

# LEE SOUND DESIGN

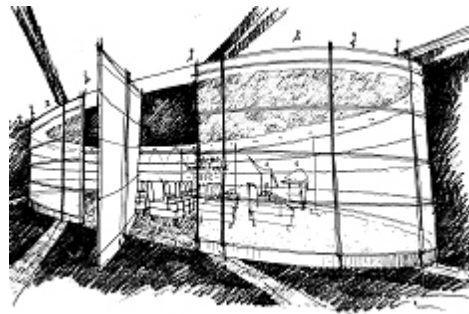
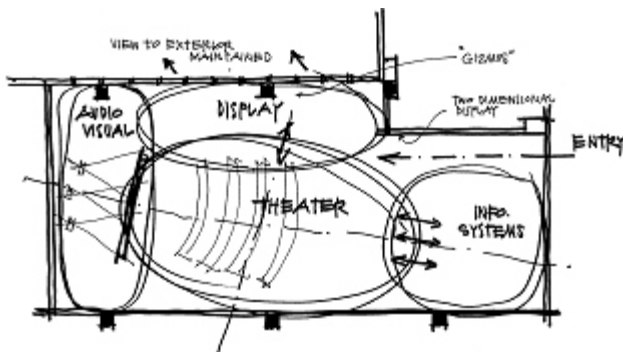


THE NATURE OF CREATIVE ENGINEERING

*the art and science of aural and visual communication*

**LEE SOUND DESIGN** is a full service consulting engineering firm specializing in technologies of the art and science of aural and visual communication. We apply our creative expertise to professional, commercial and residential environments where critical listening, entertainment viewing and multimedia communication occurs. We provide complete design and project management services to bring professional world class solutions to your organization.

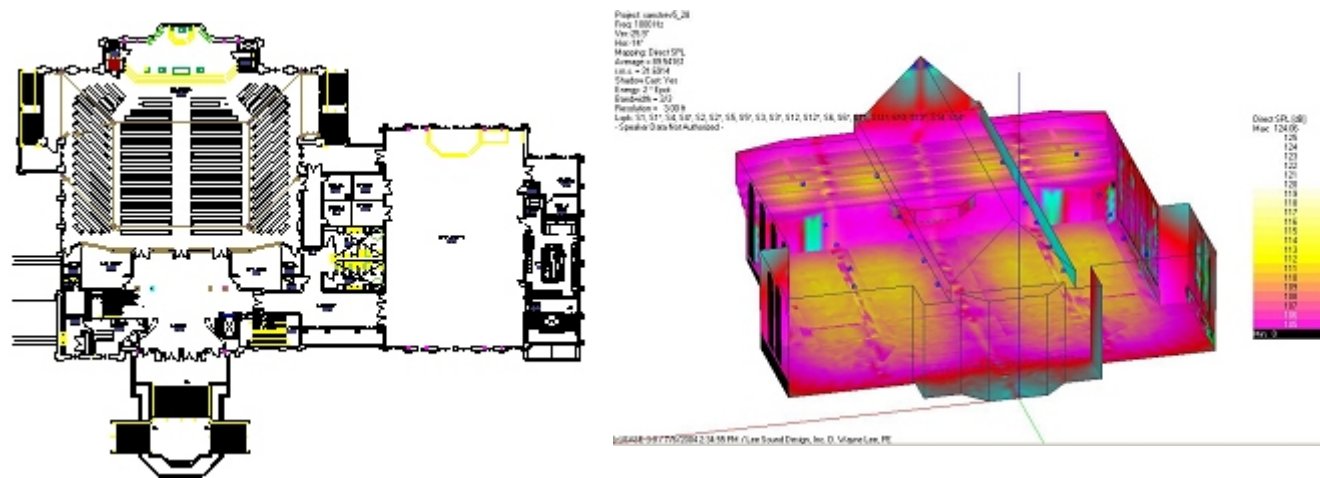
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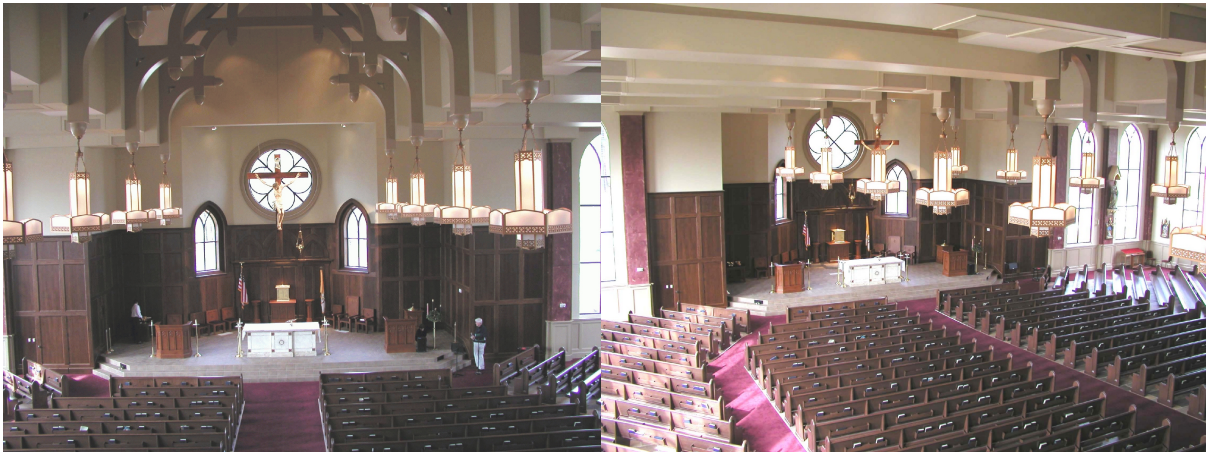
TO REALITY:



FROM CONCEPT:



TO REALITY:



OTHER  
EXAMPLES:



We were founded in 1993 to provide professional consulting engineering and construction management services to the industry. Our mission:

- Provide quality consulting services for a fair price
- Maintain a level of professionalism that elevates the respect and recognition of acoustical and specialty consultants in the professional engineering community
- Educate architects, engineers and the public in these technologies. Hearing and seeing are the oldest forms of communication, while at the same time aural and visual technologies remain one of the least understood technologies in today's world.

## Lee Sound Design Services include:

### Systems Design

- Large and Small Venue Sound Systems
- Multimedia Presentation Facilities
- Videoconference and Distance Learning Systems
- Acoustics for Speech Reinforcement - Music Quality - Noise Control

### Facilities Design and Planning

- Audio-Visual Spaces - Ergonomics - Lighting - Acoustics
- Architectural Acoustics and Noise Control Consulting
- Technology Planning - Programming - Budgeting - Feasibility

### Custom Technology Services

- Certified Control System Programming and Design
- Control System Web Page Design and Graphic Interface Design

### Our Facility and System Design Experience includes:

Performing Arts Facilities

Convention Centers and Hotels

Worship Spaces

Arena, Stadium, and Sports Facilities

Government and Educational Rooms

Corporate Conference Rooms

Computer Presentation Rooms

Training Rooms

Video Production Studios

Audio Recording Studios

Band & Choral Rehearsal Rooms

Museums and Exhibit Spaces

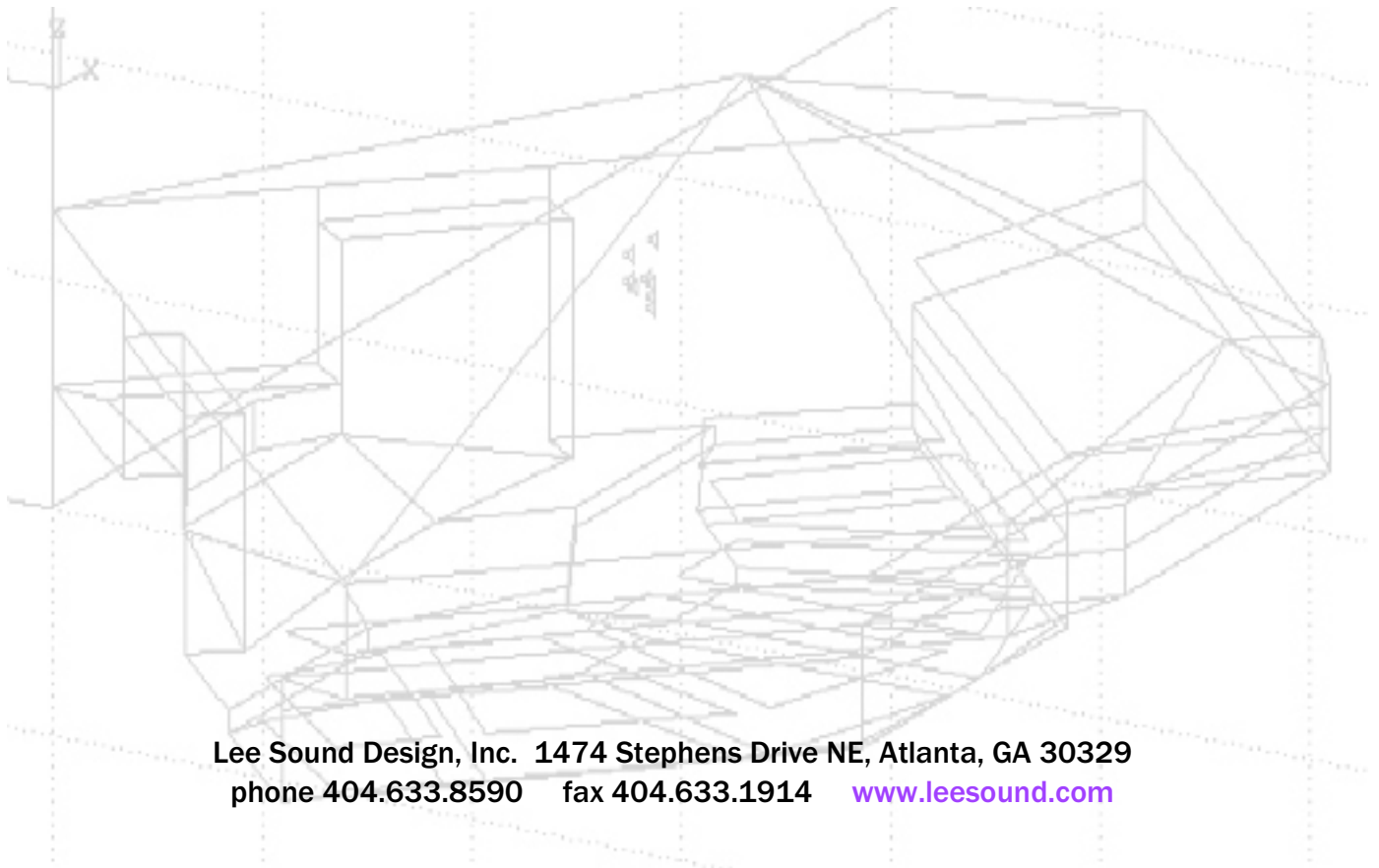
Courtrooms and Law Schools

Auditoria, Theaters and Concert Halls



## Why Choose Lee Sound Design?

- Registered Professional Engineering in Georgia, South Carolina and Florida
- Certified Technology Specialists
- Member of the National Council of Acoustical Consultants
- Sponsor of the National Systems Contractors Association
- Member of the International Communications Industries Association
- Proven Performance on multi-million dollar projects
- Laboratory and Field Measurements according to ASTM Standards
- Time Delay Spectrometry (TEF Method), FFT Analysis and MLS Analysis
- Pre-construction Performance Predictions and Computer Modeling
- Contract Administration and Construction Observation
- Seminars, Presentations and Training Workshops
- Professional Liability Insurance for Errors and Omissions



Lee Sound Design, Inc. 1474 Stephens Drive NE, Atlanta, GA 30329  
phone 404.633.8590 fax 404.633.1914 [www.leesound.com](http://www.leesound.com)

**D. Wayne Lee, P.E.** offers over 35 years of proven experience in various aspects of the industry. A graduate of the Georgia Institute of Technology, he studied under Dr. W. Marshall Leach, Jr., School of Electrical Engineering and performed *extensive* studies under Dr. Eugene T. Patronis, Jr., School of Physics. Georgia Tech studies included audio engineering, acoustical engineering, electronic instrumentation, loudspeaker design, fiber optics and noise reduction techniques.

Industry experience started in 1981 with Western Electric, Co. where Mr. Lee was a Field Engineer supporting submarine sonar systems and designing test sets for the Navy's ballistic submarine fleet. Responsibilities included field support of the existing analog system and prototype testing of the all digital system under development at Bell Laboratories. Then a move to Altec Lansing, Corp. as a Senior Development Engineer brought the establishment of the Electronics R. & D. Department in Oklahoma City. As the group leader Mr. Lee was involved in new product development and existing product support. Projects included development of power amplifiers, automatic microphone mixers, equalizers, and signal processors.

Starting in 1986, Mr. Lee spent nearly eight years as the Engineering Manager for Baker Audio/Telecom, an established design/build contracting firm in Atlanta that specializes in acoustics, sound systems and audio visual systems. There he pioneered computer assisted sound system design and acoustical measurements utilizing the Techron TEF Analyzer. System performance was predicted prior to installation and field verified with site measurements after installation. This background in design/build contracting offers practical experience many consultants may not be able to provide. In 1993, Mr. Lee founded Lee Sound Design, Inc.

## **EDUCATION**

Bachelor of Electrical Engineering - Georgia Institute of Technology - 1981  
SYN-AUD-CON Electro-acoustic Seminar Graduate - 1987  
SYN-AUD-CON Loudspeaker Designer's Workshop Staff Assistant - 1988  
SYN-AUD-CON Sponsored Intelligibility II Workshop, Indiana University - 1990  
ASTM Training on Acoustics and Noise Control for Office,  
Architectural and Industrial Applications - 1991  
Professional Liability Education Program for Architects and Engineers - 1997, 1999  
TEF Level II - Advanced Workshop Space Acoustics & Sound Analysis Workshop - 2000  
TEF Level III - Advanced Workshop on Speech Intelligibility - 2001  
SYN-AUD-CON Sound System Design & Optimization Seminar - 2002  
SYN-AUD-CON Acoustic Test and Measurement Workshop - 2002  
SYN-AUD-CON Loudspeaker Array Workshop - 2002  
SYN-AUD-CON Architectural Acoustics Workshop - 2003  
SYN-AUD-CON Hums, Buzzes and Radio Frequency Interference Workshop - 2005  
SYN-AUD-CON Equalization Workshop EQ07- 2007  
SYN-AUD-CON Digital Audio Workshop - 2008  
Audio Engineering Society - Atlanta Section - Acoustical Measurement Workshop  
Instructor - 2011

## **PROFESSIONAL SOCIETIES**

Member - Audio Engineering Society (AES), Chairman - Atlanta Chapter - 1994, 1995  
Member - Acoustical Society of America (ASA)

**Michael E. Cooper, CTS** joined Lee Sound Design, Inc. in 1997 as a Principal Consultant. Mr. Cooper brings over 38 years of experience in design and project management for several aspects of our industry including, video systems, audio visual facilities, computer control systems and sound reinforcement systems. Additionally, he worked in video production and engineering for several Universities and hospitals.

Mr. Cooper started his career in video and audio technology as the Chief Television Engineer for Baptist Memorial Hospital in Memphis, Tennessee. Then, during the late nineteen eighties, Mr. Cooper was Director of Technology Planning for Georgetown University. During that period he designed the television studio, production and editing suites on-campus. As well he was responsible for technical direction, editing and production work.

Most recently Mr. Cooper was Engineering Manager for Baker Audio/Telecom. Prior to that he worked with Mr. Lee as a Senior Systems Design Engineer. Responsibilities included consulting, design, project management and installation management for all forms of audio and visual related projects. One specific area of expertise is computer control system design and programming.

## **EDUCATION**

Vietnam Era Veteran in the United States Navy  
Associate of Science Electronics Technology - Memphis State University - 1966  
United States Navy Advanced Electronics School - MIT Curriculum - 1968  
IBM Local Area Network (LAN) Design and Maintenance - 1987  
SYN-AUD-CON Electro-acoustic Seminar Graduate - 1991  
ICIA Sponsored Audio/Visual Technical Courses - 1989-99  
Sony Corporation Display and Projection Products Technical Training - 1990-99  
BARCO, Inc. Large Display and Projection Products Technical Training - 1990  
Crown International, Inc. Factory Training for Computer Control of  
    Sound Systems using the Crown IQ System - 1993 Certified  
Extron Electronics, Inc. - Consultants Workshop - Improving Tour Image - 1999  
Atlanta Signal Processing, Inc. (ASPI Digital) - Conference Room Design - 1999  
Communication Technology Specialist (CTS) Designation - 1999  
Professional Liability Education Program for Architects and Engineers - 2000  
Crestron Level III Programming Certification Class - 2002  
Infocomm Sponsored Technical Courses in Audio Ethernet Networks, Integrating IP  
    into Audio/Visual Systems, A/V Streaming Fundamentals and Fiber Optic  
    System Architecture - 2003, 2006  
    Designing Digital Signage, Emerging Display Technologies - 2009

## **PROFESSIONAL SOCIETIES**

Member - Society of Motion Picture and Television Engineers (SMPTE)  
Member - Infocomm Independent Consultants in Audiovisual Technologies (ICAT)

## **CURRENT AND RECENT PROJECTS**

**Hillcrest Church of Christ**, Decatur, GA - Acoustical design and audio-visual system design for a 1000 seat Sanctuary and Education Building. Designed for improved vocal acoustic music performances. Contract administration, construction observation and performance testing will be provided.

Client: Croft & Associates Architects, Kennesaw, GA

Client: Hillcrest Church of Christ, Decatur, GA

**Springfield Elementary School**, Charleston, SC - Acoustical design and review for LEED for Schools certification of an Elementary School.

Client: Glick/Boehm & Associates, Charleston, SC

**CNN International Control Rooms F and G**, Atlanta, GA - Acoustical design and computer simulation of two control rooms and two audio rooms. Simulation modeling with performance predictions including responses at individual seats in the control room. Construction administration for installation and system optimization.

Client: Comprehensive Technical Solutions, Atlanta, GA

**Trident Technical College Radio/Film and TV School**, Charleston, SC - Planning, programming and budget development for a 17,000 square foot facility, including acoustics, electrical infrastructure, video systems and audio systems. To facilitate hands-on training with professional television and radio production equipment including: studio and field cameras; lighting instruments; video, post-production equipment as well as sound, recording and mixing equipment. Areas planned include lecture rooms, lab classrooms, computer labs, digital editing suites, TV/Film production studios, TV/Film control room, sound recording studio and control room, radio studio control rooms and a conference room.

Client: Glick/Boehm & Associates, Charleston, SC

**Decatur Recreation Center**, Decatur, GA - Acoustical, sound and video system design for a city recreation facility including a family gymnasium, divisible multipurpose/aerobics studio, multiple meeting rooms, conference rooms, social lounges, lobby and art rooms. Contract administration, construction observation and performance testing will be provided.

Client: LP3/Praxis3 Architects, Atlanta, GA

**First Baptist Church**, Jonesboro, GA - Acoustical re-design and a new sound system design for an existing 2775 seat Sanctuary. Electro-acoustic computer modeling performed for acoustical design and sound system performance predictions. Orchestra, choir and blended music production capabilities. Sound system commissioning provided.

Client: First Baptist Church, Jonesboro, GA

**Montessori School of Charleston Elementary School**, Charleston, SC - Acoustical design and review for LEED for Schools certification of an Elementary School.

Client: Glick/Boehm & Associates, Charleston, SC

**Charleston School of Law**, Charleston, SC - Acoustical review and sound masking system design for a two-level law reference library. System commissioning and site evaluation included.

Client: Glick/Boehm & Associates, Charleston, SC

**Beaufort County Courthouse**, Beaufort, SC - Acoustical review of Government Center Atrium for reverberation and noise. Report with recommendations provided.

Client: Glick/Boehm & Associates, Charleston, SC

**Harbor View Elementary School**, Charleston, SC - Acoustical design and review for LEED for Schools certification of an Elementary School.

Client: Rosenblum Coe Architects, Charleston, SC

**YSM Design**, Atlanta, GA - Acoustical evaluation and recommendations for interior activity noise control, room isolation and interior acoustics for a architectural design studio.

Client: YSM Design, Atlanta, GA

**Central Carolina Technical College**, Sumter, SC - Acoustical Design of a round Lecture Hall and a large divisible Multipurpose Room.

Client: LS3P Associates, LTD, Charleston, SC

**Colleton High School**, Colleton County, SC - Acoustical design of a 1000 seat Auditorium, Band Rehearsal Room, Choral Rehearsal Room, Individual Practice Rooms and classrooms.

Client: Liollo Architecture, Charleston, SC

**Hancock County Historic Courthouse**, Bay St. Louis, MS - Acoustical analysis and re-design of an existing historic courtroom. Acoustical measurements and tests were performed by a local firm. Electro-Acoustic computer modeling was required to determine acoustical treatments. BASWAPhon plaster like absorbing material was selected for it's aesthetic and acoustic value and to keep within historic guidelines.

Client: Cinemagic LLC, Bay St. Louis, MS

**Georgia Perimeter College Decatur Campus**, Decatur, GA - Audio-visual system design for a Lecture Hall, Dining Area multiple classrooms and conference rooms. Sound system design for the Gymnasium. Contract administration, construction observation and performance testing will be provided.

Client: Georgia Perimeter College, Atlanta, GA

**Georgia Perimeter College Dunwoody Campus**, Dunwoody, GA - Audio-visual system design for an Auditorium, Lecture Hall, multiple classrooms and conference rooms. Gymnasium sound system design. Contract administration, construction observation and performance testing will be provided.

Client: Georgia Perimeter College, Atlanta, GA

**Lee University Chapel**, Cleveland, TN - Acoustical design and sound system design for a 400 seat Chapel. Designed for improved acoustic music performance. Contract administration, construction observation and performance testing will be provided.

Client: Cope Associates, Rardin & Carroll Architects, Lee University, Cleveland, TN



## **CLIENTS AND PROJECTS**

### **EDUCATIONAL FACILITIES**

#### **Universities and Colleges**

Georgia Perimeter College/Georgia State University Clarkston, Atlanta, GA  
Georgia State University CineFest Theater, Atlanta, GA  
Lee University Pangle Hall, Cleveland, TN  
Georgia Military College Fairburn, GA  
Motlow State College, Tullahoma, TN  
Charleston School of Law, Charleston, SC  
Trident Technical College Radio/Film and TV School, Charleston, SC  
Georgia Perimeter College Lakeside Administration Building, Tucker, GA  
Lee University Chapel, Cleveland, TN  
Central Carolina Technical College, Sumter, SC  
North Georgia Technical College Clarkesville, GA  
Georgia Perimeter College - Decatur Campus, Decatur, GA  
Georgia Perimeter College - Clarkston Campus, Clarkston, GA  
Georgia Institute of Technology, Atlanta, GA  
Fort Valley State University, Fort Valley, GA  
Georgia Perimeter College - Dunwoody Campus, Dunwoody, GA  
Georgia Perimeter College - Newton Campus, Monroe, GA  
Tuskegee University - College of Business and Information Technology, Tuskegee, AL  
University of the South All Saints Chapel, Sewanee, TN  
University of the South McClurg Dining Hall, Sewanee, TN  
Trident Technical College, Culinary Institute of Charleston, Charleston, SC  
Vanderbilt University, Nashville, TN  
Macon State College, Macon, GA  
Athens Technical College, Athens, GA  
Georgia State University, Atlanta, GA  
Kennesaw State University, Kennesaw, GA  
Georgia Southern University School of Information Technology, Statesboro, GA  
Vanderbilt University Law School, Nashville, TN  
Medical University of South Carolina, Charleston, SC  
South Carolina State University, Orangeburg, SC  
The McKimmon Center, NC State University, Raleigh, NC  
University of South Carolina at Aiken, Aiken, SC  
United Arab Emirates Faculty of Medicine, Al Ain, UAE  
Midlands Technical College Harbison Campus, Columbia, SC

#### **Middle Schools, High Schools and Specialty Schools**

Addlestone Hebrew Academy, Charleston, SC  
Springfield Elementary School, Charleston, SC  
Montessori School of Charleston Elementary School, Charleston, SC  
Pace Academy, Atlanta, GA  
Jerry Zucker Middle School, Charleston, SC  
McCormick Middle School Gymnasium, McCormick, SC  
Harbor View Elementary School, Charleston, SC  
Spring Valley High School, Columbia, SC  
Anderson Middle School, Anderson, SC

Moultrie Middle School, Moultrie, SC  
Colleton High School, Colleton County, SC  
Anderson Middle School, Columbia, SC  
Chesnee High School, Chesnee, SC  
Sophia Academy, Atlanta, GA  
York High School, Charleston, SC  
Pensacola High School, Pensacola, FL  
Fellowship Christian School, Roswell, GA  
Rawlinson Road Middle School, Rock Hill, SC  
Gibbes Middle School, Columbia, SC  
Carver High School, Atlanta, GA  
Sumter High School, Sumter, SC  
Bluffton High School, Bluffton, SC  
New Wando High School, Charleston, SC  
Boiling Springs Junior High School, Boiling Springs, SC  
The Renaissance Center, Dickson, TN  
West Ashley High School, Charleston, SC  
Dutch Fork High School, Irmo, SC  
Southeast Middle School, Richland County, SC  
Rock Hill Middle School, Rock Hill, SC  
Chester Middle School, Chester, SC  
Clayton County Schools Performing Arts Center, Jonesboro, GA  
Walhalla High School Auditorium, Oconee Co, SC  
Seneca High School Auditoriums, Oconee Co, SC  
Horry County Schools, Horry Co., SC

### **WORSHIP SPACE PROJECTS**

Lake Oconee Presbyterian Church, Eatonton, GA  
Northwest Christian Church, Acworth, GA  
St. Francis Cabrini Catholic Church, Lebanon, TN  
St. Thomas Aquinas Catholic Church, Alpharetta, GA  
Christ The King Catholic Church, Pastoral Center, Pine Mountain, GA  
St. Pius X Catholic Church, Conyers, GA  
Langdale United Methodist Church, Valley, AL  
First United Methodist Church, Enterprise, AL  
Holy Transfiguration Greek Orthodox Church, Marietta, GA  
St. Matthew's Lutheran Church, Charleston, SC  
New Hope Baptist Church, Fayetteville, GA  
Salem Baptist Church, McDonough, GA  
Saint James Episcopal Church, Clayton, GA  
Church of the Good Shepherd, Cumming, GA  
Woodruff Road Presbyterian Church, Greenville, SC  
Pleasant Grove Baptist Church, Ellijay, GA  
Hillcrest Church of Christ, Decatur, GA  
First Baptist Church, Jonesboro, GA  
Cartecay United Methodist Church, Ellijay, GA  
St. Joseph's Catholic Church, Dalton, GA  
Cathedral of Christ the King, Kenny Hall, Atlanta, GA  
First United Methodist Church, Brevard, NC  
First Presbyterian Church, Covington, GA

Covenant Church, Douglas, GA  
First Baptist Church Youth Theater, Atlanta, GA  
Saint Francis of Assis Catholic Church, Blairsville, GA  
First Baptist Church, Statesboro, GA  
Catholic Church of Saint Ann, Marietta, GA  
Episcopal Church of the Holy Family, Jasper, GA  
Saint Lawrence Catholic Church, Lawrenceville, GA  
Zion Hill Baptist Church, Atlanta, GA  
First Church of the Nazarene, Nashville, TN  
First United Methodist Church, Lawrenceville, GA  
Atlanta Chinese Christian Church, Atlanta, GA  
Church of God of East New York, Brooklyn, NY  
Immaculate Heart of Mary Catholic Church, Atlanta, GA  
Saint Peter Chanel Catholic Church, Roswell, GA  
Christ the King Catholic Church, Pine Mountain, GA  
Main Street United Methodist Church, Columbia, SC  
Hiland Park Baptist Church, Pensacola, FL  
AL-FAROOQ MASJID Islamic Mosque, Atlanta, GA  
First Presbyterian Church, Dalton, GA  
First Presbyterian Church, Atlanta, GA  
University of the South All Saints Chapel, Sewanee, TN  
First United Methodist Church, Montgomery, AL  
Low Country Community Church, Bluffton, SC  
Prince of Peace Catholic Church, Taylors, SC  
New York Full Gospel Korean Church, Flushing NY  
All Saints Catholic Church, Atlanta, GA  
Village Baptist Church, Destin, FL  
Christian Life Assembly, Cumberland, PA  
Maple Hill Church of God, Lebanon, TN  
In Touch Ministries World Training Center, Atlanta, GA  
First Baptist Church, Atlanta, GA  
Cathedral of the Incarnation Catholic Church, Nashville, TN  
University Park Baptist Church, Charlotte, NC  
Holy Spirit Catholic Church, Dunwoody, GA  
St. Brigid Catholic Mission Church, Alpharetta, GA  
Oakhurst Baptist Church, Decatur, GA  
St. Peter Chanel Catholic Mission, Roswell, GA  
First United Methodist Church of Anniston, Anniston, AL  
Free Chapel Worship Center, Gainesville, GA  
Vineville Baptist Church - North, Macon, GA  
Victory Christian Center, Charlotte, NC  
Forest Hill Church, Charlotte NC  
Warner Robins First Methodist Church, Warner Robins, GA  
Auburn United Methodist Church, Auburn, AL  
St. Philip's Episcopal Church, Charleston, SC

#### **CORPORATE HEADQUARTERS AND TRAINING FACILITIES**

YSM Design, Atlanta, GA  
NCR Singapore, Atlanta, GA  
NCR The Worlds, Peachtree City, GA

Gilmore Foundation Conference Center, Armory, MS  
McKesson Corporate Headquarters, Alpharetta, GA  
Media Solutions, Atlanta, GA  
Fernbank Museum of Natural History  
Wild Dunes Resort Village, Isle of Palms, SC  
Lexmark International, Lexmark, KY  
In Touch Ministries World Training Center, Atlanta, GA  
HBO & Company Headquarters, Alpharetta, GA  
American Red Cross, Atlanta, GA  
CompDent Corporation, Atlanta, GA  
Charleston Technical Center/WestVaco Facility, Charleston, SC  
Woodruff Arts Center Circle Room, Atlanta, GA  
Spartanburg Regional Medical Center, Spartanburg, SC  
Arthritis Foundation National Office, Atlanta, GA

### **GOVERNMENT FACILITIES**

Superior and Juvenile Courtroom Renovations, Newton County, GA  
Ft. Bragg Group HQ & Battalion Ops Facility, Ft. Bragg, NC  
Beaufort County Courthouse, Beaufort, SC  
Robins AFB Deployment Readiness Training Center Air Force Reserve Command Band Facility, Warner Robins, GA  
Decatur Recreation Center, Decatur, GA  
Hancock County Historic Courthouse, Bay St. Louis, MS  
Ray Charles Park, Albany, GA  
Whitfield County Public Hearing Room, Dalton, GA  
Troup County Government Center, LaGrange, GA  
Jefferson County Shades Valley Complex Training Room, Birmingham, AL  
Cobb County Superior Courts Courtroom of the Future, Marietta, GA  
Statesville Civic Center, Statesville, NC  
Institute of Nuclear Operations, Inc, Atlanta, GA  
Ft. Gillem Army Distribution Center, Atlanta, GA  
Dorchester Co. Human Services and Law Enforcement Complex, Charleston, SC  
Nuclear Assurance Corporation, Norcross, GA  
South Carolina Employment Security Commission, Columbia, SC

### **THEATER AND AUDITORIUM PROJECTS**

Carroll County Performance Center, Carrollton, GA  
Fernbank Museum of Natural History, Atlanta, GA  
Pensacola High School, Pensacola, FL  
Jepson Center for the Arts - Telfair Museum of Art, Savannah, GA  
Gibbes Middle School, Gibbes, SC  
Sumter High School, Sumter, SC  
Bluffton High School, Bluffton, SC  
New Wando High School, Charleston, SC  
Boiling Springs Junior High School, Boiling Springs, SC  
The Renaissance Center, Dickson, TN  
West Ashley High School, Charleston, SC  
Southeast Middle School, Richland County, SC  
Rock Hill Middle School, Rock Hill, SC  
Chester Middle School, Chester, SC

Clayton County Schools Performing Arts Center, Jonesboro, GA  
Walhalla High School Auditorium, Oconee Co, SC  
Seneca High School Auditoriums, Oconee Co, SC  
Horry County Schools, Horry Co., SC  
University of South Carolina at Aiken, Aiken, SC  
United Arab Emirates Faculty of Medicine, Al Ain, UAE  
Gatlin Brothers Theater, Myrtle Beach, SC  
South Carolina Employment Security Commission, Columbia, SC  
Midlands Technical College Harbison and Airport Campus, Columbia, SC

### **RECORDING STUDIO AND PRODUCTION FACILITIES**

CNN International Control Rooms F and G, Atlanta, GA  
NBA on TNT Live TV Set, Turner Studios, Atlanta, GA  
Georgia Tech Musicians Network "Under The Couch", Atlanta, GA  
The New Schools at Carver, Atlanta, GA  
Vericom Corporation, Roswell, GA  
Manchester Recording Studios, Manchester, TN  
In Touch Ministries World Training Center, Atlanta, GA  
University Park Baptist Church, Charlotte, NC  
Hawk's Ridge Recording Complex, Atlanta, GA  
Georgia State University Digital Arts & Entertainment Lab Video Routing and Production Facility, Atlanta, GA  
The Renaissance Center, Dickson, TN  
Georgia State University Instructional Tech Center Production Studio, Atlanta, GA  
Crash Bang Wallop Studio, Stone Mountain, GA

### **ACOUSTICAL AND NOISE CONTROL PROJECTS**

Philadelphia College of Osteopathic Medicine, Suwanee, GA  
Fellowship Christian School, Roswell, GA  
Riverside Park Amphitheater, Roswell Recreation and Parks Department, Roswell, GA  
Alpharetta BellSouth Central Office Expansion, Alpharetta, GA  
Chastain Park Amphitheater, Atlanta, GA  
Wood Hollow Apartment Complex, Atlanta, GA  
Laurens Place Condominium/Maritime Center, Charleston, SC  
Blast Cleaning Products of Atlanta, Cumming, GA  
Nuclear Assurance Corporation, Norcross, GA

### **SPORTS ARENA AND STADIUM PROJECTS**

Georgia Perimeter College/Georgia State University Clarkston, Atlanta, GA  
Fellowship Christian School, Roswell, GA  
Georgia Dome Phased Renovation, Atlanta, GA  
American Airlines Arena, Miami, FL  
New Atlanta Philips Arena, Atlanta, GA  
Broward County Civic Arena, Sunrise, FL  
Centennial Olympic Stadium, Atlanta, GA  
Olympic Tennis Center, Stone Mountain, GA  
Morris Brown College Stadium, Atlanta, GA  
Clark Atlanta University Stadium, Atlanta, GA  
Morehouse College Gymnasium, Atlanta, GA  
Gator Bowl Stadium, Jacksonville, FL



# VICTORY CHRISTIAN CENTER CHARLOTTE, NORTH CAROLINA

LEE SOUND DESIGN



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ACOUSTICAL CONSULTANT:	Lee Sound Design, Inc.
ARCHITECT:	The Omni Associates - Architects, Inc.
OWNER:	Victory Christian Center
LIGHTING CONSULTANT:	The Light Source, Inc.
SOUND & AV CONSULTANT:	Audio Ethics, Inc. and Lee Sound Design, Inc.
CONSTRUCTION COST:	25 Million USD
COMPLETION DATE:	2002

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Victory Christian Center is a contemporary worship center which includes a 4700 seat sanctuary, TV studio and various edit and control suites. Unique architecture includes a 236 foot diameter circular layout with a free span geodesic domed roof structure over the sanctuary. Several acoustical systems were designed and employed to reduce the effects of the circular room and domed ceiling.

An electro-acoustic computer model was generated for statistical analysis and ray tracing analysis. Mid band reverberation times of under 1.5 seconds were targeted and achieved. Sanctuary walls were continuous coverage of standard 2" thick semi-rigid fiberglass board with the middle 1/3 consisting of a layer of very accurate Binary Amplitude Diffusor templates continuous around the sanctuary. This provided high frequency diffusion instead of excessive absorption.

Various size acoustically diffusive clouds were suspended overhead to enhance singing by scattering sound back down onto the congregation. Clouds were provided in sizes of 8'x8' and 16'x16' suspended at various heights and locations overhead. Over 950 formed 1-Dimensional Quadratic Residue Diffusor panels were arranged in different orientations in grid systems.

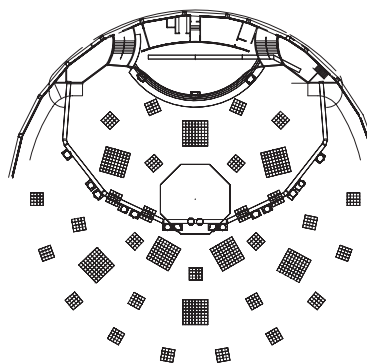
## CRITICAL DATA

Total Facility Size:	85,000 square feet
Sanctuary Volume:	1,770,000 cubic feet
Seating Capacity:	4700 Seats
Measured Reverberation Time (Mid-Band, Unoccupied)	1.3 seconds
Measured Speech Intelligibility (Unoccupied)	7% to 9% ALCons 0.59 to 0.54 STI
Measured Noise Level:	NC-35

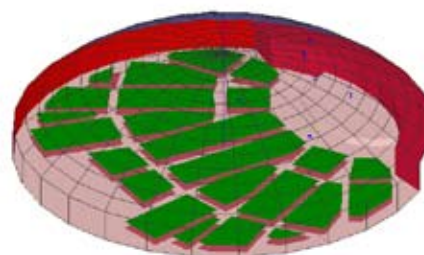
The stage walls are absorptive with standard 2" thick fiberglass panels, down to 4' AFF. Below that is a row of 1-Dimensional Quadratic Residue Absorber-Diffusor panels continuous around the stage wall. The center apex of the dome is treated with suspended fiberglass filled, vinyl rip stock banner systems, arranged in a criss-crossed manner, 50 feet in diameter, to reduce focusing. Frictional broadband low frequency absorbers or bass traps were installed under the concrete risers for absorption down to 50 Hz and in a large rear wall chambers absorbing down to near 20 Hz.

Reverberation times, ITDG, and speech intelligibility were predicted and calculated prior to construction. After construction these parameters were measured and verified using primarily Time Delay Spectrometry and the TEF Analyzer.

## DIFFUSIVE CLOUD PLACEMENT



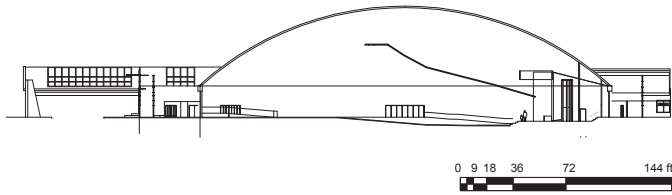
## COMPUTER MODEL



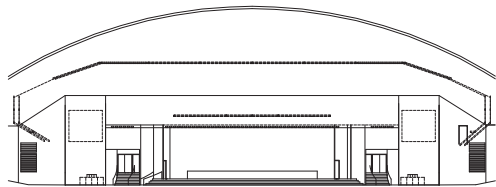
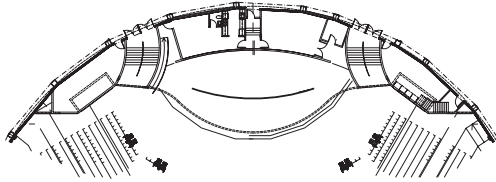
# VICTORY CHRISTIAN CENTER CHARLOTTE, NORTH CAROLINA

LEE SOUND DESIGN

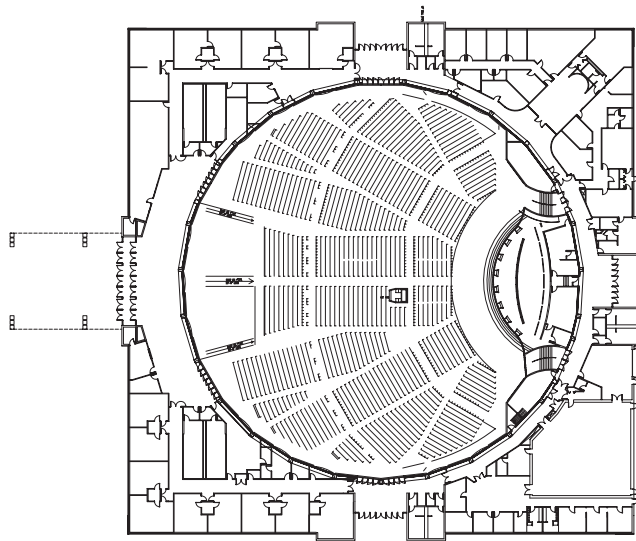
THE NATURE OF CREATIVE ENGINEERING



LONGITUDINAL SECTION



STAGE VIEWS



FLOOR PLAN



LOUDSPEAKER COVERAGE - 1000 HZ DIRECT SPL



# SAINT BRIGID CATHOLIC CHURCH

## ALPHARETTA, GEORGIA

ACOUSTICAL CONSULTANT:	Lee Sound Design, Inc.
ARCHITECT:	CDH Partners, Inc.
OWNER:	Roman Catholic ArchDiocese of Atlanta
ORGAN CONSULTANT:	Keith Shafer
ORGAN:	Casavant Frères
SOUND AND AV CONSULTANT:	Muzak Atlanta and Lee Sound Design, Inc.
CONSTRUCTION COST:	15 Million USD
COMPLETION DATE:	2003

Saint Brigid lived in Ireland in the 5th century; a holy woman, granted by the grace of God, great gifts of spiritual leadership, devotion in prayer, patience and compassion. Brigid is probably the best known Irish saint since Saint Patrick - the patron saint of Ireland.

Acoustical and sound system design was performed for the 1000 seat Sanctuary, 750 seat Parish Hall and 150 seat Chapel. Emphasis was placed on organ acoustics and speech intelligibility as a priority. Acoustical elements were integrated into the architecture in an unobtrusive manner. Multiple layers of gypsum board were employed to support organ acoustics. A study of the diaphragmatic characteristics of the stain glass windows was performed. Reverberation measurements were taken before and after the windows were installed over the exterior glass. Fortunately, they showed little influence. A splayed sectional balcony face added to the low frequency diffusion. Many irregular shapes and varying depths were incorporated into window and door trim. Diffusive wall elements included false columns and full statues at the Stations of the Cross.

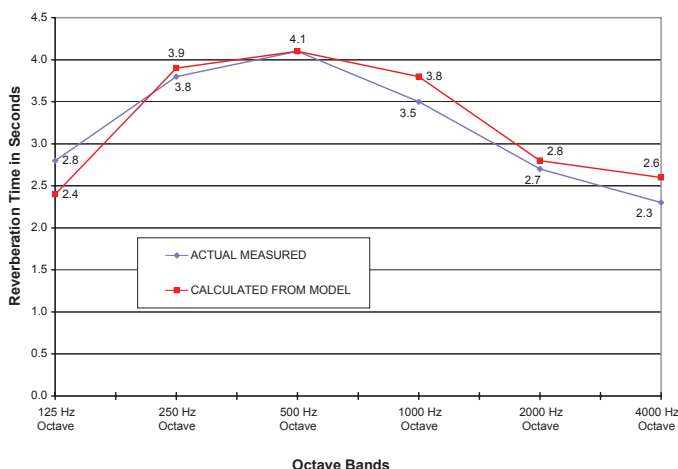
The loudspeaker system consisted of 20 highly directive mid-high frequency loudspeaker modules in an overhead semi-distributed angled arrangement. All speech reinforcement loudspeakers are located within 22 feet of the listeners to increase the Direct-to-Reverberant energy and speech intelligibility. They are recessed into the false ceiling beams and hidden from sight. The large antiphonal choir needs no sound reinforcement support for full projection into the Nave. But a small music playback loudspeaker system is installed and aimed from the rear to provide some sound reinforcement for the smaller choirs, children's choir and even a Praise Band.

Since 1879, Casavant has installed over 3,800 instruments all over the world. This one, Opus 3832, is the fifteenth Casavant installation in the state of Georgia since the first arrived in Statesboro more than forty years ago. It contains 2,153 pipes, in 37 ranks, playable with 30 stops over two manuals and pedalboard.

### CRITICAL DATA

Sanctuary/Nave Effective Surface Area:	85,000 square feet
Sanctuary/Nave Volume:	305,000 cubic feet
Seating Capacity:	1000 Seats
Volume Per Seat:	305 cubic feet
Organ Cost:	580,000 USD
Measured Speech Intelligibility (Unoccupied)	11% to 15% ALCons 0.50 to 0.45 STI
Measured Noise Level:	NC-30

### REVERBERATION TIMES - UNOCCUPIED



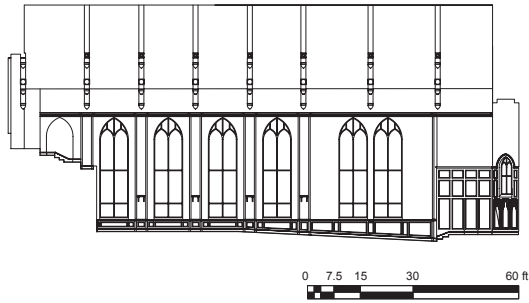


# SAINT BRIGID CATHOLIC CHURCH

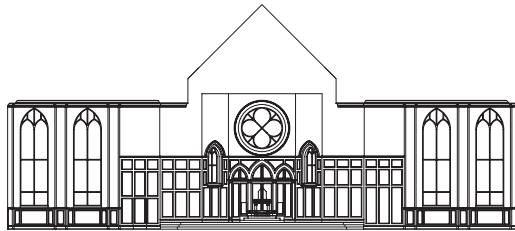
## ALPHARETTA, GEORGIA

LEE SOUND DESIGN

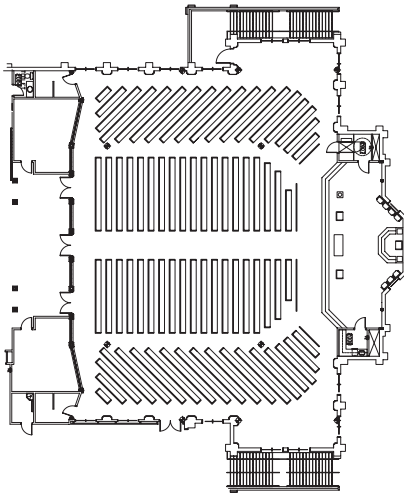
THE NATURE OF CREATIVE ENGINEERING



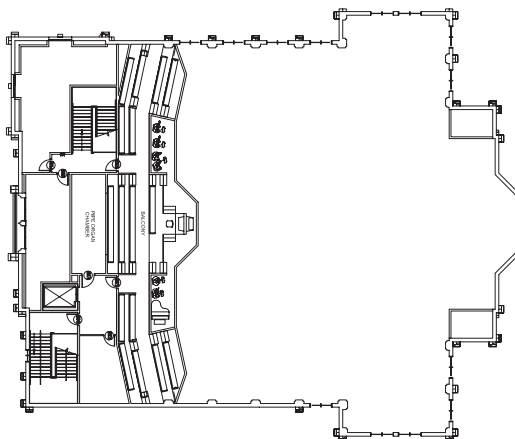
LONGITUDINAL SECTION



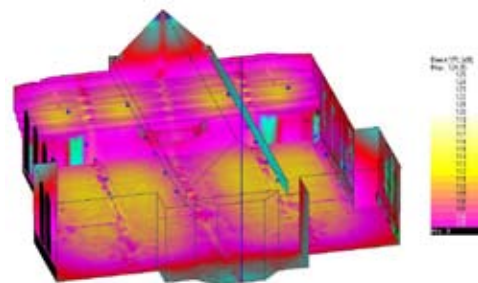
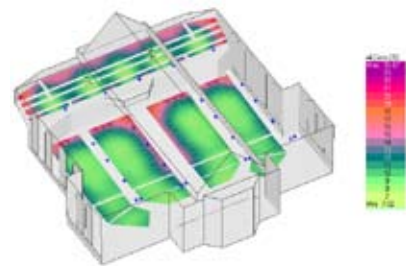
LATERAL SECTION



MAIN FLOOR PLAN



BALCONY FLOOR PLAN



COMPUTER MODELS

# AL FAROOQ MASJID OF ATLANTA

## ATLANTA, GEORGIA

ACOUSTICAL CONSULTANT:	Lee Sound Design, Inc.
ARCHITECT:	Design Arts Studio
DESIGN BUILD FIRM:	Engineering Design Technologies, Inc.
OWNER:	Al Farooq Masjid of Atlanta
SOUND AND AV CONSULTANT:	Lee Sound Design, Inc.
CONSTRUCTION COST:	10 Million USD
COMPLETION DATE:	2007

Al Farooq Masjid of Atlanta is the largest mosque in the Southeast and was designed with traditional Muslim and interfaith concerns in mind. All mosques must face Mecca, the Saudi Arabian city where Muhammad, the founder of Islam, was born in A.D. 570. Making this work within the limitations of a modern city required orienting the mosques's prayer hall towards the northeast while the rest of the building sits squarely on the mid-town Atlanta block.

The facility features a 36 foot high dome over the main prayer hall, a 19 foot dome over the library/dawa center and a 131 feet high minaret. The main level consists of the main prayer hall, library/dawa center, men's ablution area and a gathering place. The upper level has a women's prayer hall, women's study & lounge, women's ablution area, and a glassed in mezzanine area where non-Muslims can view prayers below. The basement has several large, divisible meeting rooms and a kitchen.

Acoustical, sound and audiovisual system design was performed for the entire facility. Concerns and challenges were sound focusing by the dome and the octagon floor plan. Being a speech only worship service, the approach was to add absorption everywhere possible. The interior of the dome was designed with a

smooth, field applied, seamless absorbing finish system. The finish is an emulsion of mineral particles, which form a micro-porous membrane applied to pre-coated mineral wool supporting panels. After drying, the seams are sanded and multiple higher density (smaller mineral particles) base coatings are trowel applied and smoothed, providing the appearance of a seamless conventional gypsum or plastered surface. Traditional 2" thick, fabric wrapped, semi-rigid fiberglass panels were applied to all available wall surfaces to reduce the reverberation times and sound system reflections. Initially steerable line array loudspeakers were proposed to reduce the amount of sound impinging on the domed ceiling. Marble columns and ornate fixtures were too prevalent to allow this, so traditional mid-high frequency modules were recessed above the Minbar, where the iman speaks from. Facility wide audio/video overflow and monitoring capability exists on all levels. The meeting rooms have complete AV presentation systems as well. Unobtrusive exterior loudspeakers will be provided for the call to prayers.

Al Farooq Masjid is named after an early Islamic leader and companion of Muhammad. There are over 2 million American Muslims associated with over 1200 Mosques in the United States.

### CRITICAL DATA

Total Facility Size:	46,000 square feet
Worship Center Volume:	225,000 cubic feet
Worship Capacity:	1500 people
Calculated Mid-Band Reverberation Time:	Less than 1.5 seconds
Calculated Mid-Band Speech Intelligibility - Unoccupied	Less than 8% ALCons Less than 0.56 STI
Recommended Noise Level:	NC-20 to NC-30

### INTERIOR ELEVATION

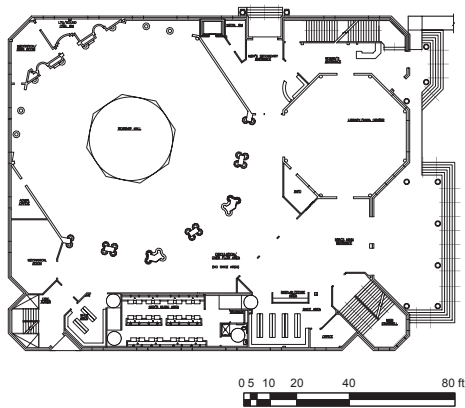




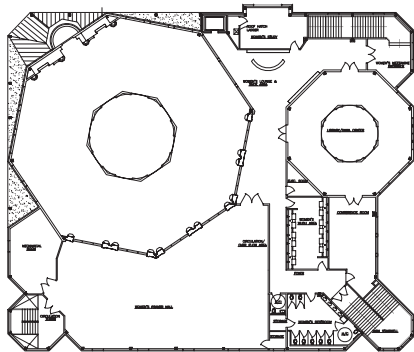
# AL FAROOQ MASJID OF ATLANTA

## ATLANTA, GEORGIA

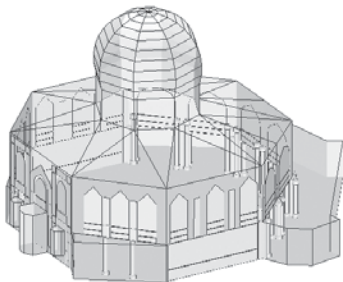
LEE SOUND DESIGN



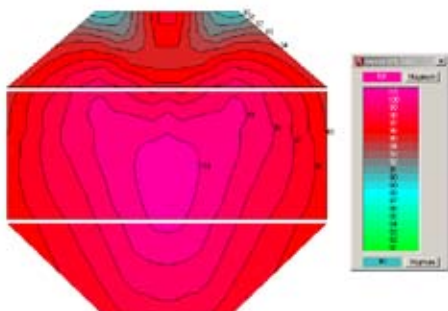
MAIN FLOOR PLAN



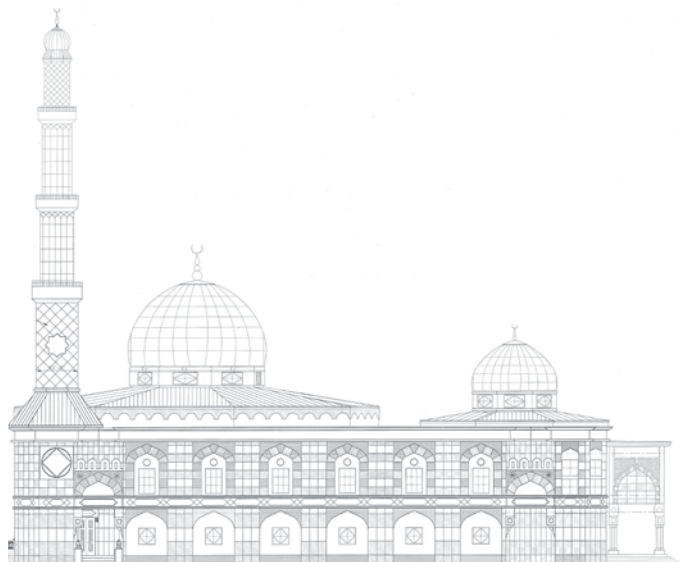
MEZZANINE FLOOR PLAN



RENDERING



LOUDSPEAKER COVERAGE - 1000 HZ DIRECT SPL



WEST ELEVATION