

# Cathedral Sound and Light, Inc

---

6201 River Ridge Rd, Fayetteville, 28311 800-525-4024 [www.cathedralsound.com](http://www.cathedralsound.com)

## **New Construction Tips for Sound, Lighting, and Video systems**

### **Sound**

Designing a successful sound system is an art not a mechanical process. Computer software, technical books, and education in acoustics of course, is essential but is only a set of tools to work with. All of the education in the world won't guarantee the success of a sound system in terms of great sound and good articulation. It's not about the equipment. It's about how the equipment will be used.

Everyone who has ever seen one, knows how to play a piano. You strike the keys and it makes a sound. However, knowing how to play a piano is much different than how to make music. Understand the difference. A lot of people know how to install sound equipment. Very few know how to make it sound good.

The most common way sound systems are bought works against the buyer. Several installers are called and asked to quote a system. Each of the installers are on different levels of experience and learning and you are handed several different bids on your new sound system. Each of them are vary dramatically in price but more importantly each design differs from the others. They all claim to sound the best. How do you the untrained buyer decide which one will sound good in your sanctuary? You can't and you don't have time to learn the art either.

The best way to buy a sound system is have a designer that knows good sound provide the specifications for the best system to fit your ministries and sanctuary acoustics. Then have contractors bid on the specs. This is the only way you can get an apples to apples price quote with a guaranteed outcome.

I have over 30 years experience in this arena. I guarantee my work. You'll love the sound quality. Email [ellisguy@sprintmail.com](mailto:ellisguy@sprintmail.com) to request an appointment to discuss your project.

In the mean time here are a few hints that you need to be aware of as you begin the process of designing your facility for music and drama.

# Cathedral Sound and Light, Inc

6201 River Ridge Rd, Fayetteville, 28311 800-525-4024 [www.cathedralsound.com](http://www.cathedralsound.com)

---

## **Speaker Placement**

Correct speaker system is key to great sound - must match sanctuary acoustics and style of music ministry. Three main types used for the main speakers in the sanctuary

- 1) Speakers on each side - absolutely last resort - rarely works well
- 2) Cluster works best for highly reverberant rooms and/or high peak ceilings. Never use one in a low ceiling room (less than 15 feet high)
- 3) Overhead distributed ceiling speakers (high quality) works best for low ceilings

Design ceiling structures to hide speakers before the sanctuary is built

Think about choir monitor speakers. Design in false ceilings and cavities above the choir to house choir monitors. Choir monitors are best from overhead but not more than 15 feet away from the choir. Choir monitors hung on the back of central cluster speakers won't work well. The throw is too far requiring the sound to be turned up so loud it washes the first few pews on the main floor with undesirable sound. Sound also is bounced off the back wall behind the choir back into the audience, creating acoustical problems.

If musical instruments are a long way from choir, choir monitors and musicians monitors will be required to hear the basic organ and piano for proper timing. Make sure musicians monitors are on separate mixes from other monitor systems.

## **Placement of sound booth**

Placement is critical for proper operation of sound system

MUST be where operator can hear what sanctuary hears

Never use glassed-in room. Operator can't hear the same sound as the sanctuary

Open booth on sanctuary floor is best

Keep noisy electronics equipment out of booth - amplifiers have fans that will make mixing sound very difficult and can even be heard during quiet services. Only have in the sound booth the mixer and tape equipment and other stuff that the operators need to work with. Install amplifiers and other electronics that do not need adjustment in a remote mechanical room

Never place booth near noisy air return grills or vents. Noise makes mixing sound difficult

If you must have a "sound" room, make window as large as possible

Install absorption material on wall behind operator. Otherwise operator will hear more mid range sound because of sound bouncing off of rear wall behind him / her causing false adjustments

Carpeted counter top keeps down noise from handling tapes, etc.

Power booth from "clean" direct circuit from main breaker panel

# Cathedral Sound and Light, Inc

6201 River Ridge Rd, Fayetteville, 28311 800-525-4024 [www.cathedralsound.com](http://www.cathedralsound.com)

---

Install can lighting overhead on a dimmer to light console and equipment

Install phone line for servicing and troubleshooting

Make sound booth as large as possible 12 x 6 feet minimum

See Temple Baptist Church installation shoots at [www.cathedralsound.com](http://www.cathedralsound.com) for a good shot of a good sound booth layout

## Acoustical Problems

Acoustical problems directly affect speech clarity

Slap back problems are caused by flat back walls and large side walls that have no absorption materials (sheetrock, brick, paneling, etc.)

Reverb - what is it?

Not the same as slab back - thousands of reflections off of walls, floors, and ceilings

Speech verses music in terms of reverb time

Your brain integrates music differently than speech. Excessive reverb destroys speech clarity but makes music sound good. Sound systems should be designed for speech first. Target reverb time should be 1.5 seconds or less for good speech clarity and is good for music. Times over 1.5 seconds will cause the sound system cost to rise to overcome speech clarity issues

Ways to determine reverb time - acoustical measurements from plans or site

Reverb can be derived from building plans and treatments recommended before the building is built.

We can provide that service - each project quoted on a case by case basis

Wall treatments - typical way to tame reverb - use in sanctuary, fellowship hall

Common complaint - we can't hear ourselves singing in the choir or congregation

Don't carpet choir loft or platform - use wood

Forget about trying to mic choir into monitors - hard to do

# Cathedral Sound and Light, Inc

6201 River Ridge Rd, Fayetteville, 28311 800-525-4024 [www.cathedralsound.com](http://www.cathedralsound.com)

---

## Lighting

Good lighting extremely important to the way a sanctuary feels and the ability to read

Ask lighting designer for a print out of the lighting coverage for a minimum of 20 lux

### Wash lighting verses canned lights

Wash covers more evenly per fixture (chandeliers, etc.)

Canned lighting casts hot spots - more required to cover area - but more control over areas where you want light - pulpit, etc.

Avoid dark ceilings - causes lots of light loss

Pay attention to the color of lighting

Quartz vs metal halide - all lighting is designed to look good to the eye, but can be pink, blue, purple, or green to cameras! Not good for wedding shots! Avoid metal halide or other gas filled fixtures. Quartz is best

Dimming -

Dimming has several applications -

Setting a mood - weddings and other special events

Creating a focal point - guest speaker or music special

Lowering lights for video or film projection

Controlling power costs and bulb life in large facilities

Full theatrical productions

### Wall controls vs central dimming packs

Wall controls - cheap, buzz, requires a large number to control several zones, hard to effect a smooth dimming for drama or presentations

Central digital system - multiple wall stations can be installed with preset memories - much easier to control several zones with one button - preset for weddings, funerals, drama, presentations, etc.

What can be dimmed and what cannot - most any filament type lamp such as standard light bulbs, theatrical fixtures, and quartz can be dimmed. Fluorescent, metal halide, or any type of gas filled lamp cannot be dimmed easily.

Plan light fixture wiring so fixtures dim from front to back of sanctuary, not side to side. This way, you can dim the first two rows, for example, to avoid spilling light on projection screen that may be mounted on rear wall of platform

Don't use fixture that require ballasts to start

# Cathedral Sound and Light, Inc

6201 River Ridge Rd, Fayetteville, 28311 800-525-4024 [www.cathedralsound.com](http://www.cathedralsound.com)

---

Put high fixtures on crank down hoists for servicing

Plan theatrical lighting fixtures location to blend into decor

Wire now even if you don't buy any fixtures - cheaper now than later

Make sure you have enough power in the building to feed large amounts of lighting down the road

## **Video projection considerations**

Video projection is all about the screen being brighter than the ambient light in the room. The only way to ensure a good image is to invest in a quality bright projector, control the sanctuary lighting via dimming, screen placement, and controlling sun light in the room.

Buy as much brightness as you can afford - do not scrimp here! Minimum 1500 lumens.

Plan a place for your screen and build it into the decor

Types of screens - permanently tensioned or roll down, you can even use white walls

Light dimming is required to control sanctuary light from washing out the screen - plan dimming circuits to control lighting in front of screen position

Window treatments may be required in severe conditions

Install computer connections on the platform and in sound booth for Power Point and video inputs

## **General Tips**

Platform construction considerations -

Most churches today are built for drama - use open platform construction

### **Concrete stage verses wood stage -**

Concrete is impossible to alter later - if you need to add audio jacks, video jacks, AC power, etc., it will be practically impossible

Wood is easy to modify - you can add things in the floor much easier

Run as much empty conduit as you think you will ever need before the slab is poured for organs, computers, lighting controls, intercoms, etc.

Bury conduits between old and new buildings for same reason

# Cathedral Sound and Light, Inc

6201 River Ridge Rd, Fayetteville, 28311 800-525-4024 [www.cathedralsound.com](http://www.cathedralsound.com)

---

Connect video and sound to other areas of the facility - weddings, dramas - lets drama actors, key people, wedding parties, funerals, etc. to see and hear what is going on in the sanctuary for cues. Also, good for overflow crowds in the fellowship hall

Install phone jacks in all mechanical rooms and sound booth

Install plenty of electrical outlets on the platform

Dedicate a room for sound, video, and lighting equipment

Get a monitor for the organist!

Often, organists cannot hear themselves playing because the speakers are usually located some distance from them. The organists tend to crank up the volume until they can hear, making it too loud for those sitting out in the audience that are in the direct fire of the organ speakers. Have the organ company install a monitor speaker near the organists so they can more easily hear themselves playing. Calibrate this monitor volume to be the maximum volume you would like to hear in the sanctuary.

Make sure your builder is bonded!

We lost \$27,000 on a job because the general contractor went bankrupt building a church. Not only the one we were working on, but several in North and South Carolina. Millions of dollars were lost. Some churches had given large deposits to begin work and didn't have the first brick to show for it! The church did not know about bonding the construction company so that the work would continue even if the contractor went out. Bonding ensures that everyone will get paid and your project will be finished. Make sure your builder is bonded, and if they won't provide a bond, I suggest you go elsewhere. The risk is too great.

Know what a change order is. The contractor has bid his price based on the plans he was presented. There is no "throwing in stuff" when work begins. You will pay handsomely for alternations to the original bid due to added materials and the impact of your change on the work schedule and code requirements.

Get your sound, lighting, and video systems designed into the project. Don't do it as an afterthought.

From our past experience architects and engineering firms do not know and understand very much about sound, lighting, and video systems, especially for ministry. Use me to help you coordinate what you need into your building plans. I have the experience and can save you thousands in the long run not to mention hours of frustration, not only in the building process, but in the years of you trying to use your new facility.

Do not under any circumstances plan an opening date until after you have completed the facility and have had time to get a feel of the new building, work out all of the kinks, and learn the technologies in your new space. I have seen several instances where the church sets in stone some opening date before the building is finished. You must allow time for setbacks. Stuff happens. Don't back up everyone against the wall with a rush job toward some finish line. You won't get a good job. You'll get a "let's roar through this mess and get out of here" attitude from every contractor on your job. There's nothing wrong with and it's necessary to set a completion date. Just don't alert the media and plan mass mailings 3 months before it's supposed to be finished assuming it will.