Thomas Wolfe Auditorium
U.S. CELLULAR CENTER
Ashville, North Carolina

Report of Impact to Structural due to Recommended Renovations

Prepared for
Threshold Acoustics

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INTRODUCTION

Thomas Wolfe Auditorium

The Thomas Wolfe Auditorium is the result of an evolution of construction and renovations since its debut as the New Municipal Auditorium (1939-1974). The original building was designed by architect was Lindsey M. Grudger to cover 20,000 square feet and have a seating capacity of over 3,000 persons with a level floor capable of being converted to a ballroom.

The site in front and adjacent to the existing Auditorium was developed into the Asheville Civic Center Complex. The Complex was opened in June of 1974. Following the completion and opening of the new facilities, the Auditorium underwent renovation construction. The lead Architect for this renovation was John Cort. The renovation resulted in the current Thomas Wolfe Auditorium ad was opened on Sunday, December 13, 1975.

Various studies have been made in the past decade in order to determine the feasibility of reviving this Auditorium. The purpose of this study is to evaluate the feasibility of various improvements that are proposed to revive this facility and the impact the modifications would have on the current structure.

Observation and Analysis

For this study Walter P. Moore has:

- Reviewed the available existing documentation of the auditorium.
- Conducted a two-day site visit to review the existing conditions, visually compare the existing structure to the provided documentation, access and view areas, and interviewed knowledgeable staff and tenants for structurally related items.
- Attended two performances to observe the setup and use of the facility for a symphonic event and a theater/show event.
- Viewed the structure for evidence of major structural distress, areas of deterioration, and to identify visible potential or suspected structural problem areas.
- Select review of exposed floors, columns, beams, and walls.

- Evaluated the auditorium as an existing building in light of the North Carolina 2015 Existing Building Code and the International Building Code.
- Work with the team to evaluate the proposed modifications so as to prepare a final report outlining the basic recommendations.

Structural Seismic Code Compliance Plan

For any modifications to existing building the work must be in compliance with the local city and state building codes. Compliance with the intent of the appropriate code sections of the currently enforced building codes are most critical for the proposed renovation project. Complying with these sections is intended to assure that the modifications made do not put the public at any greater risk under a seismic event than that in the current building condition.

Seismic upgrades for this building would be a major undertaking of technically challenging work, with great impact to operations and extremely costly construction. The scope of this study is intended to review modifications proposed by Threshold Acoustics for improving the acoustics and functionality of the auditorium and to identify that work that would or would not trigger a seismic upgrade of the existing building structure. If done in a systematic manner the impact of the renovation will not require the existing structures be seismically upgraded and thus would comply with the intent of the “existing buildings” sections of the codes.

BUILDING CODE IMPLICATIONS

Summary of the Implications of the North Carolina State Building Code for Existing Structures

Compliance with the sections of the currently enforced building code are the most critical for the proposed project. The primary code is the NCSBC 2015 which refers to more specific codes such as the North Carolina Existing Building Code and the North Carolina Rehab Code. Similar code sections include Chapter 34 of the International Building Code which is in kind adopted by North Carolina.

North Carolina Existing Building Code - 2015 Edition

The 2015 NC Existing Building Code has been adopted by the BCC and approved by the RRC with a March 1, 2015 effective date. The 1995 NC Existing Building Code will expire on March 1, 2015. The NC Rehabilitation Code will remain effective until March 1, 2018 (3-year overlap).

Any construction or renovation to an existing structure other than a repair or addition must comply with the applicable provisions of the 2015 North Carolina Existing Build Code. The code divides work done to an existing building into the following categories: Alterations are classified as Level 1 (Renovation - former NC Rehab designation), Level 2 (Alteration – former NC Rehab designation), and Level 3 (Reconstruction – former NC Rehab designation).

Much of the work proposed that is likely cost effective for the Thomas Wolfe Auditorium will fall within the Level 2 category. Level 2 Alterations must follow SECTION 807 STRUCTURAL [B] 807.5 Existing structural elements resisting lateral loads. The fundamental premise for this section is that the work shall not cause any diminution of existing structural strength below that which exists at the time of application for a permit or that which is required by the applicable codes of the North Carolina State Building Code, whichever is lower. This is fundamentally similar to the concept of no increased risk to the public after the work than that which currently exists.

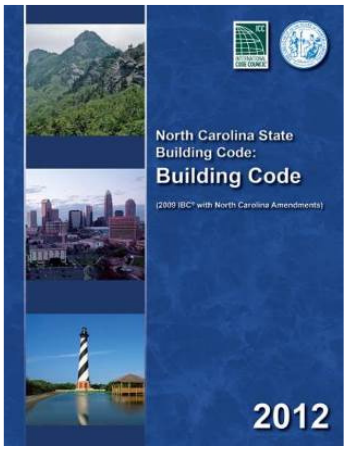
The North Carolina Rehab Code

The North Carolina Rehab Code was the first building code in North Carolina written specifically for existing buildings. The code provisions directed the required modifications away from the dependence on new buildings as the correct measuring safety guide.

The code made it easier and less expensive for owners to rehabilitate existing buildings. In addition, the Rehab Code encouraged the upgrade of buildings and also supported the affordable housing efforts. Except when otherwise specified, this code manages all building matters concerning repair, renovation, alteration, reconstruction, change of use, and additions.

IBC 2012 Chapter 34 for Existing Structures

Similarly the Existing Building Sections 3412.1 Compliance and 3412.2.4 Alterations and repair, are the most important structural provisions for this project. Complying with these sections can assure that the modifications made do not put the public at any greater risk under a seismic event that in the current condition.



SECTION 3404 ALTERATIONS

This section of the code indicates that any alterations to any building or structure shall comply with the requirement of the code for new construction. The section indicates that alterations shall be such that the existing building or structure is no less complying with the provisions of this code than the existing building or structure was prior to the alteration.

Section 3404.4 deals with existing structural elements that carrying lateral loads and in situations where the alteration increases design lateral loads based on the new building loading section in chapter 16, or where the alteration results in a structural irregularity as defined in ASCE 7, or where the alteration decreases the capacity of any existing lateral load-carrying structural element, the structure of the altered building or structure shall be shown to meet the requirements of Sections 1609 and 1613. For most old existing buildings, the lateral capacity generally will not meet the requirement of these sections.

The is an exception in which any existing lateral load-carrying structural element whose demand-capacity ratio with the alteration considered is no more than its demand-capacity ratio with the alteration ignored shall be permitted to remain unaltered. For this exception, comparisons of demand-capacity ratios and calculations of design lateral loads, forces, and capacities shall account for the cumulative effects of additions and alterations since original construction.

SECTION 3412 COMPLIANCE ALTERNATIVES:

The provisions of this section are intended to maintain or increase the current degree of public safety, health and general welfare in existing buildings while permitting repair, alteration, addition and change of occupancy without requiring a seismic upgrade.

Specifically section 3412.2.4 focuses on parameters for alterations and repairs which would allow current owners to make reasonable modifications to existing building without taking on an extreme financial burden. Hence, an existing building or portion thereof, which does not comply with the requirements of the code for new construction, shall not be altered or repaired in such a manner that results in the building being less safe than such building is currently. If the alteration or repair results in a reduced level of safety, the portion that is altered or repaired shall now conform to the requirements of specific chapters of the code for new construction.

RENOVATION WORK PLAN FOR CODE COMPLIANCE

Thomas Wolfe Auditorium Renovation Work Plan

The Thomas Wolfe Auditorium Renovation "Structural Seismic Code Compliance Plan" is as follows:

1. Maintain the current lateral load resisting systems intact.
2. Minimize floor penetrations through the existing floor slabs that participate as lateral load resisting slab frames.
3. Reduce the building mass symmetrically in plan and at each of the floor levels or roof by removing and replacing the CMU or Brick partition walls with conventional gypsum stud walls, removing and replacing old plaster ceilings with new ceilings, and or the removal of portions of floor where determined not to be essential to the function of the primary structure. The change in the building weight including the new partitions, cheek walls, seating, or ceilings must be less than the current weight plus no more than 5%. The method to keep track of this is to identify fixed building components that are removed such as ceilings where that weight which is the mass is deposited into the "mass bank" and then modifications that add weight back to the building withdraw a mass credit from the bank. The intent is to at the end of the renovation add less than 5% mass, by the tabulation, above the current mass.
4. The distribution of the building mass, aka weight, needs to remain balanced to maintain the center of building mass to within a few percent so as not to create a torsional irregularity.
5. The distribution of the building mass needs to be maintained somewhat in proportion from floor to floor based on the current ratio but can become less the higher up the floor is.
6. Use the currently adopted building codes for the design of any and all additions or alterations to the existing clinic buildings including those cited earlier in the report.
7. Modifications must be made such the risk to the public during a seismic event cannot be any higher than under the current structural system.

8. Proposed modifications must be of reasonable cost and constructible by local trades.
9. Any new structures must be 100% self-supporting and comply with the building codes for new structures.

If followed accordingly and the scope of renovations are in conformance with the “Structural Seismic Code Compliance Plan” then the modifications can be made and avoid a financially and technically challenging seismic upgrade and results in a renovated building that still complies with the intent of the locally adopted building code.

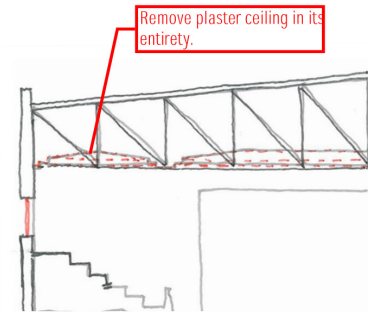
For conditions of extreme modifications, extensive studies would be necessary to determine the extent to which a seismic upgrade might be required.

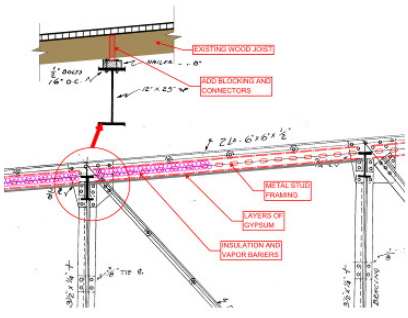
MODERATE RENOVATION PROJECTS

Moderate Renovation Projects following Threshold Acoustic's Outline

The following italicized bullet point list is a summary of the recommendations by Threshold Acoustics. WPM structural commentary is provided in bold. The use of terms such as mass credits or use of mass credits is relative to the balancing of the building overall mass and its distribution per the Renovation Work Plan noted above. *WPM cost comments are noted in blue italic. These estimates are in the form of added material in place of various complexity. All cost references are relative to basic structural cost including factors such as access, level of detail and difficulty of installation. A more comprehensive form of cost comparison is presented by the cost estimator.*

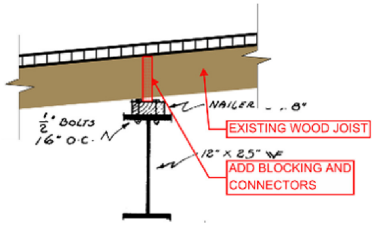
Ceiling Revisions

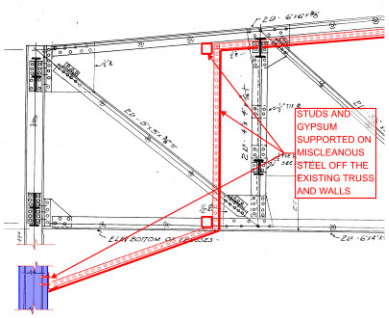


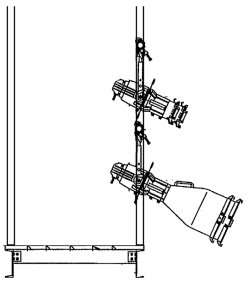


Work in this section includes revisions and additions to the upper portion of the house. Refer to Sketches 01 and 02.

- *Remove the existing plaster ceiling in its entirety, including support structure behind.* This recommendation is of high value as the removal of the existing plaster ceiling reduces building mass which will allow the installation a similar mass in the form of a better acoustic ceiling as noted below. It is a low cost but high positive mass credit impact to structure. *For estimating there is a demolition cost but no added structural cost associated with this modification.*
- *Remove brick infill from original windows along the upper galleries.* ***Condition and in turn reduces building mass having a small positive*** impact to structure. *For estimating there is a demolition cost but no added structural cost associated with this modification.*
- *Install four layers of drywall to the underside of the wood joists.* This is recommendation is dependent on the removal of the existing plaster ceiling as noted above. It is a moderate cost item

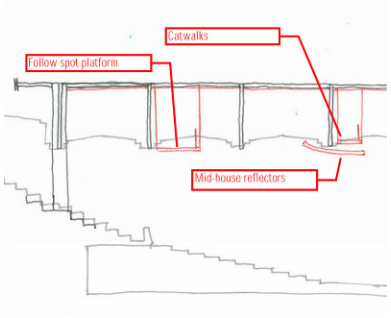


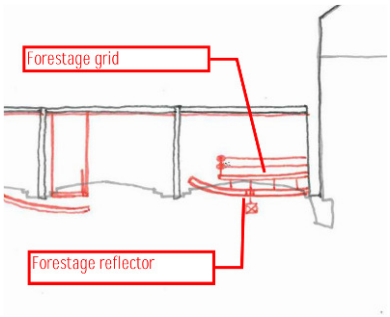


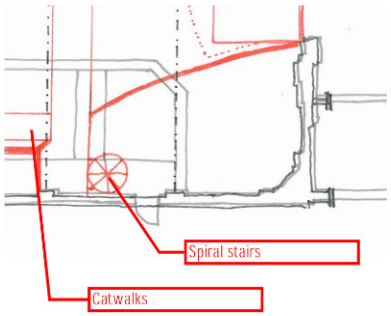


as the actual construction to add the drywall to the underside of the roof joist will require the addition of wood blocking and positive connections along the perimeter support condition between the roof diaphragm and the walls. This item uses a considerable amount of the mass credit coming from the removal of the old ceiling noted above. *For estimating assume metal stud framing which can span up to 20 feet with drywall attaching to the existing roof trusses at the nodes. Allow 14 tons of small sized complicated steel to make connections to the existing steel. Also assume blocking and metal connectors will be required at most of the existing wood joist to nailers. Supplemental clamping or strapping of the wood joist and roof diaphragm to the steel beams, steel trusses and perimeter walls is likely to be required to create a better and more structurally sound load path.*

- *Apply intumescent paint to newly-exposed trusses. Paint the remaining exposed walls and new drywall at the underside of the by scaffolding.* This has a relative null impact to structure. *For estimating there is no added structural cost associated with this modifications.*
- *Install new acoustically-rated window assemblies in the exposed original penetrations along the galleries on both sides.* This has high value, low cost, and small positive mass credit impact to structure. *For estimating there is no added structural cost associated with this modifications.*
- *Construct a soffit in the upper corners of the room (within the height of the trusses) running the full length of the room to house ductwork and support reverberation. Construct this out of metal framing and four layers of drywall. Paint.* The ability to make this modification is dependent on the mass credits accumulated from the removal of the ceiling and the removal of the mechanical equipment noted in the mechanical section below. It uses the mass credits to create a better acoustical volume and MEP distribution path. *For estimating assume metal stud framing with drywall attached the existing structure. Allow 8 tons total of small sized complicated steel along the length of the soffits.*





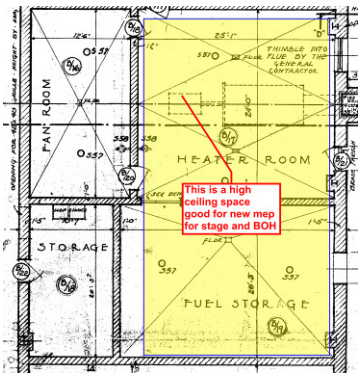


- *Install a network of catwalks, including two follow spot platforms. Assume metal grate flooring, guard rails at 21" and 42", and an additional light pipe on the front (up stage) side of the two catwalks.* This work will require some local moderate structural cost to make connections for the support of the items. It uses some of the mass credits from the demolitions noted above and needs to consist of light steel construction. *For estimating assume complicated small structural framing attached the existing structure to support and brace the new catwalks. The catwalk allowance shall be based on typical per square foot cost. Allow 10 tons additional small sized complicated steel along the catwalk to make miscellaneous connections that might not be in a cost per sf estimate.*
- *Install a forestage grid for rigging loud speakers, box trusses, the forestage reflector, and temporary scenic elements.* This renovation will have a moderate cost as supplemental structure will need to be added to carry part of the added load. The item will also use mass credits generated from the above demolitions. *For estimating assume complicated small structural framing attached the existing steel truss structure and the proscenium wall to support and brace the new forestage grid. The forestage grid allowance shall be based on typical per foot cost. Allow 10 tons additional of small sized complicated steel.*
- *Install a forestage reflector hung from the forestage grid, and two mid-house reflectors hung from each of the catwalks. Construct these out of metal framing and three layers of drywall.* This renovation will have a moderate cost as supplemental structure will need to be added to carry part of the added load. The item will also use mass credits generated from the above demolitions. *For estimating assume the structural cost is included in the above allowance.*
- *Install a spiral stair on each side of the house within the new cheek walls to connect the gallery level with the forestage grid/catwalk level.* This is a high value, low cost item will very little impact to the structure and use of mass credits.

Mechanical Systems

Work in this section involves the replacement and relocation of HAVC equipment serving the house and stage. Refer to Sketch 03.

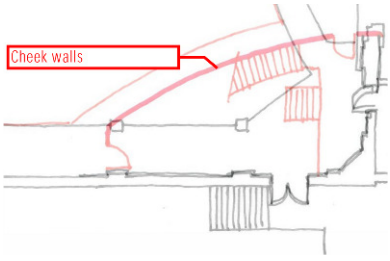
- *Remove the two mechanical units suspended above the ceiling of the auditorium (which will be demolished) and all accompanying ductwork, including the supply air doghouse.* This is a high value item for many reasons including providing a significant mass credit for use in other renovations noted above in and around the roof, ceiling, and catwalks. This has a net positive impact to structure. *For estimating there is no added structural cost associated with this modifications*
- *Remove the mechanical unit serving the stage located in the enclosure constructed on stage left. Demolish this enclosure in its entirety.* This item is a high value modification that will basically help to return the structure to that of the original design reducing mass that was added in a previous renovation. *For estimating there is no added structural cost associated with this modifications. There will be cost to add portions of the floor back in to create functional space but that will be included in other areas.*
- *Install new mechanical units to serve the auditorium. Locate these units on the roof above the lobby addition constructed in the 1970's. Provide supply and return ductwork to the auditorium through the newly installed soffits (described above).* This modification is necessary and has no impact to the existing auditorium but will require a moderate cost to prepare the lobby addition to support the added load and mass. It is a high value item because the mass is not being added back to the existing auditorium but is being added to the lobby expansion structure that is a more up to date structure. *For estimating there will be added steel dunnage at the new roof of about 5 tons. Some retrofit of the existing structure is likely to be needed but a seismic upgrade of the existing structure is not anticipated. Include an additional 5 tons of complicated structural steel to be installed via scaffolding to support the new unit on the existing structure.*

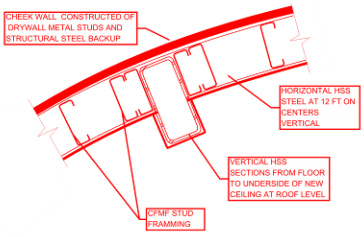


- *Install a new mechanical unit to serve the stage. Locate this unit in the basement beneath the dressing room level. Provide new supply and return ductwork.* This modification is a high value and moderate cost item. The impact to structure will be the installation of support structure for the MEP unit and the creations of openings in the floors to allow for ducting. The weight for supplemental steel to support floor openings is offset by the weight of the concrete floor removed for a net zero add. It has a low to null impact to structure as only a small amount of duct is added and a small amount of floor is removed. The weight of the MEP unit will be located closer to the foundation having a low impact to the structure from a seismic standpoint. *For estimating there is no added structural cost associated with this modifications except for the support dunnage. Include 5 tons of structural steel for the dunnage. Also include the cost for creating openings in concrete floors and approximately 5 tons of additional miscellaneous steel to provide support at two primary floor openings.*

Cheek Walls

Work in this section includes construction of acoustically supportive walls adjacent to the stage just in front of the proscenium, known as "cheek walls." Refer to Sketches 04 and 05.

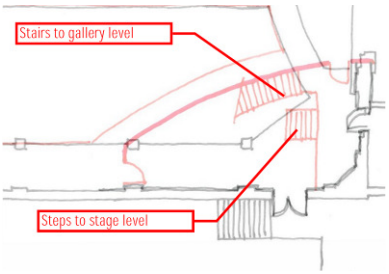




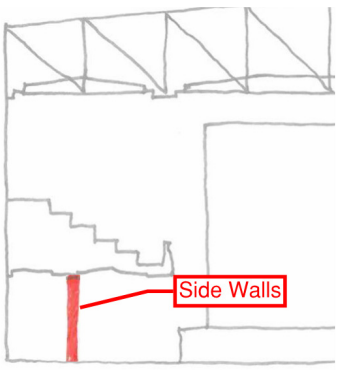
- *Construct curved cheek walls on both sides of the auditorium immediately in front of the proscenium opening from orchestra seating level to the underside of the roof deck. Assume metal framing with three layers of drywall on the outer side (facing the auditorium). Construct around the existing side gallery structure.* The installation of the cheek walls is obviously a high acoustical value and is a necessary modification. The construction must be as light weight as possible so that a relatively small amount of mass credit is used from that accumulated above. It must also be done in a symmetrical manner as noted. It is expected that a grid of HSS steel shapes will be required to create support for the metal studs and dry wall construction. Based on similar walls the vertical HSS sections are likely to be HSS 20x8 sections at 10 ft

on centers. It is a moderate use of any mass credits but must be carefully executed. *For estimating assume metal stud framing with drywall attached the existing structure. Allow for 16 tons of HSS 20x8 sections and 8 tons for curved horizontal support members. Allow an additional 6 tons total of small sized complicated steel at the ceiling for kickers to the existing structure and roof. And lastly add 8 tons of miscellaneous steel to be added below the floor to locally reinforce the support members.*

- *Construct steps within the cheek wall enclosures on both sides of the house connecting orchestra seating level with stage level. Include a wheelchair lift within the cheek wall enclosure on house left to provide an accessible route.* These steps use a relatively low amount of overall mass credits but is necessary for the functional use of the space. Light weight steel and concrete filled pan stairs is likely the best choice from a cost and mass standpoint. This modification requires the use of some mass credits and must be done in a symmetrical manner. The wheel chair lift will have a small impact to structure but mainly in a local manner. The use of a lift that does not require a pit to be cut into the floor structure is strongly encouraged so that the floor diaphragm in this area can be preserved for other potential floor cuts. *For estimating other than the cost of the stairs, there is no added structural cost associated with this modifications.*



- *Construct stairs within the cheek wall enclosures on both sides to connect stage level with the gallery level.* The comments on this modification is similar to that above for the addition of stairs between the orchestra seat and stage noted above. *For estimating there is no added structural cost associated with this modifications except for the stairs.*



Side Walls

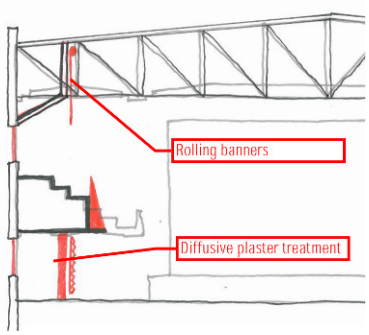
Work in this section includes construction of walls to narrow the acoustic space at the orchestra seating level. Refer to Sketch 06.

- *Construct new walls at the orchestra seating level between the new cheek walls and the existing cross aisle location.* This modification will use mass credits which will need to be identified.

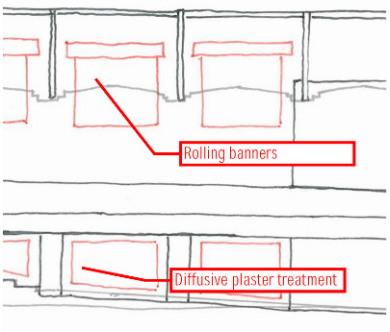
It may be that the soffit of the side bay could be replaced with a lighter weight ceiling allowing a mass credit to be used for the wall in that local area. The ceiling modification may already be necessary for MEP upgrades. It is a high value modification with a relatively low cost and null impact to structure if mass credits can be obtained from the ceiling in the corridor or possibly from the next item below. *For estimating other than the primary CFMF construction there is no added structural cost associated with this modifications.*

Variable and Permanent Acoustic Treatments

Work in this section includes elements placed within the space to improve the acoustic environment for both amplified and nonamplified performances. Refer to Sketch 07.



- *Install permanent diffusive elements along the side walls of the orchestra level seating and the upper galleries. Assume construction of pre-fabricated plaster panels that will be installed on the existing walls and finished. Note that if the plan option for the orchestra level seating with new walls constructed along the column line, the diffusion in these locations will be on the new wall instead of the existing wall.* This is of high value and low additional cost if already combined with the side gallery walls noted above. The additional impact to structure is null. *For estimating other than the primary construction there is no added structural cost associated with these modifications.*



- *Install mechanically-operated rolling banners within each structural bay at the upper corners of the room on both sides.* This is a high value low cost item with almost null impact to structure if combined with other modifications including the ceilings, MEP, and soffit enclosures. There would be minimal to no use of mass credits. *For estimating other than the primary construction there is no added structural cost associated with these modifications*
- *Install a walk-along curtain along the back wall of the house to cover the full surface of the wall. This curtain will be housed in a pocket when not deployed. Note that if the option to reconfigure the balcony and move the rear wall forward is selected (described*

below under the Major Renovation Projects section), then this curtain will be installed on this new wall. On its own this is a high value low cost item with almost null impact to structure if combined with other modifications including the ceilings, MEP, and soffit enclosures. There would be minimal to no use of mass credits. *For estimating other than the primary construction there is no added structural cost associated with these modifications.*

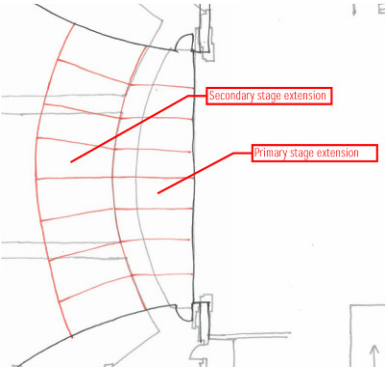
Seating

Replace theatrical seating throughout the auditorium. As different options described in this memo have affect the total seat count, provide costing on a per-seat basis so that final seat cost can be determined for various options. On its own this is a high value high cost item that is functionally necessary. This has almost null impact to and there would be a minimal add to no use of mass credits. *For estimating other than the seats and flooring there is no added structural cost associated with these modifications*

Stage Extension

Work in this section involves the purchase of a larger stage extension system. Refer to Sketch 08.

- *Purchase a new, larger stage extension system that can be manually deployed and disassembled. Provide the ability to have two options for stage extension size: the first a moderate extension useful for typical orchestral performances and certain types of non-theatrical productions, and the second an addition to the first allowing the stage to extend far into auditorium for particular orchestral performances.* These extensions are high value and low cost as compared to an equivalent Major Renovation noted below for hydraulic pits. The systems must be a light as possible and should be custom made to work efficiently with the other modifications such as the cheek walls and new seating. As this is a temporary condition, provided the systems are light in weight and the use is limited to Symphonic and Theatrical events this will have a null effect on the structure load capacity and



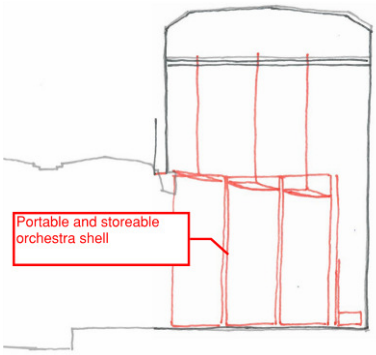
the mass use or credit would not be considered because of the random temporary use of the stage extension and that they are generally not fixed to the primary structure. *For estimating other than the cost of the stage extensions there is no added structural cost associated with these modifications.*

Proscenium

- *Demolish decorative plaster proscenium to increase proscenium size. Remove back to primary structure – approximately two feet on each side and at the head. Refinish edges with plaster.* This is a high value low cost modification that will have a null effect on the structure and could add a small amount of mass credit depending on the true amount of material removed. *For estimating other than the cost of the demolition and repair there is no added structural cost associated with this modifications*

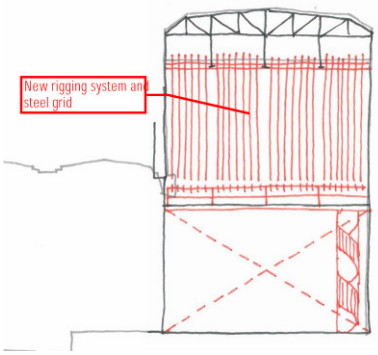
Orchestra Shell

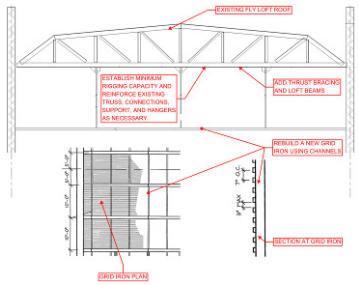
Work in the section involves the purchase of a new orchestra shell on stage. Refer to Sketch 09.

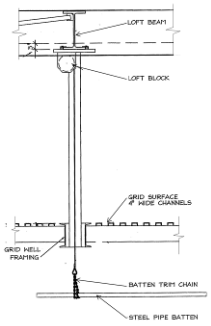


- *Purchase a new orchestra shell designed specifically for the stage and house. Assume 11 towers at 25 feet tall, plus three ceiling panels that will be suspended from the rigging system.* The shell like the stage extensions are high value and low cost as compared to permanent solutions. The shell wall system should be custom made to work efficiently with the other modifications such as the cheek walls, proscenium modifications, stage extensions and etc. As this is a relatively light temporary condition, this will have a null effect on the structural load capacity and the mass would not be tracked as it is part of a normal variable stage load and because it is not fixed to the primary structure. *For estimating there is no added structural cost associated with this modifications except that which would be required to create a storage space.*

Rigging







Work in this section involves replacement of the rigging system. Refer to Sketch 10.

- *Remove the existing hemp rigging system and wood grid.* This is a high theatrical value and potentially high cost if fully replaced. However, it is the writer's opinion after made a site visit, that this system along with other associated elements should be upgraded irrespective of the decisions made due to this report.
- *Construct a new steel grid and install a new double-purchase rigging system. Assume 24 fly lines, including 3 electric lines and 3 lines dedicated to the new orchestra shell ceiling as described above.* This is a high theatrical and safety value and potentially high cost if fully replaced. However, it is the writer's opinion after having made a site visit, that this system along with other associated elements should be upgraded irrespective of the decisions made due to this report. Supplemental Structure would need to be added and if not done in a "light weight" manner could upset the mass credits available. The mass credits available would be that generated by removing the current hemp rigging and wood grid which does not weigh much. Effort needed for this evaluation would require input from the AOR and a Theatrical consultant in order to reach a final decision. *For estimating there is a significant added structural cost associated with this modifications*
- *Install new access ladders to connect the existing fly loft to the new grid.* This is a high safety value and low relative cost. It is the writer's opinion, that this system along with other associated elements should be upgraded irrespective of the decisions made due to this report. *For estimating include an added structural cost associated with this modifications*

Electrical Panels

Work in the section involves electrical infrastructure supplying the theatrical elements of the stage house. Refer to Sketch 11.

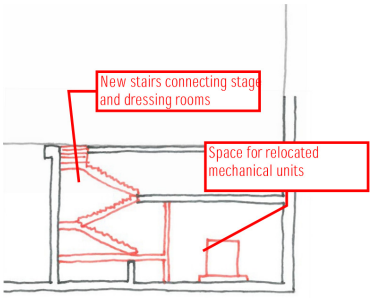
- *Demolish existing electrical panels on stage right and the partial height clay block wall on which they are hung.* This is a high safety value as it relocates the panels to a better position. This has little impact to structure but does add a small amount of mass credit.

For estimating other than the cost of the demolition and repair there is no added structural cost associated with this modifications

- *Provide new stage electrical panels. Relocate to either the upstage wall or the far stage right wall.* This is a high safety value and likely high cost but does not have any significant impact to structure except for the holes that will need to be made in the floor. This has no impact to the mass bank. *For estimating other than the cost of the demolition and repair there is no added structural cost associated with this modifications*
- *Provide new dimmer switches for theatrical lighting. Locate rack remotely from the stage.* The comment is similar to that above. *For estimating other than the cost of the demolition and repair there is no added structural cost associated with this modifications*

Dressing Room Renovation and Expansion

Work in the section includes improvements to the performers' quarters. Refer to Sketches 12, 13, and 14.



- *Demolish all existing dressing rooms, restrooms, and the green room at the dressing room level (directly beneath the stage).* This modification would be of high value and if the walls removed would add credit to the mass bank. *For estimating other than the cost of the demolition and repair there is no added structural cost associated with this modifications.*
- *Remove abandoned mechanical unit in the basement level. Relocate the mechanical unit serving the dressing room level to this location.* This modification would be of high value and if the MEP unit added back is equal to or weighs less will not have any impact to the structure or mass bank. Mechanical duct work and floor penetrations may be required and would need to be coordinated with the floor framing. Careful planning could result in a null impact to structure. *For estimating other than the cost of the demolition equipment and dunnage, there is no added structural cost associated with this modifications. This item is noted to some degree in the Mechanical Section earlier in the narrative.*
- *Construct stairs on stage left and stage right connecting the stage to the dressing room level and basement level.* This modification is

of high value, the cost would be moderate, and impact to structure would be minimal, net null contribution to the mass bank as the floor slab weight would be replaced by the weight of the new stairs. Some minor structure may be necessary to support the edges of the new opening. *For estimating other than the cost of the demolition, stairs, and stair installation, there is no added structural cost associated with this modifications. However if is the intent to include this along with other Major Renovations noted below a seismic upgrade of some sort would be anticipated due to loss of floor diaphragm..*

- *Construct new dressing rooms at the dressing room level. Assume 2 small (~100 sf) star performer dressing rooms with their own single-stall restrooms with showers, four medium (~200 sf) dressing rooms sharing two single-stall restrooms with showers, and a green room.* It is likely that these modifications would have null effect on the primary structure but would be of high value. *For estimating there is no added structural cost associated with this modifications.*

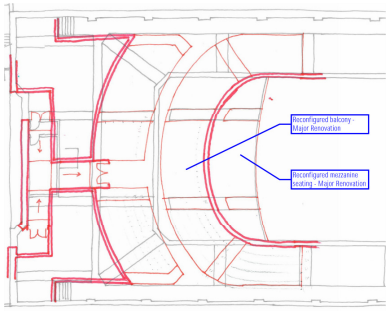
Paint

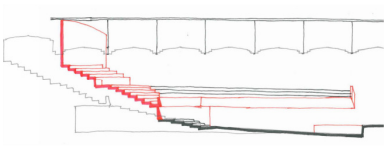
- *Repaint all remaining existing plaster.* This modification has no impact to structure. *For estimating there is no added structural cost associated with this modification*

Restroom

- *Renovate restrooms located off the main floor lobby and the lower lobby (a total of four restrooms).* These modifications may as local structural gravity load impact to structure requiring some reinforcing of existing structure, however it would be of high value and very low impact to the mass bank but could be of moderate expense depending on the available MEP. *For estimating there is no added structural cost associated with this modification unless there are major floor penetrations necessary.*

MAJOR RENOVATION PROJECTS





Descriptions of the Major Renovation Projects following Threshold Acoustic's Outline

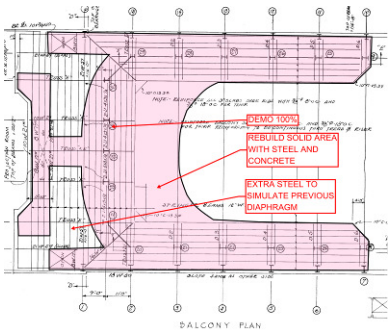
The following italicized bullet point list is a summary of the recommendations by Threshold Acoustics. WPM structural commentary is provided in bold. The use of terms such as mass credits or use of mass credits is relative to the balancing of the building overall mass and its distribution per the Renovation Work Plan noted above. *WPM cost comments are noted in blue italic. These estimates are in the form of added material in place of various complexity. All cost references are relative to basic structural cost including factors such as access, level of detail and difficulty of installation. A more comprehensive form of cost comparison is presented by the cost estimator.*

Note that the following items are not being included in the mass tabulations as most of these are unlikely to be permitted within the current budget. The tracking would require a significant number of qualifying assumptions that are not likely to be feasible.

Reconfigure Balcony

Work in this section involves a reconfigured balcony to create more intimacy between the audience and the performance, and to provide better patron accommodations. Refer to Sketch 15.

- *Construct a new balcony in front of the existing balcony, relocated approximately one structural bay forward of the existing balcony. Include a curved balcony face with diffusive plaster treatment, a curved cross-aisle, and reconfigured upper balcony area.* This modification is of very high value but at a very high cost and unless carefully planned would likely force a significant domino seismic structural upgrade. The modification would need to be made to rebuild the balcony diaphragm and to make sure that it is equal or better than original. Most of the concrete would need to be demolished to deposit this into the mass bank. Rebuilding of the floors would withdraw from the bank. It is likely that some of the existing steel structure would be replaced with some modification



or upgrade for local gravity load capacity to other members. The mass bank and distribution in plan would need to be closely monitored and ultimately balanced out or the result would cause the risk to the public to be greater than that of the current building configuration. An increased risk would trigger a seismic upgrade. Any and all of the undocumented sloped bowl construction from the 1970's must be removed and reworked to return the structure to the intent under which the building was originally permitted. *For estimating assume that this work would be equivalent to a full demolition of the interior balcony and seating areas and a rebuild at a premium structural cost. Allow for approximately 20 psf of highly detail complicated structural steel to rebuild the balcony. This would amount to almost 100 tons for the approximately 100 foot x 100 foot renovation. The concrete volume would need to be reduced to allow for the extensive amount of steel. Assume 120 CY of 5000 psi in place concrete with 20 tons of reinforcing bars for the walkways and seating. Should the rebuild weight be too great, more expensive but lighter stadium type composite seating might be used.*

- *Construct a new curved rear wall.* This modification must work in harmony with the purposed work in the section above. It in conjunction with the other modifications in this section are of high value but very high cost. Ultimately some space may be abandoned to allow for a net positive balance in the mass bank. *For estimating assume metal stud framing with drywall attached and braced to the existing structure.*
- *Demolish a portion of the existing balcony risers to make way for a new vomitory connecting the new cross aisle with the existing conference room located behind the existing rear wall of the auditorium. Include doors to create a sound and light lock. Construct ramps along the connecting path to adjust to the elevation difference between the cross aisle and the conference room (~two feet). Create penetrations through the existing back wall of the auditorium building (the former exterior wall of the auditorium).* This modification must work in harmony with the purposed work in the sections above. It is a high value and very

high cost modification and would require that two door openings be cut through the existing wall above the main entrance. Existing upper balcony structural steel would need to be modified or removed to allow the construction of the two entrance corridors that combine to create a vomitory. The spaces to the sides below the new upper balcony would need to be removed and abandoned to allow for a credit into the mass bank to allow the construction. Likewise a trussed horizontal steel grid would need to be installed to replace the old balcony diaphragm. *For estimating assume that this is already part of the above for primary steel. Add the floor and ramps for the vomitory and wall penetrations through the Thomas Wolfe back wall to the above estimates. Add 4 tons of structural steel for the reinforcing of the new wall penetrations.*

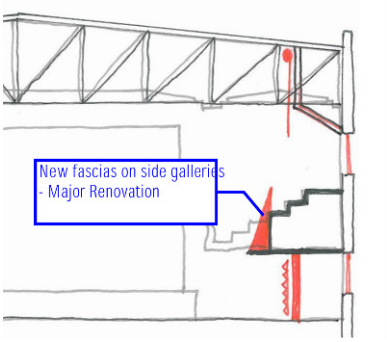
- *Construct a wall between the existing mezzanine seating risers and the underside of the new balcony.* This modification must work in harmony with the purposed work in the section above. It in conjunction with the other modifications in this section are of high value but very high cost. Ultimately some space may be abandoned to allow for a net positive balance in the mass bank. *For estimating this is already part of the original major structural modifications. Add any wall increases due to this modification.*
- *Replace the balcony face of the side galleries with new diffusive plaster treatment. This item assumes that the option to remove the first two rows of the side galleries (described below) has not been accepted. .* This modification must work in harmony with the purposed work in the section above and below. *For estimating this is already part of the original major structural modifications. Add any wall increases due to this modification.*
- *Install a second set of doors at the rear exits of the auditorium to create sound and light locks.* This is a high value and low cost modification that would have a relatively null effect on the primary base structure. *For estimating there is no added structural cost associated with this modification.*
- *Renovate the finishes in the existing conference room.* For the most part these modifications do not impact the primary structure.

For estimating there is no added structural cost associated with this modification.

- *Construct two additional multi-person restrooms adjacent to the existing conference room.* These modifications may as local structural gravity load impact to structure requiring some reinforcing of existing structure, however it would be of high value and very low impact to the mass bank but could be of moderate expense depending on the available MEP. *For estimating there is no added structural cost associated with this modification unless there is a cost associated with floor penetrations.*

Remove Portion of Side Galleries

Work in this sections includes demolition of portions of the side galleries to improve sight lines to the new stage extension. Refer to Sketch 16.



- *Demolish the first two rows of both of the side galleries.* This modification would deposit mass into the bank but would as noted above have a negative effect on the stiffness of the balcony diaphragm action. A net positive deposit in the mass bank would be expected. In this area and the removal of the balcony cantilevers would reduce the depth of the balcony which would result in some negative impact on the lateral diaphragm. Some stiffening of the remaining depth may or may not be required as the impact to the overall structure would require significant investment of time. However if combined with the other major modifications it is NOT likely that this in conjunction to the other modifications can be done without triggering a seismic upgrade. *For estimating assume that the major modification is not being made so the ends of the balconies is removed, stiffened and re-cladded. Allow for 16 tons of intricate steel to provide added stiffness to the shallower balcony.*
- *Install a new fascia and rail along the exposed face of the shortened side galleries. Assume prefabricated diffusive plaster panels installed over a framed wall.* This modification would use some of the mass that was deposited leaving a net credit, however the negative effect on the stiffness of the balcony

diaphragm action may be difficult to overcome. *For estimating assume the structural cost are similar to the previous modification.*

- *Note that the reconfiguration of the balcony as described above would need to be modified to integrate with the shortened side galleries.* It is unclear as to what this modification DOES. The impact of shortening the length of side galleries parallel to the outside wall could be detrimental. If that is the meaning then the outside wall would lose too much stiffness that was provide by the balcony diaphragm. Solutions would likely require open steel horizontal truss work to brace the wall at the balcony height and defeat the purpose. Assume this is not a viable option. *For estimating assume the structural cost are not able to be estimated.*

Orchestra Level Side Galleries

Work in this section includes construction of raised seating galleries at the orchestra seating level. Refer to Sketch 06.

- *Construct raised seating sections in front of the new side walls at the orchestra seating level.* This modification would be a high value and low cost in proportion to the other related components of the modification. This would need to be carefully designed so as to minimize any use of mass credits. Any mass added in the 1970's modifications must be removed. *For estimating assume that this will only require local demolition and a light build floor using knee walls, deck, and concrete that would be self-supporting as it would be built on the existing floor. There would be no other added structural cost associated with this modifications.*

Pit Lift System

Work in this section involves the installation of an orchestra pit lift system. Refer to Sketch 08.

- *Demolish a portion of the orchestra seating level floor (both the original structural floor and the topping slab added later). Provide supporting structure around the penetration as required. This will include demolition of an existing structural steel beam encased in*

concrete located one structural bay downstage of the proscenium. See combined response below.

- *Construct a raised floor and walls enclosing a new wagon storage areas.* See combined response below.
- *Install a pit lift system consisting of:*
  - *One pit lifts, each of which can be positioned independently at the new wagon storage level, an orchestra pit level, audience seating level, and stage level.* See combined response below.
  - *Chair wagons for the pit lift that can be rolled from the wagon storage areas onto the lift and raised to audience level to provide seating.* See combined response below.
- *Note that this option would be in lieu of the purchase of both stage extension system as described above.* See combined response below.

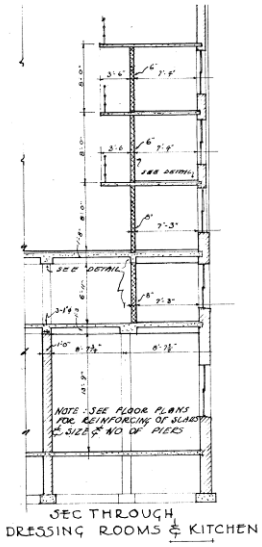
Combined response:

The above modifications would be of very high value at a high cost. To avoid a seismic upgrade the pit size and opening should be minimized. The impact to structure is not significant if the pit opening is small as compared to the whole floor diaphragm. If a small lift is used a dressing stair opening at the stage would be acceptable. The addition of supplemental wagon storage under the seating area is a good value at a low cost and little impact to the primary lateral structure. *For estimating assume that the option is to include a small pit and lift with a wagon storage in the assembly area. Assume that approximately 20 tons of structural steel will be needed to reinforce the opening.*

Additional Rigging Improvements

Work in this section involves replacement and expansion of the rigging infrastructure. Refer to Sketch 10.

- *Demolish three levels of existing dressing rooms and the fly loft located stage right.* This modification is of high value, deposits mass in the bank, but would require that the new fly loft below be stiff enough to replace the combined effects of the dressing room

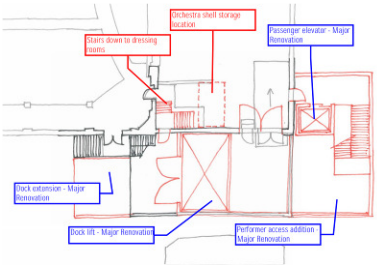


floors. By comparison to the other side it is likely that this is governed by the amount of window area. *For estimating there is no added structural cost associated with this modification.*

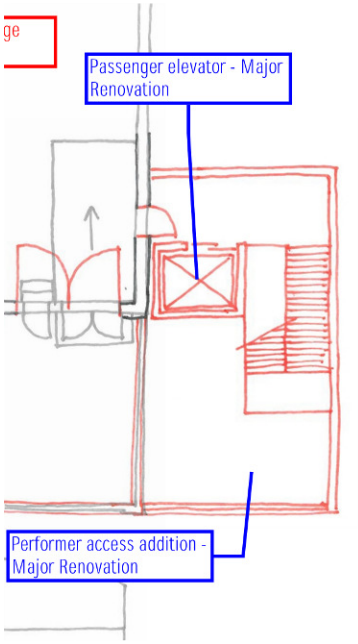
- *Construct a new fly loft located stage right midway up the height of the stage house (positioned to work with a doublepurchase system) to maximize the wing space available under the loft. Install a spiral stair in the northwest corner of the stage to connect stage level to the new fly loft and the new grid.* This modification is a high value and moderate cost but would need to respond to the structural impact of removing the dressing room floors. *For estimating include approximately 20 tons of structural steel for this modification in addition to all of the specialty members..*
- *Construct a new pinrail gallery located stage left midway up the height of the stage house (level with the new fly loft). For estimating include approximately 5 tons of structural steel for this modification.*
- *Construct a spiral stair connection stage level to the new pinrail gallery.* This is a high value modification of relatively small cost as related to the addition of the all the other fly loft and rigging cost. It has very low impact to structure. *For estimating there is no added structural cost associated with this modification.*
- *Note that work in this section is in addition to the rigging project described in the Moderate Renovation above.*

Loading Dock Addition

Work in this section includes improvements to the load-in and crew/performer access to the loading dock, stage, and dressing rooms. Refer to Sketches 12, 13, and 14.



- *Construct an addition on the southeast corner of the stage to house. Assume the structure underneath the new platform lift and loading dock will be exposed steel pylons. Include the following access-related items:*
  - *At ground level, a performer's entrance and security check point (when required for shows) with access to a passenger elevator and stairs connecting to the loading*



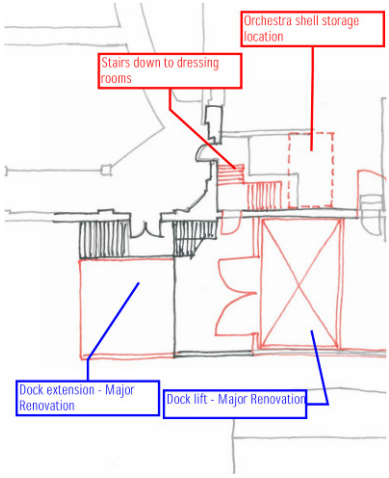
dock, dressing rooms, and stairs. See combined comment below.

- *At dressing room level, access to the passenger elevator and stairs.* See combined comment below.
- *At loading dock/stage levels, a large platform lift connecting the loading dock to the stage level, new large loading doors into the stage, and access to the passenger elevator and stairs.* See combined comment below.

· *Expand the loading dock platform outside the new addition to create additional staging area for loading and unloading of trucks.* See combined comment below.

· The following is a combined comment on the above proposed modifications which would complete the basic needs for the functioning of the back of house and stage. For most of these modifications there would be little to null impact to the base structure as most of the work would involve standalone independent structures. The cost would be high as an elevator would be involved but the structure would (could) be very simple..

Based on the site visit the best value would be obtained if these structures were all new. Adding onto the existing loading dock would likely involve workaround's and strengthening of what concrete, steel and masonry in-fill. The entire structure could be made of composite steel and braced frames for quick erection. Infill of the steep ramp to create a flat access is a high value as witnessed during the load-in and load-out of the two venues that were observed. It is the writer's opinion that the loading dock and ramp to the stage should be updated irrespective of the direction of the future work. *For estimating assume that this work would be equivalent to the addition of a multistory enclosed elevator and stair tower. Allow for approximately 20 psf of moderately detail complicated structural steel for the building. This would amount to almost 16 tons for the addition. Assume normal steel braced frames with steel beams, 3" 20 gage metal deck, composite studs and 41/2 inches of concrete topping. Assume spread footings for*



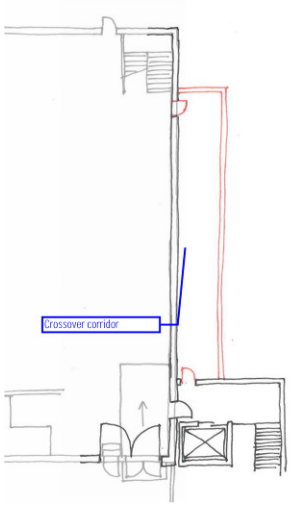
the foundations. Assume roof deck with rigid insulation. The façade will be brick with CMU backup. An alternative would be metal stud backup while a third would use metal stud and metal panel.

For estimating assume that the loading docks will use galvanized steel braced frames (approximately 30 tons) with concrete slabs. An alternative would be a CIP concrete footings, columns, and floors. Assume (10) 2'x2' reinforced concrete columns on spread footings with an 8" thick concrete slab and 24"x24" beams on all sides and 10 feet on centers max. Total reinforcing for a multilevel loading dock of approximately 20'x 80' is 20 tons of galvanized rebar.

Replacing the floor slab and installing new stairs to the dressing rooms below would have little impact on the primary structure. Only local floor construction and reinforcing would be required. Coordination of the impact to structure when cutting the access stairs with the possible installation of a pit lift opening would be critical. *For estimating there is no added structural cost associated with this modification.*

Stage Crossover

Work in this section involves the construction of a stage crossover for performers to use during performances. This work assumes the option for the loading dock addition (described above) has been selected. Refer to Sketch 17.



Install a new crossover corridor behind the stage. Construct with framed walls with exterior masonry cladding. This modification would be a high value and relatively low cost depending on the ability to install foundations below. If a standalone structure it would have null impact to the base structure. *For estimating assume that this work would be equivalent to the addition of a single story covered enclosed. Allow for 10 tons of simply detailed structural steel for the building. Assume normal steel braced frames with steel beams, 3" 20 gage metal deck, composite studs and 41/2 inches of concrete topping. Assume spread footings for*

the foundations. Assume roof deck with rigid insulation. The façade will be brick with CMU backup. An alternative would be metal stud backup while a third would use metal stud and metal panel.

- *Assume the corridor addition is constructed on exposed metal structure below (not enclosed).* This modification would be a high value and relatively low cost. If a standalone structure it would have null impact to the base structure and if light weight would be less costly. *For estimating this would be similar to that above with the enclosure removed.*

Symphony Offices

- *Renovate approximately 1200 square feet of space in the basement level into office space for 8 staff members.* This modification has no impact to structure. *For estimating there is no added structural cost associated with this modification unless there are major floor penetrations necessary.*

SUMMARY

This report has been prepared to assist Threshold Acoustics and the owner to understand the nature and type of limitations that must be adhered to in order to make reasonable modifications to the existing building to improve the acoustical properties of the hall. Tangible modifications but not directly associated with acoustical modifications have also been evaluated. One such example is the Stage Crossover which reduces the potential for unwanted acoustical sources that would deter the quality of the performance.

It is the writer's opinion that the owner could greatly improve the functionality of the facility by acting on many of the Moderate Renovation Projects. It is likely that the most value but at the highest cost, will come from the demolition of the existing ceiling and addition of a new gypsum ceiling at the roof line.

Although not directly addressed by the writer, it is possible that slight modifications to the balcony seating to angle the interior corners could be accomplished without a structural concern. The writer would recommend this alteration rather than any of the Major Renovation Projects associated with the reconfiguration of the balcony.

It is the writers opinion that other value added Moderate Renovation Projects include those such as the catwalks, follow spots, reflectors, proscenium enlargement, seating, replacement of windows and doors, addition of stairs and ladders, double vestibule doors, and 100% of the MEP and related modifications. Most of which seem essential to the basic functionality of the venue.

The writer would suggest that the owner consider the use of the temporary platform extension first and if necessary only the implementation of a small pit elevator. The larger single pit openings are too costly and of a radical nature to be even suggested.

Finally, it is the writer's strong opinion that appropriate modifications to the Rigging Loft, Fly Grid, Stair and Ladder access along with other associated elements should be acted upon irrespective of the decisions made due to this report. To a lesser degree, the writer is also of the opinion that the loading dock and steep stage ramp should also be renovated irrespective of other work to be done on the facility.

LIMITATIONS

This report has been prepared to assist Threshold Acoustics and the owner to understand the nature and type of limitations that must be adhered to in order to comply with the structural and structural seismic provisions of the building codes. The ultimate intent is to maintain and or reduce the risk to the public during a seismic event to that risk under the current structural system. The “Structural Seismic Code Compliance Plan” presented herein is intended to serve as a guiding document.

Comments in this report are not intended to be comprehensive but are representative of conditions deemed appropriate for the intended use. In this study Walter P Moore did not review of the design or preform a detailed analysis of the existing buildings to verify adequacy of these structures to carry the imposed loads nor to check conformance to all of the applicable codes under the original construction and or for the proposed work.

It is Walter P Moore’s understanding that the local code official will have the jurisdiction to assign the appropriate code editions and sections that must be followed for the specific work what would be done. It is understood that various categories of work will invoke particular codes and or code sections.

Moving forward, a complete feasibility analysis including the current team members, Local Code Officials, Code Consultants, Architects, Theater Consultants, Diagnostics Engineers, MEP Engineers and other specialist would be required.

REFERENCES

2015 North Carolina Existing Building Code®

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2012 NC Rehabilitation Code

Effective Date: January 1, 2015

APPENDIX
BUILDING MASS LEDGER

THOMAS WOLFE AUDITORIUM RENOVATION
Building Mass Bank
(DOES NOT ACCOUNT FOR SPACIAL POSITION)

	CATEGORY RED IS A CREDIT	DEPOSIT +1	WITH-DRAWL -1	DEPOSIT KIPS	WITH-DRAWL KIPS	BANK BALANCE KIPS	% OF TOTAL %	CATEGORY WEIGHT KIPS	LUMP ITEM KIPS	PLAN WIDTH FT	PLAN LENGTH FT	PLAN HEIGHT FT	WALL THICKNESS FT	WALL WEIGHT PCF	WALL WEIGHT KIPS	ROOF WEIGHT PSF	ROOF WEIGHT KIPS	FLOOR WEIGHT PSF	LVL 1 FLOOR WEIGHT KIPS	CEILING WEIGHT PSF	CEILING WEIGHT KIPS
BASE	PRIMARY BOX	1.0		3562	0	3562	36.1%	3562		100.0	140.0	57.3	1.5	120	2477	35	245	100	700	20	140
BASE	FLY HOUSE BOX	1.0		2763	0	2763	28.0%	2763		100.0	40.0	91.0	1.5	120	2293	35	70	200	400		0
BASE	FLY HOUSE INTERSTIAL FLOOR	1.0		250	0	250	2.5%	250		100.0	40.0				0		0	120	240	5	10
BASE	STAIR TOWERS LEFT BOX	1.0		862	0	862	8.7%	862		30.0	30.0	65.0	1.5	120	702	35	16	300	135	20	9
BASE	STAIR TOWERS RIGHTBOX	1.0		862	0	862	8.7%	862		30.0	30.0	65.0	1.5	120	702	35	16	300	135	20	9
BASE	ENTRANCE LOBBY	1.0		365	0	365	3.7%	365		30.0	50.0	57.3	0.5	120	275	35	26	50	38	35	26
BASE	SOUTH BALCONY	1.0		148	0	148	1.5%	148		20.0	80.0				0		0	150	120	35	28
BASE	NORTH BALCONY	1.0		148	0	148	1.5%	148		20.0	80.0				0		0	150	120	35	28
BASE	UPPER BACK BALCONY	1.0		555	0	555	5.6%	555		100.0	60.0				0		0	150	450	35	105
BASE	PROJECTOR ROOM	1.0		52	0	52	0.5%	52		10.0	20.0	10.0	1.0	120	36		0	120	12	35	4
BASE	MEP ROOM IN ROOF TRUSS	2.0		136	0	136	1.4%	68	20	20.0	20.0	10.0	1.0	60	24		0	120	24		0
BASE	FLY GRID	1.0		40	0	40	0.4%	40		100.0	40.0				0		0	20	40		0
BASE	ASSEMBLY ROOM CEILING	1.0		105	0	105	1.1%	105		100.0	210.0				0		0		0	10	105
BASE				0	0	0	0.0%	0							0		0		0		0
BASE				0	0	0	0.0%	0							0		0		0		0
BASE				0	0	0	0.0%	0							0		0		0		0
DEMOLITION	REMOVE CEILING		-1.0	0	-350	-350	-3.6%	350		100.0	200.0	0.0	0.0	0	0	0	0	0	0	35	350
DEMOLITION	REMOVE SIDE CEILINGS AT BALCONY		-2.0	0	-56	-56	-0.6%	28		20.0	80.0				0		0		0	35	28
DEMOLITION	REMOVE PROJECTOR ROOM		-1.0	0	-52	-52	-0.5%	52		10.0	20.0	10.0	1.0	120	36		0	120	12	35	4
DEMOLITION	MEP ROOM IN ROOF TRUSS		-2.0	0	-116	-116	-1.2%	58	10	20.0	20.0	10.0	1.0	60	24		0	120	24		0
DEMOLITION				0	0	0	0.0%	0							0		0		0		0
DEMOLITION				0	0	0	0.0%	0							0		0		0		0
REBUILD	GYPSUM CEILING (1.2 covers slope)	1.2		197	0	197	2.0%	164	14	100.0	200.0	0.0	0.0	0	0		0		0	15	150
REBUILD	ADD LINEAR MEP CHASE AT WALLS	2.0		58	0	58	0.6%	29	8	20.0	140.0				0		0		0	15	21
REBUILD	ADD CROSS CATWALKS	4.0		52	0	52	0.5%	13	10	3.0	100.0				0		0	20	3		0
REBUILD	ADD SIDE CATWALKS	2.0		16	0	16	0.2%	8	4	3.0	140.0				0		0	20	4		0
REBUILD	ADD FORESTAGE GRID	1.0		19	0	19	0.2%	19	10	15.0	60.0				0		0	20	9		0
REBUILD	ADD FORESTAGE REFLECTOR	1.0		6	0	6	0.1%	6		20.0	60.0				0		0	10	6		0
REBUILD	ADD 2 MID HOUSE REFLECTORS	2.0		7	0	7	0.1%	4		12.0	60.0				0		0	10	4		0
REBUILD	ADD CHEEK WALLS	2.0		201	0	201	2.0%	101	76	1.0	40.0	60.0	1.0	10	25		0		0		0
REBUILD	ADD STAIRS TO GALLERY AND STEPS	2.0		12	0	12	0.1%	6		60.0	4.0				0		0	50	6		0
REBUILD	ADD SOUND DOORS AND WALLS	2.0		12	0	12	0.1%	6		1.0	20.0	14.0	1.0	20	6		0		0		0
REBUILD				0	0	0	0.0%	0							0		0		0		0
REBUILD				0	0	0	0.0%	0							0		0		0		0
REBUILD				0	0	0	0.0%	0							0		0		0		0
	TOTALS			10427	-574	9854	100.0%														
	TOTAL BASE BUILDING			9847																	
	TOTAL DEMOLITION			-574																	
	TOTAL ADDITION			580																	
	DIFFERENCE (- IS GOOD)			7	0.07%	7															
	MAX IN EXCESS MASS ASPERCENTAGE				5.00%	521															
	MASS SPREAD TO WORK WITH				4.93%	515															