The College of
WILLIAM & MARY

Arts Quarter Predesign and Project Phasing Study

JULY 15, 2013

HGA MOSELEYARCHITECTS

Commission Number 2926-002-00

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1.1 Purpose

The following study has been developed for the College of William and Mary to establish a program for, and determine the phasing of, three projects for the fine and performing arts. Together, these projects will create an Arts Quarter on campus, centered on Phi Beta Kappa Memorial Hall. This Arts Quarter will bring the William and Mary Fine and Performing Arts programs together, providing a synergy among the departments and giving the campus an integrated and lively Arts Quarter alive with creative energy visible and accessible to the entire College population, as well as the greater Williamsburg community.

The departments that will come together to create the Arts Quarter are the Department of Music, the Department of Theater, Speech and Dance, and the Department of Art and Art History. The creation of the Arts Quarter will provide each department with spaces of an acoustic and technical quality that meet the needs of their faculty, staff and students for both teaching and performance. A combination of renovation, adaptive reuse and new construction will be employed to realize the Arts Quarter over a series of three phases, with one phase being the focus of each biennium in the current six-year capital plan.

1.2 Process

The process of establishing the program for the Arts Quarter, as well as a phasing scenario for the three projects, was facilitated through University Administration and Facilities Planning, Design and Construction. The process was formed through input and direction from the Arts Quarter Building Committee who advised the design team on the objectives of the Arts Quarter and its qualitative and quantitative aspects.

Additionally, substantial input from the faculty and staff of the Departments of Music, the Department of Theater, Speech and Dance, and the Department of Art and Art History was instrumental in the refinement of the program for each of the departments.

The design team also consulted with other university stakeholders including the Dean of Libraries and Director of the Media Center at Swem Library, leadership at the Muscarelle Museum and University Facility, and Operations and Utilities staff to gain additional campus-wide insights into the impact of the Arts Quarter.

The study effort evolved between January and July 2013. The study involved three, on-campus, 2-day workshops which included existing building tours and meetings with the aforementioned stakeholders to explore and discuss the goals, objectives, project phasing and exciting possibilities for the realization of the Arts Quarter.

1.3 Participants

College of William & Mary Building Committee Members:

Administration
- Anna Martin, Vice President
- Martha Sheets, Senior Planner

Finance
- Sam Jones, Vice President

College of Arts and Sciences
- Kate Conley, Dean of the Faculty
- Teresa Longo, Dean of Curriculum Review
- Anne Rasmussen, Chair, Music
- Joan Gavaler, Chair, Theater, Speech and Dance
- Catherine Levesque, Chair, Art and Art History
- Eric Bradley, Chair, Math (outgoing Arts and Sciences Facilities Coordinator)
- Arthur Knight, Incoming Arts and Sciences Facilities Coordinator
- Stephen Mount, Muscarelle Museum
- Matthew Reese, Student, Music
- Taylor Nelms, Student, Theater, Speech and Dance

Facilities Management
- Dave Shepard, Associate Vice President
- Wayne Boy, Director, Facilities, Planning, Design and Construction (FPDC)
- Joe Martinez, Deputy Director, FPDC

Other College Participants:

Department of Music
- James Armstrong
- Jamie Bartlett
- Paul Bhasin
- Neal Cary
- Kathleen De Laurenti
- Ryan Fletcher
- Brian Hulse
- John Lindberg
- Thomas Payne
- Kathleen Preston
- Judith Zwerdling Zwelling

Department of Theater, Speech and Dance
- Matthew Allar
- Mary Jo Damon
- Denise Damon Wade
- David Dudley
- Leah Glenn
- Meg Hamilton
- Steve Holliday
- Denise Wade
- Patricia Wesp

Library
- Carrie Lynn Cooper, Dean of Libraries
- Diane Dudley, Music Library
- Troy Davis, Head of Media Services

Muscarelle Museum
- Aaron DeGroft

Design Team:

Moseley Architects
- George Nasis
- Jeff Hyder
- Bryna Dunn
- Tim Pruitt

HGA Architects and Engineers
- Gary Reetz
- Loren Ahles
- Rebecca Krull Kraling
- Steven Dwyer
- Kendra Beaubien
- Paul Asp
- Leighton Deer
- Zachary Poynter

Auerbach Pollack Friedlander
- Steve Friedlander
- Don Guyton

JaffeHolden
- Russell Cooper, Acoustics
- Jessica Newton, Acoustics
- Phillip Peglow, Audio Visual

2.1 College of William & Mary Mission*

The College of William and Mary, a public university in Williamsburg Virginia, is the second-oldest institution of higher learning in the United States. Established in 1693 by British royal charter, William and Mary is proud of its role as the Alma Mater of generations of American patriots, leaders and public servants. Now, in its fourth century, it continues this tradition of excellence by combining the best features of an undergraduate college with the opportunities offered by a modern research university. Its moderate size, dedicated faculty, and distinctive history give William and Mary a unique character among public institutions, and create a learning environment that fosters close interaction among students and teachers.

The university's predominantly residential undergraduate program provides a broad liberal arts education in a stimulating academic environment enhanced by a talented and diverse student body. This nationally acclaimed undergraduate program is integrated with selected graduate and professional programs in five faculties -- Arts and Sciences, Business, Education, Law, and Marine Science. Masters and doctoral programs in the humanities, the sciences, the social sciences, business, education, and law provide a wide variety of intellectual opportunities for students at both graduate and undergraduate levels.

At William and Mary, teaching, research, and public service are linked through programs designed to preserve, transmit, and expand knowledge. Effective teaching imparts knowledge and encourages the intellectual development of both student and teacher. Quality research supports the educational program by introducing students to the challenge and excitement of original discovery, and is a source of the knowledge and understanding needed for a better society. The university recognizes its special responsibility to the citizens of Virginia through public and community service to the Commonwealth as well as to national and international communities. Teaching, research, and public service are all integral parts of the mission of William and Mary.

In fulfilling its mission, William and Mary adopts the following specific goals:

- to attract outstanding students from diverse backgrounds;
- to develop a diverse faculty which is nationally and internationally recognized for excellence in both teaching and research;
- to provide a challenging undergraduate program with a liberal arts and sciences curriculum that encourages creativity, independent thought, and intellectual depth, breadth, and curiosity;
- to offer high quality graduate and professional programs that prepare students for intellectual, professional, and public leadership;
- to instill in its students an appreciation for the human condition, a concern for the public well-being, and a life-long commitment to learning; and
- to use the scholarship and skills of its faculty and students to further human knowledge and understanding, and to address specific problems confronting the Commonwealth of Virginia, the nation, and the world.

*Excerpt from the College of William and Mary Undergraduate Course Catalog 2012-2013

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2.2 Project Overview

The Arts Quarter project will provide the College with spaces to support the growth and development of the arts programs currently hampered by inadequate spaces in both type and amount, and the fact that those spaces are far-flung, limiting the ability to foster interdisciplinary coordination. The Arts Quarter will be home to the Departments of Music, Theater, Speech and Dance and Art and Art History and will be centered on Phi Beta Kappa Memorial Hall (PBK) reinforcing the prominent location on Jamestown Road. The Arts Quarter will be realized through a combination of adaptive reuse, additions and new construction via three project phases. Phase 1 is a new building for Music east of PBK. Phase 2 is the renovation, expansion and adaptive reuse of and addition to PBK. Phase 3 is the renovation and adaptive reuse of Andrews Hall and a new building for Art and Art History to house the system's intensive studio disciplines to the west of the Muscarelle Museum. An additional component of the Arts Quarter project will be the relocation of the Apollo Room from it's current location in PBK to a new location yet to be identified by the College.

The new and renovated spaces in the Arts Quarter will allow for interdisciplinary coordination and creativity, and will match the caliber of the College's faculty, staff and students. The Arts Quarter will become a vibrant center of creative activity both on campus and in the greater Williamsburg community.

The following is an overview of the building program for the Arts Quarter and its functions. The usage and areas of rooms listed in the program are identified based on departmental needs and Campus standards. The building program is outlined in detail in Section 3 of this report.

Requirements for seven types of spaces were identified in the building program for each of the departments: Performance Space, Instructional Studios, Exhibition, Classrooms, Common Areas, Office/Administrative Spaces and Support Spaces.

Performances spaces are key components of the Music and Theater, Speech and Dance programs. For Music, the key performance spaces are a Concert Hall that seats 450 and a Recital Hall that seats 125. For Theater, Speech and Dance, the key performance spaces include the Main Stage Theater reconfigured in the footprint of the existing main stage theater that seats 500, a Studio Theatre that

is reconfigurable and seats 250, a Lab Theater for student productions that seats 100 and a Dance Recital Theater with seating for 60.

Instructional studios range in size and function for each of the departments and are based on the instructional and training needs of the programs. Studios will be designed to accommodate electronic instructional capabilities and the range of technology incorporated will be suitable to serve many different academic needs over the life of the studios. These instructional studios range from large ensemble rehearsal rooms in Music, scene and costume shops in Theater, Speech and Dance, and painting, sculpture and printmaking studios in Art and Art History to name only a few.

Exhibition spaces will be formal, as in the gallery that is part of the Art and Art History program, and informal such as that seen typically in lobbies or other public circulation or gathering spaces throughout each of the buildings that comprise the Arts Quarter. These exhibition spaces should be as transparent as possible and accessible to students, faculty and visitors as they move through the Arts Quarter both within and around the buildings.

The more traditional classroom spaces will vary in size from small seminar classes to large lecture halls and will run the gamut in between. The large lecture hall will likely have raked fixed seating to ensure proper sight lines while the smaller classrooms will be flexible in format to allow for reconfiguration to suit the class. Additionally, there are a number of computer-based classrooms also being planned for each of the departments.

Office and Administrative areas will be organized to facilitate the interaction of faculty, staff and students and will be located such that they are readily accessible to visitors and guests.

Support spaces will be provided to optimize maintenance and operation of the facilities by faculty and staff.

Common areas are composed of shared spaces for students and staff encouraging informal learning and discussions. These common areas may include lobbies, lounges and other gathering spaces.

2.3 Project Goals

The goal of the Arts Quarter is twofold: to provide the College with spaces that will support the growth and development of the arts programs and to provide both the types of spaces and the proximity between spaces that will allow for interdisciplinary collaboration and creativity.

The following summarizes the goals of the Arts Quarter and of each of the departments that will call the Arts Quarter home:

- Create an environment for the delivery of instruction based on the technology and latest teaching methodology of each of the departments.
- Construct buildings the function well for students, faculty, staff and facilities.
- Provide an environmentally sound and energy efficient building.
- Create an aesthetically pleasing Arts Quarter that presents its mission as a start of the arts visual and performing arts complex.
- Create a building sympathetic with its surroundings while providing an aesthetic unique to the programs housed within.
- Provide a code-compliant and safe environment in which to teach and do creative research in the arts.

DEPARTMENTAL PROGRAM GOALS

Music

- Provide the Music Department with a performance venue that reflects the quality of their student ensembles.
- Provide acoustically isolated spaces for instruction, rehearsal and performance of music.
- Provide acoustically appropriate spaces for the instruction, rehearsal and performance of the many types of music taught.
- Explore ways to display the many beautiful and interesting instruments the College owns.

Theater, Speech and Dance

- Create a facility that houses all elements of the department to allow for greater interaction and collaboration within the department.
- Provide adequate lab and instructional spaces for the varied disciplines that make up theater instruction.
- Provide rehearsal space separate from performance space.
- Provide a welcoming and generous lobby space that will also serve as the College's public front room.
- Provide the Dance program with the quantity, size and types of spaces required for the program to gain accreditation with NASD.

Art and Art History

- Create a facility that houses all elements of the department to allow for greater interaction and collaboration within the department.
- Provide safe and adequately sized instructional studios for the teaching of the various art disciplines.
- Provide adequate teaching space for the variety of Art History class sizes.
- Provide a state-of-the-art Visual Resources Center that can be used by faculty, staff and students in support of their work.
- Provide a gallery space for the exhibition of not only student, but faculty and visiting artist work.

2.4 Project Summary

The proposed Master Plan and phasing of the Arts Quarter will allow the College to realize the goals of the College and of the arts departments in a manner that aligns with the funding opportunities from the state.

The combination of new construction and renovation/ adaptive reuse allow the College to take the most advantage of existing spaces. The phasing order is such that swing space needs are minimized. Additionally, many of the new spaces will be designed to accommodate flexibility of use allowing more than one discipline or type of class to be taught in the same space.

The "new" facilities for all departments will be state-of-the-art and will allow each of the departments to grow their programs and foster interdisciplinary coordination and creativity amongst the departments and on Campus as a whole. The new facilities will provide beautiful and compelling spaces designed for instruction of the arts that will aid in the recruitment of students, while also providing a welcoming and vibrant presence in the Williamsburg community.

Phase 1 will provide the Music department with 74,950 gross square feet of teaching and performance space tailored to their unique functional and acoustic needs. Phase 2 will provide the Theater, Speech and Dance department with 105,200 gross square feet of renovated and new space tailored to their unique teaching and performance needs, and, for the first time, will unite the entire department in one building. Phase 3 will provide 64,100 gross square feet of teaching and exhibition space for the Art and Art History department tailored to their unique space and systems requirements, creating a safe working and teaching environment for their staff and students in two locations, separating the systems intensive disciplines from the non-systems intensive disciplines.

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3.1 Introduction

The program for the Arts Quarter utilized the program developed during the 2009 Study as its starting point. Through the on-campus workshops and follow-up discussions with each department's faculty and staff, the program was discussed, revised and updated to reflect current programmatic space needs and to align with phasing budget goals and physical site capacity for each phase.

3.2 Program Summary

The program developed with the faculty will provide the departments of Music, Theater, Speech and Dance and Art and Art History with the quality of instruction and performance spaces that align with the quality of the faculty, staff and students using them. The spaces described will provide them with the type, quantity and size of spaces to support their programs, to maintain current accreditations, and in the case of Dance, will provide the opportunity to gain accreditation. All spaces will provide the technical, systems and acoustic environments required for the instruction of fine and performing arts.

PROGRAM SUMMARY - Net SF

	Category	Program Net SF	Phase Total NSF
Phase 1	Music	29,715	
Phase 1	Concert Hall	15,710	45,425
Phase 2	Theater, Speech & Dance	41,235	
Phase 2	Main Stage Theater Renovation	13,689	
Phase 2	Main Stage Theater Support	14,200	
Phase 2	Theater Swing Space / Long Term Storage	4,000	73,124
Phase 3	Art & Art History	38,855	38,855

PROGRAM SUMMARY - Gross SF

	Category	Grossing Factor	Program GSF	Phase Total GSF
Phase 1	Music	1.65	49,030	
Phase 1	Concert Hall	1.65	25,922	**74,951**
Phase 2	Theater, Speech & Dance	1.65	68,038	
Phase 2	Main Stage Theater Renovation	1.00	13,689	
Phase 2	Main Stage Theater Support	1.65	23,430	
Phase 2	Theater Swing Space / Long Term Storage	1.00	4,000	**109,157**
Phase 3	Art & Art History	1.65	64,111	**64,111**

DEPARTMENTAL PROGRAM HIGHLIGHTS

Music
New Music performance and teaching spaces focused on natural acoustics for music and sound isolated construction.

- 450-seat Concert Hall
- 125-seat Recital Hall
- Instrument and Choral Rehearsal Rooms
- Non-Western Music, Historic Keyboard and Percussion Rooms
- Resource Center
- Practice Rooms
- Teaching Studios
- Classrooms and Seminar Rooms

Theater Speech and Dance
Renovated Theater performance space focused on needs for Theater and Dance. New Dance spaces will provide program with spaces that will allow for the program to become accredited in the future.

- Renovated 500-seat Proscenium Theater
- 250-seat Studio Theater
- Renovated 100-seat Lab Theater
- Performer and Audience Support Spaces
- Costume Shop
- Scene Shop
- Acting Studios
- 60-seat Dance Recital Theater
- Dance Rehearsal Studio
- Dance Support spaces
- Classrooms and Seminar Rooms
- New Lobby and Box Office

Art and Art History
Renovated Andrews and new construction west of Muscarelle Museum.

Renovated space in Andrews Hall which includes:
- 2D Art Studios
- Art History Classrooms
- Lecture Hall for 150 seats
- Visual Resources Center
- Gallery

New building west of the Muscarelle Museum for the systems and materials intensive studios:
- 3D Art Studios (Ceramics, Sculpture, Architecture)
- Printmaking Studio
- Outdoor Kiln Yard and Workspace

Art Faculty Studios will remain at the Lake Matoaka Studio building.

3.3 Unique Space Needs

Performance and exhibition, the 'doing' of music, theater, dance and art, is a core value in performing and visual arts curricula. The music, theater, dance and art programs can be a principal means of outreach to the college community and the larger surrounding community.

The performing and visual arts students' homework often cannot be done at a desk at home. The resulting product can range from a document to a recording to a sculpture to a performance. These unique products also require unique spaces in which to create them.

Music
Music education involves instruction, demonstration, practice, rehearsal and performance. The students' learning space may be a traditional classroom, a large rehearsal room, a small practice room or on stage. The "exam" venue may be a traditional desk, a computer workstation, a stage or a recording studio. The product may be a document, a musical composition or a performance.

Theater, Speech and Dance
As with Music, education for Theater and Dance involves instruction, demonstration, practice, rehearsal and performance. Theater technology involves design, production and installation. The students' learning space may be a traditional classroom, a hands-on lab space or on stage. The "exam" venue may range from a traditional desk, to a sewing machine, a computer station or a stage. The product may be a drawing, a costume, a large set construction or a performance.

Art and Art History
Art education also involves instruction, demonstration and practice. The students' learning space may be a traditional classroom, a hands-on lab space, an outdoor environment or a gallery. The "exam" venue may range from a traditional desk to a computer station to the gallery. The product may be a document, a painting, a sculpture or a photograph.

Unique Spaces
Understanding that music, theater, dance and art education have unique space needs is critical to offering competitive educational experiences for talented students. Greater physical space is needed to accommodate a student with their canvases or instruments, or a student acting out a scene. Greater volume is needed to provide the right viewing, moving and acoustic environment. Space is also required for observers, instructors, collaborators and audiences.

3.4 Space Program

The space program provides instructional, performance and support spaces for the Departments of Music, Theater Speech and Dance, and Art and Art History.

	MUSIC		Program		Notes				
Room #	Name		Net SF			LOWER	MAIN	UPPER	Un-assignable Upper Volume
									(in un-assignable # DGS-30-219)
100	**Recital Hall**								
	Recital Hall (125 seats)		1,250		125 seats		1,250		
	Performance Platform/Stage		800		(40'x20')Jazz Band 21 incl lg percussion, 16 singers, gamelan?, middle eastern ensemble(15-25) in 2 semi-circles		800		
	Sound & Light Locks		192		3 @ 64 sf		192		
	Control booth for recording/sound		120				120		
	Piano Storage		150		2 concert grands		150		
	Backstage wings & Crossover		875				875		
	Dimmer Room		120					120	
	Recital Hall Prefunction Space		1,015				1,015		545
	FOH Restrooms		300				300		
200	**Rehearsal Rooms**								
	Instrumental rehearsal		2,400		45 person wind ensemble + percussion, 85 orchestra incl. percussion		2,400		
	Instrument Rehearsal Storage		150		piano, chairs, stands		150		
	Sound and Light Lock		64				64		
	Music Library - Orch score storage		200				200		
	Music Library - Wind score storage		200				200		
	Choral Rehearsal Room/Lecture Hall		1,600		60 person choir; 70-80 for class		1,600		
	Choral Rehearsal Storage		150		piano, chairs, stands, risers		150		
	Sound & Light Lock		64				64		
	Choral Library - Choral score storage		200				200		
	Robe Storage		150		near performance space not rehearsal space		150		
	Percussion Room		600				600		
	Non-Western Music		800		very visible, gamelan, storage at perimeter		800		
	Historic Keyboard Room		300		instrument storage visible		600		
300	**Practice Rooms**								
	Practice Room - small		1,200		16 @ 75	1,200			
	Practice Room - medium		1,600		16 @100	1,600			
	Practice Room - large		220		1 @ 220	220			
400	**Academic Classrooms**								
	Classroom		400		20 students	400			
	Classroom		800		35 students			800	
	Classroom		800		35 students			800	
	Keyboard Theory Classroom		800		15 students + baby grand			800	
500	**Instrument Storage**								
	College/Student Owned		1,250			1,250			
600	**Music Resource Center**								
	Computer Media Lab/Elec Music Classroom		800			800			
	Music Media Lab/Library		2,200			2,200			
	Music Media Lab - office		120			120			
	Collaborative Media Workspace		120		2-8, with table, av rack	120			
	Collaborative Media Workspace		120		2-8, with table, av rack	120			
	Equipment Room		100		storage for check out equip	100			
700	**Music Dept Administration/Teaching Studios**								
	Reception/Dept Admin Office		300		main dept admin office (2-3 staff)		300		
	Dept Support/Workroom		120		work room, mail, copier, etc		120		
	Faculty teaching studios		2,700		11 @ 180 - tenure, 3 @ 180 - prof faculty, 1 @ 180 - visiting (15 @ 180)			2,700	
	Office - Director of Applied Music		120				120		
	Applied Teaching Studios		2,520		14@ 180 (33 applied faculty)	2,520			
	Student Activities Storage		100				100		
	Lounge		420					420	
800	**Building Support**								
	Vending		80				80		
	Primary Custodial Room		120				120		
	Custodial Closets		240		3 @ 80sf (1 per level, incl main level)	80	80	80	
	Housekeeping Breakroom		120			120			
	Trash Room/Recycling		150				150		
	Loading Dock								
	Telecom		195		7'x9' rooms, stacked vertically	65	65	65	
	Mech/Elec		in GSF						
	MUSIC SPACES TOTAL NSF		**29,715**			10,915	13,015	5,785	
	CONCERT SPACES TOTAL NSF		**15,710**				13,680	2,030	
	TOTAL NSF		**45,425**			10,915	26,695	7,815	
	grossing factor		**1.65**						
	GSF		**74,951**			**18010**	**44047**	**12895**	

* SF numbers in program reflect BCOM method for accounting NSF vs GSF

	CONCERT								
			Program		Notes				
Room #	Name		Net SF						
						LOWER	MAIN	UPPER	Un-assignable Upper Volume
100	**Concert Hall**								(in un-assignable # DGS-30-219))
	Audience Seating with balcony		4,500		450 seats (includes choir in seating loft behind platform)		3560	940	
	Performance platform		200		85 person orchestra (40'x50')		2,000		
	Sound & Light Locks		500		4 main level, 2 balcony		240	160	
	Wings & Crossover		1,000				1,000		
	Lighting & Sound control booth		250					250	
	Followspot Booth		150					150	
200	**Stage Support**								
	Office stage mgr		120				120		
	Office visiting production		120				120		
	Stage unisex / accessible restroom		80				80		
	Storage performance lighting equip		160				160		
	Storage sound & comm equip		160				160		
	Stage Furniture Storage		300		risers, stands, chairs		300		
	Piano Storage		150		2 concert grands		150		
	Dimmer Room		150					150	
	Amp & AV Rack Room		80					80	
300	**Performer Support**								
	Green Room		400		Shared with Recital Hall		400		
	1-2 person dressing		150		including restroom & shower		150		
	1-2 person dressing		150		including restroom & shower		150		
	Musician's Locker Room		0						
	Musician's Locker Room		0						
	Warm-up Room		0		assume use other Music Dept Rehearsal Spaces				
	Musical Instrument Case Storage		0						
	Backstage restroom male		120				120		
	Backstage restroom female		120				120		
400	**Audience Support**								
	Pre-Function Space		3,000				3,000		1295
	Elevator		120				120		
	Elevator Equipment Room		100				100		
	FOH Public Restrooms		800				500	300	
	Box Office		100		Will call booth		100		
	Concessions		200				200		
	Concessions Storage		150				150		
	House Manager Office		130				130		
	Front of House Storage		150				150		
	Coat Room		200				200		
	Entry Vestibule		200				200		200
500	**Building Support**								
	Vending				Assumes shared, see Music List for sf				
	Primary Custodial Room								
	Custodial Closets								
	Housekeeping Breakroom								
	Trash Room/Recycling								
	Loading Dock								
	Telecom								
	Mech/Elec								
	CONCERT HALL TOTAL NSF		**15,710**		**NSF**		**13,680**	**2,030**	

* SF numbers in program reflect BCOM method for accounting NSF vs GSF

			Program		Notes						
Room #	Name		Net SF				LOWER	MAIN	UPPER	CATWALK	Un-assignable Upper Volume
	THEATRE, SPEECH & DANCE										(in un-assignable # DGS-30-219))
100	**Theater Performance & Rehearsal Spaces**										
	Studio Theatre		3,600		250-300 seats; 60'x60'x35'			3,600			
	Control Booth		240						240		
	Sound & Light Locks		260					260			
	Storage		200					200			
	Studio Theater Prefunction		1,000					500	500		300
	Catwalks		1,000							1,000	
	Laboratory Theatre		1,600		100 seats (in existing Studio Theatre, reconfigured)			1,600			
	Control Booth		200						200		
	Sound & Light Locks		140					140			
	Storage		200					200			
	Laboratory Theater Prefunction		1,200					600			600
	Catwalk		500							500	
	Acting Studio		2,400		2 @ 1200 (Asian Perf class 30 students)			2,400			
200	**Dance Performance, Rehearsal & Support**										
	Dance Recital/Theater		3,300		seating for 60, dance performance theater			3,300			
	Storage for Dance Studio		120					120			
	Control booth for Dance Studio		150						150		
	Dance Rehearsal Studio		2,400					2,400			
	Warm-up/Choreography studio		800					800			
	Student Changing Room-Women		500					500			
	Student Changing Room-Men		100					100			
	Faculty Changing Rooms		240					240			
	Dance Medicine Lab		200					200			
	Dance Waiting Room		500					500			
	Storage-dance department		450		costumes & equipment			450			
300	**Design Laboratories**										
	Design Lab		600		10-12 students			600			
	Media Tech Lab		600		computer based (including sound & video editing; 10-12 students			600			
	Lighting Lab		625		25'x25'x20' with pipe grid, 20 students			625			
	Scene Shop		2,900		size of existing scene shop			2,900			
	Scenic Art Laboratory		1,500					1,500			
	Scenic Properties and crafts lab		500					500			
	Everyday scene & prop storage		400		existing (prop storage only, see Main Stage Theater for Scene Storage)			400			
	Metal Construction Lab		400					400			
	Stage Electrics Lab		300					300			
	Costume Workshop		800						800		
	Costume Craft Construction		200						200		
	Everyday Costume Storage		400						400		
	Laundry and Dye Room		150						150		
	Spray Booth		80		8'x10' walk-in (shared by scene & costume)			80			
	Costume Conservation Lab		150						150		
	Long-term Costume Storage		1,000						1,000		
	long-term Properties & Furniture Storage		800				800				
400	**Classrooms**										
	Classroom		800		2 @ 400; 20 students				800		
	Classroom		1,600		2 @ 800; 30-40 students				1,600		
500	**Offices**										
	Department Admin Office		300		reception				300		
	Office - student production staff				within larger dept admin office space						
	Office - Dept administrator		120						120		
	Department Work Room		120		mail, copier, etc				120		
	Office - dept chair		180						180		
	Faculty Studio - music director		200		piano				200		
	Office - tech director		180					180			
	Office - VSF Director		200		space for admin asst + faculty				200		
	Office- full time faculty		1,320		11 @ 120				1,320		
	Office - adjunct faculty		1,320		11 @ 120				1,320		
	Office - Staff		480		4 @ 120 (ATD, Costume, Box Office, Dance Accomp)				480		
	Office - Visting Production Staff		0		guest artists						
	Conference Room		300						300		
	Library		400		scripts, music, video; could be co-located with music potentially				400		
	Lounge		250						250		
	Student Activities										
600	**Building Support**				Shared with Main Stage Theater						
	Vestibules/Overhangs				see Main Stage Theater						
	Vending		80					80			
	Primary Custodial Room		120					120			
	Custodial Closets		160		2 @ 80sf (1 per level, incl main level)			80	80		
	Housekeeping Breakroom		120						120		
	Trash Room/Recycling		150					150			
	Loading Dock										
	Telecom		130		7'x9' rooms, stacked vertically			65	65		
	Mech/Elec		in GSF								
			0								
	THEATRE, SPEECH & DANCE SPACES TOTAL NSF		**41,235**		**40,635**		800	26,690	11,645	1,500	(ADAPTIVE RE-USE/ADDITION)
	MAIN STAGE THEATER TOTAL NSF		**14,200**				2,675	9,705	1,820		(ADDITION-NEW CONSTRUCTION)
	SUB TOTAL NSF		**55,435**				3,475	36,395	13,465	1,500	
	Grossing Factor		**1.65**				2,259	23,657	8,752	975	
	SUB TOTAL GSF		**91,468**				5,734	60,052	22,217	2,475	
	MAIN STAGE THEATER NSF		**13,689**		**13,689**		3,360	6,751	2,578	1,000	(RENOVATION)
	Grossing Factor		**n/a**								
	SUB TOTAL GSF		**13,689**								
	TOTAL GSF		**105,157**		**total GSF**		9,094	66,803	24,795	3,475	
					total NSF		6,835	43,146	16,043	2,500	
	Swing Space										
	Scene Shop Swing Space / Long-term Scenic Storage		**4,000**		offsite storage facility built to be used as swing space during construction and storage once construction is complete						
			109,157								

* SF numbers in program reflect BCOM method for accounting NSF vs GSF

Room #	Name	Program Net SF	Notes	LOWER	MAIN	UPPER	CATWALK	Un-assignable Upper Volume (in un-assignable # DGS-30-219))
	MAIN STAGE THEATER							
100	**Main Stage Theater**							
	Auditorium	5,000	499 seats, existing Main Stage renovated		3,250	1,750		
	Sound & Light Locks	384	6 @ 64 (4 main level, 2 balcony)		256	128		
	Stage	2,950	(36'x78')		2,950			
	Stage Apron	295	(4'-6" x 40'-3")		295			
	Orchestra Pit	325	(11'-1" x 43'-8")	325				
	Trap Room	1,310		1,310				
	Scene Storage	1,725		1,725				
	Lighting Control Booth	150				150		
	Sound Control Booth	200				200		
	Followspot Booth	150				150		
	House Mix/Control	200				200		
	Catwalks	1,000					1000	
	MAIN STAGE THEATER RENOVATION TOTAL NSF	**13,689**	**NSF**	**3,360**	**6,751**	**2,578**	**1,000**	
200	**Stage Support**							
	Stage Unisex/Accessible Restroom	75			75			
	Piano Storage	60			60			
	Dimmer Room	150				150		
	Amp Room/Audio Rack Room	120				120		
	Stage Electrics Storage	400			400			
	Stage Draperies Storage	400			400			
	AV Storage	200				200		
300	**Performer Support**		Shared by Studio Theater & Lab Theater					
	Green Room/Performer Lounge	350			350			
	4-person Dressing Room	225	(includes restroom/shower)	225				
	4-person Dressing Room	225	(includes restroom/shower)	225				
	4-person Dressing Room	225	(includes restroom/shower)	225				
	4-person Dressing Room	225	(includes restroom/shower)		225			
	Chorus Dressing Room	1,000	20 people (includes restroom/shower)	1,000				
	Chorus Dressing Room	1,000	20 people (includes restroom/shower)	1,000				
	Chorus Dressing Room	0	20 people (includes restroom/shower)					
	BOH staff / student / performer restrooms	300	with dressing rooms? Access from corrdior & dressing room		150	150		
400	**Audience Support**							
	Prefunction Space	4,500			3,500	1,000		1000
	Elevator	120			120			
	Elevator Equipment Room	100			100			
	FOH Public Restrooms	800			600	200		
	Box Office	400			400			
	Concessions	120			120			
	Concessions Storage	100			100			
	House Manager Office	200			200			
	Front of House Storage	120			120			
	Coat Room	200			200			
	Coffee Shop - sales	250			250			
	Coffee Shop - storage & prep	150			150			
	Office - Coffee Shop operations	110			110			
	Vestibule/Overhangs	2,075			2,075			
500	**Building Support**							
	Vending		Assumes shared, see T/S/D List for sf					
	Primary Custodial Room							
	Custodial Closets							
	Housekeeping Breakroom							
	Trash Room/Recycling							
	Loading Dock							
	Telecom							
	Mech/Elec							
	MAIN STAGE THEATER NSF	**14,200**	**NSF**	**2,675**	**9,705**	**1,820**		

* SF numbers in program reflect BCOM method for accounting NSF vs GSF

Room #	Name				Program Net SF	Notes
	ART & ART HISTORY					
0	**Outdoor Studio/work area**					
	Outdoor Kiln Yard - covered				800	gas kilns (included in totals below)
	Raku and sawdust firing - uncovered				500	(uncovered, not included in totals below)
100	**3 D Studio Program**					
	Metal Shop				800	wood and metal can not be in the same space
	Metal Shop Storage				200	
	Wood Shop				800	wood and metal can not be in the same space
	Wood Shop Storage				200	
	Sculpture Studio				2,000	
	Sculpture Studio Foundry				750	
	Sculpture Wash & Mold Room				500	
	Sculpture Supply & Tool Storage				500	
	Sculpture Student Project Storage				300	
	3d Foundations Studio				1,200	
	3d Foundations Storage				200	
	Ceramics Studio				2,400	
	Kiln Room				200	electric kilns
	Clay Mixing and Storage				150	
	Glaze Mixing andStorage				150	
	Architectural Studio				1,200	
	Architectural Studio Storage				200	
	Interdisciplinary studio				1,200	
	Interdisciplinary studio storage				200	
200	**2d Studio Program**					
	2d Foundations Studio				1,200	
	2d Studio Storage				200	
	Drawing Studio				1,600	
	Drawing Storage				200	
	Painting Studio				2,000	
	Painting Storage				200	
	Printmaking Studio				2,400	
	Printmaking Storage				200	
	Photography/Digital Media				1,200	is photography program wet or digital-space and systems implications; could be digital primarily with small wet component as part of Printmaking Alternative Processes
	Photography/Digital Media Storage				200	
	Senior Studio				1,200	
300	**Art Resources / Gallery**					
	Visual Resource Center and library				800	
	Visual Resource Office				120	
	Presentation Prep/Matting Room				200	
	Gallery				1,025	similar in size to Andrews Gallery (minimum)
400	**Classrooms**					
	Small Classroom				300	12-15 students
	Classroom				400	20 students
	Small Lecture/Classroom				750	20-30 students; flexible
	Medium Lecture/Classroom				950	30-50 students; raked seating
	Lecture Hall				1,600	150 students; could be shared with Theater & Music (Art 1x semester)
500	**Department Admin & Support**					
	Art & Art History Admin Office				300	main dept admin office + reception
	Art & Art History Chair Office				160	
	Art Workroom				120	
	Art Dept Conference Room				400	15-20 people
	Art History Faculty Offices				1,050	7@150 - Art History Faculty
	Studio Art Faculty Studios					located at Lake Matoaka
	Sculpture Studio Office				120	studio adjacent
	3d Design Studio Office				120	studio adjacent
	Ceramics Studio Office				120	studio adjacent
	Architectural Studio Office				120	studio adjacent
	Interdisciplinary Studio Office				120	studio adjacent
	2d Foundations Studio Office				120	studio adjacent
	Drawing Studio Office				120	studio adjacent
	Painting Studio Office				120	studio adjacent
	Printmaking Studio Office				120	studio adjacent
	Photography Studio Office				120	studio adjacent
	Faculty Lounge					
	Student Lounge					
600	**Building Support**					
	Vestibule				100	
	Lobby in Andrews				1,770	
	Lobby in New Building				1,000	
	Elevator				240	2 @ 120; 1 in each building
	Elevator Equipment Room				200	2 @ 100; 1 in each building
	Vending				160	2 @ 80; 1 in each building
	Primary Custodial Room				240	2 @ 120; 1 in each building
	Custodial Closets				320	4 @ 80sf (1 per level, incl main level); 2 in each bldg
	Housekeeping Breakroom				240	2 @ 120, 1 in each building
	Trash Room/Recycling				300	2 @ 150, 1 in each building
	Loading Dock				100	
	Telecom				260	7'x9' rooms, stacked vertically; 2 in each building
	Mech/Elec				in GSF	
	Art & Art History TOTAL NSF				**38,855**	**NSF**
					64,111	**GSF (1.65 grossing factor)**
		NSF	**19,450**	**GSF**	**32,949**	**In new construction**
		NSF	**19,405**	**GSF**	**31,162**	**In renovated Andrews**
			38,855		**64,111**	**In both new construction & renovated Andrews; included in totals above for each**

* SF numbers in program reflect BCOM method for accounting NSF vs GSF

4.1 Introduction

The Arts Quarter at the College of William & Mary is a three phase project. A number of phasing scenarios were presented and discussed with the Building Committee during the on-campus workshops. Refer to Appendix 7.7 for phasing scenario options presented. Each of the phasing scenarios were vetted based on a number of criteria including: cost of phase, impact on program, impact on site, swing space needs, construction sequence, degree of reliance on Muscarelle Museum for phase realization and building infrastructure and massing implications.

4.2 Site Analysis and Context

Phi Beta Kappa Memorial Hall (PBK) is the center of the planned Arts Quarter at the College of William & Mary which is located on Jamestown Road in the South Campus. The site of the Arts Quarter is defined by the real estate occupied by PBK and Andrews Hall, the area between PBK and Andrews east of Barksdale Field and south of ISC1 and Rogers Hall, and the area southwest of the Muscarelle Museum potentially including the real estate currently occupied by Morton Hall. Pedestrian circulation through the site from Jamestown Road to the Swem Quad is important and should be maintained in some form. Service access to the loading docks at the Muscarelle and PBK will need to be maintained or revised as both facilities have substantial service needs. Major utility hubs are located to the north of Muscarelle Museum and south of ISC1 and must be maintained.

4.3 Preferred Phasing Approach

The preferred phasing approach is outlined as follows:

Phase 1 – Music: Wholly new construction east of Phi Beta Kappa Memorial Hall and west of Barksdale Field to house the Department of Music.

Phase 2 – Theater, Speech and Dance: A combination of renovation, adaptive reuse, demolition/reconstruction and addition to Phi Beta Kappa Memorial Hall to house the Department of Theater, Speech and Dance.

Phase 3 – Art and Art History: A combination of the renovation/adaptive reuse of Andrews Hall to house non-systems intensive art disciplines and art history teaching space and construction of a new building to the west of the expanded Muscarelle Museum to house the systems and materials intensive art disciplines.

4.4 Swing Space Analysis

As all of the departments will need to continue teaching their academic programs during the construction/reconstruction of their new homes in the Arts Quarter, swing space is a critical aspect to the planning of the phasing of the three projects. The preferred phasing scenario described above was selected in part because it has the least impact on swing space needs.

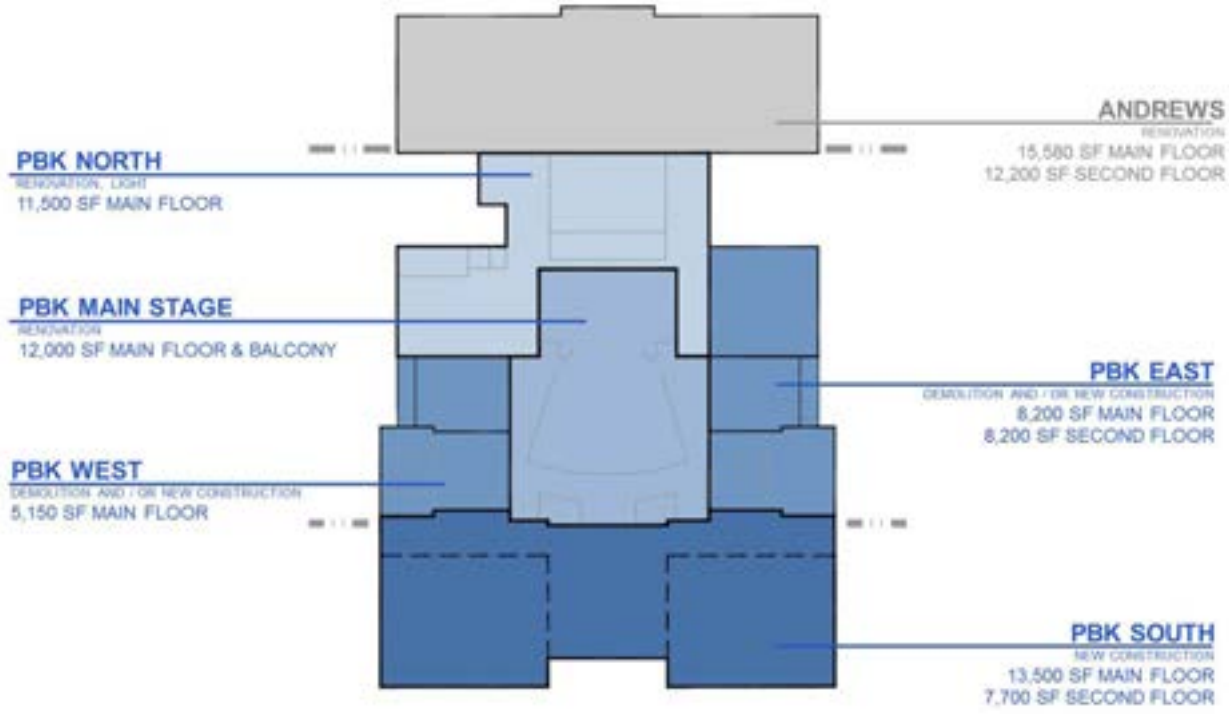
Phase 1
With the construction of a new Music Building as Phase 1, no swing space for Music will be required.

Phase 2
- Ewell Hall and the new Music Building can be used as leveraged swing space for Theater, Speech and Dance.
- Construction of an industrial space off-site to house Scene Shop and Costume Shops needs will be required before construction of Phase 2 begins. When Phase 2 is complete, the building will serve as the home for long-term Scene and Costume Storage for Theater, allowing consolidation of all current off-site Theater storage into one space.
- Dance will remain in Adair Hall during construction of Phase 2, no swing space will be required for the Dance program.
- During construction of Phase 2, Theater and Dance will need to perform either in other on-campus venues or off campus.

Phase 3
- The construction sequence of Phase 3 can minimize the swing space needs for Art and Art History.
- Spaces at Lake Matoaka and Ceramics space remain in operation during construction of both parts of Phase 3 as necessary.
- New Building to house systems intensive program elements can be built before Andrews is renovated, eliminating the need for swing space for the Foundry and Sculpture studios.
- Art and Art History program to be housed in renovated Andrews can move to Lake Matoaka Studios (studio classes) and other more general classroom spaces on campus for Art History during renovation.

4.5 PBK and Andrews Adaptive Reuse

As part of the realization of the Arts Quarter, both Phi Beta Kappa Memorial Hall and Andrews Hall will be adaptively reused. Each will entail varying degrees of adaptive reuse ranging from light renovation to demolition and reconstruction of new space where old once was. The diagrams below outline concepts for the degrees of adaptive reuse for each building which will be analyzed more deeply in Phases 2 and 3.

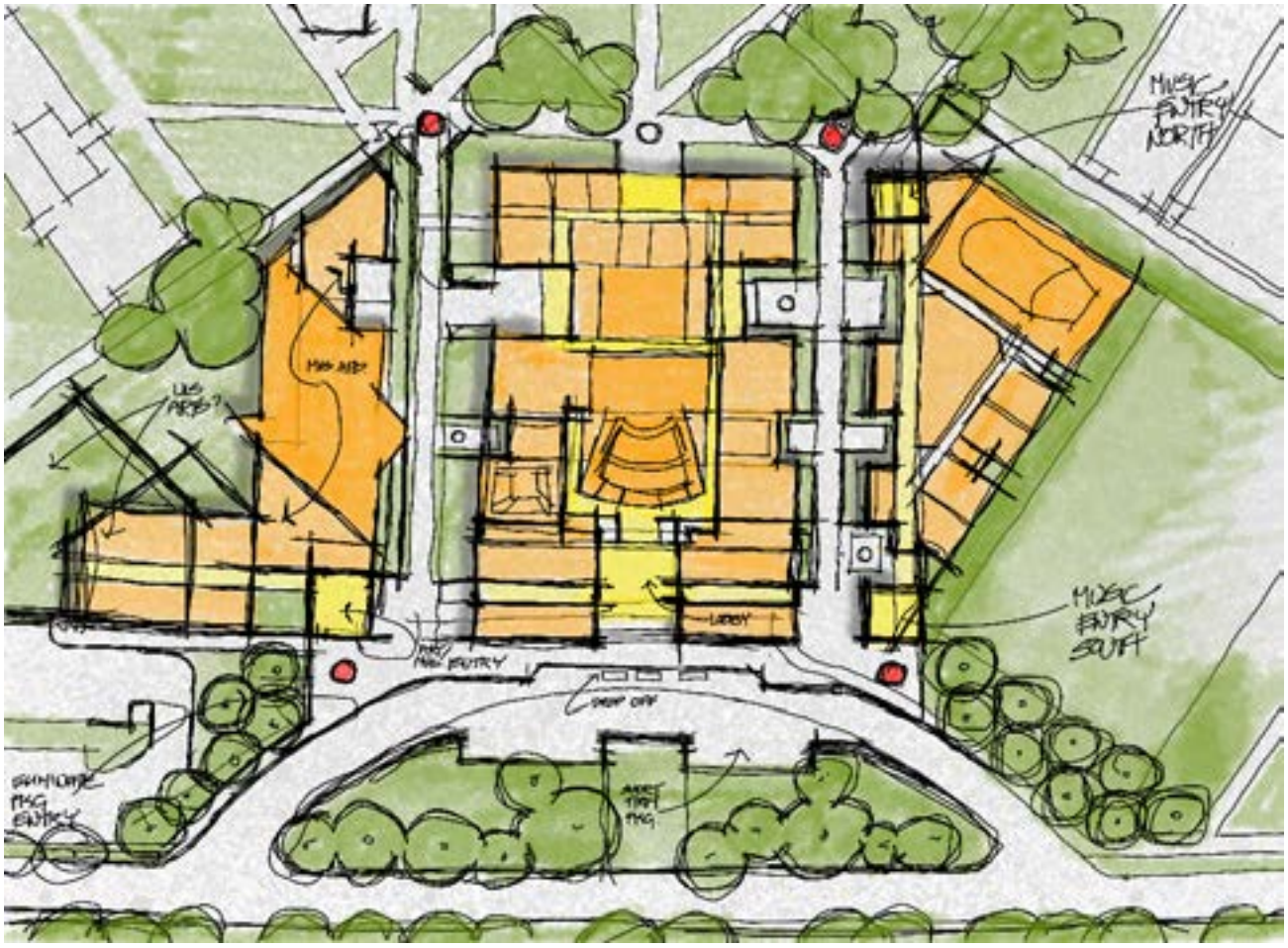


THEATER STRATEGIES / PBK

ANDREWS HALL STRATEGIES: 18,000SF NET USABLE

4.6 Arts Quarter Defined

The Arts Quarter is centered around the existing Phi Beta Kappa Memorial Hall and will provide a significant and exciting front door for the fine and performing arts on Jamestown Road. The new Music Building will sit to the east of PBK and to the west of Barksdale Field. The renovated and expanded PBK will be the home for Theater, Speech and Dance. A renovated Andrews Hall for Art and Art History in concert with a second new building for Art and Art History to house the systems intensive disciplines to the west of the Muscarelle Museum. An expanded Muscarelle Museum is the final piece of the Arts Quarter and the final realization of the Arts Quarter will be coordinated with the Muscarelle Museum expansion effort.



5.1 Architectural Approach

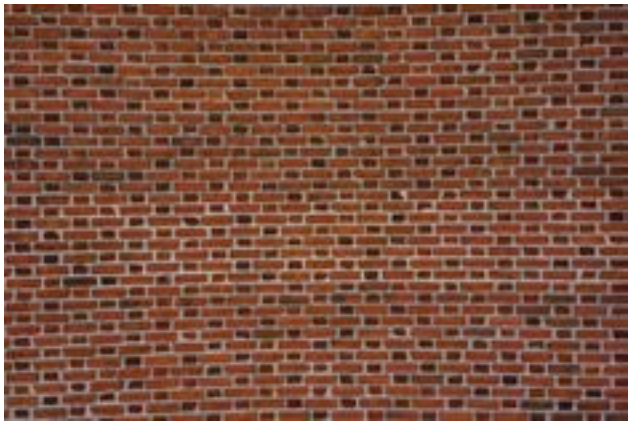
5.1.1 Massing Concepts

The new music building is carefully oriented on the site in relation to Phi Beta Kappa Hall and adjacent to Barksdale Field. The two buildings face one another along a primary north/south axis with the exterior space between their masses acting as a gateway to the south campus. A two-story interior pre-function space organizes the music program along this arts focused axis. This linear space presents a formal face to the north and to the south. The primary entry approach to the building is therefore from Jamestown Road or the Swem Library Quad. Informal entry points between the gateway arts axis and the western edge of the music atrium create zones of opportunity for unplanned encounters between passersby and arts programming.

The unique volumes of choral rehearsal, recital hall, concert hall and instrument rehearsal define the eastern edge of the music pre-function space and inform eastern edge of the building along Barksdale Field set back to provide a safe buffer for athletes using the field. The massing concept is developed with a sense of rhythmic procession. Circulation is from one primary volume to another along an axis activated by the arts.

5.1.2 Architectural Expression

Durable, high quality materials play a significant role in creating an architectural expression that references the lasting imagery of the historic William and Mary campus while also responding to the vibrant music program of today. Flemish bond brick clads the primary building program volumes and grounds the building in campus history. Sound and light are carefully moderated within the brick performance venues. In contrast, light filled volumes of steel and glass enclose circulation and gathering spaces. The glass faced atrium reaches upward and is animated by sunlight during the day. At night, light from the lobby activity floods out onto the entry plazas and gateway route.



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5.1.3 Acoustics

Prepared by JaffeHolden

INTRODUCTION

This document will state the acoustical criteria for the programmed spaces for the College of William and Mary Performing Arts Complex project. This report will offer a general overview, consistent with schematic design, of acoustical criteria for the sound sensitive spaces. Project specific solutions and details will be developed in the coming phases as the design progresses. The following areas will be discussed:

- Architectural Acoustics – Refers to proper room square footage, volume and shape; need for and orientation of sound absorbing, reflecting and diffusing surfaces; need for and orientation of adjustable absorption systems. These criteria are determined based on the program requirements for each sound critical space.
- Sound Isolation – Refers to the construction of floors, ceilings and walls designed for acoustic separation between adjacent spaces and from external noise. The constructions are recommended based on the background noise criteria for each sound critical space in combination with the anticipated noise levels in adjacent spaces.
- Building Systems Noise Control – Refers to the proper devices and strategies to control excess noise and vibration associated with mechanical, electrical, and plumbing systems. Recommendations are based on proximity between noisy equipment and the sound critical spaces as well as the type of equipment used.

ARCHITECTURAL ACOUSTICS OVERVIEW

This section of the report contains descriptions of the different acoustical finishes as well as space and geometric volume requirements for all sound critical spaces. The recommended treatments and criteria are described for each space below:

CONCERT HALL

The 450-seat concert hall will feature one balcony and side galleries and a rear of stage choral/patron gallery. Balcony overhang height to depth ratio should be 1:1. A shaped ¾" plaster or 3 layer gypsum board ceiling is required at an average height of 45' above the main floor level in front of the stage. The volume necessary for orchestral music should be 300,000 ft3. Reverberation time for orchestral music should be 1.8s fully occupied. For amplified events, percussion and contemporary works, the reverberation time should be 1.2s. This variability will be achieved through the use of adjustable acoustical draperies, approximately 7,000 SF, located around the upper walls of the room and at the rear of the stage.

A fixed overhead reflector canopy will be over the stage and shaped in such a manner so that sound from the performers is reflected both out into the house and also throughout the stage and choir platform for excellent on-stage hearing conditions. The materials are yet to be determined but thicknesses in the ½" to ¾" are optimal. Side walls of the hall shall be shaped to promote diffusion of sound. Surfaces shall be thick and massive to reflect sound in all frequencies. Carpeted aisles and reflective floor surfaces are required. Chairs are upholstered bottom and back with ¾" thick foam for the back and 2" foam for the seat. The back of the back and the underside of the bottom are wood.

5.1.3 Acoustics

RECITAL HALL

The 125-seat recital hall will be less formal than the concert hall, but as symmetrical as possible across the centerline. A fixed overhead reflector similar to the concert hall is required. A shaped ¾" plaster or 3 layer gypsum board ceiling is required at an average height of 35' above the main floor level in front of the stage. The volume necessary for orchestral music should be 75,000 ft3. Reverberation time for orchestral music should be 1.5s fully occupied. For amplified events, percussion and contemporary works, the reverberation time should be 1.0s. This variability will be achieved through the use of adjustable acoustical draperies, approximately 1,500 SF, located around the upper walls of the room and at the rear of the stage. Side walls of the hall shall be shaped to promote diffusion of sound. Surfaces shall be thick and massive to reflect sound in all frequencies. Carpeted aisles and reflective floor surfaces are required. Chairs are upholstered bottom and back with ¾" thick foam for the back and 2" foam for the seat. The back of the back and the underside of the bottom are wood.

INSTRUMENTAL REHEARSAL ROOM

This 2400 square foot room should not be perfectly square, with the width equal to 1.2 the length, (54' x 44'). The ceiling height or slab above height to provide the acoustic volume should be set at 26 feet. A partially sound transparent, partially sound reflective ceiling will be required at approximately 18 to 20 feet. The walls below this elevation will receive evenly distributed acoustical panels. An acoustic shelf will be required on a minimum of three walls and should be located 12 feet above the finish floor. The shelf will also be used as a place to have adjustable acoustic drapery, which consists of 25oz velour with 100% fullness. The walls below the shelf will be shaped to provide acoustical diffusion and prevent parallel wall conditions. Finally, the underside of the deck will be treated with acoustical absorptive material in a checker board pattern covering approximately 50% of the surface area. Finishes in these spaces will be a mix of acoustically reflective, diffusive and absorptive surfaces. See the acoustical matrix for specific square footages of treatments required.

CHORAL REHEARSAL

This 1600 square foot room should not be perfectly square, with the width equal to 1.2 the length, (44 x 36). The ceiling height or slab above height to provide the acoustic volume should be set at 24 feet. A partially sound transparent, partially sound reflective ceiling will be required at approximately 16 to 18 feet. The walls below this elevation will receive evenly distributed acoustical panels. An acoustic shelf will be required on a minimum of three walls and should be located 12 feet above the finish floor. The shelf will also be used as a place to have adjustable acoustic drapery, which consists of 25oz velour with 100% fullness. The walls below the shelf will be shaped to provide acoustical diffusion and prevent parallel wall conditions. The underside of the deck will be treated with acoustical absorptive material in a checker board pattern covering approximately 50% of the surface area. Finishes in these spaces will be a mix of acoustically reflective, diffusive and absorptive surfaces. See the acoustical matrix for specific square footages of treatments required.

NON-WESTERN MUSIC REHEARSAL

This room will be used for rehearsal and display of musical ensembles from around the world and will house varying instruments ranging in size from Gamelon to Sitar. As a result the room will need to have a varying acoustic quality to match the ensembles and instrument's acoustic requirements with a visual component for visitors. This room should not be perfectly square, with the width equal to 1.2 the length. The ceiling shall be two layers of 5/8" gypsum board and shaped to provide the proper diffusion of sound and for the correct acoustic volume should be set at 14 feet. It will be treated with acoustical absorptive material in a checker board pattern covering approximately 50% of the surface area. The walls will be shaped to provide acoustical diffusion and prevent parallel wall conditions. There should be an adjustable acoustic drape in the room to adjust the liveness in the room for varying ensembles use. Finishes in these spaces will be a mix of acoustically reflective, diffusive and absorptive surfaces. See the acoustical matrix for specific square footages of treatments required.

HISTORIC KEYBOARD ROOM

The historic keyboard room will be used to house and rehearse important and precious historic keyboards. A pipe grid will be suspended from the ceiling. The ceiling height or slab above height to provide the acoustic volume should be set at 12 feet. The walls will be shaped to provide acoustical diffusion and prevent parallel wall conditions. Acoustical wall panels shall be distributed around the room, see the acoustical matrix for area requirements.

PERCUSSION REHEARSAL

The percussion rehearsal space will be used by the percussion ensemble, steel drum ensemble and other percussion needs. This room should not be perfectly square, with the width equal to
1.2 the length. The ceiling shall be two layers of 5/8" gypsum board and shaped to provide the proper diffusion of sound and for the correct acoustic volume should be set at 14 feet. It will be treated with acoustical absorptive material in a checker board pattern covering approximately 50% of the surface area. The walls will be shaped to provide acoustical diffusion and prevent parallel wall conditions. The room will be a mix of absorptive and diffusive surfaces. Special attention will be paid to the control of low frequencies using bass traps and low frequency tuner panels.

MUSIC TEACHING STUDIOS

The Teaching Studios will be primarily used for applied instrumental coaching. Similarly to the rehearsal room, these rooms should not be perfectly square and should comply with the width equal to 1.2 the length criterion. Finishes in these spaces will primarily consist of acoustically reflective surfaces with strategically placed sound absorptive treatments. Please refer to the Acoustical Construction Matrix for detailed information. Non-parallel walls must be provided in these rooms. Typically, an angle of 7 degrees between parallel walls adequately prevents flutter echoes. The gypsum board ceiling in these rooms should also be angled to break up the parallel condition with the floor.

MUSIC PRACTICE ROOMS

These rooms must also not be perfectly square and should comply with the width equal to 1.2 the length criterion. Finishes and wall/ceiling shaping requirements in these spaces will be almost identical to those in the music studios except will be carpeted. Please refer to the Acoustical Construction Matrix for detailed information.

5.1.3 Acoustics

COMPUTER MEDIA LAB/ELECTRONIC MUSIC CLASSROOM

This space will be primarily used for instruction, composition and practice. Similarly to the rehearsal room, these rooms should not be perfectly square and should comply with the width equal to 1.2 the length criterion. Finishes in these spaces will primarily consist of acoustically diffusive surfaces with strategically placed sound absorptive treatments. Please refer to the Acoustical Construction Matrix for detailed information.

MUSIC CLASSROOMS

Classrooms will be primarily used for instruction and rehearsal. Similarly to the rehearsal room, these rooms should not be perfectly square and should comply with the width equal to 1.2 the length criterion. Finishes in these spaces will primarily consist of acoustically diffusive surfaces with strategically placed sound absorptive treatments. Please refer to the Acoustical Construction Matrix for detailed information.

SOUND ISOLATION OVERVIEW

All rooms listed above will require excellent sound isolation from surrounding sound sources. In order to achieve this, the construction of walls, ceilings and floors will need to be massive and airtight. In addition, doors and windows in sound critical spaces will need to achieve specific levels of acoustical performance. In the most sensitive areas, box-in-box constructions will be required.

Box in Box Construction
Box in box construction consists of a floating interior light weight construction surrounded by a more rigid massive construction and is used to isolate high level sounds in tight spaces. A core of
8" minimum thickness concrete masonry units grouted solid, is provided between adjacent spaces and corridors constructed rigidly from slab to slab. Inside these walls is laid a floating wood floor onto which is built a steel stud partition with 2 layers of 5/8" gypsum board and fiberglass batting in the studs. These studs are either free standing or resiliently braced back to the masonry wall, allowing them to "float" and eliminate potential paths for vibration transfer. For practice rooms, there is no CMU, and the metal studs rest on each room's floating floor.

The floating wood floor consists of a double layer of plywood laid over neoprene or fiberglass mounts. The air space between the isolation mounts is filled with fiberglass insulation and the perimeter of the wood floor is held back from the perimeter walls to maintain the resiliency and allow for expansion and contraction of the wood. The finish material for each space would be scheduled in addition to the plywood sub-floor previously described.

The floating ceilings consist of multiple layers of gypsum board that are supported from the structure above with vibration isolation hangers. These hangers include a neoprene and spring element in series that prevent structure-borne noise transfer between the structure and the ceiling. The ceilings in this project will all be scheduled to consist of two layers of gypsum board. The gypsum board is held back from the interior gypsum board walls to allow for ceiling movement. As an alternate, it may be possible to construct the ceiling framing directly to the floating walls, completing the floating interior box, without hangers provided no connection is made between this ceiling and the non-floating structures. Note that recessed fixtures must be avoided with this type of ceiling in order to insure the acoustical performance of the ceiling assembly is not compromised.

Penetrations through the CMU are sealed air tight and all penetrations in the interior gypsum board are caulked air tight. Electrical connections to the inner box should use flexible conduit and duct work connections should use flexible duct connections to grilles and registers.

The doors in the box in box assembly are acoustical doors and are attached to the inner box construction only. There will be two types of doors used in this project. The first type is gasketed doors. These doors consist of a typical hollow metal door with a series of adjustable heavy-duty acoustical gaskets applied around the perimeter of the door. The second type is acoustically rated doors. These doors consist of a door leaf, door frame and acoustical seal assembly that have been tested in a laboratory and meet a specific sound transmission class (STC) rating.

Windows in sound critical rooms need to include an integral air space and/or laminated panes. The exact type of glass and air spacing and frames depend on the location in the building, the percentage of glass to wall and the room's adjacency to other sound critical rooms. Windows should be as scheduled in the acoustical matrix.

BUILDING SYSTEMS NOISE CONTROL OVERVIEW

This section of the report references different sources of noise and vibration, which can be classified as follows:

- Airborne Noise refers to noise radiated into the air by equipment sources such as fans and air handling units. Such noise may transmit through walls, floors, and ceilings to acoustically sensitive spaces.
- Structureborne Noise refers to equipment vibration that is mechanically coupled into the building structure and re-radiated into acoustically sensitive spaces as audible noise. Structureborne noise may also be generated when a component of a building structure is exposed to high levels of airborne noise.
- Ductborne Noise refers to noise generated primarily by fans in air handling systems that transmits to acoustically sensitive spaces via ductwork, where it can either emanate from the duct termination or 'break out' of the duct prior to its termination. Noise may also 'break in' to a duct.

DESIGN CRITERIA

The following criteria for maximum ambient noise levels due to operation of the building HVAC, plumbing, and electrical systems have been established for the acoustically sensitive spaces on the project. These criteria are established in terms of Noise Criterion (NC) ratings as described in ASHRAE 2001 Fundamentals Handbook, Chapter 7 (Sound and Vibration):

Program Space	***Noise Criterion***
Performance Spaces	15
Performance Hall Control Rooms	20
Rehearsal Rooms	20
Teaching Studios	25
Classrooms	25
Practice Rooms	30
Library	30
Corridors/Lobbies	35
Offices	35

5.1.3 Acoustics

HVAC NOISE AND VIBRATION CONTROL

Central Heating and Cooling Equipment

1. Equipment Location
   Central cooling and heating equipment – such as chillers, cooling towers, pumps, and boilers – can generate substantial levels of noise and vibration that can potentially transmit to acoustically sensitive spaces via airborne, structureborne, and ductborne paths. The locations in the building have been determined based on the project requirements and will be isolated as required to achieve the NC criteria of the different spaces.

2. Equipment Notes:

   A. Chillers:
      - Generally, chillers and other packaged refrigeration equipment employing reciprocating or screw type compressors are generally noisier than other types and should be avoided in acoustically sensitive applications. Centrifugal or scroll type compressors should be considered instead.

   B. Cooling Towers:
      - Induced draft cooling towers typically may not be fitted with noise control devices, and should be employed only where radiated noise will not cause an adverse noise impact.
      - Where cooling tower radiated noise is a concern, forced draft units incorporating centrifugal fans, which may be fitted with noise control devices if required, should be considered.

   C. Pumps:
      - To prevent excessive tonal noise from large chilled and condenser water pumps, the pump impellers should be sized for not more than 85% of their maximum diameter.
      - Large pumps should incorporate 12 inch long spool sections of pipe installed immediately at the suction and discharge connections to the pump, to facilitate installation of flexible pipe sections in the future should a noise problem develop. All valves and gauges should be on the piping side of the spool sections (away from the pump).

   D. Boilers:
      The combustion process in some boilers produces a strong low frequency noise that is carried through the flue system. In addition, clean-outs and other fittings in the flue system can cause high levels of turbulence noise. For these reasons, boiler flues should not be run in shafts adjacent to or in close proximity to acoustically sensitive space.

Air Distribution Systems

1. Overall System Considerations

   A. Air distribution systems serving noise sensitive assembly spaces should be single zone, low pressure, low velocity type. Variable airflow, if required, shall be accomplished with fan speed controls. Variable inlet vanes and other restrictive volume control devices should not be utilized.

   B. Air distribution systems required to serve multiple zones may be Variable Air Volume (VAV) type. However, terminal devices must be located outside of the boundaries of acoustically sensitive spaces and above non-sensitive space. Refer to guidelines below for location and configuration of VAV terminal devices.

   C. A primary system design goal governing sizing and selection of ductwork and air distribution equipment serving noise sensitive spaces should be to minimize overall pressures throughout the system, and especially the system total static pressure. Since the fan is typically the predominant component of noise in an air handling system, and also since the noise output of a fan is highly sensitive to static pressure, minimizing the fan total static is the best approach to avoiding other expensive and complicated noise control measures.

2. Location of Air Handling Equipment

   A. Air handling equipment should be located remotely from acoustically sensitive spaces, with sufficient lengths of duct run to dissipate fan noise before entering the space served. The following table gives guidelines for minimum lengths of duct run between air handling equipment and acoustically sensitive spaces:

Table I – Minimum Duct Runs for Air Handling Equipment

Noise Criterion	*Minimum length of supply and return duct run between air handling equipment (fans / air handling units) and boundaries of space served*
NC-15	75 ft.
NC-20	60 ft.
NC-25	45 ft.
NC-30	30 ft.
NC-35	20 ft.

   B. Location of air handling equipment directly adjacent to (including above and below) acoustically sensitive spaces may require complicated and expensive sound isolation constructions or complete structural isolation, and should be avoided altogether. Under no circumstances may ductwork penetrate directly from a mechanical room into an acoustically sensitive space.

   C. Should it not be feasible to provide the above lengths of duct run between the air handling equipment and space served, then special considerations will be required for the air handling equipment, such as utilization of quiet type fans, double wall insulated air handling unit casings, and incorporation of sound attenuator sections within air handling units.

   D. The following table gives guidelines for minimum lengths of low pressure ductwork between VAV terminals and acoustically sensitive spaces:

Table II – Minimum Duct Runs for VAV Terminals

Noise Criterion	*Minimum length of low pressure supply ductwork to be incorporated downstream of VAV terminals before entering boundary of space served*
NC-15	VAV systems should not be used
NC-20	25 ft., plus one horizontal elbow
NC-25	20 ft., plus one horizontal elbow
NC-30	15 ft., plus one horizontal elbow
NC-35	10 ft., plus one horizontal elbow

5.1.3 Acoustics

3. Fan Selection

   A. In general, fans should be selected to operate in the range of peak mechanical efficiency. Do not select a fan at or to the left of the peak of the static pressure curve where fan operation becomes unstable and generates high levels of noise.

   B. Deliberately oversizing a fan should not be pursued automatically as a strategy for minimizing fan noise.

4. Ductwork

   A. General:
      - Ductwork serving acoustically sensitive spaces should be designed for the smoothest possible airflow. Avoid obstructions in the airflow and abrupt changes in pressure and velocity.
      - To the extent possible, air distribution systems should be self-balancing, with pressures naturally equalized at outlets and inlets.
      - Balancing dampers should be provided only for trim volume control and should be located at least 4 duct diameters upstream of any supply or return openings.

   B. Main Ductwork:
      - To the extent possible, lengths of straight duct run (3-4 duct diameters) should be developed at the inlet and discharge of fans and air handling units. Abrupt transitions and fittings in close proximity to fan and air handling unit connections should be avoided.
      - To avoid excessive air turbulence, duct connections to air handling unit sections incorporating plenum fans should be on the top, bottom, or sides of the plenum; never on the end of the plenum opposite the fan.
      - Main trunk ductwork should be rectangular to maximize sound energy dissipation.
      - Elbows in main trunk ductwork should be mitered and fitted with turning vanes.

   C. Distribution Ductwork Within Boundaries of Acoustically Sensitive Spaces:
      - All elbows and junctions should be smooth radius or wye type.
      - Transitions should be smooth with maximum 15 degree included angle.

   D. Air Velocities:

      The following table outlines maximum ductwork air velocity guidelines for acoustically sensitive spaces:

Table III – Maximum Ductwork Air Velocities

Maximum Air Velocity in Feet Per Minute (FPM)				
Noise Criterion	Net Velocity Through Air Device (*1)	Within 10 ft. of Air Device	Within 20 ft. of Air Device	Within 30 ft. of Air Device
NC-15 Supply	250	350	500	600
NC-15 Return	300	400	500	600
NC-20 Supply	300	400	550	700
NC-20 Return	350	450	550	700
NC-25 Supply	350	450	650	850
NC-25 Return	400	500	650	850
NC-30 Supply	450	550	800	1000
NC-30 Return	500	650	800	1000
NC-35 Supply	500	600	900	1200
NC-35 Return	600	750	900	1200

*1 Applicable to custom or architectural devices. For manufactured devices, refer to Grilles,Registers, and Diffusers below.

E. Attenuation of Ductborne Noise:
- The full extent of supply and return ductwork serving acoustically sensitive spaces should be 1 in. internally acoustically lined.
- For preliminary budgeting purposes, main supply and return ductwork should be provided with 7 ft. medium pressure drop sound attenuators sized for 800 FPM (±) maximum (0.10 in. pressure drop).
- For preliminary budgeting purposes, low pressure supply ductwork downstream of VAV terminal devices should be provided with 5 ft. medium pressure drop sound attenuators sized for 1,000 FPM (±) maximum(0.10 in. pressure drop).

F. Grilles, Registers, and Diffusers:
- Ideally, grilles, registers, and diffusers should not be used in NC-15 spaces.
- Plaques and flared openings are preferred.
- Preliminarily, grilles, registers, and diffusers may be sized according to manufacturers published NC ratings for 5 points less than the background noise criterion established for a given space.
- Diffusers shall not incorporate dampers or other volume control devices. iv. The use of perforated and plaque face type diffusers should be avoided.
- Penetration of Ductwork Through Sound Isolation Assemblies

G. Penetrations of ductwork through mechanical room walls and slabs, as well as the boundary construction of acoustically sensitive spaces, should be sealed airtight. Generally, such penetrations should be treated with details commensurate with 2 hr. fire rated construction. Wherever sealant is used in such details, the sealant should be a permanently flexible type.

5.1.3 Acoustics

Vibration Isolation

1. Generally, all reciprocating and rotating equipment shall be vibration isolated from the building structure.

2. All piping 2" o.d. and larger which is connected to vibration isolated equipment shall be vibration isolated from the building structure for a distance of 50 feet or 100 pipe diameters from connected equipment, whichever is greater. Heat exchangers and expansions tanks shall also be vibration isolated.

3. Ductwork connections to air handling equipment shall be flexible.

4. The following table gives preliminary vibration isolation requirements. Isolator static deflections will be determined based on equipment location:

Table IV – Vibration Isolation Guidelines

Equipment Types	Base Type	Isolator Type
Fans (including air handling, air conditioning, and heating / ventilating units)		
Floor/Roof Supported	Per Mfr	Spring
Suspended		Spring/Neoprene hanger
Pumps > 5 Hp (close coupled, end suction, and split case)	Conc. Inertia Base	Spring
Package boilers, steam generators	Per Mfr	Restrained Spring
Air Compressors		
up to 10 Hp	Per Mfr.	Spring
> 10 Hp	Conc. Inertia Base	Spring
Air Cooled Chillers	Per Mfr.	Restrained Spring
Heat Exchangers, expansion tanks	per Mfr.	Restrained Spring
Cooling Towers	per Mfr.	Restrained Spring
Mechanical and Domestic Piping		
Floor Supported	as req'd	Spring
Suspended		Spring/Neoprene Hanger Neoprene Pad
Steam		
Curb Mounted Roof Equip.	Spring isolation curb	
Generators	per Mfr.	Restrained. Spring

The above schedule is to be coordinated with equipment proposed for the project, and provided within specifications or drawings.

5.1.3 Acoustics

PLUMBING SYSTEM NOISE CONTROL

General:

1. With the exception of sprinkler systems, pipes conveying water, including roof drains, must not run within acoustically sensitive spaces. Where such pipe runs are unavoidable, the piping must be wrapped with insulation and flexible sound barrier material such as acoustical pipe lagging.
2. Toilets rooms and other spaces containing or served by plumbing should not be located directly adjacent to acoustically sensitive spaces. In the event that this can not be achieved, resilient support and attachment of the piping and / or fixtures may be required and fixtures such as toilets should be adjusted to operate at the lowest possible pressures.
3. Penetrations of piping through equipment room walls and slabs should be sealed airtight. Generally, such penetrations should be treated with details commensurate with 2-hour fire rated construction. Wherever sealant is used in such details, the sealant should be a permanently flexible type.

ELECTRICAL SYSTEM NOISE AND VIBRATION CONTROL

Power:

1. Large transformers, equal to or greater than 500 kVA, should be located outside of the building on a pad that has no connection to the building structure. Those that must be located inside the building must be remote from acoustically sensitive spaces and preferably on grade and vibration isolated from the building structure. On-grade installations typically require neoprene mountings, while above grade installations typically require steel spring type mountings. Critical above grade installations may require pneumatic air springs.
2. Electrical equipment rooms containing small transformers, less than 500 kVa, and dimmer equipment rooms, should not be located directly adjacent to acoustically sensitive spaces. These pieces of equipment may require vibration isolation from the building structure. Such isolation typically consists of flexible neoprene mountings or hangers.
3. Switchgear rigidly connected to vibration isolated transformers should be isolated in the same way as the transformers and all conduit connections shall be flexible.
4. Electrical outlet boxes in the common walls of acoustically sensitive spaces that are adjacent to each other shall not be located back-to-back. The boxes shall be offset by at least one stud bay or 24 inches, whichever is greater. Similarly to other building systems, penetrations of conduit through equipment room walls and slabs, as well as the boundary construction of acoustically sensitive spaces, should be sealed airtight with similar details to those previously described.

Lighting:

1. Florescent and metal halide fixtures are susceptible to noise due to interaction with their associated ballasts. For this reason, these types of fixtures should not be used in spaces having an NC rating equal to or lower than 25 unless electronic ballasts are utilized.
2. Lighting fixtures in acoustically sensitive spaces should not incorporate thin, lightweight aluminum baffle fins, which tend to vibrate sympathetically with certain sounds and thus create buzzing and rattling sounds. Samples of fixtures in question will need to be submitted for our review and testing.

PRELIMINARY ACOUSTICAL CONSTRUCTION MATRIX

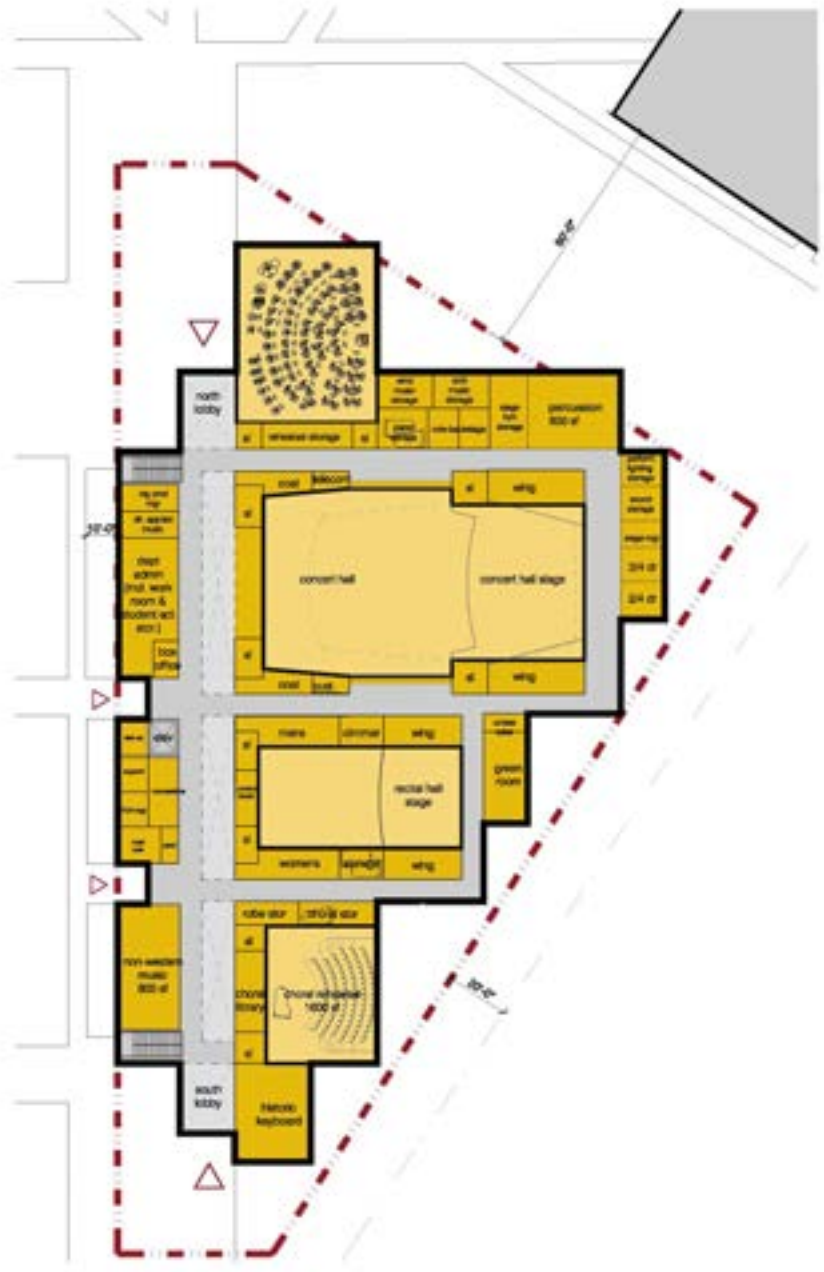
Space	*NC*	*Floor Finish*	*Floor Construction*	*Wall Finish*	*Room to Room Wall Construction*	*Room to Corridor Construction*	*Ceiling Construction/ Height*	*Doors*	*Windows*	*Special Acoustic Treatment*
Concert Hall	15	Wood Stage with air space Carpeted Aisles Stained Concrete under Seats	Double Slab with top slab penetrated for supply air to plenum between slabs	1" th. wood, ¾" plaster, or 3x5/8" GWB on metal studs with acoustic batt	N/A	10" Cast in place concrete OR 12" CMU grouted solid – not in the plane of steel	Finished plaster ceiling ¾" thick or 3 layers of 5/8" gwb. OR 6" thick normal weight concrete on top of metal deck roof. 45' high	Pair of HM or Wood doors with acoustic seals with absorptive sound and light lock	N/A	Adjustable acoustic drapes approx. 7000 SF Upper side walls and rear stage platform. Diffusive wall and ceiling shaping
Recital Hall	15	Wood Stage with air space Carpeted Aisles Stained Concrete under Seats	Double Slab with top slab penetrated for supply air to plenum between slabs	1" th. wood, ¾" plaster, or 3x5/8" GWB on metal studs with acoustic batt	N/A	10" Cast in place concrete OR 12" CMU grouted solid – not in the plane of steel.	Finished plaster ceiling ¾" thick or 3 layers of 5/8" gwb. OR 6" th. normal weight concrete on top of metal deck roof. 35' high	Pair of HM or Wood doors with acoustic seals with absorptive sound and light lock	N/A	Diffusive wall and ceiling shaping Adjustable acoustic drapes approx. 1000SF
Performance Hall Control Rooms	25	Carpet	Concrete Slab	GWB, AWP on rear wall	3x5/8" gwb on metal studs each side with acoustical batt	3x5/8" gwb on metal studs each side with acoustical batt	A.C.T.	Acoustically Gasketed	STC-45 Sliding Window	2" acoustical panels 150SF
Large Instrumental Rehearsal Room	20	Linoleum, VCT	Slab on Grade	GWB, 1500sf of 4" thick Acoustical Wall Panels	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid, 1x5/8" gwb on furring channels	6" th. concrete on metal deck 26'h with 4" ACP 1200sf, coverage in checkerboard pattern	Pair of HM or Wood doors with acoustic seals with absorptive sound and light lock	Exterior: 1" IGU with 1/4" laminated on the interior	Adjustable acoustic drapes approx. 1500SF
Choral Rehearsal Room	20	Linoleum, VCT	Slab on Grade	GWB, 600sf of 4" thick Acoustical Wall Panels	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid, 1x5/8" gwb on furring channels	6" th. concrete on metal deck 24'h with 4" ACP 500sf, coverage in checkerboard pattern	Pair of HM or Wood doors with acoustic seals with absorptive sound and light lock	Exterior: 1" IGU with 1/4" laminated on the interior	Adjustable acoustic drapes on all wall, approx. 100SF
Non-Western Music Room	20	Linoleum, VCT	Floating Wood Floor	GWB, 200sf of 4" thick Acoustical Wall Panels & Glass	Double stud walls 2x5/8" gwb on metal studs each side with acoustical batt	Double stud walls 2x5/8" gwb on metal studs each side with acoustical batt	Sound Control Ceiling 14'h with 300sf coverage, checkerboard pattern of 2" ACP	Acoustical STC-51, double doors with vision panels	Exterior: 1" IGU with 1/4" laminated on the interior	Adjustable acoustic drapes on all wall, approx. 500SF.
Percussion Rehearsal Room	20	Linoleum, VCT	Slab on Grade	GWB, 200sf of 4" thick Acoustical Wall Panels	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid, 1x5/8" gwb on furring channels	Sound Control Ceiling 14'h with 4" ACP 300SF in checkerboard pattern	Acoustical STC-51, double doors with vision panels	Exterior: 1" IGU with 1/4" laminated on the interior	Box in Box Construction 100SF of low frequency acoustical panels
Teaching Studios	25	Linoleum, VCT	Wood Floating Floor	GWB & 2" AWP approx. 200SF	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid	Sound Control Ceiling 10'-12' sloped	Acoustical STC-51	Exterior: 1" IGU with 1/4" laminated on the interior	Box in Box Construction

5.1.3 Acoustics

College of William and Mary Performing Arts Complex — April 4, 2013

Space	*NC*	*Floor Finish*	*Floor Construction*	*Wall Finish*	*Room to Room Wall Construction*	*Room to Corridor Construction*	*Ceiling Construction/ Height*	*Doors*	*Windows*	*Special Acoustic Treatment*
Computer Media Lab/Electronic Music Classroom	25	Carpet	Slab on Grade	GWB & 2"and 4" AWP approx. 200SF	2x5/8"gwb on metal studs with batt insulation, 8" CMU grouted solid	Double stud walls 2x5/8" gwb on metal studs each side with acoustical batt	Sound Control Ceiling 10'h with 50% coverage, checkerboard pattern of 2" ACP	Acoustical STC-51	NONE	Box in Box Construction
Practice Rooms	30	Carpet	Wood Floating Floor	GWB & 2" AWP approx. 75SF	Double stud walls 2x5/8" gwb on metal studs each side with acoustical batt	Double stud walls 2x5/8" gwb on metal studs each side with acoustical batt	Sound Control Ceiling 10'h	Acoustical STC-46 with vision panels	NONE	Box in Box Construction
Library	30	Carpet	Slab on Grade	GWB	2x5/8" gwb on metal studs each side with acoustical batt	2x5/8" gwb on metal studs each side with acoustical batt	A.C.T. and GWB	Standard Doors		
Classrooms	30	Carpet	Wood Floating Floor	GWB & AWP	2x5/8" gwb on metal studs each side with acoustical batt	2x5/8" gwb on metal studs each side with acoustical batt	GWB	Acoustical STC-46	Exterior: 1" IGU with 1/4" laminated on the interior	2" acoustic panels approx. 300SF
Offices	35	Carpet	Concrete Slab	GWB	Standard	Standard	A.C.T.	Standard Doors		
Lobby/ Corridors	35-40	Carpet, Concrete, VCT	Concrete Slab	GWB, Concrete			A.C.T. & GWB	N/A		

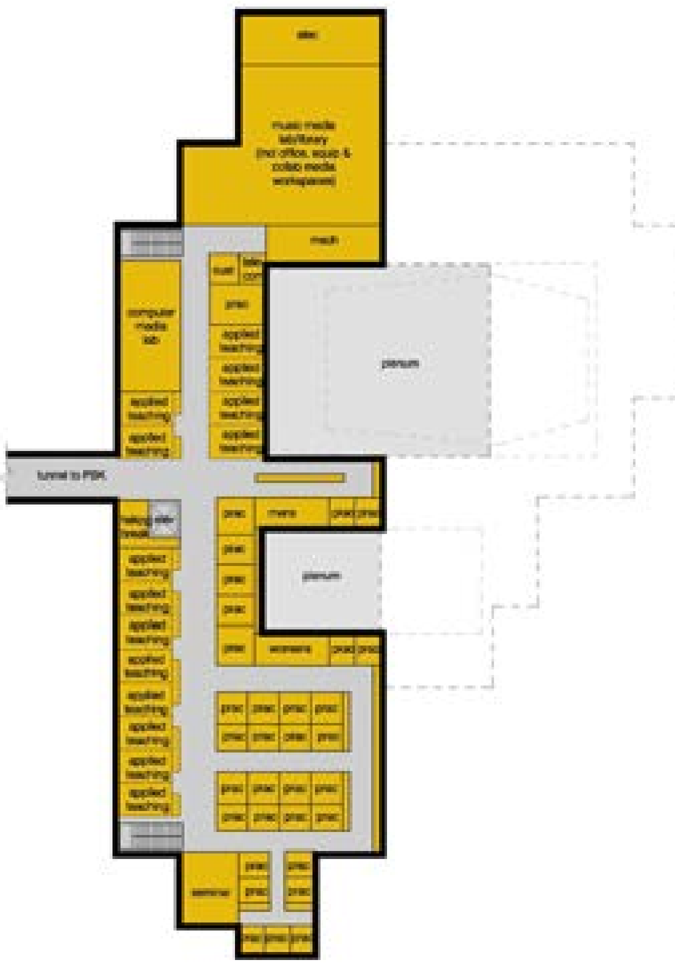
5.1.4 Floor Plans



MUSIC MAIN LEVEL

5.1.4 Floor Plans

MUSIC UPPER LEVEL



MUSIC LOWER LEVEL

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5.2 Site Approach

5.2.1 Landscape

As important as the programmed space within the buildings that create the Arts Quarter is the landscape that surrounds them. The landscape and outdoor spaces around the buildings should reinforce the Arts Quarter with distinctive elements unique to the Arts Quarter this could be through the use of special plantings, by the placement of sculpture or other works of art in the outdoors spaces among many others.

The landscape should also align with the approach described in the Campus Design Guidelines. In particular, items three and four of the Vision Plan as excerpted below:

3. *New public spaces on campus should be created and connected by clearly articulated pedestrian circulation paths. New buildings should create and frame new public spaces wherever possible.*
4. *Existing barriers to unifying the campus, such as roads and parking, should be removed (or at least minimized) wherever possible.*

Source: The College of William & Mary Campus Design Guidelines Report, May 2003 prepared by Sasaki and Boynton Rothschild Rowland

5.2.2 Pedestrian Access

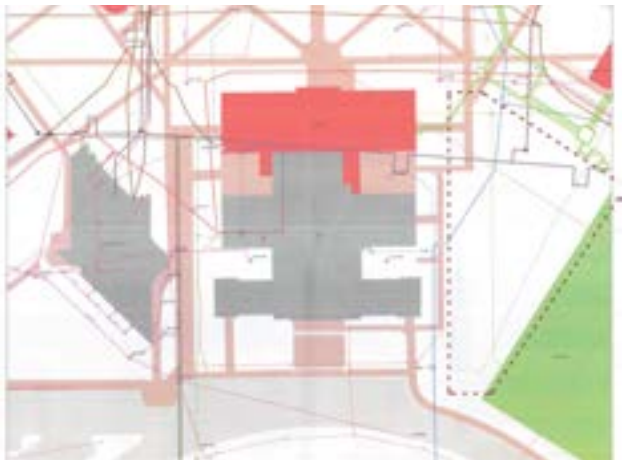
The north edge of the Arts Quarter will be bounded by the south campus Promendae connecting the east and west ends of campus. Main campus paths located to the east and west of PBK providing north/south campus connections from Jamestown Road to the interior of campus will be maintained and improved.

Pedestrian experience will be emphasized and vehicular traffic will be minimized to the extent possible within the Arts Quarter; however, most service needs will need to share space with pedestrians.

Landscaping of the promenade and paths will be further emphasized by the creation of courtyards and outdoor rooms throughout the Arts Quarter.

5.2.3 Utilities

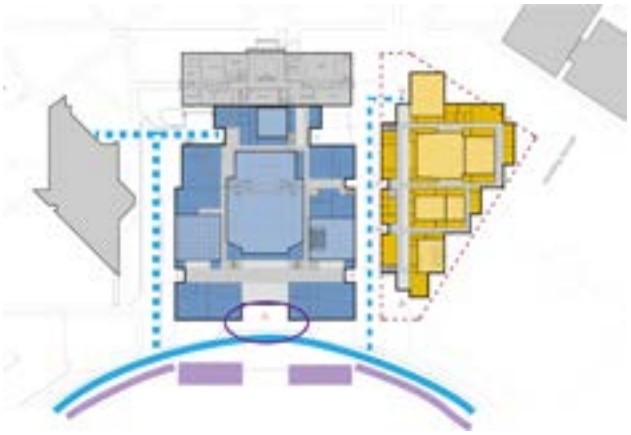
The Arts Quarter will be supported by the new West Plant which must be completed before the Arts Quarter in order to ensure the capacity to service the components of the Arts Quarter is there. The site for Phase 1, Music, is south of a main utility hub just to the south of ISC1. There will need to be rerouting of minor utilities affected by Arts Quarter build-out. See additional information regarding impact of the Arts Quarter on utilities in the Mechanical and Electrical Systems sections of this report.



5.2.4 Parking/Service/Traffic Flow

Vehicular access to the Arts Quarter will be critical for both service needs and to serve the patrons of the programs and performances occurring in the Arts Quarter.

A reconfiguration of the parking and traffic flow on crescent off of Jamestown Road is proposed to make this zone less confusing, more pedestrian friendly and provide a better drop-off situation while maintaing the current parking count. This proposal would include making the traffic pattern on the crescent one-way traffic and provide parking along the south edge only. Configuration of this parking could include both pull-in parking and parallel parking. Moving all parking to the south edge would allow the north edge of the crescent to be used for drop-off purposes only.



In addition to parking and drop-off realignments at the crescent, service access must be maintained to the existing docks for the Muscarelle Museum and PBK. Additionally, light service requirements will need to be met on the east side of PBK to access the north and south music lobbies to allow for loading and unloading of musical instruments and food service for events which is assumed to be done via small box trucks and vans.

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5.3 Systems Approach

5.3.1 Theatrical

5.3.2 Audio Visual

5.3.3 Structural

5.3.4 Mechanical

5.3.5 Electrical

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5.3 Systems Approach

5.3.1 Theatrical

Prepared by AUERBACH·POLLOCK·FRIEDLANDER
Performing Arts/Media Facilities Planning and Design

Overview
The primary purpose of this report is to establish recommended operating criteria, performance systems, elements and equipment for the 500-seat Concert Hall, 150-seat Recital Hall and the larger practice and rehearsal facilities in the new Music Building at The College of William & Mary in Williamsburg, Virginia. The elements of this narrative expand the detail of our understanding of the program development to date. As we complete the Pre-Design and Project Phasing Study, this narrative is intended to serve the project design team and the College, confirming a scope of systems and operational concepts that can be verified with principal stakeholders as the project prepares to move forward into Schematic Design.

Our recommendations for systems and equipment are based upon the following criteria:

- Functional viability for the activities to be accommodated
- Economy with respect to initial capital cost and long term maintained operation.
- Ease of operation and safety for operators, technicians and students, consistent with projected utilization and staffing.

THE CONCERT HALL

General Planning Statement

The Concert Hall is a dedicated music venue and will have a performance platform sized to support an 85 piece orchestra. Based on the Acoustician's design input, the room will be an integrated "single-room" venue featuring a performance platform with a permanent architectural surround. Choral accommodation is provided using fixed seating integrated into the architectural plan for approximately 50 singers above and behind the performance platform. Counting the choral loft seating in addition to the 500 audience seats, as many as 550 may be accommodated for concert events where a choir is not seated above the performance platform.

Although the primary use of the Concert Hall is the presentation of live music events for the public, secondary uses identified in the program discussions include large ensemble classes. Optional uses discussed in work sessions may also include lecture events with moderate levels of amplification with pre-recorded or live sound.
The performance systems supporting presentations in the Concert Hall include limited overhead rigging points, an orchestra, choir and performance lighting system and an array of variable acoustics banners, panels or other elements.

Theatrical Rigging Systems

The installed rigging systems will be limited to a series of "strong points" located at strategic positions and in a regular array over the performance platform. Rigging strong points will allow users to hang lightweight decorative banners and screens as necessary for certain events. Rigging from strong points is not anticipated to be motorized, however power and data points will be provided adjacent to these overhead locations should temporary hoists be required for special events.

5.3.1 Theatrical

There may also be motorized speaker rigging hoists to support speaker arrays associated with amplified events and the playback of pre-recorded material. The necessity of speaker arrays will be determined by the Audio-Visual Consultant in the Schematic Design phase. If speaker arrays are utilized, it is likely they would be stored and concealed above a fixed canopy ceiling element. If movable motorized speaker arrays are employed, they will be lowered to predetermined elevations for use during amplified events and raised to an upper elevation to be out of sight when not in use. They may also be lowered to the stage floor for service and repair.

All of the above elements will be carefully integrated into and coordinated with the overstage fixed ceiling / canopy structure. It is possible that the final design solution above the orchestra ceiling may include walkable catwalks with structural rigging points within reach overhead. These points, concealed above the acoustically reflective canopy would be integrated into a series of slots or grommets that are in this plane to accommodate down lighting, moving speaker arrays and cable drops from overhead rigging.

Variable Acoustics

Variable acoustics draperies as determined and scoped by the Acoustical Consultant will provide variable absorption within the audience chamber to alter the reverberation time as appropriate for each type of event on stage. For ease of operation, all drapes in the upper volume of the room will be motorized and controlled via a control panel with presets to be determined by the Acoustical Consultant. It is possible that some manually operated variable acoustic draperies may be employed in locations that are within easy reach of technical staff.

All variable acoustic drapery fabrics will be certified as inherently flame retardant to comply with pertinent building and fire codes. Banners and panels will be developed in close consultation with the Architect and the Acoustical Consultant.

In all cases, variable acoustics draperies shall be integrated within and coordinated with the architectural elements of the room and as outlined in the Acoustical Consultant's report.

Performance Lighting System

The performance lighting system will utilize "high rise time" type dimming, to provide dimming operation appropriate for the acoustical environment of the concert hall. Dimming and control will rely on state of the art network data and computer control and shall be capable of incorporating future advancements over the life of the system.

Front-of-house lighting positions are anticipated to provide 45° front light and special lighting from the rear of the audience chamber to reduce musician's visual issues associated with contrast and glare. A somewhat flatter 30° lighting position will also be provided for "fill" and soft light. Both of these positions will be carefully designed as a critical part of the overhead audience chamber architecture. Over-stage lighting positions may be integrated within the ceiling element above the performance platform.

Approximately 144 branch load circuits/144 dimmers will terminate at dimmer racks in the dimmer room. In addition to the dimmed circuits, DMX controlled relay panels which will be controlled through the performance lighting control system will provide switched power at all lighting positions to accommodate moving lights and other types of non-dimmed fixtures. These relays will also control "work lights" and "running lights" in backstage and technical areas.

Architectural lighting, which is anticipated to be at "levels" sufficient to read programs and musical scores during each performance should also be anticipated as concurrent loads with separate dimming using similar high rise time dimming as is appropriate for the acoustical environment.

The dimmers will be solid-state and digitally controlled from a main console located in the control booth. All control devices will be interconnected on an Ethernet-based control network. Dedicated network input receptacles will be located at key locations throughout the concert hall. The system will support a wireless hand-held focus remote controller, which will provide basic control access for focus or service sessions.

Backstage, a portable console for control of house lights, performance lighting and work/rehearsal lights will also be provided. This location is typically used by the stage manager or orchestra manager in rehearsal situations and during some performances. There will be connection receptacles on stage and in the Control Booth. House lighting can also be controlled at usher stations located at entrances to the audience chamber.

Work lighting using energy efficient sources will be provided in all off-stage and technical areas. This system provides lighting in technical areas during non-performance times. Work lights will be centrally controlled as well as controlled at entry points to any given area. Rehearsal lighting includes non-dimmed semi-permanent theatrical fixtures for use limited to rehearsals and set up functions. A switched system of "running lights" mounted along the perimeter walls of the backstage will enable low floor illumination of back stage circulation areas for performers and crew during performances.

The Ethernet-based network will provide for reliable, fast communications between dimmers and control devices. The Ethernet network will allow headroom for growth and future modifications in systems communications protocols.

The performance lighting fixtures will provide 100 foot candles at music stands, which is a widely-accepted criterion for orchestra lighting. Touring and visiting users will be able to use this system, as it will have sufficient flexibility incorporated into the fixture layout.

LED-sourced architectural down lights in the audience chamber will be seriously considered for cost and return on investment. While LED fixtures are more costly, the difference between relamping annually to once a decade, extended lamp life and energy use should be factored into the decision.

Performance Lighting Fixtures

Lighting for platform events will use portable lighting instruments clamp-mounted on pipe rails of the catwalks and from the overstage ceiling. A full complement of fixtures, with varied wattages and focal lengths suitable to specific functions and respective mounting locations will be provided. All lighting, with the exception of followspots, if necessary, will utilize quartz-halogen type lamps.

5.3.1 Theatrical

Seating Systems

Audience seating shall include self-rising, fully upholstered chairs. All seating accommodations for the disabled will be provided in keeping with applicable guidelines and Virginia codes including seating for patrons in wheelchairs, their companions and transfer arm seating. Materials for backs, seat pans, end standards and armrests will be determined at a later date based on the architect's vision and the acoustician's requirements for materials and construction. It is anticipated that wood elements will be critical with respect to chair backs, armrests and decorative end panels. Aisle lights will be provided to comply with prevailing code, delivering a minimum of 0.2 footcandles, continuous along the aisle/egress path.

Sound, Video and Communications Systems (refer to AV Systems Consultant's Report)

THE RECITAL HALL

General Planning Statement

The Recital Hall is a dedicated "single-room" form music venue and will have a performance platform sized to support a variety of smaller musical groups, from soloists and small ensembles to chamber orchestras. Accommodation for choral groups, horns or percussion is provided using a portable riser system. Similarly, recital screens, specific for use by soloists and small ensembles, is provided to visually and acoustically reduce the performance area. Discussions with the chief stake-holders have suggested that seating may either be fixed or flexible. This determination will be made during the Schematic Design phase.

Although the primary use of the Recital Hall is the presentation of live music events, the hall may also be used for lectures.

The performance systems supporting presentations in the Recital Hall include a flexible performance lighting system as well as an array of variable acoustics draperies along the walls and upper regions of the room.

Theatrical Rigging Systems

The installed rigging systems will be limited to a specific set of "strong points" located at strategic positions above the performance platform. These rigging strong points will allow users to hang lightweight decorative banners and screens as necessary for certain events.

Speaker rigging may be included if it is determined to be necessary by the Audio-Visual Consultant during the Schematic Design phase.

Variable Acoustics

Variable acoustics draperies, as determined and scoped by the Acoustical Consultant, will provide variable absorption within the Recital Hal to alter the reverberation time appropriate for each type of event on stage. Variable acoustic draperies within reach of technicians will be manually cord-operated. Variable acoustic devices in inaccessible areas will be motorized with control from a preset panel located in the back stage area.

All variable acoustic drapery fabrics will be certified as inherently fire retardant to comply with pertinent building and fire codes. In all cases, banners and panels will be developed in close consultation with the Architect and the Acoustical Consultant.

In all cases, variable acoustics draperies shall be integrated within and coordinated with the architectural elements of the room and as outlined in the Acoustical Consultant's report.

Performance Lighting System

The performance lighting system will utilize "high rise time" type dimming, to provide dimming operation appropriate for the acoustical environment of the Recital Hall. Dimming and control will rely on state of the art network data and computer control and shall be capable of incorporating future advancements over the life of the system.

Front-of-house lighting positions are anticipated to provide 45° front light and special lighting from the rear of the audience chamber to reduce musician's visual issues associated with contrast and glare. A somewhat flatter 30° lighting position will also be provided for "fill" and soft light. Both of these positions will be carefully designed as a critical part of the overhead audience chamber architecture. Over-stage lighting positions may be integrated within the architecture and acoustic reflectors above the performance platform.

Approximately 96 branch load circuits/96 dimmers will terminate at dimmer racks in the dimmer room. A dedicated relay panel will also control "work lights" and "running lights" in backstage and technical areas.

Architectural lighting, which is anticipated to be at "levels" sufficient to read programs and musical scores during the performances should also be anticipated as concurrent loads with separate dimming using similar high rise time dimming as is appropriate for the acoustical environment.

The dimmers will be solid-state and digitally controlled from a main console located in the control booth. All control devices will be interconnected on an Ethernet-based control network. Dedicated network input receptacles will be located at key locations throughout the Recital Hall. The system will support a wireless hand-held focus remote controller, which will provide basic control access for focus or service sessions.

Backstage, a portable console for control of house lights, performance lighting and work/rehearsal lights will be provided. It is typically used by a stage manager in rehearsal situations and performances. There will be connection receptacles on stage and in the Control Booth. House lighting can also be controlled at usher stations located at entrances to the audience chamber.

Work lighting using energy efficient sources will be provided in all off-stage and technical areas. This system provides lighting in technical areas during non-performance times. Work lights will be centrally controlled as well as controlled at entry points to any given area. Rehearsal lighting includes non-dimmed semi-permanent theatrical fixtures for use limited to rehearsals and set up functions. A switched system of "running lights" mounted along the perimeter walls of the backstage will enable low floor illumination of back stage circulation areas for performers and crew during performances.

5.3.1 Theatrical

The Ethernet-based network will provide for reliable, fast communications between dimmers and control devices. The Ethernet network will allow headroom for growth and future modifications in systems communications protocols. The performance lighting fixtures will provide 100 foot candles at music stands, which is a widely-accepted criterion for orchestra lighting. LED-sourced architectural down lights in the audience chamber will be seriously considered for cost and return on investment. While LED fixtures are more costly, the difference between relamping annually to once a decade, extended lamp life and energy use should be factored into the decision.

Performance Lighting Fixtures

Lighting for platform events will use portable lighting instruments clamp-mounted on pipe rails of the catwalks and from the ceiling above the stage. A full complement of fixtures, with varied wattages and focal lengths suitable to specific functions and respective mounting locations will be provided.

Riser and Platforming Systems

The range of musician seating layouts for various performance conditions will be served by a riser system. The platforms, sized specifically to meet the acoustical consultant's suggested layouts, may be specified as simple 'leg-up' units consisting of a deck and four insertable tube legs. The platforms will be designed and constructed to meet specific structural and acoustical requirements. Platforms are capable of interlocking side-by-side so as to provide a rigid, stable surface for performers.

Seating Systems

Audience seating shall include self-rising, fully upholstered chairs. All seating accommodations for the disabled will be provided in keeping with applicable guidelines and Virginia codes including seating for patrons in wheelchairs, their companions and transfer arm seating. Materials for backs, seat pans, end standards and armrests will be determined at a later date based on the architect's vision and the acoustician's requirements for materials and construction. Aisle lights will be provided to comply with prevailing code, delivering a minimum of 0.2 footcandles, continuous along the aisle/egress path.

Sound, Video and Communications Systems (refer to AV Systems Consultant's Report)

LARGE REHEARSAL ROOMS

General Planning Statement
Large scale rehearsal rooms will include manually operated variable acoustic draperies at upper and lower wall areas as determined by the Acoustical Consultant. Floors will be resiliently-mounted assemblies with wood finish floor.

End of Theatrical Report by

5.3.2 Audio Visual

Prepared by JaffeHolden

INTRODUCTION

This document will state the Audio-Video (AV) criteria for the proposed new Performing Arts Complex for the College of William and Mary. This report will offer a general overview of AV criteria for the project. Project specific solutions and details will be developed in the coming phases as the design progresses. The following areas will be discussed:
AV Systems - This is a Pre-Design description of our understanding of the AV needs for the pedagogical and performing arts functions of the project. Ongoing meetings with the constituents of the Performing Arts Complex will be required to flesh out the requirements in more detail.

AUDIO-VIDEO SYSTEMS TERMINOLOGY

The following terminology should be referenced to gain clear understanding of design intent and help identify potential needs or deficiencies when moving forward through the design process.

Infrastructure: Refers to electrical pathways and connections that convey AV systems' power and signals to their desired locations. This broad definition includes: electrical conduit, junction and back-boxes, power distribution, wire and cable, as well as finished floor and wall connection plates.

Facility-Wide Distribution: Refers to the ability of being able to route audio and video to and from disparate areas of the facility to allow for one-to-many applications.

Program Audio: Refers to the presentation of audio material at low to moderate volumes. Typically associated with playback of music material or audio from a video presentation.

Vocal Lift: Refers to the slight amplification of a speaker's voice to promote intelligibility amongst listeners. Typically associated with a lecturer speaking to a small to medium sized assembly.

Production Audio: Refers to the presentation of audio material at moderate to loud volumes. Typically associated with popular music concerts or presentations for large assemblies.

Background Music / Paging Audio: Refers to the ability to produce background music and issue intelligible voice announcements above background noise levels. Typically synonymous with the general term public address. These functions are usually accomplished by using a distributed speaker system.

Surround Sound: Refers to the infrastructure and equipment that is required to support playback of multi-channel audio typically found on commercial video formats, specialized audio formats and live theatrical playback.

Assistive Listening: Refers to the amplification of audio using specialized equipment for the personal benefit of individuals that may have hearing difficulties. This equipment is sometimes required by national code.

5.3.2 Audio Visual

Archival Audio: Refers to a basic mono or stereo recording of an event for the purpose of later reference. Typically associated with the recording of a lecture or rehearsal for internal review. This should not be considered a means by which publicly-available material should be made.

Multi-media System: Refers to the control system that facilitates the presentation of a variety of audio and video sources in a cohesive manner. Typically associated with events such as when a lecturer may implement a PowerPoint presentation from a computer in conjunction with video playback from a DVD player.

Video Projection: Refers to the presentation of images onto a reflective surface through the use of light and optical lens system. Typically associated with the reproduction of a computer's display, movie or video camera onto a screen.

Video Display: Refers to the presentation of images through an electronic device such as a television or computer monitor. Typically associated with viewing television programming or digital signage applications.

Collaborative Display System: Refers to an AV display system with the ability to input local source material for playback appropriate for a larger group. A typical example is an audio and projection system with a wall AV input for laptops.

Room Capture: Refers to the audio and visual recording of a lecture or presentation for the purpose of archival storage, multi-media playback, distance learning or distribution. Typically associated with online playback of lectures for student use.

Production Video: Refers to the ability to create and distribute video content typically associated with performing arts or demonstration events.

Portable Equipment: Refers to any AV equipment that may be freely located depending on the needs of a particular assembly.

Production Communications: Refers to wired and wireless two-way communications between technical staff, performers and support staff in performance settings.

AUDIO-VIDEO SYSTEMS OVERVIEW

This section of the report outlines typical systematic approaches that will be employed when designing for the project to assure compliance with pre-existing campus standards and outline typical approaches towards designing appropriate solutions to meet present and future needs. Characteristic design criteria for AV systems are described for each space below:

RECITAL HALL

1. Usage
   The Recital Hall will be a 125 seat teaching and performance venue with associated support spaces and will have a wide array of programmatic capabilities.

2. Audio-Video Capabilities
    A. Infrastructure
    B. Facility-Wide Distribution
    C. Program Audio
    D. Vocal Lift
    E. Production Audio
    F. Background Music / Paging Audio
    G. Surround Sound
    H. Assistive Listening
    I. Archival Audio
    J. Multi-media System
    K. Video Projection:
    L. Video Display
    M. Collaborative Display System
    N. Room Capture
    O. Production Video
    P. Portable Equipment
    Q. Production Communications

REHEARSAL ROOMS: INSTRUMENTAL REHEARSAL

1. Usage
   The Instrumental Rehearsal room will be large enough to house an orchestral rehearsal and have Audio and Video equipment to support the pedagogical requirements of that purpose.
2. Audio-Video Capabilities
    A. Infrastructure
    B. Facility-Wide Distribution
    C. Program Audio
    D. Vocal Lift
    E. Assistive Listening
    F. Archival Audio
    G. Multi-media System
    H. Video Projection
    I. Collaborative Display System
    J. Room Capture
    K. Portable Equipment

5.3.2 Audio Visual

REHEARSAL ROOMS: CHORAL ROOM / LECTURE HALL

1. Usage
   The Choral Rehearsal Room / Lecture Hall will be large enough to house the choral rehearsal and lectures, and will have Audio and Video equipment to support the pedagogical requirements of that purpose.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Program Audio
   D. Vocal Lift
   E. Surround Sound
   F. Assistive Listening
   G. Archival Audio
   H. Multi-media System
   I. Video Projection
   J. Collaborative Display System
   K. Room Capture
   L. Portable Equipment

PRACTICE ROOMS: SMALL

1. Usage
   The Small Practice Rooms will be capable hosting portable equipment on an as-needed basis and have the ability to send and receive digital signals from the facility-wide AV network.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Portable Equipment

PRACTICE ROOMS: MEDIUM

1. Usage
   The Medium Practice Rooms will be capable hosting portable equipment on an as-needed basis and have the ability to send and receive digital signals from the facility-wide AV network.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Portable Equipment

PRACTICE ROOMS: LARGE

1. Usage
   The Large Practice Room will be capable hosting portable equipment on an as-needed basis and have the ability to send and receive digital signals from the facility-wide AV network.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. iPortable Equipment

CLASSROOMS: SEMINAR

1. Usage
   The Seminar Room will have the ability to host a broad range of pedagogical activities.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Program Audio
   D. Vocal Lift
   E. Surround Sound
   F. Assistive Listening
   G. Archival Audio
   H. Multi-media System
   I. Video Projection
   J. Collaborative Display System
   K. Room Capture
   L. Portable Equipment

CLASSROOMS: 2 @ 35 PERSON

1. Usage
   The 35-person classrooms will mirror the abilities of the seminar rooms.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Program Audio
   D. Vocal Lift
   E. Surround Sound
   F. Assistive Listening

5.3.2 Audio Visual

G. Archival Audio
H. Multi-media System
I. Video Projection
J. Collaborative Display System
K. Room Capture
L. Portable Equipment

CLASSROOMS: Keyboard Theory

1. Usage
   The Keyboard Theory classrooms will also mirror the abilities of the seminar rooms.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Program Audio
   D. Vocal Lift
   E. Assistive Listening
   F. Archival Audio
   G. Multi-media System
   H. Video Projection
   I. Collaborative Display System
   J. Room Capture
   K. Portable Equipment

MUSIC RESOURCE CENTER

1. Usage
   The Music Resource Center will house a variety of AV technology similar to the classrooms. It will also serve as a centralized location for the storage and check-out of portable equipment by students and staff.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Program Audio
   D. Vocal Lift
   E. Background Music / Paging Audio
   F. Surround Sound
   G. Assistive Listening
   H. Archival Audio
   I. Multi-media System

J. Video Projection
K. Video Display
L. Collaborative Display System
M. Room Capture
N. Production Video
O. Portable Equipment

MUSIC DEPARTMENT ADMINISTRATION / TEACHING STUDIOS

1. Usage
   The Music Department Administration and Teaching Studios will have basic infrastructure and the ability to house portable equipment as the need arises.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Portable Equipment

CONCERT HALL

1. Usage
   The Concert Hall will be a 450 seat teaching and performance venue with associated support spaces and will have a wide array of programmatic capabilities.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Program Audio
   D. Vocal Lift
   E. Production Audio
   F. Background Music / Paging Audio
   G. Surround Sound
   H. Assistive Listening
   I. Archival Audio
   J. Multi-media System
   K. Video Projection:
   L. Video Display
   M. Collaborative Display System
   N. Room Capture
   O. Production Video
   P. Portable Equipment
   Q. Production Communications

5.3.2 Audio Visual

STAGE SUPPORT

1. Usage
   The Stage Support areas will house the technical systems and offices of the Concert Hall.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Facility-Wide Distribution
   C. Program Audio
   D. Background Music / Paging Audio
   E. Production Video
   F. Portable Equipment
   G. Production Communications

PERFORMER SUPPORT

1. Usage
   The Performer Support areas will provide dressing rooms, lounging areas, storage and restrooms for the Concert Hall performers.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Background Music / Paging Audio
   C. Production Video
   D. Production Communications

AUDIENCE SUPPORT

1. Usage
   The Audience Support areas will provide ticketing, lobby space and restrooms for attendees of performances as well as serve as the public entrance to the Concert Hall.
2. Audio-Video Capabilities
   A. Infrastructure
   B. Background Music / Paging Audio
   C. Production Video

ADDITIONAL SYSTEMS

1. Digital Signage
   The above systems description and cost estimates do not include digital signage content creation, distribution and playback. Collaborative wall-mounted flat panel displays can however be used to display digital signage content when not in collaborative use.

2. Performance Lighting
   The above systems description and cost estimates do not include performance lighting. Performance lighting will not be part of the AV systems design and will need to be designed and installed separately. AV control systems can be programmed to perform basic triggering of lighting scene presets.

AUDIO-VIDEO SYSTEMS STRUCTURAL & THEATRICAL REQUIREMENTS

Structural and Theatrical Requirements will be developed based upon the University's needs. However, the following items can be assumed:

1. Wall-mounted loudspeakers will need wall blocking installed to facilitate secure mounting. Wall-mounted loudspeakers will each weigh 100 pounds or less.
2. For permanently mounted items, all rigging from the point of connection down will be by the AV subcontractor, who will provide shop drawings for the rigging.

AUDIO-VIDEO SYSTEMS ELECTRICAL REQUIREMENTS

1. Audio-Video technical power ("AVTP") systems may be required for some AV systems. These are separate isolated ground power systems to be designed by the electrical engineer, based on criteria supplied by Jaffe-Holden. They require:
   A. Feed from a dedicated K-13 rated isolation transformer with copper windings and an electrostatic shield. This transformer feeds the AVTP system exclusively and may not be used for other devices.
   B. Estimated total loads will be developed in the ongoing design process.
   C. Isolated ground 20A circuits for all AV device locations, as identified by JaffeHolden.
      - Only those outlets and loads identified as AVTP may be connected to the AVTP panel(s).
      - Specific load sequencing of the AVTP outlets is required. JaffeHolden will provide the panel layouts for all AVTP circuits for use by the electrical designer.
      - Each AVTP branch circuit requires an insulated ground conductor home run to the load center panel.
      - A company switch may be required and shall be supplied and installed by the electrical contractor.
      - A sequencing panelboard may be required and shall be supplied by the AV contractor and installed by the electrical contractor.
2. Empty conduit and raceway systems connecting all AV equipment terminations are required, to be provided by the electrical contractor.
   A. The electrical contractor will be required to provide a final riser diagram for approval by the electrical engineer and JaffeHolden. The final riser diagram must be created in consultation with the AV contractor, but is the responsibility of the electrical contractor.
   B. Note that the wire and wire-pull labor for low voltage AV cables are part of the AV system scope, not the electrical scope. Only the conduit and raceways are part of the electrical scope.

5.3.2 Audio Visual

WORK SCOPE SUMMARY TABLE

ITEMS TO BE PROVIDED AND INSTALLED	Electrical Contractor		Systems Contractor	
	Provide	Install	Provide	Install
Main Power Service Panel Boards and Circuit Breakers	x	x		
Main Power Service Conduit and Conductors	x	x		
Main Power Service Terminations		x		
Audio & Video Technical Power (AVTP) Transformers	x	x		
Transformer Conduit and Conductors	x	x		
Transformer Terminations		x		
AVTP Isolated Ground Conduit and Conductors	x	x		
Isolated Ground Terminations		x◊		
AVTP Distribution Panelboards and Circuit Breakers	x	x		
Distribution Panelboard Conduit and Conductors	x	x		
Distribution Panelboard Terminations		x		
AVTP Standard Load Centers and Circuit Breakers	x	x		
Standard Load Center Conduit and Conductors	x	x		
Standard Load Center Terminations		x		
AVTP Custom Sequencing Panelboards and Circuit Breakers		x	x	
Custom Sequencing Panelboard Conduit and Conductors	x	x		
Custom Sequencing Panelboard Terminations		x◊		
AVTP Company Switches for Portable Equipment	x	x		
Company Switch Conduit and Conductors	x	x		
Company Switch Terminations		x		
AVTP Outlet Devices for Branch Circuits delivered to Systems Equipment Racks and Devices			x	x
Equipment Rack Back Boxes and Wall Plates			x	x
Outlet Device Back Boxes		x	x	
Outlet Device Wall Plates			x	x
Branch Circuit Conduit and Conductors	x	x		
Branch Circuit Termination				x

WORK SCOPE SUMMARY TABLE (continued)

ITEMS TO BE PROVIDED AND INSTALLED	Electrical Contractor		Systems Contractor	
	Provide	Install	Provide	Install
Systems Equipment Racks and Devices			x	x
Metallic Conduit between Systems Devices and Systems Equipment Racks	x	x◊		
Conduit Insulation Bushings between Metallic Conduit and Systems Equipment Racks	x	x◊		
Systems Equipment Rack Cabling			x	x
Systems Equipment Rack Terminations				x
Systems Device Back Boxes and Floor Boxes		x◊	x	
Systems Device Metallic Conduit	x	x◊		
Systems Device Cabling			x	x
Systems Device Termination				x
Empty Conduit (for temporary use)	x	x		
Systems Cable Trays	x	x		
Systems Cable Sleeves	x	x		
Systems Pull Boxes	x	x		
Conduit Riser Diagram	x			

◊ Installation criteria to be provided by Systems Contractor

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5.3.3 Structural

Design Criteria

Building Codes and Standards

Design criteria for the structural analysis and design will be based on the following Codes and Standards:

- 2009 Virginia Building Code (2009 IBC plus amendments)
- The College of William and Mary - Facilities Management Technical Standards – March 2007
- ACI-318-03 Building Code Requirements for Reinforced Concrete
- AISC Manual of Steel Construction – 13th Edition
- Steel Joist Institute – Standard Specifications for K, LH and DLH Joists

Building Category

- The Building Occupancy Category is III – occupant load greater than 500 for colleges.

Design Floor Live Loads

- Lobbies, corridors, stairs, public assembly, movable seating areas – 100 psf
- Office, classrooms – 80 psf plus 15 psf partition allowance
- Fixed seating areas – 60 psf
- Stages – 150 psf uniform or 250 lb concentrated load on 4 square inches
- Light storage, shops, file rooms, mechanical and electrical rooms – 125 psf or actual equipment loads where greater
- Catwalks – 40 psf
- Followspot, projection and control rooms – 50 psf
- Performance rigging and gallery loads determined based on theater and acoustic consultant recommendations.

Snow Loads

- Ground Snow Load = 20 psf
- Snow Exposure Factor = 1.0
- Snow Thermal Factor = 1.0
- Flat Roof Snow Load = 22 psf

Wind Design Data

1. Basic wind speed (3 second gust) = 100 MPH
2. Wind Importance Factor: 1.15
3. Wind Exposure Category: B
4. Internal Pressure Coefficient: 0.18
5. Mean Roof Height: 70 feet

Earthquake Design Data

The project is located: Latitude: 37.26827 Longitude: -76.71522

The following design parameters are identified:

1. Seismic Importance Factor: I=1.15; Occupancy Category III
2. Mapped Spectral Response Accelerations from the Campus Standards: Ss=0.170; S1=0.060
3. Site Class: The site class has not yet been determined.
4. Spectral Response Coefficients: If site class is D, SDS=0.181; SD1=0.096. If site class is E, SDS=0.283; SD1=0.140.
5. Seismic Design Category: If site class is D, SDC=B. If site class is E, SDC=C.
6. Basic seismic-force-resisting system: Will be determined based on framing system selection.
7. Design Base Shear: Will be determined based on framing system selection.
8. Seismic Response Coefficient: Cs= Will be determined based on framing system selection.
9. Response Modification Factor: R= Will be determined based on framing system selection.

5.3.3 Structural

Vibration Criteria

Audience seating support structures will be designed to control vibration due to rhythmic excitation due to active audience participation based on the following criteria contained in AISC Design Guide 11:

Vibration Design Factors: k = 1.7, ao/g = 5.0 %
First Harmonic: f = 3 Hz, Wp = 31 psf, alpha = 25.0 %
Second Harmonic: f = 5 Hz, Wp = 31 psf, alpha = 5.0 %

Materials

- Cast-in-place concrete
  - F'c=3000 psi at 28 days for footings
  - F'c=4000 psi at 28 days for all other concrete
- Concrete masonry units – ASTM C90 type "N-1"
- Masonry grout – F'c=3000 psi at 28 days
- Structural Masonry – F'm 1500 psi using Type S mortar
- Reinforcing bars – ASTM A615 (grade 60)
- Reinforcing bars to be welded or used as part of lateral systems – ASTM A706 (grade 60)
- Structural Steel
  - W shapes and Tees cut from W shapes – ASTM A992 Grade 50
  - Plates – ASTM A36 (Fy=36 ksi)
  - Hollow structural sections (HSS) – ASTM A500 Grade B (Fy=46 ksi)
  - Pipes – ASTM A53, Types E or S, Grade B or ASTM A501
  - Bolts – ASTM A325 and A490
  - Anchor Rods – ASTM F1554

GENERAL DESCRIPTION

The project will be developed in three phases:

- Music building on a new site to the east of the existing Phi Beta Kappa Building. As the first phase, this narrative describes the music building structure in more detail than the others.
- Theater addition to the Phi Beta Kappa Building, selective demolition of existing portions of the building, and renovation and repair of existing structure to remain.
- Art and Art History renovation of Andrews hall and new construction for a portion of the Art program in a building located south and west of the art museum.

MUSIC BUILDING DESCRIPTION

Foundation Systems

A geotechnical investigation and report has not yet been completed for this building on this site. Reports of investigations on a nearby site for the Science Buildings show relatively low bearing capacity. Ground water at nearby sites was observed at 14 to 23 feet below grade. The seismic site class was identified as D.

Native soil on the site would support only 2000 psf bearing capacity. Foundations for this nearby project consisted of spread footings with bearing capacities of 5000 psf on soil modified by rammed aggregate piers. It is likely that the Music Building will also require soil modification.
A geotechnical engineering investigation should be completed during schematic design phase to determine appropriate foundation systems for the project. If soil correction or other methods can be used to increase allowable bearing capacity, spread footings will be used. An option for pile-supported foundations will be considered and priced during Schematic Design phase to be compared with spread footings on corrected soil.

Structural Framing Systems

The Music Building consists of a tall Concert Hall wrapped by a lower roof building. The portions of building around the Concert Hall consists of a series of double volume single story boxes each wrapped with low roof spaces containing practice rooms and offices.

Concert Hall
The Concert Hall has requirements for amplified, large group and small group concerts. Acoustics will play a significant part in the selection of structural systems for this building. Mass is required between acoustically sensitive program spaces and to isolate the Concert Hall from exterior noise. The Performance Hall volume is dictated by acoustics. Wall and roof materials are required to be massive to limit sound transmission between spaces in the building and to keep outside noise from quiet spaces within the building.

Acoustic recommendations indicate that a plaster ceiling or 6" thick normal weight concrete roof slab is required. For Predesign Phase, assume a 4 ½" normal weight concrete slab supported on 1 1/2" – 18 gauge composite deck (total 6" thickness). The roof slab on metal deck spans between custom designed 60 inch deep LH and DLH open-web steel joists spaced at 5 feet on center spanning approximately 75 feet between side walls.

The 50 foot high side walls will also need mass to limit sound transmission. The acoustic consultant recommends the equivalent mass of a 12" thick solid grouted CMU wall. A variety of structural materials and finish materials can be combined to achieve this required acoustics.

Structurally, a wall spanning vertically can be constructed as a solid structure or ribbed structure. The solid structure will be thinner over all but use more material. The ribbed structure will be deeper but more efficient. Three options will be considered in Schematic Design: 16" solid load-bearing concrete wall; steel columns spaced at 20 feet on center with grout-filled CMU in-fill walls; or precast concrete wall panels spanning vertically between foundation and roof. Advantages of the reinforced concrete and precast walls include the space savings due to the fact that the structure will be thinner than a steel framed wall with equivalent strength. Disadvantages include the significant formwork system cost for reinforced concrete walls, slower erection time, and heavier total weight. Disadvantages of the steel framed walls include the difficulty of integrating the CMU and steel columns in a way that assures acoustic performance and maintains constructability. The suitability of precast will also depend on the local supplier and installer market.

The roof trusses will be designed to support suspended acoustic clouds or ceilings, curtains, catwalks, technical gallery/shelf, speakers and rigging points as required by the programs of each space.

The balcony structure will be either reinforced concrete or structural steel supporting concrete slab on metal deck. The choice of steel or concrete will be driven by the wall type. If steel columns are used for the wall construction, the balconies will also be steel framed. In either case, the balcony structure needs to be stiff enough to accommodate active audience participation without discomfort.

Recital Hall
The Recital Hall roof structure is similar to the Concert Hall, but with shorter truss spans and fewer hung loadings. Roof joists will be 36 inch LH at 5'-0" o.c. spanning approximately 42 feet.

The 35 foot high side walls can be built with 12" solid load-bearing concrete walls, steel columns spaced at 20 feet on center with horizontally spanning CMU in-fill walls, or 12" solid precast wall panels.

Large Instrument Rehearsal, Choral Rehearsal, Percussion Rehearsal
The roof construction of these spaces also needs 6" of normal weight concrete.

The 25 to 35 foot high side walls for these spaces can be built with 10" or 12" solid concrete walls, 12" load-bearing masonry walls, precast wall panels, or steel columns spaced at 20 feet on center with grout-filled CMU.

5.3.3 Structural

Second Floor Framing

Floor framing options include structural steel framing with composite concrete slabs on steel deck or reinforced concrete pan and joist framing. Structural steel could be used with either reinforced concrete walls or the steel framed wall options. The reinforced concrete framing option would only be appropriate with the concrete wall option. The reinforced concrete system will be shallower than structural steel but will require more time for erection and will weigh more. The limited area of second floor framing and large area of roof also points to structural steel as the more appropriate structural system. Column spacing of up to 30′ x 40′ are economical in steel. Column spacing of 30′ x 30′ are economical in concrete.

Low Roof Framing

For structural steel framing options, the low roofs would be framed with open-web steel joists supporting 1 ½″ - 20 gauge steel roof deck. Structural steel girders will frame to square-tube columns. The reinforced concrete option would be concrete pan and joist framing.

Acoustic Isolation

The acoustic consultant recommends that structural isolation joints be used to limit sound transfer between acoustically sensitive rooms. Two options were provided: Option 1 divides the building into five zones with isolation joints creating five separate buildings, each with its own lateral and gravity system. Option 2 isolates the four individual rooms that require higher degrees of sound isolation (Recital Hall, Choral Rehearsal, Instrument Rehearsal, and Concert Hall). The surrounding building remains intact and each sensitive room becomes an isolated building.

In either option, the joints run from the top of shared footings up through the roof. Option 1 would allow the isolation joints to also be used as expansion joints. But, because the overall building size, expansion joints are not required. Option 2 would minimize the length of joints and optimize their placement. Because the sensitive rooms already have full-height walls of concrete, masonry or steel braced frames, these boxes are already self-supporting. The surrounding building will then need to be laterally and vertically supported independently. This could be accomplished with double concrete walls or double columns of steel.

A third option will also be explored that may not require complete isolation. By selectively connecting discrete beam elements and only isolating concrete slabs, the walls of the tall boxes can be braced by low roofs or floors and made significantly less costly with only minimal impact to acoustics.

All options will be studied in-depth in Schematic Design.

Lateral Systems

For the structural steel option, steel concentric braced frames located within architectural partitions will be used for the lateral system. Each rehearsal or performance hall that is taller than the surrounding low roof will need wall bracing on at least three sides (and preferably four sides) of each box. Ideally, low roof diaphragms can tie into the larger boxes' braced frames for stability. Since acoustic isolation joints are required around each tall box, each isolated building will need its own lateral force resisting elements. Reinforced concrete shear walls or shear walls of CMU or precast concrete are options for the steel frames.

The reinforced concrete framing option would use a lateral force resisting system of shear walls for tall boxes and ordinary concrete moment frames for infill buildings. Diaphragms of steel roof deck, composite slab on deck, or concrete slabs will deliver wind and seismic loads to lateral force resisting members.

PHI BETA KAPPA HALL STRUCTURE DESCRIPTION

Existing Building Background

The existing PBK building consists of a central theater with a balcony, two story lobby, stage with orchestra pit, and a fly loft with full grid-iron. Flanking the theater are one and two story wings containing support spaces. Behind the stage exists a mechanical room and studio theater. A small portion of the building has a basement level, mostly below and adjacent to the stage.

Foundation Systems

The existing building drawings show spread footings supporting columns and strip footings supporting bearing walls. Reinforced concrete is used for bearing walls up to grade level.

Structural Framing Systems

The one and two story wings are typically shown as masonry bearing wall structures supporting reinforced concrete or steel framed floor and roof structure. The roof of the stage, studio theater, and main theater are supported by steel columns with in-filled masonry bearing walls.

Theater Auditorium

Seven foot deep roof trusses span from steel columns in the side walls to create the roof over the theater auditorium. Roof purlins and steel roof deck span between trusses spaced at 15'-3" on center. Three rows of crossing catwalks are hung from the roof framing. The catwalks are framed in steel angles and channels with wood plank floor deck.

A lower projection room roof to the rear of the auditorium consists of a 3 ½" thick concrete slab and steel beams spanning to load bearing masonry walls. The projection room floor is a 4 ½" thick concrete slab with concrete beams hung from the roof framing.
At each side of the auditorium, a mechanical mezzanine structure consists of 4" thick concrete slabs spanning to steel beams with a roof of steel deck and open-web steel joists.

The balcony consists of 2 ½" thick concrete seating slabs spanning to 4" wide riser beams that span between cantilever concrete raker beams. The 21 foot cantilever span is balanced by the back span of the cantilever beams which extend back to the exterior wall of the lobby and support the 2nd floor lobby floor. The beams are supported by concrete columns positioned within the back wall of the main floor of the auditorium. The lobby structure is supported by load bearing masonry exterior walls.
Several cracks were observed on the interior face of the exterior masonry wall at the projection room floor bearing locations. These did not appear to be caused by foundation settlement, but rather by movement of the hung projection room with respect to the ground-supported 2nd floor lobby. Since the lobby, balcony and projection room will be demolished as part of the renovation, no repair will be required.

Theater Stage

The 68 foot tall stage house is constructed using 12 steel columns spaced around the perimeter supporting steel beams and roof deck. A grid iron level is hung below the roof. The grid iron level is framed with a walking surface consisting of 3" steel channels laid flat and spaced at 6" on center. A pair of deeper channels at each grid line form a grid well, allowing rigging which is hung from roof beams to pass through the grid iron down to the stage below. Loading and operating galleries at the side stage provide access to the rigging counterweights. These levels are served by a spiral stair.

The exterior brick with CMU backup is laterally supported by the steel frame structure. Recent repairs have included additional backup steel structure and saw-cut control joints in the brick.

The stage floor is concrete slab on grade with a portion filled with removable framing to a trap room below. A pit for the orchestra lift and interconnecting tunnels are formed with concrete.

Scene Shop

The scene shop wing consists of a main level reinforced concrete beam and slab structure over a basement space. Openings exist for a painting well and hatch to the lower level. The roof structure is framed with 21 inch deep beams spanning side wall to side wall and supporting acoustic steel roof deck. A mezzanine for material storage is placed at one side of the room, rigging for the paint well at the other, and a monorail crane support is positioned over the lower level hatch. An outdoor cooling tower well is nested below the roof line. The cooling tower has been removed.

Several masonry cracks were observed in this room. Vertical cracks in the north wall near the west corner appear to be due to corner restraint of lateral expansion and contraction of masonry. These types of cracks are common at corner conditions of masonry buildings. This corner also includes the effect of the tall masonry parapet which screens the cooling tower. The cracks do not appear to be related to foundation settlement and can be repaired during the expansion.

5.3.3 Structural

Vertical cracks were observed in the interior CMU bearing wall adjacent to concrete beam bearings. The cracks do not appear to be related to foundation settlement and can be repaired during the expansion.

Other Issues Observed

Roof and landscape drainage issues were observed that will have structural implications and will need to be corrected as part of the renovation. The roof of the studio theater adjacent to the Andrews Hall addition appears to have no overflow drains or roof scuppers. The original scuppers may have been removed when Andrews was constructed.

The landscaping drainage of the northeast courtyard between Andrews and PBK will need to be addressed. Roof drainage has been directed into an areaway and into the basement of Andrews. Drainage within the courtyard appears inadequate and will need to be corrected in Phase 2.

Lateral Systems

Masonry shear walls provide lateral resistance to wind and seismic loading. Systems remaining after the demolition will need to meet the International Existing Building Code requirements for additions to existing buildings for masonry shear walls. Recently repaired walls of the stage were likely designed to current codes and may not need additional retrofit.

Proposed Alterations

The exterior shell of the Auditorium, Stage House, Scene Shop and northwest wing will remain. The balcony, lobby an all other wings will be removed. A new and smaller Auditorium will be built within the existing shell and a new two level addition will wrap the west, south and east. Structural system options for the addition will be developed in Schematic Design phase, but will likely be a structural steel frame with concrete composite deck floors.

ANDREWS HALL STRUCTURE DESCRIPTION

Existing Building Background

The existing Andrews Hall is a two story building with a partial basement and is connected to the PBK building to the south. The building is steel framed with masonry perimeter walls and integral steel columns.

Foundation Systems

The existing building drawings show spread footings supporting columns and strip footings supporting bearing walls. Reinforced concrete is used for bearing walls up to grade level. The drawings indicate 4000 psf bearing capacity.

Structural Framing Systems

The roof structure consists of 1 ½" deep steel deck spanning to steel joists bearing on steel beams spanning to steel columns. The second floor consists of 2 ½" concrete slabs spanning to steel joists bearing on steel beams spanning to steel columns. The ground floor is a 4 inch slab on grade with stepped seating slabs for a large classroom. Reinforced concrete slabs and beams span over a 21 foot wide basement utility tunnel which extends over the entire width of the building. The concrete basement walls of the tunnel straddle the location of two existing 8 inch diameter high pressure hot water mains. The walls bridge over the pipes and are supported by spread footings each side of the pipe.

Lateral Systems

Masonry shear walls provide lateral resistance to wind and seismic loading. Lateral system upgrades may be required if the alteration is of sufficient magnitude to require it. The International Existing Building Code allows existing buildings with base shear that does not increase by more than 5% to not need lateral upgrades to the current code. Based on our current understanding of the magnitudes of the renovation, no lateral system upgrade should be necessary.

5.3.4 Mechanical

Codes, Standards and Guidelines

New systems and renovations should be planned and designed to meet the following minimum criteria

- Current Building, Mechanical, Plumbing, Fire and Energy Code with State and Local amendments
- ASHRAE 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings with Minnesota amendments
- 1996 ANSI A117.1/ADAAG.
- ASHRAE Standard 55-2010 Thermal Environmental Conditions for Human Occupancy
- ASHRAE Standard 62.1-2010 Ventilation for Acceptable Indoor Air Quality.
- NFPA Standards 13, 14, 20, and 25.
- William & Mary Campus Design Guidelines
- William & Mary Facilities Management Technical Standards 2007

HVAC System Design Criteria

- Outdoor Summer Conditions should meet current 0.4% ASHRAE dry bulb with mean coincident wet bulb data.
- Winter Outside Design Conditions should meet current 99.6% ASHRAE dry bulb with mean coincident wet bulb data.
- Indoor design conditions for general spaces should meet design requirements outlined in the William & Mary Facilities Management Technical Standards 2007. Spaces unique to the project are outlined below:
  - Theater, Performing Arts and Spaces Containing Professional Music Instruments:
    - Cooling: 72-75 degrees F and 40-55 percent RH.
    - Heating: 70 degrees F.
  - 2D, 3D and Art Classrooms:
    - Cooling: 72-75 degrees F and maximum 55 percent RH.
    - Heating: 70 degrees F.
- HVAC Noise Control: In addition to design requirements outlined in the William & Mary Facilities Management Technical Standards 2007, refer to Acoustics section for recommendations and guidelines associated with mechanical equipment.
- Spaces requiring 24/7 conditioning, routine weekend or holiday ventilation cooling and/or heating requirements, or spaces of such a critical nature as to necessitate redundant cooling and/or heating previsions will be provided with appropriate year-round cooling systems and/or heating systems. Rooms containing heating emitting electrical devices shall use ambient air for cooling whenever possible.

Energy Efficiency and Sustainable Design Targets

New systems and renovations should be planned and designed to meet the following minimum criteria

- Energy use in the building will target to improve on MN Energy Code requirements by 25%.
- Systems should be designed to aid in the achievement LEED Silver certification under current LEED version.
- Energy management and mechanical systems should be commissioned
- New plumbing fixtures should be design to minimize water usage by at least 30% less than baseline plumbing water requirements outlined in the 1992 Energy Policy Act.
- No CFC-based refrigerants should be used in the project. Any refrigerants used shall be selected to minimize both the ozone depletion potential and global warming potential of the refrigerant.
- Carbon dioxide sensors for demand controlled ventilation should be implemented for all high occupant density spaces. (Classrooms, conference rooms, lecture halls, auditoriums, concert halls)
- Energy metering should be provided on all connections to central utilities: chilled water, hot water, natural gas, domestic water systems for optimization and verification.

5.3.4 Mechanical

Existing Building Conditions

PBK

General: The existing mechanical equipment is past their expected service life but appear to be operating acceptably. Pneumatic control systems are out-of-date when compared to modern digital control systems and limit the ability for system control and energy management.

Air Handling Systems: Air handling units are distributed throughout the upper floors of the building and serve the majority of the building. While air handling units are operational, they are original to the building, and should be replaced. In addition, he systems do not appear to meet modern codes and standards regarding ventilation and indoor air quality. There is limited general exhaust and process exhaust in place to address odor, pollutant and theater exhaust processes.

Cooling Systems: Cooling for the building is provided by the campus chilled water cooling loop in the utility crawl-space under the connection between Andrews and PBK. The cooling piping appears to be in reasonable condition does not appear to be replaced. Chilled water is distributed through the building to coils in the air handling units and miscellaneous cooling units.

Heating Systems: Heating for the building is provided by the campus high temperature hot water heating loop in the utility crawl-space under the connection between Andrews and PBK. The heating piping is original to the building and due to its age, has the potential for failure associated with age. It is recommended that the piping be replaced when the building is renovated. Hot water is distributed through the building to radiators and coils in the air handling units.

Plumbing Systems: Plumbing fixtures and equipment are original to the building and appear to be functional. Fire Protection: Fire protection systems are installed and appear to be functional.

Recommendation: It is recommended that all mechanical systems be replaced when the building is renovated, as all systems will be impacted by renovation and mechanical renovation costs will be the lowest during renovation rather than higher costs associated with replacing systems when failures occur.

ANDREWS

General: Recent building renovations updated mechanical systems and equipment to meet modern space conditioning and ventilation. Digital control systems, air handling, cooling, and heating systems are up-to-date.

Air Handling Systems: Air handling units are distributed throughout the building and serve space conditioning and ventilation needs. Exhaust systems appear satisfactory to meet space needs.

Cooling Systems: Cooling for the building is provided by the campus chilled water cooling loop in the utility crawl-space under the connection between Andrews and PBK. The cooling piping appears to be in reasonable condition does not appear to be replaced. Chilled water is distributed through the building to coils in the air handling units and miscellaneous cooling units.

Heating Systems: Heating for the building is provided by the campus high temperature hot water heating loop in the utility crawl-space under the connection between Andrews and PBK. The heating piping is original to the building and due to its age, has the potential for failure associated with age. It is recommended that the piping be replaced when the building is renovated. Hot water is distributed through the building to radiation and coils in the air handling units.

Plumbing Systems: Plumbing fixtures and equipment have been recently replaced and appear to be functional. Fire Protection: Fire protection systems are installed and appear to be functional.

Recommendation: Mechanical systems are up-to-date and are suitable for use for classroom needs.

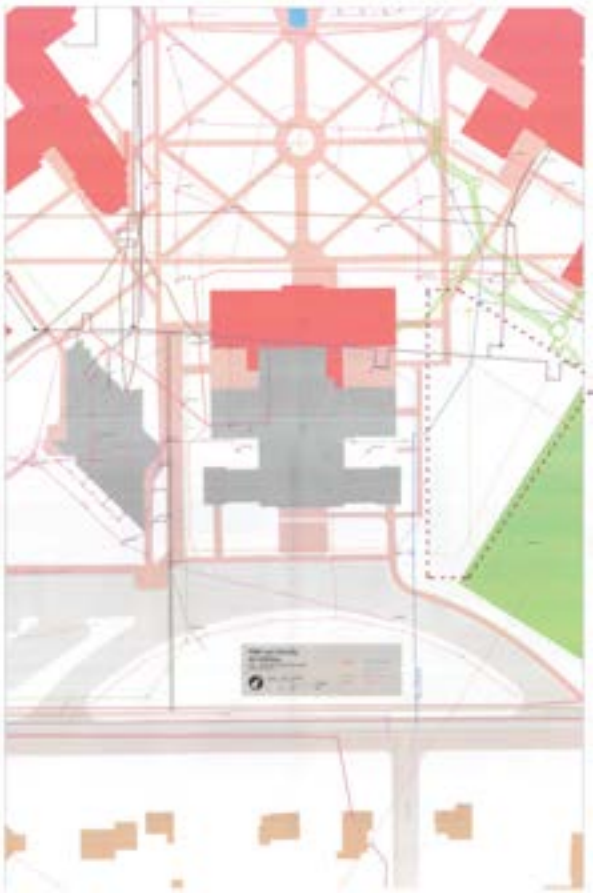
CERAMIC STUDIO

General: The existing Ceramics Studio is located in a converted industrial building. There are minimal existing mechanical systems to serve Arts space conditioning and industrial ventilation needs. News systems are required to bring space up to current codes and standards for arts classrooms spaces. Outdoor kiln spaces are well situated for industrial process.

Recommendation: It is recommended that new mechanical systems be designed and installed to serve space conditioning and Arts processes. Based on the state of the current building, a new building would be the most cost-effective means for serving new mechanical requirements.

Existing Site Utilities

Existing utilities in the Arts Quarter will create challenges for planning, phasing and first costs. Full survey and field verification of the project is recommended to minimize costs and potential redesign risks.



Chilled Water: Existing campus chilled water loop routes through the planned Arts Quarter. 12" Chilled water piping is routed under and through an accessible crawlspace under Andrews that allows for reasonably good access to piping for any renovation or new connections required. Existing 14" chilled water piping and vault connecting the Integrated Science Center buildings to campus loop are located on the north portion of the site area identified for phase 1 Music. The nature of the ISC buildings require that chilled water service not be interrupted and there are no other cost effective means for interrupting service. Therefore Phase 1 Music must be sited where it does not interrupt chilled water service. New Arts building located near Morton Hall must be located so as to not interrupt chilled water piping that serves chlled water loop from planned new chilled water central plant. Planned new Arts building does not impact utility.

Hot Water: Existing campus hot water loop routes through the planned Arts Quarter. 8" hot water piping is routed under and through an accessible crawlspace under Andrews that allows for reasonably good access to piping for any renovation or new connections required. Based on condition of existing hot water piping routed through Andrews, it is recommended the piping be replaced whenever possible. Existing 10" hot water piping and vault connecting the Integrated Science Center buildings to campus loop are located on the north portion of the site area identified for phase 1 Music. The nature of the ISC buildings require that hot water service not be interrupted and there are no other cost effective means for interrupting service. Therefore Phase 1 Music must be sited where it does not interrupt hot water service. New Arts building located near Morton Hall must be located so as to not interrupt hot water piping that serves chlled water loop from planned new chilled water central plant. Planned new Arts building does not impact utility.

Gas: Natural gas piping exists on west side of PBK and sized large enough for only medium to small sized heating system needs.

5.3.4 Mechanical

Water: Main domestic water service to the south portion of the entire campus routes to the East of PBK and through the site of Phase 1 Music. The water service will be required to be temporarily disconnected when Phase 1 Music is built.

Sewer: Nearest sanitary sewer piping occurs to the West of PBK. Piping size and inverts are suitable for Phase 2 and Phase 3 sewer needs. Based on existing piping inverts and locations, the point of connection for Phase 1 Music is anticipated just to the south of the Phi Beta Kappa Circle road.

New HVAC Systems

Cooling Systems:

- Chilled water for cooling and dehumidification for each of the project phases will be drawn from the campus chilled water loop. It is anticipated that the full chilled water need for the facility will be available throughout the year.
- The initial estimate for phase and projects cooling load at the Building Concept Phase is below:

Program	Phase	Total GSF	New GSF	Renovation GSF	Peak Cooling Tons	Primary Cooling Function
Music	1	72,188	72,188	0	250	Internal Loads and Ventilation
Theater/Speech/ Dance	2	90,074	48,979	41,095	300	Internal Loads and Ventilation
Art and Art History	3	56,273	30,113	26,160	175	Art: Ventilation Art History: Internal Loads and Ventilation

Note: Arts Commons and Muscarelle Museum program should be reviewed for impact on total campus cooling planning

- Chilled water peak may be reduced by using energy recovery systems on outdoor air units and utilizing process cooling system, but are not currently planned at this point in the planning process.
- It is probable that there will be sufficient secondary pressure available from the campus distribution pumps such that additional chilled water pumping for the project will not be required. In the event that sufficient pressure is not available, any added pumps would be on variable frequency drives and operated only on an as needed basis. Pump speed shall be varied based on calculated demands determined by monitoring both valve position and the differential pressure between the supply and return headers at the most hydraulically remote location of the buildings.
- The existing chilled water campus piping should be reused as much as possible as the piping is in good condition.
- The campus chilled water piping loops allows for connection of new and renovated projects with minimal disruption to campus chilled water system. It is recommended to incorporate valves, piping and vault for Phase 2 campus connections into Phase 1 work. In addition, when renovation to PBK occurs, new valves, piping and vault for Phase 3 work is recommended to occur at that time.
- Chilled water will be distributed throughout the project phases to distributed air handling unit chilled water coils, fan coil units, chilled beams and process cooling systems (computer rooms, dimmers, telecomm, electrical rooms).
- Pressure independent control valves are recommended for all air handling unit chilled water cooling coils.
- Chilled water piping will be insulated with insulation according to campus standards. Any exterior chilled water piping will be insulated with polyisocyanurate and covered with thicker PVC jacket. Insulation thickness will be as required to prevent condensation on cold piping, and to prevent thermal losses on chilled water piping as required by the ASHRAE/IES 90.1-2010 or Energy Code, whichever is more stringent.
- Chilled water BTU metering at each phase building entrance will be provided.

Heating Systems:

- Hot water for heating for each of the project phases will be drawn from the campus heating loop. It is anticipated that heating will be available year round to accomplish both traditional winter heating needs as well as reheat needs for humidity control.
- The initial estimate for phase and projects heating load at the Building Concept Phase is below:

Program	Phase	Total GSF	New GSF	Renovation GSF	Peak Heating MMBtu	Primary Heating Load
Music	1	72,188	72,188	0	250	Envelope and Ventilation
Theater/Speech/ Dance	2	90,074	48,979	41,095	300	Envelope and Ventilation
Art and Art History	3	56,273	30,113	26,160	175	Envelope and Ventilation

Note: Arts Commons and Muscarelle Museum program should be reviewed for impact on total campus heating planning

5.3.4 Mechanical

- Hot water peak may be reduced by using energy recovery systems on outdoor air units and utilizing local supplemental heating systems.
- It is probable that there will be sufficient secondary pressure available from the campus distribution pumps such that additional hot water pumping for the project will not be required. In the event that sufficient pressure is not available, any added pumps would be on variable frequency drives and operated only on an as needed basis. Pump speed shall be varied based on calculated demands determined by monitoring both valve position and the differential pressure between the supply and return headers at the most hydraulically remote location of the buildings.
- The existing hot water campus piping should be replaced whenever possible during renovation work as the piping is from original campus steam system and has the higher potential for failures.
- The campus hot water piping loops allows for connection of new and renovated projects with minimal disruption to campus hot water system. It is recommended to incorporate valves, piping and vault for Phase 2 campus connection into Phase 1 work. In addition, when renovation to PBK occurs, new valves, piping and vault for Phase 3 work is recommended to occur at that time.
- Hot water will be distributed throughout the project phases to distributed air handling unit hot water water coils, fan coil units, reheat coils and perimeter heating systems.
- Pressure independent control valves are recommended for all air handling unit hot water heating coils.
- Hot water piping will be insulated with insulation according to campus standards. Any exterior hot water piping will be insulated with polyisocyanurate and covered with thicker PVC jacket. Insulation thickness will be as required to prevent thermal losses on hot water piping as required by the ASHRAE/IES 90.1-2010 or Energy Code, whichever is more stringent.
- Hot water BTU metering at each phase building entrance will be provided.

Air Handling Systems

- Air handling units will be a combination of modular and custom units. Custom units anticipated for main Theater and Music spaces, while Art and Support spaces are anticipated to be packaged/modular units.
- Music will be all new air handlings located in new basement areas. Theater, Speech and Dance will be new units primarily located in new or renovated penthouse areas. Air handling units in Andrews are suitable for reuse. New Arts building will require new air handling and makeup air units in roof areas and away from Art exhaust systems.
- The air handling units are broken up according to space use, expected use schedule, and physical proximity. The current units are sized as follows
- Consideration for service and maintenance of the components of the air handling units will be given in establishing the mechanical area sizing for the project.
- A typical air handling system will consist of the following equipment and components.
  - Return air plenum.
  - Return air sound attenuator (noise critical units)
  - Return fans: Airfoil plenum type with variable speed drive.
  - Outside air/return air/relief air dampers with 100 percent outside air economizer capability and minimum outside air dampers.
  - Mixed air plenum.
  - MERV-8 pre-filters; 2-inch deep pleated panel type with activated carbon treatment for odor control.
  - MERV-13/15 final filters; 12-inch deep cartridge type
  - Hot water heating coils: Circuited drainable coils.
  - Section for steam humidification dispersion manifold. (Central humidification will be provided in specific units only, unless agreed upon otherwise with campus facilities staff.)

- Chilled water cooling coil or coils. Coils will be sized to maintain an average face velocity of 400 fpm. Coils will be not more than 10 rows deep with no more than 14 fins per inch. Large units will have multiple stacked parallel coils with intermediate drain pans. Air side economizers will be incorporated to provide winter time cooling.
- Supply fan or fans: Airfoil plenum type with variable speed drives.
- Supply air sound attenuators. (noise critical units)
- Discharge air plenum.

Exhaust Systems:

- Toilet rooms, custodial closets, catering kitchens will be exhausted to the building exterior.
- Hydraulic elevator equipment rooms will be exhausted to the building exterior with an independent system.
- Program areas with processes exhaust needs (ie theater woodshop, costume labs, ceramics, printmaking, photography) will be exhausted to the building exterior with an independent system located away from outdoor air intakes and pedestrian paths.

Air and space conditioning concepts:

- Large performing spaces will try and incorporate low supply air and high return air systems as much as possible to provide good acoustical performance, superior indoor air quality, and improved energy performance.
- Typical spaces (classrooms, office and support areas) will be served from traditional overhead air distribution systems.
- Utilization of campus chilled water systems for space conditioning through chilled beams or similar tempered chilled water systems should be reviewed as there are large potential energy savings associated with using chilled water at campus chilled water return temperatures. In addition to energy savings from reduced fan power, utilizing campus chilled water return for sensible cooling could improve overall central plant efficiency. Careful care with condensation control is required when using these systems and would require detailed review and discussions with campus staff.

Automatic Control System

- Each new and renovated project will have new stand-alone direct digital control systems connected to central campus control systems. Main control equipment either manufactured by Johnson Controls or Siemens.
- All controls will be open protocol (BACNet) on both the IP and MSTP levels.
- The system will provide direct digital control of all HVAC systems and equipment including all air and water terminal units and all valve and damper operators.
- Operator interface for programming, control and monitoring will be through a personal computer located within each phase buildings with remote ethernet connection capability from a compatible PC workstation.

Building Systems Startup and Verification

- Testing and Balancing. HVAC air and water systems will be tested, adjusted, and balanced by an approved independent AABC or NEBB certified agency.
- Equipment Startup and Testing. The Mechanical Contractor will accomplish equipment startup and testing. Each piece of equipment will be started and checked out according to manufacturer's recommendation to assure proper operation before occupancy.
- Owner Training. The Mechanical Contractor will demonstrate the operation and maintenance procedures of each mechanical system or equipment item for the Owner's representative before occupancy.
- Automatic Control System Testing. The Automatic Control System will be started and checked out by the System Installer and by the Mechanical Design Engineer to assure proper operation and conformance with requirements before occupancy.
- Basic and enhanced commissioning. At a minimum, a basic commissioning of this building is recommended. A full enhanced commissioning as defined by the United States Green Building Council

5.3.4 Mechanical

Plumbing Systems

Domestic Water Systems

- New domestic water service will be required for new buildings in Phase 1 and Phase 3. Anticipated new domestic water service to Phase 1 Music is 3" and occurs to the Southeast of PBK. New domestic water service to Phase 3 new Arts building is 2-1/2" and would occur to the Southwest of new building.
- Existing domestic water service connection to PBK and Andrews adequate for building sizes and needs.
- Domestic cold and hot water piping will be provided to building fixtures and equipment. Piping will be concealed within building shafts, walls, and above ceiling spaces in finished areas. Piping will be exposed in mechanical and equipment rooms.
- Domestic hot water heating will be a combination of gas fired tank-type heaters and point of use electric water heaters. Gas fired heaters will be used as much as possible and point of use heaters used in remote areas where piping routing costs are high.
- Water piping will be provided with shutoff valves for isolation of piping sections for maintenance and repair. Locate isolation valves in walls to allow rapid access in the event of leaks or overflows. Means will be provided to drain piping.
- Water piping will be insulated with fiberglass insulation with a foil-scrim-kraft vapor barrier jacket covering. Insulation thickness will be as required to prevent condensation on cold piping, and to prevent thermal losses on hot piping as required by the ASHRAE/IES 90.1-2010 or Energy Code, whichever is more stringent.
- Domestic water will be metered at the building entrance.

Plumbing Fixtures

- Commercial quality plumbing fixtures and trim will be provided for the base building according to programmed need. Fixtures will be as those by Zurn, American Standard, Kohler, and Toto. Flush valves will be as those by Zurn or Sloan. Faucets by Chicago, Zurn, or American Standard. Fixture types will be reviewed with campus staff for approval during the design phase.
- Plumbing fixtures will be selected to provide water conservation and to provide high levels of energy efficiency.
- Flush valve fixtures will not be located on walls that adjoin a noise critical space.
- Plumbing fixtures will be selected and arranged to be ADA compliant. Fixtures will be of the following types:
  - Water Closets: Wall hung vitreous china with exposed, water conserving flushometer.
  - Urinals: Wall-hung, vitreous china with exposed water conserving flushometer.
  - Lavatories: Wall-hung and counter-mounted, vitreous china type or solid surface with integral sink type. Faucets for public toilets will be single lever type with standard spout with flow restrictors and automatic flow sensors.
  - Service sinks: Counter mounted stainless steel or solid surface countertops with integral sinks of various types and sizes. Faucets will be gooseneck type with wrist blade handles.
  - Service Sinks: floor-mounted, molded stone receptor types. Faucet will be wall-mounted with vacuum breaker and pail hook.
  - Electric Water Coolers: Wall-hung, stainless steel, electric refrigerated types.
  - Wall Hydrants: Recessed non-freeze, keyed types at the building exterior.
- A graywater system could be explored if economically feasible. Graywater would be used to flush toilets only, and would be piped independently of domestic water to avoid cross contamination.

Sanitary Waste and Vent Systems

- Sanitary waste piping will be routed by gravity to new sanitary sewer connections. Piping will be below grade, or concealed within building ceiling and wall cavities if possible. Sanitary vent piping will extend to the roof.
- Sanitary waste and vent piping will be according to campus standards.
- New sanitary sewer piping will be required for new buildings in Phase 1 and Phase 3. Anticipated new sanitary service to Phase 1 Music is 5" and expected point of connection is just to the south of the Phi Beta Kappa Circle road. New sanitary service to Phase 3 new Arts building is 4" and would occur to the Southwest of new building.
- Existing sanitary sewer service connection to PBK and Andrews adequate for building sizes and needs.

Storm Water Drain System

- Storm water drain piping will extend from roof drains to connection(s) to storm water sewer piping. Piping will be concealed within building ceiling and wall cavities. Piping may be exposed in mechanical and equipment rooms.
- Roof rainwater overflow will occur through interior building rainwater leaders discharging onto grade through downspout nozzles. Splash blocks will be provided to prevent erosion.
- Storm water piping will be according to campus standards.
- Options for reclaiming storm runoff should be explored and incorporated if economically feasible.
- Storm water piping will not be routed through noise critical spaces unless absolutely necessary. If any storm water piping must cross a noise critical space, it will be enclosed in a gypsum board soffit to minimize noise breakout.

Fire Protection Systems

General: A performance specification for fire protection systems will be developed. Discussions with Facilities Management and the Authority Having Jurisdiction will take place during design phases to locate hose connections, alarm panel locations, annunciator panels, etc.

- Water Service Entrance: New fire water service will be required for new buildings in Phase 1 and Phase 3. Anticipated new fire water service to Phase 1 Music is 8" and would occur to the Southeast of PBK. New fire water service to Phase 3 new Arts building is 6" and would occur to the Southwest of new building.
- Existing fire water service connection to PBK and Andrews adequate for building sizes and needs.
- Hose Connection System: 2-1/2 inch fire department valves at each floor will be provided in or near each stair enclosure and elsewhere as required for full coverage with 100 foot hoses.
- Sprinkler zone valves with test valves will be provided from central locations on each floor.
- A minimum of one Class III standpipe will be located on the Theater stage.
- Wet Pipe Sprinkler System: All occupied areas will be sprinkled for 100% coverage. Sprinkler zones will be provided as required.
- All sprinklers will be quick response type sprinklers in ceilings and will be recessed type. Sprinklers in finished and unfinished areas without ceilings will be brass pendant, upright or sidewall types suitable for the application.
- The fire protection system will have zone control valves with flow and tamper switches located in a floor by floor basis to allow reductions in the building fire resistance rating. Zone drain valves will be piped to appropriate receptacles to allow testing of the systems in the building.
- Sprinklers will be located in a regular pattern, perpendicular and parallel with building lines, and in perfect alignment with other ceiling or building components. Sprinklers will be installed in the center of acoustical ceiling tiles, and no closer than 4-inches from any ceiling edge or other ceiling component.
- Sprinklers in areas subject to freezing will be recessed pendant or sidewall, dry-type sprinklers.
- Special Fire Protection Systems: A double detection pre-action fire suppression system is recommended at the stage, in rooms with storage of especially valuable instruments, electronic equipment, audio equipment, or dimmers.
- Centrifugal Fire Pump: Since the fire protection system in this building must new serve standpipes in the Theater fly tower, a fire pump is required.

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5.3.5 Electrical Systems

This predesign narrative is intended to describe the design for the electrical power, lighting, and special systems to be included in the Division 26 specifications.

Items currently not included in the scope of work:

1. Telephone System: Telephone hardware and electronics such as handsets. It is presumed the Owner will provide this equipment.
2. Data System: Data network electronics such as Ethernet switches, servers, wireless LAN access points, uninterruptible power supplies, and other specialty electronic equipment. It is presumed the Owner will provide this equipment.
3. Cable TV (CATV) System: media player/ recorders, video signal processors and similar electronics equipment are not included. It is presumed the Owner will provide this equipment.

Building Codes and Standards

Design criteria for the electrical systems will be based on the following Codes and Standards and any associated amendments. These codes, Standards, and Guidelines shall be considered the minimum requirements for the project.

- 2008 Electrical Code
- 2006 Virginia Fire Code
- 2009 International Energy Conservation Code
- 2009 United States Green Building Counsel (LEED)
- 2010 ASRHRAE 30.1 Energy Code Requirements
- TIA/EIA Telecommunications Building Wiring Standards: 526-7, 526-14, 568-C.0, 568-C.1, 568-C.2, 568-C.3, 568-C.4, 569-C, 606-B, 607-B, and 758-B.
- IEEE/ANSI 142-1982 - Recommended Practice for Grounding of Industrial and Commercial Power Systems
- ICEA publication S-80-576-2002
- 1996 ANSI A117.1/ADAAG
- Requirements of Insurance Carrier

Service and Distribution Scope

1. Currently the electric utility provider, Dominion, operates and maintains a 34.5kV distribution system that runs through the campus. Neither Dominion, nor the Collage requires power distribution to be encased in concrete duct banks. Dominion provides service transformers to each of the campus buildings. The College is responsible for all the secondary electrical power terminations.
2. A new electrical service will be required to serve the Music building. It is recommended that this service be 480Y/277V, 3-phase, 4-wire service from the utility. It is estimated that a 1000 amp services size should be adequate to support the Music building. The service would enter at the north/northeast corner of the Music building into an electrical room located within the basement.
3. Currently the existing PBK building is served with a 208Y/120V, 3-phase, 4-wire. The existing main switchboard is antiquated and should be removed. It is recommended that the utility service be upgraded to a 480Y/277V, 3-phase, 4-wire service from the utility. It is estimated that a 1200 amp service size should be adequate to support the new Theater building. The existing service enters the building on east side of the building and passes through an old electrical vault room. The vault room does not serve as a vault today, and only has the utility transformer secondary conductors within the room. It is recommended that this new vault room be converted into a new electrical room, in which the new 480Y/277V service would enter. This vault room is adjacent to the existing electrical room containing the existing switchboard. It is recommended that these two rooms be combined to allow for adequate electrical room clearances and to provide two means of egress as required for a 1200 amp switchboard.

5.3.5 Electrical

4. Directly north of the PBK building is the existing Andrews building. PBK and Andrews are two separate buildings and occupancies. The Andrews building is typically made up of student classrooms and teacher offices. The Andrew's building electrical service is derived from the PBK building, entering at the southwest corner of the building. The switchboard serving Andrews is in fair condition. However it is recommended that Andrews receive a separate 480Y/277V, 3-phase, 4-wire utility service rather than be served from the PBK Theater building. It is estimated that a 600 amp service size should be adequate to support the new Andrews building. Currently the Andrews service distribution board is located in a mechanical room. It is recommended that this service point be relocated to a designated electrical room.
5. For all new and remodeled buildings it is recommended that the building electrical distribution equipment physically segregate major load types, such as mechanical equipment, lighting, and plug loads. This distribution arrangement shall allow for an energy measurement and verification strategy that shall be easier to understand and operate for future on-going operations and maintenance.
6. Provide each building with electrical energy and power quality monitoring for each respective secondary 480Y/277V service. This will provide whole building electrical monitoring. Additional electrical energy monitors shall be provided to monitor energy consumption of major system loads (mechanical, lighting, and plug loads). These secondary power monitors shall consist of a combination of metering feeders or monitoring points within packaged mechanical equipment. All power monitoring points shall be brought into central power monitoring software platform. It is important that the College make a decision as to which platform should be responsible for aggregating the measurement data.
7. Provide a connection to Theatrical and Music Hall support dimmer cabinets, company switches, and disconnects switches.
8. Provide a new 480V connection to 208/120V K13 shielded transformer to Theatrical and Music Hall Isolated ground system. The distribution board being served by this connection shall serve sequencing panelboard(s) and company switches used for the Isolated ground power system providing power to the Audio/Visual system.
9. Other power requirements
   A. Provide sequencing panels from Lyntec, Inc.
   B. Provide theatrical company switches from Union Connector or Lex

Emergency Systems

1. Typically buildings do not have an emergency power generator system to provide emergency power for emergency lighting, fire alarms systems, and like systems. Most buildings where a backup generator is present, it is utilized to backup critical loads within the building.
2. The use of battery backup for emergency lighting systems should be considered the primary design for emergency lighting and exit signs in the new Music and Art buildings, if a fire pump is not required. The Theater building should be designed with an emergency generator in mind to support associated fire pump, emergency lighting, and fire alarm systems. A new generator solution will be located outdoors and the main emergency distribution panel and automatic transfer switches shall be located within a 2-hour rated room separate from the normal power main distribution equipment. It is estimated that a 100kW packaged engine generator should be adequate to support the required loads of the Theater building.
   A. Loads:
      · Life safety branch: Provide single 4P – 480Y/277V wall mounted, automatic transfer switch to serve code required emergency egress lighting and exit signage, fire alarm and fire protection branch circuits.

- Legally Required branch: Provide single 4P - 480Y/277V wall mounted, automatic transfer switch to serve legally required elevators and associate elevator equipment and controllers.
- Optional Stand-by branch: Provide single 4P-480Y/277V wall mount, program transition automatic transfer switch to serve select mechanical equipment, IT equipment, and select building loads, to be determined.

Programing Space Power Requirements

Faculty Offices: Provide at least one convenience duplex receptacle per wall and one double duplex receptacle at each one of two work station locations per office. Should powered furniture partitions be installed, partition feed will be provided instead of double duplex outlet. Convenience receptacle locations shall be coordinated with around large shelving units.

Meeting rooms: Provide convenience duplex receptacle on each wall and in the floor. Provide ceiling mounted receptacle to power overhead projector. Provide power and switch for motorized screen, where applicable.
Break/Kitchenette: Provide dedicated duplex receptacles for full height refrigerator, two (2) microwave ovens and dishwasher. Provide convenience two (2) duplex receptacles. Microwave oven receptacles shall be mounted at counter height for ADA accessibility. Receptacles shall be GFI type were required by code.

Entrance Lobby: Provide at least one convenience duplex receptacle per wall.

Commons: Provide at least one convenience duplex receptacle per wall. Provide a dedicated GFI receptacle for each vending machine and electric water cooler.
Conference and Meeting rooms 220 to 1500sf: Provide a ceiling mounted receptacle to power overhead projector. Provide power and switch for motorized screen. Provide convenience duplex receptacles on each wall and in the floor. Receptacles shall be evenly spaced on the walls and floors to provide flexibility.

Copy/Work Rooms: Provide dedicated duplex receptacles for every copier. Provide at least one convenience duplex receptacle per wall.

Toilet Rooms: Provide one above counter GFIC convenience duplex receptacle at the sink 48" AFF.
Janitor closets, storage, and support spaces: Provide one above counter GFIC convenience duplex receptacle adjacent to wall switch 48" AFF.
Lounge: Provide a convenience duplex receptacle on each wall in addition to duplex receptacles required for vending machines or televisions.

Presentation rooms: Provide convenience duplex receptacle on each wall and in the floor. Provide ceiling mounted receptacle to power overhead projector. Provide power and switch for motorized screen.

Corridors: Receptacles every 40 feet throughout for housekeeping purposes. Provide power for interior signage touch screen pads.

Storage and Utility spaces: One receptacle at entrance door, 48" AFF.

Mechanical Spaces and Packaged Mechanical Equipment: Receptacles spread throughout for maintenance purposes, typically every 12 linear feet. Each piece of mechanical equipment shall be equipped with at least 1 convenience receptacle.

Outdoors: One receptacle at each entrance/exit from the building, with additional perimeter outlets to reduce the spacing to 100'-0" maximum.

Main Telecom/IT Rooms: (4) 20 Amp/120 Volt individual branch circuits with 4-plex receptacle on each branch circuit. (2) 30 Amp/208 Volt individual branch circuits with single L6-30R twist-lock receptacle on each branch circuit.

MPOP Room: (1) 20 Amp/120 Volt individual branch circuit with 4-plex receptacle. (1) 30 Amp/208 Volt individual branch circuit with single L6-30R twist-lock receptacle.

5.3.5 Electrical

Automatic Receptacle Control should be provided to meet the requirements of ASHAE 90.1-2010. Provided control to 50% of all receptacles in offices and open offices. Receptacles control shall be shut off equipment such as computer monitors, copiers, water coolers, charging stations, etc.

Lighting Scope

1. Interior Lighting: Lighting systems appropriate for the task and design of the space will be selected. Lighting levels will meet or exceed IES recommended lighting levels.
2. Design will utilize energy efficient T8 or T5HO fluorescent lamps and electronic ballasts. Lamp color temperature shall be consistent with the Capitol campus standard degree Kelvin color temperature with a color rendering index (CRI) of 85 or better for general lighting applications, with exceptions in specialty art areas where 3500 degree Kelvin color temperatures may be applied.
3. Fluorescent lighting fixtures shall be provided with ballasting to accommodate step-dimming or inboard/outboard switching as indicated.
4. Where recessed down lights are specified, high performance remote phosphor LED lamp modules shall be provided for all lamp sources.
5. Indoor Lighting Specifics. It is recommended that the interior spaces described below maintain the following illumination level and luminaire types.
    A. Classrooms: Provide 30fc using linear pendant mount direct/indirect fluorescent luminaires. At presentation wall, provide linear fluorescent marker board lighting. General lighting shall have step dimming to 50% light output. 'Front of room' shall be switched separately.
    B. Janitor Closets: Provide 30fc using two (2) lamp fluorescent strips with wire guard.
    C. Storage: Provide 30fc using recessed fluorescent troffers, 0.125 acrylic lens and flush aluminum door.
    D. Offices: Provide 30fc using recessed direct/indirect fluorescent luminaires. Provide ballasting for step dimming to 50% light output.
    E. Toilet rooms: Provide recessed asymmetrical linear fluorescent wall washing on wet walls. Provide down lights in circulation path. Provide decorative linear fluorescent sconces, vertically mounted, flanking the mirror. Where required, provide wet location shower lights.
    F. Miscellaneous enclosed spaces: Provide 30fc using recessed direct/indirect fluorescent luminaires. Provide ballasting for step dimming to 50% light output.
    G. Dressing rooms: Provide 50fc using direct/indirect fluorescent along with mirror lighting.
    H. LED exit signs with brushed aluminum housing should be used throughout.
6. Exterior Lighting Recommendations
    A. Building Accent Lighting: Each exit door shall have minimum of one building mounted LED luminaires, factory equipped two (2) driver modules.
    B. Pedestrian Circulation Areas: Lighting should match adjacent campus areas and campus standards.
    C. Exterior lighting shall not exceed 80% of the LPD allowed by ASHRAE 90.1-2010.
    D. Building and landscape lighting should not exceed 50% of the LPD allowed by ASHRAE 90.1-2010.
    E. Emergency Egress Lighting:
    F. Exterior: Building-mounted exterior lighting at entrances/exits from the building will be circuited and controlled to serve as egress lights and be provided with battery backup or connected to the life safety circuit.
    G. Interior: Egress lighting will be provided by fixtures with battery backup or connected to the life safety circuit where necessary to meet code requirements.

7. Lighting Controls:
   A. Single-occupant offices, single-occupant toilet rooms, corridors, storage rooms, and other enclosed rooms less than 1000 square feet will be provided with occupancy sensors to automatically control lighting. See list below for occupancy sensor application.
      - Janitor's closets, small storage rooms, single-occupant toilet rooms: Wallbox infrared
      - Multi-occupant toilet rooms: Ceiling-mounted dual technology
      - Large storage rooms: Ceiling-mounted dual technology
      - Individual office, conference rooms: Ceiling-mounted dual technology
      - Open office: Wall mounted dual technology.
      - Corridors: Ceiling-mounted dual technology

   B. Waiting areas, lobbies, any large common spaces: should be controlled by a microprocessor-based, low-voltage lighting control system consisting of line-voltage relays controlled throughout. The microprocessor based system shall accept input signals from remote low-voltage switch stations, astronomic time clock and campus Building Automation System.

   C. Local dual-level switching will be provided in work and office areas to allow occupant selection of lighting level.

   D. Wall box dimmers will be provided where incandescent is located. Large areas of incandescent will have multiple dimming zones, controlled separately.

   E. Exterior lighting will be controlled by a microprocessor-based lighting control panel consisting of line-voltage relays controlled through the microprocessor based control input.

Systems Scope

Campus telecommunications infrastructure is provided and maintained by the College. There is a fiber optic cable network that interconnects the campus buildings and is the backbone for telephone, data, security, and fire alarm systems on the campus. Requirements and standards of the campus telecommunications department should be followed.

1. All campus telecommunications and fiber ducts routed within the campus should be routed within a concrete encased duct bank.
   A. Voice/Data Systems: The voice/data cabling systems will be provided and installed by the contractor. The contractor will provide empty boxes and pathways to facilitate the voice/data cabling. In addition, the contractor shall provide all cabling, outlets, faceplates, patch panels, terminal blocks, network equipment racks, cable management, terminations, and cable testing. A typical voice/data outlet will have a 5" x 5" x 2.875" box with a single gang trim ring and a 1-1/4" empty conduit with pull string routed up to an accessible ceiling space or cable tray located in the corridor.

   B. Entrance Facility (MPOP) Room:
      - A new MPOP room will be located in the lower level.
      - (4) 4" conduits will be provided from the MPOP room to the nearest communication manhole located outside of the building. One (1) of the (4) 4" conduits will contain (3) 1-1/4" innerducts for the installation of fiber optic cabling.
      - ¾" AC grade fire retardant plywood from 4" AFF to 8'-4" AFF will be provided along all four walls of the room and painted with two coats of paint

2. Horizontal Cabling System:
   A. The horizontal cabling to the typical voice/data outlet faceplate will consist of (2) plenum rated Augmented Category 6 twisted pair cables for voice and data.

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B. The typical voice/data outlet will consist of two 8-position modular jacks on a single-gang faceplate.

C. The horizontal voice and data cables will be terminated on rack mounted Augmented Category 6 patch panels in the telecom rooms

3. Typical Voice/Data Outlet Recommendations and Locations:

A. Classrooms: Provide 2-data jacks per outlet faceplate at each computer work station location. Provide 2-data jacks per outlet faceplate at ceiling mounted outlet for ceiling mounted projector.

B. Offices: Provide 2 voice/data outlet faceplates, one on opposite walls.

C. Cubicles: Provide 1 voice/data outlet faceplate.

D. Administration Meeting Rooms: Provide 2 voice/data outlet faceplates on opposite walls and 2 ceiling mounted data jacks per outlet faceplate for ceiling mounted projector.

E. Conference and Meeting rooms 220 to 1500 sf: Provide 2 voice/data outlet faceplates on opposite walls and 2 ceiling mounted data jacks per outlet faceplate for ceiling mounted projector.

F. Copy/work room: Provide 2 voice/data outlet faceplates.

G. Lounge: Provide two (2) voice/data outlet faceplates on opposite walls. Provide data outlet faceplate with 1 jack at each vending machine location.

H. Wireless LAN Access Points (WAP): Provide data outlet locations consisting of two (2) data jacks at each location for ceiling mounted Access Points. WAP locations to be determined by IT facility study and shown per their direction during design.

I. Main Fire Alarm Panel: Provide 2 jacks for telephone connections to auto-dialer.

J. Building Management System (BMS) Control Panels: Provide data jacks to each control panel.

K. Security Cameras: Provide 1 data jack at each camera location.

L. Card Access System Control Panels: Provide 1 data jack at each card reader control panel.

M. Mechanical Rooms: Provide 1 jack for wall mounted telephone.

N. Telecom Rooms: Provide 1 jack for wall mounted telephone.

O. Electric Rooms: Provide 1 jack for wall mounted telephone.

Fire Alarm Systems

The existing campus standard fire alarm system is Simplex Fire Alarm Systems. All new fire alarms systems should be Class A, fully addressable systems.

1. Provide a complete multiplex/intelligent fire alarm system, with zone selective one-way voice communications on a building by building basis and campus facility wide basis. Campus wide capabilities for full function remote monitoring shall be by dedicated campus facilities fiber network command center. Fire alarm system will be provided including new signal and initiation devices throughout each campus building. The system will include manual stations, smoke detectors, duct smoke detectors, heat detectors, connection to fire suppression systems, audio (speaker)/visual (strobe) devices. The system will be designed to meet NFPA, the State, local and applicable COD Guidelines. The following items will be included:

2. The fire alarm system will include manual stations, smoke detectors, duct smoke detectors, heat detectors, connection to new complete building sprinkler system, audio (speaker)/visual (strobe) devices. The system will be designed to meet NFPA, and State Building Code and applicable COD Guidelines. The following items will be included

A. Manual pull stations at each exit from each floor, double action, keyed reset. Mounting heights shall be no lower than 36" aff and no higher than 48" aff and shall be within ADA accessible reach limits at all locations and within 5' of exit door.

B. iAudible Notification: Speakers shall be placed throughout the areas building to maintain a prescriptive performance of 70dBA. Municipal prescriptive performance test shall be provided by the Contractor. Mounting heights shall be no lower than 80" and no higher than 96" aff.

C. iiVisual notification: Strobes placed within restrooms, all general/common use areas (studios, work areas), hallways, lobbies, and any other areas for common use. Devices shall be UL 1971 listed, 75 candela minimum. Mounting heights shall be no lower than 80" and no higher than 96" aff.

D. iAutomatic smoke detection: Provide for HVAC supply system return air duct detection in accordance with NFPA 90, and as otherwise adopted by College standards.

E. Other functions: Interface to accomplish control of HVAC units based on duct detector input, monitoring of power used for life-safety functions (shunt trip power, etc.)

F. Connection to tamper and flow switches in quantities and locations determined by the fire protection contractor.

G. An LCD remote annunciator with All-Call voice capabilities, zone selectable by floor or total building will be provided at a location acceptable to the AHJ fire department, College Campus Safety and for notification and control of the system.

H. Audio/visual and visual notification appliances in quantities and locations required to notify occupants in accordance with NFPA 72 and the ADA. Strobes shall be minimum 15/75 cd rating under UL 1971.

I. A DACT will be provided to transmit fire alarms to the Campus central monitoring location via the BAS system.

Security System

The campus standard access control system is a C-Board system. The new security access will be tied to the central campus monitoring system Card readers should be provided at all required doors as directed by facilities management and campus standards.

1. TV Distribution

   A. A wired television distribution system connected to Campus TV System will be provided. Cabling will consist of plenum rated RG-11 or ½" Hardline coaxial trunk distribution cabling from the Head-end equipment located in the lower level to each telecom room. Horizontal drop cabling will consist of plenum rated RG-6 coaxial cabling from the nearest telecom room to each TV jack. Taps, Splitters and line amplifiers shall be located in telecom rooms (not located above ceiling tiles) and shall support 5 MHz to 750 MHz minimum video bandwidth.

   B. TV Outlet Quantities and Locations:
      - Offices: Provide 2 TV outlets, one on opposite walls.
      - Cubicles: Provide 1 TV outlet.
      - Administration Meeting Rooms: Provide 1 TV outlet.
      - Conference and Meeting rooms 220 to 1500 sf: Provide 2 TV outlets.
      - Copy/work room: Provide (1) TV outlet.
      - Lounge: Provide one (1) TV outlet.

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5.4 Sustainable Design Approach

The new construction and major renovation work associated with the Performing Arts precinct will be designed to achieve a minimum of LEED Silver certification using the LEED-NC v2009 Green Building Rating System. Each of the three phases of development in the Performing Arts precinct will be defined with its own unique LEED project boundary; the LEED project boundary for phase I will follow the limits of construction associated with the music and concert hall.

The location of the music and concert hall lends itself quite well to the achievement of the majority of the sustainable sites credits. The site is previously developed (graded and altered by direct human activities), it is located in proximity to high density residential development, is located in proximity to at least 10 basic services, and is served by multiple public transportation options. Through the inclusion of showers and bicycle racks, preferred parking for low emitting and fuel efficient vehicles, and preferred parking for carpools, a variety of alternative transportation modes are encouraged. And, although the current Commonwealth of VA regulations encourage a degree of runoff quantity management, the project team will investigate ways to protect receiving stream channels from runoff and erosion adequate to meet LEED quantity management requirements. The majority of the roof surface is anticipated to be a reflective membrane, although there are areas that would lend themselves to the inclusion of vegetation, should that approach become necessary or desired by the College.

Water conservation will be a specific objective of this project. Water needed for landscape irrigation will be minimized through both species selection and irrigation system type. Water used inside the building will also be minimized through the use of low-flow but still effective plumbing fixtures, including 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals (also called "pint flush"), sensor-activated lavatory faucets, and 1.5 gallon per minute showers.

Energy conservation will also be an important aspect of this project's design. While the building's energy profile will be dominated by internal loads, envelope integrity will still be an important component of the project's overall energy performance. Due to the sensitive acoustic nature of the spaces in Music, and also many of the spaces in Theater, Speech and Dance, the exterior wall construction will be more substantial than a typical building. The exterior walls will be a double wall system, with both components being insulated, and the glazing is planned to be insulated glass units (IGUs) with at least one of the layers being laminated. In addition to a sound thermal envelope, lighting strategy will also be important. Energy efficient lamps and fixtures will be specified, while daylight harvesting will be implemented where ever possible in common and multi occupancy spaces. Mechanical highlights under consideration include chilled beams, underfloor air, and demand-controlled ventilation. Although photovoltaic (PV) equipment is not part of the project's scope, the building will be prepared to receive PVs at whatever point in the future the College of William and Mary should decide to add them. To allow for the operations staff and the occupants to understand how the building is operating, appropriate metering instrumentation will be included. All energy conserving equipment will be commissioned by an agent provided by the College.

While the majority of the materials and resources credits fall to the contractor to deliver, specifications will be in place to require construction waste management, the use of recycled content building materials, the use of regional materials, and the use of FSC certified wood. Infrastructure for recycling by occupants will also be included in the design.

The indoor environmental quality of the music and concert hall will be protected and enhanced through strategies such as outdoor air delivery monitoring, construction indoor air quality management, the specification of low-emitting materials, and indoor chemical and pollutant source control. Lighting systems will have a high degree of controllability, and thermal design parameters will be met (and followed with post-occupancy verification).

Innovative design approaches will also include a comprehensive educational outreach program, green housekeeping, minimum acoustical performance (based on the LEED for Schools 2009 prerequisite requirements), and the specification of low mercury lamps.

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5.5 Code Review/Analysis

Concept Code Analysis, Phase I - Music

101.1 Applicable Codes
Virginia Construction Code (VUSBC Part I), 2009 Edition incorporating all applicable codes
2010 ADA Standards for Accessible Design
Construction and Professional Services Manual 2012

302.1 Classification
Music Building: Assembly Group A-3
Business Group B

404.6 Atrium smoke control not required, connecting only 2 stories.

410.3.1.1 Stage is less than 50 feet high, emergency ventilation not required.

503.1 Allowable Area Calculations
Academic Building: Based on Use Group A-3 with sprinkler system, and IIA Type of Construction

Tabular Limit (Table 503) per Floor:	15,500 gsf
Perimeter increase	4,330 gsf
200% increase for sprinklers	31,000 gsf
Total Allowable Area per Floor	50,830 gsf

Design Area Calculation

Lower Level	18,010 gsf
Main Level	44,047 gsf
Upper Level	7,815 gsf
Total Square Footage:	74,951 gsf

504.1 Allowable Height

Tabular Limit (based on A-3):	3 stories, 65 feet
Increase for Sprinklers:	1 story, 20 feet
Allowable Building Height	4 stories, 85 feet
Actual Building Height:	3 stories, 60 feet

508.2 Accessory Occupancies
Aggregate accessory occupancies shall not occupy more than 10 percent of the area of the story in which they are located and shall not exceed the tabular values in Table503, without height and area increases in accordance with Sections 504 and 506 for such accessory occupancies.

508.2.5 Incidental Accessory Uses
Incidental accessory areas with automatic fire-extinguishing systems shall be separated by construction capable of resisting the passage of smoke, or by a fire barrier.

601 Required Fire Resistance Rating of Building Elements

Structural Frame	1-hour
Exterior Bearing Walls	1-hour
Interior Bearing Walls	1-hour
Interior Non-bearing Walls and Partitions	0-hour
Exterior Non-Bearing Walls and Partitions (based on fire separation distance):	
less than 5 feet	1-hour
between 5 and 10 feet	1-hour
over 10, less than 30 feet	1-hour
Floor Construction	1-hour
Roof Construction	1-hour

603.1 Type of Construction: Type IIA (Non-combustible, protected)

705.11 Parapets not required per exceptions 1, 4 or 6.

708.2 Shaft Enclosures
Per Exception No. 7, the lobby floor openings between the second and third floors are not enclosed. Openings do not connect more than two stories, are not part of the required means of egress system, are not concealed, and are separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.

708.4 Shaft and Vertical Exit Enclosures
Connecting less than four stories: 1-hour rated

903.2 Automatic Fire Suppression System
A wet pipe, automatic fire suppression system will be provided throughout the building, except where pre-action system is used for elevator shafts

905.3 Standpipes not required for buildings with highest floor less than 30 feet above lowest level of fire department vehicle access

905.3.4 Hose connection required for stages over 1000 square feet in area

915.1 In-Building Communications Coverage
Dedicated infrastructure to accommodate emergency communication equipment required unless testing shows it is not necessary.

1004.1.1 Design Occupant Load

Occupant load calculations are based on the following factors (sf per occupant):

Assembly – Concentrated	7 nsf
Assembly – Unconcentrated	15 nsf
Business areas	100 gsf
Educational – Classrooms	20 nsf
Educational – Labs	50 nsf
Mechanical rooms	300 gsf
Storage	300 gsf

Occupant Load for determining egress requirements

Lower Level	299
Main Level	1619
Upper Level	215
Total Occupant Load:	2,133

1004.5 Convergence: Where means of egress converge from above and below, the capacity of the egress from the point of convergence shall not be less than the sum of the two floors.

1005.1 Egress Width per Occupant Served (with sprinkler system)

Stairways:	0.2 inches per occupant
Other Egress Components:	0.15 inches per occupant

1007.4 Elevators are not considered part of an accessible means of egress.

1007.6 Areas of refuge not required.

1013.1 Guards are not provided per exceptions for audience side of stages including at steps leading to same, raised stages and platforms including ramps and side stages, elevated walking surfaces appurtenant to stages for access to special lighting and equipment, and assembly seating where guards per Section 1028.14 are allowed.

1014.3 Common Path of Egress Travel

Use Group A: 75 feet

1016.1 Exit Access Travel Distance

Use Group A: 250 feet maximum (with sprinkler system)

1018.1 Corridor Fire Resistance Rating: 0-hour (with sprinkler system)

1018.2 Corridor Width: 44 inches minimum, except:
Minimum 36 inches where serving occupant capacity of 49 or less.
Minimum 72 inches where serving classrooms (per CPSM).

1018.4 Maximum Dead End Corridor: 20 feet

1021.1 Minimum Number of Exits

Lower Level	299 occupants =	2
Main Level	1619 occupants =	4
Upper Level	215 occupants =	2

1022.1 Vertical Exit Enclosures
2 enclosed stairs serving all three floors shall be 1-hour rated enclosures, with exits sized for convergence per 1004.5.

1027.1 All exits discharge directly to the exterior.

1028.8 Assembly seating common path of egress travel
50 or more occupants: 30 feet
Fewer than 50 occupants: 75 feet

1028.12 In places of assembly with over 200 occupants, seats shall be fastened to the floor except where there are no ramped or tiered floors and seats are at tables, or where seats are intended for musicians or other performers and are separated by guards or similar barriers
Where an aggregate of six or more male and female water closets is required, a family or assisted-use toilet is included.

1604.5 Occupancy category of building: Category III. Building is not an emergency shelter.

6.1 Overview

The following information is based on a program estimate that was generated from documentation in this report. It includes a conceptual cost estimate for each phase of the three-phase project, including escalation to the anticipated construction period for each phase. Additionally, a more detailed breakdown of the conceptual cost model is shown for Phase 1, which includes probable costs for systems, sitework, structure, envelope and finishes.

This conceptual cost model does not include Furniture, Fixtures and Equipment (FFE) or other owner soft costs.

6.2 Phasing Cost Analysis

College of William & Mary - Arts Quarter Phasing

Preliminary Construction Cost Modeling

	TOTAL PROJECT	SOFT COSTS (% of constr.)	TOTAL CONSTR
POTENTIAL BUDGET	**$45,000,000**	**35%**	**$33,333,333**

				Arts Quarter	PHASED PROJECT IMPLEMENTATION		
	UNIT COST	GSF		POTENTIAL COST	Phase 1	Phase 2	Phase 3
		Grossing Factor 1.65					
THEATER, SPEECH & DANCE				***$38,423,200***		*$38,423,200*	
Theater Swing Space / Long Term Storage	$125.00	4,000	sqft	*$500,000*			
Renovation of Existing Main Stage Theater	$509.82	13,689	sqft	*$6,978,950*			
Tear Down & Build New - 1 Level	$308.84	7,504	sqft	*$2,317,500*			
Tear Down & Build New - 3 Level (2+BSMT)	$397.82	25,069	sqft	*$9,972,900*			
New Construction (South Addition)	$390.79	40,687	sqft	*$15,900,000*			
Renovation of PBK - Minor	$151.24	18,208	sqft	*$2,753,850*			
		109,157	***sqft***				
MUSIC				***$36,306,527***	*$36,306,527*		
Concert Hall	*see detailed cost model*	26,037	sqft				
Music Program Spaces (Including Recital Hall)	*see detailed cost model*	48,914	sqft				
		74,951	***sqft***				
ART / ART HISTORY				***$19,370,000***			*$19,370,000*
Renovation of Andrews	$235.06	31,162	sqft	*$7,324,800*			
New Construction (Partial Program)	$365.57	32,949	sqft	*$12,045,200*			
		64,111	***sqft***				
		Escalation to mid-pt of construction			*Q2-2016 6.75%*	*Q2-2018 14.75%*	*Q2-2020 22.75%*
		(3%/yr through 2015, 4%/yr from 2016 on-going)			*$2,450,691*	*$5,667,422*	*$4,406,675*
		TOTAL CONSTRUCTION COST			***$38,757,217***	***$44,090,622***	***$23,776,675***
		TOTAL PROJECT COST			***$52,322,244***	***$59,522,340***	***$32,098,512***
						$143,943,095	
MAKE READY WORK				***$1,450,000***			*$1,450,000*
Demolition of Morton Hall	$25.00	58,000	sqft	*$1,450,000*			
		Escalation to mid-pt of construction					*Q2-2020 22.75%*
		(3%/yr through 2015, 4%/yr from 2016 on-going)					*$329,875*
		TOTAL CONSTRUCTION COST					***$1,779,875***
		TOTAL PROJECT COST					***$2,402,832***
MUSEUM				***$24,187,500***			*$24,187,500*
Museum Renovation	$350.00	18,750	sqft	*$6,562,500*			
Museum Addition	$500.00	35,250	sqft	*$17,625,000*			
		Escalation to mid-pt of construction					*Q2-2020 22.75%*
		(3%/yr through 2015, 4%/yr from 2016 on-going)					*$5,502,656*
		TOTAL CONSTRUCTION COST					***$29,690,156***
		TOTAL PROJECT COST					***$40,081,711***

6.3 Detailed Cost Analysis – Phase I

College of William & Mary

Preliminary Building Construction Cost Modeling

				MUSIC BUILDING
Construction Costs		%cost	$/GSF	*74,951 GSF*
SUB-STRUCTURE		5%	$22	**$1,685,410**
SUPER-STRUCTURE		11%	$44	**$3,295,156**
ENCLOSURE		12%	$48	**$3,619,608**
ROOF		2%	$8	**$593,568**
INTERIORS		21%	$87	**$6,550,042**
SPECIALTIES & EQUIPMENT		10%	$43	**$3,187,280**
MECHANICAL		15%	$62	**$4,636,565**
ELECTRICAL		11%	$44	**$3,276,530**
GENERAL CONDITIONS	*8.00%*	7%	$29	**$2,147,533**
CONTRACTORS, FEE, BONDS, INSUR.	*6.50%*	6%	$25	**$1,884,460**
DESIGN / CONSTRUCTION CONTINGENCY	*12.50%*			**$3,859,519**
ESCALATION TO MID-CONSTR - PHASE 1	*incl. w/ Summary*			**incl. w/ Summary**
Total Bldg Construction Cost			*$463.45*	***$34,735,669***
Total Site Construction Cost ***(incl. contingency & escalation as above)***			*$20.96*	**$1,570,858**
Total Bldg & Site Construction Cost			*$484.40*	***$36,306,527***

6.3 Detailed Cost Analysis – Phase I

College of William & Mary

Preliminary Building Construction Cost Modeling

			Sitework		
	85,000	*sqft*			
SITEWORK	**QUANTITY**		**UNIT $**	**TOTAL COST**	
SITEWORK					
Site prep, controls, make-ready work	1	lsum	$40,000.00	$40,000	
General site R/F grading	85,000	sqft	$1.20	$102,000	
New pedestrian surfacing/sidewalks - Pavers or colored/stamped concrete, plain grey sidewalks	8,000	sqft	$12.00	$96,000	
General landscaping of greenspace - sod, plantings, irrigation	54,898	sqft	$2.00	$109,796	
Minor site retaining walls, planters, curbs, furnishings, etc.	1	lsum	$40,000.00	$40,000	
Site lighting - LED	1	lsum	$75,000.00	$75,000	
Water service connection to building	100	lnft	$120.00	$12,000	
Existing water service relocation	320	lnft	$180.00	$57,600	
Sanitary service connection to building	800	lnft	$125.00	$100,000	
Sanitary lift station	1	lsum	$75,000.00	$75,000	
Storm water u.g. infiltration - 60" perforated collection pipe	500	lnft	$250.00	$125,000	
Storm water system piping, structures, connection to campus system	400	lnft	$80.00	$32,000	
Heating hot water service connection/modifications	600	lnft	$275.00	$165,000	
Chilled water service connection/modifications	300	lnft	$275.00	$82,500	
H/C water piping vault	1	lsum	$50,000.00	$50,000	
Electrical service connection - from new Utility Co. service & transformer	100	lnft	$500.00	$50,000	
Telecom service connection pathway - service by Utility Co.	500	lnft	$50.00	$25,000	
SUB-TOTAL CONSTRUCTION COST				***$1,236,896***	
				$14.55 /sf	

6.3 Detailed Cost Analysis – Phase I

College of William & Mary

Preliminary Building Construction Cost Modeling

			Building Core & Shell			
			74,951	*sqft*		
CORE & SHELL			**QUANTITY**		**UNIT $**	**TOTAL COST**
SUB-STRUCTURE						
EXCAVATION & BACKFILL FOR BASEMENT & FOOTINGS	Typical application		13,000	cuyd	$10.00	$130,000
GEOPIER SOIL STABILIZATION	Agg stone piers		28,518	sqft	$10.00	$285,180
SPREAD FOOTING FOUNDATIONS	Typical application		74,951	sqft	$6.00	$449,706
SLAB ON GRADE	Typical application		22,798	sqft	$7.50	$170,983
SLOPED SLAB ON GRADE @ SEATING	Minor foundation walls, etc.		5,530	sqft	$12.50	$69,125
FOUNDATION WALLS	Concrete, 12", insul & WP		11,888	sqft	$32.00	$380,416
TUNNEL TO PBK	Precast concrete, WP		50	lnft	$2,500.00	$125,000
FOUNDATION PITS, MATS, DRAINAGE, ETC	Allowance for special situations		1	lsum	$75,000.00	$75,000
						$1,685,410
						$22.49 /sf of bldg
SUPER-STRUCTURE						
MASONRY BEARING WALLS	Double wythe acoustical		39,120	sqft	$22.00	$860,640
SINGLE STORY STEEL STRUCTURE	Typical column/beam @ BOH/Circ/Practice	10.0psf	209.68	ton	$3,200.00	$670,960
STRUCTURAL PREMIUM SPACES	Open to below, Perf space bracing, etc.	5.0psf	38.60	ton	$3,200.00	$123,520
BRACED FRAME LATERAL SUPPORT	Allowance	1.5psf	56.21	ton	$3,500.00	$196,746
LONG SPAN GABLE ROOF STRUCTURE	Performance spaces	14.0psf	108.08	ton	$3,500.00	$378,280
SLAB ON METAL DECK	Typical		41,935	sqft	$14.00	$587,090
SLAB ON METAL DECK - ACOUSTICAL	Acoustical deck, insul concrete		15,440	sqft	$18.00	$277,920
MISC STRUCTURAL SUPPORT	Canopy, screenwalls, exterior, equip, etc.		1	lsum	$200,000.00	$200,000
						$3,295,156
						$43.96 /sf of bldg
ENCLOSURE						
EXTERIOR ENCLOSURE - STUD BACK-UP/SHTG/INSUL/WP	Allowance for typical back-up wall		43,184	sqft	$20.00	$863,680
PUNCHED WINDOW OPENINGS	High quality storefront system, acoustical glass	10%	4,318	sqft	$85.00	$367,064
CURTAINWALL	Butt-glazed, full ht.	20%	8,637	sqft	$125.00	$1,079,600
BRICK VENEER	Typical, some detailing	70%	30,229	sqft	$30.00	$906,864
METAL PANEL, STONE, ACCENTS, CORNICE	Higher level of detail, alternate material		1,016	lnft	$150.00	$152,400
EXTERIOR DECORATIVE FEATURES/ELEMENTS	Sun screens, accents, louvers, etc.		1	lsum	$150,000.00	$150,000
ENTRANCE LOCATIONS	Monumental glass doors, access control, etc.		4	loc	$25,000.00	$100,000
						$3,619,608
						$48.29 /sf of bldg
						$83.82 /sf of wall
ROOF						
METAL ROOFING @ GABLE AREAS	Slate or similar		11,440	sqft	$28.00	$320,320
BUILT-UP ROOFING SYSTEM COMPLETE	Typical application		17,078	sqft	$16.00	$273,248
						$593,568
						$7.92 /sf of bldg
MECHANICAL						

6.3 Detailed Cost Analysis – Phase I

College of William & Mary

Preliminary Building Construction Cost Modeling

		Building Core & Shell			
		74,951	sqft		
CORE & SHELL		**QUANTITY**		**UNIT $**	**TOTAL COST**
FIRE PROTECTION	Typical	74,951	sqft	$4.00	$299,804
PLUMBING SYSTEMS, PER FIXTURE LOCATION	Incl. distr., HW inst heating, piping, fixture	74	each	$5,000.00	$370,000
ROOF DRAINAGE	Internal	1	lsum	$50,000.00	$50,000
HEATING & COOLING SERVICE EQUIPMENT	xchangrs, pumps, etc.	1	lsum	$200,000.00	$200,000
SUPLIMENTAL H/C EQUIPMENT	unit heaters, local cooling, etc.	1	lsum	$100,000.00	$100,000
HYDRONIC PIPING	Complete system, hw & cw	74,951	sqft	$6.00	$449,706
AIR HANDLING UNITS - BOH	w/ humidification	70,000	cfm	$8.00	$560,000
AIR HANDLING UNITS - PERFORMANCE	w/ humidification	30,000	sqft	$10.00	$300,000
HVAC DISTRIBUTION SYSTEM - BOH	Typical w/ VAV's, sound attenuation	58,951	sqft	$22.00	$1,296,922
HVAC DISTRIBUTION SYSTEM - PERFORMANCE	Low delivery, high return, sound attenuation	16,000	sqft	$28.00	$448,000
HVAC CONTROLS	DDC	74,951	sqft	$7.50	$562,133
					$4,636,565
					$61.86 /sf of bldg
ELECTRICAL					
ELECTRICAL POWER SERVICE & EQUIPMENT	Gear @ service connection, 1200a	1	lsum	$250,000.00	$250,000
ELECTRICAL POWER DISTRIBUTION	Sub-panels & distribution	74,951	sqft	$12.00	$899,412
LIGHTING SYSTEM - BOH	Lay-in typical	58,951	sqft	$8.00	$471,608
LIGHTING SYSTEM - PERFORMANCE	Varying systems, LED, accent, etc.	16,000	sqft	$16.00	$256,000
FIRE ALARM SYSTEM	Typical application	74,951	sqft	$3.00	$224,853
TELECOM SYSTEMS INFRASTRUCTURE	Cabling, pathways, devices	74,951	sqft	$5.00	$374,755
SECURITY, PA	Minor systems	74,951	sqft	$2.00	$149,902
AV INFRASTRUCTURE	Cabling, pathways, devices	1	lsum	$650,000.00	$650,000
					$3,276,530
					$43.72 /sf of bldg
SUB-TOTAL CONSTRUCTION COST					***$17,106,837***
					$228.24 /sf

College of William & Mary

Preliminary Building Construction Cost Modeling

		Interior Fit-out & Finishes 74,951 sqft			
INTERIOR FIT-OUT		**QUANTITY**		**UNIT $**	**TOTAL COST**
INTERIOR					
SPACE FIT-OUT (INCLUDES WALLS, DOORS, FINISHES, CASEWORK, SPECIALTIES)					
CONCERT HALL		14,504	sqft	$150.00	$2,175,525
RECITAL HALL		3,040	sqft	$120.00	$364,800
INSTRUMENTAL REHEARSAL		2,400	sqft	$110.00	$264,000
CHORAL REHEARSAL		1,600	sqft	$110.00	$176,000
PERFORMANCE SUPPORT SPACES		7,537	sqft	$70.00	$527,604
STUDIO, PRACTICE ROOMS		15,873	sqft	$80.00	$1,269,840
ACADEMIC CLASSROOMS, RESOURCE		11,567	sqft	$65.00	$751,823
ACADEMIC SUPPORT, STORAGE		3,696	sqft	$50.00	$184,800
PUBLIC, CIRCULATION		7,788	sqft	$85.00	$661,980
MEP, MAINTENANCE, STORAGE		6,947	sqft	$25.00	$173,670
		74,951	*sqft*		**$6,550,042**
					$87.39 /sf of bldg
SPECIALTIES & BUILDING EQUIPMENT					
DECORATIVE FINSHES/FEATURE ELEMENTS	Display wall, dec glass, ceiling upgrade, etc.	1	lsum	$250,000.00	$250,000
VARIABLE ACOUSTICS	Wall panels, draperies, reflectors, etc.	1	lsum	$850,000.00	$850,000
LIGHTING & AV EQUIPMENT	Control & production	1	lsum	$1,750,000.00	$1,750,000
GENERAL BUILDING SPECIALTIES	Shades, signage, etc. - NIC sort/track equipment	74,951	sqft	$4.50	$337,280
					$3,187,280
					$42.52 /sf of bldg
SUB-TOTAL CONSTRUCTION COST					***$9,737,321***
					$129.92 /sf

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