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APPENDIX N
BAND TRAINING FACILITIES (BTF)

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APPENDIX N

BAND TRAINING FACILITIES

1. GENERAL AND SPECIFIC CRITERIA.

a. General. The specific criteria contained in this appendix are applicable for the planning and design of Band Training Facilities (BTF) for Active, Reserve and National Guard Army bands. The general criteria contained in preceding chapters of Technical Instructions (TI) 800-01, Design Criteria, are applicable where such criteria are not included in this appendix. Therefore, this appendix must be used with the chapters contained in this document.

b. Proponent. Army Bands, AG School, SSI 10000 Hampton Pkwy, FT Jackson, SC 29207-7025. Additional oversight of Army bands is the Department of the Army Staff Bands Office, Hoffman Building, Alexandria, VA 22332-0474

c. Applicability.

(1) Except as modified here, the design of new BTF to be modernized will be in accordance with the design criteria contained in this appendix and applicable chapters of TI 800-01, including all references.

(2) Obsolete Criteria. DG 1110-3-119 is obsolete and will not be used when designing BTF. The criteria contained in the design guide are superceded by criteria contained in this appendix.

2. PLANNING GUIDANCE.

a. Project Justification.

(1) Important factors for project justification include:

- The age and condition of the existing facility.
- The degree to which the existing facility meets the musical and operational mission of Army bands.
- How well the existing facility provides a professional image of the command the band represents.

(2) While the personnel composition and functions of bands are relatively standardized, the facilities that house them will have minor local variations in design, which should be reflected in the facility design and the procurement process. These local variations should be directed by installation Department of Public Works offices and band leadership based on the local band's mission. It is preferable to conform to the spirit of existing architectural elements of a given installation.

b. Site Planning Criteria. This appendix provides general guidance for facility engineer personnel, Army band commanders and personnel involved with planning, programming, and initiating projects for band facility construction and renovation. This appendix provides specific guidance for the selection of sites for new construction, sites for existing building renovations, and for development of the architectural program. Criteria are provided against which existing band facilities, buildings proposed for renovation for band use, and new designs can be evaluated. These criteria are provided for assessment in terms of architectural program, spatial and structural suitability, building organization and relationships, and the design of individual activity spaces. Improvements to existing facilities, through renovations and better space utilization and operation, can be applied by local band and engineer personnel, based on such assessments and on the design guidance in this document.

(1) Individual sites or buildings being evaluated may not be able to meet all the criteria indicated. Certain sited and building suitability criteria, as discussed below, are essential to a viable

band facility and must be met. Others, which are desirable but not mandatory, should be considered and used to rank alternative possible sites or buildings against. Judged against all these factors, the overall most satisfactory site should be selected. Where an existing facility to be renovated is being selected, satisfying the essential criteria for building suitability for band functions will typically outweigh the less critical site location factors.

(2) Desirable Proximities. It is ideal for BTF to be located near the installation parade ground, for convenience of performance and rehearsal of the ceremonial functions that are normally a prominent part of a band's activities. Proximity to general post operations areas, for performance convenience, also is desirable. However, many performance commitments, and housing for much of the band, will inevitably be found elsewhere, in dispersed locations.

(3) Undesirable Proximities. The site for the band facility must be quiet, located away from truck routes, heavy equipment operations, runways and flight paths, helicopter landing areas or any other area where noise exceeding 75dB is inevitable. The outdoor practice field must not be located between closely spaced buildings, especially within facility parallel walls, to avoid echoes and other undesirable acoustic phenomena. Functions in buildings adjacent to the band training facility should not be those that would be disturbed by outdoor practice or performance noise.

(4) Site Access. The site configuration and relationships to access roads should readily permit design of good, separate patterns for the multiple access needs of the band facility. This should include service access to the loading dock and mechanical space distinctly separate from the main entrance, preferably to the side or rear of the building. The parking area access should also be separate. The potential must exist for the provision of a car/bus drop-off space at the main entrance.

(5) Topography. The topography of the site should be easy to develop at minimum cost, with no extraordinary requirements for foundations or drainage. Slopes in the building area and the surrounding outdoor activity spaces should not require expensive grading and site preparation, or difficulty for bicycle and wheelchair access. Flat or slightly ramped access to the building is critical to frequent movement of large instruments and equipment.

(6) Single-Story Facility. It is strongly preferred that the band training facility be all on one level, in a single-story building. This avoids the problems of sound transmission up or down, from or to band practice spaces, with the resultant disturbance of band activities. It also avoids problems of moving heavy equipment from ground floor to upper floors. Significant long-term cost savings will be realized in a single-story facility vice a multi-storied one.

c. Space Criteria. Table N-1 contains the space criteria for BTF. As the basic instrument governing the design of BTF, this appendix provides the design principles and criteria for conceptual design and design development of all sizes of band facilities. The guidelines focus on the development of realistic, cost-effective buildings, which best accommodate Army band activities. They specifically address the issues of acoustical design, renovation, and practical construction approaches, which are particularly important in the development of band facilities. All the participants in this process should use these guidelines throughout the design process, Band officers and personnel, facility engineers, district engineers, and design architects and engineers. These guidelines should be coordinated with other pertinent Army and Department of Defense regulations, criteria and procedures.

(1) The criteria and illustrative designs specifically address the two standard sizes required for Direct Support (41-person) and General Support (65-person) bands.

(2) This appendix is generally applicable to facilities for the larger Special bands. The specifics of band composition, performance groups and activities differ from one band to the other, and will require modification and augmentation of the affected functional areas of the band facility. This appendix provides general guidance on the programming process, functions, and space requirements overall, individual space design criteria, and acoustical design considerations.

TABLE N-1 SPACE CRITERIA FOR BAND TRAINING FACILITIES

	DIRECT SUPPORT BAND (41-MEMBERS)		GENERAL SUPPORT BAND (65-MEMBERS)	
FUNCTION/SPACE	Spaces Required	Net Square Feet	Spaces Required	Net Square Feet
Rehearsal Areas				
Main	1	1,575	1	2,275
Large Group	1	700	1	700
Small Group	1	350	2	350
Individual - Large	2-4	80-125	3-6	80-125
Individual - Small	6-8	55-75	9-12	55-75
Offices				
Commander	1	200	1	200
Deputy Commander/Associate Bandmaster*	—	—	1	150
Enlisted Bandleader	1	150	1	150
Other Office Spaces				
Administration	1 (2 desks)	150	1 (4 desks)	300
Training	1 (2 desks)	150	1 (4 desks)	300
Operations	1 (2 desks)	150	1 (4 desks)	300
Transportation	1 (2 desks)	150	1 (4 desks)	300
Public Affairs	1 (2 desks)	150	1 (3 desks)	225
Information Management	1 (1 desk)	75	1 (2 desks)	150
Recruiting/Retention	1 (1 desk)	75	1 (1 desk)	75
Group leaders	1 (3 desks)	225	1 (5 desks)	375
Toilets/Lockers/Showers				
Men	1	950	1	1300
Women	1	550	1	580
Officer/Visitor	1	50	1	50
Storage, Supply, Support Areas				
Unit Supply/Storage	1	1,000	1	1,300
Additional Case and Equipment storage	1	300	1	500
Instrument Repair	1	100	1	100
Instrument Lockers	1	520	1	680
Instrument Cleaning	1	75	1	75
Library	1	500	1	640
Recording/Audio	1	250	1	250
Janitor's Closet	1	50	1	50
Other Areas				
Day Area	1	640	1	860
Lobby	1	600	1	900
Drill Area	1	30,000	1	30,000
Loading Dock	1	300	1	300
Parking area	45	13,500	65	19,500
Electronics Communication room				

NOTE: Mechanical normally 8-10% of total area
Circulation, Walls, etc normally 25% of total area

*Some Special bands may have requirements for additional persons, requiring additional private offices at 150 sqft. each.

d. Renovation and Modernization Projects.

(1) This appendix is applicable to all projects involving new construction, renovations, additions, or adaptive reuse for BTF. While this document provides the basic criteria for such facilities, it cannot provide all the information required for the identification of project requirements or the successful preparation of project designs. Additional information must be obtained at the installation level in order to identify the unique requirements of local bands and their activities, and the design constraints and opportunities of the physical context of sites.

(2) A major use of this appendix is to aid Army band personnel and facility engineers in evaluating existing facilities and making interior design changes not necessarily involving capital improvement funds. The appendix is intended to help these personnel to know what design principles and approaches to follow when making these changes. It provides specific, practical guidance, with how-to-do-it details, for such renovations and small-scale modifications, especially for construction items unique to band training activities and their acoustic implications.

(3) Building Suitability Criteria. There are two approaches to utilizing an existing building to renovate as a BTF:

(a) The first approach is to find a building that is at least as large as the required area to accommodate all the program spaces built of heavy construction (masonry or concrete), to provide the required external acoustic isolation properties; and with sufficient space with an area with minimum 18-foot ceiling height (25- 30 feet is preferable) to accommodate the main rehearsal and large group practice rooms. Such a building should be able to house the band training functions entirely within the existing structure. The criteria for selecting a building suitable for this purpose are discussed in detail below. Former gymnasiums, hangers, or warehouses are logical choices because they most likely satisfy the most important element of site selection criteria-adequate size and ceiling height for the main rehearsal rooms. Adequate volume is the key element for rehearsal spaces.

(b) The second approach is to find a building smaller than the required program area typically designed for normal administrative functions, and add the musically critical rooms in new construction. Square footage can be between 5,000 and 10,000 square feet, for a 41-member band, with new construction bringing the total to 12,000 to 13,000 square feet. This approach ensures that music rooms- rehearsal, practice, and control-will perform adequately, and have proper construction, shape, volume and isolation, to meet band training acoustic requirements. Although this approach is often more expensive, it provides better construction quality control standards for the acoustically sensitive spaces, typically easier to achieve in new construction than in renovation.

(4) Requirements and Criteria for Renovation of Existing Buildings. The following are the significant requirements and criteria for evaluation of potential buildings for renovation as BTF. The site location criteria may not be the same as for a newly constructed building given the location constraints of available buildings. The location benefits must be balanced against the quality and adaptability of the available facilities and the economic benefits of renovation versus new construction. However, the essential building suitability criteria, as indicated below, must be fulfilled, overriding any site evaluation factors, because without these, the facility will not perform adequately for band training use.

(a) Building Size. The building size must be at least equal to the band training program square footage, and preferably larger, unless additional construction is planned. Conversion usually requires more square footage in order to fit all the required functions and spaces within the existing configuration and structure. For a 41-person band, the building should be between 12,500 and 15,000 square feet; for a 65-person band, between 17,000 and 21,000 square feet. Minor compromises in the area of individual program spaces may be necessary to fit within an available building, but these should be made in the support, administration and the secondary spaces, not in the primary music spaces. The Main rehearsal room should be the last space compromised.

(b) Ceiling Height. It is absolutely necessary, when attempting to install music rehearsal and practice rooms in an existing structure, that there be areas of high ceilings higher than 18 feet. Without this height space, sound levels will be excessive and potentially dangerous to band personnel's hearing; and the quality of sound and ability to hear others will be impaired. For a 41-person band, at least 2,200 square feet of high-ceiling space is required; for a 65-person band, at least 3,000 are required.

(c) Single Level. The existing building configuration should be such that all music rehearsal, practice, storage, and instrument areas can be on one level. A loading dock should be on the same level. This will make movement of large instruments and equipment possible without the addition of expensive elevators. Any building configuration that results in use areas above or below music rooms should be avoided. The main rehearsal room is the most important room to be located on the ground floor.

(d) Construction. Band Training Facilities should be of permanent construction. Construction systems of masonry or concrete are inherently more suitable for band facilities for sound isolation reasons. Buildings of other types of construction may be used, but with less successful results and with difficult renovation techniques required. Large open interior spaces are easier to renovate to fit band space requirements. Especially for the music spaces, structural bay sizes of 20 feet by 30 feet or greater are preferred. It is important that substantive girder support is designed in musical rehearsal spaces to support long spans in the ceiling to avoid support columns that may hinder good visual communication.

(e) Environmental Systems Reuse. Reuse of expensive elements of the existing building such as plumbing and mechanical systems is economically advantageous. New ductwork may be inevitable to achieve low noise HVAC.

NOTE: *In order to reuse plumbing systems and toilet rooms, they must be located in an area of the building that is usable for the more private band functions, rather than near spaces to be used for semi-public activities such as music rehearsal, practice or lobby. Any mechanical systems or equipment to be reused must be in good condition and capable of being modified to satisfy the functional and environmental requirements of the facility. Noisy equipment should not be near spaces to be used for music practice.*

(5) When designing rehearsal facilities it is important to prioritize work due to limited funding. Once an existing building is selected, consideration must be given to how it can best serve as a band facility, given the constraints of the structure and existing space configuration. Accurate survey drawings of the building, showing the size of the existing spaces, the location of walls, windows and doors, and the structural and environmental systems, are required. Alternative patterns fitting function to space should be developed according to the general and individual space criteria presented in this appendix. This will involve consideration of possible modifications to the building: removal of walls, combination or division of spaces, changes of windows and entrances, relocation of building-removal of walls, combination or division of spaces, changes of windows and entrances, relocation of building support systems, and additions outside the original structure. The relative costs of these alternative renovations, and their benefits in terms of completeness of program accommodation, must then be weighed. Priority choices should be made as to what is financially feasible and what compromise on program accommodation is acceptable.

e. Budget Constraints. The renovations required to meet band training programmatic needs must be accomplished within the budget limitations set by Army regulations for additional investment, relative to the type and value of the facility. The cost of renovating an available existing facility must be compared with the cost and relative appropriateness of new construction. Only part of a desired renovation may be able to be afforded, or the work may need to be supplemented by band personnel. In such a case, the decision must be made whether a partial level of satisfaction of band desires and

needs is appropriate as a basis for project development. It is critical that music rehearsal spaces have priority in any case.

3. COMBINED FACILITIES. It is preferred that joint-use facilities be discouraged. If BTF have a use other than band functions, it is critical that sound isolation and noise control issues be addressed.

4. DESIGN REQUIREMENTS.

a. General. It is imperative that the band commander ensure that proposed BTF are considered at every level including Director of Public Works (DPW), installation engineers, installation and appropriate tenant leadership, and any others who have input to the installation planning board.

(1) Project Development. All Army installations DPW offices. Any proposed project involving facilities should be coordinated through DPW and parent leadership have construction programs that are maintained and monitored by installation engineers or to ensure that the project is included in AR 210-22, Master Planning for Permanent Army Installations.

(2) Design. The district engineer's office is charged with construction responsibility. The district engineer develops the design criteria, and either handles concept design, final design and construction administration in-house, or contract the design to an outside architect/engineer. It is critical that the facility engineer and band personnel review and approve the plans of architects/engineers before and during all work.

(3) Provisions for Physically Handicapped. All BTF will be accessible to physically impaired adults and children in accordance with chapter 7of TI 800-01.

(4) Sustainable Design and Development (SDD). SDD will be in accordance with ETL 1110-3-491, Sustainable Design for Military Facilities, 01 May 01.

(5) Antiterrorism Protection (AT). AT protection will be in accordance with latest edition of DoD Minimum Antiterrorism Standards for Buildings.

b. Architectural Criteria.

(1) General. Architects and engineers selected for design of BTF should be experienced in the design of band or music training and performance facilities. They should be able to respond with imagination to the principles and considerations in this appendix, as well as able to coordinate with the installation rules of building and improvement. The architects must integrate design quality, functional efficiency and cost control with efficient product procedures. They must be able to coordinate with the technical engineering and other special services required, in particular the specialized acoustic engineering capabilities essential to good band facility design. Planners experienced in acoustical engineering should be consulted in as many phases as possible of planning and construction to ensure that proper design requirements are addressed.

(2) Concept Design. The designer prepares concept designs (detailed schematic designs) to define all functional aspects of the facility, and provides a firm basis for evaluating the total building and site design. Band leadership should be actively involved in initial schematic ideas for band facilities.

(3) Overall Building Design.

(a) General Use Categories. Music spaces must be predominant. A band facility is used most importantly to rehearse/practice music and secondarily to support functions required for operation of the band. Examples of support functions include library, administrative, operations, and storage/supply. Among the spaces in the band facility program, the most important are the music spaces- in order of precedence: Main Rehearsal Room, Large Group Rehearsal Room, and Individual Practice Rooms. This predominance should be reflected in the design. The requirements of these spaces, spatially and in relationships, should take priority in design considerations. In the event it becomes necessary to make compromises, those spaces not critical to musical rehearsal should be

adjusted. This importance should also be evident in the music spaces' prominence in the architectural form and image of the Band Training Facility.

(b) Storage. Adequate storage is another critical element to designing and planning a Band Facility. A comprehensive plan for renovation must include large areas reserved for storage of instruments, cases, and other items critical to the band's mission. Band commanders must be actively involved in the careful planning of storage requirements for their respective bands. Careful planning to ensure that each rehearsal area has storage for cases and other equipment will result in a well-organized room with minimum interference in musical rehearsals.

(c) Band Image. This facility should have an architectural image that helps project an identity for the band. The band is an important component of the morale and esprit de corps of a unit, post, and parent commands. The building should have an attractive presence to passers-by and visitors approaching from the outside, as well as to those inside. It should present a distinctive, identifiable image as a band facility. In part, this can be achieved through the architecturally prominent and musically appropriate design of the predominant music spaces. Band facilities should conform generally to external architectural styles common to the particular installation.

(d) Renovations. Renovation of an existing building is a common means of creating a Band Training Facility. A BTF must have the ability to contain rooms large enough for musical rehearsals. Most of the objectives and requirements described for new construction apply. Many posts have historical or other architectural requirements that present challenging constraints and opportunities for this type of facility. It is critical that planners have a clear understanding of these requirements as soon as possible and do not compromise the musical rehearsal space requirements.

(e) Interior Design and Signage. Interior design features must be developed in coordination with the architectural design. All features of the building relative to the interior design, whether they are furnished and installed as part of the construction contract or provided later by the using service, must be developed as an overall scheme. Graphic design and signage should be included as part of the overall design to identify activities and facilitate functional effectiveness. Requirements must be coordinated with the using service and the installation.

(f) Hearing Loss. A real safety concern pertinent to band training facility design is the potential hearing damage and health problems affecting band personnel, which can result from improper acoustics in practice and performance spaces. Continuous exposure to high sound levels can lead to hearing loss, and band facility design and operation should comply with requirement in Occupational Safety and Heath Act. Proper acoustic design of BTF can avoid such problems. As a general rule, larger spaces reduce the potential to hearing damage.

c. Site Design Criteria.

(1) Landscape Planting Design.

(a) The landscape planting design will be accomplished in accordance with the requirements of TM 5-803-13 and Unified Facilities Criteria (UFC) 2-600-01,Installation Design, 30 Jun 00.

(b) Landscaping should be both hardy and indigenous to the specific area of the band's location. This will ensure a minimal amount of upkeep.

d. Acoustical Criteria. Acoustical issues must be the foremost consideration in Band Training Facility design. The quality of band performance can be correlated directly to the quality of the band's training and practice area. Band personnel must be able to hear themselves and each other clearly. Control of the quality of sound within the music rooms, and of the ability to hear, without distraction from other rooms, is essential. Non-musical spaces (administrative, supply, library, mechanical etc.) may be designed using standard design principles as long as the musical spaces are not compromised or degraded due to proximity.

(1) Noise Control. The design of mechanical systems so as to achieve reasonably low noise levels for all non-musical spaces and especially low and sufficiently even background noise levels in musical spaces. (See TABLE N-2)

(2) Room Acoustics. The quality of sound within a room, assuming that extraneous sounds from other areas are eliminated or neutralized, is the key principle in room acoustics. The room's size and shape and the acoustical properties of its finishes must be manipulated to form the desired environment-a place where sounds are heard by band-members and leaders as distinct yet blended, strong yet not too loud, and of such quality that the players enjoy the sound they make.

(a) Loudness depends on the sound energy emitted by the instruments and equipment, which only the players can control, and on the acoustic absorption of the room, which can be controlled by the design. In essence, every doubling of absorption reduces the sound level by three decibels, but also shortens the reverberation time by a factor of two. Since excessive loudness is a major problem in practice and rehearsal rooms, liberal amounts of absorptive treatments are recommended for those rooms lacking in cubic space.

(b) A corollary and preferred method of reducing loudness is to increase the room size well beyond the minimum required to accommodate the occupants. This will create larger surfaces that can be treated (more absorption) and make the sound travel longer distances before being reflected back to the musicians (weaker reflections). For economic reasons, increased size is most often to be found in increased height. Therefore, ample volume is recommended-ceiling heights of 18 to 30 feet for the Main Rehearsal room, 15 to 20 feet for Large Group Rehearsal room. Individual Practice rooms need not be as high: 10 to 12 feet is suggested, but 8 or 9 feet is acceptable if they contain liberal areas of absorptive finishes. Less absorption is needed in larger rooms.

(c) Clarity and Communication. Abundant absorption automatically assures a fair degree of clarity for short distances. Sounds, once made, stop quickly and do not compound into a state of acoustic confusion. The wider/deeper the room the more difficult it is for musicians to hear each other. The preferred solution is to make a high ceiling partially reflective ceiling into an otherwise absorptive ceiling.

(d) Avoidance of Unwanted Effects. Adherence to the preceding guidelines does not guarantee acoustical excellence. It can be marred by one of several effects, the most common of which are discrete echoes off distant surfaces; flutter echo- (a ringing sensation due patterns of repetitive reflections along the same path); focusing; and standing waves (a booming at specific, low frequencies).

(e) The preventive measures to deal with these unwanted effects are, respectively:

- Absorptive finishes, especially on distant walls, more than 30 feet from the sound source.
- Avoidance of parallel, reflective surfaces; and splaying or treatment of these surfaces with absorptive materials. Non-parallel walls are beneficial for sound diffusion, but are not absolutely necessary if enough vertical surfaces are altered and treated.
- Avoidance of concave shapes including curved walls, vaults, domes, etc;
- Avoidance of principal room dimensions (length, width, and height) that are equal to or multiples of each other.

(f) The general rule to good design of any music room is to encourage diffusion. For this, within the limits of practicality and consistent with the previous recommendations, the suggested provisions are:

- Irregular, non-rectangular room shapes
- Small-scale splays and bumps on large, otherwise plain surfaces

- Distribution of sound-absorbing finishes evenly throughout the room, rather than their concentration on one or two surfaces

(g) At least some of the sound-absorbing materials should be furred-out or, in the case of ceilings, suspended. The airspace thus created behind the material will help absorb low-frequency sound and reduce boom; this must be taken into account when determining finished room dimensions and ceiling heights in renovation. Ceilings may be sprayed with acoustical foam or other material designed to adhere to ceilings. Care must be taken to not over dampen the reflected sound from the ceiling that may create a "dead room." Both absorption and reflection must be used to one extent or the other in ceiling treatment.

(h) For wall absorption in the larger music rooms, adjustable drapes on tracks are recommended. This would allow reflective surfaces to be covered or uncovered to reduce or increase "liveness". Such flexibility is likely to be appreciated by bandmasters, to suit their personal preferences, as well as by the various ensembles, to suit their musical styles and overall volume.

(3) Sound Isolation. Music rooms must be quiet and without distraction from noise sources outside the room. The best course is to organize the function-spaces of the building so that noise generators such as music practice rooms and mechanical rooms are not adjacent to other music rooms. Quieter activities such as corridors, offices and storage should be used as buffers between noisy activities. If two noisy rooms are connected, then it is necessary to reduce the amount of sound that "bleeds" through by constructing sound barriers that can be cost-prohibitive. The most economical and effective sound isolation is achieved by creating at least two doors between a musical activity and other sound sources. This creates an "air pocket" that is highly effective at dissipating sound waves. Sound Transmission Classification (STC) is a numerical system that evaluates materials on their sound isolation effectiveness. Typically sound barriers greater than STC 40 are needed in music facilities.

(a) Some types of construction are inherently more suitable for band facilities. Since sound is a transmitted vibration, its isolation requires constructions that are not easily set into vibration. Concrete slabs, solid or sand-filled masonry or concrete walls, and concrete roofs are appropriate, because their weight helps stop low frequency sound. Design consideration should begin with a massive construction system rather than a lighter framework that will require elaborate soundproofing later, to less effect. Fibrous materials used for thermal insulation, such as cellulose fiber or mineral wool insulation are good materials for improving sound insulation in walls and floors. Closed cell thermal insulators, such as polystyrene, or other plastics don not absorb much sound. Continuous metal roof decks and steel frames are not recommended, because they will transmit vibration throughout the building, no matter how good the wall construction. Furred out drywall can be an inexpensive way of redesigning the interior shape of a particular space and, when properly sealed can be effective in creating an air pocket that will have significant sound isolation capabilities.

(b) Rehearsal and practice rooms are best located on grade. This eliminates the need for double floor constructions, which would be necessary not only for vertical isolation, but also to stop sound from programming horizontally along the unrestrained upper-floor slab.

(c) Sound waves travel freely in air, so it is imperative that all music rooms are sealed boxes, with no air gaps-even tiny ones-or defects in construction. Acoustical sealant is a key element in this endeavor. Partial separations and semi-open planning are inadequate, as are folding partitions. Flexible acoustic sealants are an essential part of good acoustical construction. Elaborate layers of materials are wasted if poor workmanship at the joints and corners allows air passage. This includes joints where partitions meet the roof, seals around doors and windows, and where mechanical and electrical lines penetrate walls.

(d) In sealed environments, HVAC systems must be carefully designed to allow adequate airflow that does not significantly compromise sound isolation. (See 4.e. Heating, Air Conditioning, Dehumidification, Evaporative Cooling, Mechanical Ventilation)

(e) Doors are the weakest point in the enclosure, and must always be fully gasketed, unless they are incorporated into a sound lock (two doors separated by a vestibule). It is better to install a series of doors with a sound lock, than to depend on one expensive sound-insulated door. Gaskets need periodic adjustment, and misuse can make them ineffective, whereas a sound lock will always perform its function. If it is necessary to have an opening between two music rooms, then the connection should involve a pair of doors facing each other across the widest space possible.

(f) Building an independent room can increase isolation further: within the heavy walls already constructed, or adding another separate masonry wall next to the first. These added elements must be isolated completely in such a way that the vibration of one barrier will not be passed on to the other. An independent skin of gypsum wallboard (drywall) or plaster, attached to walls and roof with resilient clips, is very effective.

(g) Factory-made sound modules are an effective means of providing smaller practice rooms of good quality, either in conversions where dependable construction may be difficult, or in new construction. They provide light, heat and air supply and all interior finishes. They may also be useful for Recording/Audio Control Rooms. Manufacturers have detailed information regarding the spatial, weight, power requirements and placement suggestions about these factory-made sound modules. These manufacturers should be consulted in the earliest stages possible of building design. While artificial effects (microphones and speakers placed throughout the room to emulate different acoustics) provided by manufacturers can be helpful in smaller practice rooms, they should be avoided in larger rooms. If factory-made sound modules are to be used, it is crucial that manufacturers be contacted early in the design process to allow for adequate space and wiring requirements.

(h) Sound Transmission Class (STC) ratings may be used as a reference guide on finish materials used in room construction. For example, the Main Rehearsal Room is assigned a Noise Criterion rating of 25 (NC 25). That is, background noise up to 25 decibels (dB) is acceptable. If the rehearsal space is placed directly next to the Large Group Rehearsal Room, which might generate 95 decibels, the construction between them ideally should reduce the sound by 70 decibels, requiring an overall STC rating of 70. STC rating of more than 50 is very difficult to achieve with just construction and materials. It is far better to simply plan carefully and avoid any placement of rooms that requires such sound isolation between two rooms. It is relatively simple to achieve an STC rating between two rooms by using two doors with a hallway between. (See TABLE N-2)

NOTE: Sealed spaces must have adequate ventilation.

TABLE N-2 Recommended Sound Isolation Criteria for Band Training Facilities

	Maximum Level of Empty Room	**Typical Maximum Level of Activity**
Recording/Audio Control Booths	max. NC-25	95dB
Main Rehearsal Room	max. NC-25	100 dB
Group Practice Room	max. NC-30	95 dB
Individual Practice Rooms	max. NC-35	90 dB
All Other Occupied Spaces	max. NC-40	90dB

e. Heating, Air Conditioning, Dehumidification, Evaporative Cooling, Mechanical Ventilation.

(1) Design Requirements. It is recommended that the air-conditioning systems, especially airflow through diffusers, be engineered to provide a noise level less than the Noise Criterion

assigned to the space (see TABLE N-2). Duct systems should be of the low-velocity, low-pressure variety, and should be acoustically lined and insulated to minimize noise. (This also improves efficiency) Heating and ventilating systems of music rooms must be designed not only for adequately quiet operation, but also with isolation in mind. Ducts cannot run directly from one room to another. Instead, they should be long, devious, acoustically lined, and insulated. The mechanical equipment should be located far from sensitive music rooms. It should be on grade, rather than on rooftops or mezzanines, (where adequate vibration isolation is much more difficult to achieve).

(2) Outside/ventilation air shall be in accordance with ASHRE Standard 62.

(3) Inside design conditions shall be 70 degrees F for heating and 76 degrees F and 50% relative humidity for cooling. Between 70 and 76 degrees F shall be a deadband with no heating or cooling provided.

(4) Controls shall provide for set-up/set-back of temperatures during periods when the facility or space is not occupied. If time clock type approach is used for this function, these automatic controls shall be capable of being overridden by the occupant when the space is occupied during periods normally scheduled as unoccupied. Occupancy sensors or similar approaches may also be used where appropriate to index the system between the occupied and unoccupied mode.

f. Plumbing Equipment Criteria. See Chapter 15 of Technical Instructions (TI) 800-01 for plumbing equipment design requirements.

g. Fire Protection Criteria. Fire protection criteria will be issued by HQUSACE/CECW-E only.

h. Fire Protection System.

(1) Provide fire protection for band facilities in accordance with Military Handbook 1008C, Fire Protection for Facilities. If sprinkler protection is required, wet pipe sprinkler protection will be provided.

(2) Storage cabinets for dry-type portable fire extinguishers should be provided, particularly in locations adjacent to the Library, Audio Control Booth, Individual Instrument Lockers, and Unit Supply/Storage Area.

i. Electrical Criteria

(1) Lighting and electrical systems must be designed to be quiet, specifically in music practice areas. This includes air leaks at conduit penetrations, ballast hum, and transformer vibration. All lighting will be in accordance with the Illuminating Engineering Society Lighting handbook. Lighting for finished spaces will be part of the ceiling design with standard ceilings and modular recessed lighting fixtures.

(2) Music spaces require a general lighting level of 500 lux at 3 to 4 feet from the floor to allow for good visibility of music on stands. Proper lighting for the music practice areas is an important consideration.

(3) Conduit pipes or channels should be run throughout the Main Rehearsal and Large Group Rehearsal rooms should be connected with the audio control room to facilitate recording and communication. Sound lines, fiber-optic, and electrical lines should be properly shielded, insulated, and placed to avoid interference and sound transmission. These conduit systems may be run in walls, in the ceiling and under a floor with recessed access panels. Ceiling conduit would house microphone cables. Floor conduits can be used for Electrical power, sound cables, and LAN lines. Special care in running conduit systems must be taken to ensure that exact parallel lines are avoided. (Non-parallel lines discourage interference) Also ensure that all holes are sealed after conduit has been installed and before finish materials are placed.

(4) Convenience outlets shall be provided in all music practice areas in the following suggested quantities:

- Small individual practice rooms – 2 duplex outlets;
- Large individual practice rooms – 3 duplex outlets;
- Small group practice rooms – 6 duplex outlets
- Large group practice room and main rehearsal room – 8 on the walls and four duplex outlets evenly distributed on the floor.

(5) The audio control booth will require at least 10 electrical outlets. The power requirements for this room should be coordinated with the specific electronic equipment planned for it. It is preferred to have separate power lines within the audio control booth to avoid interference and other transmitted sounds.

NOTE: Electrical outlets placed in walls should not be back to back through the wall to avoid sound transference. Instead outlets should be offset through the wall with insulation between.

5. INDIVIDUAL SPACE REQUIREMENTS

a. Main Rehearsal Room.

(1) Functional Use.

(a) The main rehearsal room is used primarily for full-strength rehearsal with acoustic and amplified instruments.

(b) The main rehearsal room is the center of pulse of the band and must be large enough to accommodate a full 41/65-member band* (as applicable) plus several other architectural design considerations (see TABLE N-1). *Larger special bands must be calculated separately.

(2) Architectural Requirements.

(a) Provide room for at least five guest soloists added to full strength.

(b) Provide ample space for large percussion instruments and piano.

(c) Amplified sound must be taken into account in both space and sound requirements.

(d) Musicians must have good visual communication within the group and must be able to hear across the group in rehearsal.

(e) Total sound should be controlled by use of absorbing materials throughout the room to avoid high levels of noise. (See 4.d. Acoustical Criteria)

(f) Storage of cases, coats, music folders, and other temporary items standard to musical organizations must be considered as part of the initial design.

(g) Conduit pipes/or channels should be run throughout the Main rehearsal and large group practice rooms connected with the audio control room to facilitate recording and communication.

(h) One set of double doors is required for movement of large instruments latch mechanisms can be attached to floor and ceiling (providing for a space at least 72 inches wide).

(i) Fluorescent ballasts should be A-rated for least noise possible.

(j) All doors should be solid with high-quality hardware for durability and security. Metal kick plates may be installed to impact areas to minimize damage to door. If doors to outside are provided, they shall be equipped with panic hardware.

(3) Materials and Finishes: The preferred floor for the main rehearsal room is hardwood (maple or harder wood is preferable to oak due to resiliency); floated above the existing floor. These floors can be either solid or laminated. Fibrous insulation should be added to space between sub-floor and floated floor to reduce low frequency sound waves and to isolate sound transference along

the floor. (A floated floor automatically allows for the opportunity for electrical conduit to be run under the hardwood) Where this is not feasible or wanted, resilient textured flooring such as thick rubber or high-quality vinyl is acceptable. Walls may be textured with plaster, paper, and/or washable paint (semi-gloss) to enhance sound diffusion and to seal surfaces (that reduces sound transmission). Acoustical treatments of ceilings are a key element of proper construction to reduce lower frequencies in a given space. Sprayed textured coatings may be considered as an alternative to a suspended ceiling where ceiling height is greater than 25 feet. (See 4.d. Acoustical Criteria)

NOTE: *Because the main rehearsal room is the most important room to the band, it should be located central to the facility. Design considerations include:*

- *Must be immediately adjacent to the audio control room, with vision between the conductor and the recording/audio control technician via either a window or closed circuit monitor.*
- *Convenient to storage, unit supply, loading dock, and library.*
- *Should have adequate storage either designed within the room or directly adjacent to the room. Should avoid mobile storage cabinets that are not incorporated in design of room.*
- *Should not be directly adjacent to other music spaces to avoid bleed through of sound.*

(4) Space Allocation Requirement.

(a) Size and dimensions. The most important design issue is to find and/or construct a building that is large enough with high ceilings to accommodate the dimensions of the main rehearsal room. Average ceiling height of 20 to 30 feet is recommended; heights of less than 18 feet should be avoided. This room should be free from supports that may impede a clear field of vision. Support columns that may impede vision must be avoided.

(b) The dimensions of the interior should be at least 1,575 net square feet (NSF) for a 41-member band and 2,275 NSF for a 65-member band. IMPORTANT: These dimensions do not include storage space.

(c) If necessary, heights of less than 18 feet will be considered only if a minimum volume of 600 cubic feet per musician is maintained for the Main Rehearsal Room.

(d) The narrow-most dimension for a 1,575 NSF room is 30 feet; and for a 2,275 NSF room is 40 feet.

(5) Furnishings and Equipment.

(a) Built-in microphones and speakers using built-in conduits for wiring are recommended.

(b) Access panels to sound jacks and electrical outlets can be installed directly into the floor or walls to minimize cords and wires.

(c) Permanent risers should not be used.

(d) Dry-erase or chalk board (4 feet by 8 feet). Double-sided mobile boards are an alternative to permanently mounted ones.

(e) Clocks and any other electrical devices should be designed to be quiet.

(f) Heavy curtains (multiple layered theater style) on tracks to permit acoustical variability.

NOTE: Avoid storing any cases, lockers, or instruments in the room if they can be stored elsewhere. Anything that will be brought into the rehearsal hall will reduce the overall cubic space of the

room. Foreign articles not inherently designed within a space can rattle and even amplify sound waves.

(6) Sound Isolation Requirements. (See 4.d. Acoustical Criteria)

(a) Design and limit weak points in acoustic separation such as doors, windows, ventilation, pipes, and joints.

(b) Use sound locks, fully gasketed or proprietary acoustical doors such as STC 40.

(c) Single story, slab-on-grade construction is the most economical way to provide sound isolation.

(d) Heavy masonry wall construction is preferable to stud wall construction. If music spaces are adjacent, use double wall, with cavity between spaces.

(e) Avoid the use of natural ventilation, since it precludes sound isolation and the humidity control necessary to store instruments properly.

(f) Use acoustically lined, insulated sheet metal ducts for supply and return air, sized for adequately low velocity to achieve NC-25.

(g) Perfectly seal all joints and penetrations to make the room virtually airtight. Even small leaks admit sound.

(h) Avoid rigid paths for sound transmission, such as electrical conduit. Use non-metallic conduit at music room walls. Do not put outlets back-to-back. Where resiliently separated double constructions are used, do not bridge them with rigid ties. Even minor ties, unless resilient, transfer sound.

(i) Exterior windows may be used if sonic insulation is adequate to avoid excessive noise transmission through the window.

(7) Acoustical Requirements.

(a) Inadequate cubic volume (spatial) is the pervasive problem in rehearsal rooms. 600 cubic feet of space per acoustic musician should be allowed in the design of any rehearsal space.

(b) Absorption: Apply extensive amounts of sound absorbing material that is effective over a wide frequency range, including low frequencies at and below 125 Hz. The most effective and least expensive absorbing treatment is installation of acoustic tile on the ceiling. It is important to treat walls as well. Moveable thick curtains are the least expensive and most effective system of absorbing frequencies and controlling reflection. It should be noted, however that a balance of reflecting and absorbing material should be used on the ceiling. Never all reflective or all absorptive.

NOTE: STC ratings are not helpful in determining low frequency performance since STC ratings only evaluate 125 to 400 Hertz.

(c) Ceilings: The ceiling should be partially reflective. A common method for ceilings 18-25 foot high is to use suspended acoustic tile, but over only approximately one-half of the ceiling area, centered in the room, making a 50-50 checkerboard of hard, refractive and absorptive materials. Hard surfaces should not exceed one-quarter of the total ceiling area. Generally, the smaller and lower the ceiling, the more absorptive (versus reflective) materials necessary.

(d) Floors: The best floor for rehearsal areas is one made of wood, either solid or laminated. It is recommended to float a wood floor over a slab floor so there is a space that is insulated between the two surfaces. Carpet should be avoided for several reasons. Carpet tends to

impair communication within a room. Also, carpet is not durable to band activities such as regular movement of equipment across the floor and requires substantial maintenance and replacement costs.

b. Recording/Audio Control Room.

(1) The recording/audio control room should be approximately 250 NSF.

(2) Ideally, the recording/audio control room should be located between the main rehearsal room and the large group rehearsal room (The room can be integrated into the main rehearsal). This location serves two purposes, first, sonic insulation and separation between the two rehearsal rooms that allows for simultaneous rehearsal and second, communication between both rooms for recording purposes. Interior windows between the recording/audio control room and main rehearsal and the large group rehearsal rooms are ideal for communication between the bandleader and the sound technician.

(a) The interior windows should be large enough to allow a good field of vision from the recording/audio control room to most of the main rehearsal and the large group rehearsal rooms. Interior windows of at least 3 feet by 4 feet are recommended.

(b) Double glaze any interior windows; space panes at least two inches apart. Window systems that are designed for STC 40 or greater are necessary to properly isolate music rehearsal spaces. This is normally accomplished with multiple layers of glass (may be laminated) with air pockets between and added tension to avoid sympathetic vibrations through the frame. In some cases, two thick double-glazed windows between audio room and main room are sufficient. A third single pane added on the recording room side (with an air-pocket between) will significantly decrease sound transmission. The pane facing the rehearsal facility should be angled down by at least 10 degrees to avoid large reflective area of the window. The most important consideration for the window is ample sonic insulation. Window systems should achieve STC 50 or greater.

NOTE: A closed circuit monitor system is an acceptable option instead of windows, however, it should be noted that electronic monitoring systems have maintenance and power issues that make them inferior to windows long-term.

(3) A recording area of the recording/audio control room should be a prefabricated recording room to serve as a small recording studio that can isolate small ensembles and/or soloists. The size of this studio shall not be less than 80 NSF. Manufacturers should be contacted early in the design process to allow for adequate space, layout, and power requirements.

(4) The recording/audio control room should have built-in or semi-portable shelving units designed for sound equipment. Furnishings should be designed to accommodate wires, and special care must be provided to ensure adequate ventilation to electronic equipment and personnel. At least 10 multiple power outlets are necessary. Conduit pipes/or channels should be run to the main rehearsal and large group rehearsal rooms to facilitate recording and communication. (See 4.i.(3) Electrical Criteria) The recording/audio control room should be the central point of connectivity of conduit that connects rooms to each other.

NOTE: It is critical that all conduits be clearly marked throughout the construction phase.

(5) The recording/audio control room should be treated heavily with sound absorption and should be as quiet and separated acoustically as possible. High quality commercial grade carpet (and padding) is appropriate in this room.

c. Large and Small Group Rehearsal Rooms.

(1) Functional Use. The large group rehearsal room is used primarily for group rehearsals of 20 to 25 persons, with acoustic and amplified instruments. The large and small rehearsal rooms are used for group ensembles, stage/show band, rock, country, and pop groups.

(2) Architectural Requirements.

(a) Ample space for large percussion and piano.

(b) Amplified sound must be taken into account.

(c) Musicians must have good visual communication within the group and they must be able to hear across the group in rehearsal.

(d) Total sound should be controlled by use of absorptive materials throughout the room to avoid high levels of noise.

(e) Conduit pipes/or channels should be run to the main rehearsal and large group rehearsal room to facilitate recording and communication. One set of double doors, at least 72 inches wide, is required for movement of large instruments. (See 4.i.(3) Electrical Criteria)

(f) Fluorescent lighting must have a remote ballast to eliminate noise.

(g) Lockable solid doors with high-quality hardware are required for security of expensive instruments.

(h) If doors to outside are provided, they shall be equipped with panic hardware.

NOTE: Design considerations include:

- *Convenience to storage, unit supply, loading dock, and library.*
- *Must be immediately adjacent to the audio control room, with vision between the conductor and the recording/audio control technician*
- *Should have adequate storage either designed within the room or directly adjacent to the room.*
- *Should not be directly adjacent to other music spaces so as to avoid bleed through of sound.*

(3) Space Allocation Requirement.

(a) These rooms should be free from supports that may impede a clear field of vision. The following guidelines should be considered regarding the large and small group rehearsal rooms:

- The dimensions of the interior should be at least 700 net square feet (NSF) for the large group rehearsal room and at least 350 NSF for the small group rehearsal room. These dimensions do not include any space for storage.
- Average ceiling height of 20 feet by 30 feet is recommended. Heights of less than 13 feet should be avoided. If necessary, heights of less than 13 feet may be considered only if a minimum volume of 600 cubic feet per musician is maintained.
- Narrow rooms should be avoided. Avoid dimensions in smaller rooms that are exact cubes to avoid standing waves.
- Rectangular shapes are preferable. Walls should be generally splayed, not parallel. The ceiling should also be angled to avoid parallel floor to ceiling relationships. This can be easily done with a suspended ceiling being placed at a slight angle to the floor.

(4) Furnishings and Equipment.

(a) Built-in microphones and speakers using built-in conduits for wiring are recommended.

(b) Panels can be installed directly into the floor or walls to minimize cords and wires.

(c) Permanent risers should not be used.

(g) Dry-erase or chalk board (4 feet by 8 feet). Double-sided mobile boards are an alternative to permanently mounted ones.

(h) Clocks and any other electrical devices should be designed to be quiet.

NOTE: Anything brought into the rehearsal room will reduce the overall cubic space of the room. Avoid storing cases, lockers, or instruments in the room if they can be stored elsewhere.

(5) Sound Isolation Requirements and acoustical treatments

(a) Heavy curtains and tracks to permit acoustical variability.

(b) High quality commercial-grade carpeting (and padding) may be appropriate to reduce somewhat excessive reflection off hard floors. High-grade rubber flooring is preferable to carpet.

NOTE: Cost of replacing and maintaining carpet should be analyzed. Also, carpeting has a tendency to become mildewed quickly when used by brass groups due to emptying condensation from instruments

(c) Design and limit weak points in acoustic separation such as doors, windows, ventilation, pipes, and joints.

(d) Use sound locks, fully gasketed or proprietary acoustical doors such as STC 40.

(e) Single story, slab-on-grade construction is the most economical way to provide sound isolation.

(f) Heavy masonry wall construction is preferable to stud wall construction. If music spaces are adjacent, use double wall, with cavity between spaces.

(g) Avoid the use of natural ventilation, since it precludes sound isolation and the humidity control necessary to store instruments properly.

(h) Use acoustically lined, insulated sheet metal ducts for supply and return air, sized for adequately low velocity to achieve NC-25.

(i) Perfectly seal all joints and penetrations to make the room virtually airtight. Even small leaks admit sound.

(j) Avoid rigid paths for sound transmission, such as electrical conduit. Use non-metallic conduit at music room walls. Do not put outlets back-to-back-instead stagger placement to avoid sound transmission. Where resiliently separated double constructions are used, do not bridge them with rigid ties. Even minor ties, unless resilient, impair isolation.

d. Individual Practice Rooms.

(1) Functional Use.

(a) Individual rooms are used to rehearse individual and small groups of acoustic instruments, small ensembles, and amplified instruments. These individual rooms are used for a variety of ensembles. Some rooms will be used by groups that routinely produce very high sounds (above 90 dB) (e.g. Percussion room, combo (rock, country, etc…)). These rooms should have special consideration given to them to attempt to deal with these high sonic volumes. Ample absorptive treatments are the first step. Manufacturers of prefabricated practice rooms should be consulted early in the design phase to ensure that the design will allow them.

(b) One 350NSF small group practice room for 41-member band and two-350NSF small group practice room for 65-member band should be specifically built for percussion and/or rhythm groups. Walls and ceilings should be treated with maximum sound absorption possible. Specialized

materials are available from manufacturers. Although high quality, commercial-grade carpeting can increase sound absorption, it is not recommended due to maintenance problems and the relative small difference in significantly reducing overall sound levels.

(c) Design considerations include:

- Make rooms large enough for 1 to 4 people with acoustic and amplified instruments. (See TABLE N-1)
- Allow ample space for at least two larger rooms for large percussion and piano that require a double door or at least a single door at least 40 inches wide. (Doors should swing out of smaller rooms to maximize organization possibilities within the room)
- Amplified sound must be taken into account when evaluating rooms.
- Total sound should be controlled by use of absorbing materials throughout the room to avoid high levels of noise. Reflection in smaller rooms should be avoided.
- Sealed environments with adequate airflow are necessary.

(2) Architectural Requirements.

(a) Do not locate adjacent to main rehearsal room or large group rehearsal room.

(b) Avoid doors that connect to other rehearsal spaces.

(c) Single doors are normally adequate for individual practice rooms. Hallways should be used to separate practice rooms from one another.

(d) Doors should be rated at least STC 40.

(e) Ventilation system should not produce levels more than NC-35.

(3) Space Allocation Requirement.

(a) Large individual practice rooms will be 80-125 NSF each.

(b) Small individual practice rooms will be 55-75 NSF each.

(c) For Direct Support bands (41 members) provide a total of 2 to 4 large and 6 to 8 small practice rooms.

(d) For General Support bands (65 members) provide a total of 3 to 6 large and 9 to 12 small practice rooms.

(e) Minimum recommended dimensions of at least 8 feet for large and 6 feet for small practice rooms. (Doors should swing out of smaller rooms to maximize organization possibilities within the room)

(4) Furnishings and Equipment.

(a) Percussion room should have either double doors or at least a 40 inches single door. Built-in shelves and cabinets should be considered for the percussion room.

(b) Clock or any other electrical device should be quiet.

NOTE: Anything that will be brought into rooms will reduce the overall cubic space of the room. Avoid storing any cases, lockers, or instruments in the room that can be stored elsewhere.

(5) Sound Isolation Requirements.

(a) The smaller the room the more absorption is important than reflectivity or diffusion.

(b) Natural light through windows can be used if glare and acoustic properties are carefully considered. Sound isolation from exterior noise is more important than natural light. The most important consideration for windows is ample sonic insulation.

(c) Small rooms need fixed sound-absorbing treatments on walls in addition to thick curtains on windows.

(d) In smaller rooms ceilings should be wholly absorptive and not reflective.

(e) Fluorescent ballasts should be A-rated for least noise possible.

(f) Prefabricated sound modules of various sizes may provide cost-savings over renovation projects and are a viable alternative to construction costs. Early communication with manufacturers will ensure that the design will accommodate these sound modules.

e. Administration and Operations.

(1) Functional Use.

(a) Provides offices for the administrative activities for the band (See TABLE N-1) to include:

- Offices for command team (commander, associate bandmaster, and/or enlisted leader).
- Office space for:
  - Administration
  - Transportation
  - Operations
  - Public Affairs
  - Training
  - Information Management Office
  - Recruiting/Retention
- Group leader offices.
- Charge-of-Quarters (CQ) space.

(b) Full connectivity to phone jacks/LAN lines is necessary.

(2) Architectural Requirements.

(a) CQ desk must have direct overview of the Main Entrance and Lobby. Overview of the service entrance and doors to Unit Supply/Storage and Main rehearsal room is also recommended.

(b) Offices should be separate from noisy music rehearsal areas. Administrative areas can be used between musical rehearsal spaces to create a natural acoustic separation. Natural light is encouraged in these spaces. Separate closets with shelves are recommended when possible especially in Public Affairs and Information Management offices.

(c) Space Allocation Requirements. (See TABLE N-1)

(d) General administrative offices should be distinctly subdivided into two areas, for Administration and for Operations/Transportation. (Ideally, two separate rooms for these areas)

(e) A private office is required for a Recruiting/Retention.

f. Storage and Supply.

(1) Functional Use.

(a) Provides storage of issued cases, instruments, and equipment that are not used in particular rehearsals. These areas should be securable and should be located immediately adjacent

to the main rehearsal room. It is necessary to plan storage areas for cases and miscellaneous materials that are equal to 1/3 the size of the Main Rehearsal Room. (See TABLE N-1)

(b) Provides storage and security of non-issued instruments, uniforms, instrument cases, expendable band supplies and musical instrument repair parts, lighting and electronic equipment, amplification and recording equipment, music stands, possibly portable podium and risers, hand trucks, general and office supplies, linens, and some personal property.

(c) Issue desk for distribution and receipt of supplies and equipment.

(2) Design Requirements.

(a) Storage and Unit Supply must be foremost, securable. Lockable metal doors with high quality, double locks are normally sufficient.

(b) Office space should have 2 workstations with desks for a 41-person band and 3 workstations with desks for a 65-person band.

(c) Space for collection and distribution for uniform cleaning.

(d) One set of double doors, at least 72 inches wide, is required for movement of large instruments.

(e) Unit supply area should be an uncluttered, well-lighted space, dry space with some natural light available at the workstations and desks, and with well-organized specialized storage.

(f) Ideally close to main rehearsal, large rehearsal rooms, and loading dock that is direct with wide egress and no steps.

(g) Double doors are required for movement of large instruments and equipment.

(h) Instrument Storage and uniform storage must be well ventilated and humidity controlled with year-round temperature of roughly 65 to 70 degrees Fahrenheit and relative humidity of 35 to 40%.

(i) Full connectivity to phone jacks/LAN lines is necessary through conduit systems.

(j) Thresholds should be flush with floor.

(3) Space Allocation Requirements. (See TABLE N-1)

(a) Built-in shelving and cabinets are recommended in the Supply/Storage areas.

(b) Dimensions (width and depth) should exceed 16 feet to facilitate movement of large instruments and cases.

(4) Furnishings and Equipment.

(a) Storage area should be equipped with special shelving or compartments to store non-issued instruments and equipment, appropriate to the space requirements of each.

(b) The amount and configuration will vary with each band's operations.

g. Individual Instrument Lockers.

(1) Functional Use.

(a) Instrument lockers are needed to store those instruments issued to individuals.

(b) Load requirements can vary greatly depending on a particular unit's mission.

(2) Design Criteria.

(a) In addition to the actual space that instrument lockers use, it is critical that all lockers are designed for convenient access and adequate space is allowed to open and set down instruments. (Special consideration is needed for door swing, and window placement).

(b) Instrument lockers are ideally located centrally and convenient to all rehearsal and practice rooms. For large instruments such as percussion, basses, tubas, and sousaphones, it is necessary to locate instrument locker areas close to rehearsal areas and loading docks.

(c) Individual instrument storage must be well ventilated, with a year-round temperature of 65 to 70 degrees Fahrenheit, and a relative humidity of 30 to 45%.

(d) All lockers must be lockable with secure hardware.

(e) Prefabricated lockers with adequate ventilation and interior organization preferable.

(f) Plumbing layout and design must be in accordance with TM 5-810-5.

(3) Space Allocation Requirements.

(a) Individual Instrument lockers: Companies who build ready-made lockers for bands have specialized expertise that is highly recommended in this endeavor. The following provides general space requirements for instrument lockers:

- 520 NSF for a 41-member band.
- 680 NSF for a 65-member band.

(b) Approximate linear dimensions need for individual instrument lockers:

- 41-member band should be at least 64 feet by 28 inches deep x 4 ft high.
- 65-member band should be approximately 92 feet by 28 inches deep x 4 ft high.

(c) Table N-3 shows a typical modular instrument storage system for a 41-member band.

TABLE N-3 Typical Modular Instrument Storage System for a 41- member band

Instruments	Number of compartments required	Compartment Dimensions
Clarinet, Flute Oboe, Piccolo	19	12"x 12 ½" x 28"
Bassoon, Saxophone Trumpet	18	12"x 39 ½" x 28"
French Horn, Guitar	4	18"x 39 ½" x 28"
Euphonium, Trombone	6	22 ¾"x 12 ½" x 28"
Snare Drum	6	22 ¾"x 19 ¼"x 28"
Tuba, Sousaphone, Bass Drum*	10	46 ½"x 39 ½"x 28"
Misc. storage*	3	22 ¾"x 39 ½"x 28"

* Separate rooms for storage of large instruments such as sousaphones, tubas, and bass drum should be considered. The room should be lockable with built-in shelving.

(4) Furnishings and Equipment.

(a) Use either built-in or prefabricated and designed units, for issued instrument storage, that are well ventilated, secure. May be built using wood or metal.

(b) A surface for setting down instruments while removing them from their cases must be provided near the lockers. If lockers are stacked two-high, counters or tables should be provided. If lockers are single-high, their tops can be used for his purpose. Ideally, these surfaces should be carpeted or padded to protect instruments.

h. Personal Support Spaces.

(1) Functional Use.

(a) These types of personal space requirements are necessary in a band:

- Locker room/Changing area
- Showers
- Toilets

(b) A changing area with lockers for uniforms is the most important personal support space in a band. Bands have a need for showering and changing uniforms before, after, and, sometimes in-between performances and rehearsals.

(2) Design Requirements of the Changing area.

(a) Ideally, layout of the changing area should be organized so that users may use toilets/lavatories without going through dressing and shower area.

(b) An aisle of at least 8' is need for dressing and swinging of locker doors

NOTE: Special consideration and planning of adequate ventilation is crucial in these areas due to the fact that uniforms and other sensitive personal equipment are often stored in these high-humidity areas. Large exhaust fans are highly recommended.

(3) Space Allocation Requirements.

(a) Lockers must each be able to accommodate at least 3 uniforms, coats, accessories, hats, and limited personal equipment; approximate dimensions: 6 feet high, 22 inches deep, 36 inches wide.

(b) 41 member band:

- Men's dressing area, with at least 35 lockers, 4 toilets, 4 lavatories, 2 urinals, 4 showers and 2 uniform presses- 950 NSF;
- Women's dressing area, with at least 10 lockers, 2 toilets, 2 lavatories, 2 showers and 1 uniform press- 550 NSF.

(c) 65 member band:

- Men's dressing area, with at least 58 lockers, 5 toilets, 5 lavatories, 3 urinals, 5 showers and 2 uniform presses - 1,300 NSF.
- Women's dressing area, with at least 14 lockers, 2 toilets, 2 lavatories, 2 showers and 1 uniform press- 580 NSF.

(d) An additional toilet for officers and visitors may be provided near the entrance and administrative area- 50 NSF.

NOTE: The above ratios are based on a typical 80/20 (men to women) ratio. These ratios should be adjusted as needed.

(4) Furnishings and Equipment.

(a) Benches should be positioned in front of locker rooms for changing. They may be either permanent or mobile.

(b) Each dressing area should have several large, full-length mirrors.

(c) A clear area (approximately 50 NSF) should remain free for uniform pressing.

(d) In the event that unit requirements have need for multiple changes of uniform during the duty day, steam presses are the most expeditious and effective means of keeping uniforms looking in top condition. Steam pipes and machines must be integrated into the early design of the facility.

i. Library.

(1) Functional Use.

(a) The library is a storage and retrieval area for multiple copies of music, reference books, training materials, and recordings.

(b) The main uses for the band's library are therefore:

- Music storage and retrieval,
- Music layout, sorting, and distribution,
- Reference publications and recordings storage (Listening areas should be considered)
- Library administrative area.

(2) Design Requirements.

(a) Must be well lit. Natural light in combination with electric light is preferred.

(b) Plumbing layout and design must be in accordance with TM 5-810-5.

(c) Prefabricated personal lockers with adequate ventilation and interior organization are recommended.

(d) Carpeting or vinyl flooring is acceptable in library areas.

(3) Space Allocation Requirements.

(a) 41-member band: 500 NSF.

(b) 65-member band: 640 NSF.

(4) Furnishings and Equipment.

(a) Library systems on tracks are highly recommended due to the space conservation and ease of use. Systems that require more than 25 lbs of effort to view music titles should be avoided. Due to the massive weight of music, weight consideration is critical. Manufacturers of library systems can provide detailed information regarding support requirements for these systems.

(b) At least two large tables for music organization.

(c) Several sorting racks with angled shelved for sorting music.

(d) 3-5 modular desks or work areas for administrative support.

(e) Full connectivity to phone jacks/LAN lines is necessary through conduits.

j. Other common spaces.

(1) Functional Use. The following spaces are common to all military units. Service, installation and unit regulations will dictate the style, type, and requirements for these spaces.

- Day-room: Tables, chairs, games, water fountain, pay phone, refreshments/vending machines, refrigerator, microwave, sink, coffee pot etc…
- Mail distribution
- Arms room
- Nuclear, Biological, Chemical room

NOTE: Some bands do not have weapons or chemical equipment. It is important that a thorough analysis of the band's present and future needs are assessed in terms of these specialized spaces. Installation engineers can provide guidance on details of constructing these rooms.

k. Entry.

(1) Design considerations include:

- Reception and control
- Trophy and memorabilia display
- Reception and control
- Movement of equipment and personnel

l. Receiving Platforms.

(1) Receiving platforms are ideally 4 feet high and 10 feet deep. The vertical distance between the truck maneuvering areas at the platform and the canopy above will not be less than 14 feet 6 inches. It is imperative that loading docks be designed on the same level as most of the building to facilitate the movement of heavy equipment. Ramps should be added at all areas where steps are necessary.

(2) The platform canopy will extend approximately 4 feet beyond the edge of the platform.

(3) The platform area will be free of columns.

(4) Dock levelers will be provided.

(5) Placement of levelers will be in such a manner as to allow more than one vehicle in loading dock area at once (e.g., do not center on loading dock).

(6) Loading dock doors should be at least 8 feet high and 6 feet wide. Doors should be insulated and securable with double locks. Thresholds should be designed to be flush mounted to the floor to facilitate equipment with rollers. If the system has electric assistance, there should be a manual back-up system in place.

(7) Loading dock must be at the level and convenient to the main rehearsal hall and storage and supply rooms.

(8) Loading dock should be well lighted.

m. Outdoors.

(1) Design considerations include:

- Outdoor rehearsal, marching practice, ceremonial drill.
- Ample lighting in front of building and in parking area is necessary.
- Parking for band members and band vehicles.
- Loading zones should be directly off the Main Rehearsal Room.

n. Telecommunications.

(1) Administrative telephones will be provided as required.

(2) Telephone requirements must be coordinated with the user and the local Director of Information Management.

(3) Phone jacks and conduit systems must be carefully planned for each space.

6. REFERENCES.

a. Design Guide DG1110-3-119, Band Training Facilities

b. AR 210-22, Master Planning for Permanent Army Installations

c. TM 5-803-13, Landscape Design and Planting Criteria

d. ASHRE Standard 62

e. Military Handbook 1008C, Fire Protection for Facilities

f. TM 5-810-5, Plumbing

g. The Acoustical Society of America (ASA)

h. ETL1110-3-491, Sustainable Design for Military Facilities, 01 May 01

i. DoD Minimum Antiterrorism Standards for Buildings, current edition

j. Technical Instructions (TI) 800-01, Design Criteria, 20 Jul 98

k. UFC 2-600-01, Installation Design, 30 Jun 00