

CHRISTOPHER "TOPPER" SOWDEN, P.E.

Principal Consultant
Sowden and Associates
4604 Kenway Court
Fort Worth, TX 76132

Phone 817-346-0406
Fax 817-294-7713
Email: sowdenc@att.net
Web: www.sowdenassoc.com

Education

Bachelor of Science, Electrical Engineering, 1980
The University of Texas at Arlington
Advanced Seminars in Acoustics and Electro-Acoustics

Professional Registration

Registered Professional Engineer
1994, HI, PE-8359
1985, TX, 58156

Lecture and Member Organizations

Acoustical Society of America
Audio Engineering Society
American Institute of Physics
International Association of Auditorium Managers
National Systems Contractor's Association
Stadium Managers Association

Publications

"Grounding and Shielding Systems", " Sound System Engineering
"Sound Reinforcement Systems Presentation," Papers Chairman - AES Convention, 1985
"Comiskey Park II-Same Name, New Face," Sound & Video Contractor, April 1991
"Recommended Equalization Procedures," Sound & Video Contractor, 1991
"Design of Multi-Driver Arrays for Improved Loudspeaker Directionality," Acoustical Society of America
Papers, December 2, 1997
"Electro-acoustic Solutions for Themed Entertainment Attractions," Presented at the Acoustical Society of
America Workshop on the Acoustics of Themed Entertainment, April 23 and 24, 1999
"Jacksonville Jaguars Score a New Sound System at Everbank Field," Released February 13, 2013

Professional Experience

Mr. Sowden has over 30 years of experience in a broad range of acoustical and electrical engineering services, with special emphasis on building and room acoustics, noise control, electro-acoustics, and audio/visual systems. His experience includes the design of acoustics and technical systems for entertainment facilities including arenas, churches, sports facilities, meeting facilities and theatres; design of audio/visual presentation and control systems for professional, educational and training facilities; interior acoustical design of broadcast studios, auditoriums, rehearsal halls, performance facilities and convention centers; design of architectural and mechanical noise and vibration control systems for office buildings, hotels and apartment complexes.

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Mr. Sowden has conducted seminars in sound system design and operation, acoustics and noise control for the Acoustical Society of America (ASA), Audio Engineering Society (AES), National Systems Contractors Association (NSCA), Synergetic Audio Concepts (Syn-Aud-Con), Stadium Managers Association (SMA), Construction Standards Institute (CSI), the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) and the American Institute of Architects (AIA). Mr. Sowden acted as Chairman of the Sound Reinforcement Papers Session at the 1987 Audio Engineering Society Convention.

His project experience Includes:

ARENAS

Arkansas State University Bud Walton Arena, Fayetteville, AR;
Project Manager. Provided conceptual design and programming of sound reinforcement and communication systems for the new 16,000 seat home of the Arkansas Razorbacks. Provided design through delivery of construction documents.

Angelo State University Arena, San Angelo, TX:
System Designer. Provided design of sound reinforcement system for the new 9,000 seat arena. Provided design through delivery of construction documents.

Richard Berry Educational Support Center, Houston, TX;
Project Designer. Coordinated architectural acoustics, arena display systems and RF distribution systems for the 8,500 seat arena. Providing technical design of the performance sound reinforcement system and design of the technical system infrastructure.

Bi-Lo Center, Greenville, SC;
Project Manager. Provided acoustical review of events and concerts within the facility. Provided recommendations for resolution of acoustical issues that degrades the quality of the performance to the artist and the listener.

Brooklyn Atlantic Yards Arena, Brooklyn, NY;
Project Manager. Provided acoustical review of the new 18,000 seat home of the Brooklyn Nets. Provided design of the sound reinforcement systems for sports and end stage events. The design includes the largest surround sound system for the arena with high level surround loudspeakers located throughout the arena.

Cowtown Coliseum, Fort Worth, TX;
Project Manager. Provided design of sound reinforcement system renovation for this multipurpose 4,000 seat arena constructed in 1905. Provided construction administration services and final acceptance testing of the new system.

Cumberland County Coliseum Complex, Fayetteville, NC;
Project Manager. Provided room facility planning and design of acoustics, audio/ visual/ video distribution, rigging, sound and broadcast/ television for this multipurpose 16,000 seat arena and adjacent convention and meeting spaces. Provided construction administration services and final systems testing and adjustment.

Garland Special Events Center, Garland, TX

System Designer. Provided technical design of sound systems, rigging and scoreboard systems for this multipurpose 7,500 seat arena with connection to adjacent convention facilities. Provided construction administration services and final systems testing and adjustment.

Palasport Milano, Milan, Italy;

Project Manager. Provided programming for requirements of sound and communication systems for this indoor 12,000 seat gymnastics sports arena. Coordinated broadcast video cable systems programming for use in televising events.

Penn State University Bryce Jordan Center, University Park, PA;

Project Manager. Provided technical design of the sound reinforcement and television distribution system. Coordinated acoustical and television distribution systems. Provided construction administration services and final systems testing and adjustment.

Republican National Convention 2012, Tampa FL;

Project Manager. Provided acoustical recommendations to the existing Tampa Bay Times Forum to accommodate the 2012 Republican National Convention.

St. Pete Times Forum, Tampa FL;

Project Manager. Provided acoustical recommendations for the 18,000 seat home of the Tampa Bay Lightning. Provided technical recommendations for sound system renovation. Provided technical design of the scoreboard, signage displays and television distribution systems.

Sul Ross State University Convocation Center, Alpine, TX;

Project Manager. Coordinated design of acoustics, sound and broadcast/ television systems for the multipurpose 6,000 seat arena and adjacent meeting spaces. Provided technical design of the sound and broadcast/ television systems. Provided construction administration services and final systems testing and adjustment.

Tropicana Field, St. Petersburg, FL;

Project Manager. Provided technical design of the audio systems for the 44,000 seat indoor home of the Devil Rays. Provided sound system design for all public spaces; including offices, meeting rooms and clubs throughout the facility. Provided construction administration services and final systems testing and adjustment.

Tampa Bay Lightning Arena, Tampa, FL;

Project Manager. Provided acoustical review and recommendations for reduction of long arena reflections. Provided technical system design recommendations for implementation of Tesla coils, sound system and scoreboard renovation. Provided IPTV consulting for renovation of in-house television distribution system. Provided construction administration services and final systems testing and adjustment.

University of Florida O'Connell Center, Gainesville, FL;

Project Manager. Provided design of acoustical systems and sound reinforcement systems for the renovation of the 12,000 seat home of the Florida 'Gators. Provided construction administration services and final systems testing and adjustment.

University of Hawaii Special Events Arena, Manoa, HI;

Project Designer. Provided design of audio control and wiring systems. Developed contract documents for designed systems.

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University of North Texas Coliseum, Denton, TX;
Project Manager. Provided review of sound system construction documents and proposals by system contractors. Provided comparisons and recommendations of proposals to client based on capabilities of sound system operation within the facility.

Walt Disney's Wide World of Sports Field House, Orlando, FL;
System Designer. Provided technical design of audio systems for the arena and all public spaces. Provided design of audio distribution system to extend sound program to training rooms, facility RF distribution system, adjacent ballpark, presentation gazebo, tennis areas, soccer fields and football facilities throughout the project. Provided construction administration services and final systems testing and adjustment.

STADIUMS/ OUTDOOR SPORTS

Anaheim Stadium, Anaheim, CA;
System Designer. Provided power distribution design of high voltage loudspeaker systems for 65,000 seat home of the California Angels and Los Angeles Rams. Provided construction administration services and final systems testing and adjustment.

Auburn University Jordan Hare Stadium, Montgomery, AL;
Project Manager. Provided technical design of sound reinforcement system renovation for the 85,000 seat home of the Auburn Tigers. Provided construction administration services and final systems testing and adjustment.

Benedictine University Sports Facility, Naperville, IL;
Project Manager. Provided technical design of wire management systems sound reinforcement systems, and RF distribution systems covering patron seating, concourses, suites, clubs, player clubhouses, working press, broadcast facilities and operations staff offices for the 40,000 seat stadium and 3,000 seat stadium of the Eagles. Provided construction administration services through completion of the project.

Bank One Ballpark, Phoenix, AZ;
Project Manager. Provided technical design of sound reinforcement systems covering patron seating, concourses, suites, clubs, player clubhouses, working press, broadcast facilities and operations staff offices for the 45,000 seat home of the Arizona Diamondbacks. Provided auralization of the proposed sound systems to allow the stadium staff to determine the most effective acoustical systems design. Provided construction administration services and final systems testing and adjustment.

Baylor Stadium, Waco, TX;
Project Manager. Provided technical design of wire management systems and sound reinforcement systems covering patron seating, concourses, suites, clubs, player clubhouses, working press, broadcast facilities and operations staff offices for the 40,000 seat home of the Baylor Bears. Provided construction administration services and final systems testing and adjustment.

Boardwalk and Baseball, Orlando, FL;
Project Manager. Provided technical design of audio and communication systems for the 5,000 seat winter home of the Kansas City Royals. Provided construction administration services and final systems testing and adjustment.

Candlestick Park, San Francisco, CA;
Project Manager. Provided conceptual design, performance specifications and construction documents of the sound system for the 45,000 seat home of the San Francisco Giants and 61,000 seat home of the

49ers. This project is recognized as the first successful application of high fidelity distributed sound in a pro sports venue. Provided construction administration services and final systems testing and adjustment.

Charlotte Knights Stadium, Charlotte, NC;

Project Manager. Provided technical design of audio and communication systems for 7,000 seat home of the Charlotte Knights. The system design was based on portable components that could be used in the old Knight's stadium and relocated to the new stadium the following year. Provided construction administration services and final systems testing and adjustment.

Comiskey Park, Chicago, IL;

Project Manager. Provided technical design of sound reinforcement systems for the 45,000 seat home of the Chicago White Sox. Sound systems included coverage of patron seating areas, concourses, suites, working press, broadcast facilities and operations staff areas. Provided construction administration services and final systems testing and adjustment.

Creighton University Soccer Stadium, Omaha, NE;

Project Manager. Provided design of sound reinforcement and RF distribution systems for the 8,000 seat home of the Jays. Systems provided coverage of patron seating areas, suites, clubs and operations staff offices. Provided construction administration services and coordinated completion of the project.

Denver Mile High Stadium, Denver, CO;

System Designer. Provided design of broadcast, RF distribution and sound reinforcement systems covering patron seating, suites, clubs, player clubhouses and operations staff offices for the 75,000-seat home of the Denver Broncos. Provided design services through design development release of construction documents.

Eastlake Ballpark, Eastlake, OH;

Project Manager. Provided design of sound reinforcement and RF distribution systems for the 8,000 seat home of the Lake County Captains. Systems provided coverage of patron seating areas, suites, clubs, player clubhouses and operations staff offices. Provided construction administration services and final systems testing and adjustment.

Everbank Stadium, Jacksonville, FL;

Project Manager. Provided conceptual design, performance specifications and construction documents of the renovated sound system for the 80,000 seat home of the Jacksonville Jaguars. Sound systems included coverage of stadium bowl, and signal routing to existing systems in the concourses, suites, working press, broadcast facilities and operations staff areas. Provided construction administration services and final systems testing and adjustment.

Fresno State University Stadium, Fresno, CA;

Project Manager. Provided conceptual design for expansion of the stadium sound reinforcement system; generated environmental noise statements regarding impact of new system on the existing, predominantly residential environment adjacent to the stadium.

Greater Rochester Outdoor Sports Facility, Rochester, NY;

Project Manager. Provided environmental assessment, sound and RF system design for the 9,000 seat home of the Rochester Redwings. Provided construction administration services and final systems testing and adjustment.

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Homestead Stadium Complex, Homestead, FL;
Project Manager. Provided Technical design of the sound reinforcement and communication systems for the 7,000 seat spring training stadium for the Cleveland Indians. Provided construction administration services and final systems testing and adjustment.

International Tennis Center, Key Biscayne, FL;
Project Manager. Technical design of the sound reinforcement and communication systems for 20,000 seat center. Systems covered patron seating, working press areas, player and judge areas, and operations management areas.

Joe Robbie (Pro Player) Stadium, Miami, FL;
Project Manager. Provided design of the sound reinforcement and communication systems for the 70,000 seat home of the Miami Dolphins. Systems provided coverage to patron seating areas, suites, twelve clubs, player clubhouses and operations staff offices. Provided construction administration services and final systems testing and adjustment.

La Ceiba Baseball Stadium, Venezuela;
Project Manager. Provided design of the technical sound and communications systems for the new 12,000 seat baseball stadium. Provided technical design of wire management systems and sound system. Provided construction documents and construction administration services.

Lone Star Park at Grand Prairie, TX;
Project Designer. Provided design for sound reinforcement system for the 8,500 seat horse track. Provided systems covering patron seating areas, concourses, suites, Jockey Club, Silks Restaurant and Paddock Lounge.

Los Angeles Coliseum, Los Angeles, CA;
Systems Designer. Provided sound system design for analysis of environmental impact of sound systems on the surrounding community. Provided environmental estimates of sound levels with various system configurations and recommendations for system design.

Maryvale Sports Complex, Phoenix, AZ;
Project Manager. Technical design of sound reinforcement and communication systems for the 9,000 seat spring training camp of the Milwaukee Brewers. Provided systems covering the patron seating areas, concourses, large party rooms and press areas. Provided construction administration services and final systems testing and adjustment.

New York Yankees Spring Training Facility, Tampa, FL;
Project Manager. Provided programming and design of sound and production communications systems for the 8,000 seat winter home of the New York Yankees. Coordinated design of the broadcast cabling system. Provided construction documents and construction administration services.

Oklahoma City Redwings Brickyard Baseball Stadium, Oklahoma City, OK;
Project Manager. Provided acoustical design of the 7,000 seat stadium to minimize impact to surrounding community. Provided design of sound reinforcement and communications systems covering the stadium seating areas, concourses. Coordinated design of broadcast television cabling systems and television distribution systems for coverage of games to the local community. Coordinated noise isolation design of interiors to reduce noise between suites and clubhouses. Provided construction administration services and final systems testing and adjustment.

Orioles Park at Camden Yards, Baltimore, MD;

Project Manager. Provided technical design of sound reinforcement and communications systems for the 45,000 seat home of the Baltimore Orioles. Systems included coverage of patron seating areas, concourses, suites, working press, broadcast facilities and operations staff areas. Services included construction administration, final acceptance and testing of systems. Provided construction administration services and final systems testing and adjustment.

Pilot Field, Buffalo, NY;

Project Manager. Provided technical design of sound reinforcement and communications systems for the 20,000 seat home of the Buffalo Bisons. Provided systems covering patron seating areas, concourses, suites, working press and operations staff areas. Provided construction administration services and final systems testing and adjustment.

Prairie Meadows Race Track and Casino, Altoona, IA;

Project Manager. Provided review of the existing audio and video systems for the 5,000 seat horse track, grandstand and clubhouse facility. Provided conceptual design for renovation of audio, video and broadcast systems within the facility in sequence with the operation schedule. Provided programming report with budget estimates for recommended work.

Pro Player Stadium Super Bowl XXIX, Miami, FL;

Project Manager. Provided re-equalization and recommendations to update sound system to current technology and restore original sound quality.

Redskin Stadium, Laurel, MD;

Project Manager. Coordinated environmental acoustics assessment and expert witness testimony for development of a 70,000 seat stadium for the Washington Redskins.

Safeco Field, Seattle, WA;

Project Manager. Coordinated acoustics and broadcast system cabling design for the new 47,000 seat home of the Seattle Mariners. Provided auralization of the proposed sound systems to allow the stadium staff to determine the most effective sound system design. Provided construction documents for the sound reinforcement systems. Provided construction administration services.

Sun Devil Stadium Super Bowl XXX, Tucson, AZ;

Project Manager. Provided a sound system evaluation with recommendations to improve sound quality to current technology standards. Technical design of sound reinforcement systems for 70,000 seat home of the Arizona Cardinals. Sound systems included patron seating, concourses, suites and working press areas. Provided construction administration services and final systems testing and adjustment.

Texas A&M University Kyle Field, College Station, TX;

Project Manager. Provided design of sound reinforcement and communications systems for the 77,000 seat home of the Texas "Aggies." Provided construction administration services and final systems testing and adjustment.

Texas Tech University SBC Jones Stadium, Lubbock, TX;

Project Manager. Provided technical design of the sound systems, communications systems and television distribution systems for the renovated 40,000 seat home of the Red Raiders. Provided construction administration services and final systems testing and adjustment. Provided post construction production assistance in operation of the systems during the first season.

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Union Station Ballpark, Houston, TX;
Project Manager. Provided assessment of sound reinforcement, RF distribution and broadcast cabling systems. Provided recommendations for system improvements and developed construction schedules for project coordination.

University of Texas, Austin, TX;
Project Manager. Provided technical design of the sound systems, communications systems and television distribution systems for the renovated 45,000 seat home of the Texas Longhorns. Coordinated environmental assessment of sound system impact on the adjacent community. Provided construction administration services and final systems testing and adjustment.

University of Virginia, Charlottesville, VA;
Project Manager. Provided technical design of the sound and communications systems and television distribution systems for the renovated 40,000 seat home of the UVA Patriots. Provided environmental assessment of the sound system on the adjacent community. Provided construction administration services and final systems testing and adjustment.

USTA National Tennis Center, New York, NY;
Systems Designer. Provided programming of the sound reinforcement and communication systems for the 22,000 seat tennis facility. Provided design of the systems covering the patron seating, concourses, suites and working press areas.

Walt Disney's Wide World of Sports Baseball Stadium, Orlando, FL;
System Designer. Provided technical design of sound reinforcement and communication systems for the 8,000 seat winter home of the Atlanta Braves. Provided design of audio distribution system to extend sound program to training rooms, facility RF distribution system, adjacent arena, presentation gazebo, tennis areas, soccer fields and football facilities throughout the project. Provided construction

ENTERTAINMENT

Batman Attraction, Six Flags America, Largo, MD;
Project Designer. Provided design of sound reinforcement system to reinforce live action show to the 1,200 seat amphitheater. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Batman Attraction, Six Flags Darien Lake, Darien Lake, NY;
Project Designer. Provided design of sound reinforcement system to reinforce live action show to the 1,000 seat enclosed dark attraction. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Batman Attraction, Six Flags Elitch Gardens, Denver, CO;
Project Designer. Provided design of sound reinforcement system to reinforce live action show to the 1,200 seat amphitheater. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Batman Attraction, Six Flags Kentucky Kingdom, Louisville, KY;
Project Designer. Provided design of sound reinforcement system to reinforce live action show to the 1,200 seat amphitheater. Construction administration of project through completion. Final acceptance testing and voicing of systems.

Batman Attraction, Six Flags Marine World, Vallejo, CA;
Project Designer. Provided design of sound reinforcement system to reinforce live action water show to the 1,400 seat audience. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Billy Graham Theater, Charlotte, NC;
Project Manager. Provided review and acoustical recommendations for renovation of the entertainment complex. Provided recommendations for modification of the sound system design to improve the acoustical characteristics of the facility.

Caesars Palace, Las Vegas, NV;
Project Designer. Provided design of pool area sound systems for new \$40 million pool expansion. System allows underwater music, and entertainer connections within the pool area.

Cafe USA Haywood Mall, Greenville, SC;
Project Manager. Provided system design and analysis, as well as equalization and balancing efforts. Also provided system design for a new satellite advertising channel in malls located in Philadelphia, PA; New York, NY; Chicago, IL; and Greenville, SC.

Experience Music Project, Seattle, WA;
Project Manager. Provided concept design of 27 channel sound systems in the Gehry Sky Church Pavilion Entertainment Facility providing music, video shows and a live entertainment venue. Provided construction administration for the sound systems in this facility and the adjacent Artist's Journey action ride.

Hard Rock Hotel, Tampa, FL;
Project Designer. Provided acoustical design and sound system design of the new casino spaces. Services provided through Design Development.

House of Blues, Houston, TX;
Project Manager. Provided acoustical review and recommendations for the new 600 and 130 seat venues. Provided equalization and adjustment of the sound system in the 600 seat venue.

Journey to Madagascar, Resorts World Sentosa, Singapore;
Principal Consultant. Provided acoustical review and recommendations for isolation of specific scenes from patron loading areas or other scenes.

Kennedy Space Center Visitor's Complex – Cape Canaveral, FL;
Principal Consultant. Provided concept design of sound system renovation of the 37 acre theme park. Provided conceptual design of sound reinforcement system and recommendations for system component selection to achieve the desired quality of the facility.

King Kong 360-3D, Hollywood, CA;
Project Manager. Provided acoustical review of the building construction with recommendations for reduction of the impact on adjacent facilities. Provided recommendations for resolution of the sound systems.

Las Colinas Communications Complex, Irving, TX;
Project Manager. Provided technical systems interface between production facilities and sound-stages. Provided construction administration, final acceptance and testing of systems.

Planet Hollywood, Orlando, FL;

Project Manager. Provided acoustical study of facility to reduce acoustical impact of kitchen and service areas on entertainment experience. Provided recommendations for renovation of sound and video display systems. Provided recommendations on audio production for distribution to worldwide Planet Hollywood facilities.

Terminator 2–3D, Hollywood, CA;

Project Manager. Provided system design and sound design for 24 channel audio playback system through 61 loudspeaker systems. Provided construction administration, final acceptance and testing of systems.

The Old Jail, Albany TX;

Project Manager; Provided acoustical review of the 120 seat renovated events center. Provided recommendations for acoustical modifications to meet their modified functional requirements.

Typhoon Theatre, Resorts World Sentosa, Singapore;

Project Designer. Provided acoustical review and recommendations for the new 360 degree cylindrical theater. Provided evaluation and recommendations for enhancing the sound system in this facility. Provided equalization and adjustment of the sound systems in this venue and the adjacent marine museum.

Universal Studios Islands of Adventure, Orlando, FL;

Project Manager. Provided system design for parkwide sound reinforcement systems distributing over 600 audio channels through fiber infra-structure. Completion of concepts and design development documents. Services included construction administration of the systems.

Universal Studios King Kong 360/ 3-D, Hollywood, CA;

Project Manager. Provided acoustical evaluation of existing structure and adjacent facilities. Provided recommendations for reducing the effects of King Kong on the City of New York.

Universal Studios Revenge of the Mummy, Hollywood, CA;

Project Manager. Provided acoustical study of the construction and scenery to determine the impact of scene audio on adjacent scenes. Developed acoustical environment for patrons of the ride. Provided acoustical model of interaction between scenes to demonstrate the effect of acoustical treatments in the space.

Universal Studios Rip, Ride and Rockit, Orlando, FL;

Project Manager. Provided acoustical study of three existing roller coasters and the design of one new coaster to determine the noise impact of the new coaster on the sound stages located adjacent to the ride tracks.

Universal Studios Terminator 2-3D, Hollywood, CA;

Project Manager. Provided acoustical study of the construction. Provided design of noise isolation between adjacent scenes within the attraction. Developed acoustical environment for patrons of the ride.

Universal Studios Terminator 2-3D, Orlando, FL;

Project Manager. Provided acoustical study of the construction. Provided design of noise isolation between adjacent scenes within the attraction. Developed acoustical environment for patrons of the ride.

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Universal Studios Twister - Ride it Out, Orlando, FL;
Project Manager. Provided system and sound design for 24 channel audio playback system developed to provide the patron with a realistic twister experience through 27 separate loudspeaker systems. Provided construction administration, final acceptance testing and voicing of systems.

Universal Studios Wizarding World of Harry Potter, Orlando, FL;
Project Manager. Provided acoustical recommendations for the mitigation of noise generated by the patron loading belt and reduce the noise present in the adjacent scenes.

University of Texas Dallas Arts and Technology Facility, Dallas, TX;
Project Manager. Provided sound and cinema video projection systems design for this 600 seat new facility.

Wuhan Movie Park, Wuhan, China;
Project Manager. Provided acoustical review of design with recommendations to reduce impact of two attractions on the adjacent public spaces and vertically stacked attractions.

Walt Disney's Wide World of Sports, Orlando, FL;
System Designer. Technical design of audio systems for the winter home of the Atlanta Braves. Distribution of sound program to training rooms, facility RF distribution system, adjacent field house, presentation gazebo, and tennis, soccer and football facilities throughout the project. Services included construction administration, final acceptance and testing of systems.

AUDITORIUMS/ PERFORMANCE SPACES

Arlington Heights High School Auditorium, Fort Worth, TX;
Project Manager. Provided design of lighting systems, rigging systems and sound reinforcement systems for the renovated 600 seat performing arts auditorium. Provided construction documents and construction administration of the project.

Bass Performing Arts Center, Fort Worth, TX;
Project Manager. Provided review of existing sound system, wire management systems and power systems. Provided recommendations for reduction of system noise. Provided sound system consulting regarding requirements of systems for various events.

Brackets Club, Dallas, TX;
Project Manager. Provided acoustical consulting services for the 250 seat live entertainment club and restaurant.

Caesars Riverboat Casino, Elizabeth, IA;
System Designer. Provided design of the 2000 seat Boxing/ Multi-purpose Ballroom and 100 seat Legends Club sound systems for reinforcement of live music and events. Provided design of the multi-divisible conference rooms throughout the complex. Provided services up to and including generation of construction documents for fabrication.

Caravan of Dreams, Fort Worth, TX;
Project Manager. Provided design of sound reinforcement systems design for the renovated 675 seat live music club that is no longer in operation. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Cendera Center, Fort Worth, TX;

Project Manager. Provided acoustical consulting services for the 850 seat live entertainment club and conference center. Provided sound, video and production lighting systems design for the facility. Provided construction administration and commissioning services for the installed systems.

Caravan of Dreams, Fort Worth, TX;

Project Manager. Provided design of sound reinforcement systems design for the renovated 675 seat live music club that is no longer in operation. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Cleburne Civic Center Expansion, Cleburne, TX;

Project Manager. Provided electrical, lighting, sound, stage rigging and audio visual systems design and construction documents for the new 299 seat theatre. Provided acoustical consulting services for performance space and stage house. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Disney on Ice Rehearsal Facility, Bradenton, FL;

Project Manager. Provided acoustical consulting services for the two 50,000 square foot rehearsal facilities. Provided acoustical design of the six suite audio production facility supporting the rehearsal spaces.

Fort Wayne Performing Arts Center, Fort Wayne, IN;

Project Manager. Provided electrical, lighting and sound reinforcement systems design and construction documents for the renovated 1,200 seat theatre. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Hill School, Fort Worth, TX;

Project Manager. Provided design and construction documents of the lighting and sound reinforcement systems for the new 300 seat theatre. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Lakewood Amphitheatre, Atlanta, GA;

System Designer. Provided acoustical review of facility, and technical design of sound reinforcement systems for the 20,000 seat outdoor amphitheater coordinated with requirements of the tour management group. Provided design of control systems to allow operation of lawn sound systems by road show touring groups. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

In Touch Ministries, Atlanta, GA;

Project Manager. Provided environmental study, vibration, acoustical and mechanical noise control for the 400 seat live production facility.

Masonic Lodge, Fort Worth, TX;

Project Manager. Provided review of existing 1,000 seat ballroom and 300 seat Commandry. Provided review of sound system requirements for adjacent meeting areas. Provided design and construction documents of the sound reinforcement systems. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Miller Amphitheatre, Houston, TX;

System Designer. Provided acoustical review of facility, technical design and construction documents of the sound reinforcement and communication systems for the 18,000 seat outdoor amphitheater. Systems

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were developed to reduce complaints from adjacent condominiums and private properties. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Mirage Showroom, Las Vegas, NV;

Project Manager. Provided consulting for room acoustics and sound reinforcement systems for the 1,500-seat showroom. Provided technical design of sound reinforcement systems covering patron seating and lobby areas.

North Side High School, Fort Worth, TX;

Project Manager. Provided design and construction documents of sound reinforcement system for the renovation of this historical 600 seat auditorium. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Oakridge School, Arlington, TX;

Project Manager. Provided design of acoustical systems, and construction documents lighting systems, rigging systems and sound reinforcement systems for the new 400 seat performing arts auditorium. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Paris Showroom, Las Vegas, NV;

Project Manager. Provided consulting for room acoustics, HVAC noise control and sound reinforcement systems for the new 1,500-seat showroom. Provided technical design of sound reinforcement systems covering patron seating and lobby areas. Services included construction administration services.

Patriot's Park, Phoenix, AZ;

Project Manager. Provided technical design of sound reinforcement and communication systems for the downtown amphitheater built at street level above a five-story parking garage. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Sambuca Mediterranean Jazz Cafe, Houston, TX, Atlanta, GA and Denver, CO;

Project Manager. Provided consulting for room acoustics, HVAC noise control and sound reinforcement for the new showrooms. Provided technical design of sound reinforcement systems covering club and bar areas. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Sambuca Mediterranean Jazz Cafe, Houston, TX, Atlanta, GA and Denver, CO;

Project Manager. Provided consulting for room acoustics, HVAC noise control and sound reinforcement for the new showrooms. Provided technical design of sound reinforcement systems covering club and bar areas. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Suncoast Casino Showroom, Summerlin, NV;

Project Manager. Provided technical design of rigging and sound reinforcement systems for the new 800-seat showroom. Provided construction coordination through completion of the facility.

Somervell County Expo and Texas Amphitheater, Glen Rose, TX;

Project Manager. Provided acoustical study and sound system redesign for 3,500 seat amphitheater. Provided technical design of the sound reinforcement system and construction administration services. Provided design for reuse of existing amphitheater equipment in the existing 4,000 seat arena. Provided

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final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

University of North Texas Murchison Performing Arts Center, Denton, TX;
Project Manager. Provided review of existing sound systems, wire management system and power systems. Provided recommendations for reduction of sound system noise. Provided construction documents for the renovation of the sound systems. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

University of Pittsburgh, Johnstown, PA;
Project Manager. Provided design and construction documents for the renovation of the 1,200 seat auditorium and 300-seat black box theatre.

CHURCH/ SYNAGOGUE

Broadway Baptist Church, Fort Worth, TX;
Project Manager. Provided design and construction documents for sound system renovation. Provided consulting for room acoustics, HVAC noise control and sound reinforcement for the renovation of the 1,500-seat sanctuary with a new \$3.5 million pipe organ. Provided final acceptance testing and voicing of systems. Also provided sound reinforcement for the Fellowship Hall.

Central Baptist Church, Jacksonville, TX;
Project Manager. Provided design and construction documents of sound reinforcement system for the new 1,200 seat sanctuary. Provided construction documents for sound systems and lighting systems, and construction coordination through completion of the facility. Provided final acceptance testing and voicing of systems.

Canyon Creek Baptist Church, Plano, TX;
Project Manager. Provided design of sound reinforcement system and video projection system for the new 1,600 seat sanctuary. Provided design and construction documents for sound systems, video projection systems and lighting systems, and construction coordination through completion of the facility. Provided final acceptance testing and voicing of systems. Provided measurements and review of room acoustics and HVAC noise control after completion of the facility.

Crosspoint Lutheran Church, Katy, TX;
Project Manager. Provided consulting for room acoustics, HVAC noise control and sound reinforcement for the new 1,200 seat performance facility. Provided design and construction documents for sound systems. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Dallas Gospel Tabernacle, Dallas, TX;
Project Manager. Provided acoustical assessment of the existing 3,500 seat sanctuary during construction. Provided acoustical recommendations and construction documents for the new sound system. Provided final acceptance testing and voicing of systems. Provided construction administration services.

Fellowship Church, Grapevine, TX;
Technical Systems Consultant. Provided study of cable management system, power and electrical systems. Provided recommendations for reduction of electrically generated noise that existed in the audio and video systems.

First Baptist Church Aledo, Aledo, TX;
Project Manager. Provided design of acoustics and sound reinforcement system for the new 850 seat sanctuary. Provided design and construction documents for sound systems and lighting systems. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

First Baptist Church, Euless, TX
Technical Systems Consultant. Provided study of cable management system. Provided recommendations for reduction of noise that existed in the audio and video systems.

First Baptist Church, Orlando, FL;
System Designer. Coordinated design of acoustics and technical systems for the new 6,300 seat sanctuary. Provided design of sound reinforcement system. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

First Christian Church, Fort Worth, TX;
Project Manager. Provided review of existing organ installation. Provided recommendations for renovation of electrical systems to reduce communication errors between the console and processing racks. Provided construction administration services.

First United Methodist Church, Hurst, TX;
Project Manager. Provided review of existing family life center and sound system design during construction. Provided modified design and construction documents of sound reinforcement system to better achieve needs of the operators. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Gateway Church, Southlake, TX;
Project Manager. Provided acoustical assessment of existing 3000 seat auditorium with recommendations for reduction of reflections and increased intelligibility of reinforced sound.

Gateway Church, North Richland Hills, TX;
Project Manager. Provided acoustical design of 1,200 seat auditorium. Provided review of mechanical system and noise control of adjacent spaces.

Gateway Church, Frisco, TX;
Project Manager. Provided acoustical review of auditorium with excessive low frequency reflections. Provided sound trap designs to mitigate conditions. Provided acoustical recommendations for isolation of adjacent classrooms with common wall.

Good Shepherd Catholic Community, Southlake, TX;
Project Manager. Provided coordination of acoustics and design of sound reinforcement system for the new 1,200 seat sanctuary. Provided design and construction documents of sound system. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Grace Church, Wichita Falls, TX;
Project Manager. Provided review of facility with project acoustical consultant. Provided design of sound systems, house and choir video projection systems and production lighting for the new 800 seat multipurpose facility. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Green Acres Baptist Church, Tyler, TX;
Project Manager. Provided technical fabrication design drawings for wire management systems, power systems and sound reinforcement systems. Provided construction administration services.

Highland Park United Methodist Church, Dallas, TX;
Project Manager. Provided review of acoustics and sound systems in the existing 1,000 seat sanctuary. Provided recommendations for renovation of the sound system to improve system intelligibility. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Highland Park United Methodist Church, Dallas, TX;
Project Manager. Provided review of new 800 seat theater design. Provided design of stage curtain, rigging and lighting systems. Provided construction administration services.

Holy Cross Catholic Church, Dallas, TX;
Project Manager. Provided design of acoustics and construction documents for sound reinforcement systems for the new sanctuary. Provided final acceptance testing and voicing of systems.

Holy Family Catholic Church Family Life Center, Fort Worth, TX;
Project Manager. Provided design and construction documents of sound reinforcement system during renovation of the facility. Provided final acceptance testing and voicing of systems. Provided construction coordination through completion of the facility.

Kenneth Copeland Ministries, Eagle Mountain, TX;
Project Manager. Provided assessment of existing sound reinforcement system. Developed recommendations for the renovation of the main loudspeaker system to allow improvements to system coverage. Provided direction for renovation of the sound reinforcement system by the facility staff.

Lake Highland United Methodist Church, Dallas, TX;
Project Manager. Provided review and recommendations for development of the new 600 seat sanctuary. Provided development of sound reinforcement and broadcast systems through Design Development.

Metropolitan Church of God, Birmingham, AL;
Project Manager. Provided acoustical assessment of recently renovated sanctuary. Provided acoustical recommendations for improvement of sound system intelligibility, and enhancement of congregational singing. Provided construction administration services.

Olive Baptist Church, Pensacola, FL;
Project Manager. Provided review of sound reinforcement system in the existing 3,200 seat sanctuary. Provided construction documents for renovation of the existing sound system.

Pensacola Christian College, Pensacola, FL;
Project Manager. Coordinated design of acoustics and technical systems for the new 6,000 seat sanctuary. Provided design and construction documents of sound reinforcement system. Provided construction coordination through completion of the facility.

St. Clement Catholic Church, Phoenix, AZ;
Project Manager. Provided review of acoustics and sound reinforcement systems in the existing 1,000 seat sanctuary. Provided recommendations and construction documents for renovation of the acoustics and sound system. Provided construction management services.

Virgen de San Juan Guadalupe Catholic Church, Monterrey, NL, Mexico;
Project Manager. Provided review of acoustics, design and construction documents of the sound reinforcement system for the new 2,400 seat sanctuary.

CONVENTION CENTERS/ COUNCIL CHAMBERS

Austin City Hall, Austin, TX;
Project Manager. Provided Technical design of audio, video, broadcast, telephone and data cabling systems. Provided design of all video projection and display systems within the facility. Provided review of facility lighting systems and provided recommendations for modification to accommodate television production in selected areas of the facility. Developed broadcast interconnect system and television production system for archiving and distribution of the meetings to local cable services.

Azle Memorial Library, Azle, TX;
Project Manager. Technical design of paging, sound reinforcement and audio visual systems for the meeting room, teen area and public spaces at the new facility. Provided acoustical recommendations for the facility. Provided construction administration services and final systems testing and adjustment.

M. C. Benton Convention and Civic Center, Winston-Salem, NC;
Project Manager. Technical design of sound reinforcement systems. Provided design of interface to existing paging system allowing extension of paging into new convention areas.

Birmingham Jefferson Civic Center, Birmingham, AL;
Project Manager. Technical design of sound reinforcement systems including main exhibit expansion, meeting rooms, ballroom and divisible meeting room complex.

Bowles Life Center, Grand Prairie, TX;
Project Manager. Technical design of paging and sound reinforcement systems for the conference rooms, public concourse and gymnasium at the new facility. Coordinated acoustical recommendations for the facility. Provided construction administration services and final systems testing and adjustment.

Broward County Courts, Fort Lauderdale, FL;
Project Designer. Provided design of audio visual systems infrastructure in the new 20 story courts building.

Cincinnati Convention Center, Cincinnati, OH;
Project Manager. Technical design of sound reinforcement systems; coordinated acoustical recommendations for renovation of existing facility, noise control design of mechanical systems for renovation and expansion of convention center.

Dallas Convention Center Expansion, Dallas, TX;
Sound Consultant. Provided balancing, adjustment and equalization services for new convention and meeting room complex.

Eagle Pass International Center For Trade, Eagle Pass, TX;
Project Manager. Technical design of audio visual systems within the new 40,000 square foot facility including divisible convention space and meeting rooms. Provided construction administration services through completion of the project.

Garland Performing Arts Center, Garland, TX;
Project Manager. Technical design of audio visual systems within 6400 square foot facility. Coordinated acoustical recommendations for use by project acoustical consultant. Provided review and recommendations for modifications to proposed lighting system design. Provided construction administration services.

Guinn Justice Center, Cleburne, TX;
Project Manager. Technical design of court audio visual and evidence presentation systems. Provided acoustical recommendations for increased privacy of courtrooms and adjacent jury and judge chambers. Provided construction administration services.

Mansfield City Hall, Mansfield, TX;
Project Manager. Technical design of audio visual systems within the city council chamber; coordinated acoustical and mechanical system review of systems within the chamber. Provided construction administration services.

Mansfield Public Safety Building, Mansfield, TX;
Project Manager. Technical design of court audio visual and evidence presentation systems. Provided acoustical recommendations for increased privacy of courtrooms and adjacent jury and judge chambers. Provided construction administration services.

Tampa Convention Center, Tampa, FL;
Project Manager. Provided technical design of sound reinforcement and communication systems including 12 meeting rooms, divisible ballroom and a 300 foot by 700 foot convention space.

Visalia Convention Center, Visalia, CA;
Project Manager. Programming and technical design of sound reinforcement and communication systems including a 5 room divisible meeting area and a new subdividable exhibit space.

HOTELS

Caesars Riverboat Casino, Elizabeth, IA;
System Designer. Provided design of the 2000 seat Boxing/ Multi-purpose Ballroom and 100 seat Legends Club sound systems for reinforcement of live music and events. Provided design of the multi-divisible conference rooms throughout the complex. Provided services up to and including generation of construction documents for fabrication.

Hyatt Regency Guam, Guam;
Project Manager. Technical design of sound reinforcement systems and acoustical design for the ballroom, lounge, Regency club, fitness center, entertainment center and other presentation spaces for this five star hotel.

Maui InterContinental Hotel, Kihei, Maui, HI;
Project Manager. Construction administration, final acceptance and testing of sound reinforcement systems for conference center and ballroom facilities. Services included construction administration, final acceptance and testing of systems.

Regent of Jakarta, Jakarta, Indonesia;
Project Manager. Technical design of audio visual and sound reinforcement systems; review of contractor's proposals and job-site interviews with the contractors to assist in selection of contractors.

Sheraton Hotel, South Padre Island, TX;

Project Manager. Provided design of new sound system for this renovated resort. Services included construction administration, final acceptance and testing of systems. administration services and final systems testing and adjustment.

AIRPORTS

American Airlines Terminal Spaces, D/FW Airport, TX;

Project Manager. Design of sound and paging systems in renovated terminal spaces for patrons and airport personnel. Developed sound and paging systems functional program. Services included construction administration, final acceptance and testing of systems.

Houston Intercontinental Airport, Houston, TX;

Project Manager. Design of sound and paging systems for patrons and airport personnel; provided interface for FIS communication requirements and paging system. Services included construction administration, final acceptance and testing of systems.

Houston Hobby Airport Renovation, Houston, TX;

Project Manager. Design of sound and paging systems in renovated terminal spaces for patrons and airport personnel.

Houston Hobby Airport, Houston, TX;

Project Manager. Design of sound and paging systems for new concourse and renovated terminal spaces. System serves all public spaces, airline service areas, tug routes and baggage handling areas.

Philadelphia International Airport, Philadelphia, PA;

Project Manager. Development of acoustical and sound system recommendations for the improvement of sound system intelligibility of facility-wide sound reinforcement systems. Provided design recommendations for the acoustical and sound systems and provide interface for expansion to new terminals.

OTHER

Crown Athletic Club, Charlotte, NC;

Project Manager. Provided acoustical design of the facility and design of background music, paging and aerobics sound systems. Also provided final acceptance and testing of systems.

Dallas Sound Lab, Irving, TX;

System Designer. Developed power distribution systems and technical ground system to minimize noise between film, sound and video editing studios and common technical equipment rooms. Provided main audio room monitor system balancing and adjustment used to record Stevie Ray Vaughan's first album.

Fair Park Esplanade, Dallas TX;

Project Manager. Provided acoustical review of facility for renovation of the facility fountain areas and entertainment values. Provided technical design of audio and communication systems for the fountain show. Provided construction administration services and final systems testing and adjustment.

General Dynamics, Fort Worth, TX;

System Designer. Creation of testing methodology for analysis of existing plant-wide paging system and field implementation of test procedure.

Sowden and Associates

Consultants in Acoustics & Entertainment Technologies
4604 Kenway Court, Fort Worth, TX 76132

John Knox Village Activity Center, Orange City, FL;
Project Manager. Provided review of the acoustics and existing technical systems in the center. Provided recommendations for mediation of acoustical concerns and sound system design. Provided construction administration services.

Smithsonian Institution Freer Gallery, Washington, DC;
Acoustician. Performed acoustical tests of galleries and provided recommendations for acoustical treatment of the spaces and sound system designs for voice reinforcement and evacuation.

Tele-Image, Irving, TX;
System Designer. Developed power distribution systems and technical ground system to minimize noise between video editing studios, audio sweetening rooms and common technical equipment rooms.

UT Southwestern Mock Scanner, Dallas, TX;
Project Manager. Development of acoustical and electronic systems for government study on extended MRI scans using synthetic MRI coils.

UT Southwestern Sleep Study Center, Dallas, TX;
Project Manager. Performed measurements and provided recommendations for acoustical isolation of sleep study center interview rooms from adjacent offices and construction noise. Provided design of a sound masking system for the facility. Performed adjustment of the sound masking system after installation.

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