St. Paul’s Episcopal Church, Rock Creek Parish – Washington, DC

LOCATION: Rock Creek Church Road & Webster Street NW, Washington, DC 20011

SCOPE OF CONSULTING: Speech-reinforcement sound sys. design, room acoustics, noise control, sound isolation


ARCHITECT: Terry Byrd Eason, Eason & Farlow Design (liturgical consultant and designer)


REFERENCES: Walter Roberts, building committee chairman (office: 301-640-3244)
Graham J. Elliott, director of music (church office: 202-726-2080)

DESCRIPTION: Founded in 1712, St. Paul’s Church, Rock Creek Parish, is the oldest congregation in the District of Columbia. On the occasion of their 290th anniversary the parish undertook the delicate work of a historically-informed renewal, reordering and infrastructure upgrade of their church building. Portions of the brick church begun in 1721 are incorporated into the 18th century building which stands today, albeit much revised. Victorian era renovations were stripped away, uncovering a simpler interior more in keeping with the Georgian-style building. The result is a fine balance between historic-styled furnishings and the modern liturgical needs of the Anglican church.

When Clayton Acoustics Group was asked by St. Paul’s Church to join the design team we were given a challenging goal: ensure that the already good musical acoustics were not harmed by the renovation, enhance chancel acoustics for the choir and new Dobson pipe organ, and also improve intelligibility of the spoken word. We embraced the congregation’s desire to open up the enclosed chancel into a new chapel in the space formerly occupied by a cavernous organ chamber and a new multi-purpose side aisle in place of the old baptistry. This proved to be a win-win solution: the church is visually larger and more engaging, as well as acoustically more spacious and reverberant. Choir and organ sound easily projects into the nave directly through the chancel arch, as well as through the open side archways which provides early lateral reflections essential for the congregation’s sense of musical warmth and envelopment. Musical acoustics were previously judged to be fairly good, and are now just superb. The church’s fine music program, as well as an annual music festival, are well served by these changes.

One of the more striking features at St. Paul’s, is the new “wineglass” high pulpit and tester (suspended canopy) on the front nave wall, which proved quite a challenge as we designed an effective but unobtrusive speech-reinforcement loudspeaker system. Preliminary computer models showed the ideal loudspeaker height would be in conflict with the pulpit and tester—clearly, the loudspeaker had to move. To solve this dilemma we used custom “steerable line-array” loudspeakers which precisely cover the nave pews from positions high on the front nave wall. Amplified sound of talkers’ voices is synchronized with the natural sound through an innovative DSP-based “level-delay-equalization mixing matrix” and individually routed to all seating areas through loudspeakers in the nave, sanctuary, chapel and side aisle. Sophisticated computer modeling and digital-audio technology gave us the tools to design a very high quality speech-reinforcement sound system in the reverberance of St. Paul’s Church without the need to modify the natural acoustics, and with minimal visual impact. Other sound system features include a “hands-free” mixing system for worship services, program monitor loudspeakers for ancillary & support areas, assisted-listening system for the hearing impaired, modest speech & music recording system, and permanent wiring for future professional recording.

We also worked with the mechanical engineer and architect to considerably reduce mechanical and airborne noise produced by the heating and air-conditioning system (which was reused from a previous renovation). Future projects will include effective sound isolation of exterior HVAC compressor noise.
NAVE AND SANCTUARY, RENEWED IN HISTORIC STYLE – VIEW FROM REAR NAVE

COMPUTER MODEL FOR SPEECH-REINFORCEMENT SOUND SYSTEM LOUDSPEAKER DESIGN

COMPUTER MODEL TO EVALUATE DIRECT SOUND & EARLY REFLECTIONS FROM HIGH PULPIT TO LISTENERS IN THE NAVe