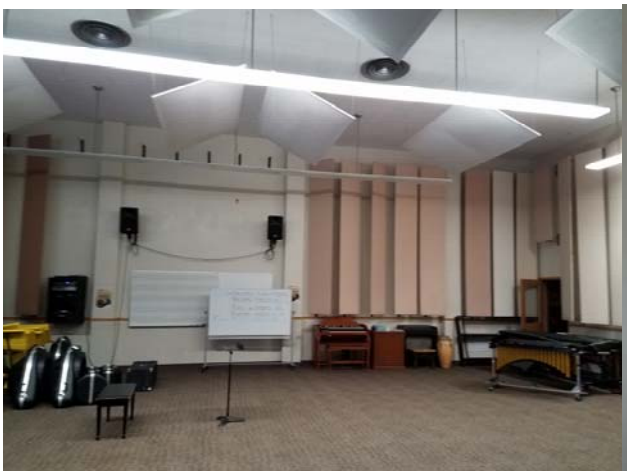
Facility Acoustic Study

For the

University of Idaho
Lionel Hampton School of Music

Ridenbaugh Hall & Music Building
Moscow, Idaho



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Updated: June 25, 2018

FACILITY ACOUSTIC STUDY

Lionel Hampton School of Music (LHSOM)
University of Idaho
Moscow, ID

Accreditation Improvements Summary

The following is a summary of the identified needs and possible corrections pertaining to sound control/acoustic issues at the UI Lionel Hampton School of Music (LHSOM) facilities that have been identified in the school's most recent accreditation findings. Analysis of the existing facility and proposed solutions identified have been completed as a part of this facility acoustic study following identified building industry standards, recommendations, building assemblies, and ratings for the building occupancies in order to respond to specific accreditation team concerns and to identify a gross magnitude of cost to correct these identified building system deficiencies.

1. **UI Facilities Included in UI LHSOM Accreditation Improvements Study-**
    a. **Ridenbaugh Hall**
        i. Practice Room Sound Improvements (individual practice)
        ii. Corner Office Sound Improvements (music instruction)
    b. **Music Building**
        i. Room 216 Sound Improvements- Group Practice Room (group practice)
        ii. Teaching Space Improvements (projection/sound/podium equipment)

2. **Building Noise Control Investigation-**
    a. **Sound Isolation Acoustic Characteristics of Building Assemblies**
        i. ***Sound Isolation of Practice Rooms-***
            1. The practice rooms included in this study are not acoustically isolated as identified in the most recent accreditation report. Due to this lack of sound isolation, sound is transmitted between practice rooms and the rest of the buildings. A careful investigation of the existing sound isolation issues was completed to establish a base for the sound isolation recommendations included in this report.
        ii. ***Sound Transmission Class (STC) Ratings-***
            1. A STC rating is a standard measurement of a building system's effectiveness in resisting transmission of airborne sound.
            2. It should be noted that a STC rating is a laboratory test and does not take into consideration weak points in the assembly such as penetrations or flanking.
            3. Change in perceived loudness relative to change in STC rating (per The Sound Book, National Gypsum)
                a. Change in STC rating of 3 = Just perceptible
                b. Change in STC rating of 5 = Clearly noticeable
                c. Change in STC rating of 10 = Twice as loud
                d. Change in STC rating of 20 = Four times as loud
        iii. ***Impact Insulation Class (IIC) Ratings-***
            1. An IIC rating is a standard test method for laboratory measurement of impact sound transmission through floor/ceiling assemblies.
            2. It should be noted that an IIC rating is also a laboratory test and does not take into consideration weak points in the assembly such as penetrations or flanking.
        iv. ***Industry Standard Publications Used in this Study for Determination of STC & IIC Ratings-***
            1. The following publications were used to determine sound isolation recommendations and applicable STC and IIC ratings of the existing and proposed building assemblies identified in this study.
            2. Wall Assemblies-
                a. Mechanical & Electrical Equipment for Buildings, McGuinness Stein Reynolds

b. Sound control for Commercial & Residential Buildings, NAIMA (North American Insulation Manufacturer's Assoc.)
c. Catalog of STC & IIC Ratings for Wall & Floor/Ceiling Assemblies, California Department of Health Services.

3. Floor/Ceiling Assemblies-
a. Mechanical & Electrical Equipment for Buildings, McGuinness Stein Reynolds
b. Catalog of STC & IIC Ratings for Wall & Floor/Ceiling Assemblies, California Department of Health Services.

b. **Acoustical Treatment of Practice Rooms**

i. ***Practice Room Acoustical Treatments-***

1. The individual practice rooms of Ridenbaugh Hall and the Group Practice Room (Room 216) of the Music Building are lacking acoustical treatments as identified in the most recent accreditation report. Due to this gross deficiency of these music learning environments, it is difficult for students to listen critically. A careful investigation of the existing room acoustical treatments was completed to establish a base for the acoustical treatments included in this report.

ii. ***Music Education Critical Listening-***

1. Critical listening is extremely important in music education where students should be able to learn and efficiently hear the differences in tone, dynamics, articulation, and balance.

iii. ***Healthy Music Learning Environment-***

1. The existing practice spaces have few characteristics that dissipate and absorb loudness within the rooms when practice and rehearsals take place.
2. Excessive noise levels within practice rooms without acoustical treatments and/or adequate volume to dissipate sound can have high sound-pressure levels well beyond OSHA recommended levels.

iv. ***Acoustical Treatment-***

1. Excessive loudness can be controlled with the appropriate combination of absorption and diffusion treatments.
2. Sound absorption occurs when sound contacts a fibrous material and is absorbed by the material.
3. Sound diffusion is where it comes in contact with reflective materials and broken and redirected within the space creating music clarity throughout the space.

v. ***Approaches to Enhance Critical Listening-***

1. This report includes three approaches to acoustical treatment:
a. Passive Acoustical Treatments- Absorber and diffuser panels are typically used to acoustically balance a music room.
b. Dynamic Acoustical Treatments- Adjustable acoustic panels such as Wenger's Tunable Acoustic Panels, allow the user to manually adjust panels so that a room can be adjusted acoustically to change a room's absorption characteristics and reverberation characteristics where flexibility is desired.
c. Active Acoustical Treatments- Active acoustical design such as Wenger's VAE (Virtual Acoustic Environment) Rehearsal System, uses absorption panels coupled with microphones and speakers to create varying acoustic environments at the push of a button. This approach allows for a music practice facility to truly flexible.

3. **UI Ridenbaugh Hall Accreditation Needs Identified-**

a. **Overview of Issues**

i. ***Summary of Issues Included in Study-***

1. Sound Control- Sound issues have been reviewed and possible solutions identified specific to the individual practice rooms and corner offices which are used for individual instruction. Sound isolation along with absorptive and diffusing characteristics within the practice rooms has been studied. Specific issues examined and possible solutions identified include: 1) walls between rooms, 2) floor/ceiling assemblies of rooms, 3) ceiling/attic assemblies of rooms, 4) existing assembly penetrations, 5) door assemblies, 6) window assemblies, and 7) sound control within the practice rooms.
2. Health & Learning- Resolving accreditation team concerns with practice spaces that protect student health and are conducive to music education learning and critical listening.

3. Historic Building- Balancing sound control issues with historic detailing will be critical to maintaining historical significance of the building.

ii. ***Sketches Developed-***
1. Sketches of the existing conditions and also possible sound control solutions have been included as graphic communication aids (see attached).

iii. ***Issues Not Included in Study-***
1. Specifically, issues not identified in the accreditation report have not been included in this study. Examination of the ability of existing hallways to absorb sound and how sound is traveling down the hallways is also not included by the owner in this study.

b. **Individual Room Sound Control Issues**

i. ***Sound Isolation- Via Walls between Rooms and Rooms to Hallway-***
1. Existing Wall Assembly Needs
   a. Existing practice room interior wall assemblies appear have a STC (Sound Transmission Class) rating of 40.
      i. This does not include wall assembly penetrations or sound flanking that may exist which would reduce sound efficiency of the wall.
   b. Wall assembly STC ratings should meet or exceed the following published industry recommendations:
      i. Practice Room to Practice Room- STC 50 (normal)
      ii. Practice Room to Practice Room- STC 55 (quiet)
      iii. Practice Room to Hall- STC 42 (normal)
      iv. Practice Room to Hall- STC 45 (quiet)
      v. A minimum level of recommended STC rating should be provided at the interior walls of the practice rooms to meet industry standards. A greater STC would increase the sound isolation characteristics of the room. Construction detailing will affect final sound isolation achieved.
   c. Wall assembly improvements should be provided exceeding the industry recommended minimums.
2. Possible Wall Assembly Improvements
   a. It is recommended that one of the following wall assembly improvement options be selected and completed to achieve the practice room industry recommended levels of at least STC 50 (normal) to STC 55 (quite) between practice rooms:
      i. Option A, Improve Existing Interior Wall Isolation Characteristics-
         1. Improve wall isolation characteristics of the existing practice room interior wall assemblies with the following improvements:
            a. Remove plaster finish from one side of wall.
            b. Insulate existing wall cavity.
            c. Install RC sound channels one side of wall.
            d. Install 2 layers of 5/8 inch gypsum wall board.
            e. Install second layer of 5/8 inch gypsum wall board at remaining finish side of wall.
            f. Sound seal all seams, perimeter, & penetrations of sound wall.
            g. Minimize electrical receptacle in sound wall.
            h. Best practices for sound control construction should be followed.
         2. Wall assembly STC rating proposed = 58 STC
            a. It should be noted that the existing hallway wall has a considerable number of penetrations making sound isolation of this wall extremely difficult.
         3. Option A advantages (pro)-
            a. Larger practice rooms of approximately 14’ x 9’-6” would be maintained.
            b. Preservation of the building’s historic windows could be easily accomplished with this option.
         4. Option A disadvantage (con)-
            a. Mechanical system and make-up air penetration issues of the hallway sound isolation wall would be much more difficult to resolve with the approach of

this option. Existing make-up air ducts connect directly between practice rooms and offices creating sound transfer issues.

ii. Option B, Modular Interior Wall Sound Isolation Installation-
   1. Improve wall isolation characteristics of the existing practice room wall assemblies through the addition of modular sound isolation room components. These component improvements would include:
      a. Installation of manufacturer's sound isolation room such as Wenger Soundlok.
      b. Create a recess at the corridor side of each practice room to creating a sound isolated practice room removing the existing HVAC and make-up air ducting from the actual practice room space.
      c. This approach would create practice rooms of approximately 10' x 9' in size.
   2. System components included as a part of this guaranteed sound isolation solution would include:
      a. Modular sound wall panels.
      b. Modular exterior wall panel with window (aligned with existing exterior window).
      c. Sound door assembly.
      d. Modular sound ceiling panels with integral air transfer sound silencers.
   3. Wall assembly STC Rating = STC of modular assembly by manufacturer
   4. Option B advantages (pros)-
      a. Much better sound isolation of the practice rooms could be achieved than the other two options.
      b. Manufacturer assembly would provide for guaranteed sound isolation of the room components used.
      c. Existing HVAC and make-up air systems would require less modification.
   5. Option B disadvantages (cons)-
      a. Effectively smaller practice rooms of approximately 10' x 8'-6" would be created.
      b. Preservation of the building's historic windows would require attention to detailing and may create maintenance issues (TBD). Sound windows located in the new modular exterior sound isolation wall (interior of the building's exterior wall) are typically fixed without access to existing exterior windows that they would be aligned with. This could be problematic for exterior window cleaning and maintenance.
      c. Added dead load weight of sound isolated practice rooms will need to be verified for structural support.
      d. Need to modify existing fire sprinkler system to include sound isolated practice rooms.
      e. Corner offices would require a solution similar to Option A. The modular sound isolation room approach does not appear to be a possible for the corner offices.

iii. Option C, Hybrid Framed Interior Wall Sound Isolation Improvements-
   1. Improve wall isolation characteristics of the existing practice room side wall assemblies with improvements matching Option A:
      a. Remove plaster finish from one side of wall.
      b. Insulate existing wall cavity.
      c. Install RC sound channels one side of wall.
      d. Install 2 layers of 5/8 inch gypsum wall board.

e. Install second layer of 5/8 inch gypsum wall board at remaining finish side of wall.
f. Sound seal all seams, perimeter, & penetrations of sound wall.
g. Minimize electrical receptacle in sound wall.
h. Best practices for sound control construction should be followed.

2. Construct an interior framed sound isolation wall separate of the existing HVAC and make-up air system similar to Option B.
    a. Frame a recess at the corridor side of each practice room to creating a sound isolated practice room removing the existing HVAC and make-up air ducting from the actual practice room space.
    b. This approach would create practice rooms of approximately 10' x 9'-6" in size.
    c. This would be similar to Option B.
3. Components included as a part of this sound isolation solution would include:
    a. Framed sound wall.
    b. Sound door assembly.
    c. Air transfer sound silencers.
4. Wall assembly STC rating proposed = 58 STC
5. Option C advantages (pros)-
    a. The effective sound isolation of the practice rooms of Option C is assumed to be much better than option A, but not as effective as Option B.
    b. Preservation of the building's historic windows could be easily accomplished with this Option. Ease of window access and maintenance would be maintained.
    c. Existing HVAC and make-up air systems should require less modification.
6. Option C disadvantages (cons)-
    a. Effectively smaller practice rooms of approximately 10' x 9'-6" would be created (slightly larger than Option B).
    b. Need to modify existing fire sprinkler system to include sound isolated practice rooms.
    c. Corner offices would require a solution similar to Option A. Adding a new room sound isolation wall (hybrid approach) does not appear to be a possible solution to the corner offices.

3. See Attached Sketches
    a. Sketches for UI Ridenbaugh Hall-
        i. ***RH 1***- Existing Ridenbaugh Hall Floor Plans
        ii. ***RH 2***- Existing Practice Room Photos
        iii. ***RH 3***- Sound Isolation Via Walls- Improve Existing Practice Rm Walls
        iv. ***RH 4***- Sound Isolation- Improve Existing Wall Detail
        v. ***RH 5***- Sound Isolation Via Modular Walls- Modular Plan
        vi. ***RH 6***- Sound Isolation-Modular Detail
        vii. ***RH 7***- Sound Isolation Via Hybrid Wall- Hybrid Plan
        viii. ***RH 8***- Sound Isolation- Hybrid Wall Detail

ii. ***<u>Sound Isolation Via Floors/Ceilings</u>- between Rooms-***

1. Existing Floor/Ceiling Assembly STC
    a. Existing practice room floor/ceiling assemblies appear have a STC (Sound Transmission Class) rating of 39.
        i. This does not include floor/ceiling assembly penetrations or sound flanking that may exist which would reduce sound efficiency of the wall.
    b. A desired STC rating of 55 is the minimum industry recommended level.

c. Floor/ceiling assembly improvements are recommended to meet the industry recommended minimum.

2. Existing Floor/Ceiling Assembly IIC (Impact Rating)
    a. The existing practice room floor/ceiling assembly appears to have an IIC (Impact Insulation Class) rating of 37.
    b. A desired IIC of 65 is the minimum level that is the industry recommended.
    c. Floor/ceiling assembly improvements are recommended to meet the industry recommended minimum.
3. Possible Floor/Ceiling Assembly Improvements
    a. It is recommended that the following floor/ceiling assembly improvements be completed to achieve practice room industry recommended levels of at least STC 55 and IIC 65:
        i. Remove existing plaster ceiling.
        ii. Fill floor/ceiling cavity with insulation.
        iii. Install RC sound channels on ceiling.
        iv. Install 2 layers of 5/8 inch gypsum wall board.
        v. Remove flooring.
        vi. Possible Floor Replacement: Install resilient tile with sound underlayment or carpet tile (not included in current itemized costs)
        vii. Sound seal all seams, perimeter, & penetrations of sound assembly.
        viii. Minimize ceiling light box penetrations.
    b. Floor/ceiling assembly STC rating proposed = 56 STC
    c. Floor/ceiling assembly IIC rating proposed = 62 IIC (prior to change of floor covering)
4. See Attached Sketch
    a. Sketch for UI Ridenbaugh Hall-
        i. ***RH 9***- Sound Isolation Via Floor/Ceiling- Detail

iii. ***<u>Sound Isolation Via Attic</u>- between Rooms (upper floor)-***

1. Existing Ceiling/Attic Assembly STC
    a. Existing practice room ceiling/attic assemblies appear have a STC (Sound Transmission Class) rating of 57.
        i. Sound currently travels over the existing walls between practice rooms through the attic via sound flanking.
        ii. This does not include ceiling/attic assembly penetrations or other sound flanking that may exist which would reduce sound efficiency of the wall.
    b. A desired STC of 55 is the minimum industry recommended level which is slightly less than the estimated actual.
    c. Ceiling/attic assembly improvements are recommended to increase the sound isolation characteristics of the practice rooms while increasing the thermal efficiency of the exterior envelope at the same time.
2. Possible Ceiling/Attic Assembly Improvements
    a. It is recommended that the following ceiling/attic improvements be completed to add to the building's thermal performance and increasing the sound isolation of practice rooms:
        i. Add additional attic insulation.
        ii. Sound seal all seams, perimeter, & penetrations of sound assembly.
        iii. Minimize ceiling light box and other penetrations.
    b. Floor/ceiling assembly STC rating proposed = 58 STC
        i.
3. See Attached Sketch
    a. Sketch for UI Ridenbaugh Hall-
        i. ***RH 10***- Sound Isolation Via Attic- Detail

iv. ***<u>Penetration of Acoustic Membrane- Various</u> between Rooms & Hallway-***

1. Existing Acoustic Membrane Penetrations
    a. Existing makeup air ducting
        i. Existing uninsulated make-up air ducting currently penetrates the practice rooms from the hallway. These ducts run between each practice room creating a sound conduit between the rooms which appears to negate the existing sound assemblies that exist between the rooms.

b. Other penetrations of the room sound assemblies have numerous penetrations such as piping, conduits, and electrical receptacles.

2. Possible Acoustic Membrane Penetration Improvements
    a. It is recommended that one of the following wall penetration improvement options be selected and completed so that the hallway side wall penetrations of the practice rooms compromise the wall assembly sound characteristics as little as possible:
        i. Option A, Improve Hallway Wall Penetration Isolation Characteristics-
            1. Improve compromising wall penetrations of the existing practice room wall assemblies with the following improvements:
                a. Duct wall penetration improvements:
                    i. Remove portions of uninsulated ducting that penetrates the practice room sound walls.
                    ii. Add ducts insulated with sound insulation where removed.
                    iii. Add sound baffles to duct runs.
                    iv. Possibly add duct turns.
                b. Vertical HVAC chase improvements (8 locations on each floor):
                    i. Remove chase finishes and install sound assembly similar to sound walls of practice rooms.
                c. Sound seal all seams, perimeter, & penetrations of sound wall.
                d. Minimize electrical receptacle in sound wall.
        ii. Option B, Modular Hallway Wall Sound Isolation Installation (eliminates existing penetrations)-
            1. Improve compromising wall penetrations of the existing practice room hallway wall assemblies through the addition of a new modular hallway practice room wall interior of the existing hallway practice room wall:
                a. Room conditioning would be handled by modular sound isolation room sound baffles using ambient air located outside of the modular unit (as recommended by manufacturer).
        iii. Option C, Hybrid Framed Hallway Wall Sound Isolation Installation (eliminates existing penetrations)-
            1. Improve compromising wall penetrations of the existing practice room hallway wall assemblies through the addition of a new framed hallway practice room wall interior of the existing hallway practice room wall:
                a. Room conditioning would be handled by modular sound isolation room sound baffles using ambient air located outside of the modular unit similar to Option B above (as recommended by mechanical engineer).

3. See Attached Sketch
    a. Sketch for UI Ridenbaugh Hall-
        i. ***RH 11***- Penetration of Acoustic Membrane- Various- Existing Plan

v. ***Penetration of Acoustic Membrane- Door Assembly(s)-***

1. Existing Acoustic Door Condition
    a. Existing wood doors.
    b. Lack of sound insulation/sound stripping.
    c. Lack of sound thresholds.
2. Possible Acoustic Door Improvements
    a. It is recommended that the following acoustic door improvements be completed to achieve practice room industry standards:
        i. Option A, Replace Existing Practice Room Doors-
            1. Replace door with insulated sound door and finish hardware assembly.
            2. Provide sound stripping at perimeter of door.

3. Provide sound sweep at door.

ii. Option B, Practice Room Door of Modular Practice Room-
1. Provide insulated sound door and finish hardware assembly (STC 46) as a part of the modular sound isolated practice room assembly.
2. Remove the existing practice room doors and re-case the opening.

iii. Option B, Practice Room Door of Hybrid Practice Room-
1. Provide insulated sound door and finish hardware assembly as a part of the hybrid framed sound isolated practice room assembly.
2. Remove the existing practice room doors and re-case the opening.

vi. ***Acoustical Room Treatments- Sound Control within Practice Rooms-***
1. Existing Sound Control Issues within Practice Rooms
   a. The existing surfaces of the practice rooms have neither absorptive or diffusion sound control characteristics. Currently hard surfaces exist within the practice rooms (walls, floor, & ceiling) creating a loud, unhealthy environment with much reflection and reverberation within each room creating an environment unconducive as practice rooms.
2. Possible Sound Control Improvements within the Practice Rooms
   a. It is recommended that the following passive sound control improvements within the practice rooms be completed to achieve practice room industry standards:
      i. Add absorptive/diffusion sound panels at walls.
      ii. Add absorptive/diffusion sound panels at ceilings.
3. See Attached Sketch
   a. Sketch for UI Ridenbaugh Hall-
      i. ***RH 12***- Passive Acoustical Treatments

c. **Individual Room Sound Control Probable Construction Costs Identified**

i. ***Individual Room Construction Costs-***
1. Itemized probable construction costs (not including cost escalation/inflation) per practice room have been estimated at:
   a. Approximately $23,430. Based on Option A.
   b. Depending on practice room solution(s) selected construction costs could be much greater than itemized in this study for Option A.

ii. ***Summary of Ridenbaugh Hall Construction Costs-***
1. Probable construction costs (not including cost escalation/inflation) for Ridenbaugh Hall (43 practice rooms and offices) have been estimated at:
   a. Approximately $1,007,220. Based on Option A.
   b. Depending on practice room solution(s) selected construction costs could be much greater than itemized in this study for Option A.

iii. ***Project Costs-***
1. Construction costs estimated in this study do not include project costs. The UI AES will provide separate projects costs which would be in addition to the costs indicated in this study.

d. **Ridenbaugh Hall Schedule & Phasing**

i. ***Schedule & Funding-***
1. The schedule to complete the Ridenbaugh Hall itemized improvements will depend on timing of funding. The UI has requested funding from the State of Idaho to complete the improvements identified above. Partial funding has been awarded to the institution which appears to be adequate to complete a number of the practice room improvements.
2. It is anticipated that the schedule to complete this Ridenbaugh Hall initial scope of work would closely match that of the Music Building.

ii. ***Possible Phasing Needs-***
1. The UI desires to complete the identified Ridenbaugh Hall improvements as soon as possible. Partial funding has been obtained, it is anticipated that project design would occur as follows:
   a. Design Work: Fall 2018
   b. Construction: Spring/Summer: 2019

4. **<u>UI Music Building Accreditation Needs Identified-</u>**
    a. **Overview of Issues**
        i. ***Summary of Music Building Issues Included in Study-***
            1. <u>Sound Control-</u> Sound issues have been reviewed and possible solutions identified specific to Room 216, Group Practice Room, which is used for group music instruction. Sound isolation along with absorptive and diffusing characteristics within the room has been studied. Specific issues examined and possible solutions identified include: 1) walls between Room 216 and adjacent spaces, 2) existing wall assembly penetrations, 3) door assemblies, and 4) sound control within Room 216.
            2. <u>Health & Learning-</u> Resolving accreditation team concerns with practice spaces that protect student health and are conducive to music education learning and critical listening.
            3. <u>Historic Building-</u> Balancing sound control issues with historic detailing will be critical to maintaining historical significance of the building. The Music Building historic significance is not as critical as Ridenbaugh Hall though the Music Building is older than the historic threshold of 50 years.
            4. <u>Room Flexibility-</u> Various musical ensembles use the space with different needs for each. Flexibility of space to accommodate various instruments and configurations has been deemed to be desirable.
            5. <u>Classroom Support-</u> The UI IT Department has conducted a separate examination of accreditation issues pertaining to instructional classroom projection/sound/podium equipment needs. The university has identified needs and recommendations to resolve accreditation findings.
        ii. ***Sketches Developed-***
            1. Sketches of the existing conditions and also possible solutions have been included as graphic communication aids (see attached).
        iii. ***Issues Not Included in Study-***
            1. Specifically issues not identified in the accreditation report have not been included in this study. Examination of the ability of existing hallways to absorb sound and how sound is traveling down the hallways is not included in this study.
    b. **Room 216 Sound Control Issues- Group Practice**
        i. ***<u>Sound Isolation- Via Walls</u> between Rooms and Room 216 to Hallway-***
            1. Existing Wall Assembly Needs
                a. North Wall: Existing north wall assembly appears to have a STC (Sound Transmission Class) rating of 46. With storage rooms and additional walls separating this room and the Haddock Performance Hall, it appears that the existing sound isolation of the north wall is adequate and is not in need of improvement.
                b. Hallway Walls: Existing wall assembly appears to have a STC of 35.
                    i. A desired STC of 50-55 is the minimum level that should be provided at the interior walls of the group practice room. A greater STC would be beneficial to sound integrity of the room. Construction detailing will affect final sound isolation achieved.
                    ii. Wall assembly improvements should be provided exceeding the industry recommended minimums.
                    iii. This does not include wall assembly penetrations or sound flanking that may exist which would reduce sound efficiency of the wall.
            2. Possible Wall Assembly Improvements
                a. It is recommended that the following wall assembly improvements be completed to achieve the group practice room industry recommended STC of at least 50-55:
                    i. Hallway Walls:
                        1. Remove gypsum wall board finish from one side of wall.
                        2. Insulate existing wall cavity.
                        3. Install RC sound channels one side of wall.
                        4. Install 2 layers of 5/8 inch gypsum wall board.
                        5. Sound seal all seams, perimeter, & penetrations of sound wall.
                        6. Minimize electrical receptacle in sound wall.
                    ii. Wall assembly STC rating proposed = 55 STC.

3. See Attached Sketches
    a. Sketches for UI Music Building-
        i. ***MB 1***- Existing Music Building Floor Plan/Building Section
        ii. ***MB 2***- Existing Room 216 Photos
        iii. ***MB 3***- Sound Isolation Via Existing Walls
        iv. ***MB 4***- Sound Isolation- Improve Existing Wall Detail

ii. ***<u>Penetration of Acoustic Membrane- Various</u> between Rooms and Room 216 to Hallway-***

1. Existing Acoustic Membrane Penetrations
    a. Existing HVAC crawl space ducting
        i. Existing uninsulated HVAC ducting appears to exist in the crawl space below Room 216. This ducting appears to penetrate the north wall of Room 216 at both the Haddock Performance Hall and the west hallway. This breach of acoustic systems appears to possibly be adding to the acoustic isolation issues that exist at Room 216.
    b. Interior sound assemblies appear to have numerous other penetrations such as piping, conduits, and electrical receptacles.
2. Possible Acoustic Membrane Penetration Improvements
    a. It is recommended that the following acoustic membrane improvements be completed to achieve practice room industry standards:
        i. Duct wall penetration improvements:
            1. Remove portions of uninsulated ducting that penetrates the practice room sound walls.
            2. Add ducts insulated with sound insulation where removed.
            3. Add sound baffles to duct runs.
            4. Possibly add duct turns.
        ii. Sound seal all seams, perimeter, & penetrations of sound wall.
        iii. Minimize electrical receptacles in sound wall.
3. See Attached Sketch
    a. Sketch for UI Music Building-
        i. ***MB 5***- Penetration of Acoustic Membrane- Various- Existing Plans

iii. ***<u>Penetration of Acoustic Membrane- Door Assembly(s)-</u>***

1. Existing Acoustic Door Condition
    a. Existing wood doors.
    b. Lack of sound insulation/sound stripping.
    c. Lack of sound thresholds.
2. Possible Acoustic Door Improvements
    a. It is recommended that the following acoustic door improvements be completed to achieve practice room industry standards:
        i. Replace existing door with insulated door assembly.
        ii. Add sound stripping at perimeter of door.
        iii. Add sound sweep to door.

iv. ***<u>Acoustical Room Treatments- Sound Control within Room 216- Group Practice-</u>***

1. Existing Sound Control Issues within Room 216
    a. The existing surfaces of Group Practice Room 216 have little effective absorptive or diffusion sound control characteristics. Currently hard surfaces and some fabric only diffusion sound panels exist within Room 216 (walls, floor, & ceiling) creating a very loud environment with much reflection and reverberation within the room that creates an environment unconducive as a group practice room. Various ensemble arrangements use the room requiring a flexible space be maintained. It appears the existing diffusion sound panels that exist do little for room sound absorption or diffusion.
2. Possible Sound Control Improvements within the Room 216
    a. It is recommended that one of the following sound control improvements within the Room 216 be completed (depending on available budget) to achieve practice room industry standards:
        i. Remove existing fabric only diffusion panels from walls and ceiling.
        ii. <u>Option A, Passive Absorptive/Diffusion Solution</u>-
            1. Add standard absorptive/diffusion sound panels at walls.
            2. Add standard absorptive/diffusion sound panels at ceilings.
            3. This solution would be least expensive and should resolve the accreditation report's health and sound level concerns,

but would not address the flexible use of the space as well as Options B and C.

iii. Option B, Dynamic Absorptive/Diffusion Solution-
1. Add tunable acoustic panels.
a. Tunable acoustical panels allow the same wall panel to adapt from absorption to diffusion changing reverberation time. This is a multipurpose solution to room acoustics.
b. It is assumed that a dynamic solution to room acoustics would be more expensive than Option A but less expensive than Option C.
c. This solution would be manufacturer specific such as Wenger Tunable Acoustical Panels.

iv. Option C, Active Absorptive/Diffusion Solution-
1. Add virtual acoustic environment technology system to simulate different acoustic environments appropriate to various ensemble arrangements.
a. System would require the addition of absorptive sound panels designed specifically for the space.
b. System includes specialized electronic solution with a combination of equipment including microphones, speakers, and key pad. Nine presets are available with the Wenger VAE Rehearsal System.
c. It is assumed that an active solution to room acoustics would be more expensive than either Option A or Option B.
d. This solution would also be manufacturer specific such as Wenger VAE (Virtual Acoustic Environment) Rehearsal System.

3. See Attached Sketches
a. Sketches for UI Music Building-
i. ***MB 6***- Passive Acoustical Treatments
ii. ***MB 7***- Dynamic Acoustical Treatments
iii. ***MB 8***- Active Acoustical Treatments

c. **Room 216 Sound Control Probable Construction Costs Identified**
i. ***Room 216 Construction Costs-***
1. Itemized probable construction costs (not including cost escalation/inflation) per practice room have been estimated at:
a. Approximately $163,730.
b. The itemized cost includes an allowance for a passive acoustic solution of generic absorptive/diffusion panels. Depending on the group practice room solution selected (passive, dynamic, or active) construction costs could be much greater than itemized in this study. Though anticipated to be more expensive, the dynamic and active solutions would better meet the required instructional needs of this flexible practice space.

ii. ***Project Costs-***
1. Construction costs estimated in this study do not include project costs. The UI AES will provide separate projects costs which would be in addition to the costs indicated in this study.

d. **Teaching Space Equipment & Technology Needs**
i. The UI IT Department has identified needs and recommendations for projection/sound/podium equipment related to accreditation findings.

e. **Music Building Schedule & Phasing**
i. ***Schedule & Funding-***
1. The schedule to complete the itemized Music Building improvements will depend on timing of funding. The UI has requested funding from the State of Idaho to complete the improvements identified above. Partial funding has been awarded to the institution which appears to be adequate to complete a number of Music Building improvements.
2. It is anticipated that the schedule to complete this Music Building initial scope of work would closely match that of Ridenbaugh Hall.

ii. ***Possible Phasing Needs-***

1. The UI desires to complete the identified Music Building improvements as soon as possible. Partial funding has been obtained, it is anticipated that project design would occur as follows:
    a. Design Work: Fall 2018
    b. Construction: Spring/Summer 2019

5. **System Sketches (UI Ridenbaugh Hall & UI Music Building)-**
    a. See Attached

6. **Acknowledgements-**
    a. The following individuals have provided active participation, input, or feedback as a part of this facility study. With much gratitude their efforts have provided for the development of this comprehensive analysis of acoustic needs and improvements to the UI Ridenbaugh Hall and UI Music Building.

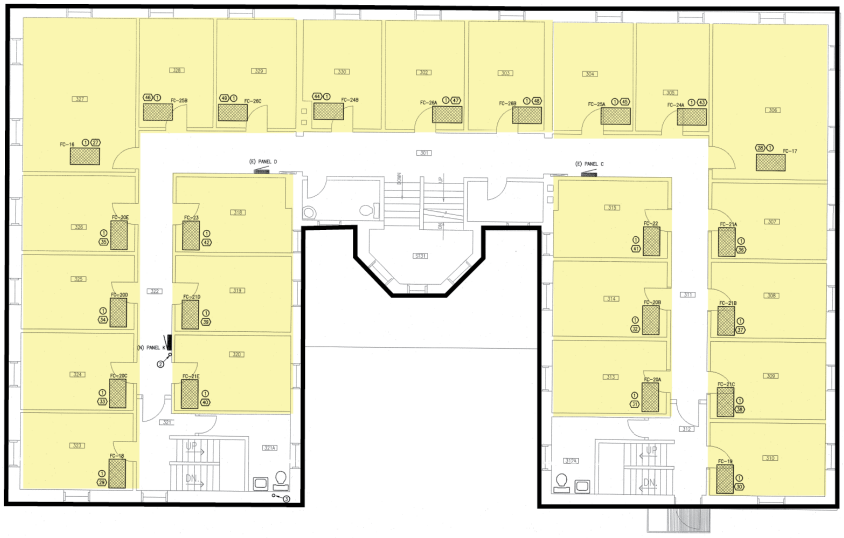
Lionel Hampton School of Music, University of Idaho
Vanessa Sielert, Director, Lionel Hampton School of Music

Architectural & Engineering Services, University of Idaho
Ray Pankopf, Director, Architectural & Engineering Services

Wenger Corporation, Hillsboro, Oregon
Jeff Kirkpartick, Region Sales Manager

Castellaw Kom Architects, Lewiston Idaho
Greg Castellaw, Principal Architect
Brent Beaudoin, Project Manager

SECOND FLOOR PLAN



THIRD FLOOR PLAN

UI RIDENBAUGH HALL

EXISTING FLOOR PLANS

NTS

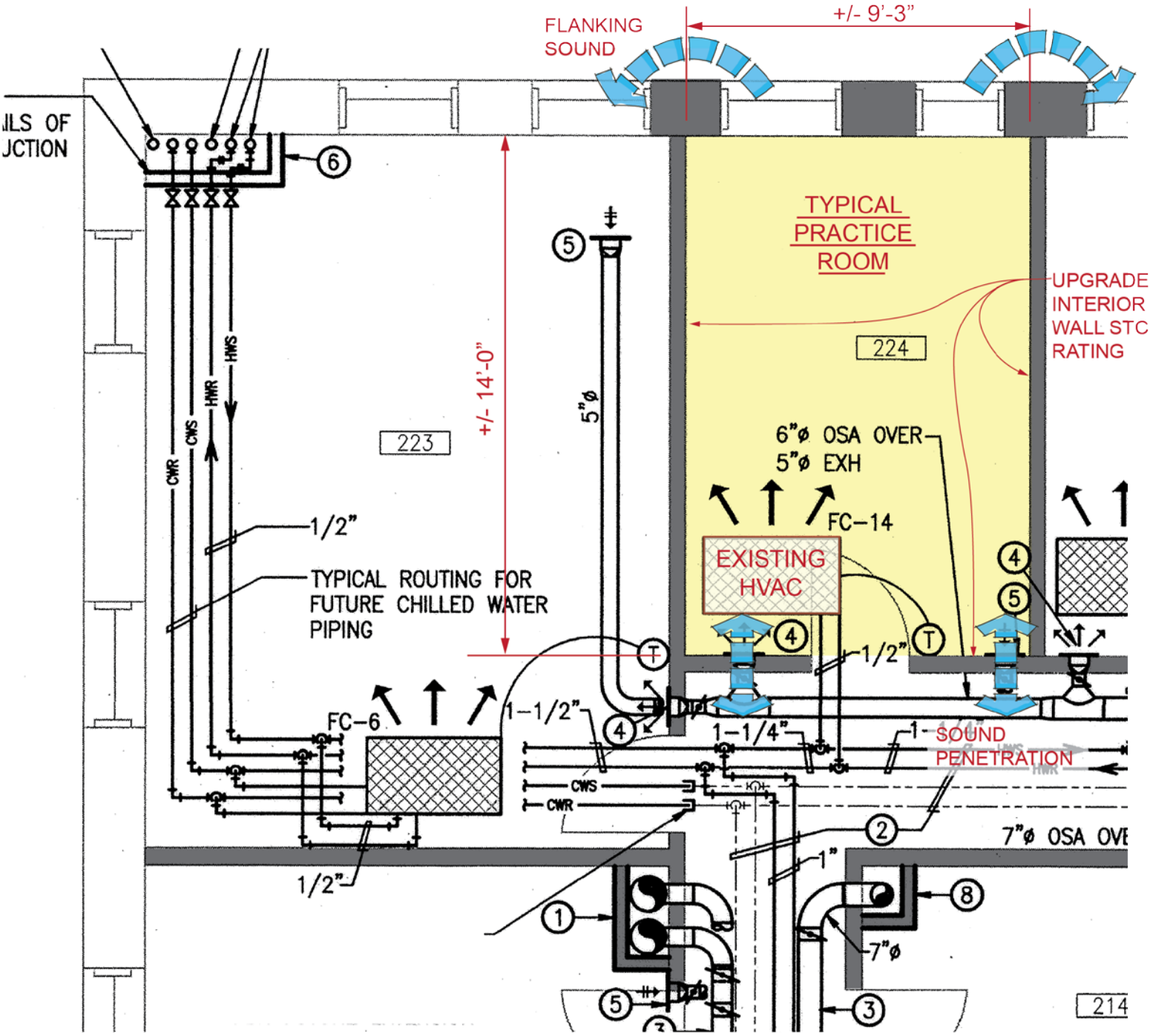
RH-1

UI RIDENBAUGH HALL

EXISTING PRACTICE ROOM PHOTOS

NTS

RH-2

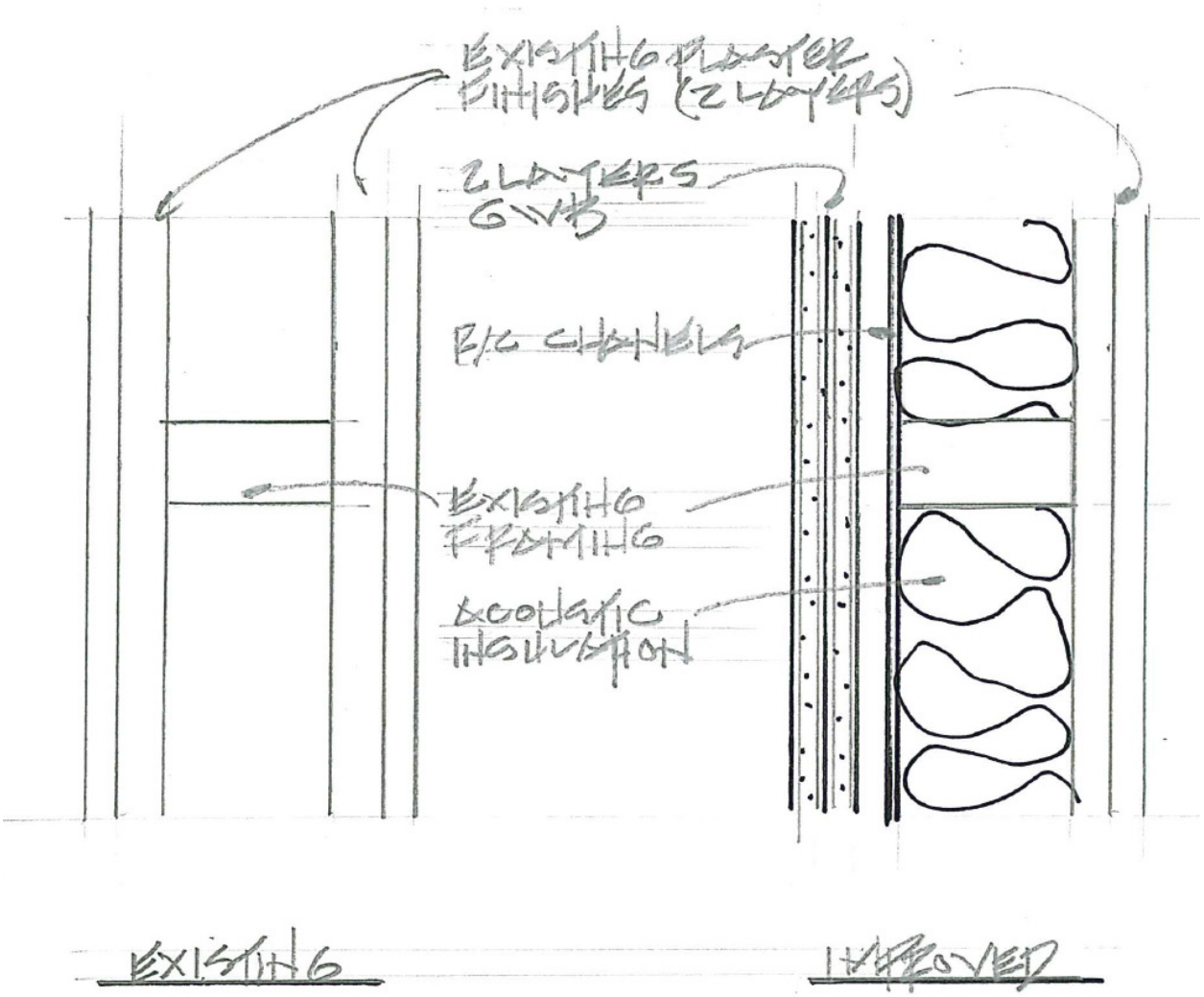


UI RIDENBAUGH HALL

SOUND ISOLATION VIA EXISTING WALLS

NTS

RH-3

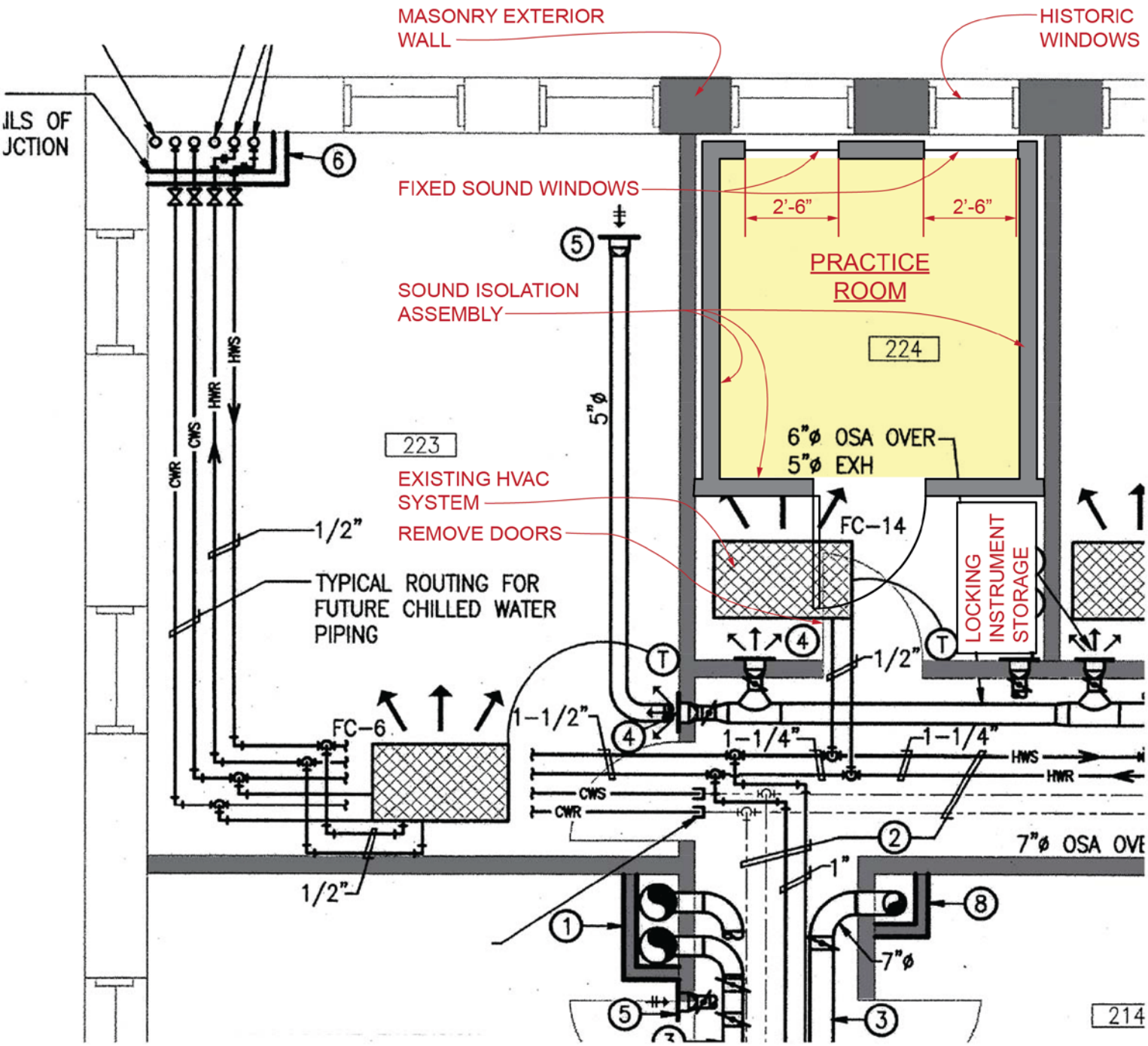


UI RIDENBAUGH HALL

SOUND ISOLATION – IMPROVED WALL DETAIL

NTS

RH-4



UI RIDENBAUGH HALL

SOUND ISOLATION VIA MODULAR WALLS

NTS

RH-5

ACOUSTICALLY TUNED SPACE

The correct amount of absorption and diffusion built-in to room.

No need to purchase additional acoustic treatment which adds to cost of room.

Additional absorption built-in for recording/broadcast applications.

QUALITY AND SERVICE GUARANTEE

Professional installation - Removes risk. Durable product construction as rooms installed over 40 years ago are still being used today!

Low Maintenance.

GREENGUARD certified product.

5-year warranty.

GUARANTEED SOUND ISOLATION

NIC 63 room-to-room based on Independent Field Test - The highest rating in the market-place.

Results of actual Field Test of 11 room installation in Weslaco, TX ranged from NIC 63-67.

VAE TECHNOLOGY OPTION

Transform your practice room to multiple performance envi-ronments, ranging from recital hall to 10,000 seat arena.

Record/playback provides immediate feedback for musician.

Ability to upload accompaniments and download practice session on to a laptop for future critique.

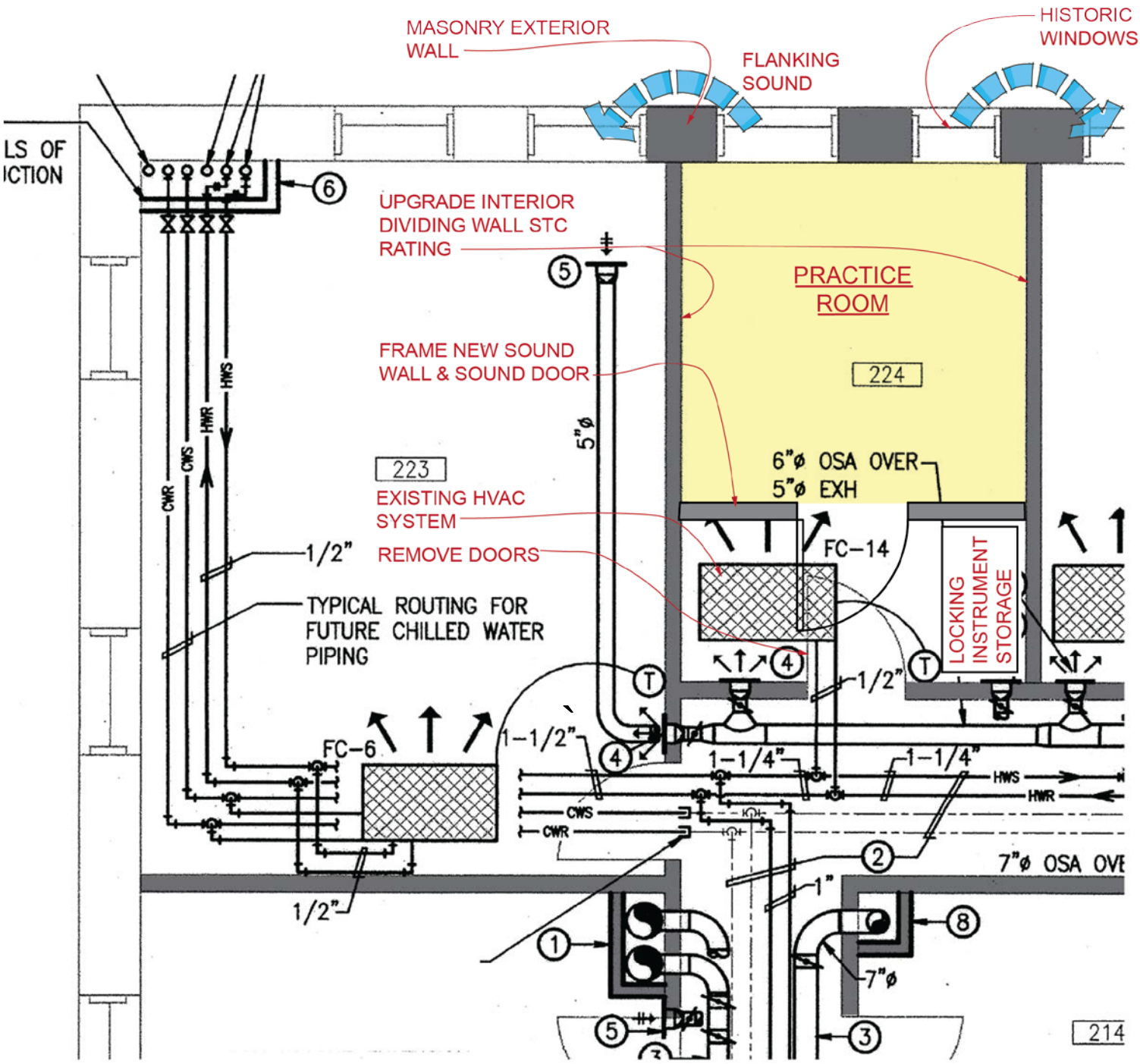
WENGER SOUNDLOK MODULAR SOUND ISOLATION ROOM

UI RIDENBAUGH HALL

SOUND ISOLATION VIA MODULAR WALLS

NTS

RH-6

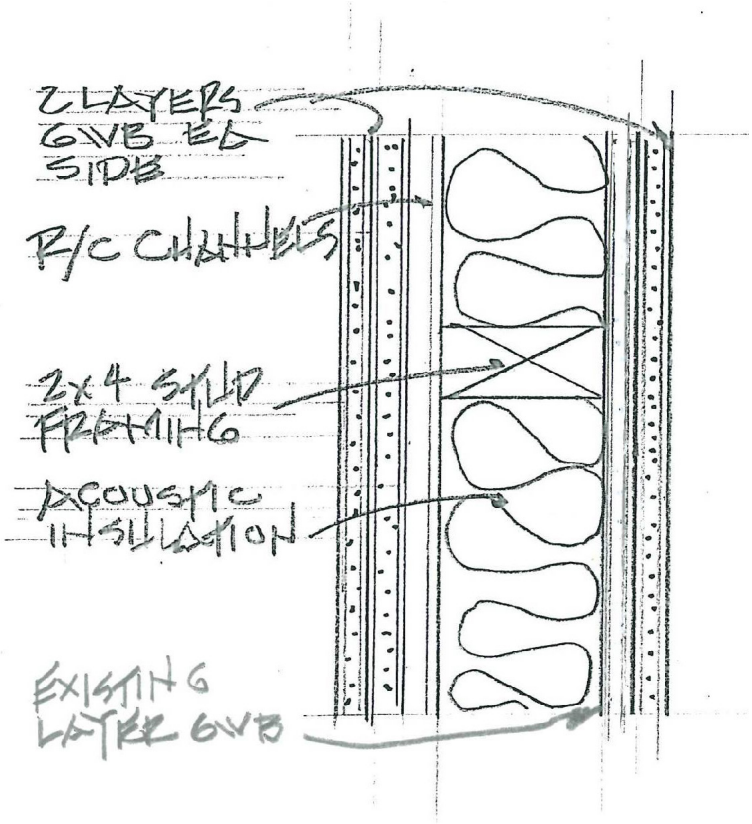


UI RIDENBAUGH HALL

SOUND ISOLATION VIA HYBRID WALL

NTS

RH-7

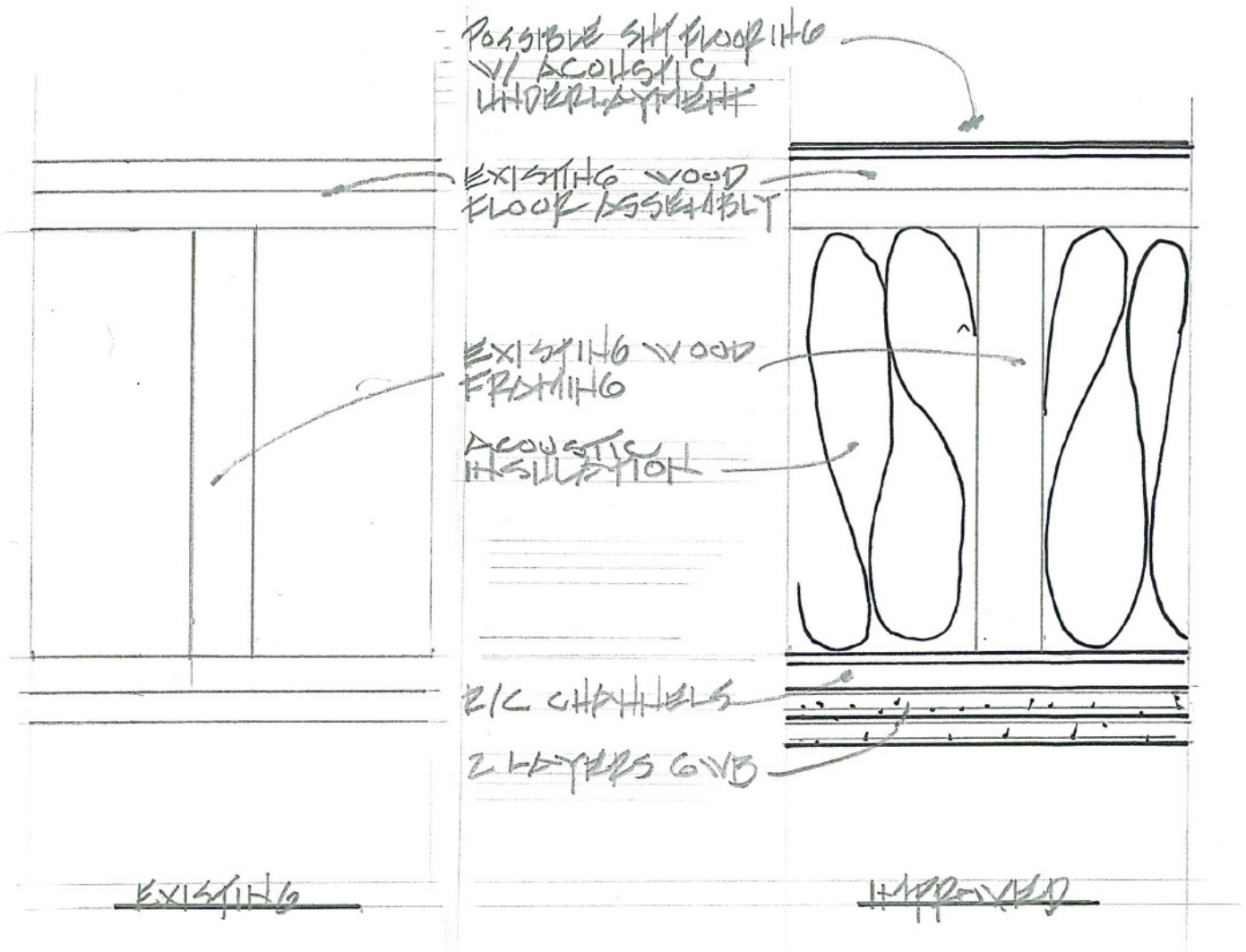


UI RIDENBAUGH HALL

SOUND ISOLATION VIA HYBRID WALL DETAIL

NTS

RH-8

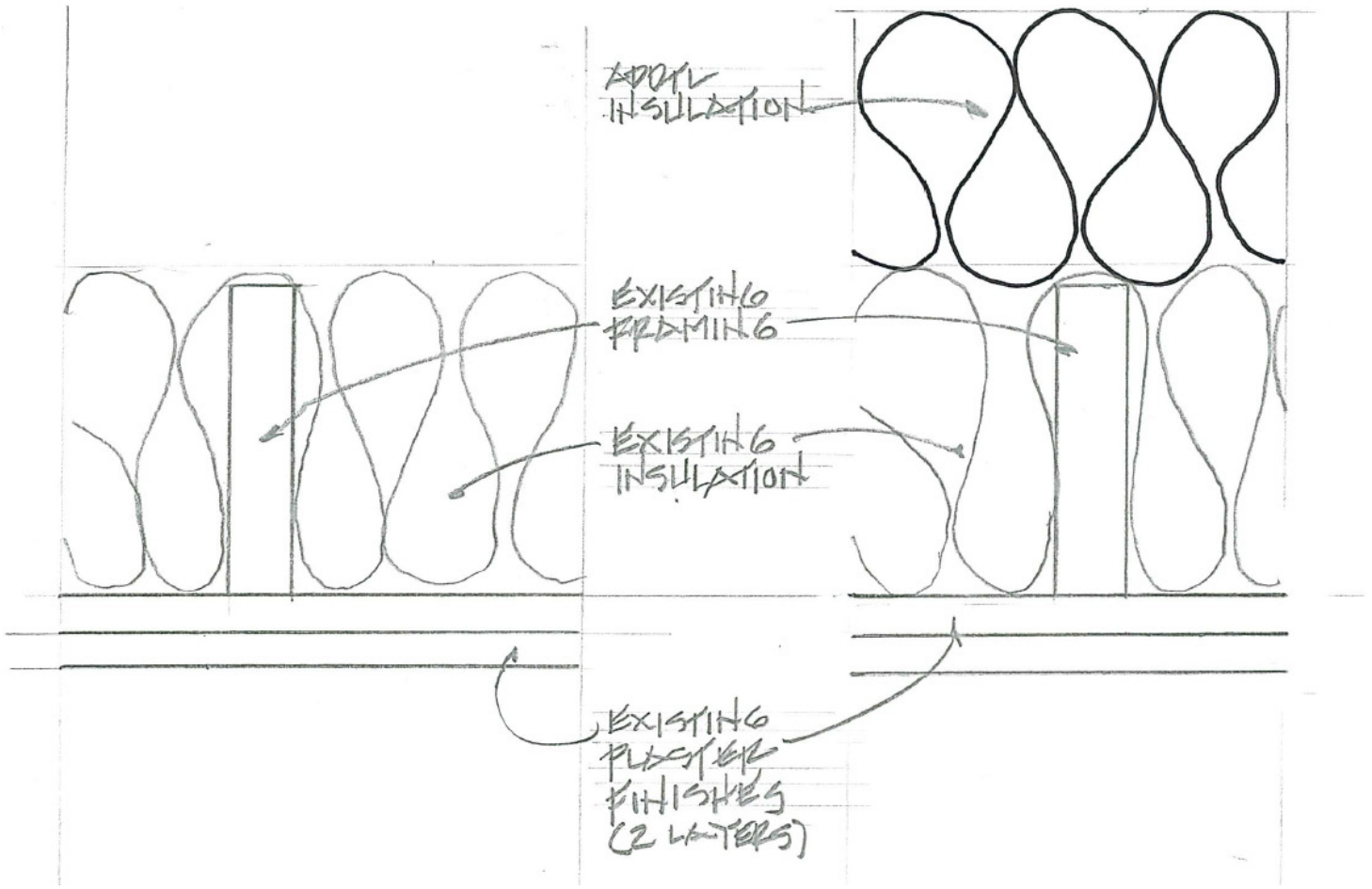


UI RIDENBAUGH HALL

SOUND ISOLATION VIA FLOOR/CEILING

NTS

RH-9

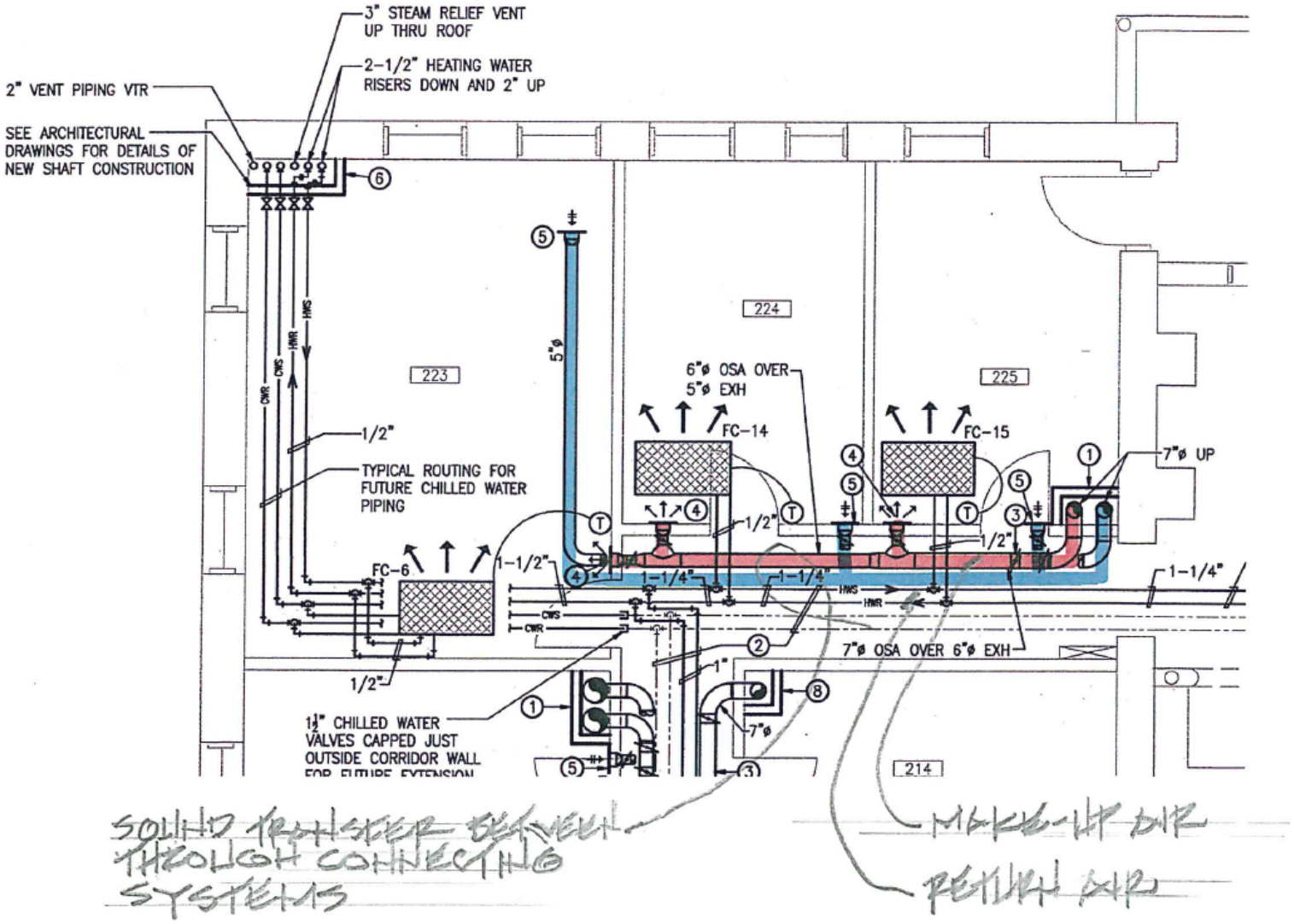


UI RIDENBAUGH HALL

SOUND ISOLATION VIA FLOOR/CEILING

NTS

RH-10



UI RIDENBAUGH HALL

PENETRATION OF ACOUSTIC MEMBRANE - VARIOUS

NTS

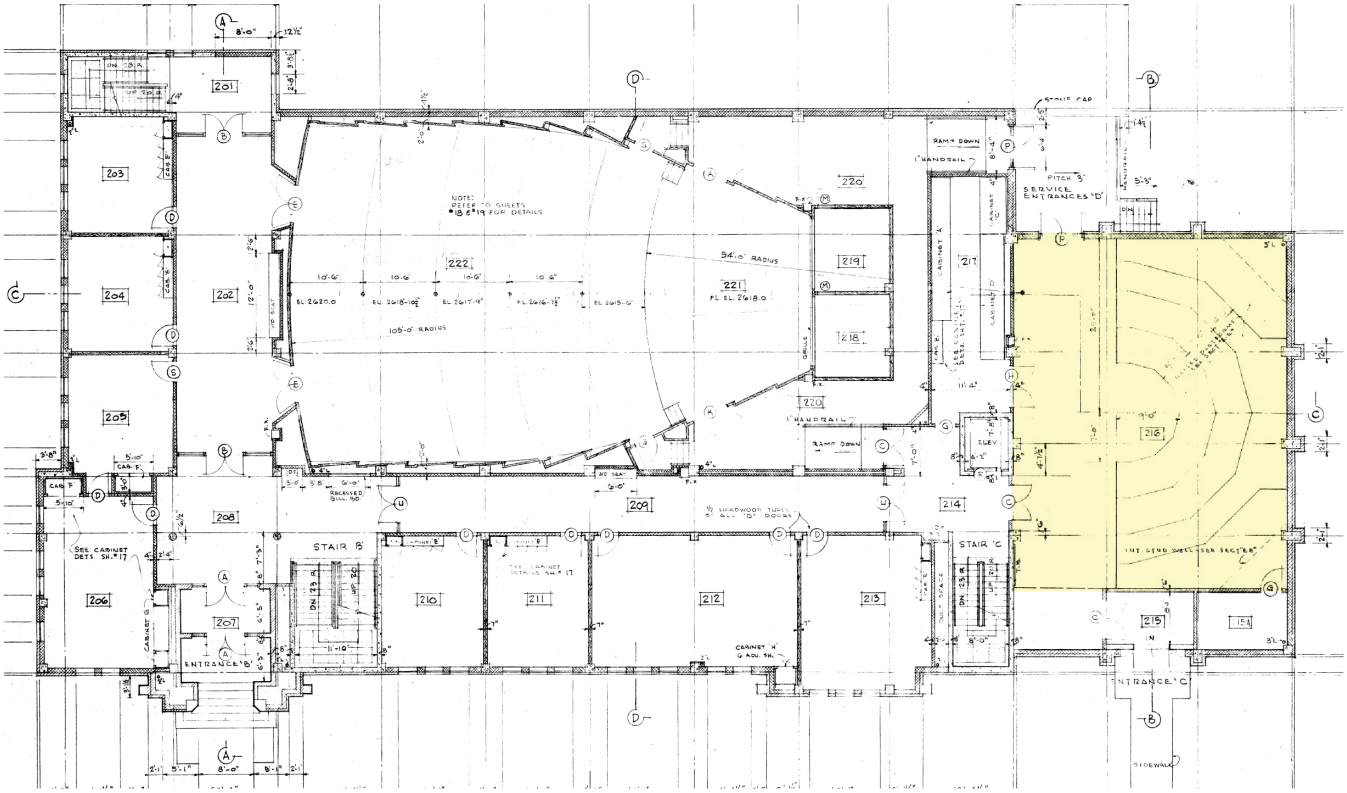
RH-11

UI RIDENBAUGH HALL

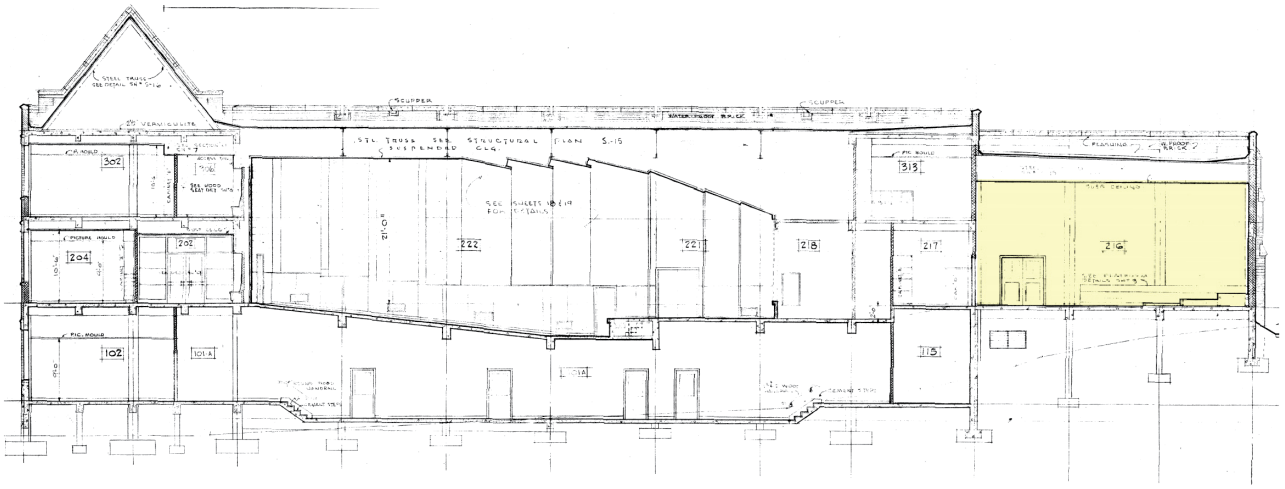
PASSIVE ACOUSTIC TREATMENTS

NTS

RH-12



SECOND FLOOR PLAN



BUILDING SECTION

UI RIDENBAUGH HALL

EXISTING FLOOR PLAN / BUILDING SECTION

NTS

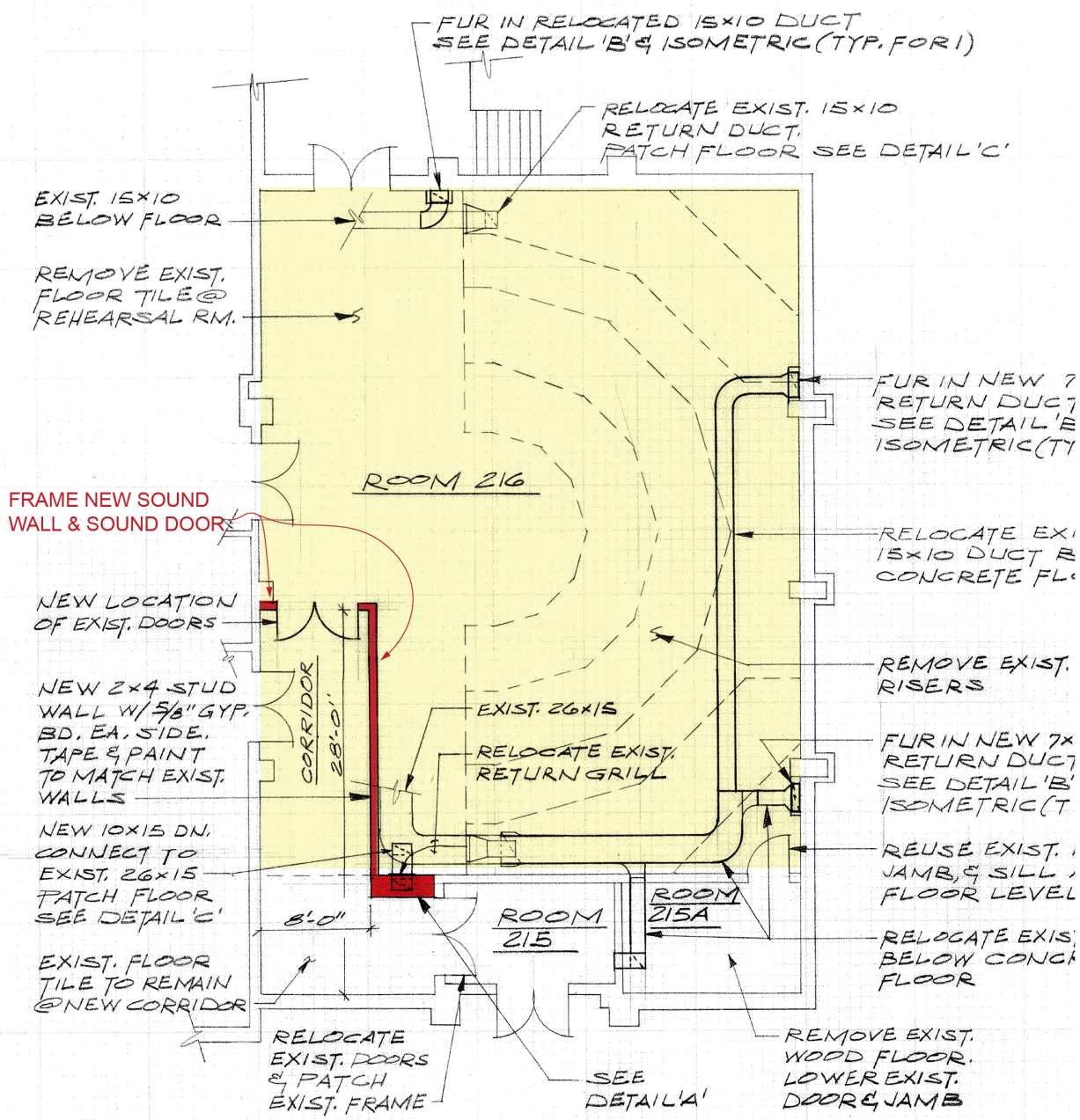
MB-1

UI RIDENBAUGH HALL

EXISTING ROOM 216 PHOTOS

NTS

MB-2

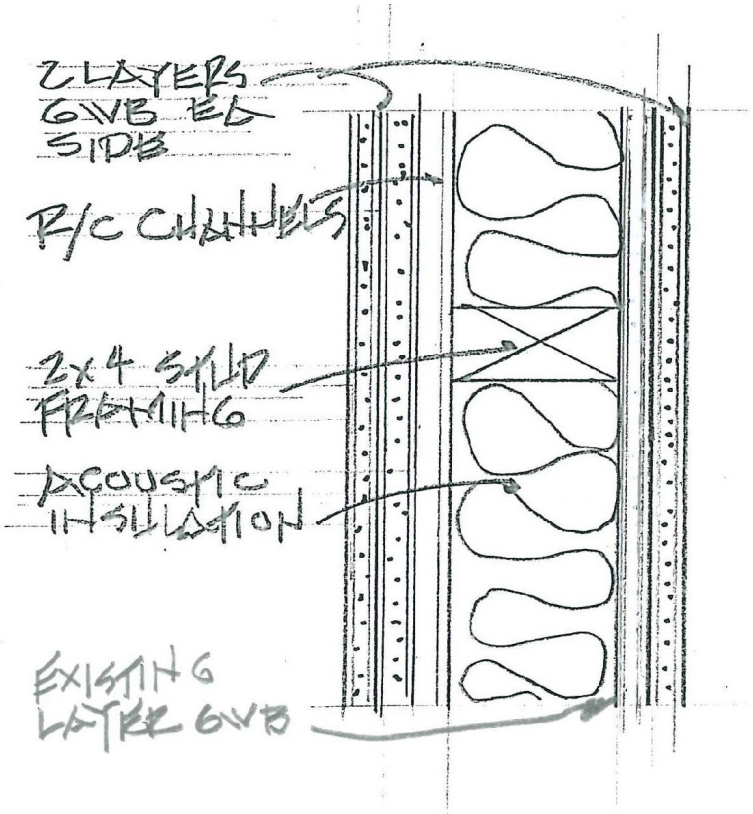


UI RIDENBAUGH HALL

SOUND ISOLATION VIA EXISTING WALLS

NTS

MB-3

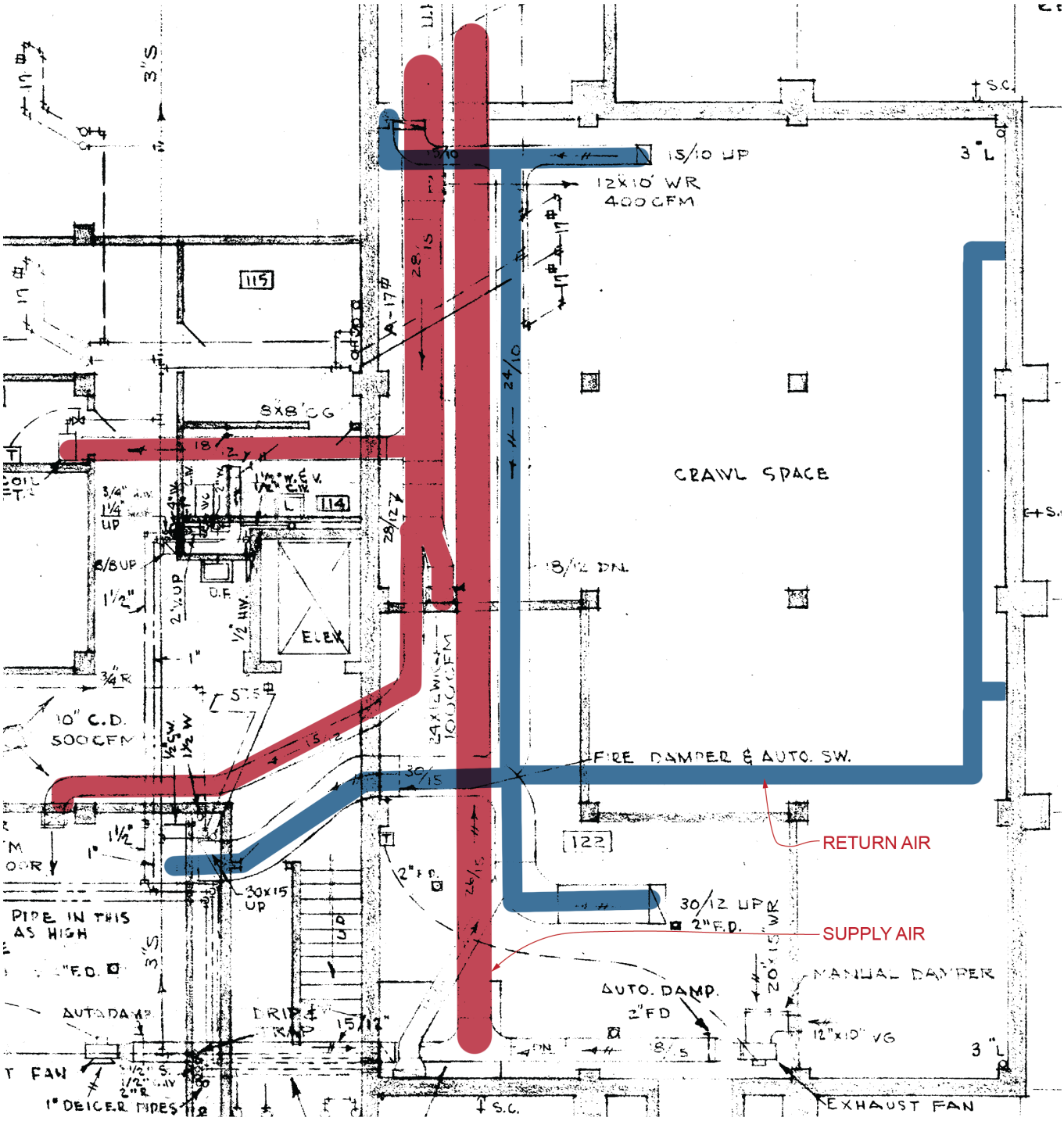


UI RIDENBAUGH HALL

SOUND ISOLATION – IMPROVED WALL DETAIL

NTS

MB-4



UI RIDENBAUGH HALL

PENETRATION OF ACOUSTIC MEMBRANE - VARIOUS

NTS

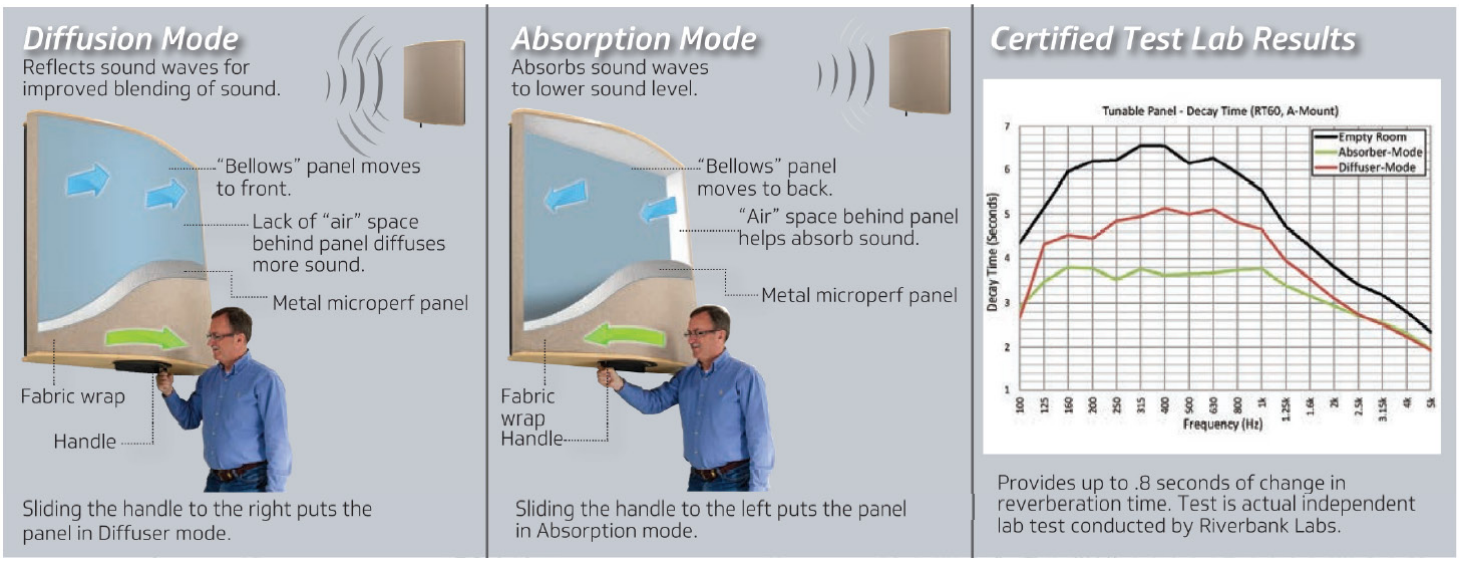
MB-5

UI RIDENBAUGH HALL

PASSIVE ACOUSTICAL TREATMENTS

NTS

MB-6



WENGER TUNABLE ACOUSTIC PANELS

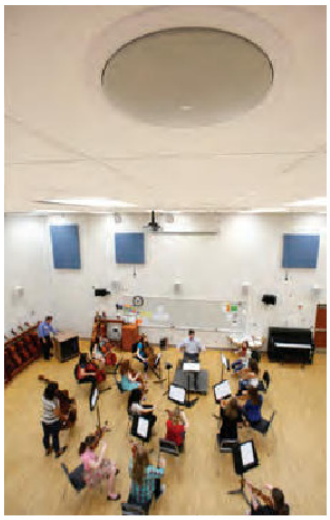
UI RIDENBAUGH HALL

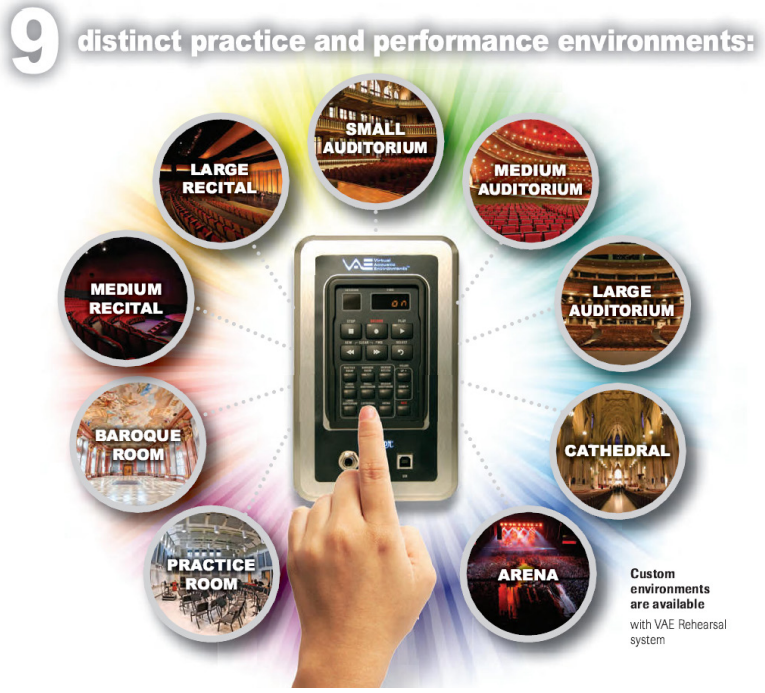
DYNAMIC ACOUSTICAL TREATMENTS

NTS

MB-7





WENGER VAE
REHEARSAL SYSTEM

UI RIDENBAUGH HALL

ACTIVE ACOUSTICAL TREATMENTS

NTS

MB-8


CKA
CASTELLAW ◆ KOM
ARCHITECTS