, except for outlet stub-ups, which shall be a minimum of six times the outside diameter.

M. Wireless Data System

1. Wireless coverage for the whole building will be confirmed by the client during the design phase and will also include the outdoor perimeter.

2. Access points for the wireless system will be connected to the standard data system via the structured cable plant and will be mounted on the floor facing side of ceiling/tiles using AP mounts. Two (2) Category 6A UFTP standard telecommunications cables will be required for each access point and will homerun to the Telecommunication Room.

3. Wireless cables will be terminated on two separate patch panel with cable with port (0) on the AP to be on the first patch panel and port (1) on the AP to be on the second patch panel

4. The wireless access point general quantities and locations will be coordinated once the floor plans have been finalized.

5. The wireless access points will be furnished by the owner IT staff, installed by the cabling contractor and programmed by the owner IT staff

6. Provisions will be made to support the use of wireless data and voice through wireless access points supporting IEEE 802.11g/n/ac and 802.11ax for future proofing.

7. The wireless access point will be provided power from the PoE enabled switch in the Telecommunications Room

8. The layout and locations of the wireless access points will be provided by the client IT group.

9. The Wireless network will be designed to support multiple SSIDs

10. The Wireless access points will support required level of 802.1a authentication.

11. Contractor to provide device matrix showing each access point location, MAC, IP, model#, Data drop#, switch port information, asset tag information, etc. (template to be provided by District)

12. Contractor to provide as-build showing all data locations with specific functions designated (e.g., wireless access points, video surveillance system, IP speaker).

VIII. Emergency Responder Radio Coverage System (ERRCS)

A. Applicable Codes

1. Texas Fire Code– Emergency Responder Radio Coverage (as adopted by the City of Dallas)

B. Applicable Standards

1. NFPA 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communication Systems, 2019 edition.

2. NFPA 1225 – Standard for Emergency Services Communications, 2022 edition.

3. UL 2524 – Standard for In-Building 2-Way Emergency Radio Communication Enhancement Systems

4. FCC 47 CFR Part 90.219 - Use of Signal Boosters

C. Acronyms

1. The following acronyms will be used in regard to the ERRCS

a. AHJ: Authority Having Jurisdiction

b. ANUN: Annunciator

c. BDA: Bi-Directional Amplifier

d. DAS: Distributed Antenna System

e. DB: Decibel

f. DBi: Decibel Relative Isotropic Radiator

g. DBm: Decibel Milliwatts

h. DL: Down Link

i. FCC: Federal Communication Commission

j. GROL: General Radio Operator License

k. Hz: Hertz

l. MHz: Mega-Hertz

m. PIM: Passive Inter Modulation

n. RF: Radio Frequency

o. RX: Receive

p. SNR: Signal-to-Noise Ratio

q. TX: Transmit

r. UHF: Ultra-High Frequency

s. UL: Up Link

t. VHF: Very High Frequency

u. W: Watt

D. Frequency Support

1. The ERRCS shall support radio coverage within the facility for the following first responder agencies:

a. City of Monterey Park Police

b. City of Monterey Fire Department

2. The ERRCS shall include the following system frequencies:

a. MP Police 1 (DL :155.5650 MHz/UL :154.9500 MHz) Modulation : P25

b. MP Police 2 (DL :155.4150 MHz/UL :156.2250 MHz) Modulation : P25

c. XLC Access (FD) (DL:470.3625 MHz/UL473.3625 MHz), Modulation: Analog

d. One of the following trunking cells based on the clearest path to the BDA

i. Montebello Trunking Cell

ii. Glendale Trunking Cell

E. Interference

1. The ERRCS shall not interfere with the radio operation of the first responding agencies.

F. FCC Certification

1. The bi-directional amplifier(s) shall be FCC certified
2. The bid-directional amplifier shall be UL 2524 listed.

G. ERRCS Components

1. The ERRCS shall consist of the following components and sub-systems:
    a. BDA
    b. Battery System
    c. Annunciator
    d. Distributed Antenna System
    e. Donor Antennas
    f. Donor Antenna Lightning Protection System

H. BDA Requirements

1. The BDA shall meet the following requirements:
    a. The BDA shall be FCC certified.
    b. The BDA shall be contained within a NEMA Type 4 waterproof cabinet
    c. The BDA battery cabinet shall be contained in a NEMA Type 4 waterproof cabinet.
    d. The BDA and battery systems shall be connected to an annunciator that will be located at a constantly attended location adjacent to the fire alarm control panel.
    e. The BDA and Battery system shall include automatic supervisory and trouble reporting for malfunctions of the signal booster and power supplies that are annunciated at the fire alarm system and at a UL listed supervision station monitoring company.
2. The battery system shall have the capacity of operating the BDA for a period of not less than 24-hours.
3. The battery system shall be connected to a dedicated emergency power circuit.
4. The BDA, Annunciator and Battery systems shall be produced by the same manufacturer.

I. Distributed Antenna System

1. The DAS shall consist of horizontal and vertical distribution elements.
2. The vertical or riser distribution shall consist of coaxial cable and RF splitters/tappers.
3. All vertical distribution cabling and components shall be physically protected.
4. All vertical distribution cabling and components shall be protected within a 2-hour fire rated pathway.
5. The horizontal element of the DAS shall consist of coaxial cabling, tappers and antennas.
6. All antennas shall be omni-directional and located as necessary to provide coverage as needed.
7. All horizontal cabling shall be plenum rated coaxial cable.
8. All vertical cabling shall be plenum rated coaxial cable.
9. The DAS shall be designed to provide balanced UL and DL signal strength across the facility.

J. Radio Signal Strength and Coverage

1. The ERRCS design shall support a minimum DL signal strength of –95 dBm within the building.
2. The ERRCS design shall support a minimum UL signal strength of –95 dBm.
3. The ERRCS design shall provide DL and UL signal strength in 95 percent of the areas on each floor of the building.
4. The ERRCS design shall ensure the highest level of isolation possible between the in-building distributed antenna system and the roof mounted donor antenna system.

IX. Cellular Distributed Antenna System (CELL-DAS)

A. Applicable Standards

1. ANSI/BICSI 003, Building Information Modeling (BIM) Practices for Information Technology Systems
2. ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard
3. ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard
4. ANSI/TIA-569-D, Telecommunications Pathways and Spaces
5. ANSI/TIA-606-B, Administration Standard for Telecommunications Infrastructure
6. ANSI/TIA-607-B, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
7. 47 CFR 1.1310, Radiofrequency Radiation Exposure Limits
8. 47 CFR 17, Construction, Marking, And Lighting of Antenna Structures
9. 47 CFR 90.219, Use of Signal Boosters

B. Acronyms:

1. AC alternating current
2. AHJ authority having jurisdiction
3. BIM building information modeling
4. BDA bidirectional amplifier
5. BTS base transceiver station
6. CW continuous wave
7. DAS distributed antenna system
8. DC direct current
9. EIRP effective isotropic radiated power
10. EMI electromagnetic interference
11. ER equipment room
12. ERP effective radiated power
13. LMR land mobile radio
14. LTE long term evolution
15. MCU master control unit
16. MIMO multiple input/multiple output (antenna)
17. PoE power over Ethernet
18. PIM passive intermodulation
19. PTP point-to-point
20. RRU remote radio unit
21. TR telecommunications room
22. UMTS universal mobile telecommunications system
23. UTP unshielded twisted pair
24. VSWR voltage standing wave ratio
25. WAN wide area network
26. WLAN wireless local area network
27. WSP wireless service provider
28.

C. Primary Cellular Carriers:

1. AT&T
2. Verizon
3. T-Mobile

D. Components: TBD

1. Donor Antenna (Roof)
2. Omnidirectional Antenna (In-Building)
3. RRU
4. Fiber Hub
5. Coaxial Cable
6. Fiber Optic Cable
7. PICO/FEMTO Cell
8. GPS Antenna

E. System:

1. The In-Building Cellular Distributed Antenna System (CELL-DAS) consisting of a passive network of antennas located to provide building coverage. Antennas will be connected to remote fiber units that will in turn be connected to an active head-end consolidation point. The design of the head-end will be based on discussions with the wireless service providers as to whether the system will utilize donor antenna technology to connect to the existing macro sites or PICO/FEMTO Cell Technology will be provided by the carriers that will be connected to internet-based carrier gateways. The system will be designed to provide 4G/LTE coverage with the facility.

F. Design will Include:

1. The development of carrier approved designs utilizing RF modeling tools such as iBwave
2. Cell-DAS Equipment Space in Equipment Rooms
3. Laying out on floor plans the antenna and active equipment
4. Cable Pathways / Risers
5. Power and Cooling Coordination
6. Assisting in vendor coordination / hardware
7. Working with wireless service providers to establish an acceptable solution for connection to their MACRO network or Network attached Gateways using PICO/FEMTO Cell Technologies
8. Utilizing existing campus standards and existing if any wireless service provider agreements

CIVIL (SURVEY)
FIRE LIFE SAFETY CODES

CIVIL (SURVEY)

TREE TABLE

POINT NO.	DESCRIPTION
5000	8" ELM
5001	8" ELM
5002	10" ELM
5003	8" ELM
5004	7" CEDAR ELM
5005	12" ELM
5006	9" ELM
5007	15" ELM
5008	7" CEDAR ELM
5009	12" ELM
5010	10" ELM
5011	10" MULTI-TRUNK ELM
5012	9" ELM
5013	8" HACKBERRY
5014	26" CEDAR ELM
5015	16" MULTI-TRUNK ELM
5016	8" MULTI-TRUNK ELM
5017	6" MULTI-TRUNK ELM
5018	6" ELM
5019	10" MULTI-TRUNK ELM
5020	15" MULTI-TRUNK ELM
5021	8" MULTI-TRUNK ELM
5022	6" MULTI-TRUNK ELM
5023	12" MULTI-TRUNK ELM
5024	8" ELM
5025	7" ELM
5026	13" ASH
5027	13" MULTI-TRUNK ELM
5028	15" MULTI-TRUNK ELM
5029	10" MULTI-TRUNK ELM
5030	12" MULTI-TRUNK ELM
5031	8" ELM
5032	6" ELM
5033	7" POST OAK
5034	12" POST OAK
5035	10" MULTI-TRUNK POST OAK
5036	10" POST OAK
5037	6" MULTI-TRUNK ELM
5038	6" ELM
5039	10" MULTI-TRUNK POST OAK
5040	6" MULTI-TRUNK POST OAK
5041	11" MULTI-TRUNK ELM
5042	16" MULTI-TRUNK ELM
5043	8" ELM
5044	8" MULTI-TRUNK ELM
5045	6" MULTI-TRUNK ELM
5046	9" ELM
5047	17" MULTI-TRUNK ELM
5048	7" CEDAR
5049	6" CEDAR

TREE TABLE

POINT NO.	DESCRIPTION
5050	7" ELM
5051	8" CEDAR
5052	9" ELM
5053	6" MULTI-TRUNK ELM
5054	10" MULTI-TRUNK ELM
5055	6" CEDAR
5056	10" ASH
5057	10" ELM
5058	6" MULTI-TRUNK CEDAR
5059	11" MULTI-TRUNK ELM
5060	6" ELM
5061	21" MULTI-TRUNK ELM
5062	6" ELM
5063	18" MULTI-TRUNK ELM
5064	8" CEDAR
5065	13" CEDAR
5066	10" CEDAR ELM
5067	13" MULTI-TRUNK ELM
5068	6" ELM
5069	10" CEDAR
5070	11" CEDAR ELM
5071	9" ASH
5072	7" MULTI-TRUNK ELM
5073	12" CEDAR
5074	18" CEDAR
5075	6" ELM
5076	10" MULTI-TRUNK ELM
5077	6" CEDAR
5078	11" ASH
5079	14" ASH
5080	7" CEDAR
5081	8" ELM
5082	9" ELM
5083	6" MULTI-TRUNK ELM
5084	10" CEDAR
5085	14" ELM
5086	9" CEDAR
5087	9" CEDAR
5088	9" ELM
5089	10" MULTI-TRUNK ELM
5090	6" ELM
5091	9" CEDAR
5092	10" ELM
5093	6" ELM
5094	11" CEDAR
5095	9" ELM
5096	6" MULTI-TRUNK ELM
5097	11" MULTI-TRUNK CEDAR
5098	10" ELM
5099	6" ELM

TREE TABLE

POINT NO.	DESCRIPTION
5100	12" ELM
5101	6" CEDAR
5102	6" ELM
5103	12" CEDAR
5104	6" ELM
5105	7" ASH
5106	14" ELM
5107	12" ELM
5108	6" MULTI-TRUNK ELM
5109	6" ELM
5110	20" MULTI-TRUNK ELM
5111	7" ELM
5112	6" CEDAR
5113	6" MULTI-TRUNK ELM
5114	12" MULTI-TRUNK ELM
5115	15" CEDAR
5116	6" ELM
5117	6" ELM
5118	16" CEDAR
5119	9" ELM
5120	8" ELM
5121	8" ELM
5122	6" ELM
5123	8" MULTI-TRUNK HACKBERRY
5124	10" ELM
5125	8" CEDAR ELM
5126	8" ELM
5127	11" ELM
5128	6" ELM
5129	14" MULTI-TRUNK ELM
5130	6" ASH
5131	7" CEDAR
5132	12" CEDAR
5133	10" CEDAR
5134	6" CEDAR ELM
5135	10" MULTI-TRUNK ELM
5136	11" MULTI-TRUNK ELM
5137	8" ELM
5138	9" CEDAR
5139	10" ELM
5140	13" CEDAR
5141	8" MULTI-TRUNK CEDAR
5142	12" ELM
5143	13" ELM
5144	7" CEDAR ELM
5145	17" ELM
5146	8" CEDAR ELM
5147	14" ELM
5148	11" ASH
5149	7" ELM

TREE TABLE

POINT NO.	DESCRIPTION
5150	10" CEDAR
5151	8" MULTI-TRUNK CEDAR
5152	6" CEDAR
5153	10" ELM
5154	7" ELM
5155	9" ELM
5156	11" ELM
5157	9" MULTI-TRUNK ELM
5158	7" ELM
5159	11" ELM
5160	12" ELM
5161	9" ELM
5162	14" CEDAR
5163	8" MULTI-TRUNK CEDAR
5164	17" CEDAR
5165	15" ASH
5166	7" ELM
5167	9" CEDAR
5168	7" ELM
5169	10" ELM
5170	10" CEDAR
5171	12" CEDAR
5172	12" CEDAR
5173	7" ELM
5174	9" ELM
5175	16" MULTI-TRUNK ELM
5176	6" MULTI-TRUNK ELM
5177	6" ELM
5178	8" OAK
5179	15" MULTI-TRUNK ELM
5180	7" OAK
5181	6" MULTI-TRUNK ELM
5182	10" MULTI-TRUNK ELM
5183	7" OAK
5184	6" ELM
5185	8" ELM
5186	10" OAK
5187	6" ELM
5188	8" ELM
5189	10" ELM
5190	8" MULTI-TRUNK ELM
5191	6" MULTI-TRUNK ELM
5192	7" MULTI-TRUNK ELM
5193	12" ELM
5194	6" ELM
5195	8" ELM
5196	7" MULTI-TRUNK ELM
5197	6" CEDAR
5198	9" MULTI-TRUNK ELM
5199	6" CEDAR

TREE TABLE

POINT NO.	DESCRIPTION
5200	8" ELM
5201	6" CEDAR
5202	9" ELM
5203	6" ELM
5204	7" CEDAR
5205	18" ELM
5206	9" ELM
5207	6" MULTI-TRUNK CEDAR
5208	9" ELM
5209	8" MULTI-TRUNK CEDAR
5210	9" ELM
5211	6" ELM
5212	8" OAK
5213	7" OAK
5214	9" MULTI-TRUNK ELM
5215	8" ELM
5216	11" ELM
5217	11" ELM
5218	10" ELM
5219	11" ELM
5220	10" ELM
5221	9" ELM
5222	11" ELM
5223	7" MULTI-TRUNK ELM
5224	12" MULTI-TRUNK ELM
5225	9" ELM
5226	11" ELM
5227	8" HACKBERRY
5228	9" ELM
5229	8" ELM
5230	6" ELM
5231	9" ELM
5232	10" ELM
5233	16" OAK
5234	14" ELM
5235	16" ELM
5236	18" ELM
5237	7" ELM
5238	19" COTTONWOOD
5239	8" ELM
5240	8" ELM
5241	7" MULTI-TRUNK ELM
5242	20" ELM
5243	8" HACKBERRY
5244	8" HACKBERRY
5245	16" CEDAR
5246	8" OAK
5247	6" CEDAR
5248	9" CEDAR
5249	14" HACKBERRY

TREE TABLE

POINT NO.	DESCRIPTION
5250	16" MULTI-TRUNK ELM
5251	20" ELM
5252	26" COTTONWOOD
5253	8" CEDAR
5254	6" CEDAR
5255	6" CEDAR
5256	8" CEDAR
5257	12" CEDAR
5258	6" CEDAR
5259	15" CEDAR
5260	7" ELM
5261	8" ELM
5262	6" CEDAR
5263	20" ELM
5264	10" ELM
5265	6" ELM
5266	13" ELM
5267	14" ELM
5268	6" ELM
5269	8" ELM
5270	8" ELM
5271	7" ELM
5272	7" ELM
5273	13" ELM
5274	16" ELM
5275	15" ELM
5276	10" ELM
5277	7" ELM
5278	10" ELM
5279	23" ELM
5280	9" ELM
5281	9" MULTI-TRUNK ELM
5282	14" ELM
5283	11" ELM
5284	11" ELM
5285	6" ELM
5286	8" ELM
5287	8" RED BUD
5288	7" ELM
5289	9" ELM
5290	9" HACKBERRY
5291	13" CEDAR
5292	6" MULTI-TRUNK ELM
5293	10" MULTI-TRUNK ELM
5294	8" CEDAR
5295	9" ELM
5296	10" CEDAR
5297	12" ELM
5298	9" ELM
5299	13" ELM

TREE TABLE

POINT NO.	DESCRIPTION
5300	13" CEDAR
5301	12" CEDAR
5302	13" ELM
5303	12" ELM
5304	8" CEDAR
5305	14" ELM
5306	15" ELM
5307	10" MULTI-TRUNK ELM
5308	12" MULTI-TRUNK ELM
5309	13" CEDAR
5310	8" CEDAR
5311	6" ELM
5312	9" ELM
5313	8" CEDAR
5314	7" ELM
5315	8" CEDAR
5316	10" ELM
5317	7" ELM
5318	6" MULTI-TRUNK ELM
5319	10" CEDAR
5320	6" ELM
5321	6" CEDAR
5322	9" ELM
5323	11" CEDAR
5324	7" CEDAR
5325	10" ELM
5326	7" ELM
5327	21" MULTI-TRUNK ELM
5328	7" ELM
5329	6" ELM
5330	8" ELM
5331	8" CEDAR
5332	8" CEDAR
5333	6" ELM
5334	7" MULTI-TRUNK ELM
5335	7" ELM
5336	14" CEDAR
5337	12" CEDAR
5338	6" ELM
5339	7" ELM
5340	8" ELM
5341	29" ELM
5342	48" ELM
5343	11" ELM
5344	13" ELM
5345	9" ELM
5346	27" ELM
5347	11" HACKBERRY
5348	14" ELM
5349	8" HACKBERRY

TREE TABLE

POINT NO.	DESCRIPTION
5350	19" HACKBERRY
5351	16" HACKBERRY
5352	20" ELM
5353	15" ELM
5354	13" HACKBERRY
5355	16" ELM
5356	8" ELM
5357	8" ELM
5358	6" ELM
5359	45" ELM
5360	8" ELM
5361	20" ELM
5362	8" CEDAR
5363	11" CEDAR
5364	15" ASH
5365	9" MULTI-TRUNK ELM
5366	14" ASH
5367	8" ASH
5368	16" CEDAR
5369	14" ELM
5370	14" ASH
5371	12" CEDAR
5372	11" ELM
5373	9" ELM
5374	8" ELM
5375	14" ELM
5376	9" ELM
5377	12" ELM
5378	21" MULTI-TRUNK ELM
5379	11" CEDAR
5380	10" ELM
5381	12" MULTI-TRUNK ELM
5382	7" ELM
5383	14" ELM
5384	13" CEDAR
5385	10" CEDAR
5386	6" CEDAR
5387	18" ELM
5388	7" CEDAR
5389	22" ELM
5390	7" ELM
5391	15" ELM
5392	21" ELM
5393	12" MULTI-TRUNK ELM
5394	12" HACKBERRY
5395	21" ELM
5396	10" ASH
5397	32" ELM
5398	18" CEDAR ELM
5399	36" ASH

TREE TABLE

POINT NO.	DESCRIPTION
5400	20" ASH
5401	10" CEDAR ELM
5402	29" CEDAR ELM
5403	33" CEDAR ELM
5404	13" ASH
5405	12" ASH
5406	33" CEDAR
5407	19" ASH
5408	16" CEDAR
5409	27" ASH
5410	16" ASH
5411	28" ASH
5412	17" ELM
5413	12" CEDAR ELM
5414	14" ELM
5415	26" ASH
5416	12" CEDAR ELM
5417	12" ASH
5418	22" ASH
5419	20" OAK
5420	17" OAK
5421	22" HACKBERRY
5422	22" ASH
5423	12" CEDAR ELM
5424	20" ASH
5425	32" CEDAR ELM
5426	25" CEDAR ELM
5427	38" CEDAR ELM
5428	12" ELM
5429	14" ASH
5430	7" CEDAR
5431	30" ELM
5432	16" CEDAR ELM
5433	19" ELM
5434	18" PECAN
5435	7" CEDAR ELM
5436	19" CEDAR ELM
5437	16" PECAN
5438	18" ELM
5439	16" ELM
5440	24" ELM
5441	13" MULTI-TRUNK ELM
5442	15" ELM
5443	24" ELM
5444	18" MULTI-TRUNK ELM
5445	23" ELM
5446	15" ELM
5447	11" ELM
5448	16" ELM
5449	20" ELM

TREE TABLE

POINT NO.	DESCRIPTION
5450	12" ELM
5451	16" ELM
5452	17" HACKBERRY
5453	12" MULTI-TRUNK ELM
5454	8" ASH
5455	10" ASH
5456	22" ELM
5457	22" ELM
5458	24" ELM
5459	16" ELM
5460	18" ASH
5461	9" ELM
5462	21" RED BUD
5463	8" HACKBERRY
5464	6" HACKBERRY
5465	12" ELM
5466	13" ELM
5467	18" ELM
5468	13" ELM
5469	26" ELM
5470	14" ELM
5471	18" ASH
5472	11" ELM
5473	8" CEDAR
5474	13" ELM
5475	11" CEDAR
5476	12" ELM
5477	8" ELM
5478	10" ELM
5479	10" ELM
5480	12" ELM
5481	7" RED BUD
5482	10" ELM
5483	6" RED BUD
5484	10" ELM
5485	8" RED BUD
5486	6" RED BUD
5487	17" CEDAR
5488	14" ELM
5489	10" ELM
5490	7" ELM
5491	11" ELM
5492	7" HACKBERRY
5493	10" ELM
5494	10" ELM
5495	8" RED BUD
5496	10" ELM
5497	6" HACKBERRY
5498	8" ELM
5499	7" RED BUD

TREE TABLE

POINT NO.	DESCRIPTION
5500	14" ELM
5501	11" ELM
5502	10" ELM
5503	11" RED BUD
5504	10" ELM
5505	6" RED BUD
5506	9" ELM
5507	19" ASH
5508	7" RED BUD
5509	11" ELM
5510	7" HACKBERRY
5511	12" RED BUD
5512	11" RED BUD
5513	6" RED BUD
5514	9" MULTI-TRUNK ELM
5515	7" RED BUD
5516	14" ELM
5517	11" CEDAR
5518	15" ELM
5519	11" ELM
5520	14" RED BUD
5521	11" ELM
5522	8" HACKBERRY
5523	6" RED BUD
5524	19" ELM
5525	11" HACKBERRY
5526	6" MULTI-TRUNK RED BUD
5527	7" RED BUD
5528	6" RED BUD
5529	14" ELM
5530	10" MULTI-TRUNK ASH
5531	18" ASH
5532	6" MULTI-TRUNK RED BUD
5533	6" CEDAR
5534	14" ELM
5535	15" ELM
5536	9" ELM
5537	12" ELM
5538	12" ELM
5539	12" ELM
5540	14" ELM
5541	16" ASH
5542	10" ELM
5543	12" RED BUD
5544	11" RED BUD
5545	7" RED BUD
5546	15" ELM
5547	8" ELM
5548	7" ELM
5549	9" ELM

TREE TABLE

POINT NO.	DESCRIPTION
5550	8" ELM
5551	8" RED BUD
5552	6" RED BUD
5553	7" RED BUD
5554	10" ELM
5555	7" ELM
5556	12" ELM
5557	9" ELM
5558	11" ASH
5559	7" HACKBERRY
5560	6" HACKBERRY
5561	9" CEDAR
5562	10" ELM
5563	7" RED BUD
5564	9" ELM
5565	18" ELM
5566	9" ELM
5567	7" ELM
5568	7" ELM
5569	9" ELM
5570	23" ELM
5571	9" ELM
5572	7" RED BUD
5573	13" ELM
5574	10" ELM
5575	7" RED BUD
5576	11" ELM
5577	11" ELM
5578	10" ELM
5579	7" ELM
5580	8" ELM
5581	17" ELM
5582	11" ELM
5583	7" ELM
5584	9" ASH
5585	21" ELM
5586	21" ELM
5587	18" ELM
5588	15" ELM
5589	10" RED BUD
5590	19" ELM
5591	11" ELM
5592	14" HACKBERRY
5593	13" ELM
5594	11" MULTI-TRUNK CEDAR
5595	8" HACKBERRY
5596	15" ELM
5597	16" ELM
5598	21" ELM
5599	12" ELM

TREE TABLE

POINT NO.	DESCRIPTION
5600	10" HACKBERRY
5601	11" MULTI-TRUNK ELM
5602	10" ELM
5603	12" MULTI-TRUNK ELM
5604	15" MULTI-TRUNK CREPE MYRTLE
5605	8" ELM
5606	12" MULTI-TRUNK ELM
5607	15" ELM
5608	11" ELM
5609	18" ELM
5610	20" ELM
5611	11" ELM
5612	9" ASH
5613	9" ELM
5614	6" RED BUD
5615	16" ELM
5616	10" CEDAR
5617	9" ELM
5618	9" CEDAR
5619	8" ELM
5620	8" ELM
5621	6" ELM
5622	9" ELM
5623	13" ELM
5624	8" ELM
5625	9" ELM
5626	9" ELM
5627	7" ELM
5628	9" ELM
5629	7" MULTI-TRUNK ELM
5630	9" ELM
5631	11" ELM
5632	6" ELM
5633	8" ELM
5634	10" ELM
5635	10" ELM
5636	7" ELM
5637	12" ELM
5638	8" ELM
5639	11" ELM
5640	10" ELM
5641	10" ELM
5642	24" ELM
5643	15" MULTI-TRUNK ELM
5644	10" MULTI-TRUNK ELM
5645	17" ELM
5646	20" ASH
5647	12" MULTI-TRUNK ELM
5648	7" ELM
5649	15" ELM

TREE TABLE

POINT NO.	DESCRIPTION
5650	10" ELM
5651	6" CEDAR ELM
5652	12" MULTI-TRUNK ELM
5653	6" ELM
5654	12" ELM
5655	8" ELM
5656	6" ELM
5657	16" ELM
5658	11" ELM
5659	16" ELM
5660	10" ELM
5661	14" ELM
5662	7" ELM
5663	6" ELM
5664	7" ELM
5665	7" ELM
5666	8" ELM
5667	14" ELM
5668	15" MULTI-TRUNK ELM
5669	13" MULTI-TRUNK ELM
5670	10" ELM
5671	15" MULTI-TRUNK ELM
5672	8" ELM
5673	7" ELM
5674	12" ELM
5675	10" ELM
5676	7" MULTI-TRUNK ELM
5677	12" MULTI-TRUNK ELM

NOTES

1. All coordinates shown are State Plane Coordinate System, North America Datum 1983, Texas North Central Zone (4202), on Grid values, no scale and no projection.

2. Subject property is shown on the National Flood Insurance Program Flood Insurance Rate Map for Dallas County, Texas, and incorporated areas, Map No. 48113C0335K, Community—Panel No. 480171 0335 K, Revised Date: July 7, 2014, and Map No. 48113C0345J, Community—Panel No. 480171 0345 J, Effective Date: August 23, 2001. Relevant zones are defined on said map as follows:

   Zone "X" — Other Areas: Areas determined to be outside the 0.2% annual chance floodplain.

   Zone "X" Shaded — Other Flood Areas: Areas of 0.2% annual chance flood.

   Zone "AE" — Special Flood Hazard Areas (SFHAs) subject to inundation by the 1% annual chance flood: Base flood elevations determined.

3. This topographic map and the survey upon which it is based has been prepared and performed in accordance with the Texas Society of Professional Surveyors standards and specifications for a Category 6 condition, topographic survey. It is not the intent of this survey to render a professional opinion as to the location or condition of the boundary of the real property shown hereon. This survey was not prepared for use in any real estate transaction, conveyance or title insurance proceedings. Any depiction that may appear hereon of bearings, distances, courses, areas or monumentation are not necessarily supported by field recovered evidence and shall be interpreted as being based on record information or conceptual renderings only.

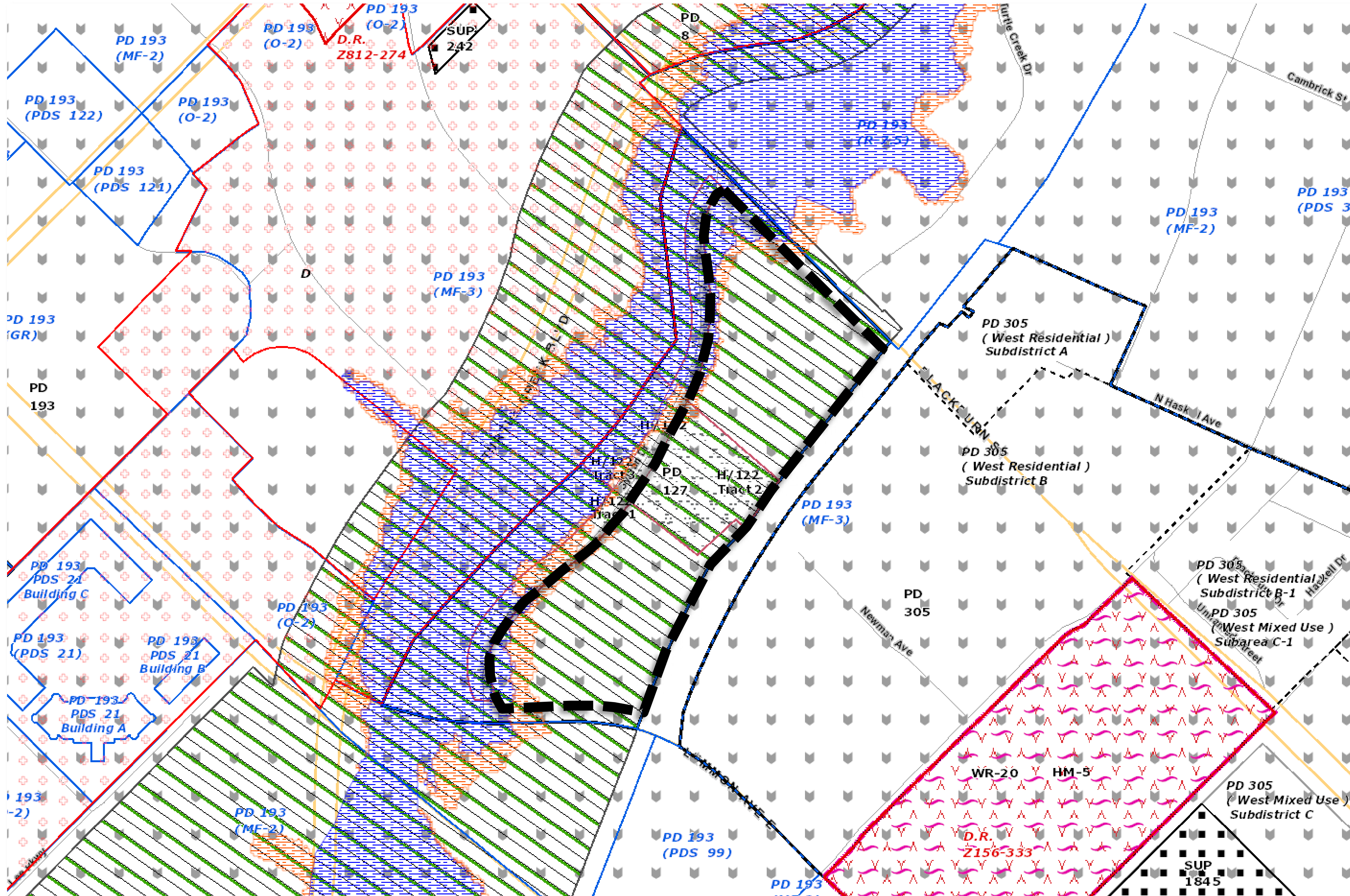

TURTLE CREEK
TURTLE CREEK
TURTLE CREEK
SYLVAN PLACE DRIVE
LEMMON AVENUE EAST
BLACKBURN STREET
CITY OF DALLAS
TWO-STORY CONCRETE BUILDING
ZONE "X" (SEE NOTE 2)
ZONE "AE" (SEE NOTE 2)
ZONE "X" SHADED (SEE NOTE 2)
VICINITY MAP
NOT TO SCALE
LEGEND
BENCH MARK LIST

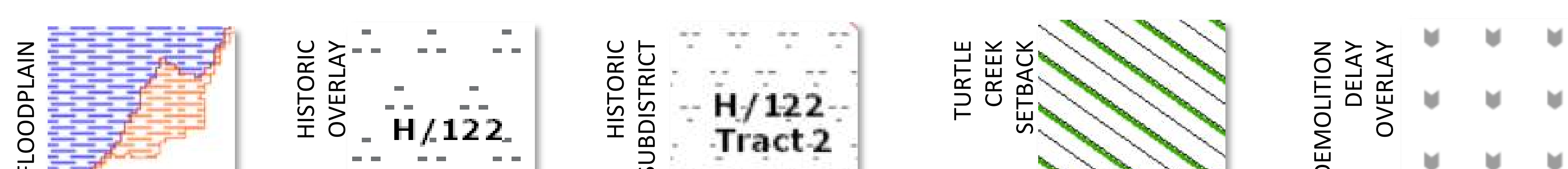
ZONING

Site Address:
3636 Turtle Creek Blvd

Zoning District:
PD 127

Site Overlays:
- Historic overlay
- Historic subdistrict
- Turtle creek setback
- Demolition delay overlay
- Flood plain





Applicable Codes

CHAPTER 16: 2015 International Fire Code, including Appendix J, with Dallas Amendments (effective October 1, 2016) The Fire Code amendments include adoption of the 2013 Edition of the following Standards: Sprinklers, NFPA 13, 13D, 13R and Fire Alarm, NFPA 72.

CHAPTER 53: 2015 International Building Code with Dallas Amendments
Code Update: Ordinance Number 32198 (effective June 13, 2022)

CHAPTER 54: 2015 International Plumbing Code with Dallas Amendments (effective March 1, 2017)

CHAPTER 55: 2015 International Mechanical Code with Dallas Amendments (effective March 1, 2017)

CHAPTER 56: 2020 National Electrical Code with Dallas Amendments (effective June 13, 2022)

CHAPTER 58: 2021 International Existing Building Code with Dallas Amendments (effective June 13, 2022)

CHAPTER 59: 2015 International Energy Conservation Code with Dallas Amendments (effective March 1, 2017)

CHAPTER 60: 2015 International Fuel & Gas Code with Dallas Amendments (effective March 1, 2017)

CHAPTER 61: 2015 International Green Construction Code with Dallas Amendments (effective March 1, 2017)

Summary

1. If entire project is designed as one complete building, the "building" will be required to meet most stringent provisions of building height, area, and number of stories. In accordance with IBC Table 504.4 for allowable number of stories above grade plane, there are at least 4 stories indicated by the pricing document. The 4 story building will be restricted to, at minimum Type IIA construction when equipped throughout with an automatic sprinkler system. At this time, the construction of the Kalita Humphreys theater is unknown, but would be required to be upgraded to at least Type IIA construction when equipped with an automatic sprinkler system. This construction type would be further restricted by the allowable area. In accordance with Table 506.2, the entire building would be required to be of Type IA construction to meet area limitations for assembly occupancies based on an approximate area of 200,000 sf. Additional information is needed to determine actual height and area and construction type.

2. If the project is to be designed as multiple buildings, with the existing theater construction type remaining as is (most likely Type IIIB), then fire walls will be required to separate the new buildings from the existing theater due to the overall size, height and area, exceed the Dallas Building Code for an assembly use, protected by fire sprinklers. Separating the buildings will allow for each building to be constructed separately in accordance with Chapter 5 provisions for building height, area, and number of stories. Openings within the fire walls shall be limited to 156 square feet and the aggregate width of openings at any floor level shall not exceed 25 percent of the length of the wall, per DBC Section 706.8. However, the 156 square footage limitation is allowed to be exceeded where both buildings are equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

3. Height is not given, however the presence of aerial fire apparatus access roads may be required if the vertical distance between grade plane and the highest roof surface exceeds 30 feet (due to the hilly topography, grade plan needs to be calculated). D105.1 Section D105.2-Aerial fire apparatus access roads shall have a minimum unobstructed width of 26 feet, exclusive of shoulders, in the immediate vicinity of the building or portion thereof. D105.3-At least one of the required access routes meeting this condition shall be located a minimum of 15 feet and a maximum of 30 feet from the building, and shall be positioned parallel to one entire side of the building. The side of the building on which the aerial fire apparatus access road is positioned shall be approved by the fire code official. D105.4-Overhead utility and power lines shall not be located over the aerial fire apparatus access road or between the aerial fire apparatus road and the building. Other obstructions shall be permitted to be placed with the approval of the fire code official.

4. The presentation documents presented indicate several dead end fire department access roads. In accordance with DFC Section 503.2.5-Dead End fire apparatus access roads in excess of 150 feet in length shall be provided with an approved area for turning around fire apparatus in accordance with Appendix D (i.e., required to have a 120-foot hammerhead, 60-foot "Y", or 96-foot diameter cul-de-sac in accordance with Figure D103.1.)

5. The pricing document indicates several proposed underground access roads. In accordance with DFC Section 503.2.1 Fire apparatus access roads shall have an unobstructed width of not less than 20 feet, exclusive of shoulders, except for approved security gates in accordance with Section 503.6, and an unobstructed vertical clearance of not less than 13 feet 6 inches.

6. The pricing plan indicates that large portions of the Plan North exterior elevations of the buildings will be greater than 150 feet from the nearest fire department access roads. In accordance with DFC Section 503.1.1-Approved fire apparatus access roads shall be provided for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction. The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building. Exception: The fire code official is authorized to increase the dimension of 150 feet where any of the following conditions occur: 1.1-The building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2, or 903.3.1.3. 1.2- Fire apparatus access roads cannot be installed because of location on property, topography, waterways, nonnegotiable grades or other similar conditions, and an approved alternative means of fire protection is provided.

7. The pricing document indicates various topography levels. In accordance with DFC Section 503.2.7- The maximum vertical grade for all fire apparatus access roads is 10 percent for concrete roads and 8 percent for asphalt roads. The maximum cross grade for all apparatus access roads is 2 percent.

APPENDIX

ESTIMATED BUDGET AND TIME

ESTIMATED BUDGET AND TIME

Kalita Humphreys Masterplan Estimated Budget and Time

The project budget was developed with the input of the entire project team. DTC hired the Beck Group to provide a construction budget estimate based on the plans as illustrated in DSR's masterplan concept scheme. Interestingly, the Beck Group has a unique perspective in that they built the original theater for DTC. Hillwood Urban provided input and guidance with regards to soft costs required to complete the project.

It is important to note the following items:

1) These figures reflect a budget based on an early set of concept plans and with 2022 cost data. As such, they are subject to movement (likely in the range of +/- 10%) with the evolution of the overall masterplan design and/or cost escalation, depending on actual construction commencement.
2) This masterplan design purposefully incorporates connectivity and accessibility between components. The budget detailed below provides estimated budgetary figures per specific project components; however, this detail is based on estimated allocations of hard and soft costs and does not reflect costs to deliver each component on a standalone basis.
3) The Theater / Program Additions component includes the proposed four new pavilions and all new program elements exclusive of the Katy Trail Improvements, Main Garage, and Site / Open Area Improvements shown below.
4) The Main Garage component is a below-grade structure housing approximately 380 parking spaces, a service/loading dock, and major utility infrastructure. In this masterplan scheme, significant investment is being made to keep these elements below grade in order to maximize available park area above grade.
5) The Site / Open Area Improvements include landscape, hardscape, grounds, paths and other park-like elements as illustrated in the Masterplan.
6) The budget does not include consideration for financing related costs or contributions to a DTC endowment fund.
7) Based on the Masterplan as presented, we have assumed a 20-month design timeframe followed by a construction period of approximately 26 months.

Project Component	Estimated Budget
Kalita Humphreys Theater Restoration	$ 52,000,000
Katy Trail Enhancements	$ 6,000,000
Theater/Program Replacements + Additions	$ 168,000,000
Main Garage - Project Infrastructure Allocation	$ 22,000,000
Park Improvements	
Main Garage - Parking Allocation	$ 27,000,000
Site/Open Area Improvements	$ 23,000,000
Project Total Budget	**$ 298,000,000**
Katy Trail/Turtle Creek Bridge Connection (to be considered a separate budget vehicle)	$ 10,000,000

BENCHMARKING

The Design Team researched and visited several existing projects as architectural and inspirational references. The selected benchmarks represent 4 categories:

- Buildings designed by Frank Lloyd Wright
- Theaters of a similar scale
- Performing arts campuses with similar program amenities
- Buildings integrated with their site

Below are a selection of the most relevant benchmarks. Please refer to the Appendix for the complete list.

Guggenheim Museum
Frank Lloyd Wright
New York, NY 1959
- 270 seats
- Same period of significance
- Thrust stage
- Parabolic seating arrangement
- Custom theatrical seating

The Wyly
REX + OMA, Dallas, TX 2009
- 575, or 800 seats
- Versatile theater with flexible seating arrangements
- Glazed exterior wall
- Open lobby, rehearsal and administrative spaces

Irish Arts Center
Davis Brody Bond, New York, NY 2021
- 165 seats
- Blackbox theater with walkable ceiling grid
- Flexible seating arrangements
- Shared public lobby and cafe

The Public, Newman Theater
Giorgio Cavaglieri, New York, NY 1967
- 299 seats
- Proscenium Theater
- Historic brick interior in former library
- Part of multi-theater complex with shared lobby

The Claire Tow Theater
H3 Hardy Collaboration Architects, New York, NY 2011
- 100 seats
- Proscenium Theater
- Part of multi-theater complex
- with shared plaza
- Exterior roof space
- Accessible rehearsal space

Midtown Arts & Theater Center
Lake Flato Architects, Houston, TX, 2016
- Part of multi-theater complex with shared lobby
- 4 theaters with a variety of scales and seating arrangements
- Shared BOH space
- Public gallery

Writers Theater
Studio Gang, Glencoe, IL, 2016
- Campus-like cluster of performance spaces
- 250 seat thrust stage and
- 99 seat black box
- Public lobby / presentation space
- Operable façade
- Shared lobby with concessions

Jacob's Pillow
Flansburgh Architects, Becket, MA, 2017
- Multi-pavilion campus with several rehearsal and performance spaces
- Integrated with landscape
- Operable facades create seamless indoor / outdoor transition
- Flexible venues can be easily transformed

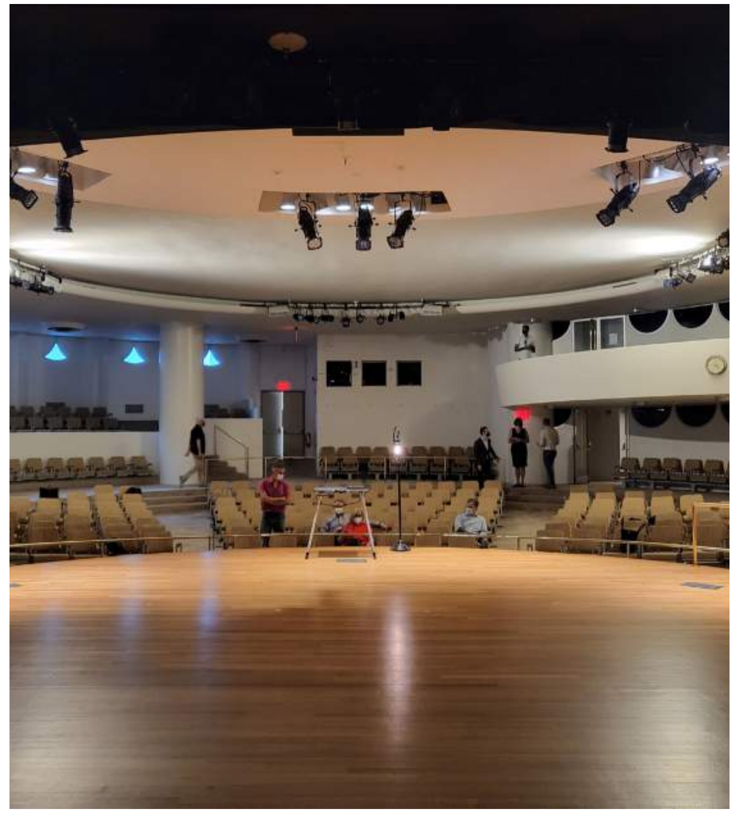
Grace Farms
SANAA, Glencoe, IL, 2016
- Multi-pavilion campus
- Integrated with landscape
- Glazed exterior creates seamless indoor / outdoor transition
- Program includes auditorium, café, library, gym, administrative spaces

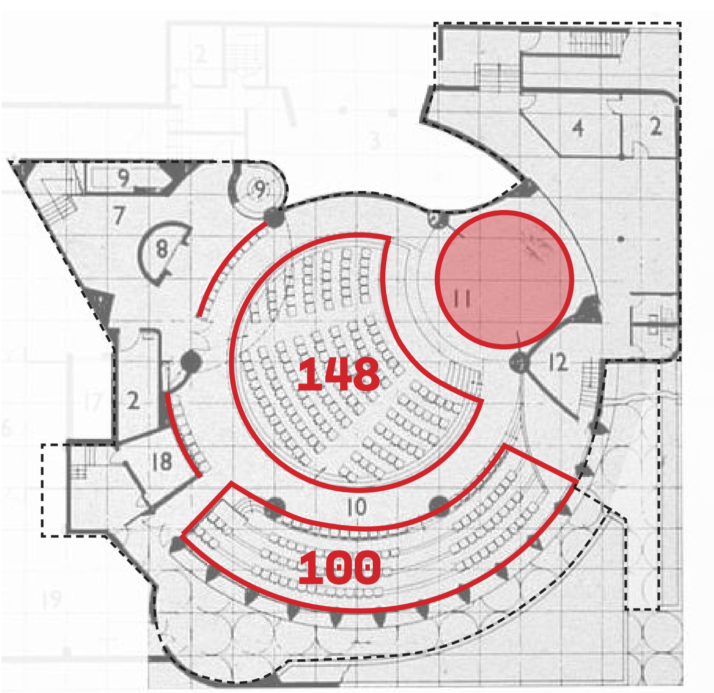
Guggenheim Museum, 1959

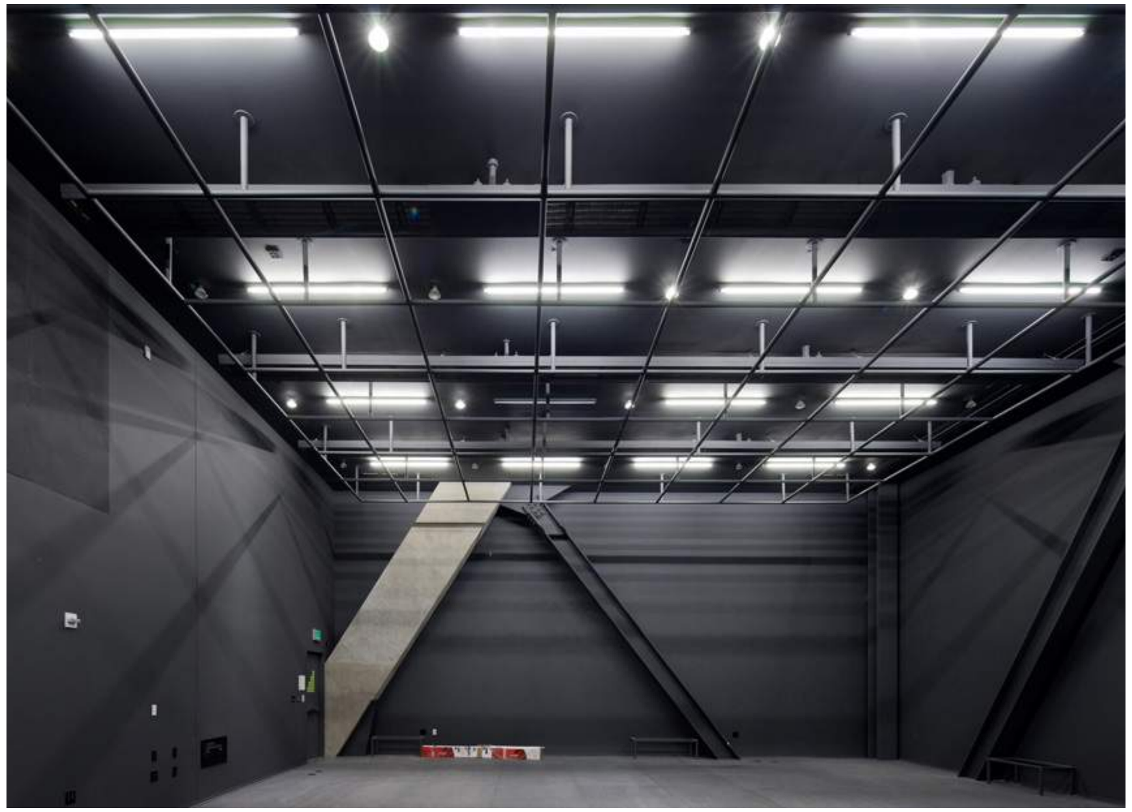
Peter B. Lewis Theater
New York, NY
Frank Lloyd Wright
Area: 5,000 SF

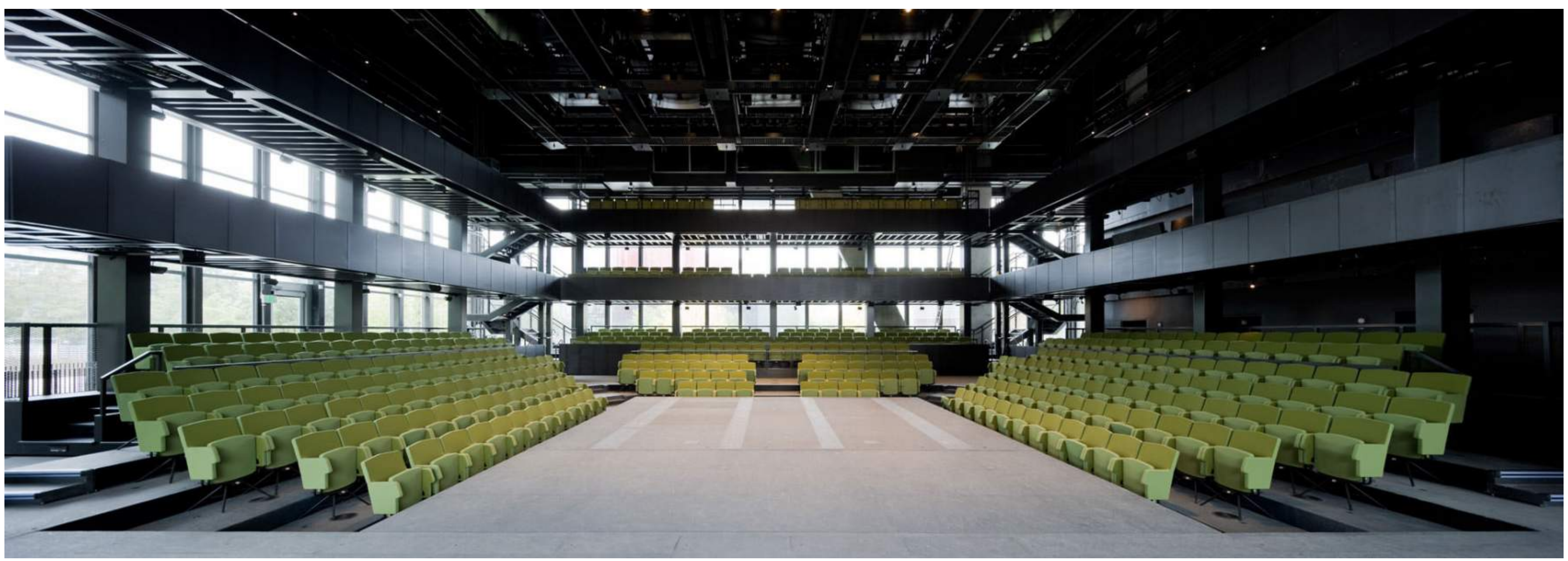
Part of Frank Lloyd Wright's original architectural design, the 270-seat theater provides space for lectures, symposia, and live performances of music and dance.

- 270 seats
- Same period of significance
- Thrust stage
- Parabolic seating arrangement
- Custom theatrical seating









Dee and Chalres Wyly Theater, 2009

Dallas, TX
OMA, REX
Area: 83,000 SF

- 575, or 800 seats
- Versatile theater with flexible seating arrangements
- Glazed exterior wall
- Open lobby, rehearsal and administrative spaces

The Dee and Charles Wyly Theatre overcomes these challenges by overturning conventional theater design. Instead of circling front-of-house and back-of-house functions around the auditorium and fly tower, the Wyly Theatre stacks these facilities below-house and above-house. This strategy transforms the building into one big "theater machine." At the push of a button, the theater can be transformed into a wide array of configurations—including proscenium, thrust, and flat floor—freeing directors and scenic designers to choose the stage-audience configuration that fulfills their artistic desires. Moreover, the performance chamber is intentionally made of materials that are not precious in order to encourage alterations; the stage and auditorium surfaces can be cut, drilled, painted, welded, sawed, nailed, glued and stitched at limited cost.

River Building, 2015

New Canaan, CT
SAANA, OLIN
Area: 83,000 SF

The River building is a multipurpose structure and landscape design for Grace Farms, an 80-acre site in New Canaan, Connecticut. The non-profit Grace Farms Foundation developed as a space for people to experience nature, encounter the arts, pursue justice, foster community and explore faith. The facilities of the building house the Foundation to Grace Community Church and other nonprofit and community groups. On-site amenities include public programs ranging from coffee and tea service, discussions, concerts, art classes and athletics.

Embedded in the landscape, the building begins at the top of the hill and flows down a long, gentle slope (a change in grade of 44 ft) in a series of bends, forming courtyard-like spaces. The building is essentially one long pvillion under a roof, made of glass, concrete, steel and wood. The hovering structure appears to float above the surface of the ground as it slips through the landscape. The walkways, courtyards and glass-wrapped volumes that form beneath the roof are transparent and engage with the natural surroundings.

Approximately 77 of the 80 acres of Grace Farms are open meadows, woods, wetlands and ponds. Fifty-five 500-foot-deep geothermal wells have been drilled on the property for heating and cooling.

In its architectural brief, the Foundation asked for a venue of "cultural interest and curiosity via open space, architecture, art and design in order to provide people with an opportunity to:

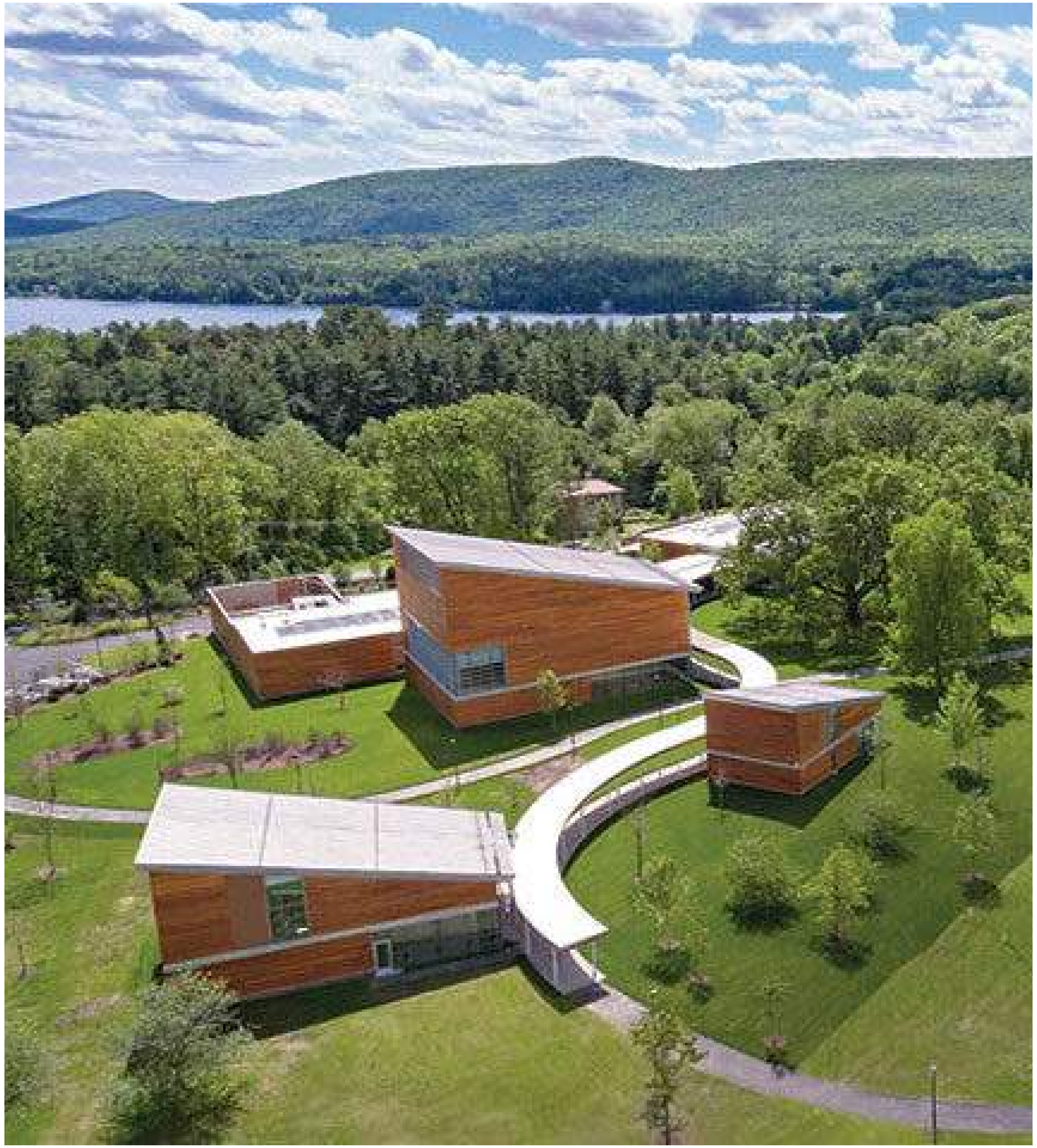
- Experience Nature: Our aim is to draw people into this beautiful landscape, to enhance one's experience of nature through all five senses, and to allow nature itself to inspire in us an experience of awe.
- Foster Community: We hope to provide a warm, welcoming environment that fosters personal relationships through passive and active, social and artistic activities.
- Pursue Justice: We will offer resources and feature opportunities to improve lives by helping others, showing mercy and advancing justice together.
- Explore Faith: We aspire to create an environment for reflection, study, discussion and worship."

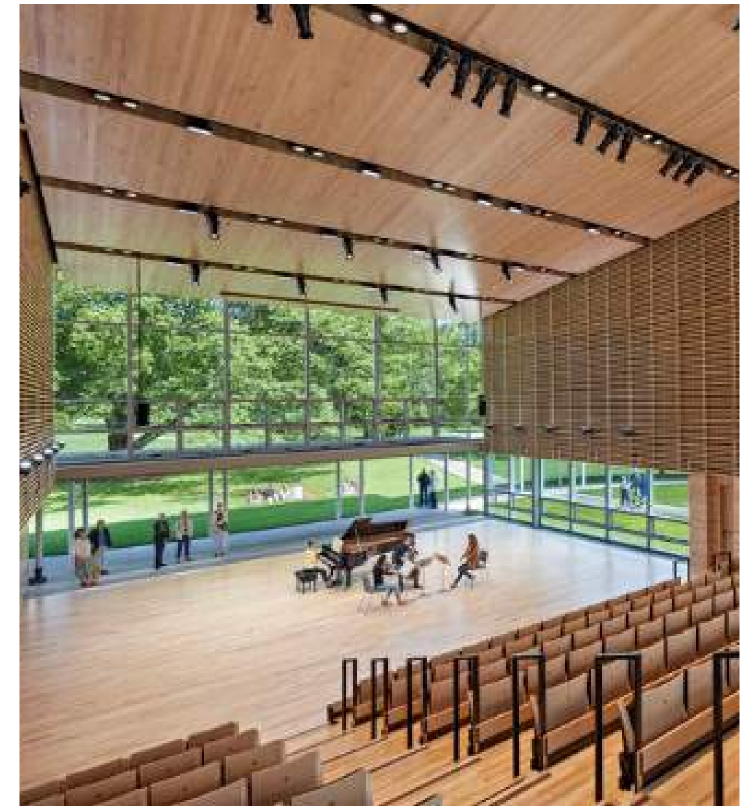
Jacob's Pillow

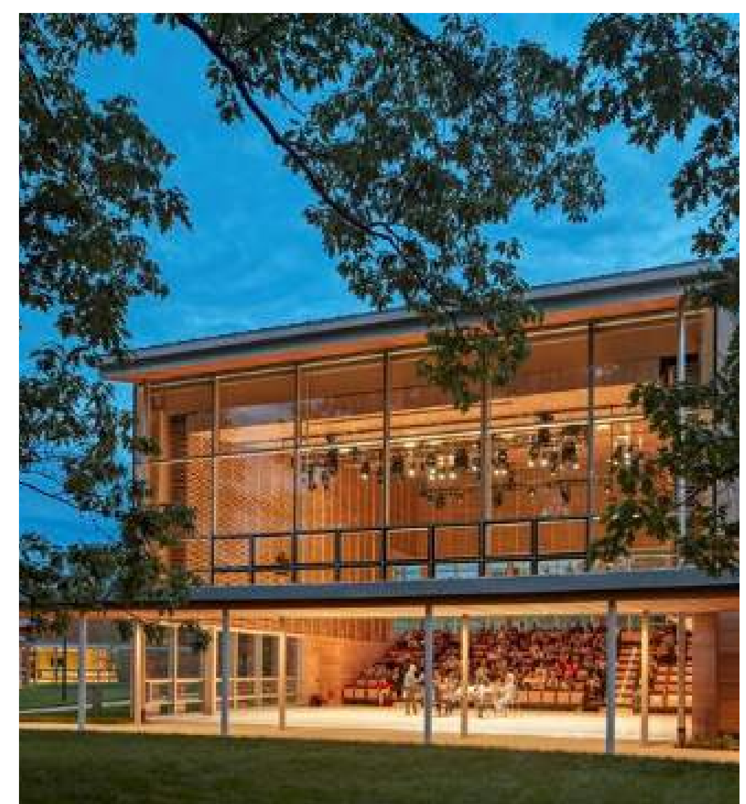
Becket, Massachusetts
Joseph Franz
Area: 220 acres

Jacob's Pillow is a dance center, school and performance space known for its Summer dance festivals. The site was settled as a farm in 1790, but began its development as a dance center in 1931, when it was purchased by dance pioneer Ted Shawn. Ownership of Jacob's Pillow changed with the onset of WWII, but was later purchased, the new theater building constructed in 1942, and Shawn installed as the artistic director until his death in 1972. Jacob's Pillow was listed as a National Historic Landmark District in 2003, cited as "an exceptional cultural venue that holds value for all Americans," and is the only dance center in the U.S. to receive this honor.

The Ted Shawn Theatre opened in 1942 as the first performance space in America specifically designed for dance. Joseph Franz, the architect, also built the indoor-outdoor Tanglewood Music Shed in Lenox, Massachusetts. After Shawn's death, a series of new artistic directors came through Jacob's Pillow, and beginning 1980 under Liz Thompson leadership, innovations in Inside/Out performances and open access to the site grounds and studios established the unique character of Jacob's Pillow. The Henry J. Leir Stage is home to the Inside/Out Performance Series, free public performances by established and emerging artists from around the world seen against the scenic backdrop of the Berkshires. The natural setting offers an uncommon setting for performance, opening up creative opportunities for performers, and offering visitors new ways of perceiving and experiencing both the landscape and the performance.







Tanglewood Linde Center

The Linde Center for Music and Learning at Tanglewood, the Boston Symphony Orchestra's longtime summer home in the Berkshires, was envisioned as a place where new ideas around music could commingle with cultural enrichment. Against the backdrop of a captivating landscape, the center is a cluster of four new buildings that help bridge Tanglewood's acclaimed music festival and its summer music academy, which provides no-cost fellowships to some of America's most talented professional musicians.

Tanglewood has represented human wellness through its quest to enrich the soul through music and develop meaningful connections with the landscape.
Connected by a serpentine pathway, the center's four buildings house Tanglewood's educational programs, recitals, and lectures, including the Tanglewood Learning Institute. The recently launched program provides classical music patrons extraordinary access to top-tier musicians as they work to hone their craft. Through all of its programs, the center aims to immerse audiences deeper into the process of creating music.

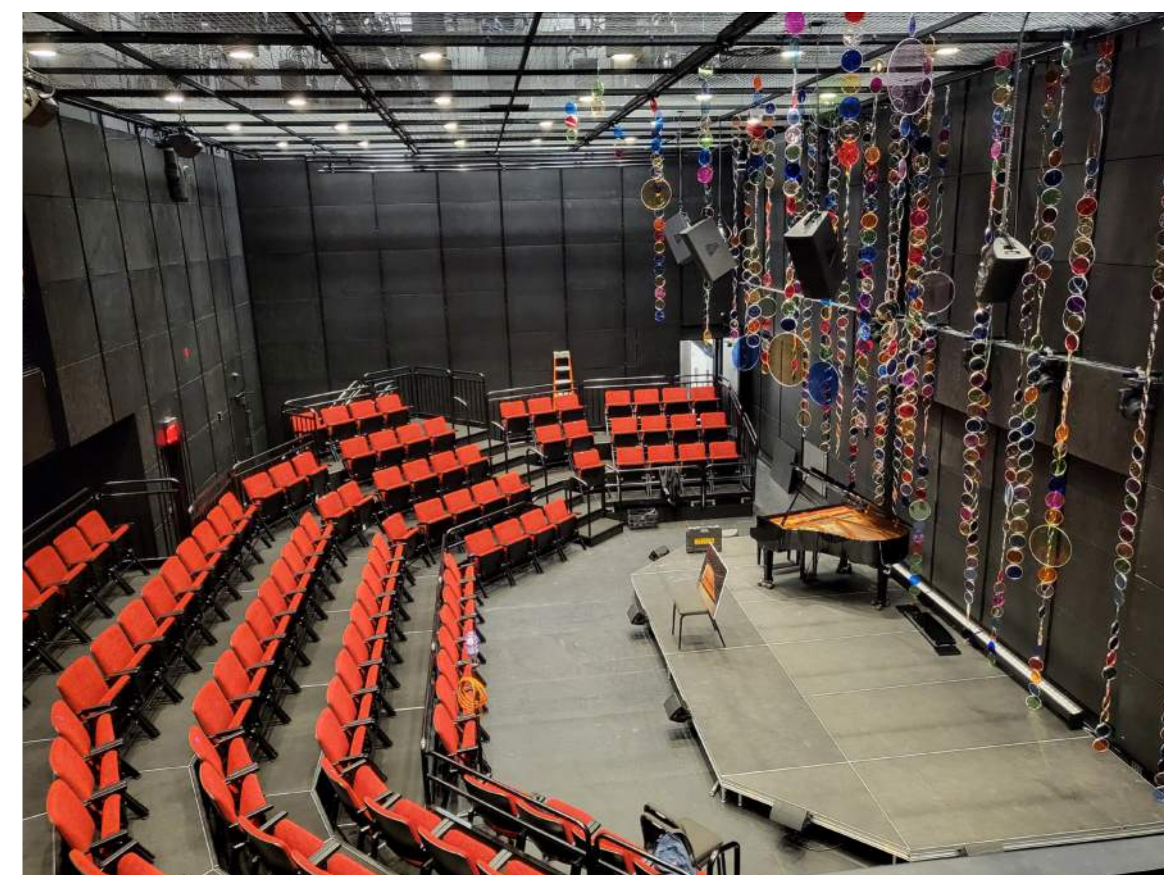
The center is positioned as a vital music incubator through its scale, flexibility, and distance-learning capabilities. Through it, the orchestra has experimented with new concepts and technologies,

Irish Arts Center, 2020

New York, NY
Davis Brody Bond, FDA
Area: 21,700 SF

The Irish Arts Center (IAC) is a home for cultural exchange with Ireland, a place for creation and development of new productions, a venue that supports cross-collaborations between US and Irish artists in many disciplines, and a center for educational programs that serves both the Irish-American and larger community. For most of its existence, the IAC operated out of a converted three-story tenement building, whose ground floor garage was transformed into a small theater. Our new expansion developed an adjacent new building on 11th Avenue which is connected to the original facility, creating a center with two venues, as well as associated support, classroom, and rehearsal space.

The renovated and expanded IAC houses a 199-seat flexible theater, rehearsal studio classroom, multi-purpose classroom, exhibit areas, and a café. It provides spaces for collaboration among the creative disciplines of music, theater, dance, film, comedy, literature, and the visual arts. The new theater will be used for drama, spoken word and music, and was designed to provide a flexible and neutral backdrop for set design while retaining a distinct character when used as a music venue. The solution was an interior of dark stained sacrificial plywood panels that allow for the adaptability of a "black box" yet still provides a sense of warmth and richness when the lights are on.



Diller Scofidio + Renfro
New York, NY

Fisher Dachs Associates
New York, NY

Threshold Acoustics LLC
Chicago, IL

Reed Hilderbrand LLC
Cambridge, MA

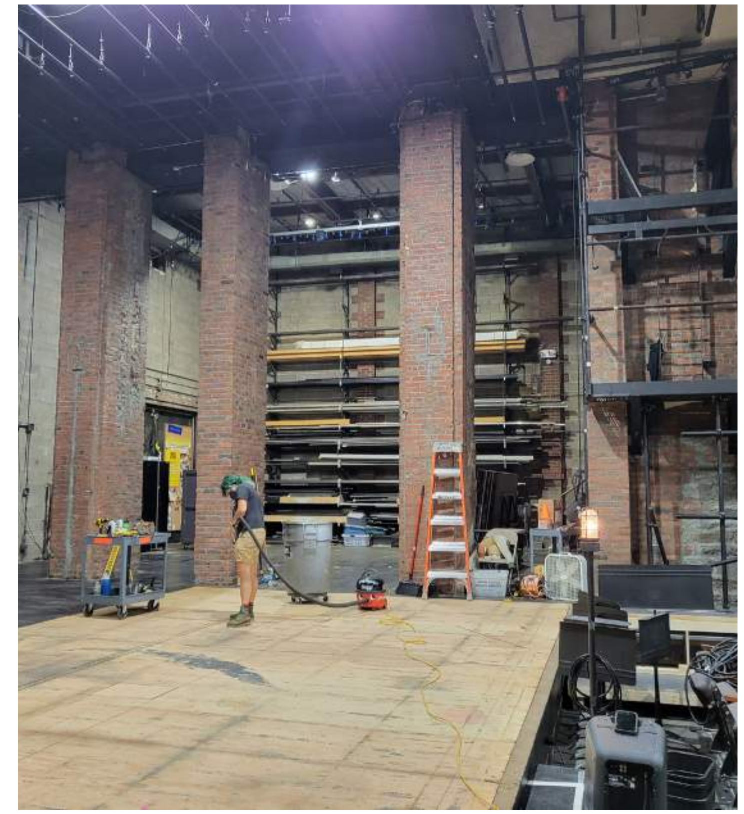
Harboe Architects
Chicago, IL

Silman Engineering
New York, NY

BOKAPowell
Dallas, TX

Syska Hennessy Group
Los Angeles, CA

Pacheco Koch
Dallas, TX



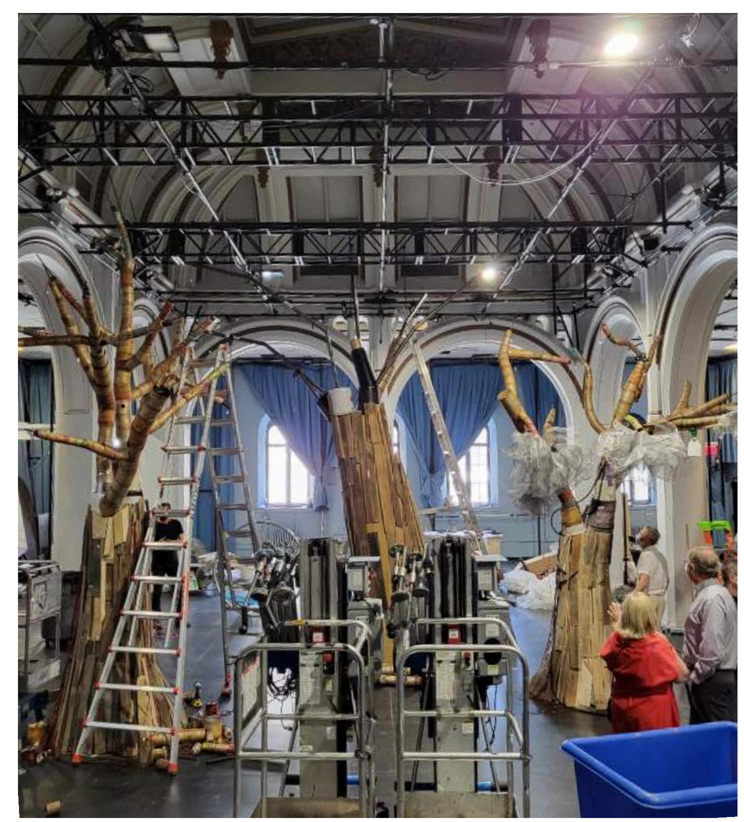
The Newman Theater, 1859, 1881

New York, NY
Giorgio Cavaglieri, Ennead
Area: X SF

The Public Theater is a New York City arts organization founded as the Shakespeare Workshop in 1954 by Joseph Papp, with the intention of showcasing the works of up-and-coming playwrights and performers. Led by JoAnne Akalaitis from 1991 to 1993 and by George C. Wolfe from 1993 to 2004, it is currently led by Artistic Director Oskar Eustis and Executive Director Patrick Willingham. The venue opened in 1967, with the world-premiere production of the musical Hair as its first show.

The Public is headquartered at 425 Lafayette Street in the former Astor Library in Lower Manhattan. The building holds five theater spaces and Joe's Pub, a cabaret-style venue used for new work, musical performances, spoken-word artists and soloists. The Newman Theater has 299 seats. The Public also operates the Delacorte Theater in Central Park, where it presents Shakespeare in the Park. New York natives and visitors alike have been enjoying free Shakespeare in Central Park since performances began in 1954.

Notable productions in recent years include: The Merchant of Venice, featuring Al Pacino as Shylock; Here Lies Love, by David Byrne; Fun Home, adapted from Alison Bechdel's illustrated memoir of the same name; Eclipsed, by Danai Gurira and featuring Lupita Nyong'o; and Hamilton, by Lin-Manuel Miranda.



Midtown Arts & Theater Center, 2017

Houston, TX
Lake Flato
Area: 59,000 SF

MATCH is centralized hub of creativity for a broad spectrum of Houston's arts organizations. Performing and visual arts groups, previously dispersed across the city, now find opportunities for synergy and collaboration with one another. The result has been an accessible and vibrant destination that has enriched connectivity of the city fabric and reinforced the identity of the arts in Houston.

The facility consists of four dedicated black-box theater spaces, two rehearsal spaces, classrooms, gallery space, and office space. A generous public breezeway serves as the building lobby where outdoor performances and community events can take place. Each theater and gallery has a 'storefront' and lobby along this internal streetscape, outwardly expressing their image and craft to a varying and diverse audience.

The MATCH is a collaboration between the City of Houston and a local not for profit organization. In addition to its function as a center for the arts, the project was seen as a key contributor to the revitalization of mid-town Houston and reinforcement of the city's public transit corridor.

New York Theater Workshop, 1997

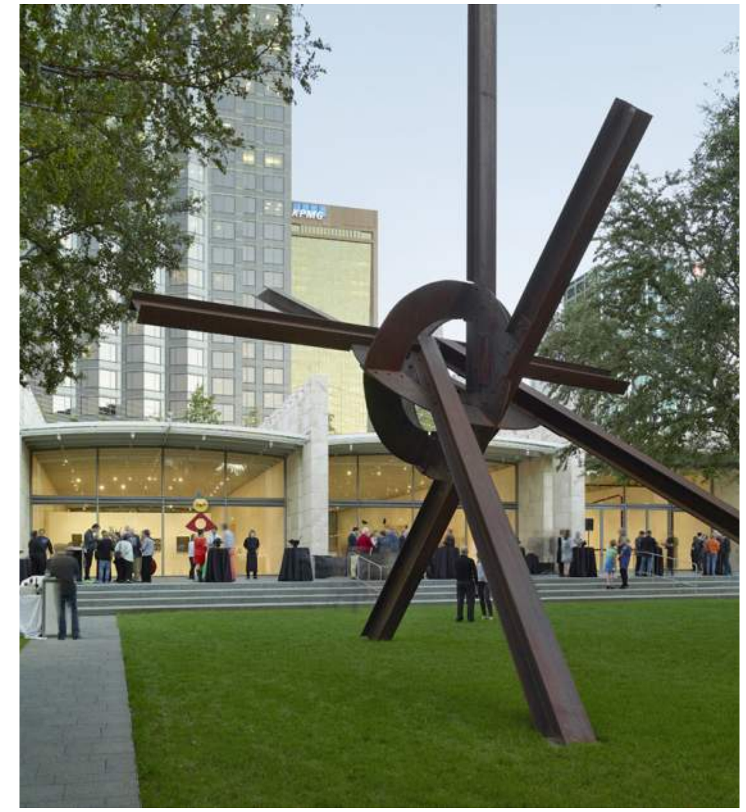
New York, NY
Mitchell Kurtz
Area: 20,000 SF

Claire Tow Theater, Lincoln Center

New York, NY
H3 hardy Collaboration Architecture, FDA
Capacity: 100 seats

The Claire Tow Theater was constructed in 2012 at Lincoln Center atop the Vivian Beaumont Theater, serving the need for a small, less formal performance space for the Lincoln Center Theatre Company. Claire Tow is the home of the LCT3, the programming initiative devoted to producing the work of emerging playwrights, directors, and designers.

Through mounting fully-staged, modestly budgeted productions, LCT3 bring a new generation of artists and audiences to Lincoln Center.



The Nasher Foundation, 2003

Dallas, Texas
Renzo Piano Building Workshop, PWP
Area: 54,000 SF

The museum is located in downtown Dallas, in the Arts Distric. The sculpture center is an oasis in an urban landscape. The building is made up of five parallel rectangular pavilions, whose volumes are delineated by a stine-walled perimeter. There are large, glazed facades at each end of the barrel vaults– transparent partitions that blur the boundaries between inside and outside.

The roof is comprised of five glass vaults which are suspended above the pavilions. The glass skylight structures allow indirect north light to illuminatw the gallery spaces. The interior exhibition spaces act as an extension of the sculpture garden, and vice versa.

The museum has two levels: the three central arcades on the ground floor house the sculptures and paintings that are most sensitive to light and humidity. The other arcades contain the cafeteria, the shop and administrative spaces. On the lower level, there's a small gallery for light-sensitive works, such as prints and drawings, as well as preservation laboratories, research and teaching areas, and an auditorium. The auditorium overlooks a terraces grandsatnd - an outdoor amphitheater. An operable façade facilitates indoor / outdoor performances.

The garden, which is surrounded by tall walls, accentuates the impression of being in a secret garden. The 86,000 square-foot outdoor space hosts a collection of nearly 25 sculptures and boasts a wide range of plant life. The garden is an ideal event space - naturally shaded by the tree canopy bove. The indoor kitchen can be utilized for smaller event preparation while larger events are catered off-site.

The Perelman

New York, NY
REX, Davis Brody Bond, Silman, Threshold Acoustics
Area: 129,000 SF

The Ronald O. Perelman Performing Arts Center at the World Trade Center will produce and premiere original works of theater, dance, music, film, and opera. The clear exterior form contrasts with a utilitarian, robust interior, which expresses the workhorse quality necessary for the changing nature of artistic needs. Steel walls, concrete trusses, wood floors, perforated plywood panels, and other ruggedly beautiful materials encourage frequent transformation.

The Perelman Center is organized in three levels—Public, Performer, and Play. The Play Level is a highly adaptable performance palette that combines both multi-form and multi-processional flexibility. It holds three auditoria (499-, 250-, and 99-person) and a rehearsal room which can double as a fourth venue. Using large, acoustic, guillotine walls that separate them, the three auditoria can be combined to form seven additional, unique performance spaces, for a total of eleven arrangements (including the rehearsal room), which can all adopt multiple stage/audience configurations. Circulation space around and between the performance rooms can also be choreographed or appropriated for performance. The Performer Level contains all support areas, such as trap, dressing rooms, green room, musician room, quiet room, wig storage, and costume shop. The Public Level can be enjoyed by anyone, anytime, and includes the lobby, restaurant/bar, and a flexible performance art space.

Mi Cocina

Dallas, TX / Klyde Warren Park
Architect Droese Raney
Area: 5,250 SF

Mi Cocina is a Tex-Mex restaurant with three locations in Dallas, Texas. Mi Cocina at Klyde Warren Park is a buzzing 5400 SF contemporary casual restaurant. It has indoor (90 seats) and outdoor seating (3950 SF), with ample bar seating (36 seats) and an approachable atmosphere, as well as a smaller take away venue with additional outdoor seating. Mi Cocina's versatility makes it an approachable restaurant for theater or museum goers and local crowds in Downtown Dallas.

BENCHMARKS BY REGION

Type	Name	Location	Campus	Single Building	Proscenium or Thrust	Black Box / Studio	Rehearsal Space	Education Space	Restaurant	Event Space	Landscape	Parking Structure
Texas	**MATCH** Lake Flato https://www.lakeflato.com/civiccultural/midtown-arts-theater-center-houston	Houston, TX	X		X	X				X		
Texas	**The Alley** Ulrich Franzen https://www.studioredarchitects.com/alley-theatre-houston-texas/	Houston, TX		X	X		X					
Texas	**Dunlavy (now Flora)** https://www.florahouston.com/	Houston, TX							X	X	X	
Texas	**Grove** https://www.thegrovehouston.com/	Houston, TX							X	X	X	
Texas	**T3 Parking** Danze Blood https://architizer.com/projects/t3-parking-structure/	Austin, TX									X	
Texas	**Mi Cocina** https://www.micocina.com/locations/in/tx/dallas/on-the-park/	Dallas, TX							X		X	
Texas	**Buffalo Bayou** https://buffalobayou.org/	Houston, TX									X	
Texas	**Greenlee Residence** Private Residence	Dallas, TX									X	
Texas	**Beck House** Philip Johnson and Bodron/Fruit Private Residence	Dallas, TX									X	
Texas	**Crystal Bridges** Safdie Architects https://www.archdaily.com/tag/crystal-bridges	Bentonville, AR	X					X	X	X	X	
Northeast	**Lincoln Center Theater Company** FDA https://www.lct.org/	NYC, NY		X	X	X	X			X		X
Northeast	The Perlman											
Northeast	**Kravis Studio, MoMA** DS+R / FDA https://dsrny.com/project/the-museum-of-modern-art?index=false&search=o&section=studio&tags=	NYC, NY		X		X			X	X		
Northeast	**Irish Arts** Davis Brody Bond https://www.archpaper.com/2021/12/the-irish-arts-center-builds-on-history-after-decades-of-planning/	NYC, NY		X		X						
Northeast	**Newman Theater, The Public** Giorgio Cavaglieri / Ennead https://www.architectmagazine.com/project-gallery/the-public-theater-at-astor-place	NYC, NY		X	X							
Northeast	**New York Theater Workshop** Mitchell Kurtz https://www.mkapc.com/nytw	NYC, NY		X	X							
Northeast	**The Joyce Theater** Zilink, Hardy https://en.wikipedia.org/wiki/Joyce_Theater	NYC, NY		X	X							
Northeast	**the Shed** DS+R / FDA https://dsrny.com/project/the-shed	NYC, NY	X		X	X	X		X			
Northeast	**Juilliard Studio Theater** DS+R / FDA https://dsrny.com/project/the-juilliard-school?index=false&section=studio	NYC, NY	X			X		X				
Northeast	**Lenfest Center for the Arts, Columbia** Renzo Piano https://www.architectmagazine.com/project-gallery/lenfest-center-for-the-arts_o	NYC, NY		X		X	X	X				
Northeast	**Kaplan Penthouse, Lincoln Center Theater** http://venues.lincolncenter.org/venues/stanley-h-kaplan-penthouse	NYC, NY								X		
Northeast	**Guggenheim Museum** Frank LLoyd Wright https://www.guggenheim.org/the-frank-lloyd-wright-building	NYC, NY		X								
Northeast	**Blue Hill Farm** https://www.bluehillfarm.com/	Tarrytown, NY							X	X	X	

Type	Name	Location	Campus	Single Building	Proscenium or Thrust	Black Box / Studio	Rehearsal Space	Education Space	Restaurant	Event Space	Landscape	Parking Structure
Northeast	**Roundhouse Beacon** https://roundhousebeacon.com/	Beacon, NY							X	X	X	
Northeast	**Grace Farms** SANAA https://www.archdaily.com/775319/grace-farms-sanaa	New Canaan, CT	X					X	X	X	X	
Northeast	**Beth Shalom** Frank LLoyd Wright https://www.architecturaldigest.com/story/frank-lloyd-wright-designed-synagogue-celebrates-60-anniversary	Philadelphia, PA		X								
Northeast	**Granoff Center for the Arts, Brown** DS+R / FDA https://www.archdaily.com/112338/perry-and-marty-granoff-center-for-the-creative-arts-brown-university-diller-scofidio-renfro	Providence, RI		X		X	X	X				
Northeast	**Jacob's Pillow** Flansburgh Archiects https://www.jacobspillow.org/	Beckett, MA	X		X				X	X	X	
Northeast	**Tanglewood Linde Center** William Rawn Associates https://www.bso.org/venues/linde-center-for-music-and-learning	Lenox, MA	X							X	X	
Chicago	**Unity Temple** Frank LLoyd Wright https://www.archdaily.com/112683/ad-classics-unity-temple-frank-lloyd-wright-3	Chicago, IL		X								
Chicago	**The Writers' Theater** Studio Gang https://www.archdaily.com/783035/writers-theatre-studio-gang-architects	Chicago, IL		X	X		X					
Chicago	**Shakespeare Festival** Hariri Pontarini Architects https://www.canadianarchitect.com/stage-by-stage-tom-patterson-theatre-stratford-ontario/	Stratford, Canada	X		X							
Chicago	**Steppenwolf Theater** Smith & Gill https://www.archpaper.com/2022/01/adrian-smith-gordon-gill-architectures-expansion-steppenwolf-theatre-crit/	Chicago, IL	X		X	X	X					
Southeast	**Arena Stage** Bing Thom Architects https://www.archdaily.com/89124/arena-stage-bing-thom-architects	DC		X	X	X				X		
Southeast	**Glenstone** Phifer https://www.archdaily.com/902692/the-new-glenstone-thomas-phifer-and-partners	Potomac, MD	X					X	X	X	X	
Southeast	**1111 Lincoln Road** Herzog & de Meuron https://www.archdaily.com/59266/1111-lincoln-road-herzog-de-meuron	Miami, FL									X	
Southeast	**Florida Southern College** Frank LLoyd Wright https://visitcentralflorida.org/featured/frank-lloyd-wright-architecture-at-florida-southern-college/	Tampa, FL		X								
Southeast	**Duke Crown Commons** Reed Hildebrand https://www.reedhilderbrand.com/works/duke-university-crown-commons	Durham, NC	X								X	
Southeast	**Nasher Sculpture Center at Duke University** Vinoly Architects https://vinoly.com/works/duke-university-nasker-museum-of-art/	Durham, NC	X								X	
Southeast	**North Carolina Museum of Art** Thomas Pfeifer https://www.archdaily.com/80719/north-carolina-museum-of-art-thomas-phifer	Raleigh, NC	X					X	X	X	X	
Southeast	**Forest Theater at UNC** https://www.tclf.org/forest-theatre	Chapel Hill, NC									X	

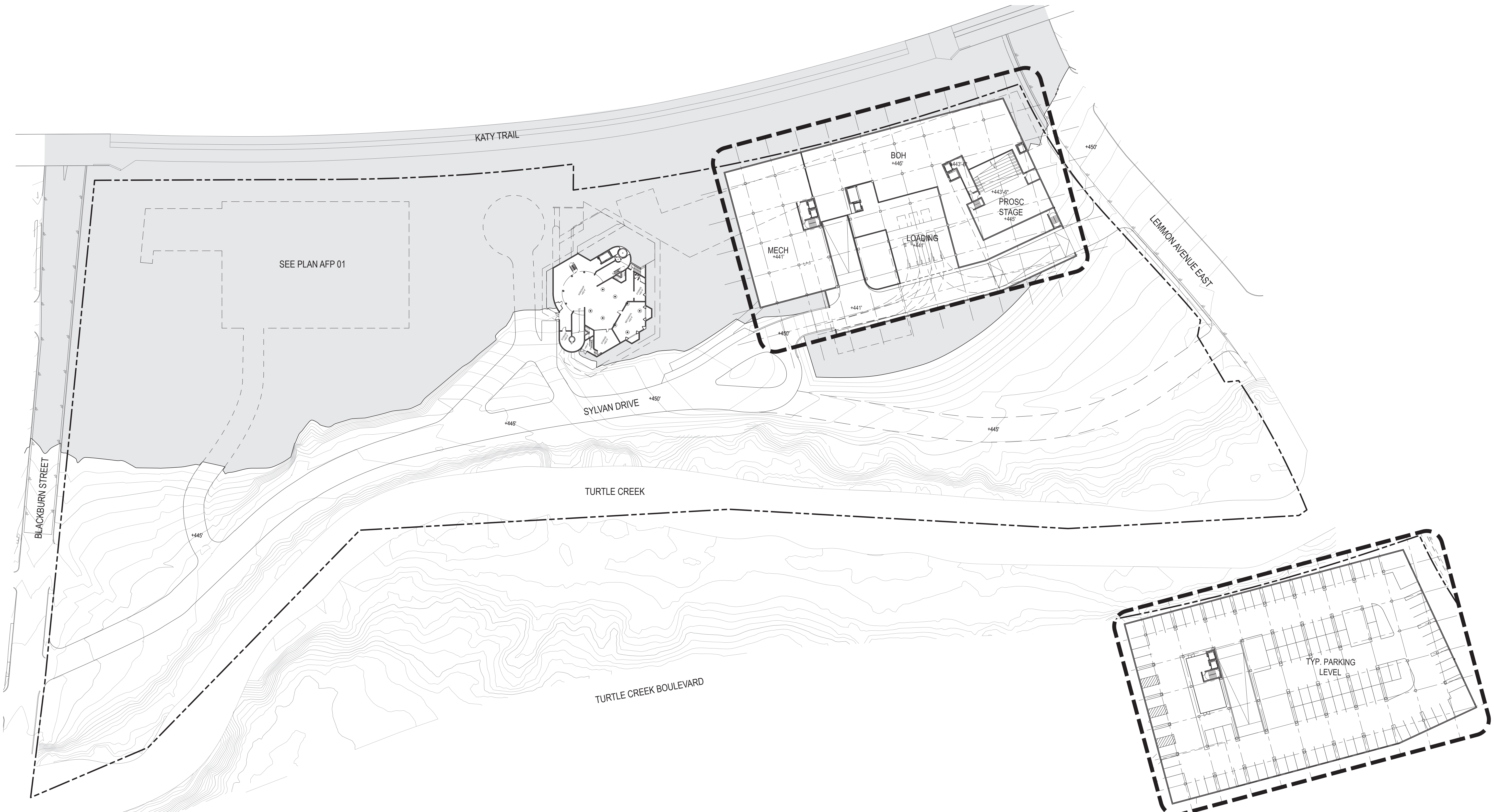
BENCHMARKS BY REGION

Type	Name	Location	Campus	Single Building	Proscenium or Thrust	Black Box / Studio	Rehearsal Space	Education Space	Restaurant	Event Space	Landscape	Parking Structure
California	**Getty Villa** Machado Silvetti http://www.getty.edu/visit/villa/top-things-to-do/architecture/	Pacific Palisades, CA	X					X	X	X	X	
	The Getty Meier https://www.archdaily.com/103964/ad-classics-getty-center-richard-meier-partners-architects	LA, CA	X					X	X	X	X	
	Barnsdall House Frank LLoyd Wright https://www.barnsdall.org/hollyhock-house	LA, CA	X									X
	Skirball Cultural Center Safdie Architects https://architizer.com/projects/skirball-cultural-center/	LA, CA	X						X	X	X	X
	The Old Globe Theater Thomas Wood Stevens https://en.wikipedia.org/wiki/Old_Globe_Theatre	San Diego, CA	X		X						X	
Northwest	**Seattle Art Museum: Olympic Sculpture Park** Weiss Manfredi https://www.weissmanfredi.com/projects/386-seattle-art-museum-olympic-sculpture-park	Seattle, WA						X	X	X	X	X
	Reed College Opsis / FDA https://www.architectmagazine.com/project-gallery/reed-college-performing-arts-building	Portland, OR		X		X	X	X				
	Oregon Shakespeare Festival https://www.osfashland.org/	Ashland, OR	X		X							
West	**Denver Center for Performing Arts** Roche Dinkeloo https://www.architectmagazine.com/design/culture/reimagining-the-denver-performing-arts-complex_o	Denver, CO	X		X					X		X
	Center for the Arts DYNIA https://www.archdaily.com/160683/jackson-hole-center-for-the-arts-performing-arts-pavilion-stephen-dynia-architects	Jackson, WY		X	X		X					
	Kauffman Center for the Performing Arts https://www.kauffmancenter.org/ Safdie	Kansas City, MO									X	X
	Taliesin West Frank LLoyd Wright https://franklloydwright.org/taliesin-west/	Scottsdale, AZ	X									X
Europe	**Young Vic Theater** Hawthorn Tompkins https://archello.com/project/the-young-vic	London, UK		X		X	X					
	Polyvalent Theater Lacaton & Vassal https://www.archdaily.com/475683/polyvalent-theater-lacaton-and-vassal	Lilies, France						X		X		
	FRAC Nord-Pas de Calais Lacaton & Vassal https://www.archdaily.com/475507/frac-of-the-north-region-lacaton-and-vassal	Dunkerque, France						X		X		
	Boa Nova Teahouse Alvaro Siza https://www.archdaily.com/355077/ad-classics-boa-nova-tea-house-alvaro-siza	Palmiera, Portugal							X	X	X	
	Teatro Olimpico Palladio https://en.wikipedia.org/wiki/Teatro_Olimpico	Vicenza, Italy		X	X							
	Parc Guell Antoni Gaudi https://www.archdaily.com/329433/ad-classics-parc-guell-antoni-gaudi	Barcelona, Spain	X					X	X	X	X	
	Igualada Cemetery Enric Miralles https://www.archdaily.com/103839/ad-classics-igualada-cemetery-enric-miralles	Barcelona, Spain								X		

Type	Name	Location	Campus	Single Building	Proscenium or Thrust	Black Box / Studio	Rehearsal Space	Education Space	Restaurant	Event Space	Landscape	Parking Structure
Other	**Taliesin (Wisconsin)** Frank LLoyd Wright https://wrightinwisconsin.org/taliesin-spring-green	Spring Green, WI	X									X
	Teatro Oficina Lina Bo Bardi https://www.archdaily.com/878754/ad-classics-teatro-oficina-lina-bo-bardi-and-edson-elito	São Paulo, Brazil		X		X						
	SESC Pompeia Lina Bo Bardi https://arquitecturaviva.com/works/sesc-fabrica-pompeia-9	São Paulo, Brazil						X		X		
	Cervantes Theater Ensemble Studio https://www.archdaily.com/463582/cervantes-theater-ensamble-studio	Mexico City, Mexico		X	X					X		
	Maezawa Garden House ALP Design Wrokshop https://archello.com/project/white-flower-arbor-and-open-air-stage	Kurobe, Japan	X									X

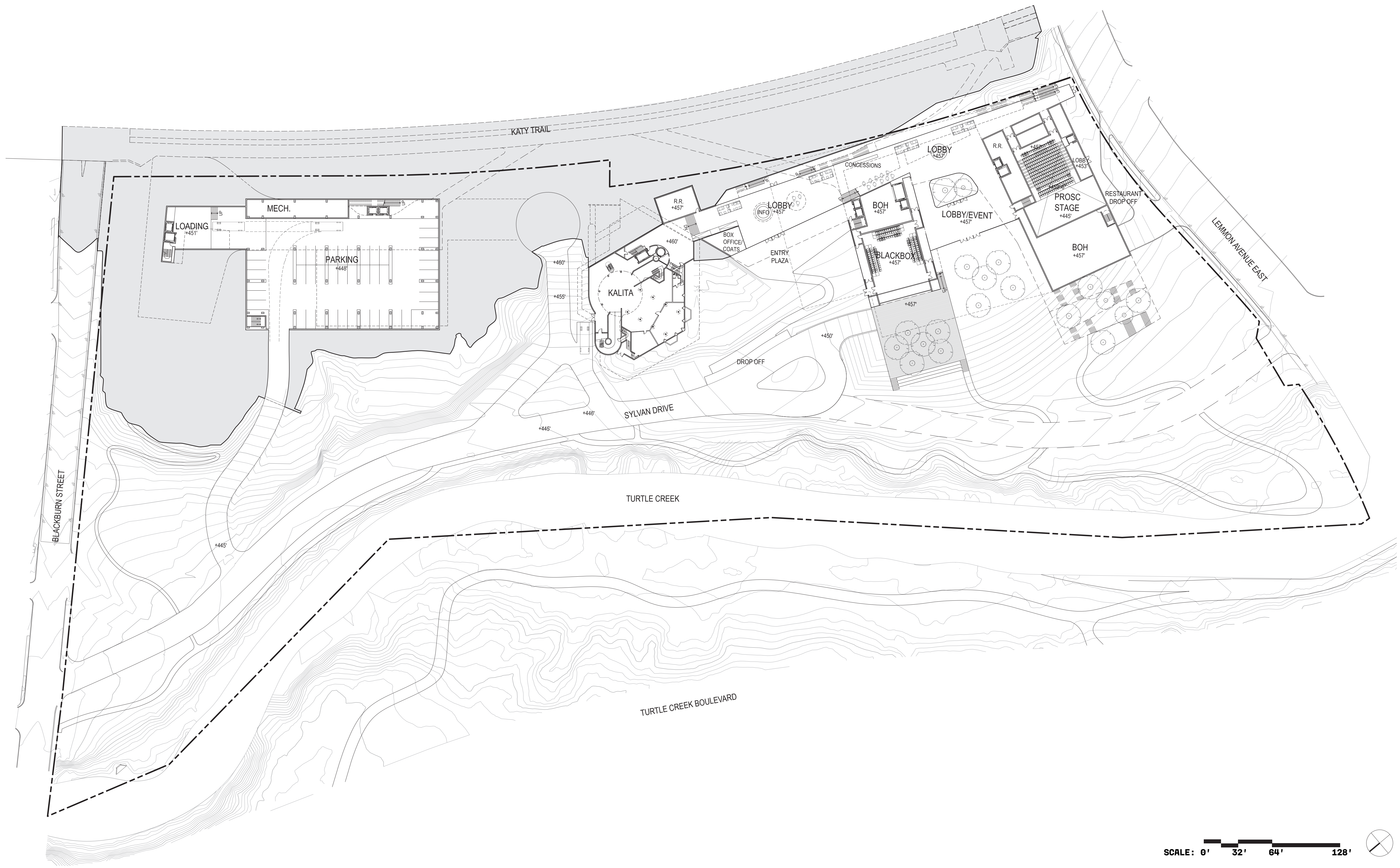
Diller Scofidio + Renfro New York, NY	Fisher Dachs Associates New York, NY	Threshold Acoustics LLC Chicago, IL	Reed Hilderbrand LLC Cambridge, MA	Harboe Architects Chicago, IL	Silman Engineering New York, NY	BOKAPowell Dallas, TX	Syska Hennessy Group Los Angeles, CA	Pacheco Koch Dallas, TX

LOADING AND PARKING LEVEL

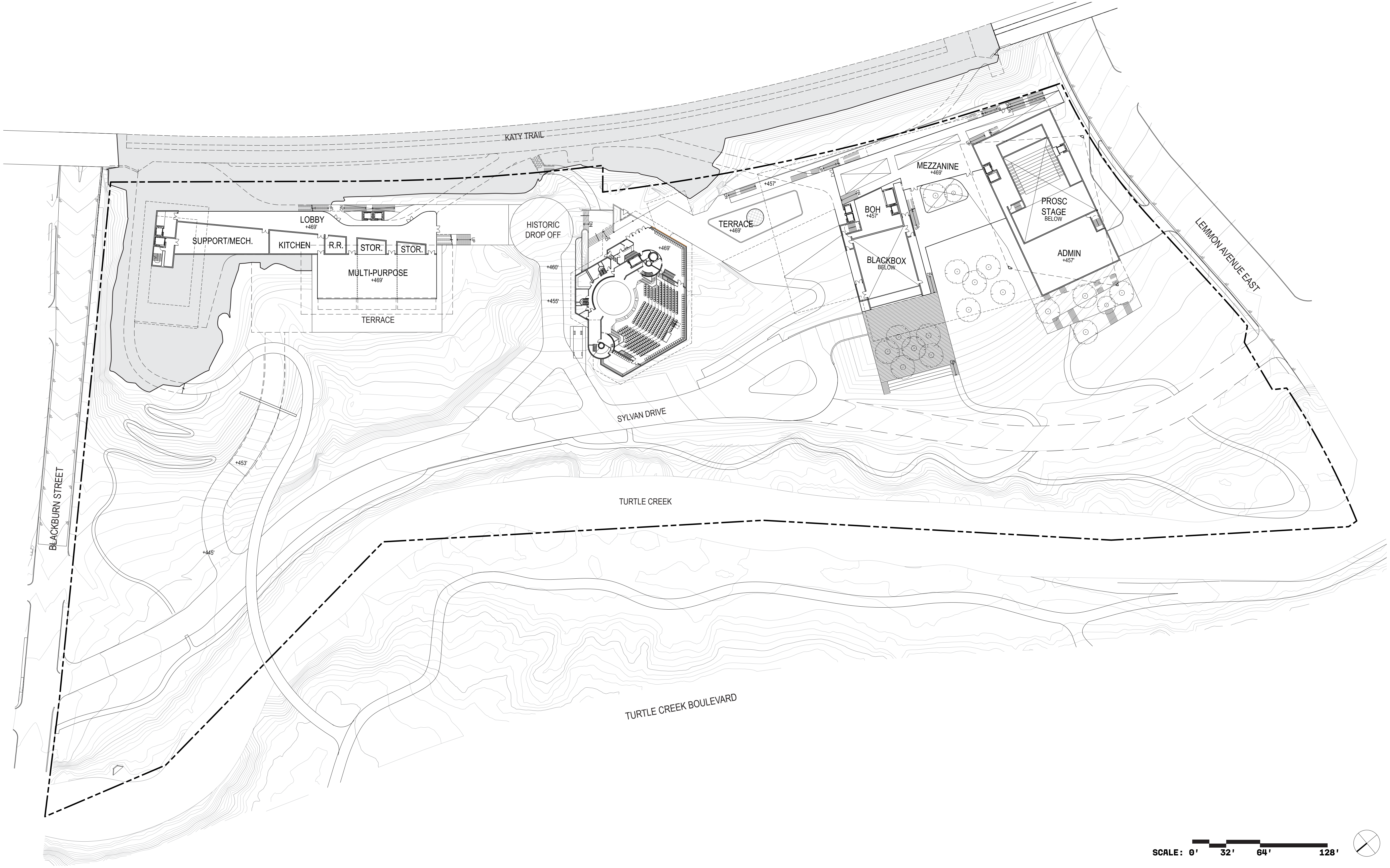


LL 1-3: TYPICAL PARKING LEVEL

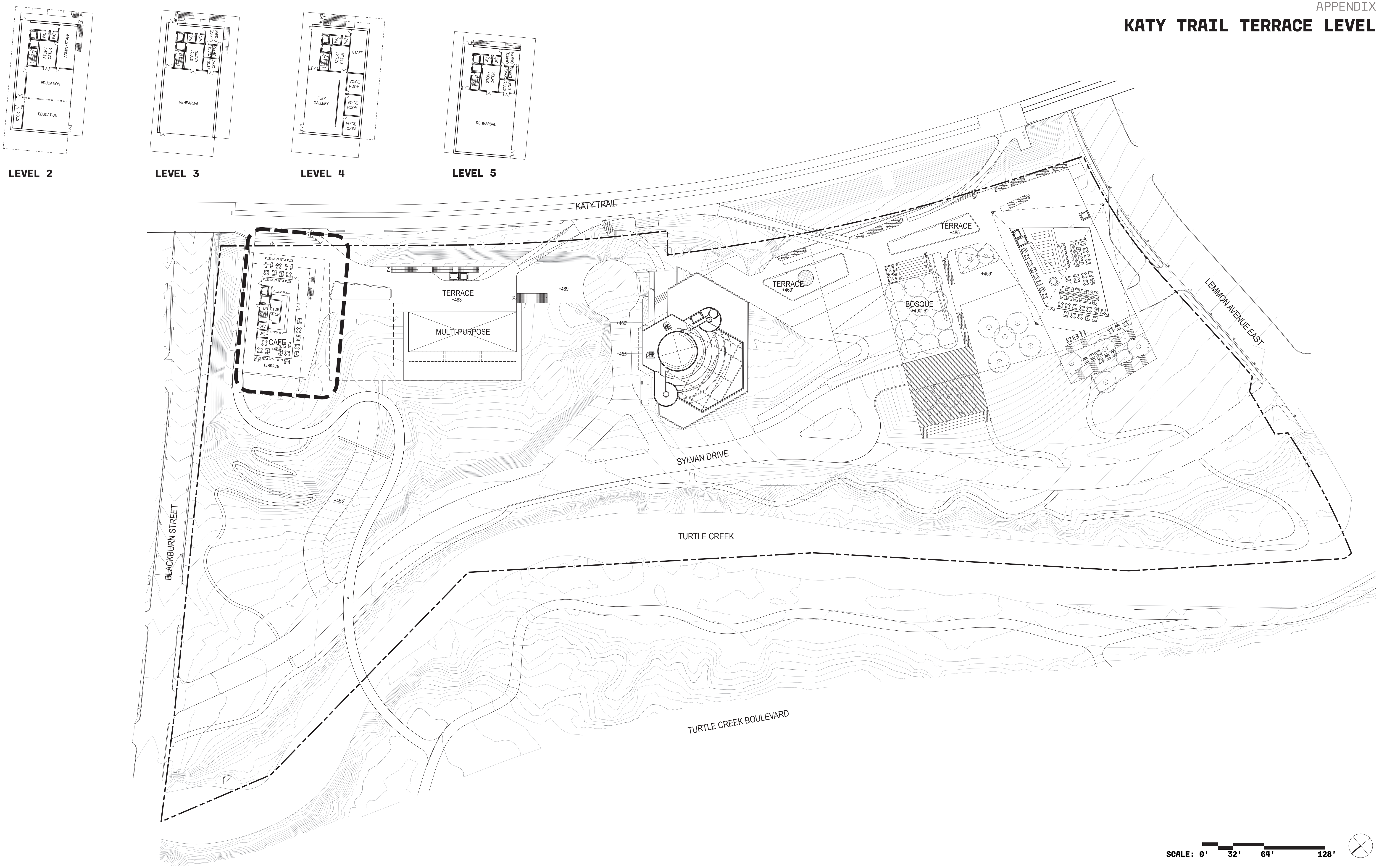
LOBBY AND NORTH PARKING LEVEL



KALITA LOBBY AND TERRACE LEVEL

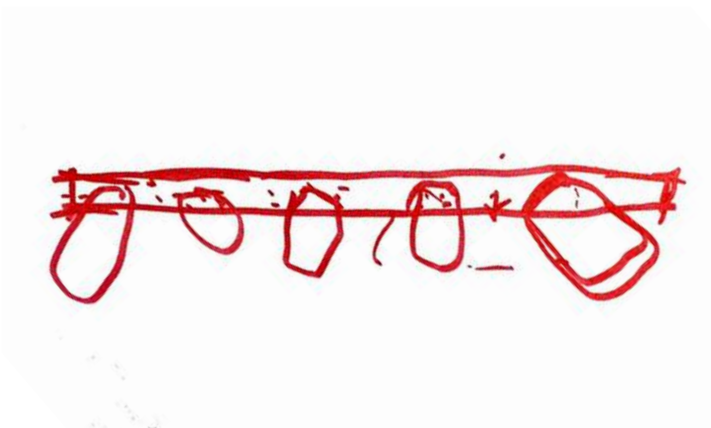


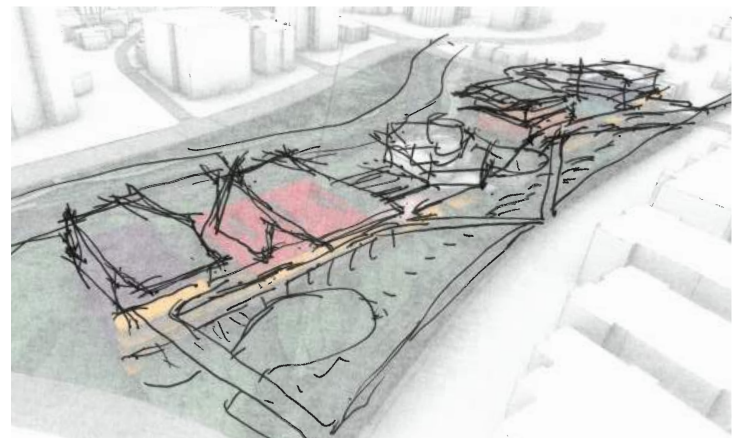
KATY TRAIL TERRACE LEVEL

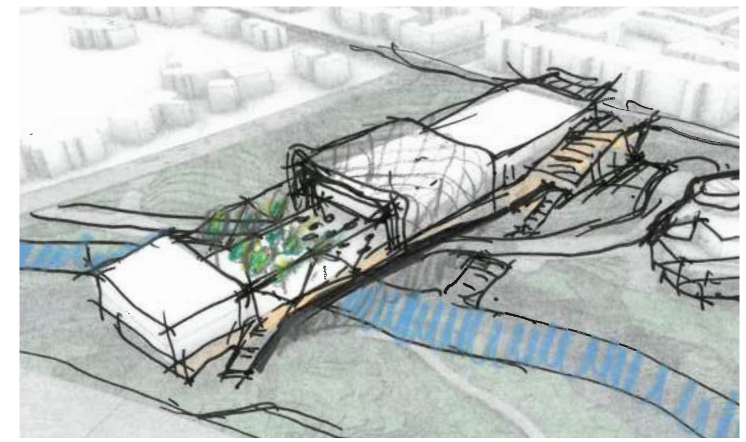


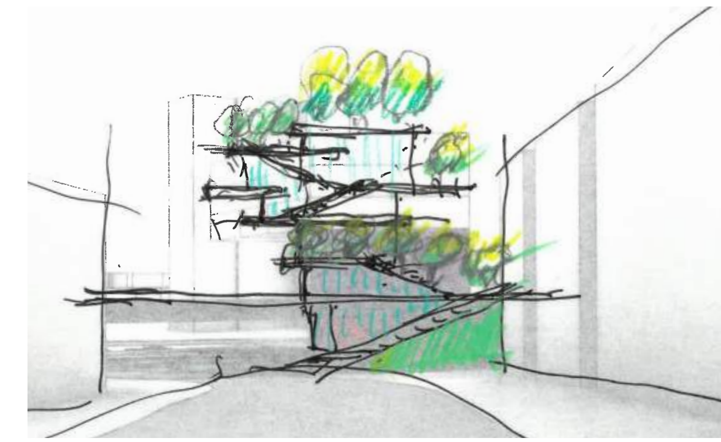
Diller Scofidio + Renfro New York, NY	Fisher Dachs Associates New York, NY	Threshold Acoustics LLC Chicago, IL	Reed Hilderbrand LLC Cambridge, MA	Harboe Architects Chicago, IL	Silman Engineering New York, NY	BOKAPowell Dallas, TX	Syska Hennessy Group Los Angeles, CA	Pacheco Koch Dallas, TX

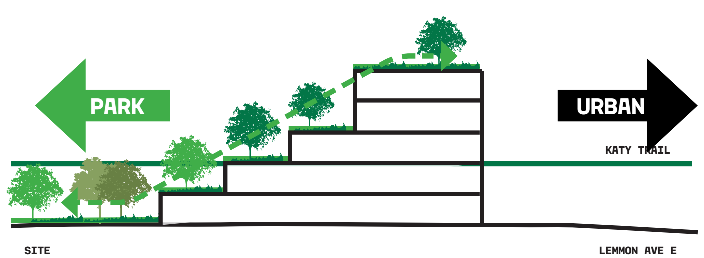
SKETCHES







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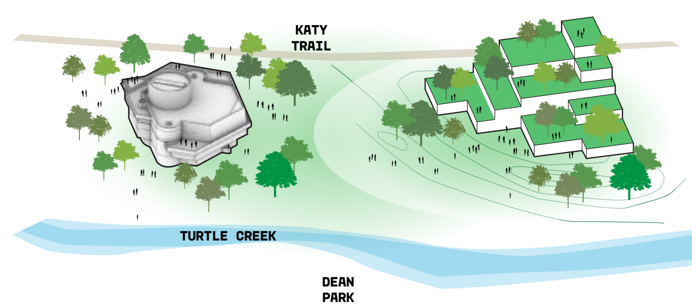
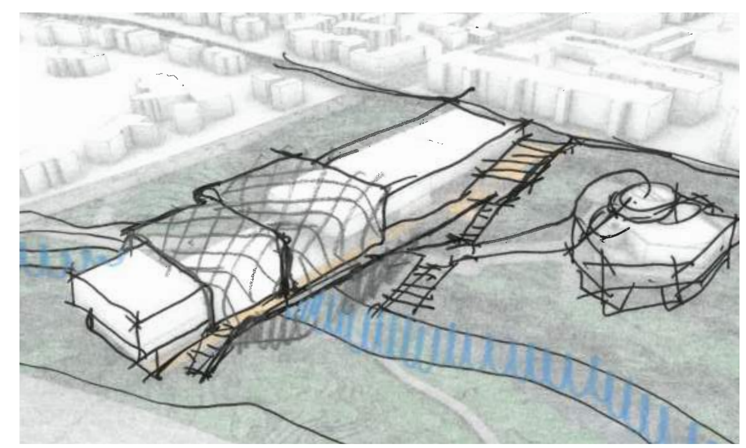
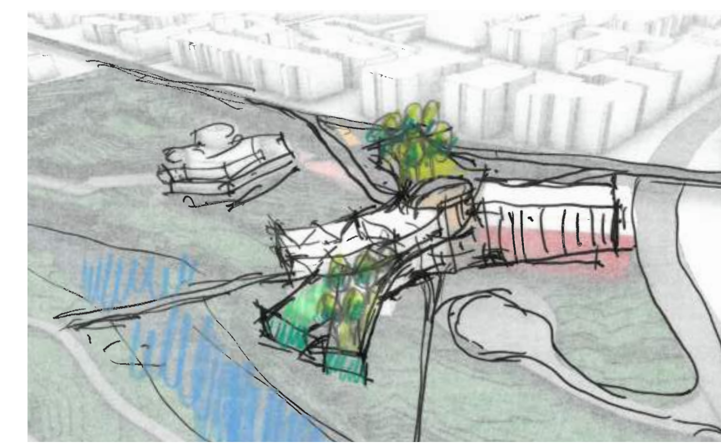
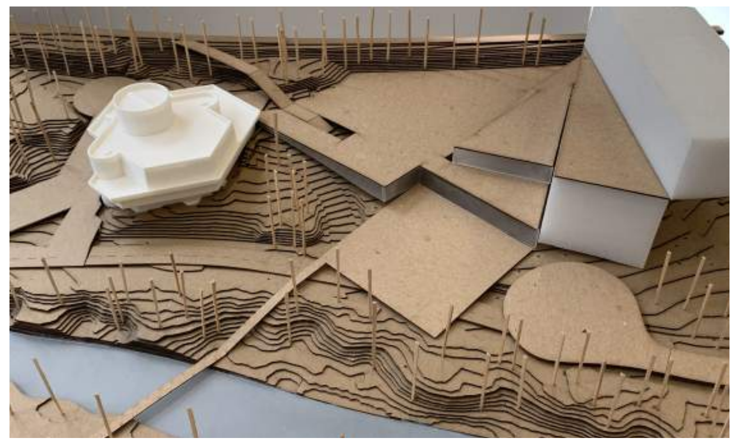
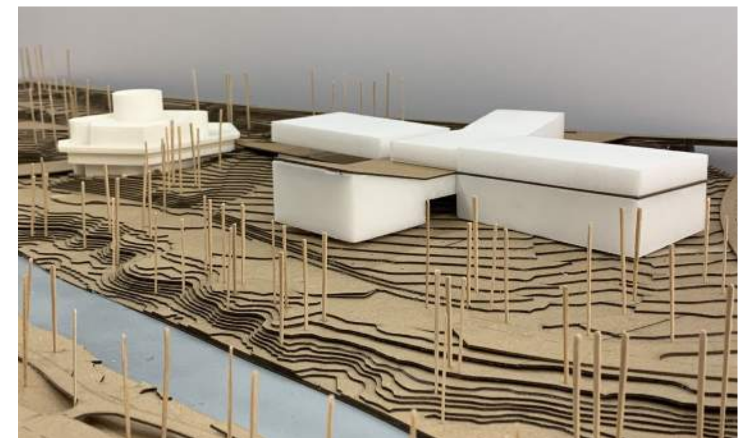
URBAN
KATY TRAIL
SITE
LEMMON AVE E

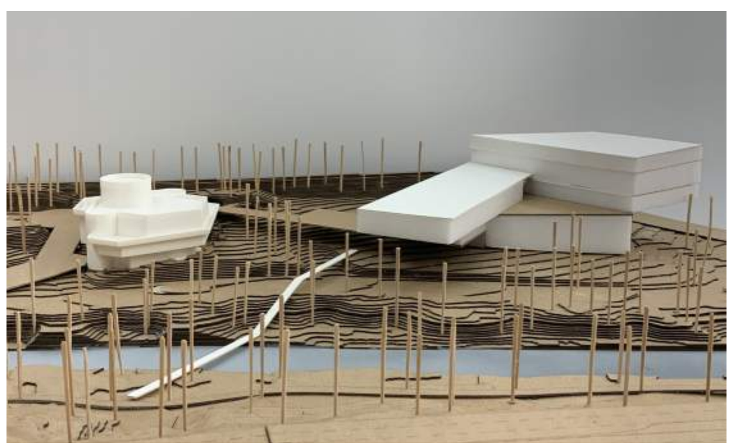
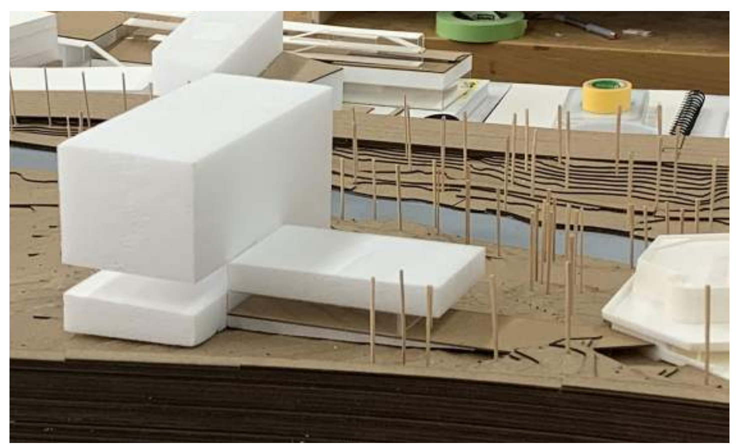
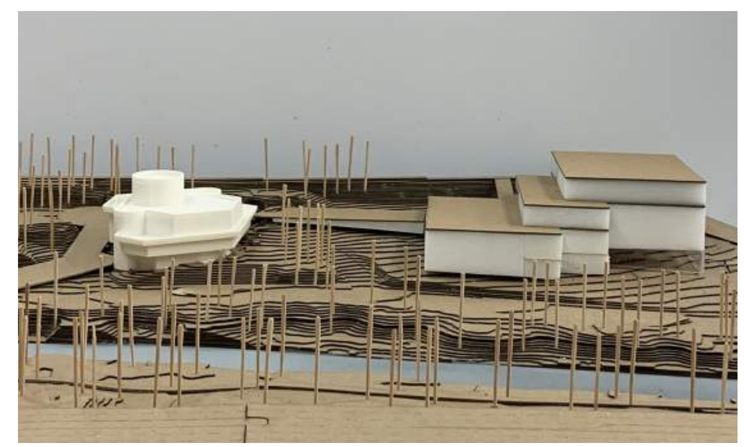

KATY TRAIL
TURTLE CREEK
DEAN PARK





STUDY MODELS

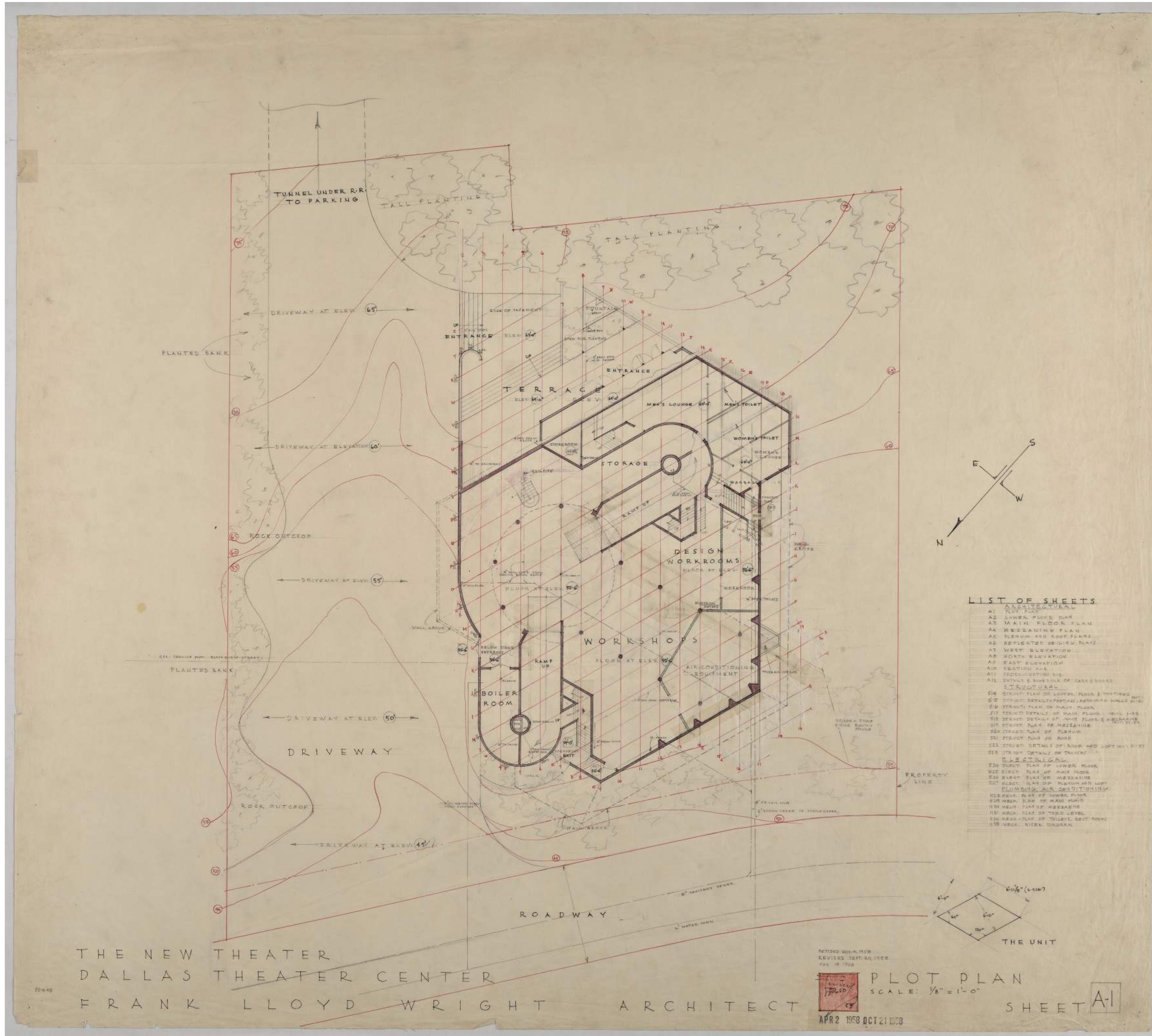





Diller Scofidio + Renfro New York, NY	Fisher Dachs Associates New York, NY	Threshold Acoustics LLC Chicago, IL	Reed Hilderbrand LLC Cambridge, MA	Harboe Architects Chicago, IL	Silman Engineering New York, NY	BOKAPowell Dallas, TX	Syska Hennessy Group Los Angeles, CA	Pacheco Koch Dallas, TX

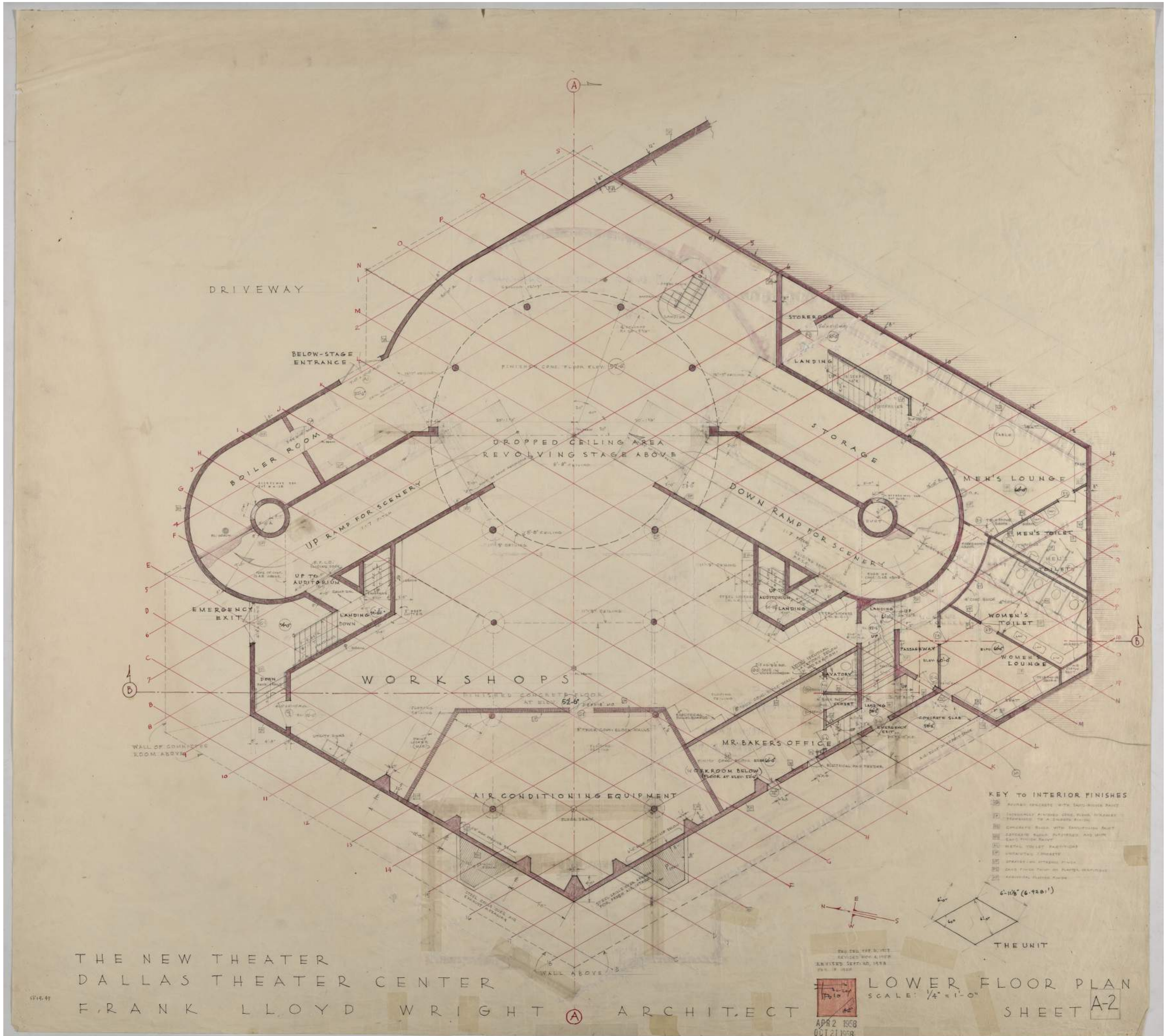
ORIGINAL 1959 DRAWINGS

1959 CONSTRUCTION DRAWINGS

Frank Lloyd Wright



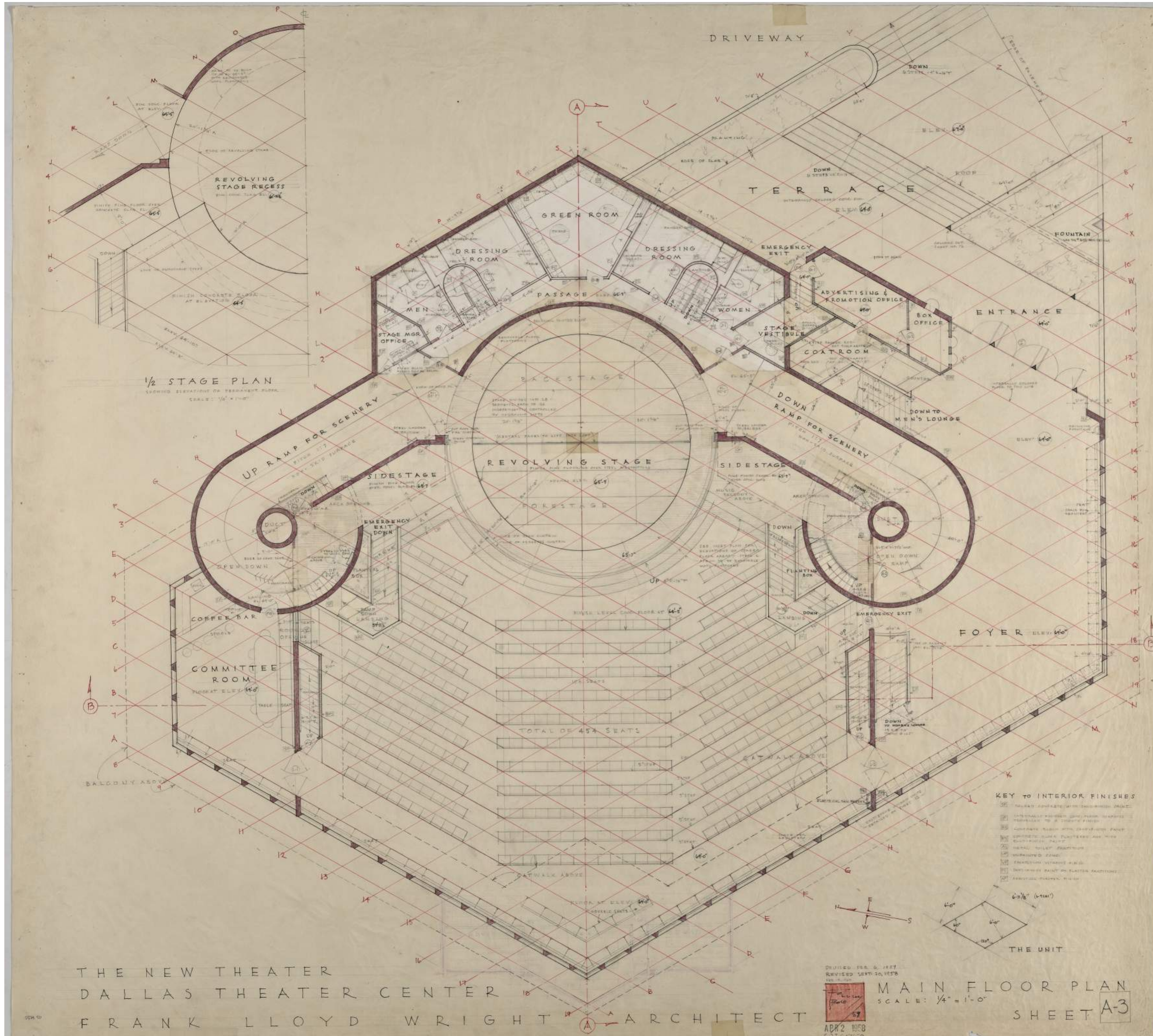
PLOT PLAN



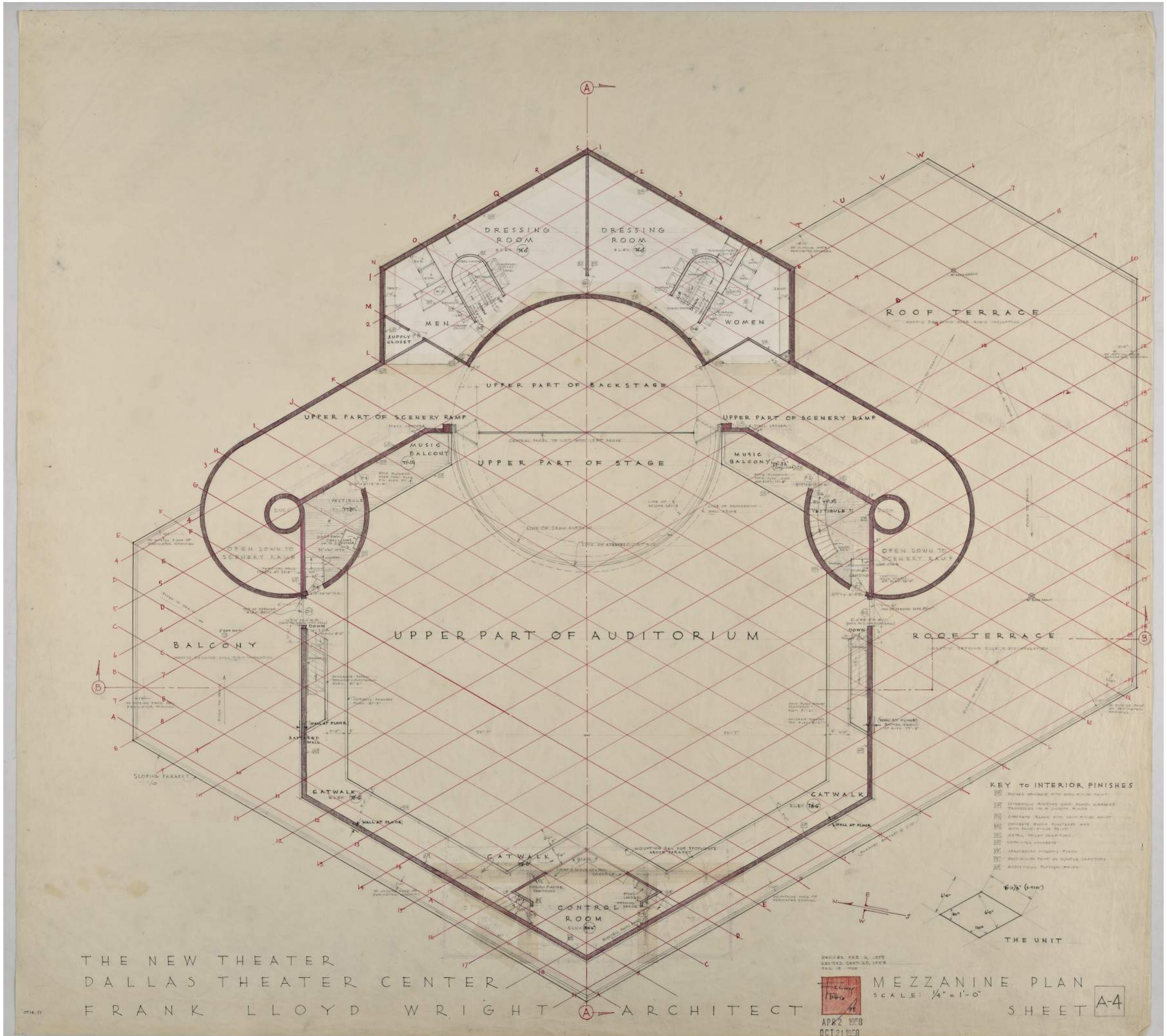
LOWER FLOOR PLAN

1959 CONSTRUCTION DRAWINGS

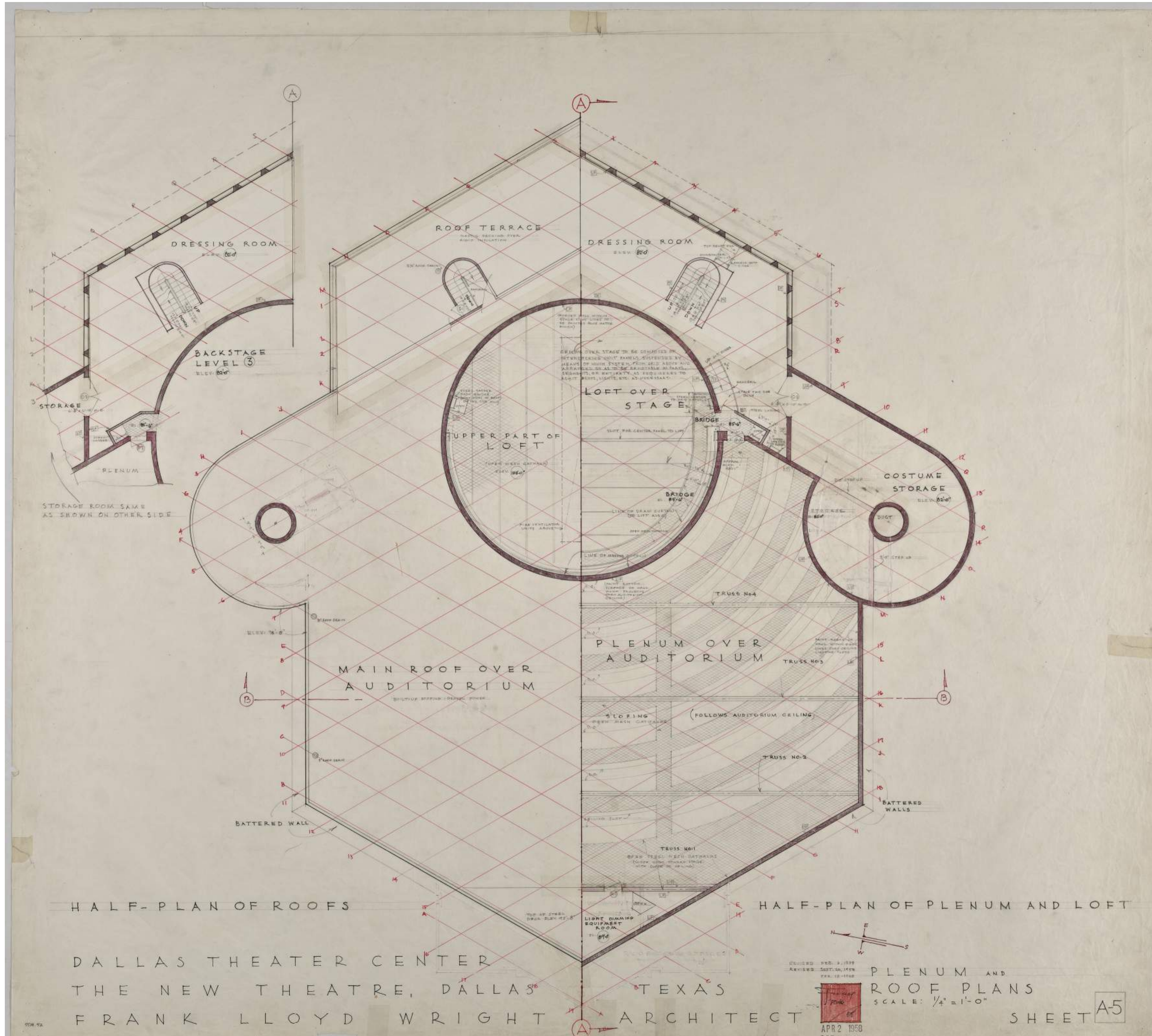
Frank Lloyd Wright



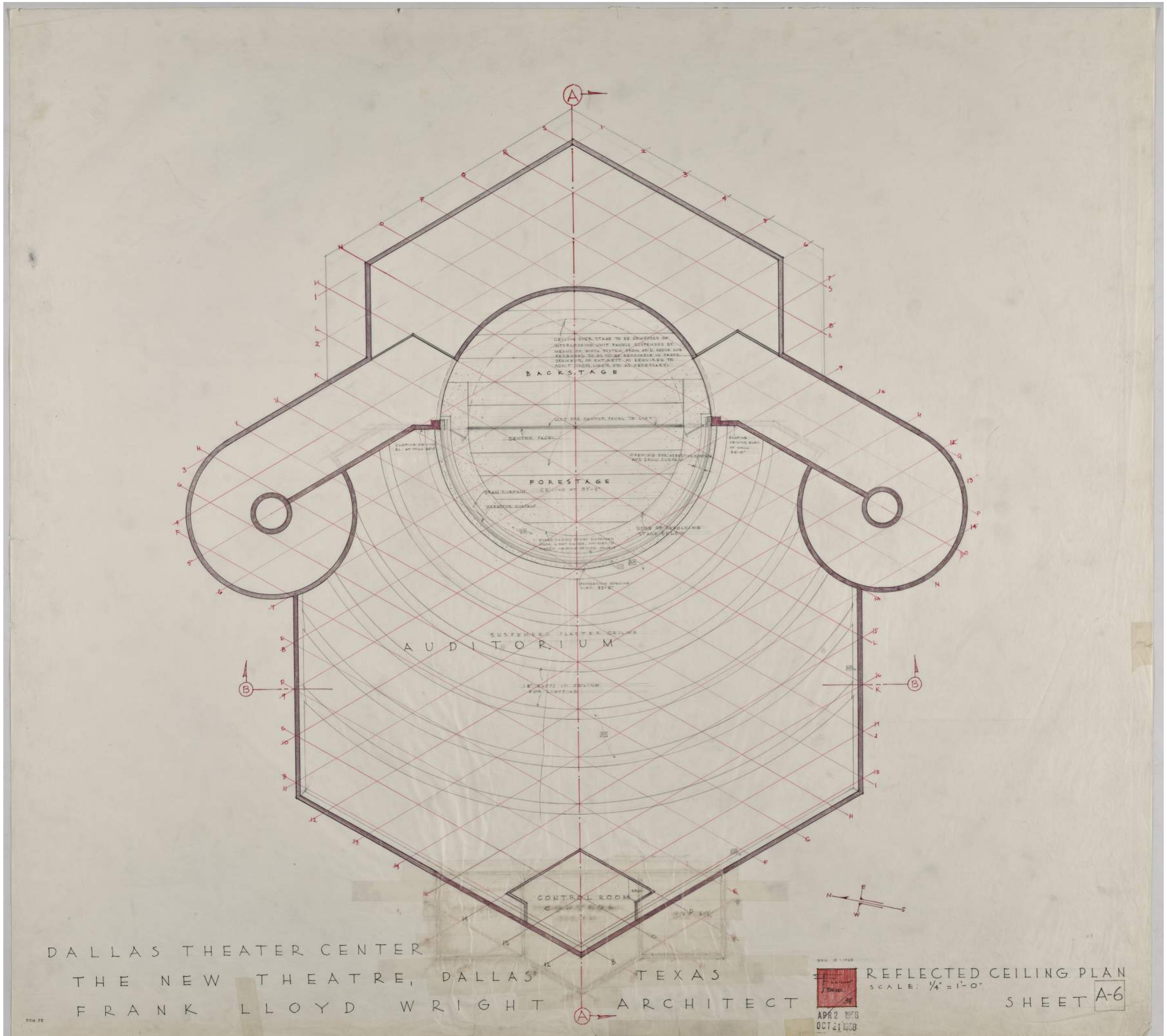
MAIN FLOOR PLAN



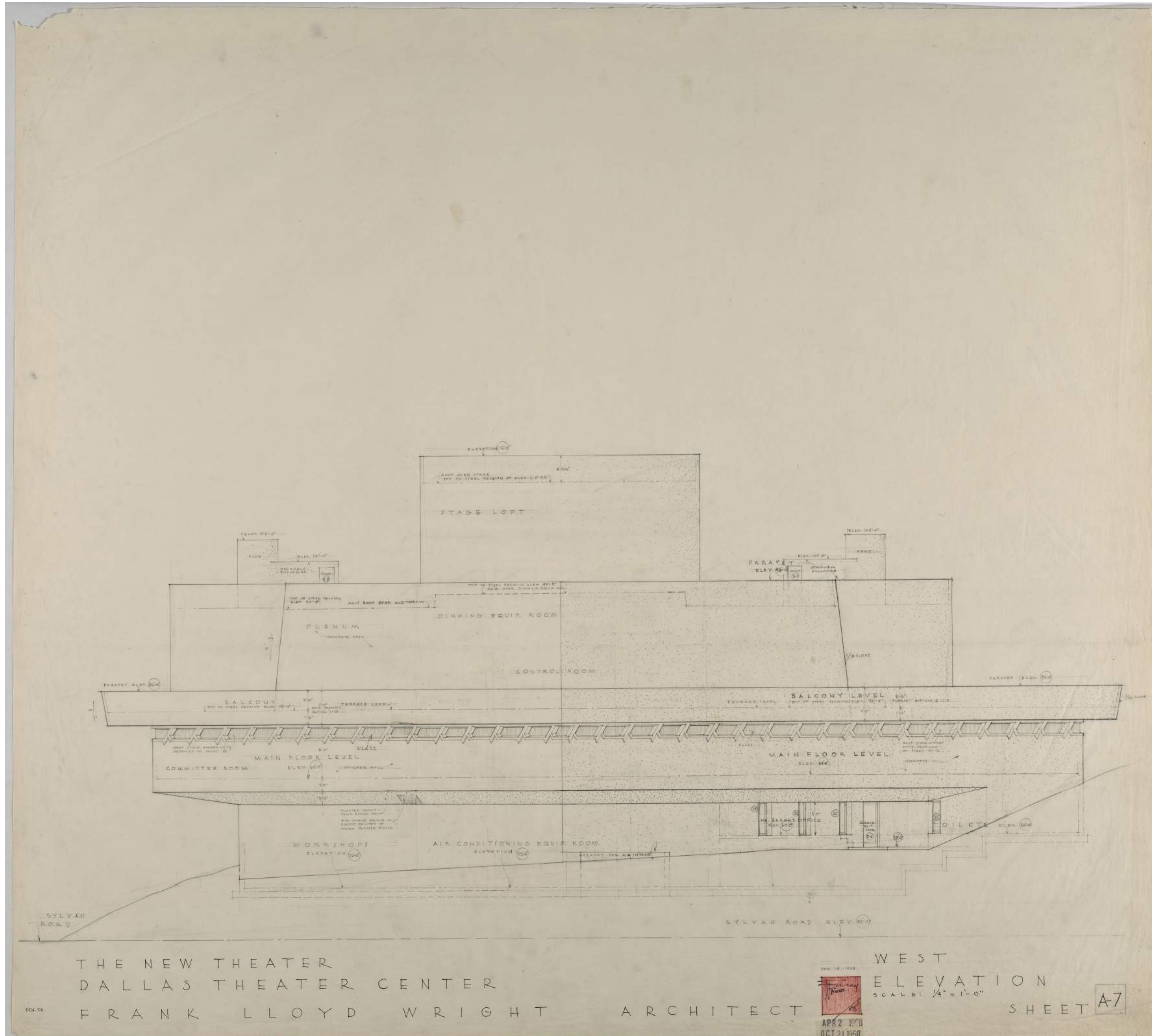
MEZZANINE PLAN



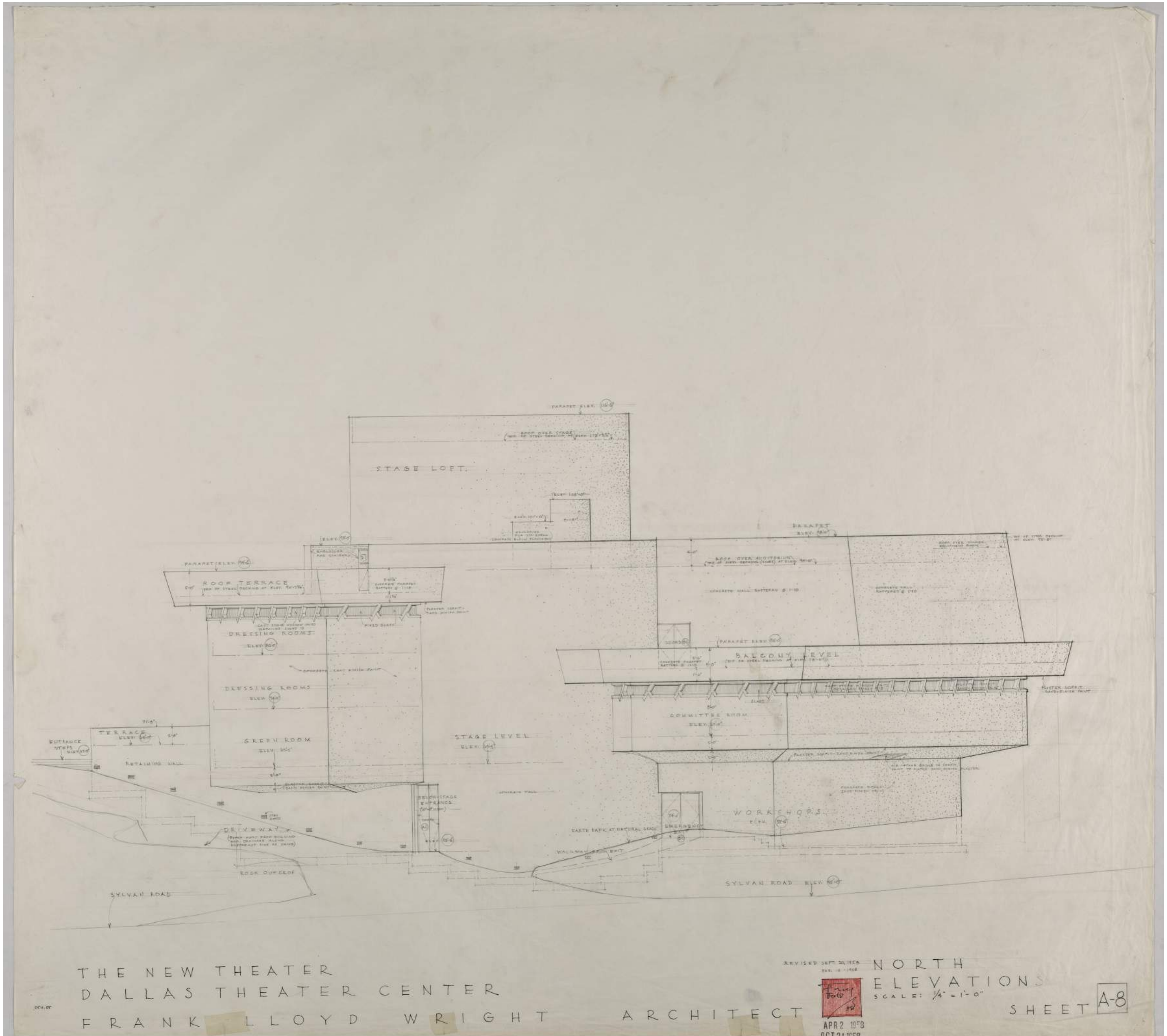
PLENUM + ROOF PLAN



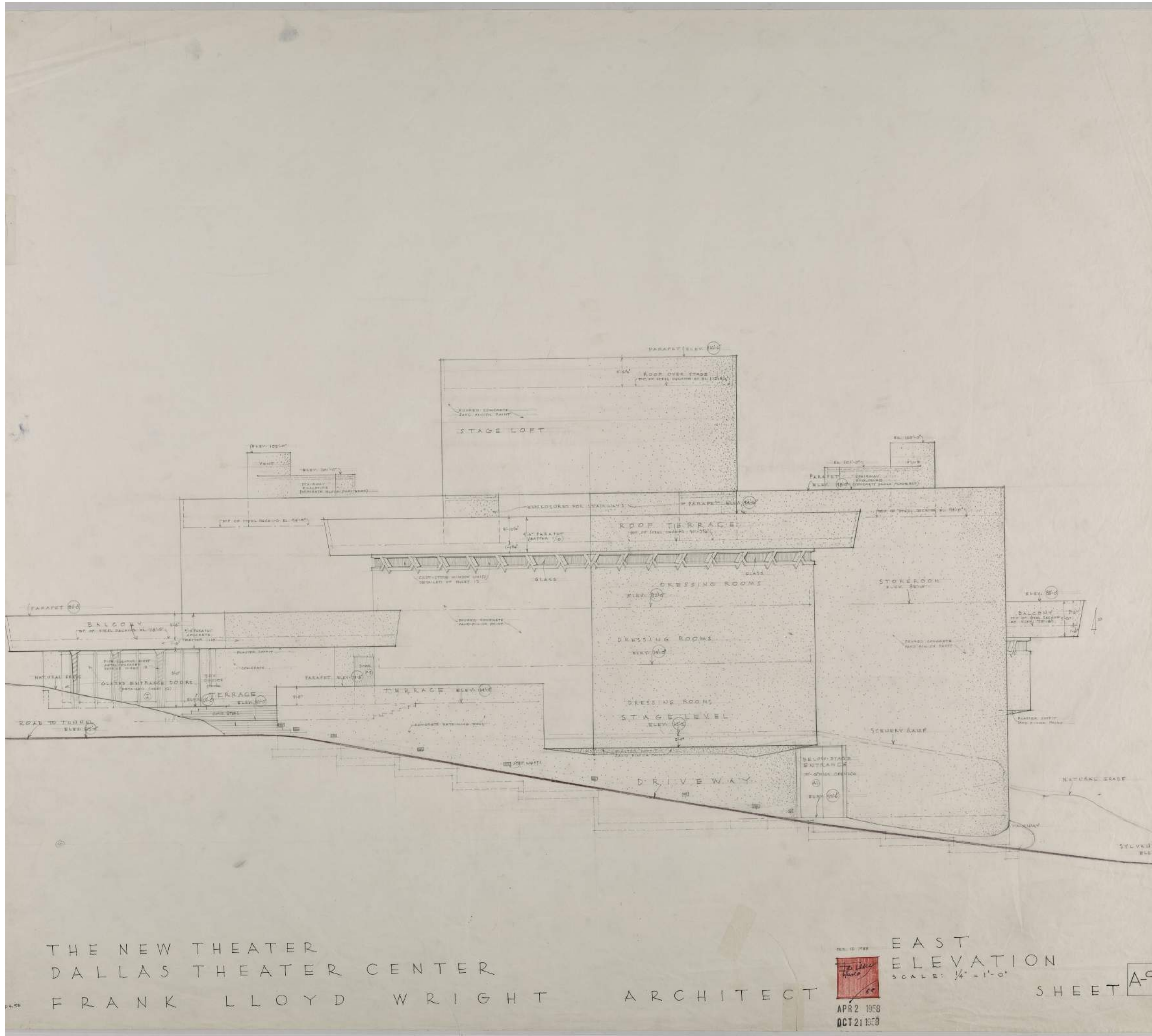
REFLECTED CEILING PLAN



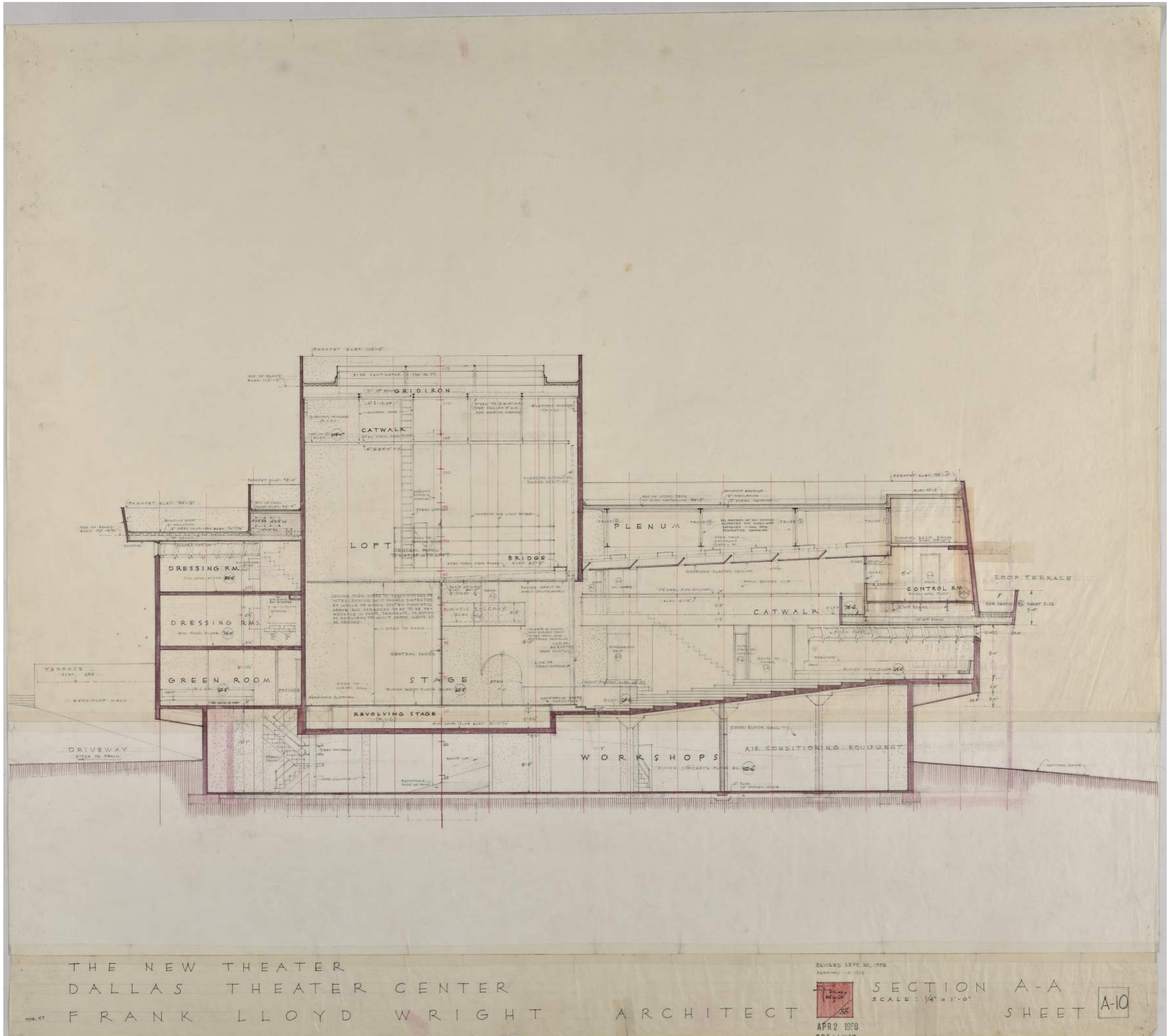
WEST ELEVATION



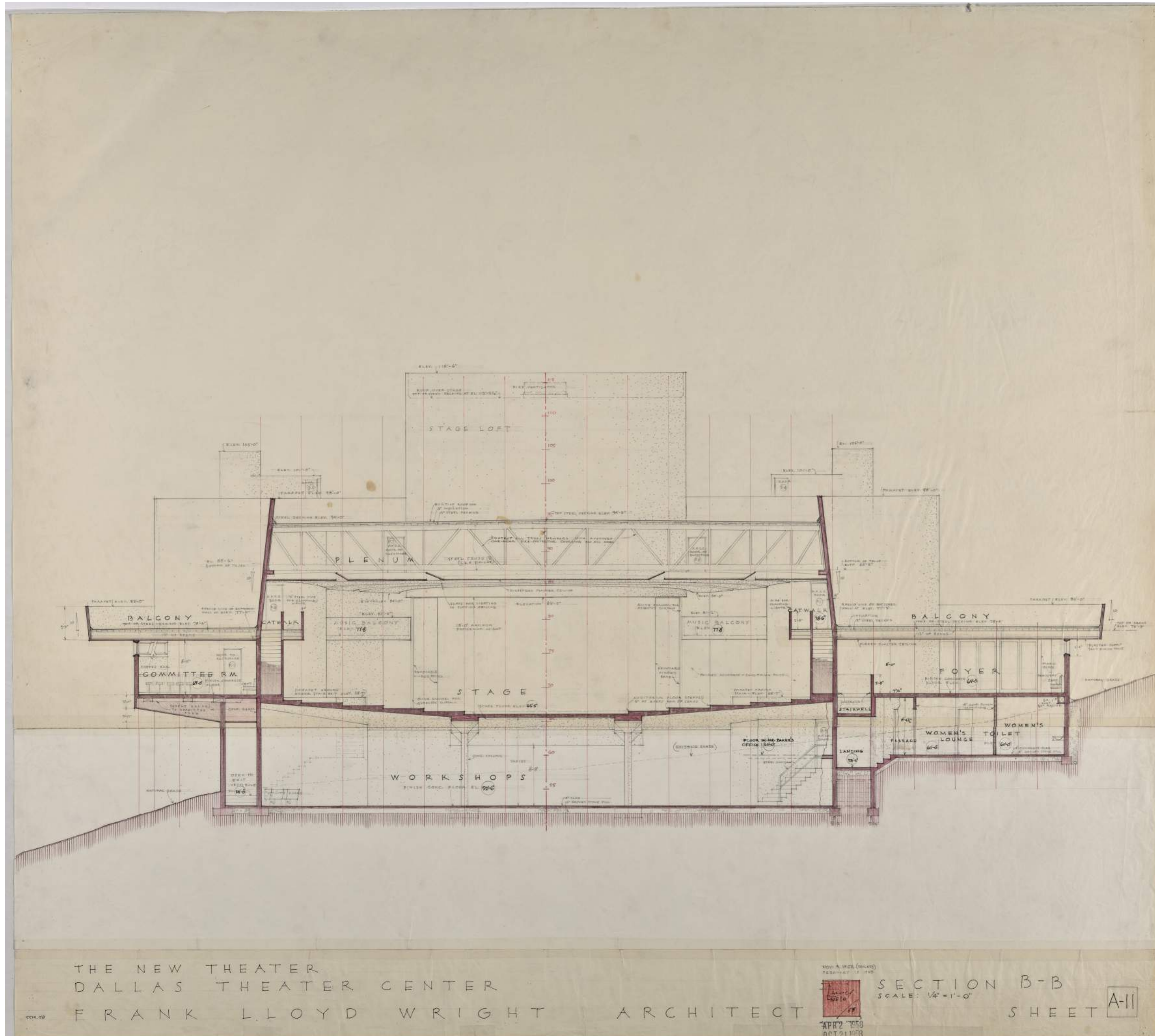
NORTH ELEVATION



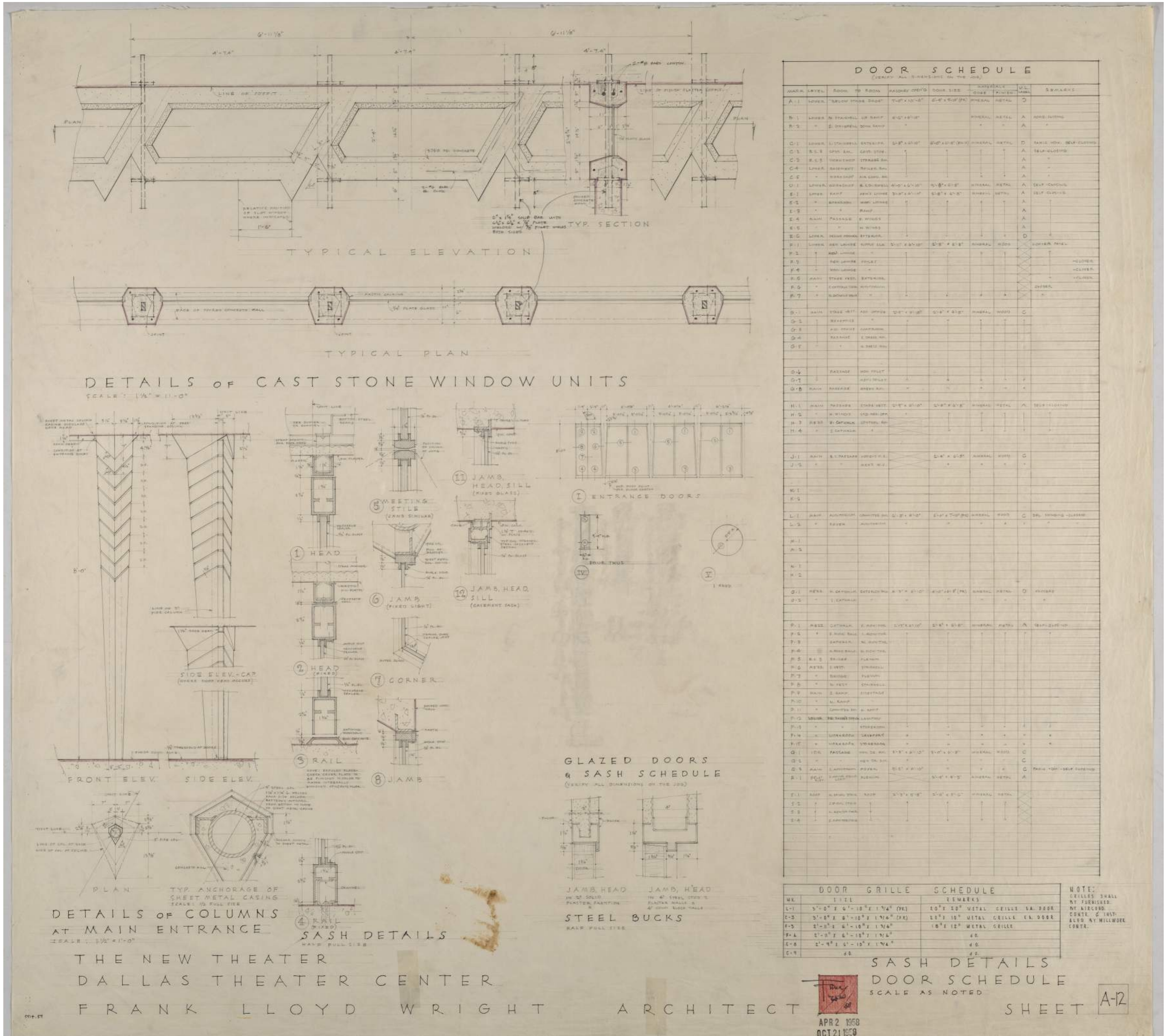
EAST ELEVATION


GRIDIRON
CATWALK
LOFT
BRIDGE
PLENUM
DRESSING RM.
DRESSING RMS.
GREEN ROOM
STAGE
REVOLVING STAGE
MUSIC BALCONY
CATWALK
CONTROL RM.
ROOF TERRACE
TERRACE
DRIVEWAY
WORKSHOPS
AIR CONDITIONING EQUIPMENT
THE NEW THEATER
DALLAS THEATER CENTER
FRANK LLOYD WRIGHT ARCHITECT
SECTION A-A
SCALE: 1/4" = 1'-0"
SHEET
A-10
APR 2 1959
OCT 21 1958

SECTION A-A


STAGE LOFT
PLENUM
BALCONY
CATWALK
MUSIC BALCONY
COMMITTEE RM.
STAGE
WORKSHOPS
FOYER
STAIRWELL
PASSAGE
WOMEN'S LOUNGE
WOMEN'S TOILET
LANDING
THE NEW THEATER
DALLAS THEATER CENTER
FRANK LLOYD WRIGHT ARCHITECT
SECTION B-B
SCALE: 1/4" = 1'-0"
SHEET
A-11
APR 2 1959
OCT 21 1958

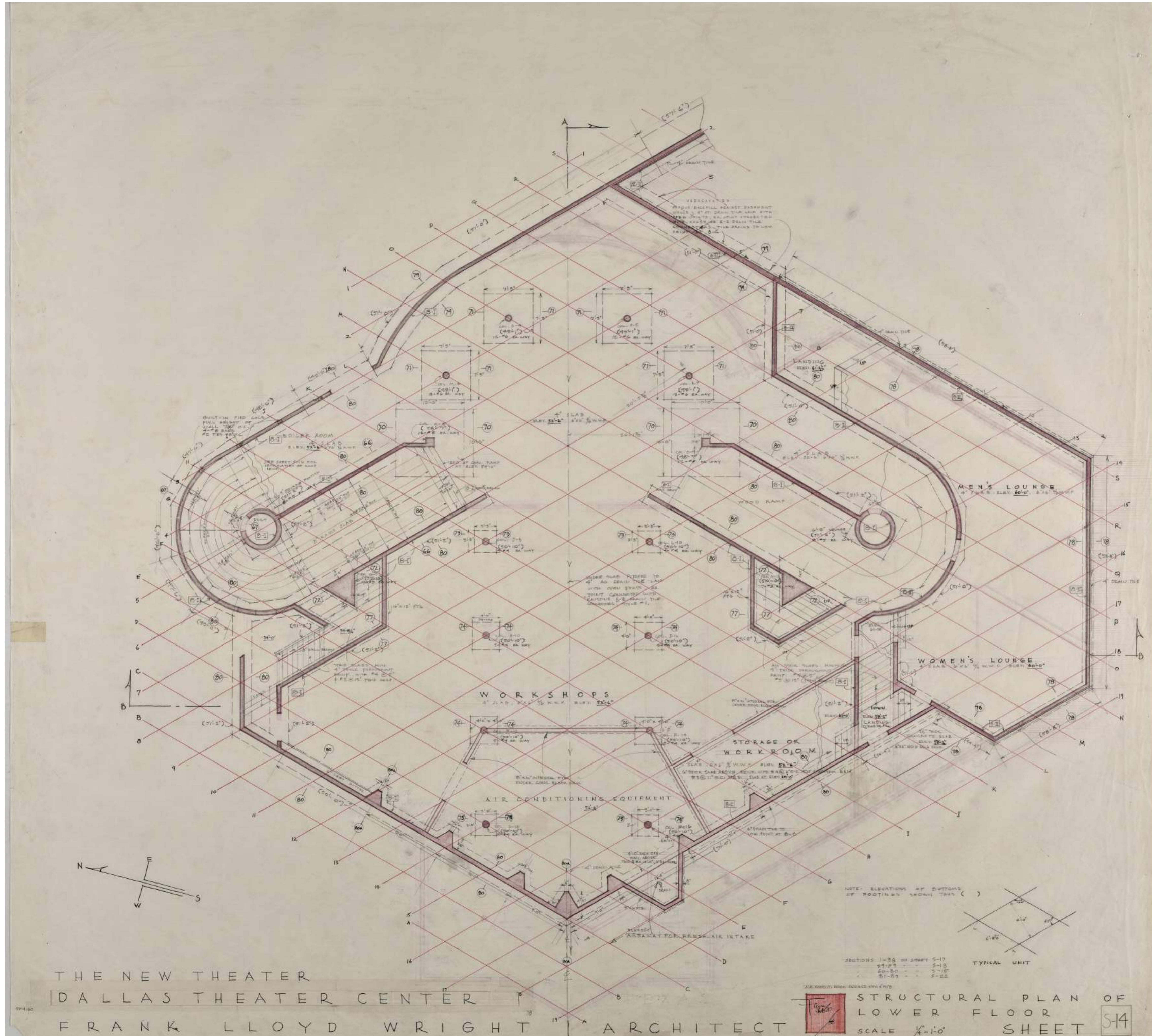
SECTION B-B



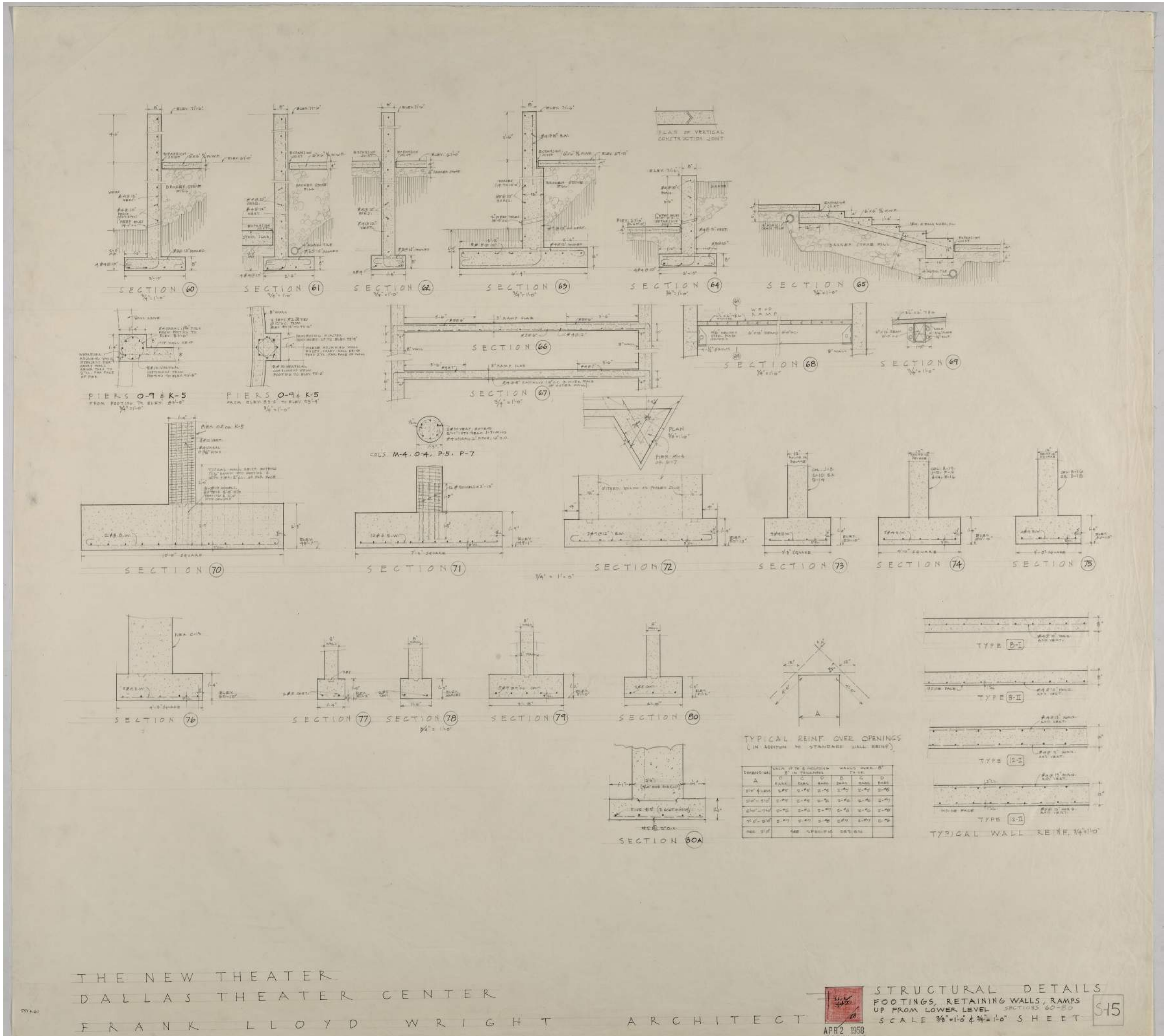
SASH DETAILS & DOOR SCHEDULE

1959 CONSTRUCTION DRAWINGS

Frank Lloyd Wright



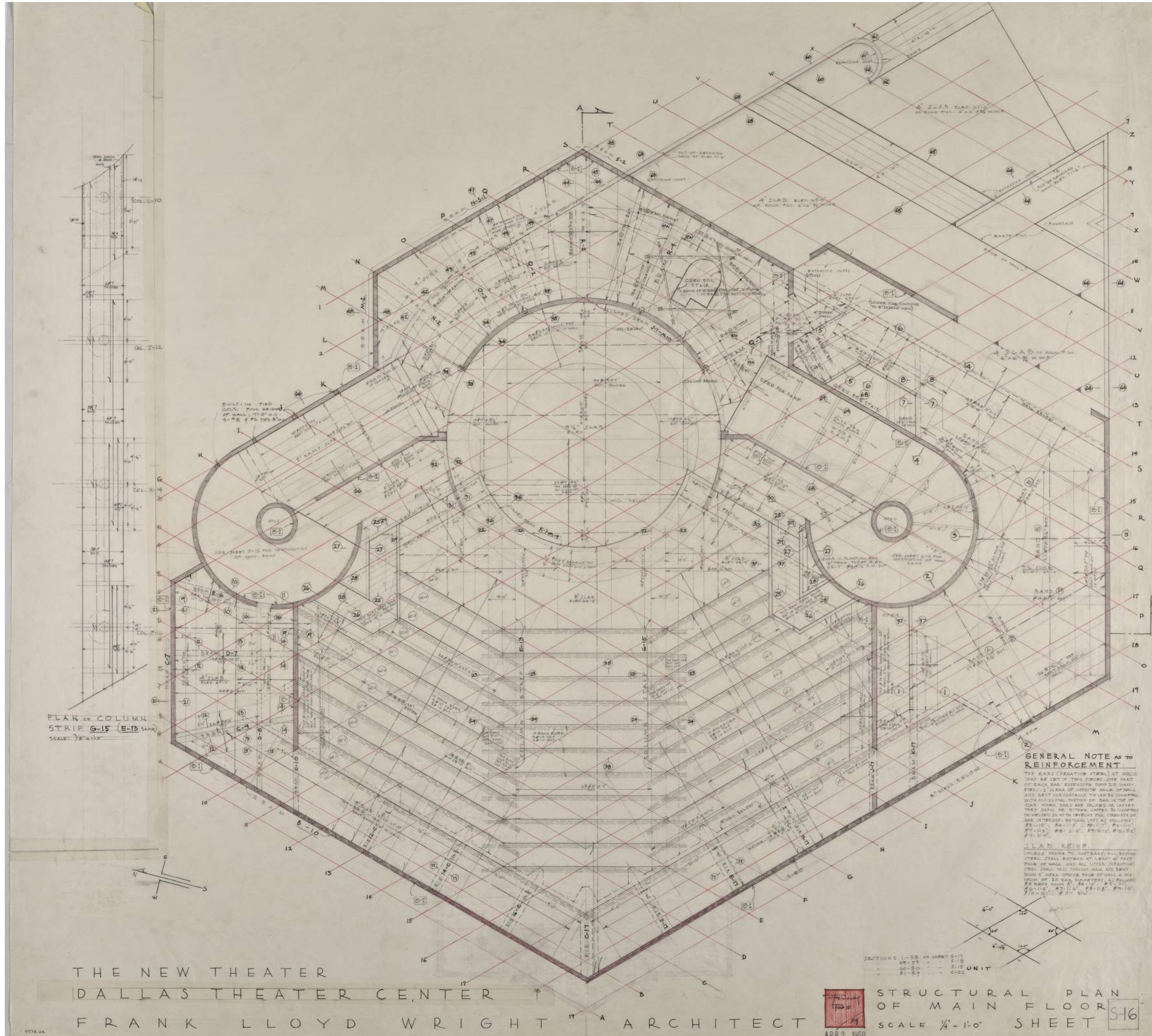
STRUCTURAL PLAN OF LOWER FLOOR



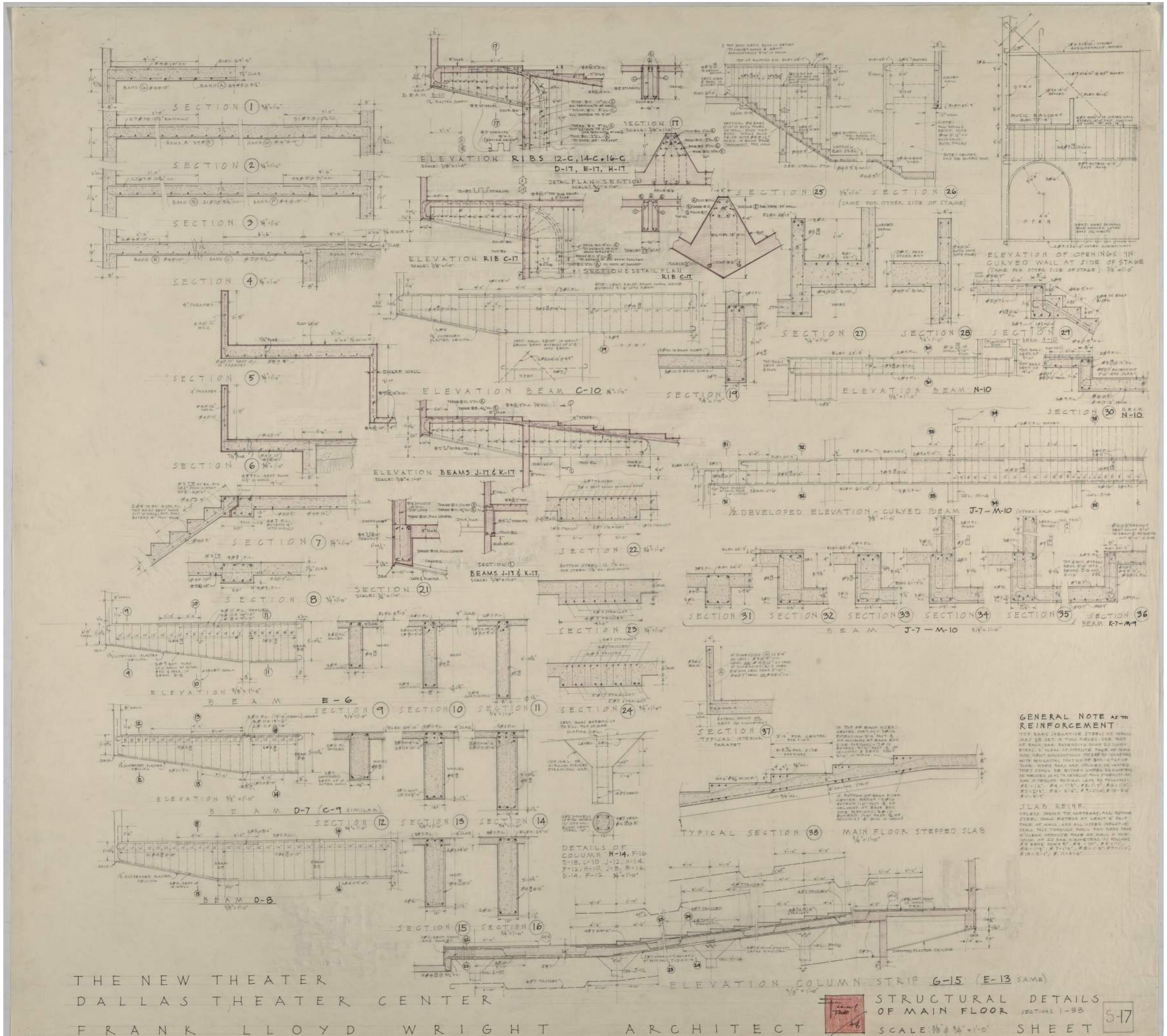
STRUCTURAL DETAILS
FOOTINGS, RETAINING WALLS, RAMPS UP FROM LOWER LEVEL

1959 CONSTRUCTION DRAWINGS

Frank Lloyd Wright



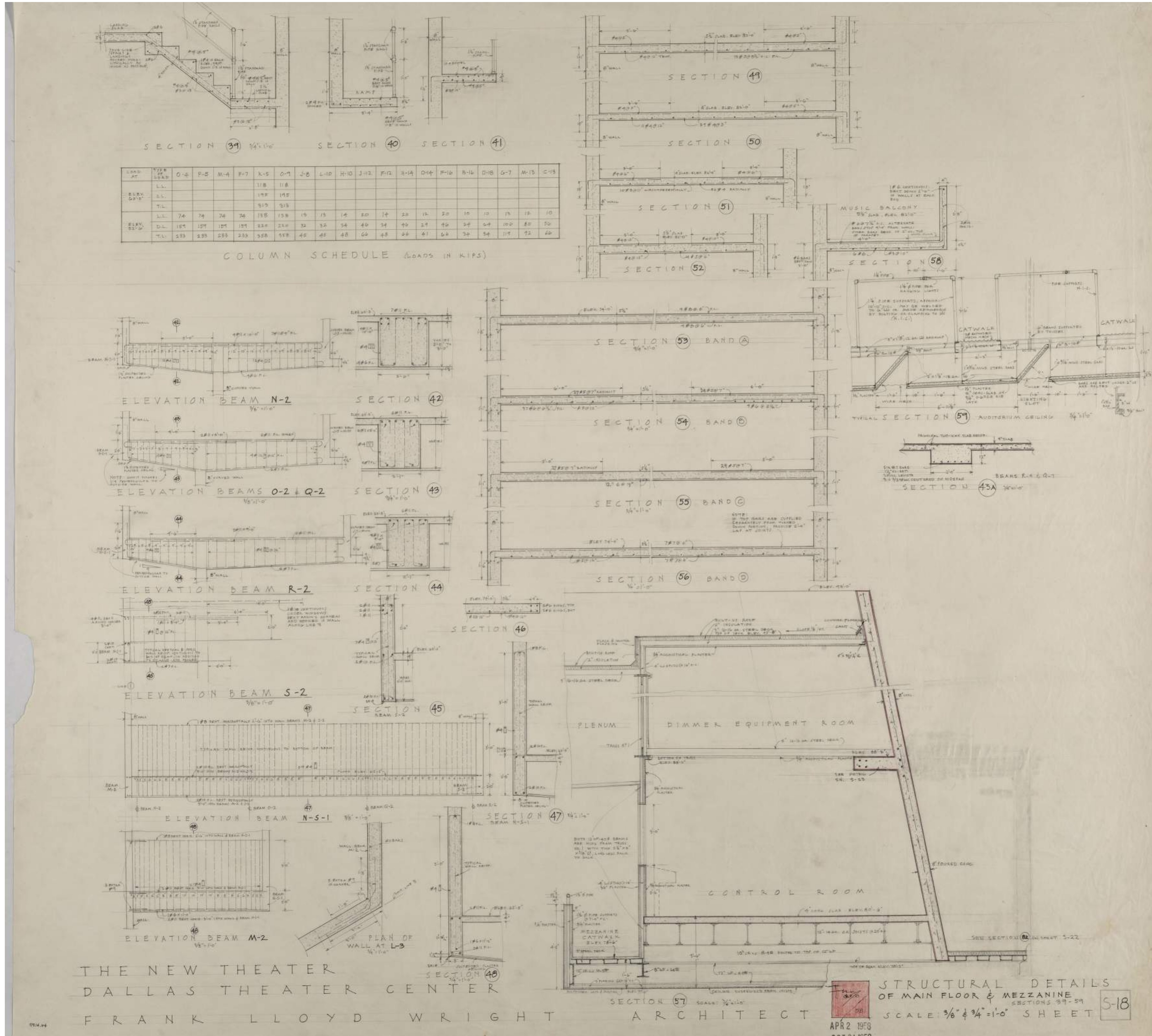
STRUCTURAL PLAN OF MAIN FLOOR



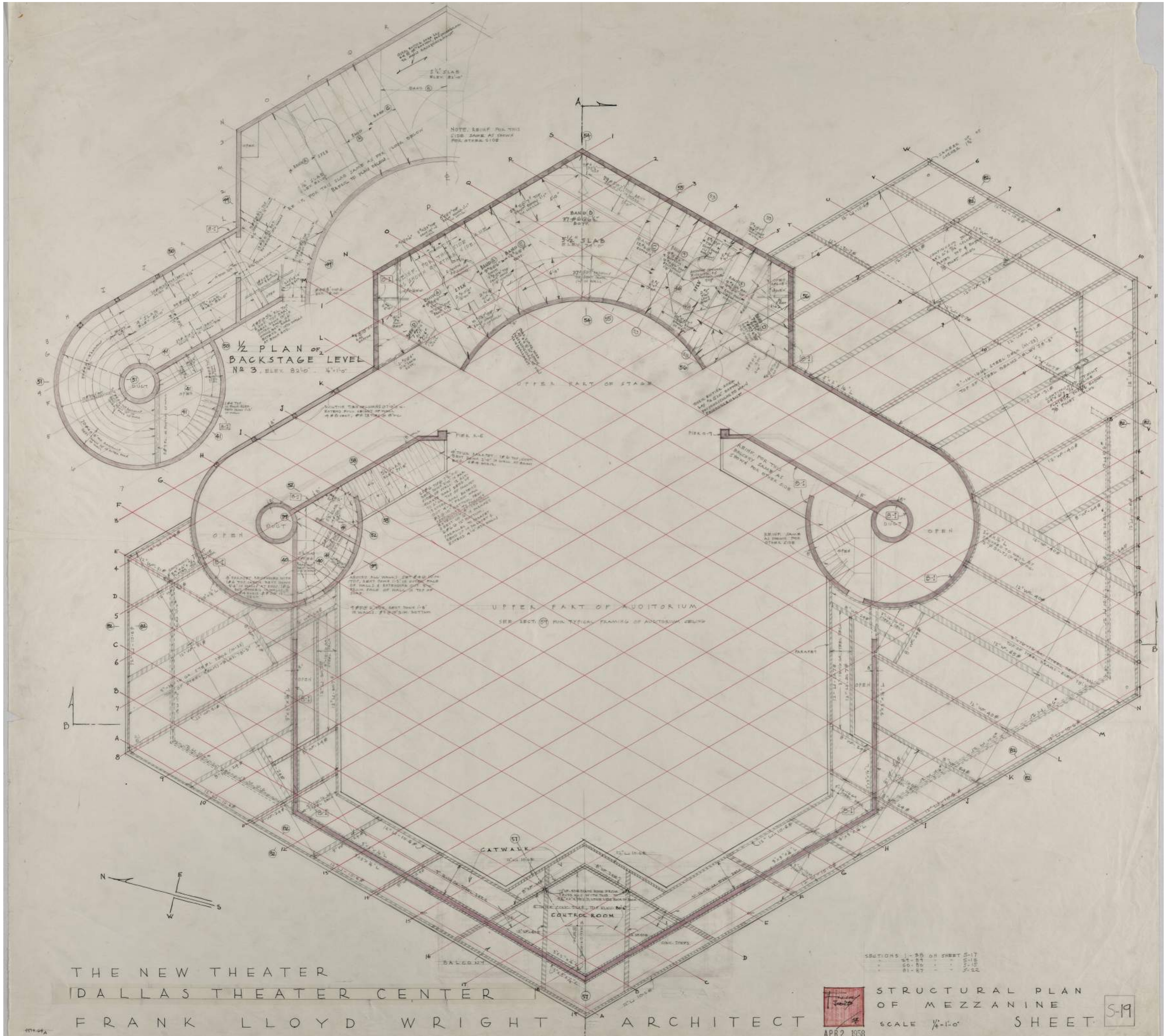
STRUCTURAL DETAILS OF MAIN FLOOR

1959 CONSTRUCTION DRAWINGS

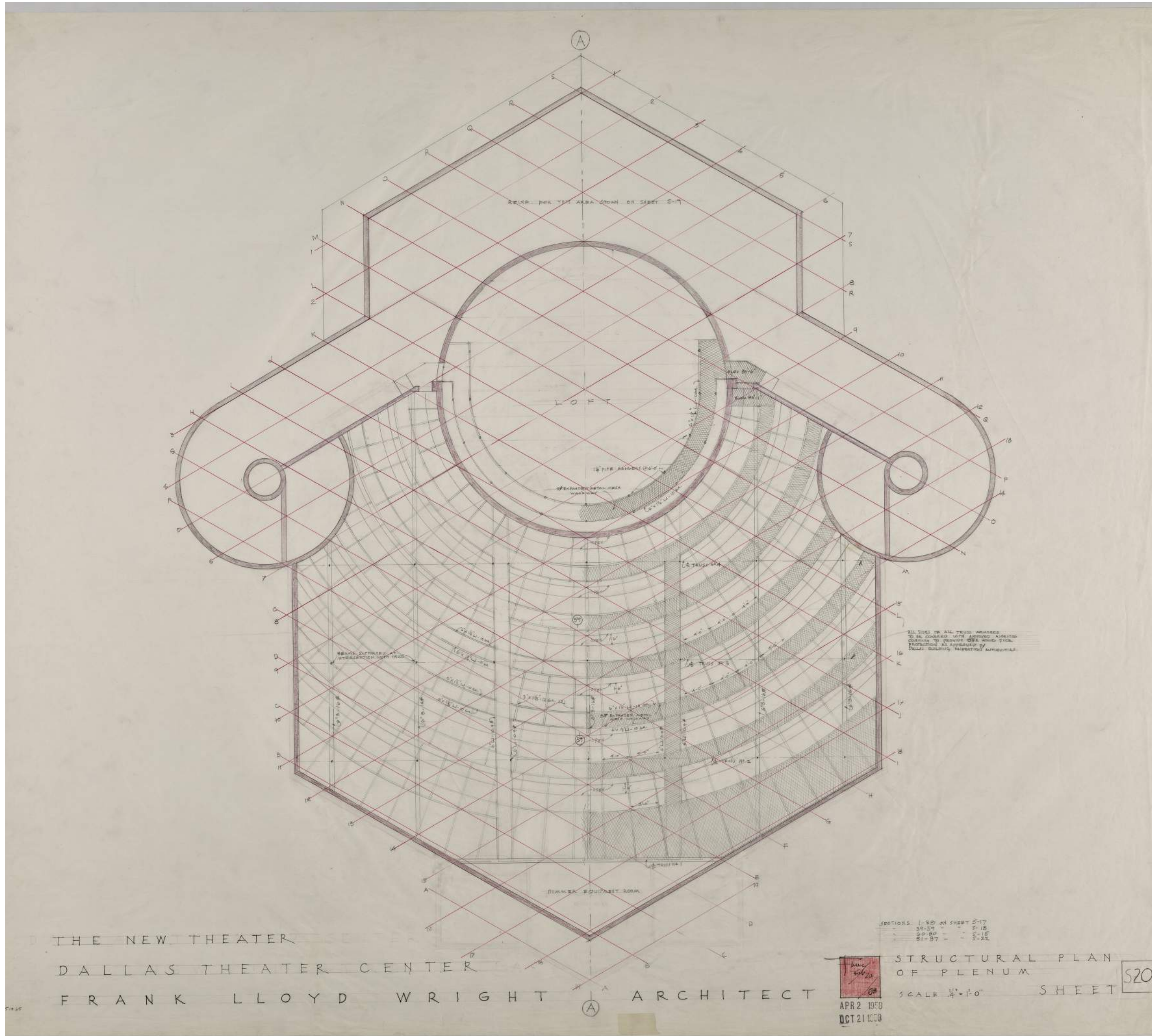
Frank Lloyd Wright



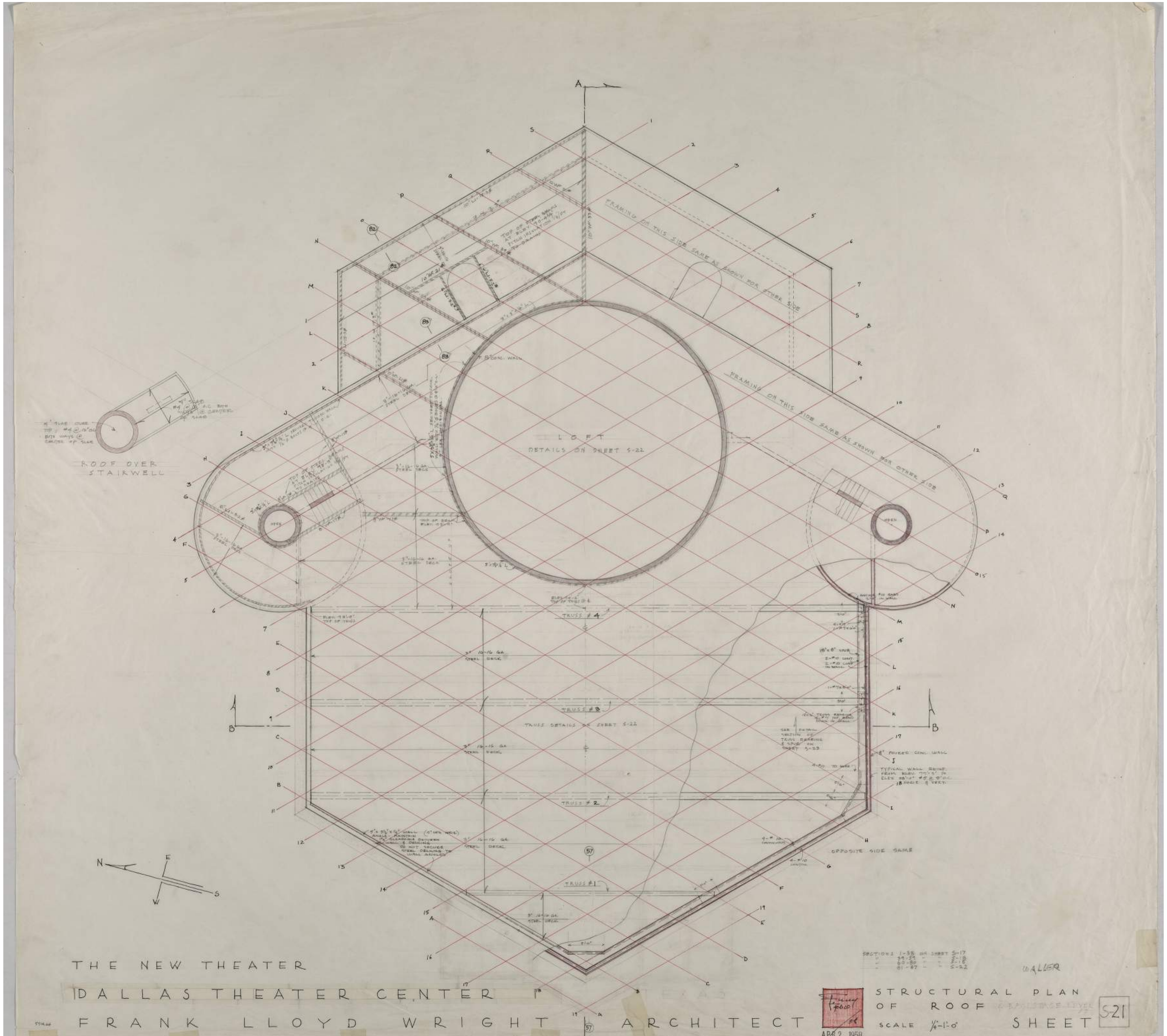
STRUCTURAL DETAILS OF MAIN FLOOR AND MEZZANINE



STRUCTURAL PLAN OF MEZZANINE



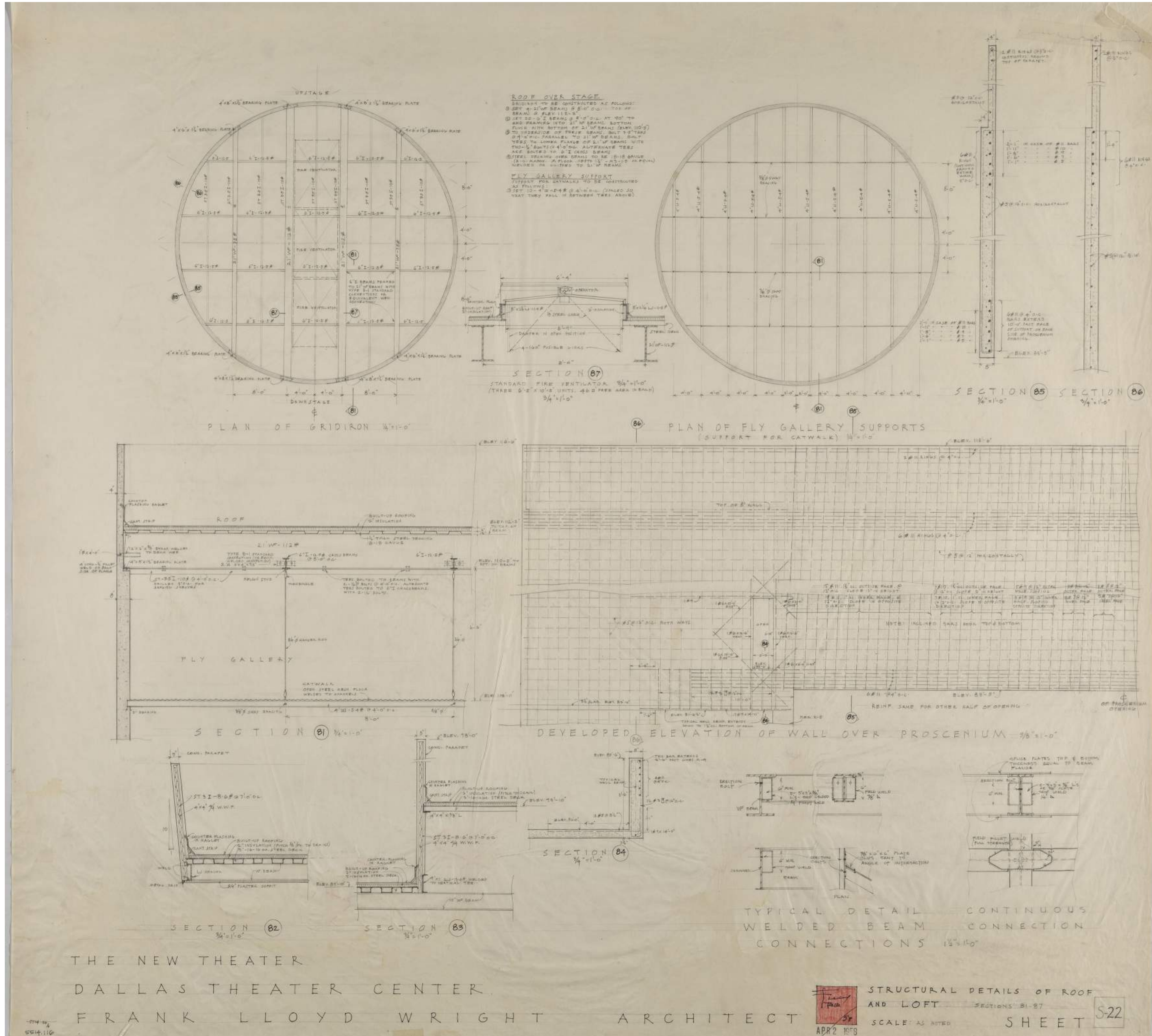
STRUCTURAL PLAN OF PLENUM



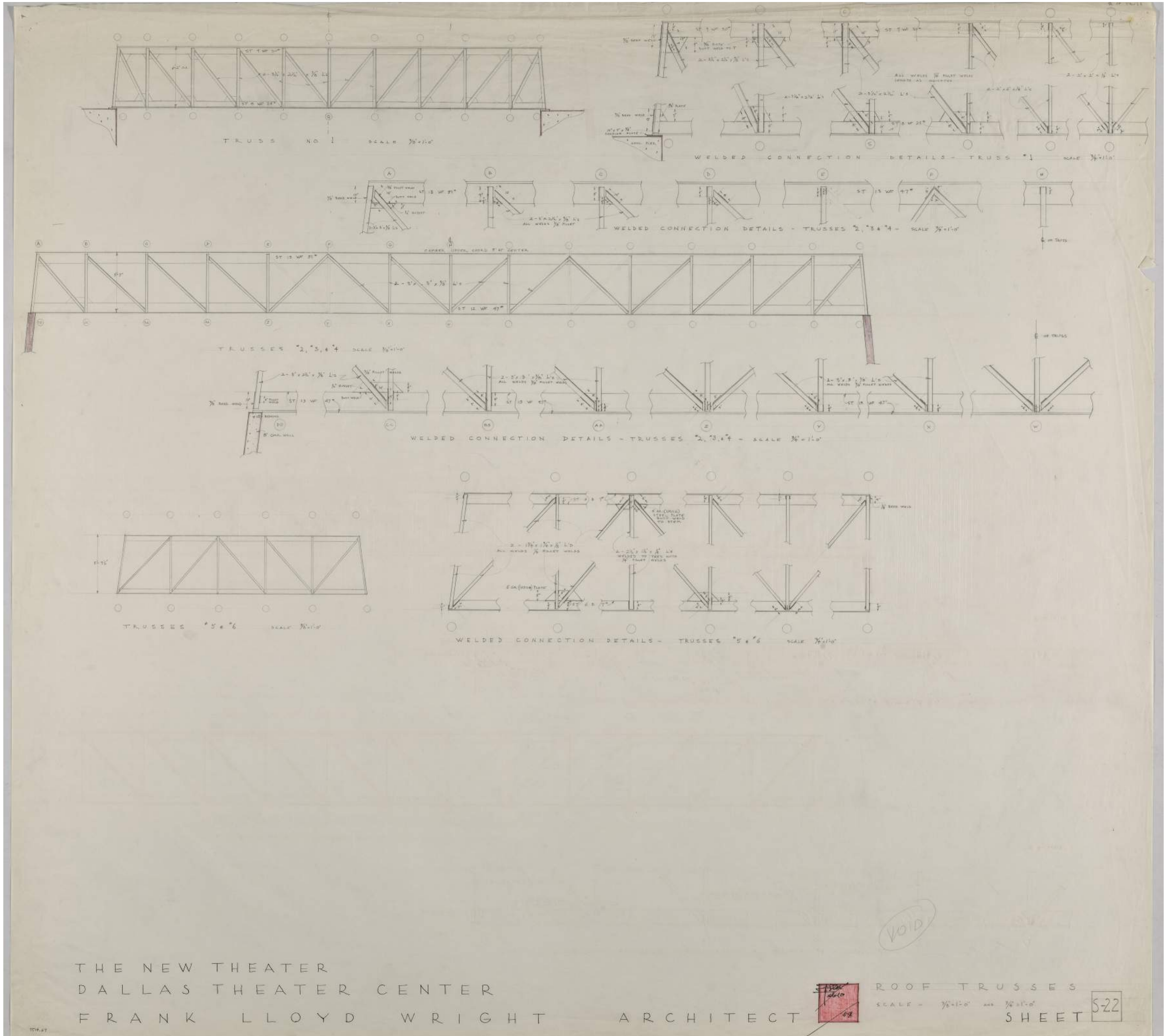
STRUCTURAL PLAN OF ROOF

1959 CONSTRUCTION DRAWINGS

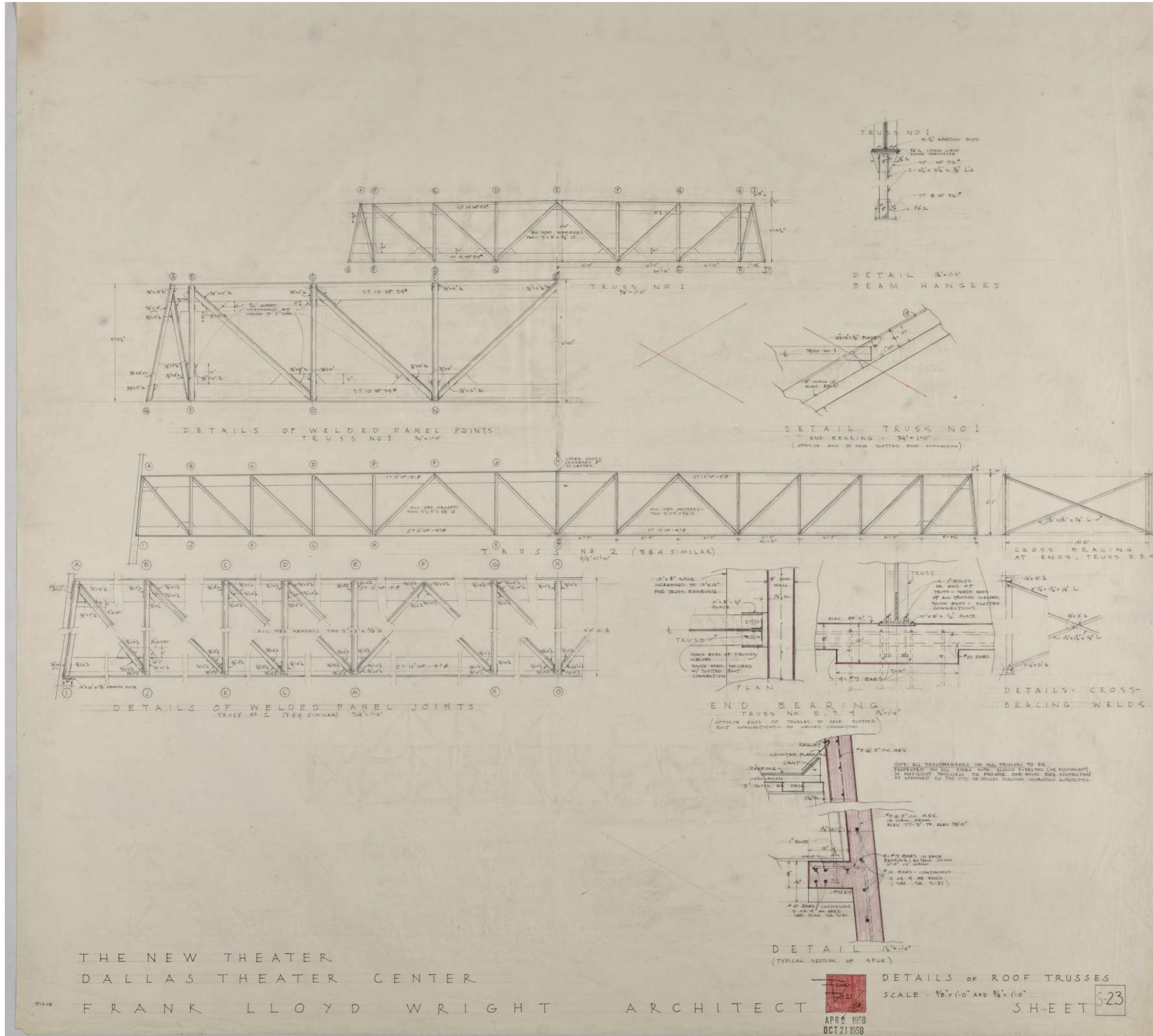
Frank Lloyd Wright



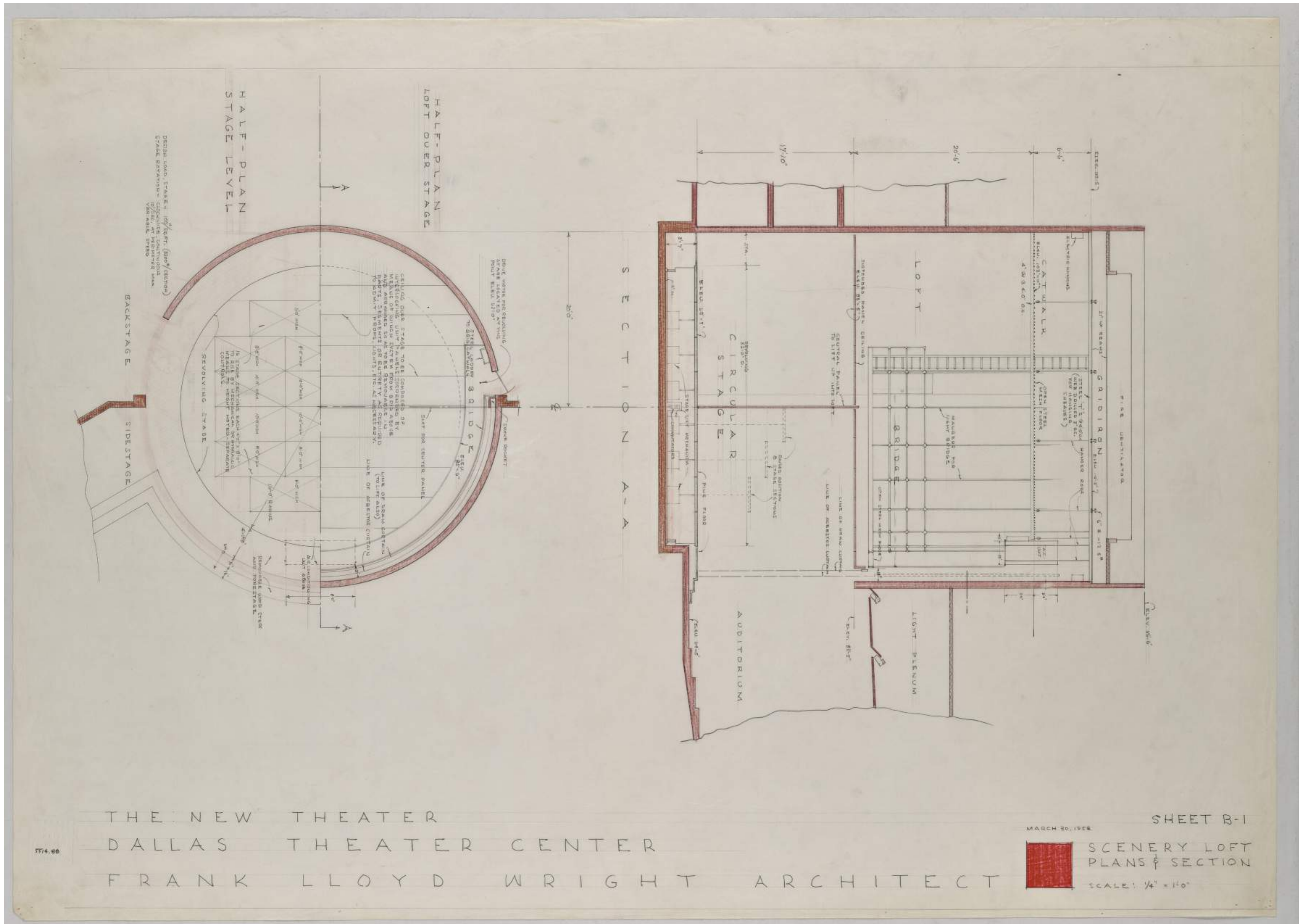
STRUCTURAL DETAILS OF ROOF AND LOFT



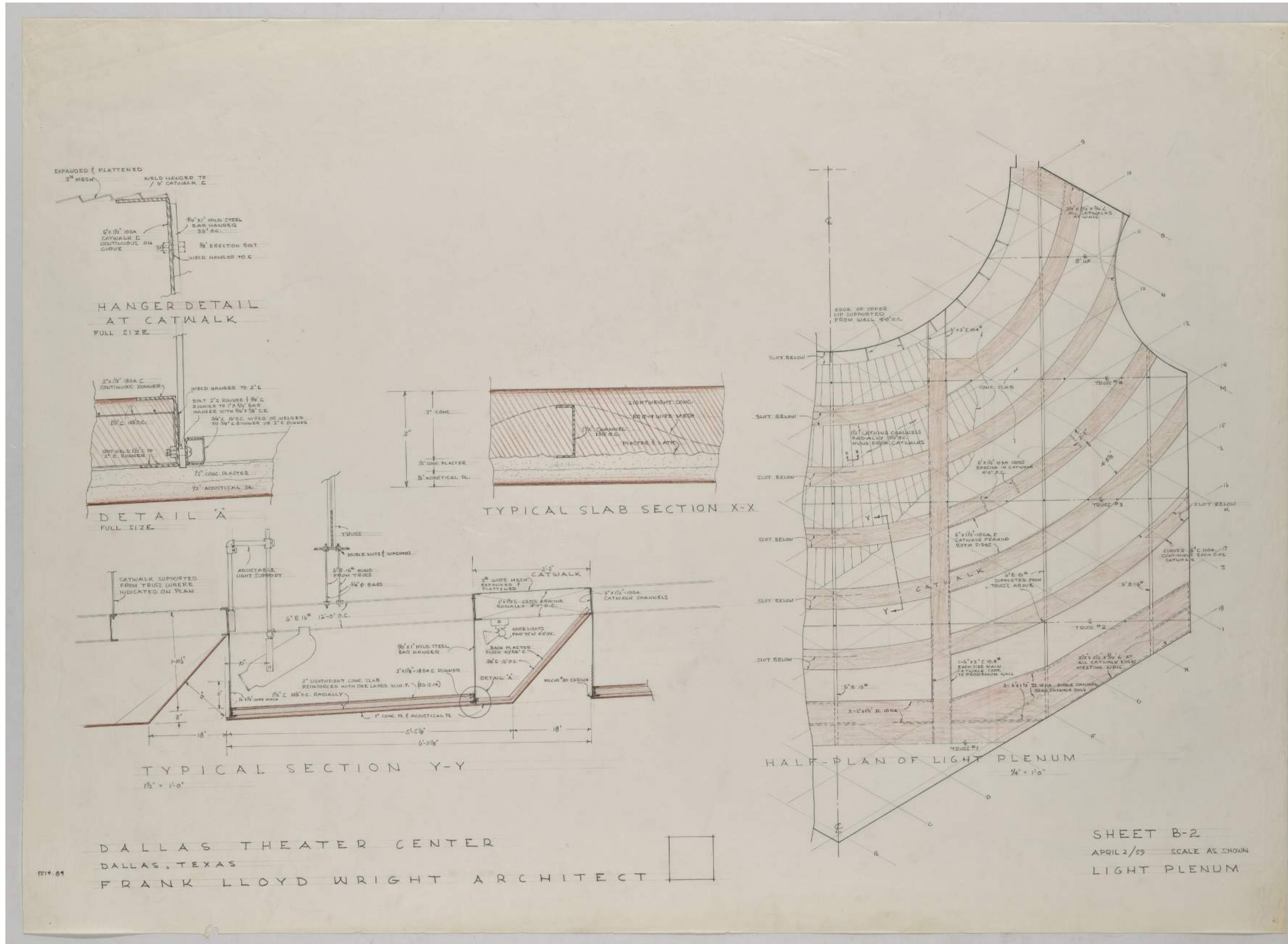
ROOF TRUSSES



DETAILS OF ROOF TRUSSES



SCENERY LOFT PLANS & SECTION



LIGHT PLENUM

ORDINANCE NO. 25955

An ordinance amending the zoning ordinances of the City of Dallas, as amended, by establishing Historic Overlay District No. 122 (Kalita Humphreys Theater Historic Overlay District) on the following described property:

BEING a tract of land within William B. Dean Park at 3636 Turtle Creek Boulevard, between Blackburn Street and Lemmon Avenue, and containing approximately 2.58 acres;

providing procedures, regulations, and preservation criteria for structures and property in the district; providing a penalty not to exceed $2,000; providing a saving clause; providing a severability clause; and providing an effective date.

WHEREAS, the city plan commission and the city council, in accordance with the Charter of the City of Dallas, the state law, and the ordinances of the city, have given the required notices and have held the required public hearings regarding the rezoning of the property described herein; and

WHEREAS, the city council finds that the property described herein is an area of historical, cultural, and architectural importance and significance to the citizens of the city; and

WHEREAS, the city council finds that it is in the public interest to establish this historic overlay district; Now, Therefore,

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF DALLAS:

SECTION 1. That the zoning ordinances of the City of Dallas are amended by establishing Historic Overlay District No. 122 on the following property ("the Property"):

THENCE continuing in a northeasterly direction, and being tangent to the last mentioned curve, a distance of 211.59 feet to the beginning of a curve to the left, having a central angle of 32°25′ and a radius of 300.02 feet;

THENCE in a northeasterly and northerly direction along said curve, an arc distance of 169.74 feet to the end of said curve;

THENCE continuing in a northerly direction, and being tangent to the last mentioned curve, a distance of 46.34 feet to the beginning of a curve to the right, having a central angle of 21°59′ and a radius of 301.43 feet;

THENCE in a northerly and northeasterly direction along said curve, an arc distance of 115.65 feet to the end of said curve;

THENCE continuing in a northeasterly direction, and being tangent to the last mentioned curve, a distance of 96.35 feet to a point on said present southwest line of Blackburn Street;

THENCE angle right 120°32′ and in a southeasterly direction, along said present southwest line of Blackburn Street, a distance of 11.63 feet to an angle point;

THENCE angle left 01°22′ and continuing in a southeasterly direction along said present southwest line of Blackburn Street, a distance of 38.92 feet to the place of beginning and containing approximately 53,781 square feet of land.

SECTION 2. That the establishment of this historic overlay district shall not affect the existing underlying zoning classification of the Property, which shall remain subject to the regulations of the underlying zoning district. If there is a conflict, the regulations in this ordinance control over the regulations of the underlying zoning district.

SECTION 3. That, except as provided in the preservation criteria attached to and made a part of this ordinance as Exhibit A, a person shall not alter the Property, or any portion of the exterior of a structure on the Property, or place, construct, maintain, expand, demolish, or remove any structure on the Property without first obtaining a certificate of appropriateness or certificate for demolition or removal in accordance with the Dallas Development Code, as amended, and this ordinance. All alterations to the Property must comply with the preservation criteria.

SECTION 4. That the building official shall not issue a building permit or a certificate of occupancy for a use on the Property until there has been full compliance with this ordinance, the Dallas Development Code, the construction codes, and all other ordinances, rules, and regulations of the City of Dallas.

SECTION 5. That the director of development services shall correct Zoning District Map No. I-7 in the offices of the city secretary, the building official, and the department of development services to reflect the changes in zoning made by this ordinance.

SECTION 6. That a person who violates a provision of this ordinance, upon conviction, is punishable by a fine not to exceed $2,000. In addition to punishment by fine, the City may, in accordance with state law, provide civil penalties for a violation of this ordinance, and institute any appropriate action or proceedings to prevent, restrain, correct, or abate the unlawful erection, construction, reconstruction, alteration, repair, conversion, maintenance, demolition, or removal of a building, structure, or land on the Property.

SECTION 7. That the zoning ordinances of the City of Dallas, as amended, shall remain in full force and effect, save and except as amended by this ordinance.

SECTION 8. That the terms and provisions of this ordinance are severable and are governed by Section 1-4 of CHAPTER 1 of the Dallas City Code, as amended.

SECTION 9. That this ordinance shall take effect immediately from and after its passage and publication in accordance with the provisions of the Charter of the City of Dallas and it is accordingly so ordained.

APPROVED AS TO FORM:

MADELEINE B. JOHNSON, City Attorney

By John Rogers
Assistant City Attorney

Passed APR 27 2005

The pages included in this report do not represent the historic ordinance in its entirety. These are selected pages with the greatest relevance to the proposed work.

EXHIBIT A

PRESERVATION CRITERIA

KALITA HUMPHREYS THEATER

3636 TURTLE CREEK BOULEVARD

1. GENERAL PROVISIONS AND INTERPRETATIONS

1.1 All demolition, maintenance, new construction, public works, renovations, repairs, and site work in this district must comply with these preservation criteria.

1.2 Any alterations to Property within this district must comply with the regulations contained in CHAPTER 51A of the Dallas City Code, as amended. In the event of a conflict, these preservation criteria control.

1.3 It is recommended that the Kalita Humphreys Theater continue to be used as a theater. Any demolition, maintenance, new construction, public works, renovations, repairs, and site work in this district should not impair use of the Kalita Humphreys Theater as a theater.

1.4 For purposes of Section 51A-4.501 of the Dallas Development Code, as amended, the Kalita Humphreys Theater is a contributing structure.

1.5 Recommended versus permitted

a. Whenever these preservation criteria provide that a condition or an alteration is recommended, that condition or alteration has been researched and determined to be consistent with the historic character of the Property and otherwise appropriate.

b. Whenever these preservation criteria provide that a condition or an alteration is permitted, that condition or alteration is believed to have no negative impact on preservation of the historic character of the Property if properly implemented.

c. The Landmark Commission is encouraged to favorably consider any application for the certificate of appropriateness for a condition or an alteration that is recommended or permitted.

d. The listing of a condition or an alteration as recommended or permitted does not mean that the condition or alteration is required and does not preclude other conditions or alterations if they are appropriate.

1.6 Certificate of appropriateness

a. Except as specifically provided in these preservation criteria, a person may not alter a site within this district, or alter, place, construct, maintain, or expand any structure on the site without first obtaining a certificate of appropriateness in accordance with Section 51A-4.501 of the Dallas Development Code, as amended, and these preservation criteria.

b. See Exhibit D, Memorandum of Agreement, for the responsibilities of interested parties in applying for certificates of appropriateness.

c. The certificate of appropriateness review procedure outlined in Section 51A-4.501 of the Dallas Development Code, as amended, applies to this district.

d. When considering applications for certificates of appropriateness, the Director and the Landmark Commission shall consider that the Kalita Humphreys Theater is recommended to continue to be used as a theater, are encouraged to favorably consider any application for a certificate of appropriateness that would enhance the use of the Kalita Humphreys Theater as a theater, and should not approve any certificate of appropriateness that would impair use of the Kalita Humphreys Theater as a theater.

e. Any work done under a certificate of appropriateness must comply with any conditions imposed in the certificate of appropriateness.

f. After the work authorized by the certificate of appropriateness is commenced, the applicant must make continuous progress toward completion of the work, and the applicant shall not suspend or abandon the work for a period in excess of 180 days. The Director may, in writing, authorize a suspension of the work for a period greater than 180 days upon written request by the applicant showing circumstances beyond the control of the applicant.

1.7 A person may not demolish or remove any structure in this district without first obtaining a certificate for demolition or removal in accordance with Section 51A-4.501 of the Dallas Development Code, as amended.

1.8 Preservation and restoration materials and methods used must comply with the Secretary of the Interior's Standards for Rehabilitation and Preservation Briefs published by the United States Department of the Interior, copies of which are available at the Dallas Public Library.

1.9 No person shall allow a structure in this district to deteriorate through demolition by neglect. Demolition by neglect is neglect in the maintenance of a structure that results in deterioration of the structure and threatens preservation of the structure. All structures in this district must be preserved against deterioration and kept free from structural defects. See Section 51A-4.501 of the Dallas Development Code, as amended, for regulations concerning demolition by neglect.

1.10 Consult Article XI, "Development Incentives," of the Dallas Development Code, as amended, for tax incentives that may be available in this district.

1.11 If a feature is restored to the secondary period of historic significance, nothing should be done that would preclude restoration of the feature to the primary period of historic significance.

1.12 Notwithstanding anything to the contrary in these preservation criteria, no reference to the secondary period of historic significance, including any reference to any facade or other feature relating to the secondary period of historic significance, as being protected, shall preclude restoration of the Property, or any feature thereof, to the primary period of historic significance.

2. **ALTERATIONS THAT DO NOT REQUIRE A CERTIFICATE OF APPROPRIATENESS**

2.1 The following alterations are permitted and do not require a certificate of appropriateness:

a. Repairs to interior and exterior piping and drainage that do not alter the location of existing piping and drainage, that do not penetrate the historic building, or that are not visible from the exterior of the Main Building.

b. The installation of a vent or small chimney that is not in a publicly accessible area and is not visible from Sylvan Drive or the parking areas adjacent to the Main Building.

c. Improvements to the electrical system, including replacement of lighting, telephone, or security systems, and re-organization of building or park electric circuits.

d. Re-lamping of interior or exterior light fixtures to meet current building codes. See Section 7.15, "Exterior lighting," regarding re-lamping of exterior fixtures.

e. Re-painting of gold features in accordance with Section 8, "Facades".

f. Alteration or removal of the following interior elements, which were built after the primary period of historic significance and the secondary period of historic significance:

1. Foyer bathroom adjacent to the existing box office.
2. Extension of the Auditorium balcony.
3. Added rake of the Auditorium floor.
4. Added loge seating in the Auditorium.
5. Added Auditorium light and sound consoles.
6. Committee Room banquettes.
7. Upper Basement restroom interiors.
8. Interiors of the Education Wing offices.
9. Education Wing restrooms.
10. Existing kitchen in the west end of the Basement.
11. Existing food storage areas in the west end of the Basement.
12. Stage loft equipment.

g. Installation of temporary theater scene structures or any constructions relating to scenic design.

h. Re-flashing of roof penetrations or re-flashing of roof hatches.

i. Installation of temporary construction fencing.

j. Erection of signs, banners, and decorative lighting in accordance with Sections 15.3 and 15.4.

k. Alterations to Sylvan Drive to control traffic or improve safety that do not prevent the later restoration of Sylvan Drive to its condition during the primary period of historic significance.

l. Interior alterations relating to normal office operations, such as changes in window treatments, the installation or removal of pictures or other wall decorations, and other comparable alterations.

The pages included in this report do not represent the historic ordinance in its entirety. These are selected pages with the greatest relevance to the proposed work.

m. Temporary emergency repairs to prevent imminent damage to the Property, provided that the temporary repairs do not preclude permanent repairs in accordance with these preservation criteria and that an application for a certificate of appropriateness for the permanent repairs is made in a timely manner.

3. ROUTINE MAINTENANCE

3.1 In lieu of the items listed as routine maintenance in Section 51A-4.501(g)(5)(B) of the Dallas City Code, as amended, the items listed in Sections 3.2 and 3.3 shall be considered and reviewed as routine maintenance.

3.2 The following routine maintenance items are recommended:

a. New concrete driveways, curbs, sidewalks in accordance with Section 7, "Building Site and Landscaping".

b. Resurfacing Sylvan Drive in accordance with Section 7, "Building Site and Landscaping".

c. Re-surfacing of the concrete facades in accordance with Section 8, "Facades".

d. Recreation of the historic stair to the Katy Trail in accordance with Section 7, "Building Site and Landscaping".

e. Removal of the existing canvas awning at the Front Entry Terrace in accordance with Section 11, "Porches and Balconies".

3.3 The following routine maintenance items are permitted:

a. Minor repairs using the same material and design as the original.

b. Patching of sidewalks and driveways using the same type and color of materials.

c. Relocation of utilities or mechanical equipment in accordance with Section 7, "Building Site and Landscaping".

d. Landscaping in accordance with Section 7, "Building Site and Landscaping".

e. Installation of outdoor light in accordance with Section 7, "Building Site and Landscaping".

f. Replacement of a roof using the same or an original material that does not include a change in color.

g. Replacement of skylights and roof dampers to match the existing skylights and roof dampers.

h. Application of paint to interior surfaces, other than sand-finished concrete surfaces, if the color is the same as the existing color or is an appropriate dominant, trim, or accent color.

i. Removal of paint in accordance with Section 8, "Facades".

j. Cleaning of the exterior in accordance with Section 8, "Facades".

k. Interior alterations in accordance with Section 13, "Preservation Criteria for the Interior".

l. Alterations to HVAC equipment as described in Section 13.6, "Mechanical Equipment".

m. Painting, replacing, duplicating, or stabilizing deteriorated or damaged architectural features (including but not limited to roofing, windows, columns, and siding) in order to maintain the structure and slow deterioration.

n. Interior alterations that do not constitute permanent fixtures and are easily removable without any damage to the Property.

4. DOCUMENTATION, ARCHIVES, AND PLANNING

4.1 If Main Building elements are removed during the course of maintenance or alteration, they must be photographed in situ, recorded in a drawing, and stored on the Property or at a documented off-site location for later use or restoration analysis.

4.2 It is suggested, but not required, that an archive be established that contains plans, specifications, reports, artifacts, and other documentation that can establish the chronology of the Main Building's construction and alterations. See Exhibit E, "Kalita Humphreys Theater Designation Report," Section 15, "Bibliography and Resources," for a list of relevant architectural documents and specifications, as well as their current locations.

4.3 It is suggested, but not required, that a historic structure report and a master plan be completed for the Kalita Humphreys Theater. These documents would document a chronology of the Main Building; assess the existing condition of the Property; facilitate development of community consensus for the restoration, improvement, and maintenance of the Property; provide a plan and guidelines for maintenance and future rehabilitation of the Main Building within its historic context; and describe a restoration philosophy for the Main Building. Upon completion of these documents, it is recommended that these preservation criteria be reviewed, and, if the consensus of the interested parties is that it would be helpful, amended to reflect these documents.

4.4 It is suggested, but not required, that a restoration architect, who has access to the historic documentation of the Property, be retained to review all plans for alterations to the Kalita Humphreys Theater building and historic areas of the site. This architect could act as a clearing-house for information for projects as they are planned; expedite the process of preparing construction documents; obtain approvals; and coordinate the efforts of the various design professionals, contractors, city departments, facility users, and facility managers or committees involved in the projects.

5. **EXHIBITS**

5.1 The following exhibits are attached to the Kalita Humphreys Theater Historic Overlay District ordinance and are hereby made a part of these preservation criteria:

a. Exhibit B: Site plan showing William Dean Park, the boundaries of the district, and the location of the Kalita Humphreys Theater.

b. Exhibit C.1: Protected facades, northwest.

c. Exhibit C.2: Protected facades, northeast.

d. Exhibit C.3: Protected facades, southeast.

e. Exhibit C.4: Protected facades, southwest.

f. Exhibit D: Memorandum of Agreement, as it may be amended, updated, or terminated in accordance with its terms. The City of Dallas Historic Preservation Officer shall maintain an up-to-date copy of the memorandum of agreement.

g. Exhibit E: Kalita Humphreys Theater Designation Report.

7.8 Any new retaining walls contiguous with the Front Entry Terrace must be constructed of concrete to match the existing concrete retaining walls from the primary period of historic significance.

7.9 Any new terrace areas adjacent to the existing patterned, pigmented concrete of the Front Entry Terrace must match the existing terrace areas from the primary period of historic significance in color, texture, and pattern.

7.10 Any reconstructed walkways on the south side of the Main Building at the entrance to the Director's Office during the primary period of historic significance are permitted to be concrete, patterned pigmented concrete, natural stone, or gravel. It is recommended that reconstructed walkways use materials similar to the historic materials in texture, color, pattern, grain and module size, as supported by historic photos or documentation.

7.11 Construction of new parking areas is prohibited, except that construction of parking areas originally designed during the primary period of historic significance but never built is recommended if built as originally designed.

7.12 Carports or garages are not permitted.

7.13 Mechanical equipment and gas, water, or electrical utilities are permitted to be located or relocated provided they do interfere with the views of any protected facade of the Main Building and are screened.

7.14 Landscaping

a. Landscaping must be appropriate, enhance the structure and surroundings, and not obscure significant views of protected facades.

b. It is recommended that landscaping reflect the landscape design from the primary period of historic significance, as evidenced by original plans, renderings, and photographs from the primary period of historic significance.

c. Existing trees over eight inches in caliper are protected, except that unhealthy or damaged trees are permitted to be removed.

d. Trees are recommended to be removed as necessary to reconstruct the original stairway to the Katy Trail, as described in Section 7.17, and to construct the stairway's connections to the current configuration of the Main Building.

7.15 Exterior lighting

a. Outdoor lighting must be appropriate and enhance the structure.

The pages included in this report do not represent the historic ordinance in its entirety. These are selected pages with the greatest relevance to the proposed work.

b. New street-lights, landscape flood-lights, and recessed wall lights must be in accord with the electrical plan from the primary period of historic significance or match light fixtures from the primary period of historic significance.

c. Additional tree-lighting, as required to ensure safety and security, is permitted.

d. Re-lamping of any lighting fixtures to meet current building codes is permitted as long as the color temperature closely matches the color temperature of the original lamps specified in the electrical plan from the primary period of historic significance.

7.16 Fences and gates are prohibited on the historic drive and within 50 feet of the Main Building. Fences and gates in other locations may be erected if they are appropriate and do not block views of the protected facades of the Main Building.

7.17 It is recommended that the addition of a stairway connection to the Katy Trail closely follow the original "Proposed Stairway and Walk Over the M.K.& T. Railway" as drawn by Kelly Oliver, dated May 30, 1960, provided that it is constructed in such a manner that its connection to the current configuration of the Main Building does not preclude restoration of the landscape to the configuration from the primary period of historic significance.

8. FACADES

8.1 Protected facades

a. The facades of the Main Building designated as protected facades on Exhibits C.1, C.2, C.3, and C.4 are protected.

b. Reconstruction, renovation, repair, or maintenance of protected facades must be appropriate and must employ materials similar to the historic materials in texture, color, pattern, grain, and module size.

c. Concrete elements on protected facades are recommended to be re-surfaced with a coating that matches coatings used during the primary period of historic significance in color, texture, and patina, as determined from specifications from the primary period of historic significance or from laboratory paint-analysis testing.

8.2 Reconstruction, renovation, repairs, or maintenance of non-protected facades must be compatible with protected features.

8.3 Historic materials must be repaired if practical; they may be replaced only when necessary.

13. PRESERVATION CRITERIA FOR THE INTERIOR

13.1 Basement scene shop

a. Any alterations in non-historic portions of the Basement (for example, kitchen and food storage areas) may not preclude restoration of the Basement to the primary period of historic significance.

13.2 Doors and windows

a. All original wood doors and hardware from the primary period of historic significance are protected.

b. Wood shutters and hardware in the Auditorium are protected.

13.3 Finishes

a. The original dark rust-colored linoleum tiles that remain in the women's backstage bathrooms are protected. If the tiles must be removed due to deterioration, samples must be saved as references for duplicating their color and appearance in replacement tiles.

b. It is recommended that any new VAT flooring, and any flooring in areas where the original tiles have already been replaced, be of materials similar in size, color, and finish to the linoleum tile from the primary period of historic significance.

c. Linoleum counter tops in the Committee Room are protected.

d. Sand-finished concrete interior finishes are protected. It is recommended that if the interior walls are re-painted, the original finish, now obscured by many layers of paint, be revealed. It is permitted for the Auditorium to be repainted to the 1972 Taliesin dark-taupe color, as evidenced by photos and paint analysis, or to a lighter or darker color in the taupe family.

e. It is recommended that any new carpet in the Auditorium and adjacent areas match the color of the gold carpet from the primary period of historic significance, as evidenced by photographs or samples.

13.4 Furnishings

a. The remaining octagonal table in the Committee Room and any other octagonal tables from the primary period of historic significance that are located on the Property are protected.

13.10 Seating

a. Any remaining built-in or attached seating from the primary period of historic significance is protected.

b. It is recommended that the design of the Auditorium seating from the primary period of historic significance, which is supported by a metal framework, be closely matched if the seating is replaced in the future.

13.11 Stairways and conveying systems

a. Any remaining concrete angled stairs from the primary period of historic significance must be documented through photos and drawings before any alterations are made. The shape and location of the stairs are protected, although alterations to the tread size are permitted if reasonably required for convenience or safety.

b. The backstage stairways, landings, and railings are protected. If these are repainted, it is recommended that they be repainted to match the original paint from the primary period of historic significance after paint analysis verifies the hue, shade, and reflectance of the original paint.

c. The dumb-waiter shafts, as originally drawn in the plans from the primary period of historic significance, are protected for future use.

d. The costume storage rooms are protected, except that a public elevator, in the shaft where the stage elevator now operates, is permitted.

13.12 Technical Equipment

a. If removed, the remaining electrical winches from the primary period of historic significance in the stage-loft should be photographed in situ prior to removal and stored in accordance with Section 4.1.

b. Any remaining equipment for the revolving stage, light consoles, or control boards from the primary period of historic significance should remain in situ. If no longer in situ, it should remain on the Property or at a documented off-premise location for later use or restoration analysis.

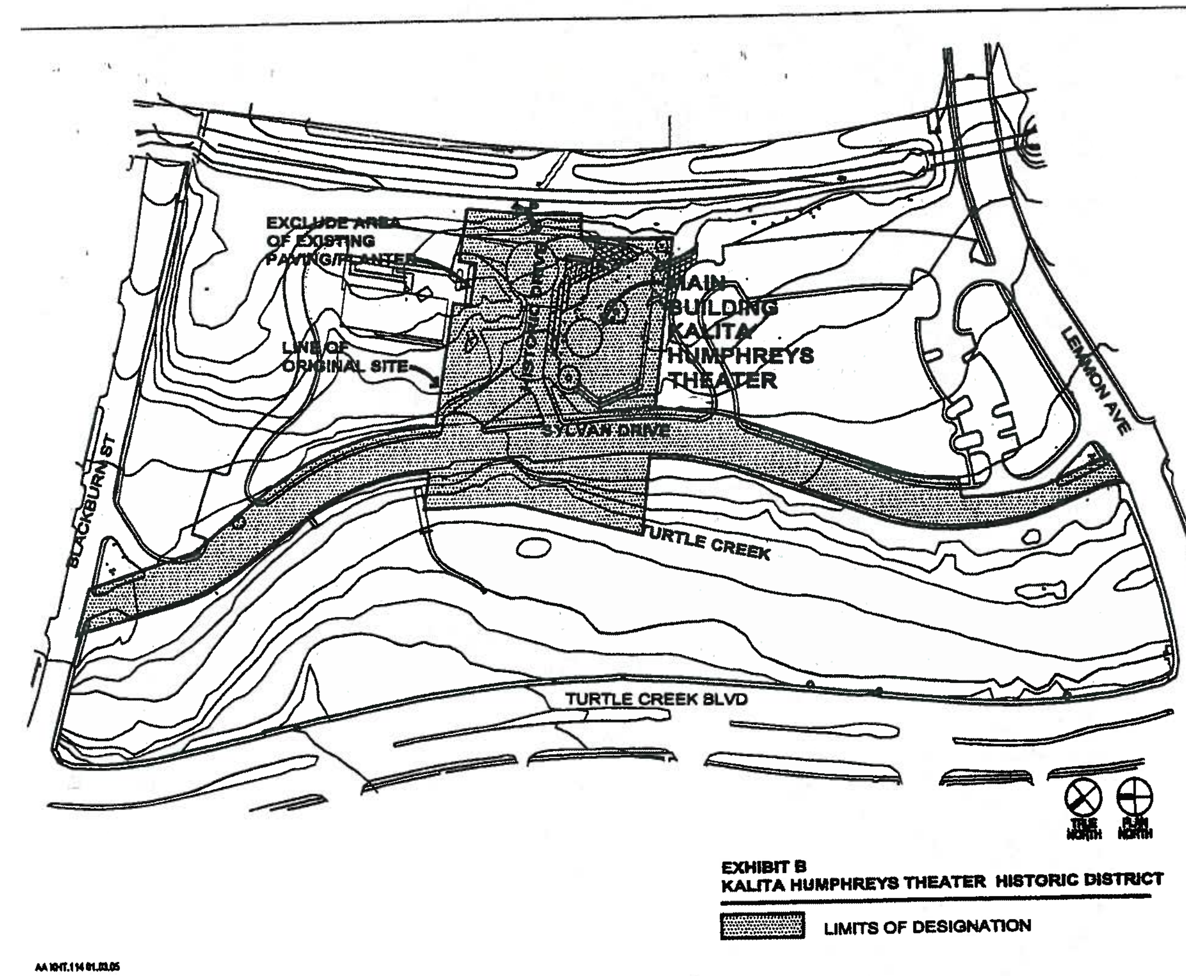
13.13 Wood Assemblies

a. Any remaining portions of the following wood built-ins from the primary period of historic significance are protected:

1. Foyer banquettes.

EXHIBIT B

KALITA HUMPHREYS THEATER HISTORIC OVERLAY DISTRICT



The tract of land comprising the Kalita Humphreys Theater Historic Overlay District, and the limits of designation thereof, are more particularly described as follows:

[Metes and Bounds Description – To Be Provided]

The pages included in this report do not represent the historic ordinance in its entirety. These are selected pages with the greatest relevance to the proposed work.

EXHIBIT C.1
PROTECTED FACADES, NORTHWEST

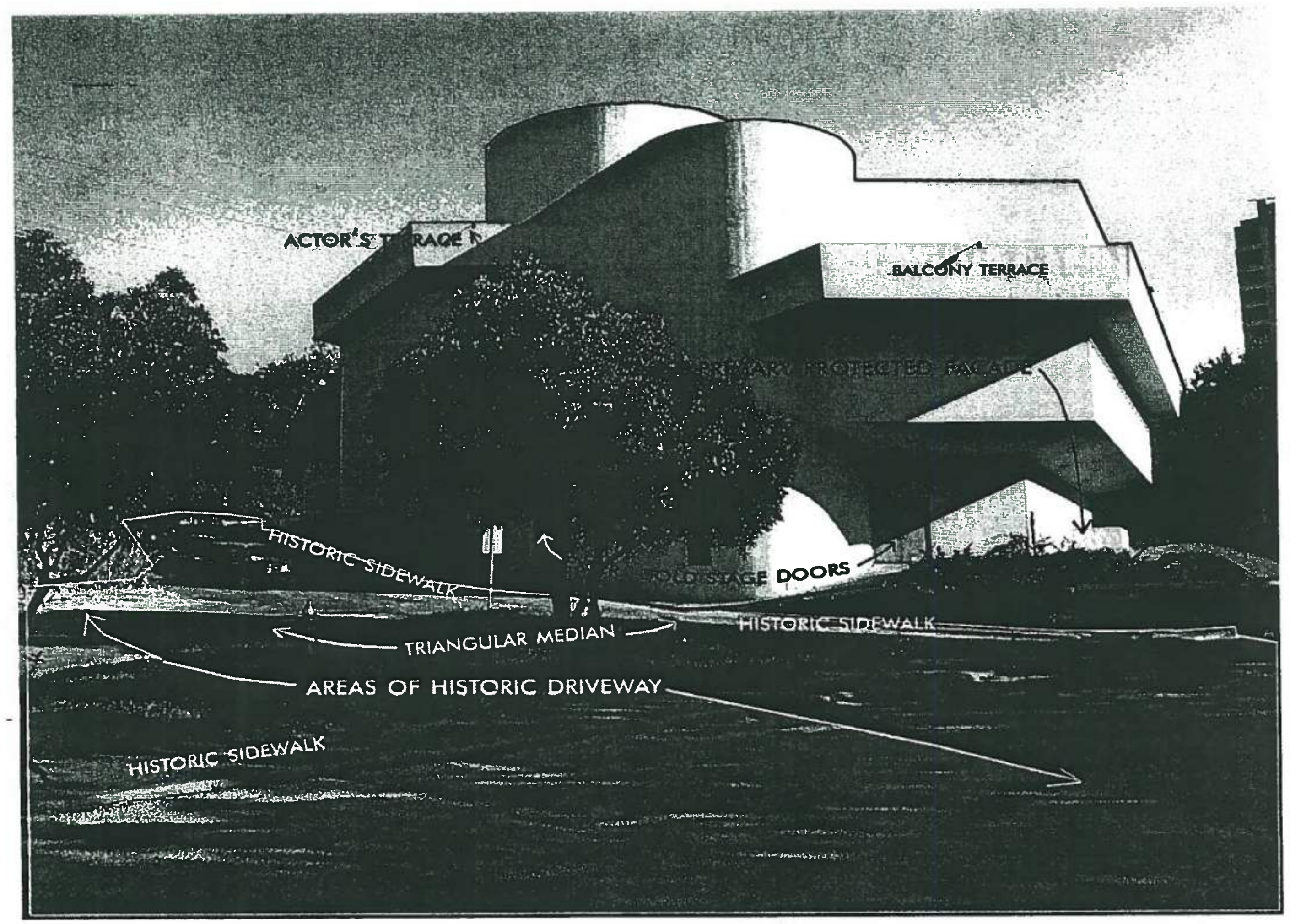


EXHIBIT C.1 PROTECTED FACADES, NORTHWEST

EXHIBIT C.2
PROTECTED FACADES, NORTHEAST

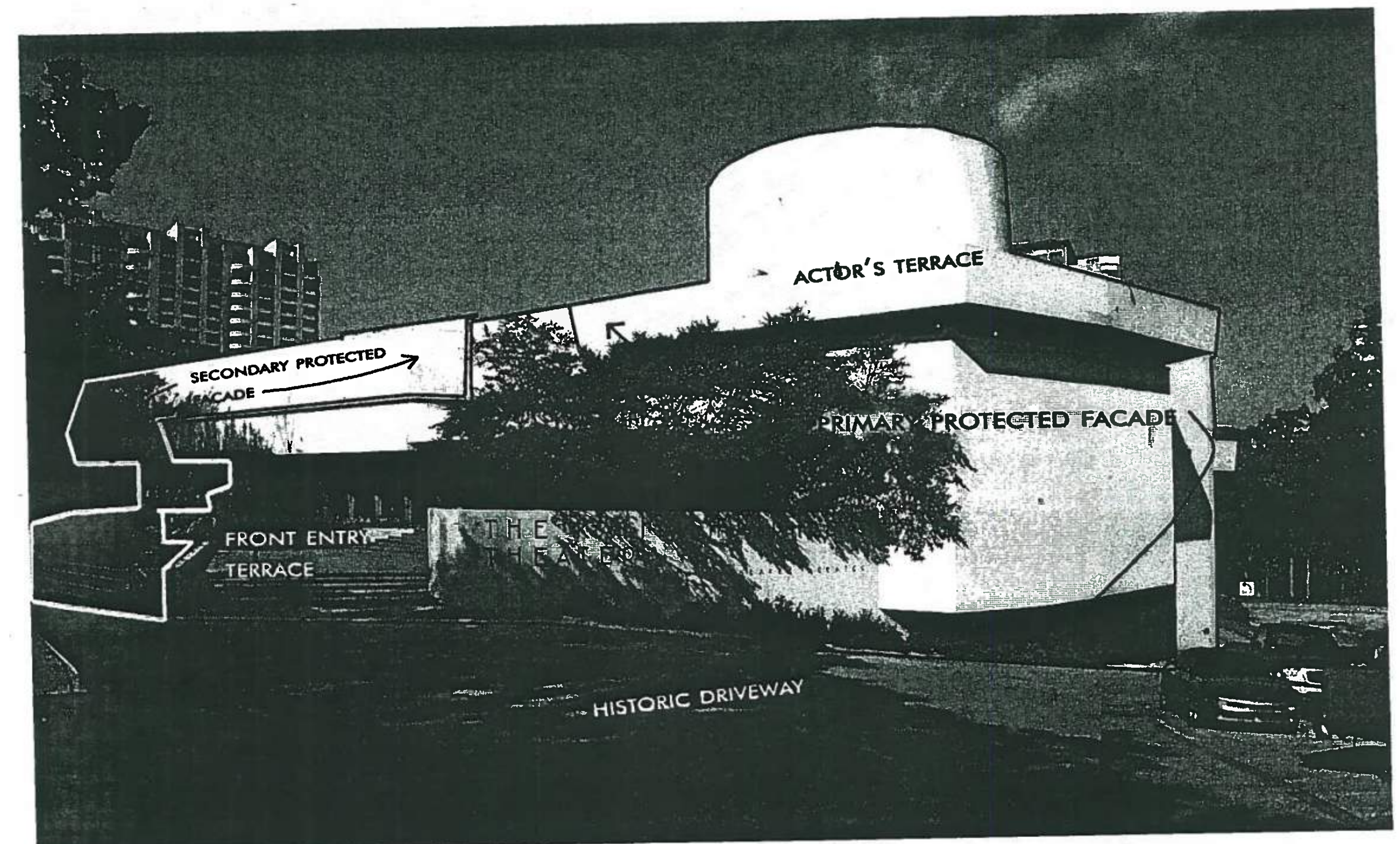


EXHIBIT C.2 PROTECTED FACADES, NORTHEAST

EXHIBIT C.3
PROTECTED FACADES, SOUTHEAST

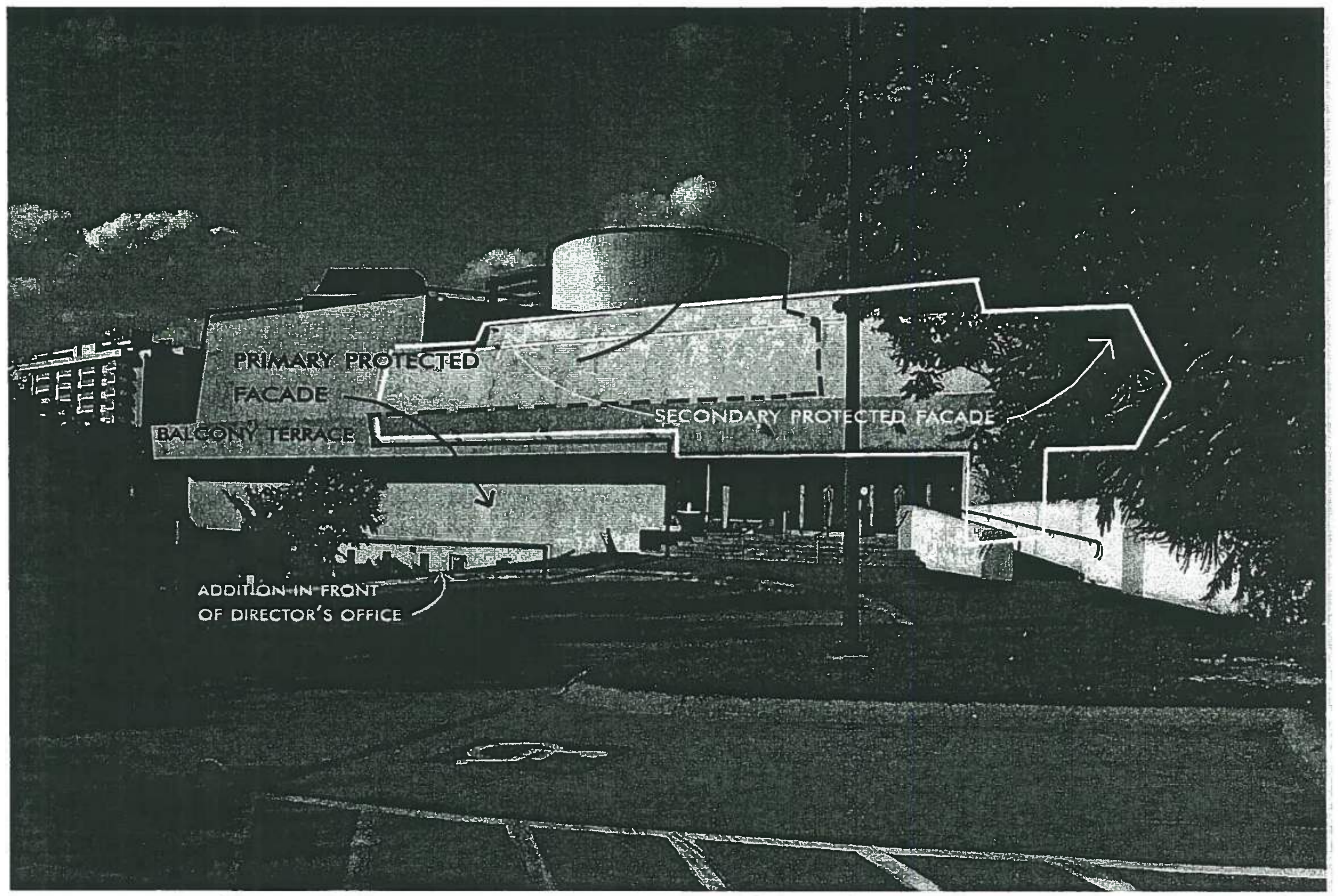


EXHIBIT C.3 PROTECTED FACADES, SOUTHEAST

EXHIBIT C.4
PROTECTED FACADES, SOUTHWEST

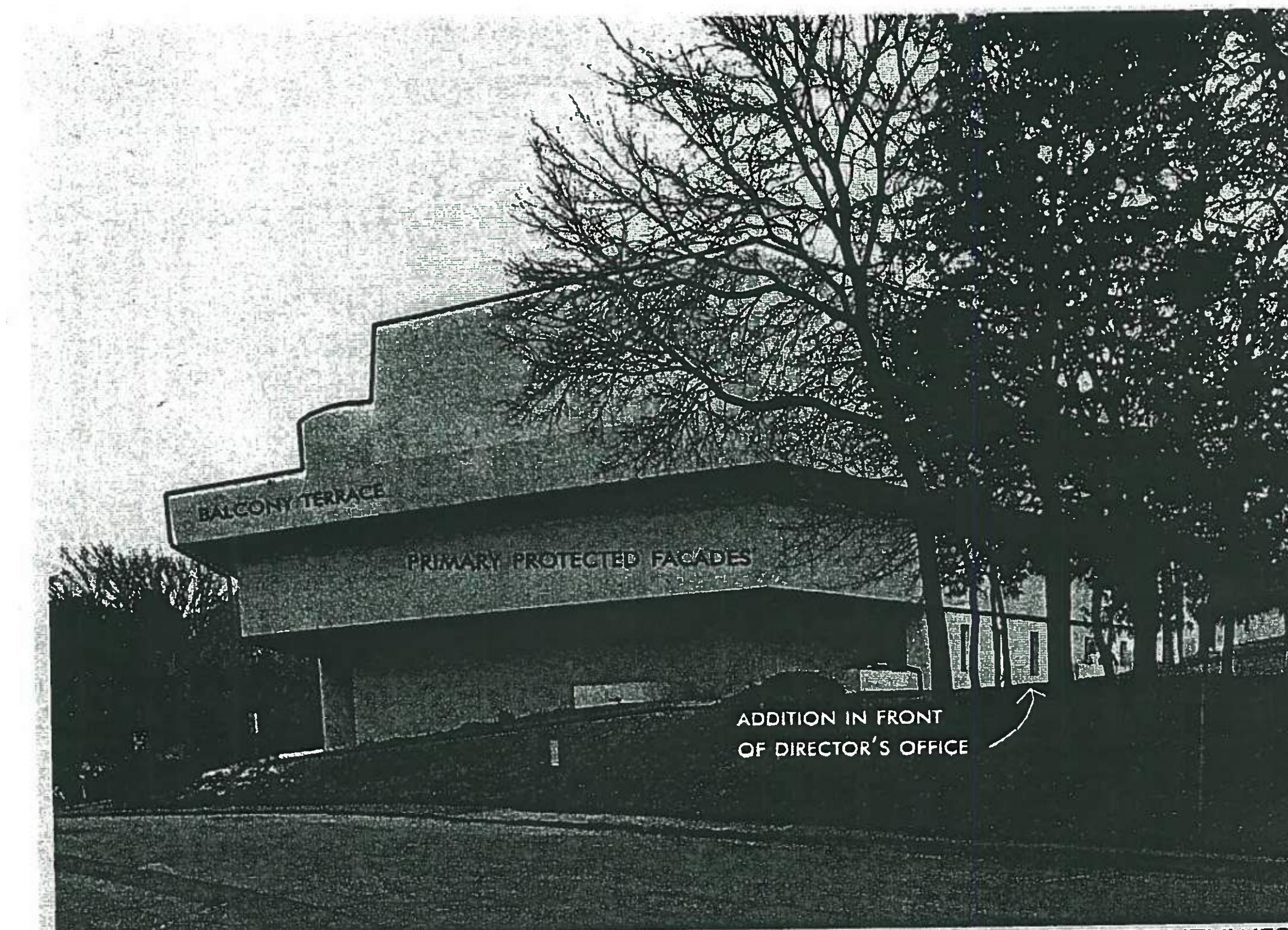


EXHIBIT C.4 PROTECTED FACADES, SOUTHWEST

The pages included in this report do not represent the historic ordinance in its entirety. These are selected pages with the greatest relevance to the proposed work.

EXHIBIT E --- DESIGNATION REPORT
Kalita Humphreys Theater in William B. Dean Park

1. Name
Historic and/or common: Kalita Humphreys Theater
Date: Original construction date: December 1959

2. Location
Address: 3636 Turtle Creek Boulevard, Dallas, Texas 75219-5598
Location/neighborhood: William B. Dean Park, Turtle Creek Boulevard
Block: 1049 *lot:* *land survey:*__________ *Tract size:* Original Lot approximately 1.2 acres
Existing site: See Exhibit B, Limits of Designation

3. Current Zoning
Current zoning: Special Use District

4. Classification

Category	*Ownership*	*Status*	*Present Use*	
____district	_X__public	_X_occupied	____agricultural	____museum
_X_building(s)	____private	____unoccupied	____commerciel	____perk
_X_structure	____both	____work in progess	_X_educationel	____residence
_X_site	*Public Acquisition*	*Accessibility*	_X_anterteinment	____religious
____object	____in progess	_X_yes:restricted	____government	____scientific
	____being considered	____yes:unrestricted	____industriel	____transportetion
		____no	____military	____other, specify

5. Ownership
Current Owner:
The Kalita Humphreys Theater is owned by the City of Dallas. The Office of Cultural Affairs oversees the management of the building. The Equipment and Building Services Department maintains the building. The Park and Recreation Department maintains the surrounding park site. The theater is leased and operated by the Dallas Theater Center, and overseen by its Facilities Managers and the Facilities Committee of the DTC Board.

Contact: General Manager, Dallas Theater Center *Phone: 214 252 3901*
Address: 3636 Turtle Creek Boulevard *City:* Dallas *State:* Texas *Zip:* 75219

6. Form Preparation
Date: January 6, 2005
Name & Title: Ann K. Abernathy, A.I.A.
Organization: Ann Abernathy, A.I.A
Contact: Ann Abernathy
Booziotis & Company Architects
2400A Empire Central
Dallas, TX 75235-4398
Phone: 214 350 5051
Acknowledgments:
The Dallas Architecture Foundation contributed partial funding for the original research for this report.
Kelly Oliver, original Taliesin supervising apprentice, contributed interviews and documentation.
Research leading to the building chronology were partially funded by the Dallas Theater Center through the generosity of Deedie Rose.
Mary Dolan edited the Designation Report.

Research leading to the building chronology were partially funded by the Dallas Theater Center through the generosity of Deedie Rose.
Mary Dolan edited the Designation Report.
Legal expertise and coordination in the preparation of the Preservation Criteria were generously provided by John Howell and Melissa Lindelow, Hughes & Luce, LLP.
Marcel Quimby provided guidance in the preparation of the documents.
Additional acknowledgments are noted in Section 15, Bibliography and Resources.

7. Representation on Existing Surveys
Alexander Survey (citywide) *local* *state* *national* *National Register*
H.P.L. Survey (CBD) *A* *B* *C* *D* *Recorded TX Historic Ldmk*
Oak Cliff *TX Archaeological Ldmk*
Victorian Survey
Dallas Historic Resources Survey, Phase ____ ___ *high* ___ *medium* ___ *low*
For Office Use Only
*Date Rec'd:*______ *Survey Verified:* Y N *by:*____ *Field Check by:*_____ *Petitions Needed:* Y N
Nomination: *Archaeological* *Site* *Structure(s)* *Structure & Site* *District*

8. Historic Ownership
Original owner: Dallas Theater Center
Significant later owner(s): City of Dallas, See Section 5.

9. Construction Dates
Original: Original completion date---December 1959
Alterations/additions:
The following chronology is a partial list of the events based on research from publications, available documents, field investigation, and oral history.

1965
Addition: "Room at the Top" over Actor's Terrace. Nagler Engineers, Inc.

Prior to 1968
Addition: Upper Basement Offices, at southwest basement, under overhang. Architect unknown.

1968
Addition and alterations: Education Wing and Rehearsal StudiosEast Balcony Terrace parapet wall removed and area enclosed as rehearsal rooms.
Ten columns added at foyer to support second-story Education Offices over new drive-through.
Driveway extended, as horseshoe, to access porte-cochere drop-off area.
Removal of retaining wall and curb, at circular drive, for new drive-through accessing Lobby.
Taliesin Associated Architects, plans dated 3-12-68.
(See Attachment #3, Construction photo c.1968)
Alteration: Refreshment Counter on east wall of Foyer, in place of former drinking fountain. David George and Regan George, Architects.

1970s
Alteration: Auditorium repainted darker taupe color approved by Taliesin Associated Architects.

1977
Alteration: Auditorium balcony rail removed and balcony floor extended forward approximately six feet, columns added for support. The Architects Partnership, Datum Engineering.

1982
Site Addition: South Parking Lot along Lemmon Ave. McKee Building Service.

1983-1984
Alterations:
Auditorium—Rake of floor increased by 1'6" overall. Removal of original banquette seating.
Interior repainted dark green. The Architects Partnership, Arthur Rogers, principal.
Replacement of original seats.
Auditorium ceiling—New lights on pipes suspended from ceiling coves. Roger Morgan, consultant.
By 1983 the carpet had been changed several times.

Stecker Library (Committee Room) banquette seating was altered and then removed (exact date and architect unknown).

1989
New Facilities for the Dallas Theater Center, A 1982 Bond Project, City of Dallas, Frank P. Wise, Park Board Engineer and AR Architects, April 15, 1989, Revisions May 10, 1989.
Upper basement—
Stair from the Foyer to the Men's Lounge floored over. Men's and Women's restrooms reversed and reconfigured.
First Floor Lobby—
Porte-cochere area enclosed to create a Lobby on exterior side of existing Foyer wall, entailing removal of portion of original southeast wall.
Original East Foyer doors relocated.
Angled stairs from the Foyer, previously accessing the Women's restroom, rebuilt with wider treads perpendicular to the stairway walls.
New stair added within the stage laft (east) ramp-tower, behind the stage elevator, replacing previous kitchen.
New corridor to the existing "handicapped" bathroom built over original stair to Men's Lounge.
Box office and promotion office, now called Ticket Sales, expanded into the space formerly occupied by the Coat Room.
New refreshment bar added outside original Foyer exterior wall.
Spray-on acoustic texturing added to the entire Foyer/Lobby ceiling.
Auditorium- One more aisle seat in each row and six new handicap spaces added. The first aisle moved closer to the stage.
Second floor—Backstage Dressing Rooms partitioned.
Third floor—Costume Room partitioned and renamed " Library".
Dye vat added.
South Entry and site—Former drive (1968) now terminated at new glass and aluminum doors.
Driveway along south sida of the building (1968) removed.
South Entry Terrace added with stairs, ramp, and new fountain.
South Parking Lot added, leveling areas of sloped terrain.
North site—
Two-story rectangular "Auxiliary Building," now called Heldt Administration Building, added uphill, approximately 130 feet to the north.
New U-shaped drives and parking lots added to the north, leveling areas of sloped terrain.

1993
Maintenance and restoration: Asbestos abatement, Auditorium ceiling. City of Dallas, General Services Department, Fugro-McClelland (Southwest), Inc.

1997
Alterations: Remodeling of Auditorium floor, necessitating new steps at Committee Room; side stairs "vomitories" decked over to provide additional seating loges; new rear partitions and sound booth cubicle, Spencer Design Group, Inc, and Charles Gojer and Associates, Inc, consulting engineers; McCreary and Associates, electrical consulting engineers.

1998
Restoration and alterations: Demolition and reconstruction of Entry Terrace patio, steps and portion of driveways, new handrail. City of Dallas, Public Works and Transportation Department, Robert Van Buren; Charles Gojer and Associates, Inc., Consulting Engineers.

2001
Immediate Needs Assessment: Dallas Theater Center, Booziotis and Company Architects and Ann Abernathy, AIA.

2002
Maintenance and restoration: Restoration of traffic coating, Actor's and Balcony Terraces; removal of 1989 dye vat; removal of 1965 "Room at the Top"; HVAC repair and replacements Education Wing and Auditorium; selective asbestos abatement. City of Dallas, EBS, and AAE Architects.

2003
Maintenance and restoration: Lobby carpet replaced with carpet of original color, new Wright-inspired tables and benches; plumbing restoration of original fountain, restoration of building drains and sewer connections; restoration of miscellaneous electrical, plumbing, water service, storm sewer, gas equipment; repairs to exterior recessed lighting and control systems, exterior lighting reconstruction per 1959 plans; paint analysis and restoration of stage doors and entrance columns; perimeter landscaping. City of Dallas, EBS, Booziotis & Company Architects, and Mesa Design Group.

10. Architect

Original construction: Frank Lloyd Wright
Alterations/additions: Included in above chronology

CAREER SYNOPSIS

From his work with his "Lieber Meister" Louis Sullivan in the late 1880s to the futuristic projects of the late 1950s, Wright's career spanned 70 years lasting from the end of the Industrial Revolution to the Media Age. Wright died in 1959 at the age of 92, having completed over 1,000 projects, at least 410 built.

Emerging from the influence of late-Victorian domestic architecture in the office of his first employer, Joseph Lyman Silsbee, Wright was then influenced by architects of the "Chicago school" while working downtown with Sullivan. After opening his own first studio in Oak Park, Illinois, he and his apprentices developed the uniquely American style of architecture that came to be known as the Prairie Style, which spread across the country, influencing burgeoning suburban developments for decades.

His international influence was secured with the publication of his work in Europe, the Wasmuth Portfolio, 1910, even as scandals about Wright spread at home in the U.S. After leaving his wife and six children and suffering great personal tragedies, he spent some years in Japan, working on the Imperial Hotel and then returned to live in California where his office developed what he called textile-block or unit-block construction. His assistants included Rudolph Schindler, his own son Lloyd Wright, and later Richard Neutra.

In the 1930s, Wright created another home and studio in the Arizona desert, Taliesin West, and began accepting resident architects. From this office he developed a new style of homes that were space-saving, efficient, and horizontal; he called them Usonian homes and these became the model for America's affordable post-war ranch houses.

In 1936, a major commission for a country estate in Western Pennsylvania led to his signature house, Fallingwater, which cantilevered dramatically over a waterfall. The public buildings after 1943 became increasingly bold in their unusual geometries and forms. As a fitting end to his career, the latest constructed buildings were actually affordable houses, which could be ordered from a catalogue.

INTRODUCTION TO WRIGHT'S DESIGN PRINCIPLES

A prolific writer as well as designer, Wright articulated his methodology of "organic architecture" as a holistic approach to design that was sympathetic to the nature of site, structure, and materials, and that enabled human use and comfort. Architectural historian Vincent Scully defined organic architecture in this way: "When a building built by men to serve a specifically human purpose not only celebrated that purpose in its visible forms but became an integrated structure as well, it then took on the character of an organism which existed according to its own complete and balanced laws" (Scully 13-14).

Wright insisted his rural upbringing was one of the most significant influences in his work, and that the "Book of Creation" was his textbook. Wright's mother educated her son with a set of kindergarten manipulatives called the "Froebel gifts," from which Wright learned to abstract from nature. Wright was influenced by his readings in Emersonian Transcendentalism and the great American literature of Walt Whitman and Mark Twain. As well, Wright referred to Asian Taoist principles and especially to what he said he learned from the study of the Japanese print.

Stylistically, the buildings from different periods of Wright's career may look quite different, but according to Wright, the design principles were a consistent methodology, not idiosyncratic. All basic elements of Wright's design philosophy were in evidence at the Kalita Humphreys Theater.

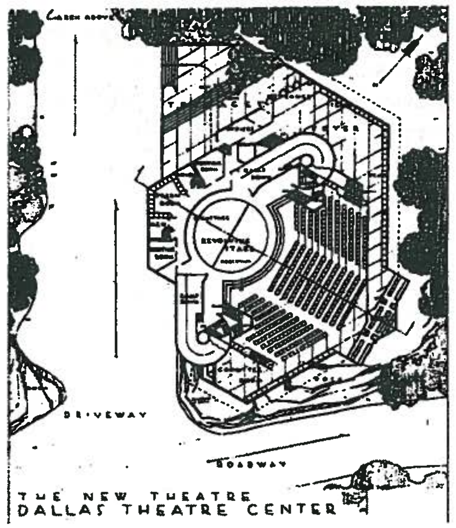
Wright believed that buildings should be "of the land not on the land," rooted in the landscape and visually growing out of it. Horizontal lines stratified his buildings, relating them to the horizontal expanse of the prairie.

The pages included in this report do not represent the historic ordinance in its entirety. These are selected pages with the greatest relevance to the proposed work.

11. Site Features

Natural: Sloping hill site with exposed rock ledges, indigenous vegetation

The original building site, in 1959, was in the center of a large tract of undeveloped parkland just north of downtown Dallas. The site was a roughly square section between the M.K. & T. Railroad right of way and Baer Drive (now Sylvan Drive), the park access road.

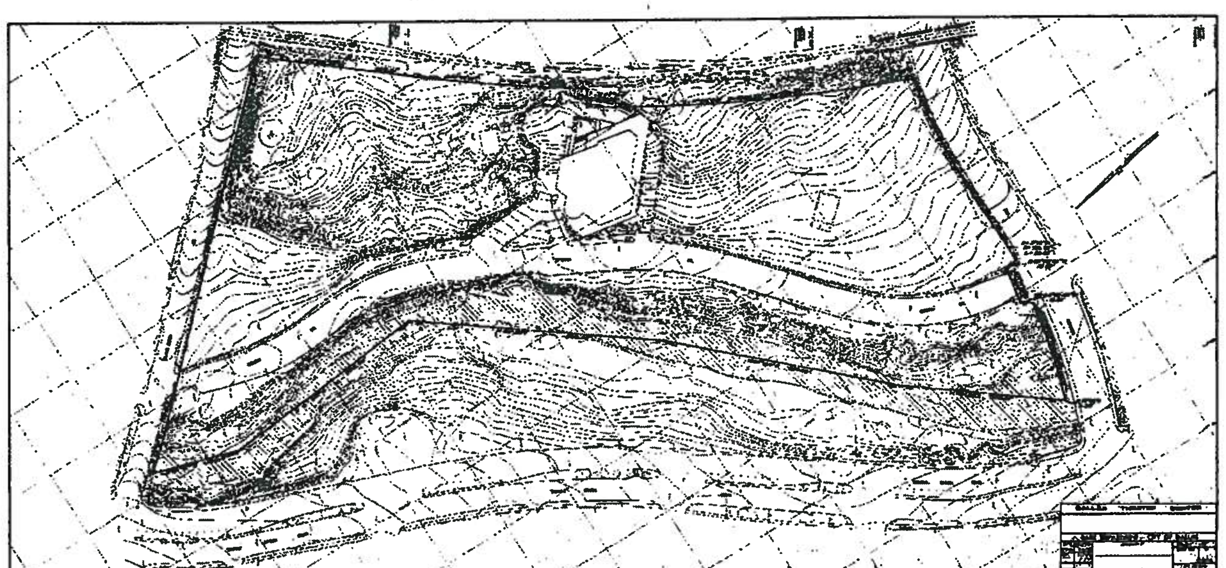


The space created between the building and the natural rock outcroppings along the driveway, and around the Entry Terrace, was an important aspect of the architecture. This early rendering of the Site Plan was drawn when a tunnel was planned to access a parking lot on the east side of the railroad right of way. The lot was not built, and instead the driveway terminated in a circular turnaround in front of the Entry Terrace. Patrons parked along Sylvan Drive and walked up the driveway.

The indirect sequence of entry to the theater was characteristic of the architect's style.

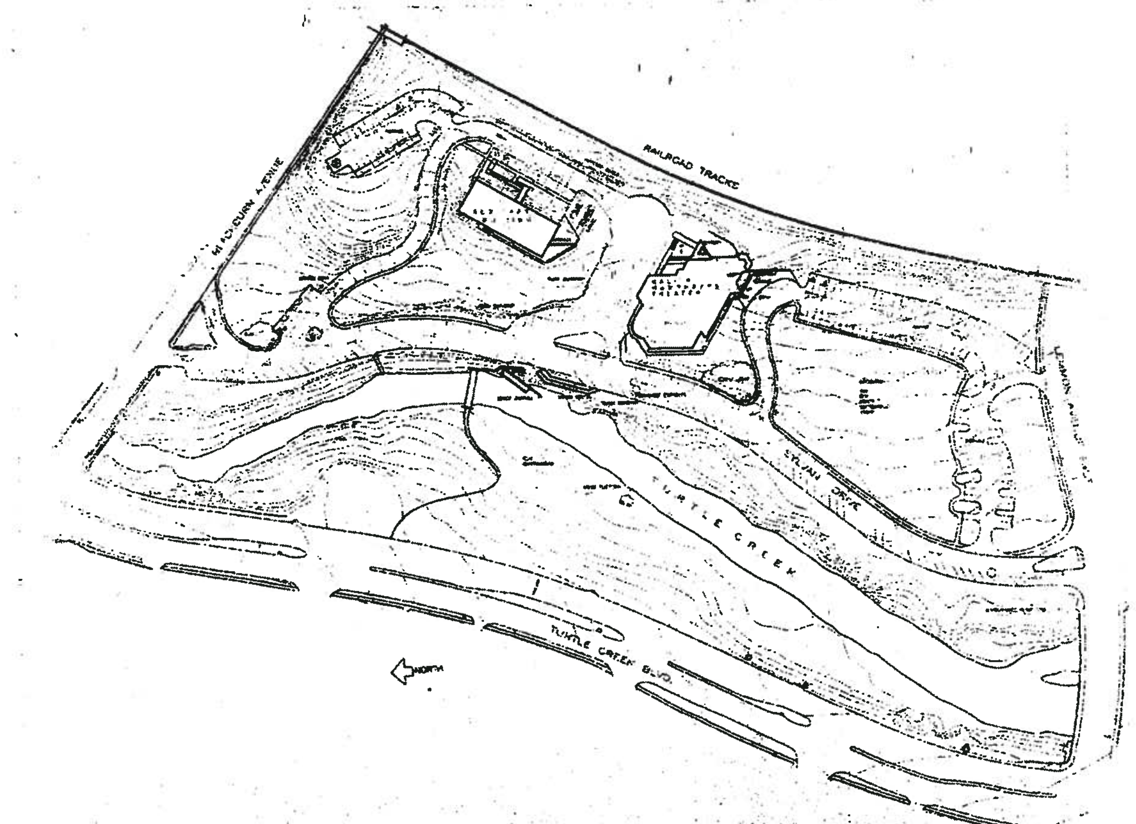
An Electrical Plan for the site, dating from 1959, shows the original configuration of Sylvan Drive, the circular drive, and the areas designated for walkways behind the building. This plan, Attachment #2, forms the basis of the Historic District Limits of Designation. There are also extant copies of original drawings that show the 1959 driveway design and the 1960 design for a stairway over the railroad tracks.

Successive additions of parking lots and driveways have created a bare zone around the building. In 1968, a driveway was added under the Education Wing Additions, illustrated below in the 1975 Topographical Survey.



City of Dallas Parks and Recreation Department Files

The effort in 1989 to create what a theater manager called "ceremonial drives" caused the effect that architecture critic David Dillon later described in the *Dallas Morning News*, saying that the building "looks like a forlorn ammonite in a sea of asphalt." A comparison of the current Site Plan (below) with the 1975 Topographical Survey shows the extent to which the hill has been removed to make way for surface parking areas.



Adapted from drawings in DTC files.

For current site description, see Section 12, Current Site Condition, p.10.

12. Physical Description

Condition, check one:

____ *excellent*	____ *deteriorated*	____ *unaltered*	*Check one:*
_X_ *good*	____ *ruins*	_X_ *altered*	_X_ *original site*
____ *fair*	____ *unexposed*		____ *moved(date)*

BUILDING DESCRIPTION

The Kalita Humphreys Theater (KHT) is an internationally significant building designed by Frank Lloyd Wright for the Dallas Theater Center (DTC). Originally commissioned in 1955 and completed in 1959, it has been in continuous operation as a theater until the present.

The building as originally completed, was four and a half stories high and topped by the stage loft rising 66 feet above grade. The poured reinforced concrete building system allowed for dramatic structural features including the cantilevered roof terraces as well as sculptural rounded towers.

(Further description of significant features and the history of the building follow in Section 13.)

Before 1968, offices were added under the south cantilever of the Auditorium, which obscured the Director's Office. (See Exhibit C.3, C.4.) Major alterations to the theater building were made in 1968, with the addition of a two-story Education Wing to the east. In 1989, the Foyer was extended and new storefront-type entrances added which fronted new surface parking lots to the north and south. Uphill and to the north a stuccoed two-story administrative building was added. All of these alterations substantially changed the experience of arrival to the KHT. Modifications have changed some interior configurations and finishes.

The setting for the DTC, Turtle Creek campus is William B. Dean Park, which is approximately 9.7 acres and is owned and maintained by the city of Dallas, Parks and Recreation Department. (Section 11, Site Features and Attachment #1, Survey Plat.)

The surrounding neighborhood is primarily residential. To the east is a proliferation of lowrise condominiums and townhomes. To the north and south, along the creek, are areas of single-family homes. To the west are many mid-rise and high-rise apartment buildings. Safe and continuous pedestrian access to the site is not ideal and a dearth of continuous paths through the site makes ADA access difficult. The two sides of Dean Park, divided by Turtle Creek, are connected only by one narrow and non-compliant footbridge.

Dean Park lies within a string of parks from the Kessler Plan, stretching from Knox Street to the north down to Reverchon Park to the south. Also connecting these areas is the former M.K.& T. railroad right of way, now the Katy Trail. Plans have been drawn for a connection from the KHT to the Katy Trail incorporating a bike ramp and the reconstruction of the unbuilt stairway originally designed by Wright and drawn by Kelly Oliver in 1960.

CURRENT CONDITION

Current Building Condition

An *Immediate Needs Assessment for the Kalita Humphreys Theater* (See Section 9, Construction Dates) recommended priorities for maintenance and repairs. Generally, the underlying structure of the original building was found to be intact and in good condition, except for the parapet walls of the original East Balcony Terrace and several staircases, which have been removed and/or encased. The 1968 walls of the Education Wing are battered (sloped) and create a condition for ongoing moisture penetration. Improvements are needed in mechanical, electrical, and plumbing systems and technical equipment. Interior and exterior finishes need refurbishment and/or restoration. There are ADA/TAS compliance issues. Original furnishings have been removed. The 1959 driveway is deteriorated and landscaped areas have been paved or have suffered from erosion.

To date there is no Historic Structure Report (HSR) that fully documents the building's history, condition and standards for maintenance and/or restoration.

Current Site Condition

The theater building is accessed by a driveway (13 parking spaces) and parking lot (30 parking spaces) to the north. An additional parking lot (59 spaces) was created to the south of the KHT, with parking (27 spaces) along a driveway paralleling Lemmon Ave. At one time Sylvan Drive was closed to traffic overnight. While two of four gates are still in place, they are no longer supervised and are always open. The looping system of driveways and persistent disregard of the one-way direction has resulted in the use of the park for "cruising" throughout the day and evening, a deterrent to full use of the park by others.

A Conceptual Site Plan drafted in 2003 for the DTC Facilities Committee, with the input of Park officials, and Booziotis and Company Architects, has proposed that the original site be considered a historic zone and that the long-term goal be to return this zone to its original condition. The historic driveway leading to the Entry Terrace is steeper than ADA limits permit and a secondary pedestrian access must be maintained.

The Park and Recreation Department has created a Vegetation Management Strategy for Dean Park, which includes "View Corridors" to the KHT. These areas for selective pruning and clearing are part of an overall plan to enable the KHT to be visible from adjacent streets.

The Heldt Administration Building, added in 1989, is sited prominently on the crest of the hill just north of and slightly above the theater. The proximity and size of the new building fundamentally changes the experience of seeing the theater building as a sculptural form in its natural setting. This kind of competitive siting is specifically discouraged by the Secretary of the Interior Guidelines for historic buildings.

Plans are underway to reconstruct the original configuration of streetlights on the east side of Sylvan Drive. The south side is lit by tall mercury vapor streetlights that detract from the aesthetic of the park, and do not light the heavily vegetated banks of the creek area at street level. Overall park lighting and pathways should be studied to improve security.

Visitors have trouble locating the KHT from the adjacent streets because no signs exist from the surrounding access streets to the building, which is surrounded by vegetation within the park.

There is an eight-foot diameter underground storm sewer pipe that bisects the area from the theater building to Lemmon in an east-west direction. It deposits street debris from as far away as McKinney Avenue into the creek just below the theater site. This debris is trapped by a boom. The City of Dallas has not proposed a solution to ameliorate this situation.

Suggestions have been made for additional out-of-doors functions such as children's theater and storytelling areas, refreshment kiosks or carts, outdoor amenities for joggers, outdoor performing arts and music venues, and a trolley stop. The building is under a flight path to Love Field and the decibel level should be considered in planning outdoor uses.

13. Architectural History—Original Building Design and Construction

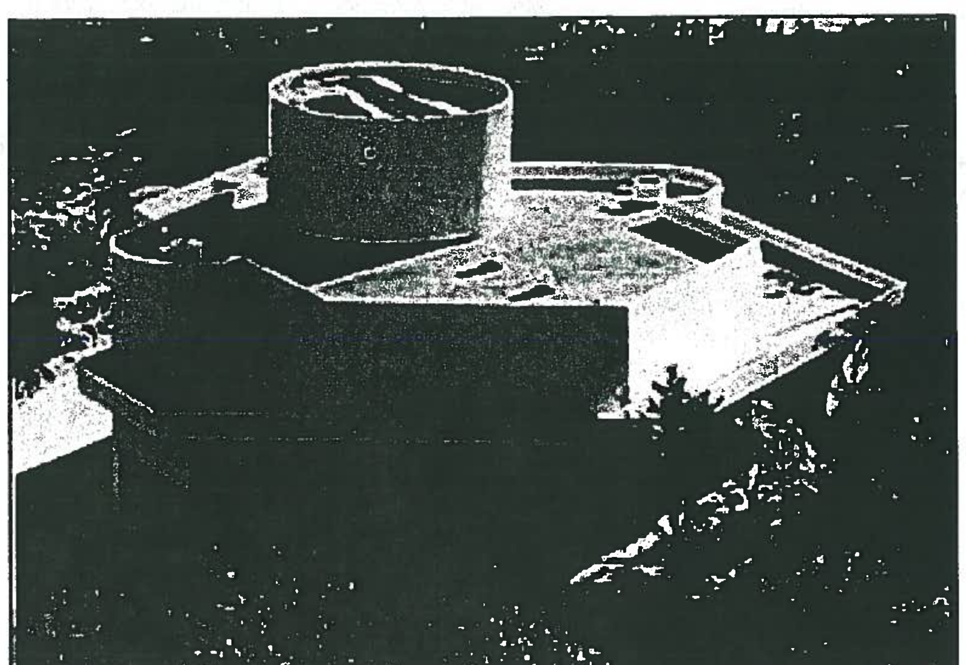
INTRODUCTION

The Kalita Humphreys Theater (KHT) has the distinction of being the only extant free-standing theater fully designed by Wright under construction before his death. The ultimate realization of Wright's vision for the "New Theater," the facility was hailed as the most innovative and interesting theater building in the country when it opened in 1959. The building was illustrative of the visionary founders of the Dallas Theater Center organization and its daring artistic director, Paul Baker. It influenced the design of the many community-based theaters that sprang up after World War II.

The modified thrust stage and open proscenium, creating an intimate connection between actor and audience, were the result of a structural tour de force unique to this theater building. The KHT was also on the cutting edge of theater technology with its motor-driven winches and lighting controls by George Izenour.

The monolithic concrete building was a combination of curved and angular forms typical of Wright's late-period public projects. The vertical cylindrical forms of the four-and-a-half story building, encircled by horizontal cantilevered decks, presented a sculptural façade, both monumental and dynamic, within a wooded park setting. The entire building was based on a 60/120-degree equilateral parallelogram, such that there were virtually no right angles. The unit-system organized not only the floor plan, but also many of the details from the smallest design of the window shapes to the facetted columns and the built-in furniture.

The KHT was unique for its structural experimentation, its unusual theater layout, the spare simplicity of its concrete shell and muscular elegance of its dramatic forms. These qualities, even in its altered state today, are still apparent. The quality of the architecture along with the cultural importance of the theater organization, events, and director cannot be overstated.



DTC Files

ORIGINAL BUILDING DESIGN

Architect and Site Selection

The DTC Building Committee was looking for an architect with a national reputation and considered both O'Neil Ford and Mies Van der Rohe before deciding on Wright. The Building Committee chose Frank Lloyd Wright as the architect to bring imagination and expertise to the project, to match the daring, innovative character of their accomplished theater director, Paul Baker.

The Turtle Creek area, just north of downtown, was developed according to the 1911 George Kessler Plan, and the site was one of the few remaining large tracts of land in 1955. Stanley Marcus, President of Neiman-Marcus Department Stores, enthusiastically endorsed this central location for the theater (Cory 27). Sylvan Baer intended to allot part of the Turtle Creek land for a large art center and concert hall (DMNews, 1957), but he placed so many conditions on the use of the site that the DTC almost returned the land to him. There was no provision on the site for parking; neither would Baer allow the road to be widened to accommodate it, but he did provide a bridge easement over Turtle Creek.

Wright first visited the site in August of 1955 and was delighted with the natural vegetation and the prominent rock outcroppings along the contours of the hill. From the east lot line, near the M.K. & T. Railroad tracks, to the west boundary at Sylvan Drive, the site had a total vertical fall of about 30 feet. There was a natural swale down the fall line along the north lot line, exposing an undulating line of limestone outcroppings. (See Section 11, Site Description, p.7.)

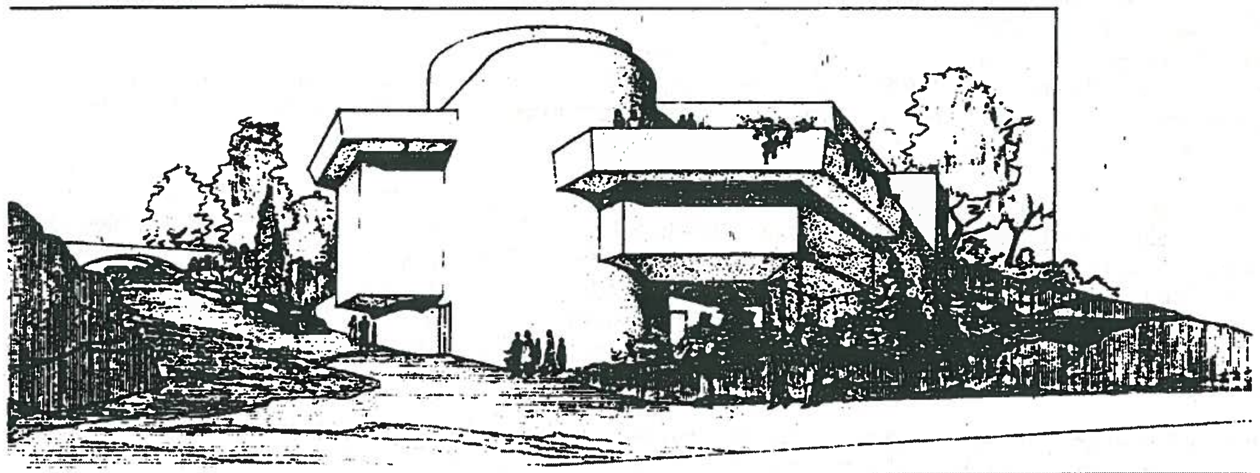
Program

The DTC founders wanted to create a community ensemble theater group that also had a strong education mission and would produce a full season of high-quality productions, both classical and modern. The original program called for a medium-sized theater, with offices for the director and a small administrative staff, as well as backstage dressing and costuming areas and a scene shop. All of this, and the driveways, were to fit on the 1.2-acre site within an original budget of $500,000. By the end of construction, in spite of cuts in the program, the construction costs and fees reached $1,000,000.

In September of 1955, the Building Committee visited Wright's studio in Wisconsin, Taliesin East, and heard his concept for the "New Theater," beginning with his several iterations of the theater for Aline Barnsdall at Olive Hill, California, 1915 -1925. Here, stage and auditorium shared the same ceiling and one scheme included a cyclorama in the rear of the stage. Wright had been influenced by Kabuki theater in Japan and had provided a stage revolve and music balconies for the theater within the Imperial Hotel in Tokyo (now demolished). Wright also showed the Building Committee his latest configurations for theaters in New Haven, 1931, and Hartford, Connecticut, 1949, both unrealized. Wright's basic concept aligned with that of the director, Paul Baker—the space for audience and actor should be melded to form a more intimate setting conducive to modern productions, and the architecture should facilitate the technical aspects of handling scenery, lighting and acoustics.

Siting and Massing

In contrast to Wright's earlier drawings of the Hartford Theater of 1949, sited on a smooth knoll, this vision for the Dallas theater was more engaged with its site and had greater clarity of its geometric forms than his earlier concepts. Popular misconceptions about the way the KHT was oriented toward the back of the site have arisen through lack of understanding about the original condition. Wright 's early renderings from November of 1955 showed a building deftly tucked into its site but also extending out along the hill and to the creek. Originally, a main ceremonial drive and promenade with fountains and overlooks angled from Turtle Creek Boulevard. The driveway was rendered as though it were a river, with the bridge at the top to reinforce the metaphor, recalling Fallingwater, Wright's seminal residence built for the Kaufmans in 1936. The bridge over the drive, the bridge over the creek, and numerous fountains en route reinforced the water imagery. Ultimately, neither of the bridges was built, the land for the parking uphill was not acquired, and only the Entry Terrace Fountain remained in the plans, next to a truncated circular driveway.



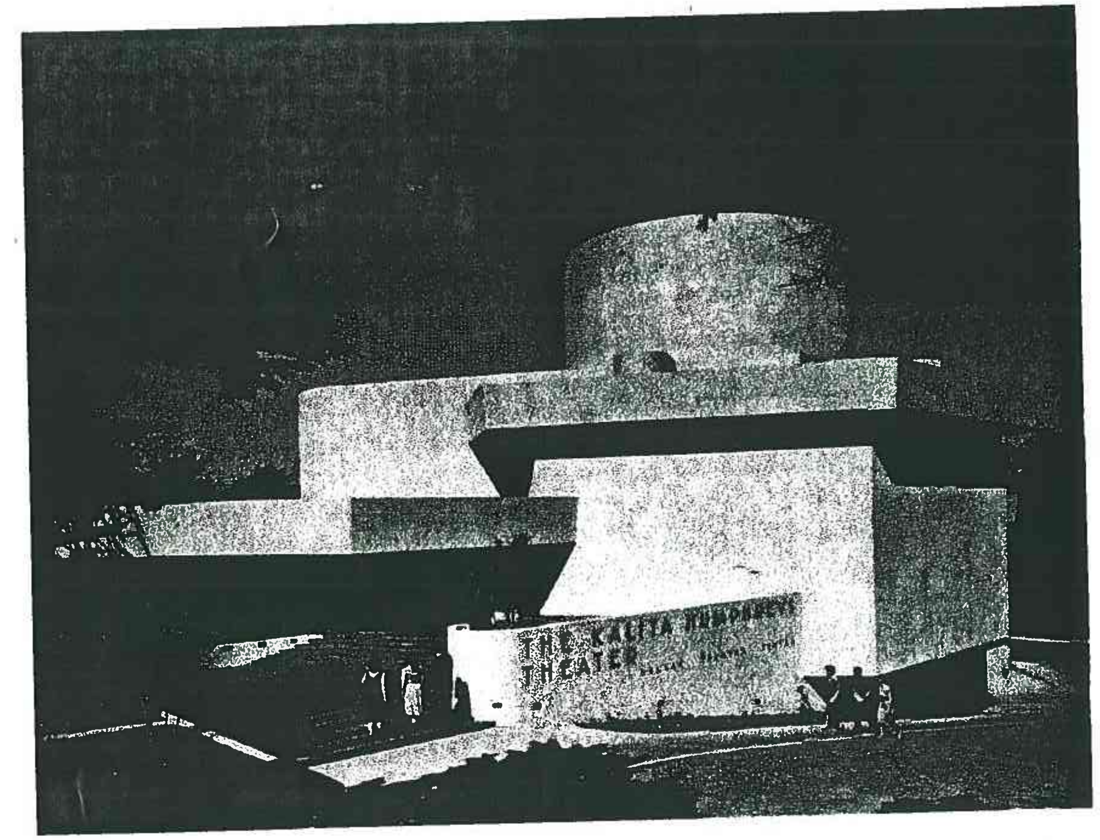
Sylvan Drive, then, became the main approach to the site, and the pedestrian route to the main Entry Terrace was via the driveway itself. The intermingling of automobile circulation and building space, which characterized the design for the KHT, is found in many of Wright's public building designs.

This gradual progression into the building, from Sylvan Drive, was a series of turns that oriented the visitor, with framed vistas, to each direction of the building setting. Each part of the approach sequence allowed the visitor to experience spaces created between the building forms and the natural forms of the rocky undulating landscape. The dialogue between the site and the building was as architecturally significant as the building itself.

As central and beautiful as the site was, it had the disadvantage of being obscured from view from any of the surrounding streets or access points. Wright's concept for a tall cylinder of smooth, light-colored concrete gave the building the prominent aspect necessary to advertise its presence from a distance. In addition to providing visibility, however, vertical stacking of uses was Wright's only option on this tight site. Not only did he have to meet the basic functional requirements for a theater and all of its attendant functions, but Wright had also to provide separate entrances for the patrons, service vehicles, and actors on only 1.2 acres.

To modulate the height of the concrete monolith, Wright created a series of horizontal lines, stacked cantilevered levels, punctuated by horizontal bands of windows, which stratified the monolith. In the renderings, the soaring concrete decks, draped with vegetation, appeared as extensions of the natural rocky ledges, and the point was visually clear—the building was built landscape, fully integrated into its natural setting. Kelly Oliver, the Taliesin apprentice who supervised the project, confirmed, "It was meant to grow out of the hill" (Interview, 2002). The levels also recall a building designed by Wright that was an institutional building in an urban setting, the Guggenheim Museum, in New York, in progress from 1943 to 1959.

The foundation for the building was cut into the bedrock of the sloping site. The basement scene shop was below grade on the uphill side while on the downhill side it opened to the street. The main level for the Entry Foyer and the Auditorium was at grade on the uphill side, while on the downhill side that same level was high above the street. Thus while the uphill spaces had a low intimate feel, the building on the downhill side was high, like a promontory overlooking the creek. This contrast of sheltering cave-like spaces leading to promontory-like terraces was emblematic of Wright's work.

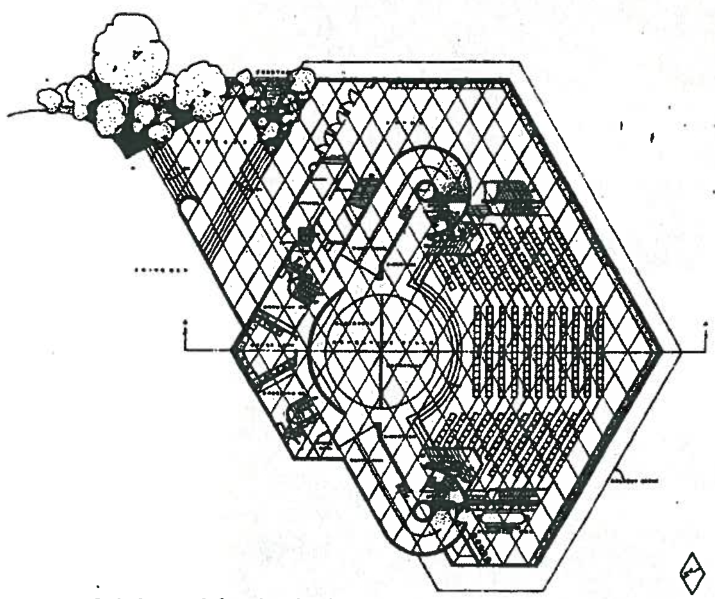


DTC Files

Entry Terrace/Foyer
At the Entry Terrace, two levels of landscaped terraces led to the low entry area guarded by only two gold columns. Here the roof canopy nearly touched the ground, making the building appear to grow out of the hill. Adding to the grotto-like feeling of this outdoor space was the sound of water from the fountain and the play of its reflections on the soffit of the cantilever above. The complex articulation of the Entry Terrace created the only area of the building where the definition between inside and outside space was blurred. In contrast to the closed form of the theater auditorium, this kind of transition space, so characteristic of Wright's designs, only happened here at this original entrance. This area of the original building should be noted as being particularly architecturally significant.

The pages included in this report do not represent the historic ordinance in its entirety. These are selected pages with the greatest relevance to the proposed work.

Building Plan
The building was designed on a grid of equilateral parallelograms, an organizational method that permeated the design at all scales, which Wright referred to as the "unit-system." Related examples of the equilateral parallelogram unit can be found in houses as early as the forties. Precedents of buildings combining round forms, such as the "hemi-cycle" houses, are numerous. Precedents for round forms combined with angular or orthogonal geometries include the 1955 Greek Annunciation Orthodox Church, Wauwatosa, 1955-61.



Building System—Reinforced Concrete
Wright's choice of a reinforced concrete building system had many environmental benefits. Acoustical privacy was of paramount importance for a theater, which was just downhill from the railroad to the east as well as under the flight path to Love Field to the west. The monolithic concrete shell could also provide insulation from the Texas heat, and the reinforced concrete cantilevers could create overhangs to shield the linear windows from the sun. For a public building, concrete gave appropriate solidity and a feeling of permanence. About this monolithic theater, with characteristic hubris, Wright said that someday "this theater will mark the spot where Dallas once stood" (Cory, 72).

Wright called concrete a "neutral" and "moldable" material because it took the shape of the formwork into which it was poured. Wright's earliest use of reinforced concrete was in Unity Temple, 1904, Oak Park Illinois, where the shapes were blocky and rectilinear. By the thirties Wright was exploring the fluid rounded lines possible with this plastic material. It was the material of choice for many public buildings that had need for shielded, quiet interiors, at a remove from the outside world, such as the Greek Annunciation Orthodox Church, the Guggenheim, and the unbuilt Crescent Opera, Baghdad.

As compared with all other institutional projects, the KHT had a greater percentage of planar concrete surface, and the least amount of decorative detail. Because of this simplicity, almost austerity, of form following function, the theater was arguably one of the most "modern" of Wright's edifices.

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