

Modern Church Design and Acoustics and its Impact on Christianity

Special Report

Historical Facts about Church Design and its indirect influence on the Church Community

This study summarizes the effects of ignoring the Biblical teaching on worship space design, acoustics, and the influence on church growth. The researched results of disregarding the Biblical instructions have caused a clear deviation from the kind of worship outlined in the Bible.

Study shows results from 1994-2020 of over 400 churches implementing the Biblical worship space management method. Included is the impact of using passive devices versus electromagnetic devices and how they affect church worship, church health, and modern technology's performance at all levels.

This work was commissioned by Joseph De Buglio
with assisted instruction and teaching from Blake Engel, Jon Jukes, David Yake, Dave Wettlaufer, Bill Calma, Bill Coons, Sandy Dillion, Brian Davis,
Members of the Toronto Chapter of AES

Abstract

Objective: To see if there is a correlation between church design and acoustics and how it impacts modern worship today compared to how the preaching of the Gospel and worship was conducted in the first 1500 years of Christianity.

Settings and outcomes measured: The bulk of the study is from churches seeking help with their sound issues due to the moving line threshold of people complaining. About 5% of the information was from earlier testing in the late 1990s from approaching random churches and applied an acoustical system described in the Bible with their permission. Over 400 Churches had followed through on the acoustical recommendation as outlined in the Bible. An additional 800 churches were studied who refused to address their acoustical limitations and chose only to implement the sound system portion of upgrading their sound.

Strengths and limitations of this research study: All of this information comes from the efforts of one person who could not find any partnership for long-term follow-ups. Blake Engel and Jon Jukes are two others who have implemented the Bible's method of managing sound with similar levels of success. Since no church denomination or association gathers information on the performance of their worship spaces, it cannot be determined if a sample group of more than 1200 churches is sufficient to encourage further studies to be conducted by established church denominations, rather by secular organizations that will want the information as proprietary. It could be that segments of the church community do not want to divulge any attendance or financial records without admitting the influence of ignoring Biblical Teachings.

The only limitation was that there is no physical building with the dimensions as outlined in the Bible to confirm the ideal worship space design. However, there are thousands of buildings with similar room proportions that suggest that the Bible does offer the best design for Christian worship and for the chief purpose of preaching the Gospel.

Results: The effect of the Biblical acoustical approach to sound impacted all parts of worship as well as improving the performance of whatever sound system existed in the sanctuary of the church. With 5- and 10-year follow-ups of these churches, the most common outcomes were higher attendance, higher tithes and offerings, more participation during congregational singing, and higher worship space activities during the week. Some people suggested that the Biblical method of managing sound also impacted fellowship and better unity of the church membership. These results were consistent, regardless of the type of worship or Biblical teaching practiced irrespective of whether the churches were conservative or liberal in the core belief values. Churches that only implemented the sound system portion of the recommendation did see a slight uptake on improved sound but not enough to be statistically significant.

Conclusion: In all cases, following the Biblical way of managing the acoustics of an existing church had a positive impact every time, regardless of the church's denomination or the style of worship practiced. The cost was also a significant influence on whether a church would follow the biblical method versus the secular form of managing sound. In every instance, the Biblical practice of managing sound in a church was 40 to 90% cheaper than any secular method when compared to results and room performance. In other words, the Biblical approach consistently got better results than any other acoustic treatment at any cost, yet the Biblical method always costs the least to implement. A secondary finding that experts in building design confirm is that the worship space portion of a new church building project would cost 10 to 25% less to build than any other plan. Buildings of this design generally have better attendance but are subject to the same economic decline that every other large building of private or commercial use is dependent on. The Bible has the best solution for all worship and building needs for modern churches. The Christian community seems unaware of the gift they have, or they are ignoring the Bible in these matters, or they are testing God to see if they can do better.

Introduction

For hundreds of years and more so in the last 200 years, churches have been struggling with preaching the Gospel, getting high participation during congregational singing, a consistent level of tithes and offerings and church attendance. While worldly education, secularism and liberal social behavior are impacting almost every Christian congregation, the church as a collective community shows evidence that they are not doing everything that it can to reverse this trend.

The Bible has a clear message of the importance of good sound, and that teaching has been ignored. Such knowledge, if any, is not practiced within the church community with any consistency. Individuals who try their best to bring these issues to church leadership, the church leaders, often from their own personal experiences, are dismissive of what they do know of its importance, and believe the secular message, often repeated, of the high cost and lack of affordability.

Furthermore, the secular methods of managing sound in a church have an abysmal track record. The results have mostly been minor improvements or no improvement. With so little gained at such a high cost, it is no wonder that any suggestion to doing whatever it takes to have a real, fully functional worship space is dismissed. Avoiding worship space design that follows the Bible's teaching, as well as acoustical treatment, suggests that what the Bible implies is mythical and beyond the affordability for any congregation to own. A popular statement that is often repeated that drives people away from the Bible's teaching is that while the rectangle is the best shape for a church, it is the worst shape when no acoustical planning is applied. When applying such comments along with the high cost of acoustic products, most churches turn to other room shapes and designs as well as the latest technology in the hope of avoiding all these problems. Such thinking has only brought forth consistent failures.

Does the Bible have solutions to modern church sound issues?

The Bible indeed has an extremely specific solution to both the design of a worship space and a detailed plan in how to manage the sound to meet all spoken, sung and musical sound requirements as part of all worship services. If you leave out any of the details, the room will fail to perform. The Bible's plan is specific to true Christian worship.

The secular community has never offered a similar solution as they refuse to adopt such a concept because it cannot be patented, licensed or profitable to any commercial endeavors. Yet within the secular community, there are some who know this but refuse to implement it because, by scientific standards, they do not want to risk something that cannot be modelled into a formula to get repeated results. Computer modelling cannot replicate what the Bible teaches. Consequently, the secular community is not in the habit of doing things in faith for fear of legal implication if such a plan should come up short on results.

On the other hand, Christians, who live lives that are based on faith, trust God with their souls but do not apply the same faith as detailed in the Bible in this matter. Christians are greatly influenced by the experiences of the secular community.

Consequences of ignoring the Bible.

Secular recommendations do change how a room sounds; that is a given, but the outcome in most cases is an exchange of one set of problems for another set of problems which often leads to no improvement that benefits everyone in the church. (*As it often happens, they did get rid of the echo, but the treatment made congregational singing worse.*) The fallacy is in the mistaken belief that the secular community has several mathematical formulas along with empirical test measurements of surfaces and products that are supposed to give predictable results. They say to trust "the science." Science will keep the promise of good sound. There is yet to be a church that trusted the secular community and methods and has a worship space that performs well enough to give its members the full range of worship the Bible describes for us to experience.

Instead, the legacy of secular worship space design and acoustical management of sound has given a platform for manufactured emotionalism, spiritualizing abnormal behaviors, liberalized teaching and false teachers to go unchallenged.

Going to the source - Biblical Clues

The Bible does offer some clues as to how important church sound is to God.

Moses

One of the first encounters of an example to hear is when Moses went up to Mount Horeb and the burning bush encounter (Exodus 3 and 4.) Here, Moses is isolated from everything else that could be a distraction. In Numbers 7:89 it says, "And when Moses was gone into the tabernacle of the congregation to speak with him, then he heard the voice of one speaking unto him from off the mercy seat that was upon the ark of testimony, from between the two cherubims: and he spake unto him." There are two things here. The first is that the tabernacle was a quiet place, and the second is that Moses could tell from where the spoken words were coming from.

King David

Later in his life, King David was in good standing with God, and despite his sins, was helped by God. David, who repented, and loved God so much, the Lord used him to design a temple that David wanted to build, because he felt that his house was better than the tent where the Ark of the Covenant stood. David was never allowed to build the temple, but God promised that one of his children would build God's house for the Ark. In 1 Chronical 28:19 "All this," said David, "the LORD made me understand in writing by his hand upon me, even all the works of this pattern." David said this to his son Solomon.

King Solomon

Most of the clues about a house of worship's performance are in the temple Solomon built. It begins with dimensions, attached rooms, the two main rooms, the length, width and height ratios. Other details include lighting, surface materials, surface shapes, surface coverings, sanitation, storage, and so much more. There were two extremely specific acoustical features included that translates perfectly into modern churches as well. Here is also

where the first form of passive sound amplification is implemented too.

Jesus

Jesus, at two different locations, gives us great examples that make it possible to speak to thousands of people at the same time. The first is the Sermon on the Mount. There Jesus went up into a mountain. We do not know how many people there were Matthew 5-7. In Matthew 13:1-33, Jesus went out in a boat to speak to a multitude of people. Again, we do not know how many people were there.

In Matthew 14:13-21, we learn that about 5000 men with their wives and children followed Jesus into a remote place. There Jesus healed people, but there is no mention of any teaching. However, the people were able to hear the instructions Jesus gave before He fed them.

Each example here shows clues in what it takes to have good sound so that thousands can hear without needing a sound system.

Risk of Bias

In collecting data to present a Biblical alternate to secular solutions to sound issues in churches, one would assume a financial advantage if this information were kept private. Since as early as 2002, 5 years after first confirmation that the Bible did indeed offer a permanent solution to church sound, many attempts have been made to make as much of this information

public as the discovery of this research has progressed. By making this information public it prevents anyone from taking advantage of the Church Community through clever marketing of licensing of such a system. This also protects the church community from anyone patenting this method and shutting the church out of any meaningful way of controlling church sound, even though this method of managing church sound dates back 3500 years.

Oddly enough, the reaction from church leaders in learning any of this information has stimulated no reaction whatsoever. Furthermore, there is no public record of any denomination doing any systematic study on church sound considering that 95% of all church endeavors in the sanctuary is centered on requiring the best sound possible for the full spectrum of activities of any worship service.

Exclusions

At this time, none of the churches that have implemented this method of managing sound has been excluded from this report. Two churches attempted to remove the acoustical system they themselves installed due to aesthetic complaints. In both cases, church members threatened to leave the church if the acoustical system was not restored. Both churches resorted the acoustical system within 45 days. One of them borrowed money to make the acoustical system aesthetically acceptable. This is an example of how sound impacts a church.

Part 1 Biblical History

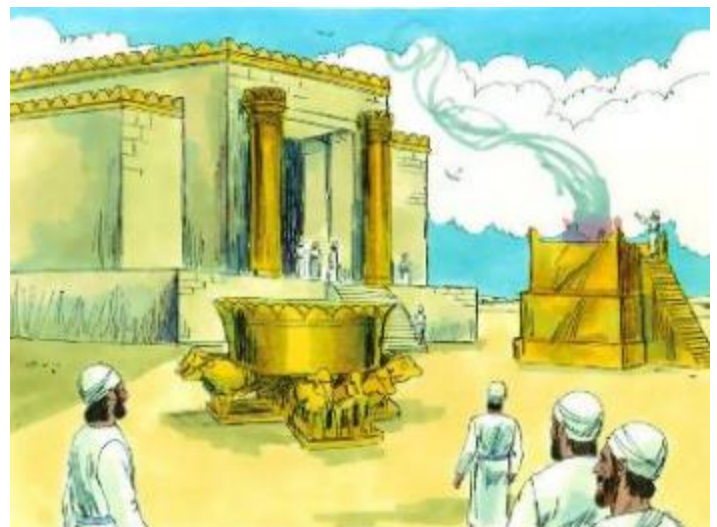
When Solomon's Temple was built, it was nothing short of spectacular. Four hundred years later, the temple was demolished. There was nothing left of the original building. When Israel returned, they rebuilt a second temple on the same spot, but it was far short of what King Solomon had erected. When a person reads the Biblical account of the construction and how the first temple was used, you may not see a connection to the present, but there is one. Most people see the temple as a larger-than-life tale that is more mythical than practical.

There are many people and groups that make claims to secrets of Solomon's temple, such as the Freemasons, various orthodox groups, people who are into mysticism and much more. Some people have spiritualized the temple into something that resembles a human form. There are those that claim that at the time when Solomon's Temple was built, the people did not have the tools to make such a monument. Whatever that case may be, secrets suggest that something is mythical, supernatural or something that is newly discovered. King Solomon, who built the temple, has been famously quoted as saying in Ecclesiastes 1:9 ... "So, there is nothing new under the sun."

I read the Bible all the time, but never cover to cover in one continuous read. For those who have, as most preachers do, they say that the Biblical story of 66 books tells a connected and continuous narrative that starts in Genesis and ends in Revelation. Everything is connected, and everything has a purpose in either teaching us or something practical. Almost all this knowledge is timeless, which means that such information

of the past can be used in the present. From Genesis to Malachi, everything points to three things: God, Eternity, and Jesus. From Matthew to Revelation, everything points to a new covenant with God through Jesus for our eternity and the consequences of the choices we make. With that in mind, how does the story of Solomon's Temple fit into the Biblical narrative? Like the rest of the Bible, what does it offer to teach us or what is there that we can use today?

In the days of Moses, the Israelites were forbidden to eat pigs. Pigs are omnivores, which means that they eat meat and plants. Pigs will eat anything when given the opportunity. While wild pigs are mostly immune to the bad things they eat, their bodies become hosts to all kinds of parasites, worms and diseases that are harmful to people. In the days of Moses and



for centuries afterwards, it made sense to protect yourself from the possibility of that kind of harm. Later it was learned that if you kept the pigs penned in and limited their feed to plants, it would be safe to eat them. Today, eating farm-raised pork is safe. Eating wild boar is not. The wild boar is associated with 24 diseases, and some of those can lead to death. While many have eaten wild boar, such as the ones roaming around in North America and Europe, the risk of coming across a boar with a deadly disease is high. That said, the laws and rules in the Bible had one common theme that they are applicable in the present. The laws and rules are there to keep us safe. How does Solomon's Temple fit into the Biblical story?

¹The building of Solomon's Temple came after the people transitioned from being nomadic and tribal in nature to become a stable and established nation. The temple became the visible symbol for the nations around Israel and a declaration that they were the followers of God. What is often overlooked in the story is that in the Book of Chronicles, in another portion of the Bible, it says that King David did not design the temple Solomon built on his own. God helped in the design of the temple. That makes the temple something special. If the temple was special enough for God to design it, why did God allow it to be destroyed? Why have such a magnificent building, knowing that the Babylonians were going to bring it down? Why did God let it stand for 400 years considering how the people of Israel sinned, turned their backs on God, worshiping other gods and even brought in idols into the Holy Place portion of the temple? Israel fell into a state of corruption, and it was overwhelming. King Josiah, 300 plus years after the temple was complete, removed the

idols and tried to restore Israel as it was in King David's days. The other leaders in Israel did not support King Josiah. When it came time to defend Israel from Egypt, the story implies that his people turned their back on him to die. Soon after Josiah was killed, the corruption in the temple and idol worshiping returned to a greater level and not long afterwards, the Temple was destroyed. Most of the people of Israel were captured and enslaved in Babylon for 70 years. If being a monument was not the purpose of the temple, did God have something else planned for us?

A Myth or Fact

What is fascinating in all of this is how the books of Kings and Chronicles were written in Babylon while Israel was held captive. It was also during this time that the quality of recording keeping improved. What is remarkable is that all the details of Solomon's Temple and how it was built most likely came from

oral history or fragments of records the people took with them when they were captured. Historians say those two books were written around 550 BCE². That was 400 years after the temple was built. The fact that such historic records came so much later makes it no wonder that many believe that Solomon's Temple is more mythical than fact. Imagine recording the details of a building years after it was destroyed.

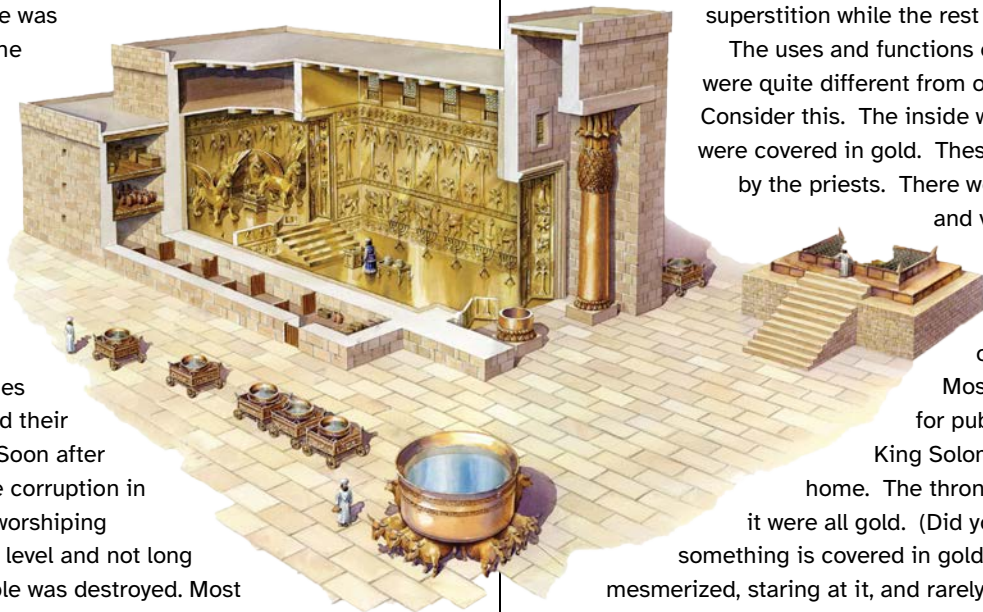
That then begs the questions, how accurate can those records be? It is no secret that many historians in the Middle East turn to the Bible as a launching point for locations and timelines in history because of its accuracy. Does Solomon's Temple hold up to the same scrutiny considering how little physical evidence there is? Is there another way to prove if Solomon's Temple was real or a myth?

The use of Solomon's Temple was vastly different. In all other religions at the time, their temples were spectacles. The buildings were monuments to and of their gods. The public was invited into the sanctuary for annual events and ceremonies. The idol statues were believed to be conduits to their gods who were thought to have supernatural powers at their disposal if they said the right prayers, performed the right dances or rituals, or offered the right animal or human sacrifices or gave money in a way to get their gods to do as they demanded. All the surrounding nations were controlled by superstitions and events, and if that coincided with their demands and prayers, sometimes such a nation would declare themselves rulers of the world and start wars to dominate others. This did not happen with Israel. It was mostly the unfaithful people who adopted superstition while the rest simply believed.

The uses and functions of Solomon's Temple were quite different from other nations. Consider this. The inside walls of the temple were covered in gold. These walls were only seen by the priests. There were no guided tours, and visitors from other nations were never allowed to see the inside of any part of the temple for years.

Most of the gold that was for public display was at King Solomon's palace and home. The throne and the steps up to it were all gold. (Did you know that when something is covered in gold, people become mesmerized, staring at it, and rarely bother to look at what is under it? That is what we are about to do.)

Questions that should be asked or has not been answered are if the temple was not for public viewing, why hide it? Why have gold-covered walls and floor if only the priest could see them? Why are there carvings of palm trees on the walls? Why is the Holy of Holies so small? Why hide the Ark of the Covenant? Why are the windows so high and small? Why are there three floors of rooms or chambers on three sides of the temple walls? These are just some of the many unanswered questions about the temple. This article is an attempt to answer such questions.



One of the biggest unanswered questions is this. Why was the temple so important that God guided King David's hand? What lessons can the temple teach us? What other purposes could the temple offer if it were not going to be an eternal monument? Is there anything about the temple that can be carried forward into the present for both the Jews and Christians? Could Solomon's Temple have been a template to be copied for future generations of followers? Could the design of Solomon's Temple be relevant to modern Churches and Synagogues today?

My experiences and research suggest that Solomon's Temple is not only relevant today, but it also proves that the temple was real and not a myth. How can I make such a claim? Myths cannot fix the acoustics of modern Churches and Synagogues; more about that later. Solomon's Temple has several lessons to teach us, including how to design and build a modern church. If you look at church design in the last 200 years, churches keep making the same mistakes repeatedly. Could Solomon's Temple be a template to prevent churches from making new mistakes and to get the highest level of performance out of existing churches? Here are some Bible verses from King Solomon that warn us to learn from our past and value what God gives us. Proverbs 1:2-7,³ 2:1-7,⁴ 2:10⁵.

Since the beginning of when Jews, and later Christians, started to build larger spaces for teaching and worship, most projects would constantly run into common problems. These problems have been a huge problem for Synagogues and Churches alike. The solutions to those issues have seemed elusive or beyond reach. Yet the remedies have always been in front of us, in the Bible.

History

As we dig through the Bible, there were two things that God designed. They are the Ark of the Covenant and King Solomon's Temple or The House of the Lord. The Ark of the Covenant was a symbol to show people that God is not limited to an idol, a box, or a location. Instead, God is everywhere, and that God can be worshiped from any place. However, Solomon's Temple is something unique as well. When you look under the hood, the temple reveals something unexpected. When you apply knowledge from a current and critical scientific perspective, we begin to realize that God gave us something exceptional and superior. For Christians, the Bible gives us a set of tools to help make the preaching of the Gospel more effective.

Was Solomon's Temple more than just a monument stuck in time or a wonder of the world? Was it limited to a show of wealth, power, and a symbol for who Israel worshiped? To answer these questions, we must start at the beginning of how Solomon's Temple came to be.

The temple was to be a replacement for the Tabernacle, a very sophisticated tent for the Ark of the Covenant that moved many times. The Tabernacle was inside a fenced-in area of heavy linen. The new temple was to be something more. It was to be a permanent place to house the Ark of the Covenant. The rest of the building was to support all the needs of the Levites. The Levites were tasked with the responsibility to perform sacrifices, rituals, teaching, learning, singing, and music within the main temple worship space. The temple was to be a testimony for the

rest of the world to see the Israelites faith in an unseen God who is everywhere.

While I am not an expert in ancient temples, I have scoured available resources on the internet and libraries and contacted some scholars to find out if there were any temples at Solomon's time that have similar details. There were other temples at the time that were bigger, taller, and elaborate, but none of them had any resemblance to what Israel built. Other temples were built around statues for idol worship in the middle of the main building for the public to see and submit to. At Solomon's Temple, the most prized possession was a box that contained the words of God, and it was hidden away and placed in a small room. It was sealed off to the priests except for once a year, and the main worship space, which was sparsely furnished, and the public was forbidden from entering it. Outside, people could see the rituals of animal sacrifices. Outside is where people could talk to the priest and confess their sins, which would be atoned for through the blood offering. Only the blood was brought in and used for the final part of the atonement ceremony.

There is no other written record before 550BCE that details a temple as such. Perhaps such details do exist, but they are not readily available for public access. This makes Solomon's Temple distinctive. While there have been attempts to copy it since then, none were completed as detailed in the Bible. If they had, they would have discovered what I learned and practiced for the past 25 years.

The planning of the temple began with King David and was constructed by his son, King Solomon. The temple was designed by King David, but David said he did not do it alone. David said in 1Ch 28:19 "All this," said David, "the LORD made me understand in writing by his hand upon me, even all the works of this pattern." Think about that for a moment. David said that God put his hand upon him. David is the only person in the Bible where he could feel God guided his hands in the design. There are other examples of the hand of God, helping others for guidance and strength, but David's hands were guided in the design of God's House. What was so important about the design of this temple that was necessary for God to reach down and guide David's hands? Consider this; Since God is always in the past, present and future, He knew that the temple would be destroyed someday in the future. Was the temple to be built only once, and knowing that archeological evidence would be almost non-existent, the story would be relegated to being nothing more than a myth or legend of the past? Or was the temple to be a template for all of God's people to use as "houses of worship," first for the Jews and now for us - the Gentiles? Let us find out.

Details of Solomon's Temple

Solomon's Temple had three main parts, the Holy of Holies, the Holy Place, and three levels of chambers on three sides of the two main rooms. The hub of activities was in two main places, the courtyard where animals were sacrificed in a public display, and the Holy Place where the Priests followed the rituals of confessing their sins and the sins of the people of Israel.

Dimensions

Let us start with the dimensions in imperial measurements⁶. The dimensions were given in cubits. For this article, the short cubit⁷ is used to keep the measurements simple: 18 inches or 1-1/2 feet.

The Holy of Holies

The Holy of Holies – the room the Ark of the Covenant was kept in for 400 years was a cube. 20 x 20 x 20 cubits or 30 x 30 x 30 feet. These dimensions seem to be inside measurements. The clue to that is in the Holy of Holies. In that room, it says in the Bible that two cherubs were carved out of olive wood. Each cherub was 10 x 10 cubits or 15 x 15 feet. Fifteen feet high, and the wings were 15 feet wide. Then it says that the wings tips of the two statues were touching each other, and the other side of their wings touched the walls. Therefore, that could only happen if the dimensions were inside measurements. There is no possibility for the wings to have been corner to corner because later, it says that the Ark of the Covenant was placed in the middle of the room in front of the door that was in the middle of the wall, and the two cherubs were on either side of the Ark.

The Holy Place

The Holy Place, which I will refer to as the Sanctuary, was 40 x 20 x 30 cubits or 60L x 30W x 45H feet.

The Holy Place had activities throughout the day, including prayers, confessions, readings, teaching, learning, singing and music. These are the same activities Christians and Jews carry out whenever they gather for worship. Today, Christians enter churches as followers of Christ on the same level as the Levites, who were the only people who were allowed in the Holy Place in the temple. 1Pe 2:9 "But you are A CHOSEN RACE, A royal PRIESTHOOD, A HOLY NATION, A PEOPLE FOR God's OWN POSSESSION, so that you may proclaim the excellencies of Him who has called you out of darkness into His marvelous light; "Worshiping God is an exclusive activity for Christians and Jews. However, unlike the laws and rules of the Holy Place in both the Tabernacle and Solomon's Temple, all sinners are welcomed to hear the Gospel in places we dedicate to God as Houses of Worship. The message is always for the Christian and for anyone who will listen, including the Jews and Gentiles.

If this were a church today, it would seat⁸ about 160 people comfortably. Questions: Is there any significance to the dimensions of God's Temple?

Is it an ideal teaching space?

The sanctuary of the temple was primarily used for the rituals and ceremonies surrounding the sin offering. It never said that the duties of the Levites were to be carried out in silence. The room had to be maintained. Those cleaning the temple may have prayed out loud when alone, reciting scriptures in unison with others, or even sang songs of worship. It is human nature to turn a repeated task into something enjoyable by communicating in some way or with God.



Figure 1 Photo by Joseph De Buglio: 450 people singing over 100dB and drowning out an 18 rank Pipe organ with all of stop pulled out. This room is like Solomon's Temple including diffusion needed to make a room like this to work.

There would have been a constant cycle of teaching younger priests the scriptures, the routines, and steps in carrying out those duties given to the Levites. While the temple at the time of Solomon was not a teaching or worship facility as we would think of how a church is used today, the required performance of the room for teaching, learning, and communicating is the same.

Teaching is teaching regardless of how many are being taught. It does not matter if the classroom has 50 or 2,000 students, one on one training, or small group instructions. The same elements of the performance of a room are required. It is about physics and the natural requirement for mouth to ear communication in a large space. Remember that the main room was empty except for some candle holders, a table for the showbread, and a small altar of incense. Other temples at the time would have statues or idols in the middle of such a room. In Solomon's Temple, the room was an open space so that people could focus on God without distractions.

As it turns out, the length and width of the Sanctuary had a 2 to 1 ratio. It is ideal for teaching, preaching, and learning. In such a space, the sightlines are ideal for lip reading for people with various levels of hearing difficulties and as people age. In a room of that shape, there are fewer distractions from people's movements, which means better attention spans. It is ideal for the person teaching as they can make more eye contact with the most significant number of listeners or longer eye contact when there are fewer listeners. This is key in helping people to be focused on the message, not the person. In wider rooms, many people are seeing the back of the minister's head up to 50% of the time, which makes lip reading difficult to impossible. Under these conditions, even with amplified sound, it becomes fatiguing for the listener, as they are spending more time trying to hear and understand instead of just understanding what was being said. This becomes a distraction to the listener, and they will be less focused on the message and be less of a participant.

For the teacher, in a rectangle room with a 2:1 ratio, there is less effort in speaking for long periods, as the room will do much of the work for you. These dimensions also make it easier

for a teacher to hear the students when responding to questions. Many acoustical experts also agree that lateral/side reflections help to reinforce speech both in loudness and clarity. Fundamentally, it is the best shape for hearing, learning, and teaching. How do we know this?

We have the American educational system to thank for that. Many college and university educational facilities have lecture halls. Years ago, before there were sound systems, there was research done to see what room shape was the best for learning. The 2 to 1 ratio was not specified as such, but they did recommend spaces to be 50L x 25W feet⁹, or 70L x 35W feet, and so on. When you dig a little deeper into that reference, those recommendations failed to mention an important detail. Those room specifications were based on spaces where there was a lot of artwork on the sidewalls, room dividers, or something physical that divided the room like folding doors that made two square rooms for smaller classes. This omission has led to many believing that the 2 to 1 ratio was a bad recommendation.

From working with many churches with a 2 to 1 ratio, whenever there was no acoustical relief on the side walls in the worship space, there were a lot of problems with hearing. The problems included deadspots and hotspots. When some kind of acoustic management system was applied, usually something that diffused sound, nothing would perform better than a rectangle with a 2 to 1 ratio for speech and higher learning. The preferred method of treating such a room is with diffusion; more about that later.

Today, much of this early learning has been forgotten as technology has driven different learning methods. It would be logical to declare that Solomon's Temple was designed to deliver the spoken word in the most effective manner to capture everyone's attention as much as possible without the need for technology. The number of people present in the room did not change the room's performance. This combination puts a person in the best possible situation for learning and participating.

Today, technology has been used to complement the learning process. Unfortunately, evidence suggests that in other room shapes where people spend most of their time sitting, listening, and taking notes, the level of learning is declining more than when there was no technology other than paper notes and a chalkboard. In the end, it seems that when the rectangle shape room is used lengthways and is properly diffused, it offers the best space for learning and hearing whether sound systems, visual aids, computers, or other technologies are used today.

Is it the ideal space for good congregational singing?

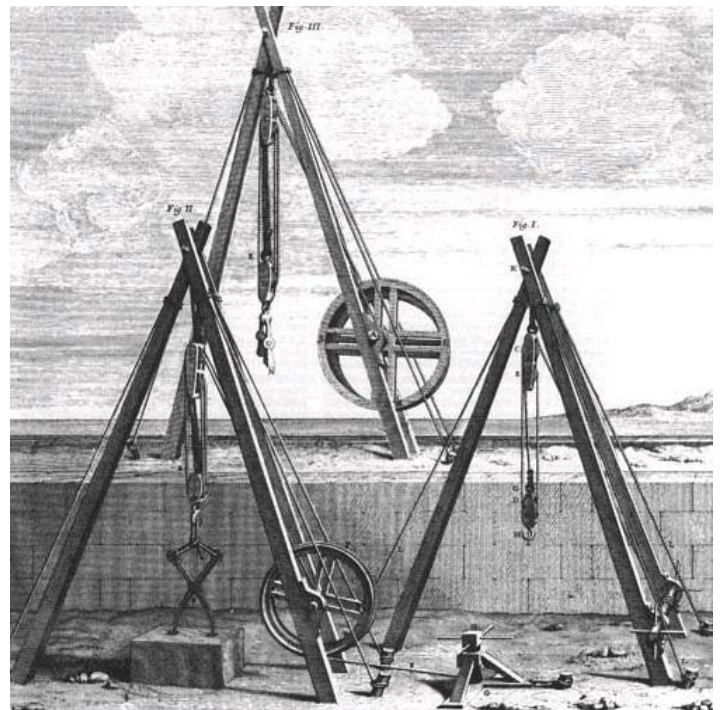
The two to one ratio is not limited to teaching. It is also applied to music spaces. But what about the Golden Ratio? Whenever the Greeks used that ratio for their outdoor theatres, they sounded good. True, but that ratio does not work well in churches, and it is not used in two of the greatest concert halls.

The best recital and concert halls use this ratio around the world. The two best-known music halls in the world are La Scala in Milano Italy, and the Boston Symphony Halls in Boston, MA. Both performance halls have shells with a 2 to 1 length to width

ratio. The shell of the Boston Symphony Hall is 156L x 75W x 59H feet.¹⁰ Those dimensions are like many other celebrated concert halls and opera houses.

This then brings us to the height of the room. It seems that any height of 45 feet, or higher is ideally suited for singing. Specifically, 45 feet is ideal for congregational singing. Furthermore, that seems to be a fixed height. For musical instruments and opera singing, they prefer a higher ceiling to create specific sound effects that are great for musical performances. Still, in a church setting, the added height interferes with congregational singing.

It would be fair to say that Solomon's Temple was more than just a showplace. It was designed as a multipurpose space intentionally for learning, teaching, music, and congregational singing. The secular community bears this out as referring to spaces designed this way as being the best. There are many churches out there that have these similar dimensions, who will disagree, and many congregations are not happy with what they have. It is most likely that something is missing. You could say that for these churches, they are not complete – no matter how old they are. Think about that. You can have a church that is 200 years old, which has all the dimensions of Solomon's Temple, and no one likes the space for hearing the Gospel, but



the room may have good sound effects for the pipe organ or children's choir. Now it is possible to turn all those churches into masterpieces of Christian worship. How crazy is that?

As for the Golden Ratio, the number sequence does start with 1 and 2. However, many say that the golden ratio is 1-1.618. It just so happens that many churches already fall into the golden ratio deliberately or by accident, and those rooms make for great entertainment facilities. The Golden Ratio works in one direction, from the stage to the audience. The golden ratio does not work in both directions at the same time. Because of

congregational singing, churches require a room that performs equally in two directions, front to back and back to front. Only a rectangle can support speech and congregational singing equally well. All other room shapes will support speech reasonably well, depending on the acoustical treatment used, but they cannot and never will support congregational singing equally.

Building design, construction costs, maintenance, lighting, sanitation, and environmental controls

Building design and Construction Materials

The next thing to look at is building materials. The three main elements were stone, wood, and gold. The stonework was the foundation and outer shell of the two main rooms of the temple. The wood was to create two essential functions. The wood was also the best surface to cover with gold. The types of wood were specific as to their functions. The floors were covered in fir, and the walls and ceiling were cedar. Wood on the floor also acted as insulation from the colder stones below. The fir wood is ideal for someone to walk on. It does not dent easily, and it returns to its original shape and size if it gets wet. These wood types are ideally suited to be covered in gold in an arid climate. The walls were in cedar, and cedar has less weight, and it is easier to shape and carve

In 1 Kings 6, it said that the walls and floors were covered in Gold. Why Gold? Was the purpose of the gold to show off, or were there other functions for covering the floors and walls with the costly mineral? If the gold were there to show off or make a statement of power, then why was the temple inaccessible to the public? After the temple was completed, the only people allowed in the sanctuary were the priests – the tribe of Levi. Without public access, no one would be able to see the gold. Why cover the walls and floors of the Holy of Holy and the Holy Place if no one was ever going to see it? Was there another reason for the Gold?

Prefab Construction

Solomon's Temple was perhaps the first building to using the modern method of prefabricated buildings in history. According to some sources, the first prefabrication of a building for construction was recorded in 1624. Solomon's Temple prefabrication was much more advanced. In 1 Kings 6, it says that all the stones used to build Solomon's Temple were quarried, cut, shaped, and completed at the quarry and later brought to the temple location and assembled on site. In modern construction, precast concrete walls are built at a factory, delivered on-site, and then assembled. Prefab construction is known as being a cheaper, faster, and safer way to build.

When you assemble a prefabricated building, for some methods, you need special tools. Again, in the Bible, it says that no iron tools were used to assemble the building. However, you would have need wooden poles or long wooden handles to steer and maneuver the finished stones into place. The temple had chambers around the outside of the inner structure on three

sides. Each level would have created a platform from which to lift the stones into place. Each lift would have been no more than 12-15 feet at a time.

Therefore, you did not need any special heavy-duty cranes to do 45-foot lifts of the larger stones.

Furthermore, as the

building became taller, the finished stones became smaller.

Interestingly enough, precut stackable columns were first used by the Greeks in the 8th century BCE. That is about 200 years after Solomon's Temple was built. These columns were cut and stacked using wooden or metal dowels or pegs. Early columns from Egypt were small blocks of stone made up of many pieces stacked and cemented in place. Then they were cut and shaped as they were building the columns. If you look at other massive stone buildings throughout history, they brought roughly cut stone on site, placed the stone into position, and carved and chiseled the rock to make a perfect fit.

By prefabricating the stones at the quarry, the same skilled stone cutters who cut the blocks also finished the stone before sending it out. That meant you only needed one team of stone cutters rather than having two teams in two different locations. With all the stone cutting and finishing done at the quarry, parts of the wall could have been pre-assembled to make sure they had a perfect fit before shipping it out. This saved time and cost. Isn't that what modern pre-fabricators do?

The whole concept of how Solomon's Temple was built was years ahead of everyone else and is commonplace today.

The Chambers

The following details of how Solomon's Temple was built was in building the chamber around the three sides of the temple, seem quite interesting. The temple walls were built to form three steps on the outside view of the temple walls and flat on the inside. The first level had the ceiling resting on the first step of the outside temple walls. The ceiling of the second



level rested on the second step, and it was the same for the third level too. The beams of each ceiling did not connect to the inside walls of the temple. That meant that the first 8 feet of the temple walls were much wider than the next 8 feet and so on. Between the heavy stones and how each of the three levels of the chambers were built, several things took place.

First off, is soundproofing. What better way is there to keep unwanted sound from entering or leaving the temple? This is another way to keep distractions to a minimum from the outside world. This is another indication that worship is about prayer, listening, learning, and sharing. Spending time with God is something we should not take lightly.

The second reason is the cost. By making the walls wider at the base, there was no need for adding pillars to support a roof so high. These days to have a clear span of 30 feet requires a lot of trusses and, in most cases, a lot of steel to support walls so high. If we look at this simple sectional view of Solomon's Temple, there would be no need for steel or trusses to make the span. Given that 3500 years ago, they did not have HVAC systems and other mechanical devices on the roof, 35-foot beams of cedar with whatever was used to make a roof waterproof was more than enough to make a safe span. In today's way of building tall buildings with thin walls and lots of steel, it is expensive. However, if a church were to build a structure like this today, it would be less expensive¹¹ to build and be very compatible with modern building codes in most countries.

The other thing that I have noticed is that these days, we use cranes, lifts, and scaffolding to build high places. If you make a new building like this, you only have to scaffold the outside walls. The roof of each level of the chambers becomes a deck to building each portion of the inside walls. Furthermore, from the roof of the third floor, it is only 9 to 10 feet to the roof of the sanctuary. This makes the whole building easier to construct, with less use of heavy equipment when building this high.

Room Lighting - The Windows and Walls

With the way the temple was designed, there was only a small section of the outside wall where you could place windows. The temple had small windows high up the walls near the roof. Some translations state that walls around the windows were narrow to the outside and wider on the inside. In modern design, we would call that a beveled edge. Due to the way the temple was designed, the center of these windows would have been 40 feet high. One possible and most likely reason for gold on the walls is that gold is very good at reflecting light, and it doesn't tarnish. Back in the days of Solomon, all gold would have been the purest gold possible. Mixing gold with alloys was not a fine art skill to make consistently. Only the best quality gold could be used in a space where there would be little to no access to maintain and clean. Gold would be the best surface material to bring light into the room to reach the temple floor. Dust does not stick to gold very much, and since it does not tarnish, it would not require much cleaning, which means little to no maintenance. Therefore, a partial reason for gold-covered wood was to light up the room and to keep the room clean. With the windows being so high, it would suggest a space where there is



as little distraction as possible. Again, this implies a room designed for teaching, learning, and prayer.

In the temple were a number of candlesticks and bases for them. Candles create soot. Soot does not stick very well to gold in a dry room, and if it does, it easily wipes off with a wet cloth. All other surface finishes at the time of Solomon's Temple would not last long and be too expensive to maintain. How do you clean temple walls covered in Gold 45 feet high? Alternatively, what do you cover the walls with, so you do not have to climb up 45 feet to clean?

Sanitation - The Floor and Blood Sacrifices

Next are the floors. This may sound strange, but they covered floors and walls with gold for sanitary reasons. In the sanctuary, on a regular schedule, the priest had ceremonies and rituals that included casting blood in sprinkles on the floor, which would also spatter onto the walls. This ritual was started in the Tabernacle before Solomon's Temple was built. In the desert, all you had to do was kick sand over the spilled blood, and the desert would kill any bacteria, germs, mold, and smell that would come from accumulated blood. Those same rituals would have been done in the new temple sanctuary often, and no one was ever allowed in the Holy of Holies except for a priest once a year on the Day of Atonement. One of the excellent properties of gold is that it does not stain from the blood. To clean any accumulated blood in the sanctuary, all you need is a wet cloth. This was most likely done after every ceremony where blood was spilled. The blood would have to be cleared to make the House of God ready for another sacrifice. Washing the blood away with a wet cloth did not wear out the gold either.

If you want to attribute this to any symbolism, consider this. In the New Testament, Jesus spilled His blood as the perfect sacrifice for us, and we are baptized in water to show the world that we have started a new life in Christ. It is a public declaration of washing our sins away. Jesus equals the sin blood sacrifice, and washing the blood away with just water is the baptism, beginning of the new, regenerative life in Christ. Once we become Christians, and when our old sinful nature causes us to sin and make mistakes again – intentionally or not,

we can come before Jesus, repent and pray for forgiveness to keep building our treasures in heaven.

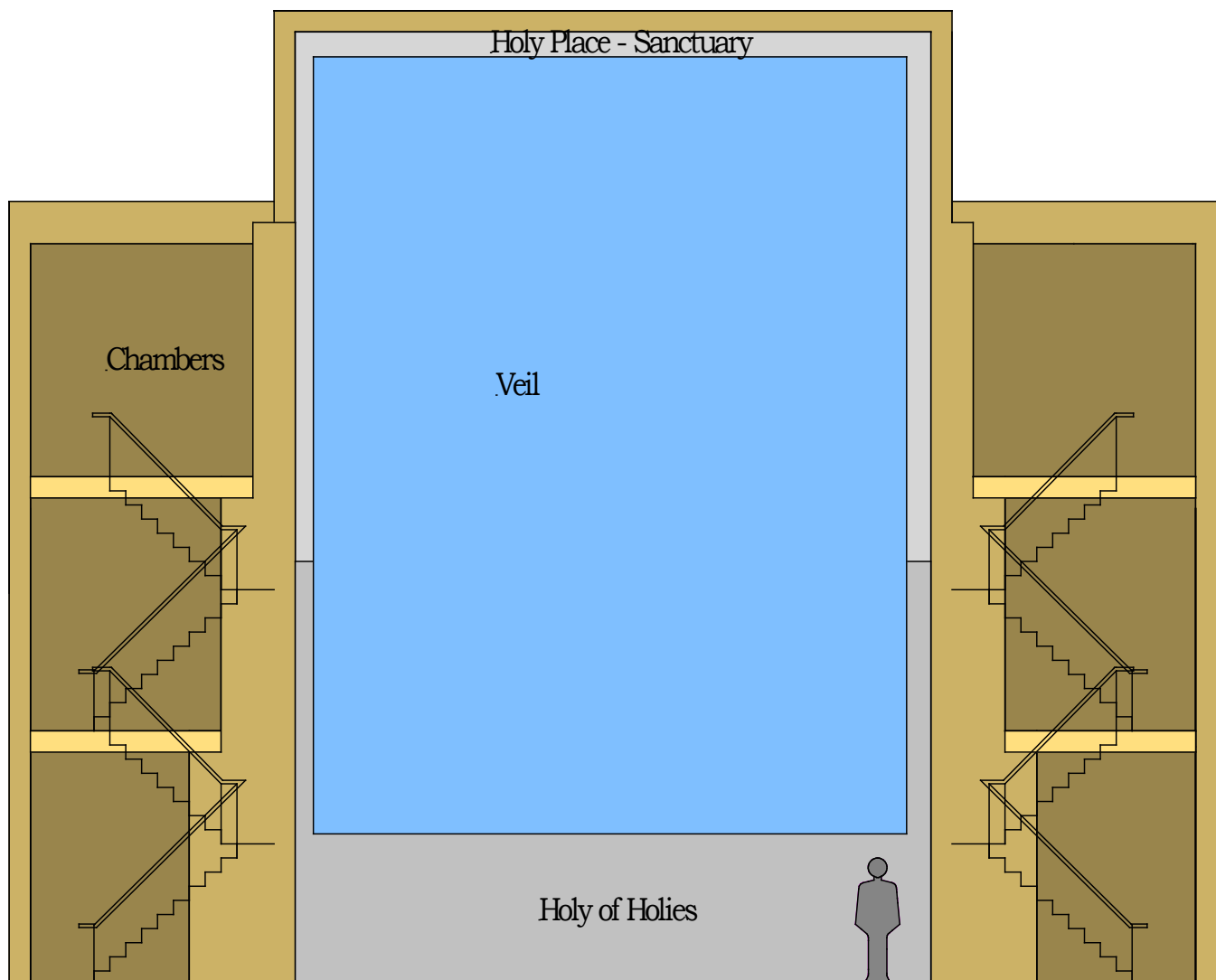
Heating and Cooling

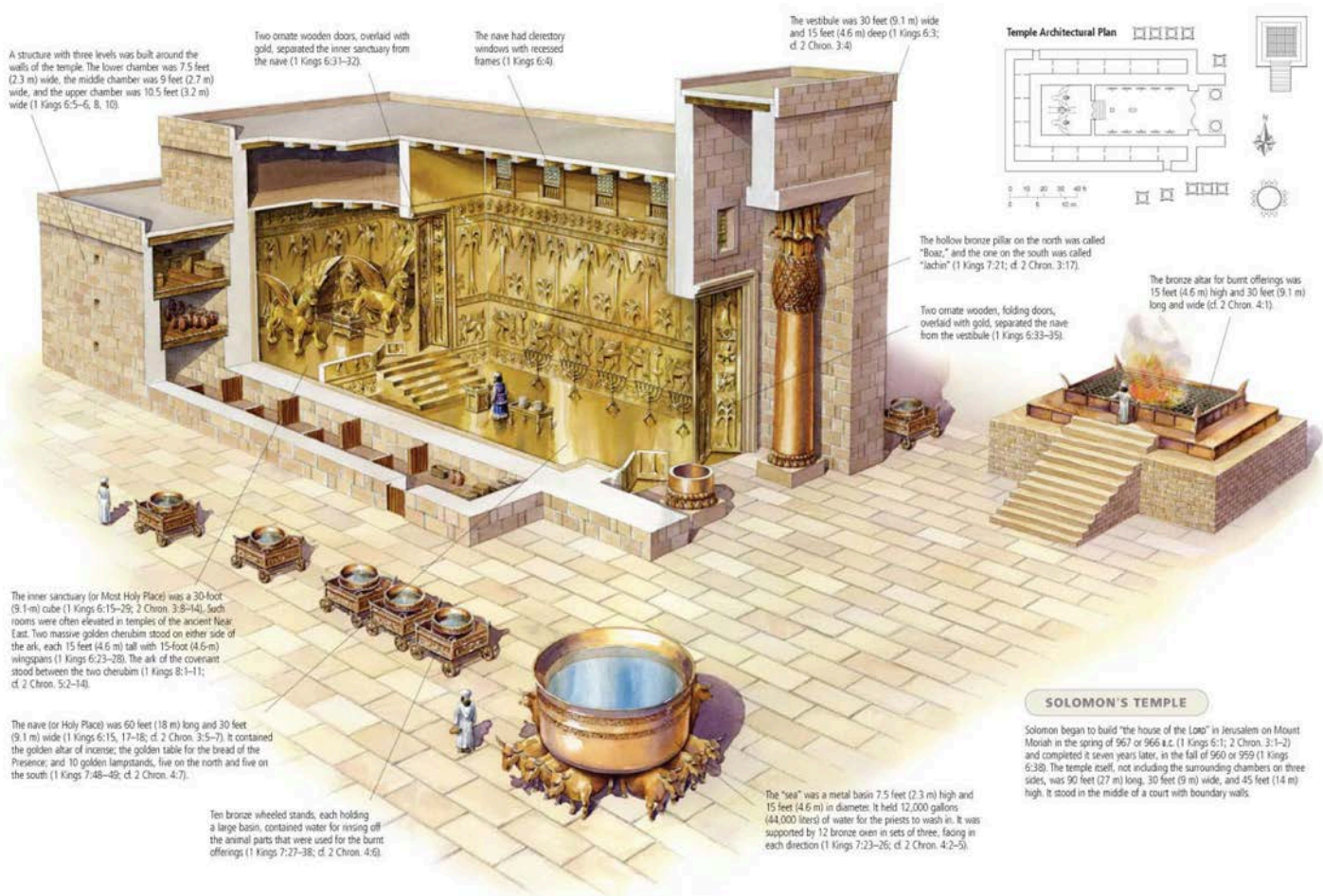
When it comes to heating and cooling, the chamber rooms around the sanctuary will perform as an insulator for the sanctuary and Holy of Holies. Between the thick walls and chambers, the temple would remain relatively comfortable all year round for both in the hot and cold seasons. Since the floor of the sanctuary is also isolated from the outside climate, the ground temperature would keep things cool. The wood on the floor would act as insulation to the colder ground temperatures making it comfortable when walking in bare feet or thin sandals. The open windows up high would allow convection cooling or warming, and it was all controlled with the front doors of the temple.

Use of the Chambers

The Bible does hint at what the chambers were used for. In 1 Chronicles 9:26-27, it mentions offices and storage rooms for their treasury. The offices were above the treasury. It also says that these porters lived in the temple to prepare the temple and open the doors for the activities of that day. In verse 33, it says

that the singers who were chiefs of the fathers were there night and day. There are a number of other activities that suggest that the chambers were more than just storage. These rooms were living quarters, storage of food, tithes, and the articles and vessels of the rituals. These rooms were used for making the ointment of the spices. Other rooms were used for making and cooking food and shewbread, for preparing it every Sabbath. The temple was a hive of activities, and all of the chambers were used. Some were also rooms for learning, prayer, and teaching. When you add up the square footage of the temple chambers, the area would be comparable to the same size of the associated space most modern churches build around a typical sanctuary. These days, most churches don't finish their buildings. They often build the sanctuary first with a few offices and a foyer. Later, they build the rest of the building. When you add up all of the space they consider as a complete church building, often, it is less than the proportion as outlined in Solomon's Temple. What I have noticed is that when a church building has the same proportions as Solomon's temple, they usually are healthier than churches that have less space available to support the needs of a typical congregation. How did Solomon know how much supporting space a congregation





needed before churches were ever created? Is this another design feature built into the first House of God?

Excellent Acoustics to complete the building

The next thing to look at in the construction of Solomon's Temple is something that seems benign and out of sorts. In 1 Kings 6:29 it says that all of the walls within and without were carvings of cherubs, palm trees, and open flowers. The wood on the walls were planks. In the days of Solomon, wood planks would have been 6 to 8 inches thick and up to 40 inches wide. The thick wood on the floor would help to keep the temperature comfortable year-round. The same thickness of wood was used on the walls. Thick wood of certain types also makes sense because it is less likely to expand and contract during the short periods of rain and humidity. If the wood were thinner, it would expand too much and cause the gold to constantly flake off and be reapplied. This detail is important as this gives the following ideas a solution to a particularly important problem the temple would have without these details. Most of the Bible translations say carvings of palm trees. There are some translations that say engravings of palm trees. This detail is significant, as well.

When building rooms with high ceilings, everyone who has been part of such a building program, knows there comes the point in the construction where the noise¹² in the room is so bad that hearing each other is almost impossible. It would have

been the same in Solomon's Temple, with everything in the temple being a hard surface. If the walls in Solomon's temple were left flat or if the carvings were just an engraving, it would have been impossible for two people to communicate beyond one cubit or about 2 feet at best. There would be no way to carry out rituals, prayer, reciting of the scriptures, and singing praises to God as detailed in the Bible over the 400 years of history of the temple. Sign language was not a thing in those days. With that much noise, it would drive everyone crazy, and no one would have wanted or been able to live in a space that sounds that bad. Something was needed to manage sound in such an important place.

When the walls were up, and the ceiling was completed, it says in 1Ki 6:11, "And the word of the LORD came to Solomon, saying, 'here God is making a promise to Solomon. How Solomon experienced the "word" is not stated, but, after this, we read about the wood on the floors and walls. Was this part of the original plan from King David, or was this something that God told Solomon to do when the Word came to him? We may never know, but either way, God is the designer of these details. God ordered the carvings of palm trees, cherubs, and open flowers. With planks of wood being 6 inches or greater, the word "carving" allows for the depth of the carved wood to be around 4 to 5 inches.

Palm Trees! Seriously!

When we look at what was carved, it is easy to understand the cherubs, which were winged creatures, who were the symbols of the protectors or guards. We understand the open flowers, the springing of new life, new beginnings. However, what are palm trees doing in Solomon's Temple? There is nothing spiritual attributed to the palm tree. Consider this, if you were in Solomon's position, would you pick palm trees to decorate the walls of a temple to God?

The palm tree had no spiritual symbolism whatsoever at the time the temple was built. These carvings went onto all of the walls in the Holy of Holies and in the Holy place, plus it was added to both sides of every door. There is no description of the carvings being in repetitive, staggered, or group patterns or sizes. We don't know if the carvings were done in rows. We do know that the carvings were plural for the doors. This would suggest smaller or variable sizes and lots of them. Since the palm trees are out of place for a Holy temple, perhaps they had a purpose – a purpose that can be relevant today.

Testing a theory

The palm tree has no branches, but it has a frond of palm leaves at the top. These carvings would all have to be vertical as a palm tree. Experiments were done in the late 1990s in Chicago, IL¹³, and Toronto, Ontario, Canada,¹⁴ to see if the palm tree carvings had a purpose. The testing was to see if the shape of the palm tree had any effect on the sound. From earlier experiences with the half-round shape of the palm tree as it would have been carved on the walls, another company that sold a product known as ASC Tube Traps™¹⁵ made and sold tube traps diffusers that were half rounds. Their sizes were 9" to 17" half rounds, which gave these researchers a starting point. These Tube Traps™ worked well, but for most churches, they were not affordable. However, this size gave a starting point to experiment with. About the only thing that was cheap and easy to cut were cardboard tubes used for making concrete posts above and below ground. They came in 8 to 16-inch diameters that were readily available. The cardboard tubes were light and easy to cut. They came in 8 and 12-foot lengths. With over 250 units assembled, several churches allowed their worship spaces to become test rooms to see what would happen.

When these tubes were brought into the first church and randomly propped up against all of the walls, right away, you could hear the acoustics of the worship space change dramatically. In that first church, the sound was hard to understand when you were more than 15 feet away. Right away, you could hear clearly end to end of the 60-foot long church. This same test was repeated in dozens of churches of different sizes and shapes. At first, the tubes were placed randomly around the room. Later it was discovered that when you organized the tubes in various patterns, you can increase their performance and equalize the room at the same time. What was most startling was how it affected the performance of whatever sound system was in place.

They Work!

In churches that have hotspots and deadspots, these effects are all caused by the room, the sound system, or both. These

half-round tubes on the walls eliminated all of the hotspots and deadspot regardless of what caused them. They also improved all of the different sound system designs that were out there, whether they had the right sound system for the room or not. There were many other ways these tubes on the walls helped, and there are far too many to mention here.

The other thing that we discovered is that if a church had carpeted floors and padded seating, the half-round tubes worked perfectly. If the floor was bare and the seating was hard-surfaced, you needed to add the same number of absorbing panels on the walls that would equal the size of the end wall of a rectangle-shaped¹⁶ church.

This led to the concept that the carvings on the walls of the temple were for sound management and not decorative. Without the carvings of the palm trees, the temple would have been a place where teaching, learning, and rituals could not have taken place.

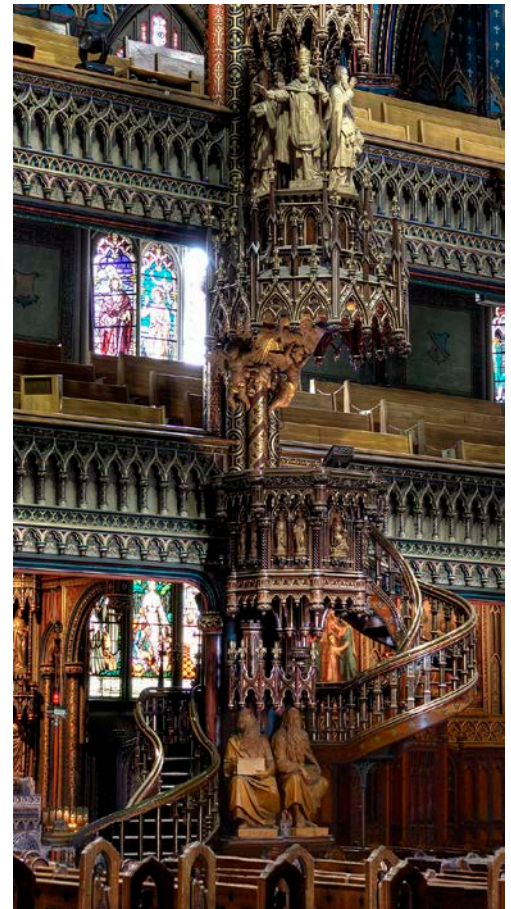


Figure 2 Notre Dame Church, Montreal, Quebec, Canada. The high pulpit position is off to the side and 40 feet ahead of the altar.

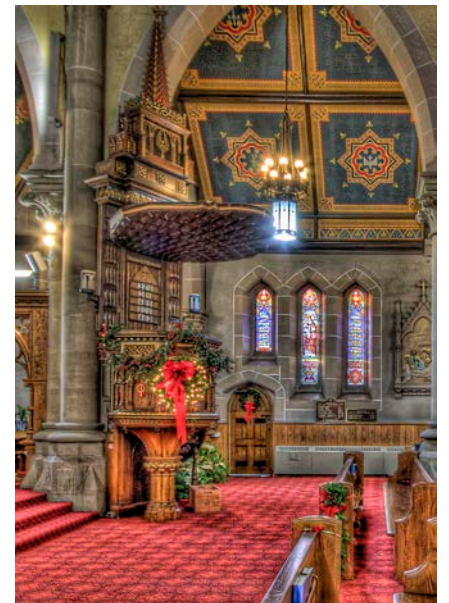


Figure 3 St Patrick Church, Hamilton, Ontario, Canada. A working and adjustable sound reflecting board of the raised pulpit.



Figure 4. Notice that the sound board has carvings of plants on the underside of it oriented front to back. This is the proper way to apply diffusion to assist with speech.

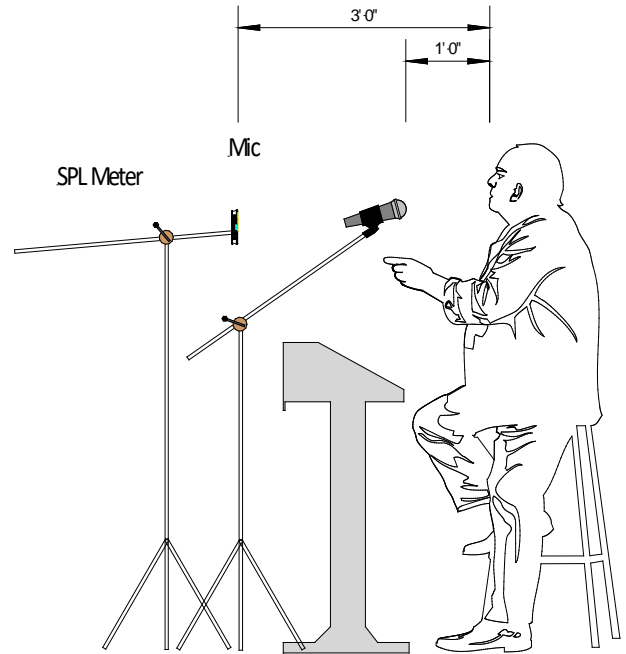
It must be pointed out that we tried smaller half-round diameters, but as they got smaller, their effectiveness became less. As it turns out, for churches under 300 seating, all you need are 8-inch half rounds, which has a depth of 4 inches. This matches up perfectly with Solomon's wall carvings, where you can carve into a wood plank 4 to 5 inches without compromising the strength of the planks.

The Veil

The next item of importance was the veil or curtain. The veil is mentioned only two times in the Bible in relationship to the temple. It is mentioned in 2 Chronicles 3:14 as being in the temple, and then in three of the Gospels, where the veil was torn in two when Jesus died. Other historical records say that the veil, which was over the door of the Holy of holies and went to the ceiling, was between 3 to 5 inches thick. The thickness of the veil as described would have provided the right balance of absorption for the sanctuary to complete the acoustical performance needed to carry out all of the functions that would take place in the sanctuary. The veil was something that God asked to be mounted in front of the Ark of the Covenant when the people were in the desert. A new veil was mounted on the wall in front of the Holy of Holies in Solomon's Temple. The veil could have been made from the leftover linen that was used to build a wall that created the courtyard before the temple was built. Such a curtain or veil would have weighed thousands of pounds, and it would have had to move enough for a priest to enter the temple once a year.

Most likely, the veil was off the wall a few inches, which meant that sound would have to pass through it twice, making it more

efficient at dampening the reverberation that was left over after the sound had already bounced on the other walls. By having the veil a few inches off the wall, it would have increased the performance of the palm tree and cherub carvings.

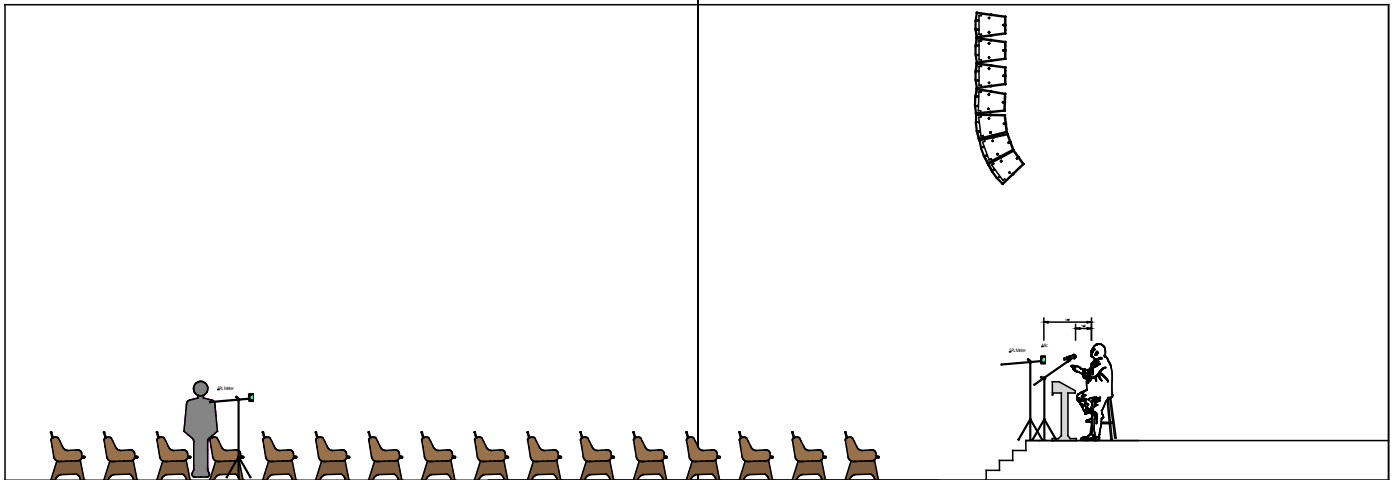


The Sound System

Solomon's Temple had no sound system. There was no need for a sound system in the temple if all of the design details were followed. Even in these modern times, a sound system wouldn't be needed, but a hearing assist system would help people who cannot carry on a conversation in a typical home living room with or without a hearing aid. With the onset of modern music, a sound system would be needed.

Since churches have not been following the Bible's teaching on sound, many churches used secular methods to manage sound. The successes were rare, and most churches still do no acoustical planning. To cope with subsequent sound issues, some discovered a sweet spot in the room. Every room has one, and some rooms have several places. In that spot, it was customary to build high pulpits. Often these podiums had a standing position where the floor of the pulpit was 5 to 14 feet above the floor and off to one side of the room. From the earliest of days, these pulpits were used to avoid dealing with the acoustics of the room. Before the 1920s, most churches were built in remote areas. Most people did not have serious hearing damage from industrial noise pollution, and on Sundays and evenings, there was little to no traffic noise to compete with the activities inside a church.

In the Notre Dame church, with 2 balconies and a seating capacity of 8,000 plus, the pulpit is 14 feet off the floor. The acoustics are fine for classical music and pipe organ music and the playback of pre-recorded music, but it does not support congregational singing or speech very well, even with a sound system.



In the St Patrick's church (completed in 1883), the pulpit is about 5 feet off the floor. To help with broadcasting the sound further, they have an adjustable soundboard with contoured shapes to help spread the sound out further. These shapes radiate outwards to spread the sound outwards. According to the priests at the time, he said the church did not need a sound system until Sunday shopping became legal in the area. Sunday traffic noise from trains, planes, cars and busses required the addition of a sound system. This church does have good overall acoustics for traditional worship but does not have enough diffusion for a contemporary program, which can be easily corrected.

The introduction of the sound system into churches started sometime around the late 1930s or early 1940s. Like the high pulpits, the introduction of sound systems was avoidance of taking corrective action of the room acoustics. Just as sound systems were introduced, whatever acoustical management Architects did know about, and churches could afford to implement, someone started a rumor. It was a mean-spirited myth that continues to this day. The rumor was that because of sound systems, Architect no longer had to include any acoustical planning. The sound system was the answer to all sound problems in a church. As a result of that rumor, church acoustics went from bad to worse. That rumor didn't go to just Architects; Church boards and building committees learned of it. They abandoned all acoustical knowledge and stopped listening

to anyone who warned churches not to build other room shapes. Those warnings fell on deaf ears, and because of the sound system, few churches today have the acoustics that they need. The other myth that is also promoted is that because of sound systems; you can build a cheaper church. Since the 1950s, the cost of building churches did seem to be cheaper, but the truth is, it made church buildings more expensive to keep and maintain. Most churches are trading off a cheaper building and pass on the high maintenance costs to their children and future members of the church.

Shortly after churches started to adopt sound systems into their worship space, a few experts in sound system design realized that sound systems were limited in what they could do. Sound systems also exposed the acoustical shortcomings of a large room. In the secular world, after sound systems were installed, acoustical experts would return to add Band-Aid fixes to make the sound system perform better. Often, these panels degraded the acoustical performance of the room. For performance spaces, it just meant you added more speakers, amps, and equalizers to compensate for the challenges the room presents. Then the added speakers expose more room problems, so more acoustical panels were added. Eventually, all of the original acoustical performance of the room was completely suppressed. This idea of adding sound systems to existing recital and concert halls and adding panels to make the sound system perform properly has ruined many performance



spaces over the years. This same pattern has been repeated many times in churches, and it is still happening today.

Sound systems will tell you how the room performs, what speaker system design you should use and so on. The easiest way to know if the room and sound system are properly matched up is with feedback. Every sound system with an open microphone amplifying the live sound of someone speaking or singing will feedback. The difference between a good room and a bad one is how quickly that happens. To test a room and setup, without any equalization¹⁷ in the installed sound system, set up a typical cardioid microphone on a stand and place it 12 inches from a person's mouth. Bring the system up until it begins to ring. Turn the level down just enough to stop the ringing. Next, have a Sound Pressure Level (SPL Meter) measuring tool such as a cell phone app, and have it placed 2 feet past the microphone so the person talking can see it. At this point, ask the person to speak at an average level of 60dB. At the same time, the sound system is still on the verge of feedback. With a second SPL meter that has been previously tested, so both meters test the same, place the SPL meter in the middle back third of the audience area. With the sound system on, the audience SPL meter should be averaging 60dB or louder. If the level is below 60dB, the room is a fail – not the sound system (unless the sound system is poorly designed or there is defective equipment in the system.) With a second person, have that person move the microphone further away while the first person is talking. Do this while the other person is still speaking. Now the test stops when the audience SPL meter average levels drop below 54dB. Measure the distance between the person talking and the microphone.

When the distance between the person talking and the mic is less than three feet, the room is considered as a fail. Anything over three feet makes for a good room. In some rooms, using the half-round tubes as in Solomon's temple, 6 feet of working distance is common.

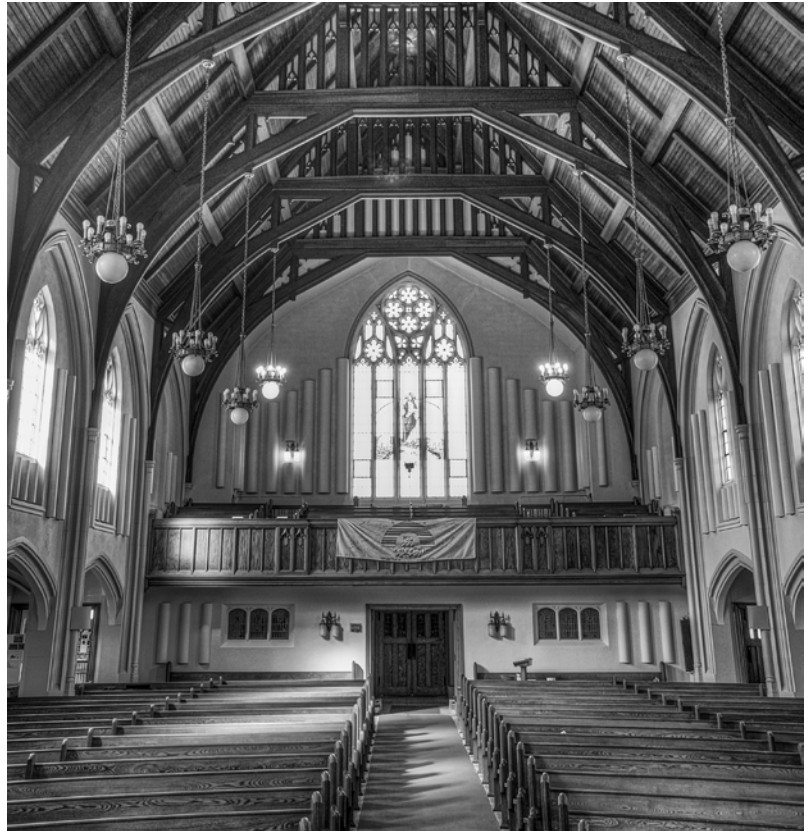


Figure 5 What a traditional church looks like when using half rounds.

To make the distinction between the room and the sound system, repeat this test with a single speaker on a stand. Place the test speaker 8 feet ahead of the person talking and 6 feet higher than the head height of the same person. Repeat the previous test with no equalization in the sound system. If the sound drops off below 54dB before getting to a distance of 3 feet, it is the room, not the sound system, that is creating sound problems. Naturally, in rooms seating over 1000 people, you have to limit the test to 80 feet rather than the back third of the seating area. When a room fails, it will be because the room has layers of acoustical problems happening at the same time, with one problem masking other problems. There is never just one thing that causes a room to fail. This will also point to the



Figure 6 What a modern church looks like when treated with half rounds.

reason for poor congregational singing, in which less than 50% of the audience is always singing. In a good room, the congregation can drown out a high-powered sound system if they want to. What is the antidote to poor room performance? Place palm trees or half-round shapes on all the walls of the temple.

By using half round shapes, like the palm tree, all of these acoustical problems are corrected. Will the sound system still have feedback? Yes, it will, but it doesn't happen when mic'ing a choir or limits the number of open microphones for an event where you need 20 open mics working, instead of being able to use 3 or 4 mics at a time. The idea of amplifying a child's voice with a microphone 15 feet away is normal when the room acoustics are managed as detailed in Solomon's Temple. Another way to look at this level of performance of using only two mic side by side to do a stereo mic mix recording and reinforce a 50-voice choir.

The purpose of detailing all of this is that it shows how forward-thinking Solomon's Temple was. Solomon's Temple is science at its best, and God gave us this gift knowing that in the future, we would need such help to keep on the straight and narrow and to shut out the distractions that are leading many astray. We need sound systems. That is a given. What we need more is a worship space that meets our needs. When our needs are met, we do not get distracted with what the secular world wants to become our wants.

The Two Pillars – Jachin and Boaz

There is another acoustical demonstration of God's majesty in the design of the temple. At the entrance of the temple, there were two pillars. They were named Jachin and Boaz. Why they have names is unknown, but they were massive. The exact sizes are unknown as these dimensions differ between Chronicles, Kings and the historian Josephus. If they were anything like in the shown drawing, these pillars did have purposes. Many scholars think of these as being purely ornamental, far from it. These pillars had an important function, and it has to do with the Day of Atonement.

Once a year, a priest would enter the Holy of Holies and follow a very specific ritual. During or at the end of the ceremony, it was believed that God would speak or reveal a message to the priests for the people. When there was a message for the people, the priest had to go somewhere to announce to everyone God's message. Where could the priest go to broadcast such a message to the highest number of people?

All designers of loudspeakers know that the curved shape of the horn does two things. The length of the horn helps to amplify sound, and the radius of the curve helps to spread the sound out to whatever dispersion pattern you need. With that in mind, it would make sense that after the priest was given a message from God for the people, he would announce it to the hundreds of leaders of the 12 tribes. What better place is there to do this from between the pillars at the entrance to the temple? If we use this image as an example, the sweet spot would be about a foot or two inside of the temple, on the gold-covered floor with the doors open. From this position, the priest would be able to proclaim the message to hundreds of people.

It is possible that using this position was often used to make announcements during the events of the year. In a way, you could stretch this idea as being a very crude first sound system. I myself had stood before two tall columns of paper rolls that were 5 feet in diameter and 6 feet tall. These were stacked in a warehouse 4 rolls high, making 24-foot tall columns. When



standing in the right spot, you could project your voice over 120 feet. If we were outdoors, on a windless day or evening, you could easily be heard by over 2000 people at a time. During the reign of King Solomon, it is speculated that there would have been about 100 representatives of each tribe, which would have meant that around 1000 to 1500 would be present for the Day of Atonement.

How many people would attend such an event is not known, and there is no record of any message from God after the temple was built. All we know is that God had spoken to Moses once when he was in the Tabernacle¹⁸, a short distance from the Ark of the Covenant. The voice came from the Mercy Seat, which was also the cover of the Ark of the Covenant. From that time on, perhaps there was an expectation of God speaking to his people from the Ark as it happened to Moses at the end of the Day of Atonement.

This section about the pillars is just an educated guess. There is no proof that the pillars at the entrance to Solomon's

Temple were used in this way. However, if we look at the other parts of the Temple and see if there is something we can learn

from the sum of these parts, it forms a picture of the temple being something relevant today.

Part 2 Answering the Questions

Just about everything in the temple had a purpose. The Temple design was more than just a remembrance of the past. That now brings us to what the temple has to do with God's plan for us today. When you combine all of the elements of Solomon's Temple and study the science, would such a space work today and be the perfect place for people to worship? Would any other room design, dimensions, and wall coverings sound any better? Can we design a church that has a different shape that will sound better, perform better, and be as affordable as Solomon's Temple would be? An honest answer would be no. The performance and acoustics of Solomon's Temple are the best for everything a church needs. Solomon's temple will have a balance between speech and music and congregational singing that seems to allude to churches outside of this design. It is when you combine the total sum of all of the parts you get the house of worship God wants for us to use. A worship space that is economical to build, have excellent sound, form and function, and affordable to maintain.

There is good news, though. If you have the courage to apply the half-round shapes of the palm trees as God commanded, made of whatever materials you have available, it will allow all of those existing churches to perform to their maximum potential. Without this detail, existing churches of other shapes are working at less than 50% of their potential. When they are fixed, although they will not be as good as a rectangle, speech and music articulation can be substantially improved, considering that it was a space that was never designed to support Christian worship in the first place.

There are already over 450 churches of all shapes and sizes that have half-round tubes on all of the walls. This system is turning bad sounding churches into great sounding sanctuaries. It doesn't matter what the walls are made of. Take any existing church where the sound is an issue, add the half-round tubes, and hear the amazing transformation. This is not something that happens some of the time; it works 100% of the time. As mentioned before, the tubes can't do everything alone. They have to be combined with absorption, and for most churches, carpeted floor and padded seating is enough.

Can you predict the results? Computer Modelling

For people who have doubts in God or God's authority, you can take cheap cardboard tubes, lean them against all of the walls of a church and hear the change instantly. However, there is more to how unique this ability is. Since the middle of the 1980s, experts in computers, math, and acoustics have been trying to create a touchstone standard for computer modelling of acoustic spaces such as churches. While the software has gone through many generations of development, it is still limited. To model a predictable acoustical solution, and one that meets all of Solomon's Temple's needs in the past or

houses of worship today, the modelling programs come up way too short.

Furthermore, while mathematical equations explain how a single diffuser works, the equations have not progressed enough to help predict real-world results when you combine them. Yes, you can break down the reactive properties of the half-round tubes into smaller parts. These properties include sound scattering, wave disruption, phase cancellation, increasing the length of time for sound to return, and using air as an absorber. When you have this many events happening at the same time, there is no software that combines them into a trustworthy prediction model. Part of the delay is because the variables are almost infinite. Distances between the diffusers, using different sizes, and grouping the diffusers offer countless ways to use them and too complex to predict in a computer modelling program. The final blow is that in a 3D world, you can only show one frequency at a time, and sound is always many frequencies, and each frequency has a different size. Computer modelling with accuracy is not yet possible, but God's way of managing sound works every time. It takes more faith to trust a computer than to trust the Bible.

Churches Acting in Faith

This then begs the question. Which takes more faith? Trusting in computer modelling, or trusting in the Word of God that has no failures? You see, all of those churches that have already put half-round diffusers on their walls did it in faith. Perhaps the salesman or consultant was good enough to convince them that they were not peddling snake oil or a false promise. For many of them, they went and visited other churches that have these tubes on the walls and experienced it for themselves. Some churches went out and bought a number of full-round tubes, placed them around the room to see what would happen. Days later, they are cutting the tubes into halves and mounted them on the walls. I would like to think that the solution speaks for itself. In the end, it is not people with creative ideas who solve the sound problems; it is God who is fixing churches today.

For churches that have a very tight budget, getting affordable cardboard tubes, cutting them in half and leaning them against the walls of the church is a great start. Try moving them around to see if one pattern works better than another. When you find the right results, paint, decorate, and mount the tubes on the walls and experience the promise God has given us in the Bible. For churches that have the resources to have detailed plans ready-made from proper acoustical evaluation, there are acoustical experts that know how to take advantage of all of the acoustical benefits this system can provide in a DIY plan.

Designing, building, and completing a church, as described in the Bible, is the best example of how you can show God's authority as being relevant in modern churches. Only the Bible

has a plan for room shapes, sanitation, soundproofing, lower building costs, and room acoustics.

In conclusion, Solomon's Temple is a blueprint for modern churches to follow if they choose to. The design can be scaled up to any size, and because of the sound system, we can make some modifications with little compromise. It also offers a universal solution for bringing existing churches of other shapes and dimensions up to the maximum level of performance. It would also mean that if your church has both a similar shape and dimension as in Solomon's Temple and the sound isn't so great; now you can complete the church by adding to the walls what God designed in His house for His people to make the message clear. For Christians, the design of a new church should not be an option, rather an act of obedience to God. The optional part of a church should be the foyer, the landscaping, the gym, and the fellowship hall. Let the exterior of a church represent your denomination and beliefs. Make the outer shell of the church uniquely yours. Leave the worship area of the design of a new church to God.

Who really designed the Temple?

Here is where Jesus fits into all of this. John 1:1-3 it says that Jesus was there as God was in the past. It also says that all things created were by the Word, Jesus. If you really believe these Gospel verses, then the design of Solomon's Temple came from the touch of Jesus being on King David's hand. "John 8:58 Jesus said to them, 'Truly, truly, I say to you, before Abraham was born, I am.'" In Matt 5:17 Jesus had to say he came to fulfill the promises He made from the past. Jesus designed the temple. Jesus, with God, are the Architects of Solomon's Temple. The evidence shows the temple as the perfect room for sharing the Gospel. The temple was never meant to be just a relic of the past. When the Israelites fell so far away from God after being given so many chances to redeem themselves, the Babylonians not only enslaved the people, but they so utterly destroyed the temple that it could never be used by any other religion again. Yet, in the midst of all of this, the Israelites remembered all of the important details of the temple design.

God is not contained in a box or a building. The temple was designed to be copied and used as a platform to show the world that God is everywhere. While we have churches all over the world that are called houses of worship, how many of them can say that their church is the best version of a sanctuary to preach the Gospel from?

The Bible teaches that salvation is a free gift. When we accept that free gift in faith, people will see the fruits of our beliefs by our works, likewise, for churches that have sound problems, this solution with the palm tree design is free, and if you act upon it in faith, you will hear God's work in action, not from a person full of techno gibberish and hollow promises. What better way is there than to use a house of worship to explain salvation through faith by sharing how the church accepted in faith and obedience that God's 3000-year-old plan would make the church sound amazing today? How much more can God do for you? Not only can you test what God has designed in the past, but you can also declare His Authority and experience it right now.

The Third Temple

Since it is reasonable to conclude that Solomon's Temple is a template for modern churches to use today, what does it say for those who believe in the third temple being a symbol to usher in a new era in the yet to be written Biblical calendar? According to the New Testament, there is no Biblical direction to build another temple for animal sacrifices. Rather, in John 2:21, 1 Corinthians 6:19 and 1 Peter 2:1-12, all describe those who are believers and followers of Jesus Christ, their bodies have become temples unto God. The idea of restoring the temple and returning to animal sacrifices is not based on any scriptures. Perhaps this is because some have this notion that restoring the temple will bring God back. God never left, but man has turned their backs on God over and over again. Those believing in faith see God everywhere, whether Christian or Jew. Without faith, you cannot see, and when you cannot see, you cannot see the hope and God's promises.

There is something else that seems to be left out of all this talk of the third temple. Even before King Solomon died, he turned his back on God and was worshiping false gods. God didn't destroy the temple for that. Three Hundred years later, a king of Israel introduced a new altar and an idol into the sanctuary of the temple. God didn't destroy the temple for that either, but it was what contributed to the end. The fourth last King of Israel, Josiah, tried to restore the nation to become followers of God, but the people did not share his commitment and allowed him to die in a battle with a king from Egypt. The next three Kings turned to evil, each being worse than the other. It was almost like it was in the days of Sodom and Gomorrah, where there were none left who followed God. No one left to confess their sins, repent, and follow God. Any rituals practiced then were to appease their conscience, not their guilt. That is when God allowed Babylon to destroy the temple. The temple was for the people, not for God. If the temple were an exclusive place for God and only where He dwelt, then God would have protected the temple, including preventing any idols or fake altars to other gods in the first place within its walls. God doesn't care about the building, he cares about us, and he allows us the freedom to choose. When there are none left following Him, he will enable calamity to patiently and painfully bring his children back.

The Temple of God, which is referred to as Solomon's Temple, was not just meant to be a temple to God or a place to contain God. God intended the temple to be for the people. It is a template to be copied.

How can the Bible be the Inspired Word of God?

For those who dismiss the term "The inspired Words of God." Consider this. Until the Israelites returned to Israel and started to rebuild the second temple, there were no reliable written records before that time. Anything written in those days was on skins, stones, or other records that didn't last very long. It was mostly oral history. If the temple was just a monument, a singular wonder of the past, then why preserve details in the present, such as the carvings of palm trees on the walls of the temple?

In the history of church design, every once in a while, a great sounding church would emerge. Due to the imagination and wealth of some individuals, some of these churches were adorned with artworks, decorative beams that were structural as well, statues, memorial plaques, and decorative trimmings. These contributions had the fortunate outcomes of making some of these churches sound really good. The reputation of such a church for sound would be so good that other churches would copy them. However, the copies would fail to live up to the success of the church they based their design on.

From studying the acoustics of hundreds of churches, when a new church copies the design of an older church that had a reputation of sounding good, and when the new designers come across something that they didn't understand the purpose of, that detail was often left out. Often it was seen as too expensive and or unimportant. After the new church is built, the acoustical qualities are of a lower quality, but still tolerated. When the next church is built, they will use the copy of a better church as a template, and when they come across something that is considered too expensive to include, it gets left out. After several general generations, the copy of the copy is so void of any acoustical properties, the church panics and seeks secular help to fix the mess they created. Acoustical knowledge in the church community has been scarce, even though the answers to their problems are in their possession. Instead, churches have turned to secular ideas used in concert halls and hearsay as a reliable help. Instead, they made churches sound worse.

As in one example in the following photo, older buildings would have a 45-degree cut in the window frames that extended from the window to the inside edge of the finished walls¹⁹. This feature was a small help with the acoustics of older churches. Older churches that sounded good would have many small details such as this.



Figure 7 There are eight features in this photo that helps to tame the sound in this church. (1) Marble memorial, (2)the beveled window frames, (3)the pillars,(4) the rounded shapes on the pillars, (5)the pipe organ, (6)the coffered wood ceiling (7) the crown molding to cover the connection from the wall to the wooden ceiling (8) the open wood trusses. It is the sum of all of the parts that makes this room work. St James Anglican Church, Toronto, Ontario, Canada. Photo by Joseph De Buglio

As each generation of a particular church design was copied, people became accustomed to the lesser quality of the room sound and performance. Some would take action by adding panels and surface changes to make up for the mistakes. Often, to get to the same quality as the church they copied, it becomes too expensive. It seems that building in any acoustical planning was much cheaper than adding it later. Often most churches would never learn of these experiences as churches seem to have no obligation to teach what they have learned to the next generation. This resulted in churches approaching a new church building as if it was the first church ever built and few lessons from the past to help. Instead, churches have allowed building codes to limit them in what they can do. With each generation of the copy of the copy, more and more details would be left out until the room is completely stripped of any acoustical performance it might have had. It is human nature to take short cuts and to find cheaper ways to build. When the scribes returned to Israel, there was no reason to record such details about the walls of Solomon's temple as there would be no significance for it. The only way such information could have been persevered is if God inspired someone to keep those design details in the scriptures.

When the second temple was built, there is no mention of wooden planks or wall carvings. Why were they were not included? We do not know. The historian Josephus makes a brief description of carved wood on the ceiling of Herod's Temple. Also, it seemed that the temple was open to more people than just the Levites as the tribes of Israel were

scattered. The temple was not exclusive to just the priests, which would suggest that details of the wall carvings were not included in Herod's version of the temple. Otherwise, how would Josephus have known of what was on the ceiling? I would think that if Josephus saw carvings on the walls in the temple, he would have recorded it, or if someone told him how the temple was finished on the inside, carvings on the walls as it was in Solomon's Temple would have stood out.

The Palm Tree – The most potent shape to manage Church Acoustics

The humble palm tree, a tree that is poor for lumber, it doesn't burn, and once damaged, it cannot repair itself. Some have fruits, and others have nuts. The rest of the tree is useless. Of all the things to be preserved in the historical details of Solomon's Temple, why the palm tree? That is an extremely specific detail. If the palm tree did not have anything to contribute to the present, then why was that detail preserved? If you have read this far, then you should see that Solomon's Temple is as much about the present as it was for the past. By following and obeying God's design, it should be applied to His churches, so we can have a better opportunity when preaching the Word of God to expose the wolves in sheep's clothing. We can be making the Gospel so understandable that it becomes harder for the deceivers to continue. True, there will always be those who are masters of deception leading a congregation of unsaved followers, but there will be fewer churches for them to dwell in where they would otherwise be exposed.

There is a heaven and hell battle for people's souls. Many are unaware or blind to it. God has given us His knowledge, wisdom,

and tools to give all those who thirst for a new life. I see the template of Solomon's Temple as another tool to give more people the same living water Jesus spoke of. For all of those people who are broken and in need of the truth, hearing God's message is a lifeline when it is not corrupted. John 3:16 is perhaps one of the most quoted Bible verses the unsaved public has been hearing in the last 40 years. For those who have read it as a slogan, they don't have a clue of what it means. People need to hear the rest of the verses that come before and after that verse so they can understand and take that leap of faith that will change their lives forever. I pray every day that the acoustics and sound systems in churches out there don't get in the way of that lifesaving message.

Hotspots and deadspots get in the way of the Gospel. Too much reverberation is distracting, as it means that people are spending more time trying to hear rather than understanding what was said. Watching people coming and going in these wider rooms are distracting, and many wind up taking their eyes off of the minister much longer than in a rectangular-shaped room. For people with hearing issues, seeing the back of the minister's head for half the sermon is not good communication.

Church acoustics has a direct impact of church attendance up to 8% and an indirect impact of up to 25%. What can happen with 8-25% more people attending your church? A clear and fearlessly preached message of the Gospel will do the rest. When it comes to preaching the Gospel, we need to stop compromising the rooms we worship in.

Part 3 Conclusion

For the record, evidence now shows that the earliest record of a large space with planned acoustics – specifically houses of worship, was King Solomon's Temple or the first Permanent House of God. The acoustical system deployed in the temple that included geometry, shapes, and materials made it possible to carry out all the requirements for the people to worship God. While initially, this worship was limited to the Levites – who were the priests, scribes, Pharisees, and workers, those details have proven to be ideal for modern worship with the current stock of existing churches and synagogues. With the smallest of adjustments, this acoustical system works amazingly well for all styles of worship around the world. The acoustics can be static or adjustable if different types of worship are practiced in the course of the day. Churches can have superior acoustics than any educational or entertainment facility or concrete hall can offer without the burden of carrying a high cost associated with secular performance spaces. The acoustics needed for worship is uniquely part of the Judao-Christian requirement. While there is no direct comparison of how Solomon's Temple was used 3500 years ago to how Christians worship today, the ability for the design of Solomon's Temple to be perfect for modern worship today is remarkable. No other religious building design in the world is so ideally suited for speaking, singing, and

hearing the message of God – hearing the Gospel of Jesus Christ.

Faith comes by hearing. The question is, will our faith in God's authority be enough to change how we have been designing churches for the last 2000 years? Do we want to create better places where more people can come to the saving grace of God through Jesus Christ by hearing His Words without interference from unwanted sound effects or distraction? For the churches that have already applied this method of managing sound, they will tell you it has aided in making them a stronger and healthier congregation.

God has given us advanced technology that is relevant today. That knowledge has been with us for over 3000 years. The scriptures have been in a common language for everyone to read for the past 500 years. Do we follow it or continue to discard such important information?

In the Old Testament, we were given commandments, rules, and laws. These teachings were to keep us safe, not to break us into submission or to enslave us. God cares more about people following Him in faith because of love than those who observe the laws as a way to earn or buy their way into heaven. God's love for us continues regardless of how often we stumble and fall. Jesus came when the teachings of the Old Covenant was absent from the priesthood. When the Jews were free after returning from Babylon, most of them didn't keep the laws in

faith. Eventually, the Israelites became so corrupted that they no longer had any relationship with God. Later, when the Jews were under the captivity of the Romans, the Israelites cried out to false gods. When that didn't work, the cries of the people turned to their true God. Shamefully, they were demanding and begging to be delivered. The priests returned to reading of the scriptures in a desperate hope that God would destroy their Roman masters. Somewhere in all of that, there was a growing number of people who began to live a life of faith with God no matter their circumstances. Perhaps those were the people who God listened to, as it was in the time of Moses. That could have been when it was time for Jesus to come. This is all speculation, but it does suggest that the Old Covenant was so forgotten that the practices of the Priest and Pharisees were polluted and totally meaningless.

Imagine people coming to the temple with their sacrifices of faith to be dishonored and trampled by the religious leader they were taught to trust with their acts of obedience, faith, and hope. Even the few religious leaders who did understand faith were forced into silence and submission. Their voices were unheard because it was only the sullied priests who held power. The Romans appointed power to the Pharisees; they were able to corrupt. These appointed Pharisees became the wolves in sheep's clothing. They convinced the widows and poor to give all that they had, thinking they were giving their money as a part of their atonement for their sins, but instead, we were lining the pockets of the corrupted Pharisees who were stealing from them. Under all of that, there was a flame of hope, and perhaps, it was that courage that ushered in a New Covenant.

Today we have a New Covenant. Jesus paid for our sins of the past, present, and future with his life as the perfect sacrifice. We are free from the things of the past. Without the sin sacrifice ritual, we no longer need the pure gold as it was in Solomon's Temple. Jesus makes us pure when we chose to become followers in the eyes of God. Underneath the gold is just wood with all of its blemishes and faults. However, the wood continues to function in what is required of it. Likewise, God accepts us as we are, including our iniquities and failings.

Without the Ark of the Covenant, we can use the space of the Holy of Holies as our quiet place to pray (Matt 6:6.) God wants us to love him exclusively as He shows His love to us. First in the creation and then in the sacrifice of His son to atone for our sins. Is it when we are in a quiet place that we turn to Him? We become a temple for the Holy Spirit when we become Born Again. In those quiet times, do you seek God or yourself and the things of this world? We don't need an Ark to know or hear God's will. We have his written words in the Bible to continue a life with Him.

Without needing the sanctified priest to bring our offerings to God, we can all now enter God's house washed in the blood of

Jesus. When we truly understand God's love and the kind of relationship, He wants to have with us, it becomes easier to follow Him. Those trials and tribulations, no matter how easy or hard they are, knowing that God loves us, makes choosing to love Him always seem peaceful- even in the midst of troubles. Perhaps entering a house of God, designed by God, allows us to experience Psalms 100. *"A Psalm of praise. Make a joyful noise unto the LORD, all ye lands. Serve the LORD with gladness: come before his presence with singing. Know ye that the LORD he is God: it is he that hath made us, and not we ourselves; we are his people, and the sheep of his pasture. Enter into his gates with thanksgiving, and into his courts with praise: be thankful unto him, and bless his name. For the LORD is good; his mercy is everlasting; and his truth endureth to all generations."* (KJV)

Once you strip away the things of the Old Covenant from the temple, we are left with a building that points to Jesus. It is also the best example of how a house of God should be. After 20 centuries, man has not been able to design anything better. Have we been so blinded by the gold, the Ark, and the treasures within that we never looked at what was under the gold? Have we been so caught up in the rituals, the garments, and the placements of physical objects that we have been blinded from the treasure the structure really is? Much of the Bible points to Jesus. Jesus said he came to fulfill. Jesus guided the hand of King David with a purpose. Was that guidance meant to be an example, stretching all the way into the current future? If it wasn't meant for us to use today, why is that design so perfect for modern houses of worship? Is this why all of those details were preserved for the last 3500 years? Should we be using what Jesus designed, or should we be continuing to play Satan's game of "let us design something better!" or "lets copy a secular type of space and fix it later" and continue to deprive ourselves of the worship God wants us to have?

Spiritual Warfare

The battle for a person's soul is a constant war on many levels. The people involved are ministers, preachers, scholars, experts, archeologists, historians, prayer warriors, educators, and ordinary Christian people who provide different ways of bringing the message of salvation through Jesus Christ. The tools we have are Bibles, books, reading materials, conservative Christian colleges, universities, missions, donations, churches, multimedia, sound systems, and more.

Many Christians are taught in the sufficiency of scriptures²⁰. Many believe that the Bible is the inspired word of God and never question it. Some of the knowledge in the Bible is still teaching us. It is only now that we are learning how relevant the preservation of the details of the First Temple scriptures are for all Christians and Jews today.

** Unless marked, photographs are from various websites on the internet. Could not source the original authors of the photos at the time.

Translations of the Bible used are from King James or the NASB versions.

Joseph De Buglio

Became a Born-Again Christian in 1975. Hired by a church builder in 1981 to learn the trade. After attending a church dedication of one of the churches he helped to build, the sound was awful, and he complained about it so much, someone suggested that he should do something about it. With those words, he has been working on Church Sound and Acoustics since 1982 and the story. Since then, he has designed 2 Churches that were built and completed—installed

over 100 turnkey sound systems and installed several acoustical fixes in churches. Consulted, sold, and designed over 1400 solutions for Churches.

For additional documentation contact

Joseph De Buglio

josephdebuglio@gmail.com

Or website at

<https://churchacousticsandsoundsystems.com/>

Joseph De Buglio and JdB Sound Acoustics has no affiliations with any product supplier of audio and acoustical products around the world.

References

¹ Image from www.freebibleimages.org

² Books of Kings, two books of the Hebrew Bible or the Protestant Old Testament that, together with Deuteronomy, Joshua, Judges, and 1 and 2 Samuel, belong to the group of historical books (Deuteronomistic history) written during the Babylonian Exile (c. 550 BC) of the Jews. – Britannica.com

³ Pro 1:2-7 To know wisdom and instruction; to perceive the words of understanding; (3) To receive the instruction of wisdom, justice, and judgment, and equity; (4) To give subtilty to the simple, to the young man knowledge and discretion. (5) A wise man will hear, and will increase learning; and a man of understanding shall attain unto wise counsels: (6) To understand a proverb, and the interpretation; the words of the wise, and their dark sayings. (7) The fear of the LORD is the beginning of knowledge: but fools despise wisdom and instruction.

⁴ Pro 2:1-7 My son, if you will receive my words And treasure my commandments within you, (2) Make your ear attentive to wisdom, Incline your heart to understanding; (3) For if you cry for discernment, Lift your voice for understanding; (4) If you seek her as silver And search for her as for hidden treasures; (5) Then you will discern the fear of the LORD And discover the knowledge of God. (6) For the LORD gives wisdom; From His mouth come knowledge and understanding. (7) He stores up sound wisdom for the upright; He is a shield to those who walk in integrity,

⁵ Pro 2:10 For wisdom will enter your heart And knowledge will be pleasant to your soul;

⁶ Being from North America, we still use imperial measurements for most construction projects.

⁷ The exact length of a cubit is unknown but there is strong support that the Royal Cubit was 20.76 inches as suggest in 2 Chronicles 3:3 and Ezekiel 43:13

⁸ It is general practice to use 12 square feet per person for estimating a worship space seating capacity includes doors, isles, altar/stage areas, stairs and access areas.

⁹ American Report of the Federal Security Agency: Office of Education, Volume 1, 1902 Page 1055

¹⁰ Collected Papers On Acoustics By Wallace Clement Sabine 1922 page 64

¹¹ According to various Architects and Church Builders. Some also call this a variation of a lean-to design.

¹² Noise is not reverberation. Noise is sound energy that arrives too soon, and it is loud enough to interfere with the direct sound. Reverberation are reflections that arrive later and 15dB below the direct sound. High quality reverberation are reflections that arrive 20 to 25dB below the direct sound and the length of the reverberation becomes less important.

¹³ Blake Engel of All Church Sound

¹⁴ Joseph De Buglio of JdB Sound Acoustics.

¹⁵ Acoustic Science Corporation ASC, Arthur Noxon, P.E.

¹⁶ For other room shapes without carpet, you would need more absorbing panels than in a rectangle shape church.

¹⁷ Most professional loudspeakers are designed to have a flat frequency response. That response is changed by the room the loudspeaker is place into. Equalization is used to correct the interference the room is imposing on the loudspeaker. With equalization engaged, you cannot determine the performance of the sound system between its design or room interference.

¹⁸ (Num 7:89) And when Moses was gone into the tabernacle of the congregation to speak with him, then he heard the voice of one speaking unto him from off the mercy seat that was upon the ark of testimony, from between the two cherubims: and he spake unto him.

¹⁹ Some refer to this as a beveled edge.

²⁰ 2Ti 3:16-17 All Scripture is inspired by God and profitable for teaching, for reproof, for correction, for training in righteousness; so that the man of God may be adequate, equipped for every good work.