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Aperture and Temporality in Interior Space

A Thesis Presented for the
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Abstract

This thesis is an investigation of interior space and its incorporation of the exterior environment. The cyclical changes of the exterior environment can be controlled within interior space, providing for the occupant temporal experiences of light, temperature, noise, and weather. By incorporating these cyclical changes, interior space is given life, providing a reference to experience a changing environment. This thesis will be explored at the frontier where interior and exterior environments meet through a study of external walls and aperture. The design project is a Roman Catholic Church. Catholic worship and church design incorporate water, light, and acoustics. This thesis will investigate the potential of aperture and temporality to emphasize the use of these elements and invigorate sacred space by engaging the exterior. The project is located at Meads Quarry in South Knoxville. The old marble quarry is a sequence of three distinct quarries. Each has its own unique characteristics of water, shade, and light providing opportunity to investigate interior space situated in particular exterior environments.

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Thesis Statement

“Since the inside is different from the outside, the wall—the point of change—becomes an architectural event. Architecture occurs at the meeting of interior and exterior forces of use and space. These interior and environmental forces are both general and particular, generic and circumstantial. Architecture as the wall between the inside and the outside becomes the spatial record of this resolution and its drama.”

-Robert Venturi, *Complexity and Contradiction in Architecture* (88-89)

This thesis investigates the role of aperture in creating a temporal interior space, and ultimately aims to understand the appropriate use of aperture in providing temporality within Roman Catholic Church architecture. The change of natural light, movement of air, changes in temperature, awareness of weather, and the egress of people through apertures creates dynamism within static interior space. This dynamism can be incorporated in Catholic churches, invigorating sacred space with connections to its exterior environment.

The minimized, abstracted forms of modern architecture have heightened our awareness of temporal exterior elements, especially the play of natural light within interior space. Henry Plummer in *Master of Light* describes the kinetic relationship of natural light and modern architecture, how the movement of light provides “a way to express and experience motion while, paradoxically, keeping in touch with a stable space and solid ground.” He writes further, “In this way motion could be read against something steady and unified, a frame of reference that was rooted and identifiable, making even more vivid and graspable the shapes of light moving freely in space, detached from any object or container” (Plummer, 98). While the emphasis of an aesthetic kinetic relationship of light and space is a great achievement of modern architecture, the Roman Catholic Church’s adoption of modern architecture’s subjectivist aesthetics have created issues in contemporary church building.

Following a change in liturgy in the previous century, Catholic churches have departed from tradition that emphasizes transcendence and the presence of God in the church, to communal churches meant to emphasize community and the presence of God in the congregation. As a result, the space of communal churches has largely become neutralized and interior-focused in order to emphasize the congregation. Richard Kieckhefer writes, “Modern communal churches

can be among the most disappointing environments for worship if those who build them have exaggerated expectation about what the architecture itself will accomplish for worship, in particular how it will foster participation [...] The challenge here is to keep the worship and its setting from becoming merely bland” (Kieckheffer, 15). As with traditional churches, contemporary Catholic churches have adopted the architectural movement of their time. However, Moyra Doorly explains that the Church’s adoption of modern Relativist space concepts has resulted in churches where “boundaries and distinctions are dissolved, and since the concept of a special place set apart is an alien one, sacred space, by definition cannot exist” (Doorly, 4).

This thesis will investigate, then, how Catholic church architecture should be treated at the boundary to the exterior. In reference to Venturi’s quote, church apertures shouldn’t be subjective, but a resolution of the “general and particular, generic and circumstantial.” Apertures can create a temporal internal environment to enliven neutral worship spaces, engage the senses of worshippers with respect to liturgy, and connect self-referential congregations to the space beyond external walls.

Temporal Interior Space

The dynamism of temporal changes within interior space is most apparent in the play of natural light on interior walls, emphasized in modern architectural designs. Plummer writes, “With modernism’s simplification of form and surface, architecture becomes more physically tranquil, allowing the subtleties of light and shadow to appear that are more nuanced and prominent than in the past” (Plummer, 22). This thesis, however, emphasizes not only the experiential benefits of temporal light, but also temperature, noise, and weather.

Interior thermal variations are typically avoided in contemporary architecture creating both thermally bland spaces and higher heating and cooling costs. Dean Hawkes explains in *The Selective Environment* that most buildings should incorporate variation in the thermal environment either from space to space or within a single room. These variations in temperature can accommodate individuals’ different comfort levels and also their varying activities that take place within the space (Hawkes, 12). Despite this pragmatic need, thermal variations have experiential benefits. These temperature differences can heighten occupants’ awareness of their surroundings, creating a connection between occupant and architectural space. Of particular interest to this thesis is the relationship of thermal quality and ritual. Lisa Heschong writes, “The association of comfort with people and place are reinforced by the ritualized use of a place. Using a place at a set time and in a specific manner [...] creates a constancy as dependable as the place itself. It establishes, in time and behavior, a definition of the place as strong as any architectural spatial definition” (Heschong, 49).

Another temporal quality within interior space is not necessarily subject to the cyclical changes of the exterior environment. Exterior noises can pass through aperture creating an audial perception of exterior activity. Depending on the space and volume of noise, this perception can create a feeling of separation or connection. The movement of noise within interior space also gives an occupant an audial perception of space. Within traditional basilicas, the echo of noise often heightens the experience of being in a grand space.

Because architecture is meant typically as a shelter from the elements, interior space is usually shielded from rain and other precipitation. However, rain isn’t always kept out of interior space. When rain falls through the oculus in the dome of the Pantheon, the interior space is

dramatically and surprisingly connected to the sky above. While the temporal qualities of light, temperature, and noise are experienced by one or two senses, precipitation is interesting because it can be experienced through sight, sound, and touch.

Connections to the exterior environment place occupants in the context of a changing environment, giving the interior space energy and motion. This movement engages occupants, and as Plummer explains, reflects our own transient nature. Embodied in the temporal nature of interior space is “the idea that life is transitory [...] The fundamental lesson about this vision is the deep reciprocity it elicits between a building and us, reflecting the fact that we humans are not objects, but are *beings*—with beating hearts, breathing lungs, and moods that rise and fall along with the hours and seasons” (Plummer, 106). Interior space connected to temporal changes in the exterior environment engages our senses and ultimately creates a fundamental connection between humans and architecture. At the center of this connection is the external wall, and how the exterior environment is allowed inside through aperture. The next chapters will discuss contemporary Catholic architecture and the use of aperture in order to understand how to connect worshippers to the space where they worship at this fundamental level.

Issues in Contemporary Church Architecture

As stated before, modern Catholic architecture has seen significant changes in the past century. This chapter will explain the recent developments in Catholic liturgy and church building. Contemporary precedents of church architecture will be analyzed to highlight these changes. By understanding the issues of communal churches through precedents, we can begin to understand the appropriate role of temporality and aperture in church design.

The Second Vatican Council implemented the most significant break in Catholic tradition in recent times, reevaluating the role of the Church in modern times. The Second Vatican Council began on October 11, 1962, initiated by Pope John XXIII. The Council began with the Pope's apostolic constitution, *Humanae Salutis*, meant to address what John Kobler describes as "the crisis in human beings," where "[w]orldwide humanity [...] is afflicted with two basic problems: the danger of nuclear war and the ongoing dehumanization of men by atheistic materialism, affluent hedonism, or abject poverty" (Kober, 19). The Council's goal to evaluate Catholic liturgy's relevance to modern humanity resulted in a change from the traditional emphasis of a transcendent God to an emphasis of God present in the people. This idea of the "People of God" was the guiding principle that changed Catholic liturgy. The concept resulted from the Council's reflection on "the 'flesh and blood' dimensions of the Church [...] the meaning for them of concrete humanity's ordering to God" (Kobler, 119). Kobler translates a portion of *Humanae Salutis* that best illustrates the Council's concern for relevance in contemporary times:

"Though not having direct earthly ends, [the Church] cannot, however, in its mission fail to interest itself in the problems and worries of here below. It knows how beneficial to the *good of the soul* are those means that are apt to make the life of those individual men who must be saved more *human*. It knows that by *vivifying the temporal order* with the light of Christ is *reveals men to themselves*; it leads them, therefore, to *discover in themselves their own nature, their own dignity, their own end*" (Kobler 21).

The Church's attempt to "interest itself in the problems and worries of here below" led to significant changes both in concept and practice. The Catholic Church now is more accepting of the various Christian denominations, Eastern Orthodox Catholicism, Judaism, and nonbelievers. Catholic mass, traditionally celebrated in Latin, is now held in the vernacular language in order

to be understood by the laity. The placement of the altar has changed in the hopes of better engaging the congregation. The sanctuary, the focus of the church where the priest holds mass at the altar table, is lowered to easily be in the congregation's view as opposed to the high altar typical of traditional churches. The table itself has been moved away from the east wall in order for the priest to face the congregation, rather than facing the same direction as the congregation during mass. During the mass itself, the congregation is expected to contribute. The parishioners are active participants in song, readings during mass, and Communion.

The liturgical changes implemented by the Second Vatican Council also changed the physical appearance and structure of Catholic church architecture. The contemporary Church has largely embraced the minimalism and abstraction of modern architecture as opposed to the ornamentation and imagery of historical churches. Also, to emphasize the "People of God," many churches have departed from the traditional rectangular basilica plan and have become more flexible in plan to emphasize the congregation; in some instances the plan is semi-circular like an auditorium or meeting room. These architectural changes have created criticism in some circles.

Doorly explains that the liturgical changes have resulted in a change of the concept of a church from the "House of God" to a less-desirable place "where the 'People of God' gather" (Doorly, 13-14). According to Doorly, the contemporary church has adopted Relativist ideas of space, becoming less of a church and more "a temple to the spirit of the age" (Doorly, 1-2). The new churches are "emptied of all but the most obscure of Catholic symbolism and imagery and presents a bland face to the world." By emphasizing the presence of God in the congregation, contemporary churches have "no meaning unless liturgical celebrations are taking place within it." This emphasis on liturgical celebrations has led to the idea of "creative liturgy," where open plans are designed for flexibility of the congregation. (Doorly, 60-61) The adoption of a flexible liturgy seems appropriate in emphasizing the ability for liturgy to change. However, Doorly explains that as a result the "very look of the new church implies impermanence" and creates "restlessness" in worship (Doorly, 61).

Richard Kieckhefer offers a different point of view, explaining that the simplicity of modern churches can inspire undue criticism. Critics of minimalism in contemporary churches may not

understand how “a minimalist aesthetic can build on longstanding traditions of simplicity in design and be infused with a richness of meaning” (Kieckhefer,289). Modern worship space can be viewed as bland when considering the single church space alone, and the space itself may encourage sedentary habits among the congregation. However, the modern church has to accomplish what traditional churches didn’t, primarily “the gathering of people from disparate places in the workaday world and the formation of a social group that then can become a worshipping assembly.” (Kieckhefer, 289) Like Doorly, Kieckhefer also recognizes that the impression a modern church makes on us largely comes from its liturgical use. While a less-populated church may appear uninspiring, that same space “may allow a fuller and more lively assembly to gain a strong sense of its own presence,” and a space that seems simplistic and impersonal may “serve well [...] when a small contemplative circle is gathered at daybreak or by candlelight” (Kieckhefer, 289-290). For a modern church to be successful, its design must be appropriate to its liturgical use. However, as Doorly pointed out, minimalist design as opposed to symbolic representation, leads to churches that seem less meaningful when worship is not taking place. How, then, can modern churches inscribe meaning?

Critics of contemporary church design differ in their viewpoints on minimalist abstraction and didactic symbolism. While Doorly insists that modern churches emptied of Catholic symbolism are bland and lack meaning, Kieckhefer explains that opposing critics view symbolism itself as meaningless. If a church is saturated with sacred symbols “how do [symbols] function for a community that has not been told their meanings, and what point is there in constantly having to instruct and remind people about symbols whose meanings are not obvious?” (Kieckhefer, 142) However, sacred symbols do not just serve a didactic purpose, but can generally serve “as reminders of the religious culture from which they derive, as witnesses to a history that [can] in principle be known” (Kieckhefer, 143). Therefore, in designing minimalist modern churches, a compromise between abstraction and symbolism must be reached by designing with sensitivity to meaning, a meaning that is particular and accessible. Kieckhefer explains that “[b]etween the plea for richness and the argument for plainness lies the urge toward a minimalism that concentrates meaning on a few subtle touches, perhaps so discreet they must be sought out carefully” (Kieckhefer,143).

Holy Rosary Catholic Church Complex

Trey Trahan designed the Holy Rosary Catholic Church Complex in Baton Rouge, Louisiana (Figures 1-3). The chapel design involves a beautiful play of light, shadow, and mass (Figures 4-6). The apertures cut into the thick walls are abstract representations of the death, resurrection, and ascension of Christ. The rectangular aperture behind the cross represents the death of Christ, while the other apertures move up the wall to the skylight in the ceiling representing the resurrection and ascension of Christ (Figures 7-9). The apertures are manipulated in section creating coffers. This manipulation makes apparent both the thickness of the wall and the play of light on the interior walls of the aperture.

This precedent is unique because it is a chapel design, rather than a church design. While churches are meant for assembly of worship, chapels are mostly a solitary, contemplative space. Doorly explains a relationship between church and chapel:

“Throughout the centuries, whatever the aesthetic and form of a particular style, whether a plain and simple chapel or grand and ornate cathedral, the church building was able to embody a vision that was both immanent *and* transcendent. In other words, “God is with us” and at the same time God is entirely “Other”. But Relativism denies the transcendent vision and is all on the side of subjectivity.” (Doorly, 14)

This quote explains the limits of Relativism, bringing into question the role of these apertures as abstract representations. Because of their abstract nature, the apertures themselves are generalized and subjective representations of Christian beliefs. These abstractions are inherently separated from the literal, creating only loose visual associations to the Christian beliefs. I’m skeptical if an occupant would recognize the association to the resurrection of Christ if they weren’t told it was so. While the space seemingly doesn’t seem to influence any active participation from the occupant, a chapel is meant to be a contemplative space for a small group of people. I expect that the chapel does provide an appropriate setting for contemplation, and an abstract, somewhat vague representation might serve a contemplation space well.



Figure 1: Holy Rosary Church Complex
Source: http://www.arch.utk.edu/special_programs/lectures08.html



Figure 2: Chapel in Surroundings
Source: http://www.arch.utk.edu/special_programs/lectures08.html



Figure 3: Chapel at Night
Source: http://www.arch.utk.edu/special_programs/lectures08.html

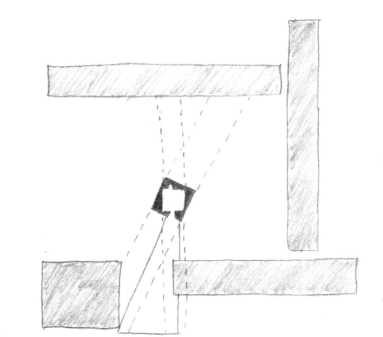


Figure 4: Chapel Axis Shift
Source: Author

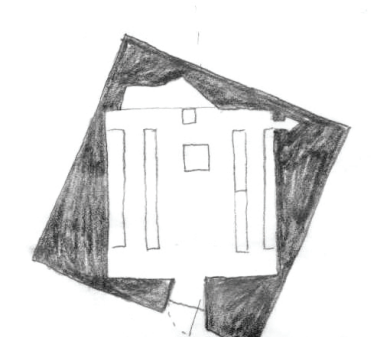


Figure 5: Carved Space in Plan
Source: Author

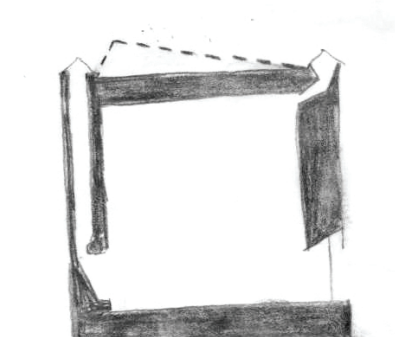


Figure 6: Carved Apertures in Section
Source: Author



Figure 7: Chapel Interior
Source: http://www.arch.utk.edu/special_programs/lectures08.html



Figure 8: Sectionally Manipulated Apertures
Source: http://www.arch.utk.edu/special_programs/lectures08.html



Figure 9: Aperture in Roof
Source: http://www.arch.utk.edu/special_programs/lectures08.html

The Jubilee Church

The Jubilee Church is a characteristic Meier design of white concrete and glass architecture (Figures 10-12). The three curved walls are meant to imply the Holy Trinity reaching up to the sky suggesting either a dome or steeple (Figures 13-15). These shells are also suggested to be reminiscent of the Gothic arch. (Richardson, 30-32) The shells' formal design conveys a sense of weight and a manipulation of gravitational forces appropriate to the design of a grand cathedral, perhaps reminiscent of the grandeur of traditional Gothic cathedrals. Doorly critiques the Jubilee Church, writing:

“The ‘white box’ represents the very latest in contemporary church design. Its enthusiasts talk about the purity of their interiors and of how they are flooded with white light from so much uncolored, hard-to-keep clean glazing, as if being dazzled by white light represents the height of spiritual experience. But white light is not pure at all, since it is made up of all the colors of the spectrum and being blinded by it is yet another reason for turning away from the transcendent and looking inward.” (Doorly, 87)

The term “white box” calls attention to the uniform illumination of natural light within the interior space. The white walls and the large amount of glazing create no differentiation in lighting. The aperture behind the altar does engage the cyclical movement of the sun, designed to allow direct light in at a particular time to backlight the crucifix (Figures 16-17). However, the particularity of this aperture is de-emphasized by the neutral illumination within the entire space.

The design of the church makes no apparent use of symbolism, seemingly allowing the presence of the congregation and the play of light to activate the space. Kieckhefer explains that a “church differs from other spaces by its making concrete and vivid a sense of the holy, of the divine presence. It is association and presence that are most important to church architecture” (Kieckhefer, 18). While the simple, white forms make more apparent the beautiful subtle movements of light and shadow, they do nothing more in the Jubilee Church. Here light and aperture are designed for a visual aesthetic, creating generalized space that provides neither a concrete nor vivid sense of the holy. The abstracted quality of light and form makes no apparent or particular associations to Christian beliefs, creating an architecture that might visually impress the occupant, but doesn't engage them in the religious realm.

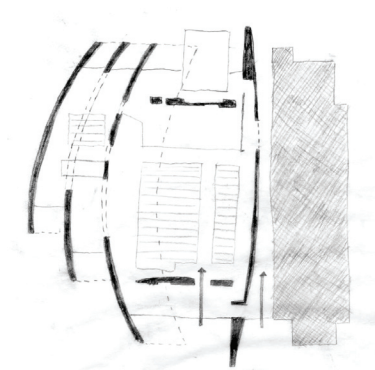


Figure 10: Jubilee Church Parti
Source: Author



Figure 11: Jubilee Church in Context
Source: Author



Figure 12: East Elevation
Source: Author

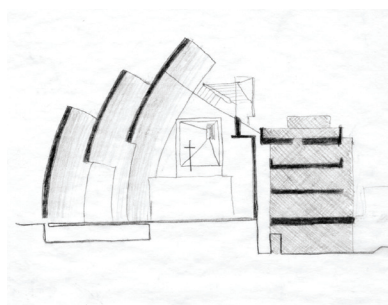


Figure 13: Section Through Shells
Source: Author

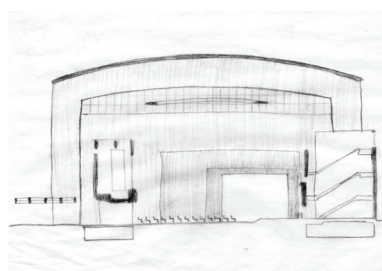


Figure 14: Layering of Shells
Source: Author



Figure 15: Glass Ceiling Between Shells
Source: Author



Figure 16: Aperture Behind Crucifix
Source: Author



Figure 17: Interior View of Nave and Sanctuary
Source: Author

The Chapel at Ronchamp

At the Ronchamp Chapel, Le Corbusier aimed to harmoniously synthesis architecture, painting, and sculpture (Figure 18). Danièle Pauly explains, “Volumes, light, colours and materials express this plastic and “symphonic” interaction and make the architectural *œuvre* a total work of art.” (Pauly, 109) Through this synthesis, Corbusier “wished to create a place of silence, of prayer, of peace, of spiritual joy. A sense of the sacred animated our effort” (Corbusier, 25).

Of course the most distinguishing aspect of Ronchamp is the manipulation of both light and plastic forms resulting in an abstract beauty (Figures 19-20). Abstraction is explicitly employed in the space heightening its drama, and the manipulation of mass, light, and form aids in this drama (Figures 21-22). The oblique surfaces of the chapel’s south and east walls are “devised as ‘receivers’ and ‘transmitters’” to reflect and capture noise (Pauly, 110-111). Light is used in various ways on the walls “qualifying the space and lending a spiritual dimension to the edifice.” The apertures in the south wall are calculated to regulate the lighting of the nave (Figure 23). The apertures vary in size and depth, and “consequently, sunlight is admitted at different angles and with varying degrees of brightness at diverse points,” varying also the lighting of the space throughout the course of the day enriching the spatial composition. The altar and choir wall “regulate” light through a few, small apertures, drawing attention to this part of the chapel. The gap under the massive curved roof receives light from the south and east walls. Without the gap “the mass of the roof covering would appear overpowering or even oppressive.” (Pauly, 113-116)

While abstraction was widely used in the chapel, Corbusier did consider symbolism in his design, using writing and images in some of the windows and considering the placement of the cross at the altar. He writes, “A few scattered symbols, a few written words telling the praises of the virgin. The cross—the true cross of suffering—is raised up in this space; the drama of Christianity has taken possession of the place from this time onwards” (Corbusier, 25). However, in the end abstract art was the means to creating the atmosphere of this sacred space. To Corbusier, abstract art is the “raison d’être of Ronchamp” where “architecture, plastic equations, symphony, music, or numbers” create a sense of “the compass needle pointing to that space which is beyond written description” (Corbusier, 123).



Figure 18: Ronchamp East Elevation
Source: Plummer, 241



Figure 19: Interior View of South Wall
Source: Plummer, 242

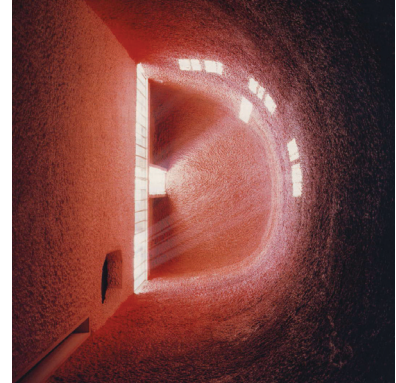


Figure 20: Interior Chapel
Source: Plummer, 245

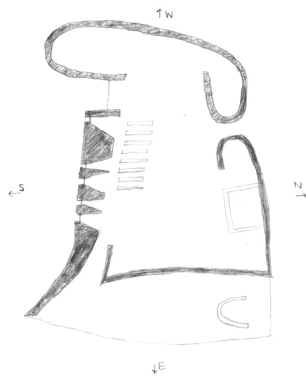


Figure 21: Manipulation of Mass in Plan
Source: Author



Figure 22: Manipulation of Mass in Section
Source: Author

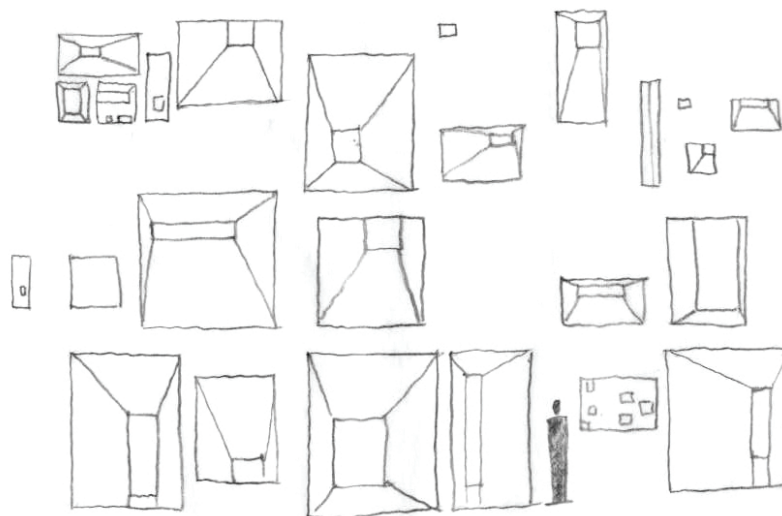


Figure 23: South Wall Interior Elevation
Source: Author

Church of St. Peter in Klippan

Sigurd Lewerentz designed the Church of St. Peter in Klippan. Lewerentz's churches are notable for their dark interiors. The apertures are designs of mass and light, which give the church a sense of being both internal and connected to exterior space. Here variation and contrast in lighting create a sense of mystery. The apertures at St. Peter's are typical of a Lewerentz design. The glazing is attached flush to the exterior wall, where the frame of the window cannot be seen from the interior (Figures 24-26). These apertures make the thickness of the wall apparent. St. Peter's also has narrow slotted openings in the ceiling, designed in a similar way to the apertures in the wall (Figures 27-28). Also, the baptismal is treated like an aperture, where a slot is opened in the floor to hold the holy water (Figure 29).

At the Church of St. Peter, apertures serve more as functional devices to illuminate the space and not as abstracted representations (Figure 30). However, Lewerentz did consider how these apertures enrich the space. In *Light Revealing Architecture*, Collin St. John Wilson is quoted as saying:

"In a rare moment of explanation, Lewerentz stated that subdued light was enriching precisely in the degree to which the nature of the space has to be reached for, emerging only in response to exploration. This slow taking procession of space (the way in which it gradually becomes yours) promotes that fusion of privacy in the sharing of a common ritual that is the essence of the numinous" (Millet, 155-156).

According to Millet, the use of light suggests divinity and "begins once again to become the symbol of divine light revealed in darkness" (Millet, 156). The apertures aren't symbols, but Millet considers the light itself a symbol of divinity. The contrast between dark and light and the sense of an interior space reaching to the exterior created by the massive thick walls create the possibility for this interpretation.



Figure 24: Exterior View of Aperture
Source: Ted Shelton



Figure 25: Flush Exterior Glazing
Source: Ted Shelton

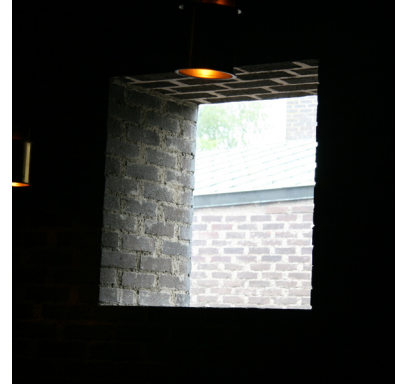


Figure 26: Interior View of Aperture
Source: Ted Shelton

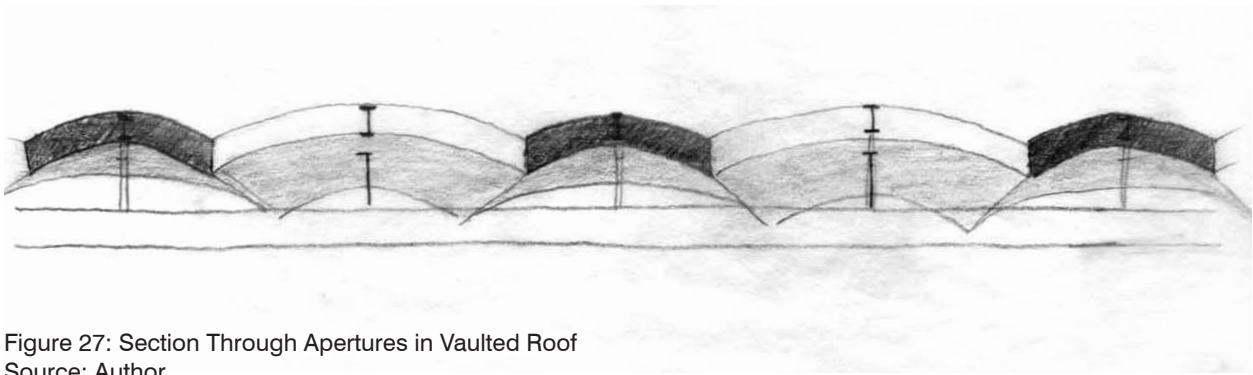


Figure 27: Section Through Apertures in Vaulted Roof
Source: Author



Figure 28: Apertures in Vaulted Roof
Source: Ted Shelton



Figure 29: Baptismal Font
Source: Ted Shelton



Figure 30: Interior View of Nave
Source: Ted Shelton

Potentials of Aperture and Temporality in Contemporary Church Architecture

Kobler translates a sentence of Humanae Salutis as saying:

“This supernatural order must, however, reflect its efficiency in that other order, the temporal one, which on so many occasions is, unfortunately, ultimately the only one that occupies and worries man” (Kobler, 20).

The change in liturgy implemented by the Second Vatican Council was an effort to resolve the inefficiencies of old traditions and concepts with the modern and temporal world. However, emphasis on the present tense has left some Catholics desiring a deeper connection with traditional ideas, mainly the idea of a transcendent God. However, the necessity of the liturgical changes is an indicator of change in Catholics' perception of sacred space, suggesting that a church cannot guarantee transcendence, even if it is designed as such, in modern times. In order to resolve this disconnection from tradition with the need to reflect “efficiency in that other order, the temporal one,” this thesis will explore possibilities of stressing both the present tense life of the worshippers and the primary foundations of Christian belief. Apertures can provide a temporal interior environment in which to worship emphasizing the relevance of the present tense life of the worshippers, while the design of the church can emphasize the core Christian belief of the simultaneous humanity and divinity of God, i.e. that God walked the earth as a human over 2000 years ago. Apertures will be designed to manipulate mass and the perception of gravitational forces, to engage temporal qualities of the exterior environment creating a contemplative space, and to relate to the liturgical celebrations leading up to Easter Mass, while figural religious sculptures will use the human form as symbols and reminders of the humanity of God and other biblical figures.

While the design of churches has seen a break from traditional forms, the manipulation of mass and gravity has been somewhat a constant architectural design scheme, as seen in the precedents discussed before. A massive wall gives a sense of weight and the possibility to visually deny gravity, highlighting the relationship between earth and the heavens. The roof of the Chapel at Ronchamp appears to hover because of the apertures between the walls and ceiling, while the carved apertures at the Church of St. Peter's give a sense of here and there.

Apertures used in abstract church designs serve better in providing a contemplative space

to reflect on the abstract notion of God, than serving as abstract representations as in Trahan's chapel. By considering the change of natural light, movement of air, changes in temperature, awareness of weather, and the egress of people, apertures can serve to emphasize parishioners' temporal present-tense environment while they simultaneously contemplate God. Figural statues can serve as symbolic reminders of the human story of God. Kieckhefer explains, "The focus in liturgical symbolism is on the connectedness of historical particularity with the particularities of present experience: the relevance of a sacrificial death on a day in ancient Palestine to concrete particulars of life here and now" (Kieckhefer, 137). By integrating particular symbolic figures with a temporal interior environment, space can attempt to connect history with the present.

Apertures can provide both a general connection to the exterior for every worship service, but also can be designed with sensitivity to particular liturgical ceremonies to signify their importance. Because modern liturgy emphasizes the idea of the "People of God," this thesis will focus on services celebrating God as a person. The liturgical celebrations leading up to the Easter Mass are some of the most active ritual ceremonies of the church, where worshippers revere Christ and his suffering, crucifixion, resurrection, and ascension.

By incorporating exterior temporal qualities inside church walls, designing both general and specific apertures, and considering abstraction and symbolism, contemporary churches can begin to resolve some of the issues resulting from a break in tradition. The modern church must provide a sense of God in both the temporal order and in connections to the past. A temporal interior space can provide a contemplative setting for worship and become enriched by both liturgical use and symbolism.

Program

As stated in the previous chapter, this thesis will focus on the Easter services of the church to emphasize the liturgical ceremonies celebrating the human story of Christ's suffering, crucifixion, resurrection, and ascension. This thesis will be translated into a final design project, and the program of this design project aims to emphasize these Easter services. The design project is a Catholic church complex located in South Knoxville at Mead's Quarry. The complex is comprised of three primary programmatic spaces along with supplementary programs. The three primary spaces are a procession to observe the Way of the Cross, a church for weekly worship, and a chapel used specifically for Easter services and baptisms. A reception hall, bell tower, church office, and home for the priest serve as supplementary program to the aforementioned. The primary spaces will be designed in consideration of liturgical use, and the liturgical services emphasized in the design project are the Way of the Cross, the Easter Vigil, and the Mass of Easter.

The procession for the Way of the Cross is important to this project because it tells the story of Jesus's crucifixion and will use figural sculptures that emphasize the human form as described in the previous chapter. The Way of the Cross is most often celebrated during Lent, but can be observed year-round. Fourteen "stations," typically plaques with descriptive images, are set up along the walls of the nave representing the events leading up to Jesus' crucifixion. The priest is assisted by a cross bearer as he proceeds from station to station along the walls of the nave. If the space is large enough, the parishioners can join in the procession. (Elliott, 65) Liturgy specifies that "[w]hile undue theatricality should be avoided, dramatic use of light and darkness may help the faithful to focus on each event of the journey of the Lord" (Elliot, 66). The design of the Way of the Cross procession will consider the both the liturgical ceremony of the congregation and the private observation of an individual.

The complex's church will be used for all services except for the final Easter celebrations, the Easter Vigil and the Mass of Easter. The Easter Vigil is a candlelight service taking place the night before Easter, and liturgy specifies that it take "place at night, never beginning before nightfall and always ending before daybreak on Sunday" (Elliott, 129). The congregation preferably begins outside where they are given candles. According to liturgy, "[t]he Easter

Candle or Paschal candle is the central symbolic object in the celebration of the Vigil liturgy because it represents the risen Lord in his glory” (Elliott, 130). The Easter Vigil is important to the church because this is when new members of the church are baptized while the congregation also renews their baptismal promises. The Easter Mass celebrates Christ’s resurrection, and is a significant “celebration of the Lord Jesus Christ, the Incarnate Word, risen indeed in our human flesh, glorified in that flesh, triumphant over the mortality of that flesh” (Elliott, 155). By celebrating these services at the chapel, anticipation for these services are emphasized and given hierarchy in relation to other celebrations of the church. Also, by separating liturgical celebrations between different programmatic spaces, the use of the site can be maximized, allowing the congregation to worship in different areas of the site.

The church complex will assume a congregation of 250 people. Minimum square footage for each programmatic space is determined according to the size of the congregation (Table 1).

Table 1: Design Project Minimum Square Footage

<u>Program</u>	<u>Minimum Square Footage</u>
Church	3200
Reception Space	
Multipurpose room	800
Kitchen	300
Storage	200
Bathrooms	200
Chapel	3200
Priest’s living quarters	800
Church Office	300
Total Minimum Square Footage	9000

Site

The proposed thesis site is an old marble quarry in South Knoxville called Meads Quarry. Meads Quarry is a linear sequence of three quarries, each with distinct qualities. The first northeast quarry in the sequence has overtime filled with spring water since the quarry ceased excavating pink marble in the 1970s (Figure 31). The lake is fed by an above ground spring found on its west end and is flanked on its north side by a large rock cliff. The central quarry is surrounded by rock cut cliffs at its perimeter, and in some areas has large cut boulders strewn on the ground. Overgrown with trees, this quarry has remnants left from when it worked as a quarry. In one area, large cut rocks have been stacked to make a large wall, its purpose unknown (Figure 32). The third southwest quarry is in contrast with the surrounding woods. The ground is covered with white powder left from quarrying marble, and only brush and small cedar trees grow in the area (Figure 33). With the absence of a tree canopy, this quarry is open to the sky and sun as opposed to the surrounding wooded area.

The sequence and size of the site influences the design of the site strategy, where the church complex engages each quarry with different buildings. In this scheme the movement of people in the site is equally as important as their movement within the interior of the church. The church and chapel are situated at the end quarries, connected by a long Easter Vigil procession through the central quarry (Figure 34). A new road will follow the existing railroad tracks, providing vehicular access



Figure 31: Northeast Quarry Lake
Source: Author



Figure 32: Rock Wall in Central Quarry
Source: Author



Figure 33: Southwest Quarry
Source: Author

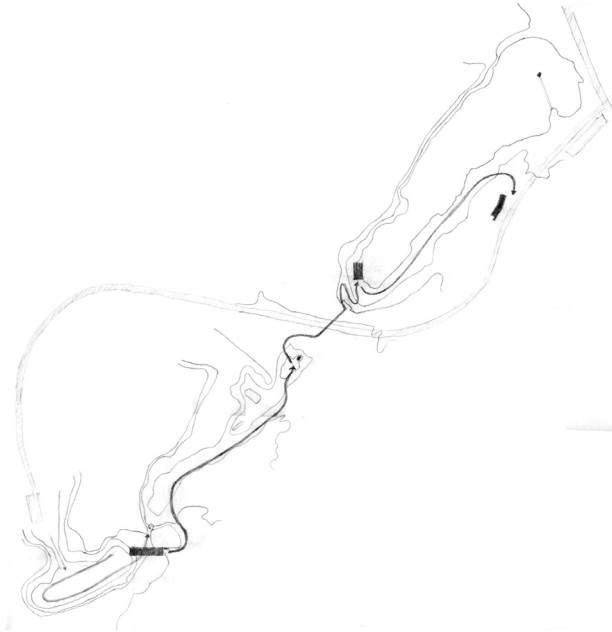


Figure 34: Schematic Site Plan
Source: Author

to the southwest quarry. The procession is important to the project because it strengthens the anticipation for celebrating the Easter services and resurrection of Christ. The congregation will walk this procession before celebrating the Easter Vigil through the central, rocky quarry. The difficult walk over boulders and down steep changes in elevation will allow the congregation to further contemplate the trials and sufferings of Christ before celebrating his crucifixion.

Each quarry in this site has unique characteristics, and the site strategy of each individual building responds to the particular qualities of the quarries. The church is sited in the southwest quarry, along with the Way of the Cross procession, the church office, and the priest's home. The southwest quarry has a change in elevation to the northwest creating a large, plinth-like area overlooking the rest of the quarry. The church is placed on this higher elevation giving it hierarchy. Because the church is located here, the path to the church and an outdoor procession of the Way of the Cross will be located in the larger, lower part of the quarry. By lengthening entry to the church and locating the Way of the Cross procession outside, the quarry becomes an extension of the church.

The chapel for Easter services and baptisms, the reception hall, and the bell tower are sited in the northeast quarry. The chapel is located at the edge of the quarry lake on its west end. Placed on the long axis of the lake, the chapel has the optimum view of the water and also has access to the spring that feeds the lake. By placing it on the level of the lake, the chapel can begin to engage the surrounding water. The reception hall is sited at the old kilns of the marble quarry, approximately a three-minute walk from the chapel. By locating the reception hall here, the kilns can be reclaimed and used as an outdoor kitchen for the hall. Also, being close to the chapel, the hall can support the Easter celebrations. The bell tower is located at the center northeast area of the lake. The bell tower is the counterpoint in the design strategy. While the chapel and reception hall receive sound and other temporal qualities of the exterior environment, the bell tower emits sound attempting to connect the chapel and reception hall with a call to worship.

Each of the quarries has unique qualities of shade, light, texture, and water that allow particular architectural response in designing sacred space. By separating elements of the church complex in separate quarries, the design of the individual spaces draw from the unique qualities of their exterior environments. The architectural design of the final project will be summarized in the next chapter.

Architectural Design

This thesis studying temporality and how apertures create connections between interior and exterior space was translated into a final design project. As explained in the previous two chapters, the church complex, consisting of a church, Way of the Cross procession, Easter chapel, reception hall, and bell tower, were isolated to the two quarries to the east and west linked by an Easter Vigil procession. The design and architectural concepts of each element of the church complex will be explained in this chapter, and all images of the final project can be found in the following appendix.

As stated before, the church and Way of the Cross procession are located in the southwest quarry. The Way of the Cross procession is an outdoor procession that begins near the entry into the site, passes through the vestibule of the church, and ends at an overlook adjacent to the second central quarry. Typically the stations are small plaques found within the body of the church, however, this project's stations are brought to the exterior and made public. The stations themselves are small chapels with statues depicting the events leading to Christ's crucifixion. The statues are viewed as a silhouette, where a side opening washes the wall behind the statues with light. This lighting creates a gestural image that visually emphasizes the human figure, accentuating the humanity of the biblical figures depicted in the stations. The stations are intended for both group and individual observance, strengthening the public nature of the Way of the Cross procession. While the congregation will use these stations in liturgical ceremonies during Lent, any individual can enter the narrow chapel, 4 feet wide near the statue, and intimately and independently observe the statues and the story of Christ throughout the year.

The design of the Way of the Cross procession connects an exterior pathway with the interior of the church by passing through the vestibule of the church. The thirteenth and fourteenth stations depict the death of Christ on the cross and Christ placed in the tomb. The vestibule of the church acts as the thirteenth station. An aperture in the wall of the vestibule frames the crucifix within the church. When individuals kneel in a moment of silence, as is practice in observing the Way of the Cross, the crucifix will be isolated within the frame of the aperture. By using the vestibule as the thirteenth station, the story of Christ's crucifixion gives context to the church and its crucifix reminding the congregation that the crucifix is part of a larger story. The fourteenth

station ends the procession at an overlook into the central quarry. In this station, the wall and floor behind the statue are completely open, allowing persons within the chapel to look beyond into the adjacent deep quarry while still silhouetting the statue. This station is oriented towards the distant Easter chapel where the Easter services are held. While Christ's resurrection isn't observed in this procession as according to tradition, the orientation of the station is a reminder to those contemplating Jesus and His tomb that Christ's resurrection will soon be celebrated.

The church in the southwest quarry is an interior-focused contemplative space that connects to the exterior site in various ways. Primarily, the church is a place of rest that connects to larger processions within the site. As explained before, the church is a piece of the Way of the Cross procession, but it also is the beginning of the annual Easter Vigil procession to the Easter chapel in the distant quarry.

The interior of the church is dimly lit, creating a mysterious, contemplative atmosphere. The walls are constructed of rock quarried from the site. Rock is drilled from the rock cliff face, creating a texture of thin vertical grooves in the quarried stone. In the vestibule of the church, the aperture designed for the thirteenth station serves to reorient worshippers to the east-west orientation of the church. The worshippers enter into the vestibule, anoint themselves with holy water in a channel at the base of the aperture, and view through the aperture the different orientation of the space they are about to enter. Over the body of the church is an arched roof creating a geometrical sense of center, while along the north and east perimeter a higher roof allows in daylight for the confessional, choir, and altar spaces. The source of the daylight is hidden, creating a dim meditative space for the congregation and providing focus on the mysteriously lit altar. The wall behind the crucifix is curved beyond the wall of the church body, serving as both a source of light to silhouette the statue and as an acoustical element to reflect the choir's singing on the opposite side of the altar. The wall is intended to reflect the music within the church, but also to reflect the music to the exterior Way of the Cross procession, further claiming this path as an extension of the church through the incorporation of sound. Beyond the altar, a large door marks the beginning of the Easter Vigil procession. Throughout the year, this door remains closed, but, on the day before Easter, the door is opened and the congregation begins the procession through the central quarry to celebrate the resurrection of Christ at the Easter

chapel.

During the Easter Vigil procession, the congregation will walk through a rough terrain of boulders in some areas, pass through an existing large rock wall, and come to an overlook of the northeast quarry lake. Here, the congregation will walk down a series of steps and arrive at the Easter chapel, ending their procession. At the Easter chapel, the congregation will celebrate the Easter Vigil, during which new members will be baptized, and the Easter sunrise service.

The concept for the design of the chapel emphasizes the temporal qualities of holy water. Within the chapel is a large baptismal pool. Rather than protecting the holy water from the environmental elements, exterior water is allowed into the baptismal pool. When water is added to holy water, this new water becomes holy, as long as it is at a smaller proportion. By allowing in water from the exterior, water is continuously being made holy, and because water is consistently incorporated into the holy water, the holy water will be re-blessed again and again. By emphasizing these temporal qualities, the chapel and its baptismal represent a faith in God that isn't static, but changes, grows, and is renewed.

The chapel allows in exterior water through various apertures. Stairs bring worshippers down to the level of the lake water, and here a pathway along the water brings them into the chapel. This pathway also connects the aboveground spring that feeds the quarry lake with the baptismal pool. The corrugated pathway has grooves in the floor that carry a small amount of the spring water to a perforated metal panel above the baptismal pool. Here the water falls and is incorporated into the holy water. To make for easier walking on the pathway, a perforated panel covers a portion of the pathway. Through the holes in the panel, the trickling water can still be viewed.

The roof of the chapel also allows in exterior water. The roof is partially sloped downward for rain and an aperture allows in water above the perforated panel adjacent to the baptismal pool. Also, along the perimeter of the baptismal pool, the roof's drip line is brought into the interior. As it rains and the roof sheds its water, the rain will drip in a consistent line along the edge of the baptismal pool.

The chapel's relationship to the bell tower also incorporates the lake water with the baptismal pool. The bell tower is located at the center of the northeast portion of the quarry lake.

Rather than being a typical tower containing a bell, the tower itself is the bell. The bell tower's walls are fixed on three sides, and the wall facing the chapel is hung from above and extends below the water level. As this wall is struck, sound is emitted and ripples are sent in the direction of the chapel. A shallow wall separates the baptismal pool from the quarry lake, and depending on the lake's water level, the ripples will overcome the wall and enter into the pool.

After the Easter Vigil concludes, the congregation moves to the reception hall for a dinner celebrating new baptisms and the coming Easter service. The reception hall is constructed above the quarry's old kilns. The kilns are meant as a place of interaction, where the kilns are used as an outdoor kitchen and as sources of heat for gathering around. The kilns are the point of entry, and two main spaces are connected to these kilns: the dining hall and sleeping rooms. The celebration of the Easter Vigil is intended to be a true vigil, where parishioners return to the chapel during different periods of the night for private worship. The sleeping rooms will accommodate these members allowing them to rest before the Easter sunrise service.

The relationship between the bell tower and reception hall is important to the design. The hall is oriented towards the tower, and as the bell tower sounds on Easter morning, the sleeping members of the church are called to worship. The sleeping rooms are separated by slanted partition walls meant to reflect the sound of the tower coming through north windows within each of the rooms. The partition walls also serve a second purpose, to reflect daylight entering through skylights into the rooms. When the bell tower sounds, the congregation returns to the chapel to celebrate the resurrection of Christ while watching the sun rise across the surface of the quarry water.

Ritual and worship can be independent of place, but this project attempts to connect ritual to a particular place through aperture and procession. Apertures serve a unique purpose in each element of the church complex. At the church and Stations of the Cross, light determines how we view the story of Christ. In the chapel, water symbolizes a temporal faith in God, and at the reception hall, sound from the bell tower connects place and individuals with a call to worship.

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Appendix



Figure 35: Quarry Lake Panorama
Source: Author



Figure 36: Central Quarry Panorama
Source: Author



Figure 37: Southwest Quarry Panorama
Source: Author

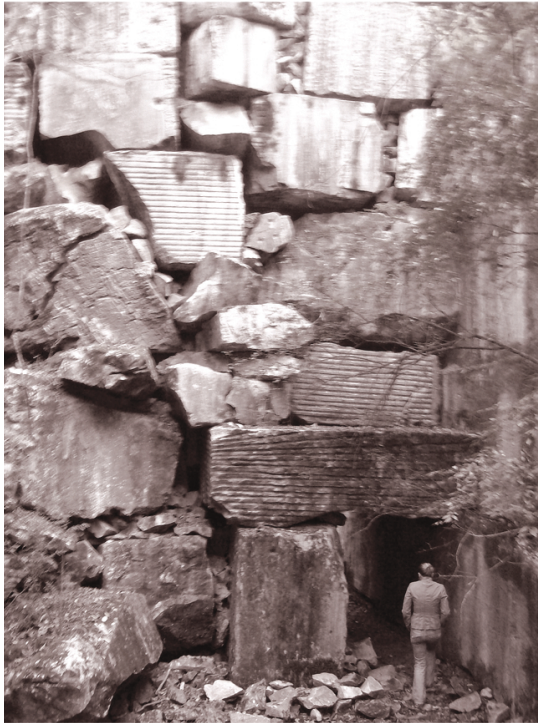


Figure 38: Rock Wall
Source: Author

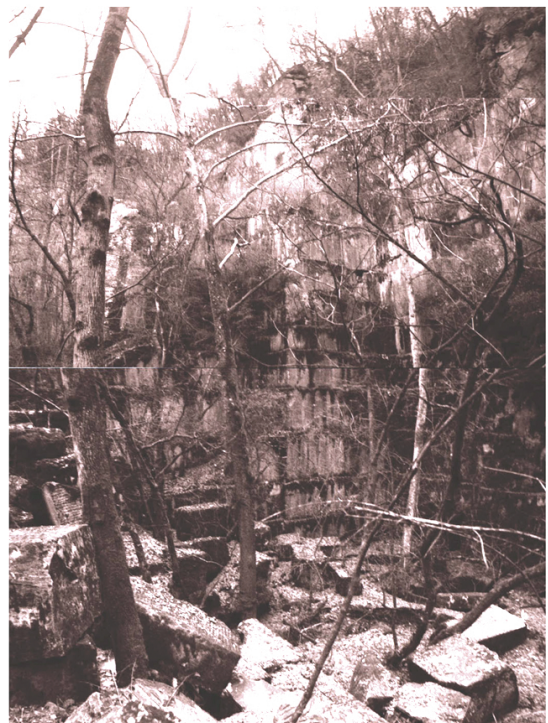


Figure 39: Boulders in Central Quarry
Source: Author

Figure 40: Quarry Kilns
Source: Author





Figure 41: Site Plan
Source: Author

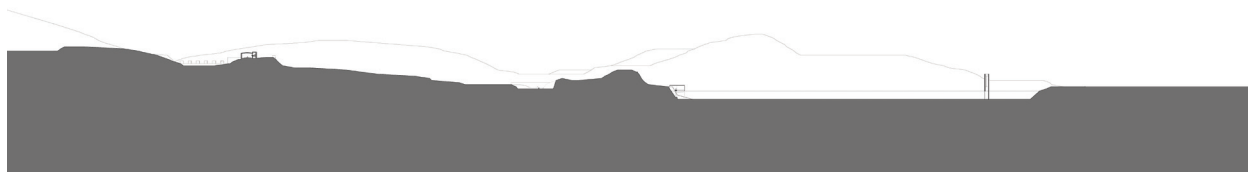


Figure 42: Site Section through Quarries
Source: Author



Figure 43: Entrance into Southwest Quarry
Source: Author

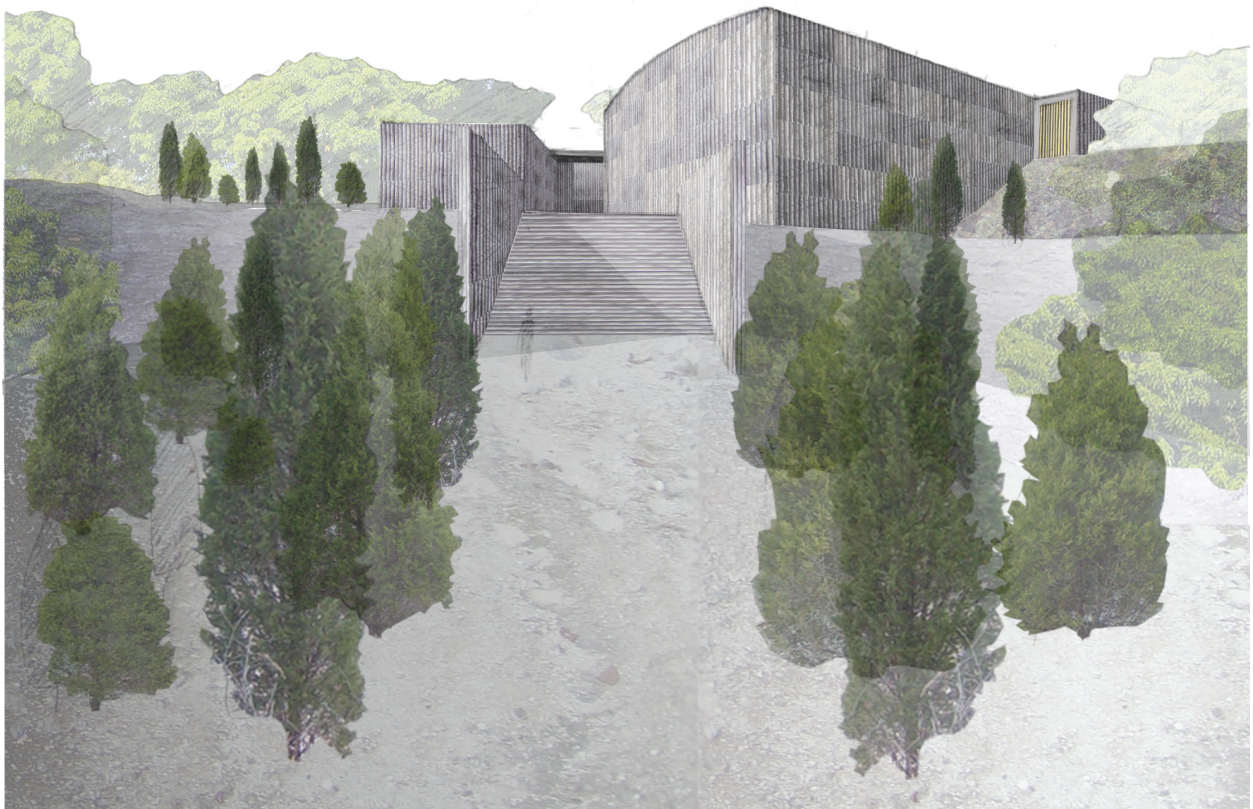


Figure 44: Pathway to Church
Source: Author

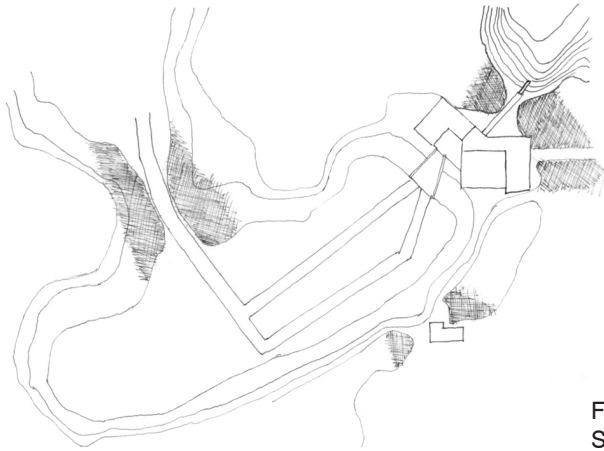


Figure 45: Landscape Apertures
Source: Author

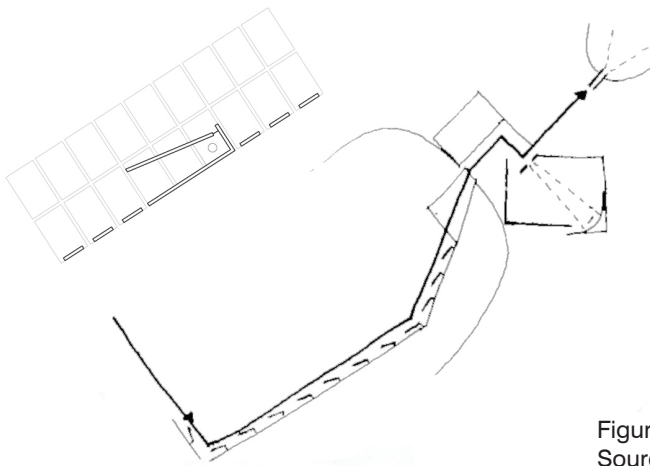


Figure 46: Way of the Cross Procession
Source: Author

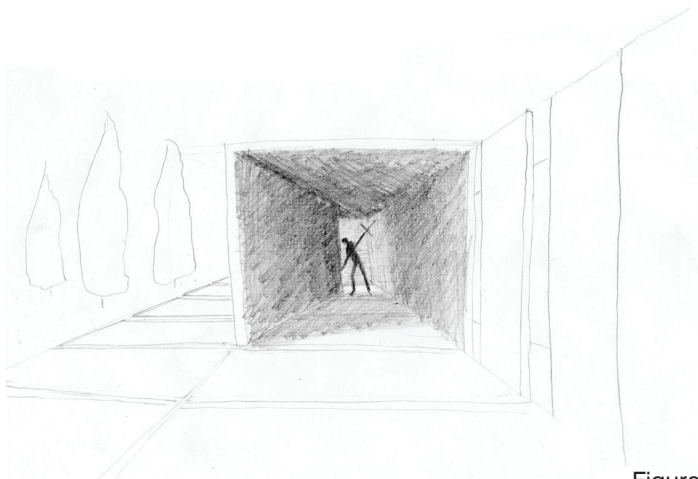


Figure 47: Station Chapel Perspective
Source: Author

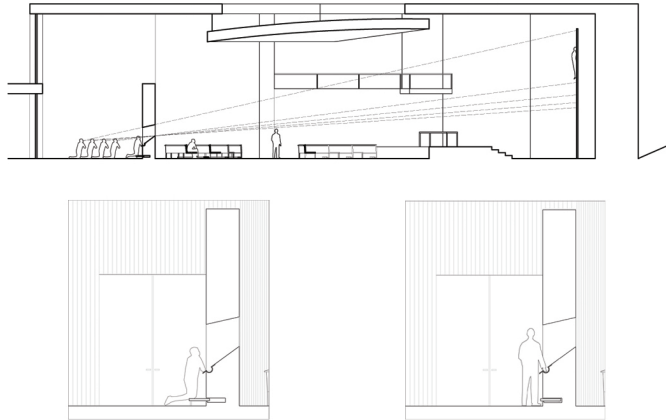


Figure 48: Vestibule Aperture
Source: Author

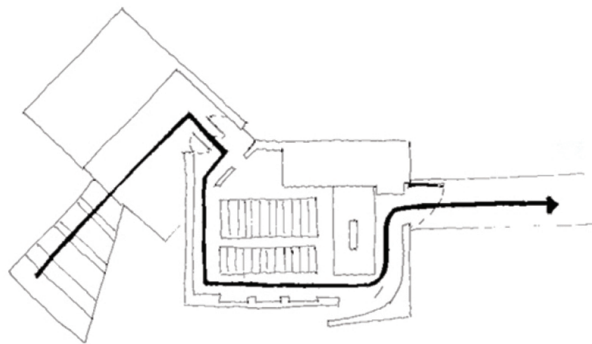


Figure 49: Easter Vigil Procession
Source: Author

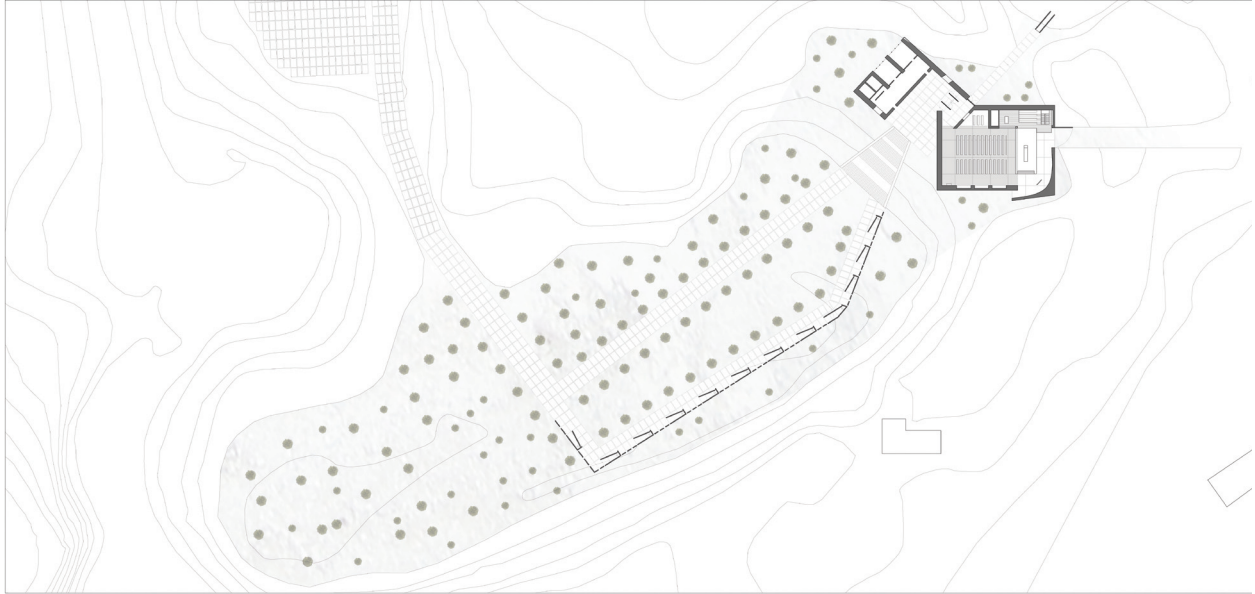


Figure 50: Church Site Plan
Source: Author

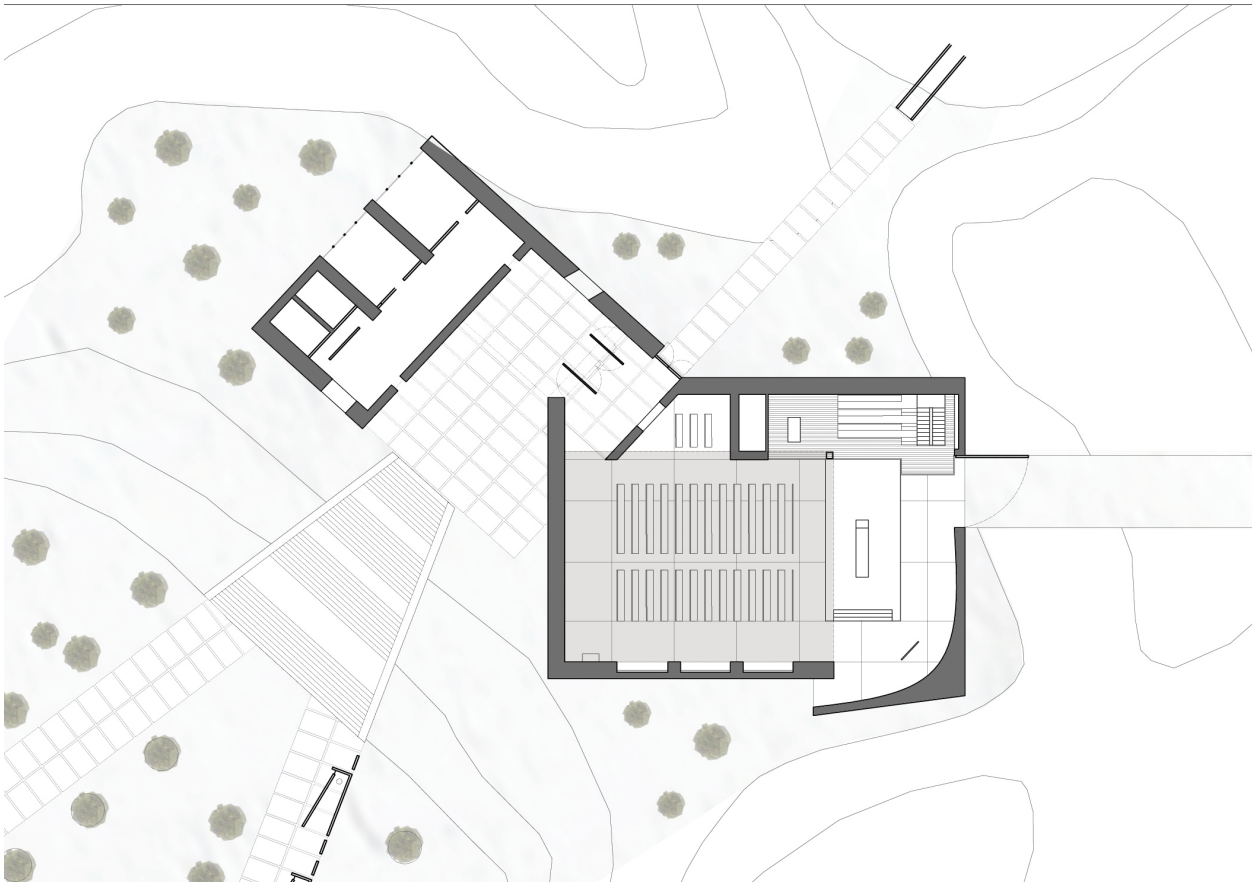


Figure 51: Enlarged Church Plan
Source: Author



Figure 52: Church Northwest Elevation
Source: Author

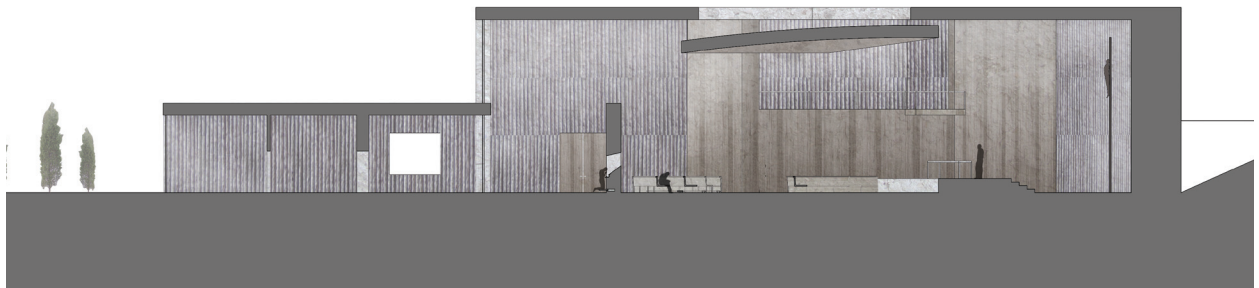


Figure 53: Church Longitudinal Section
Source: Author

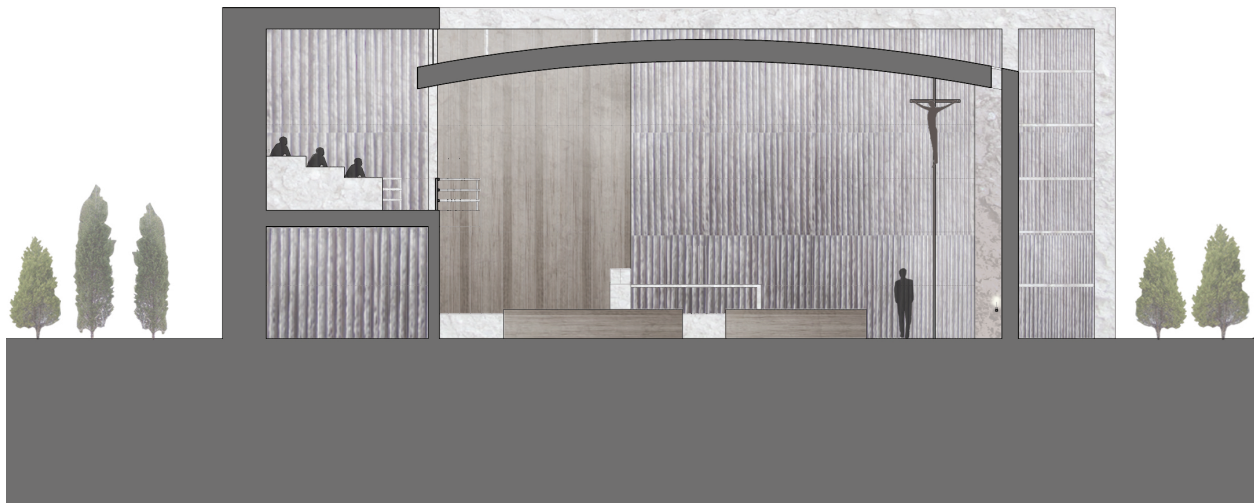


Figure 54: Church Transverse Section
Source: Author



Figure 55: Thirteenth Station
Source: Author



Figure 56: Church Interior
Source: Author

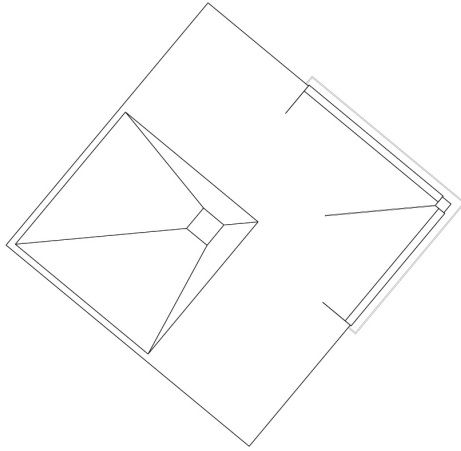


Figure 57: Chapel Roof
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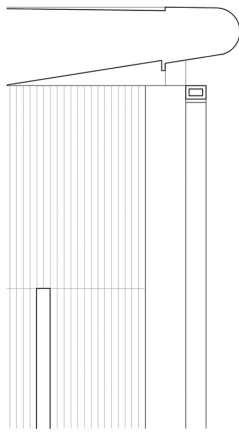


Figure 58: Interior Drip Line
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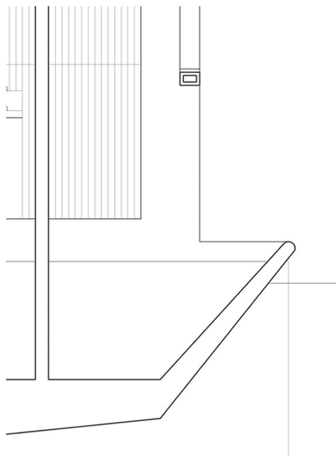


Figure 59: Section Through Baptismal Pool
Source: Author



Figure 60: Chapel Plan
Source: Author

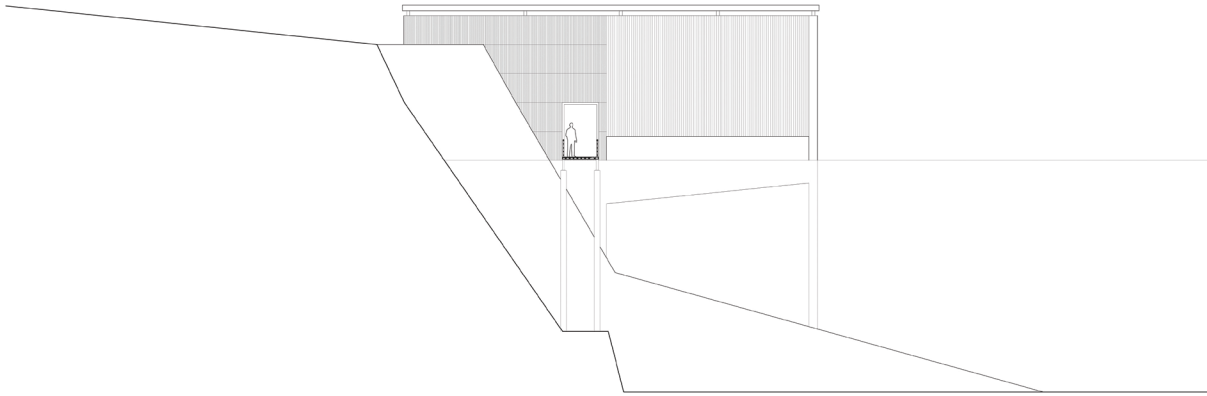


Figure 61: Chapel Southeast Elevation
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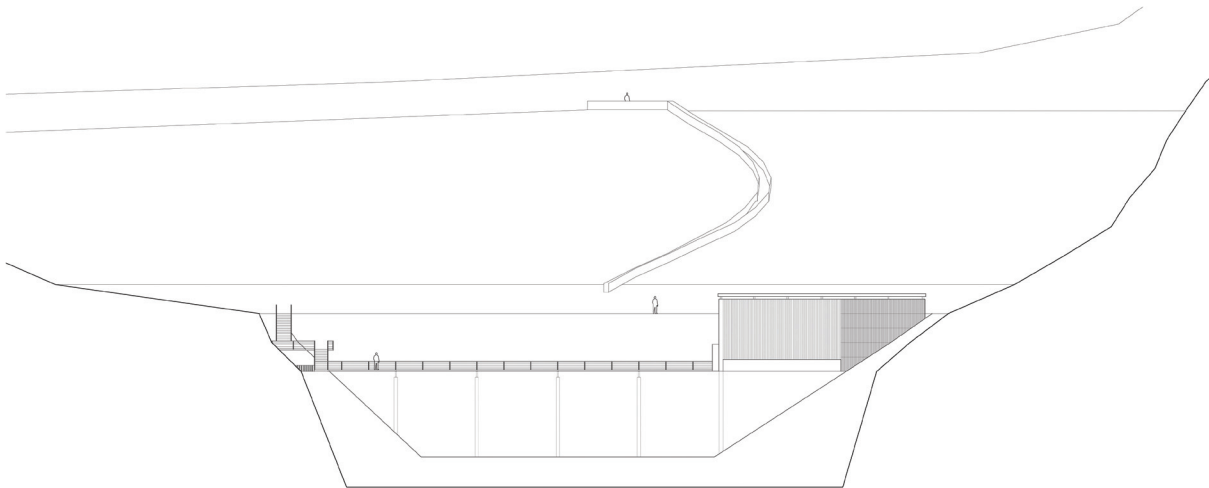


Figure 62: Chapel Northeast Elevation
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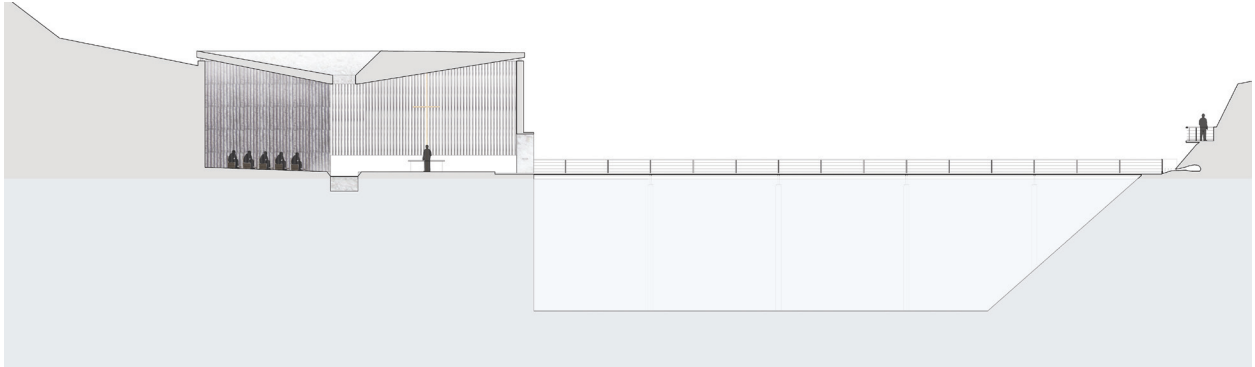


Figure 63: Chapel Longitudinal Section
Source: Author



Figure 64: Chapel Tranverse Section
Source: Author

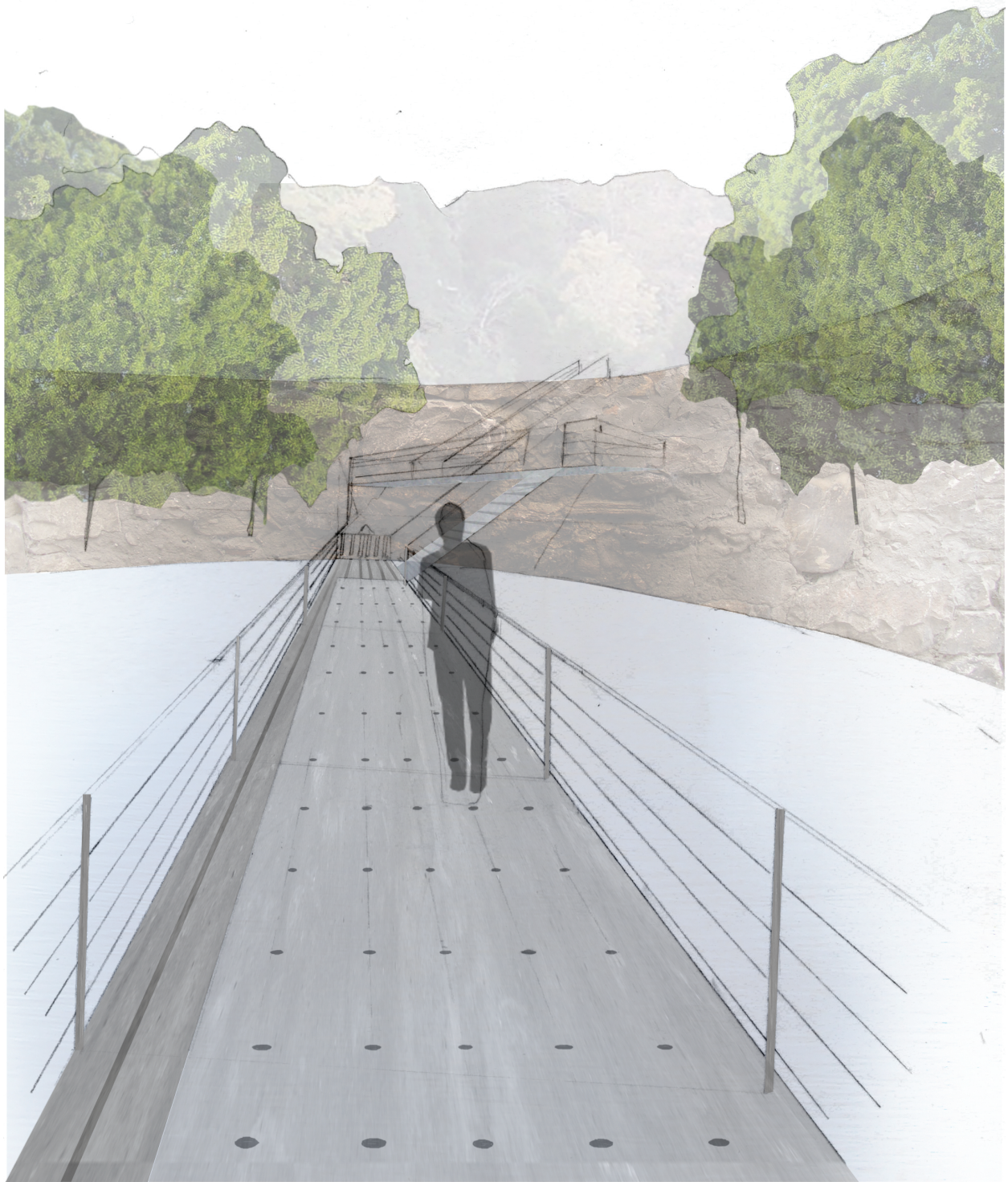


Figure 65: Chapel Pathway
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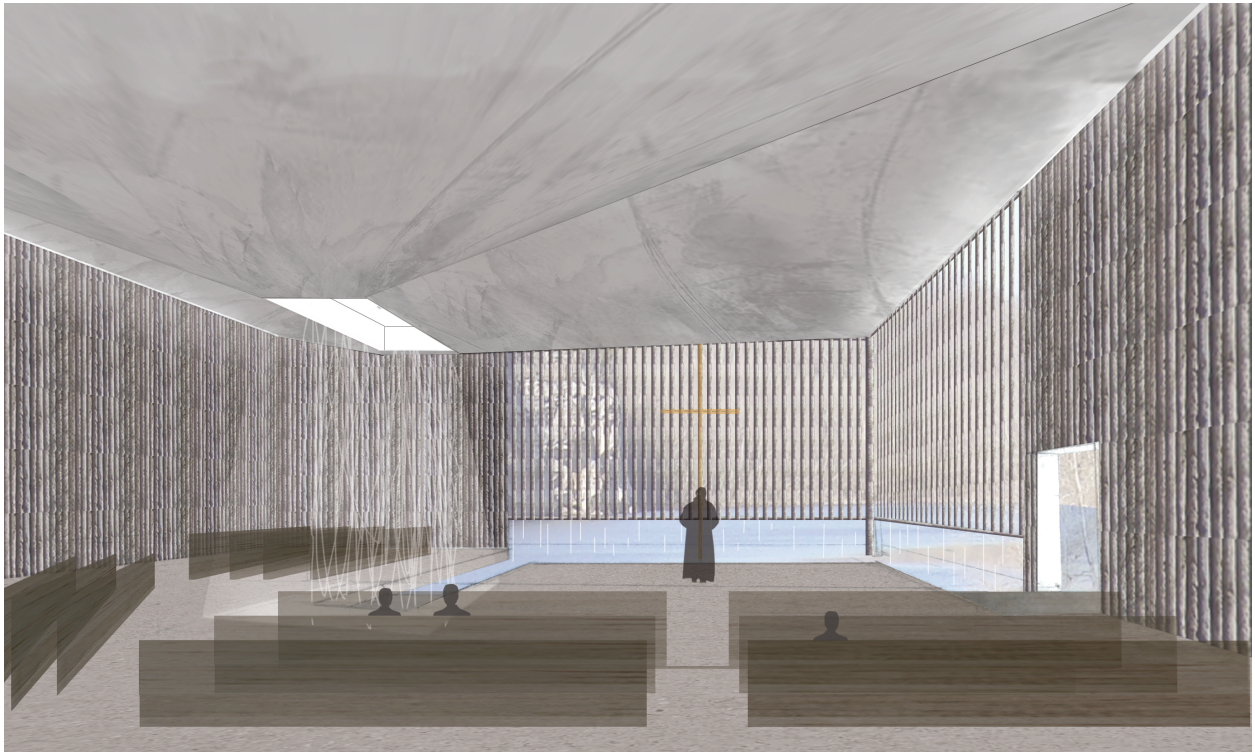


Figure 66: Chapel Interior
Source: Author

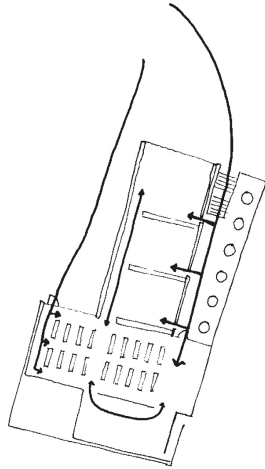


Figure 67: Reception Hall Circulation
Source: Author

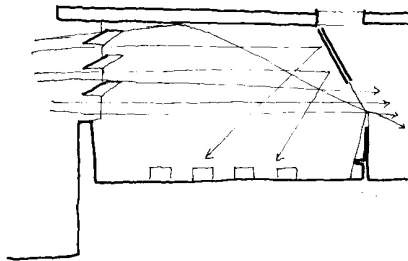
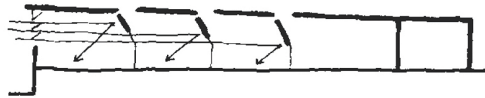


Figure 68: Sound Reflection off Partition Walls
Source: Author

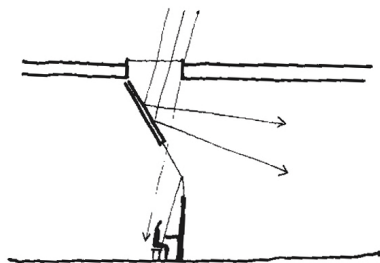
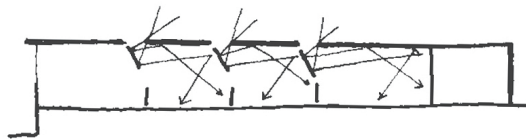


Figure 69: Light Reflection off Partition Walls
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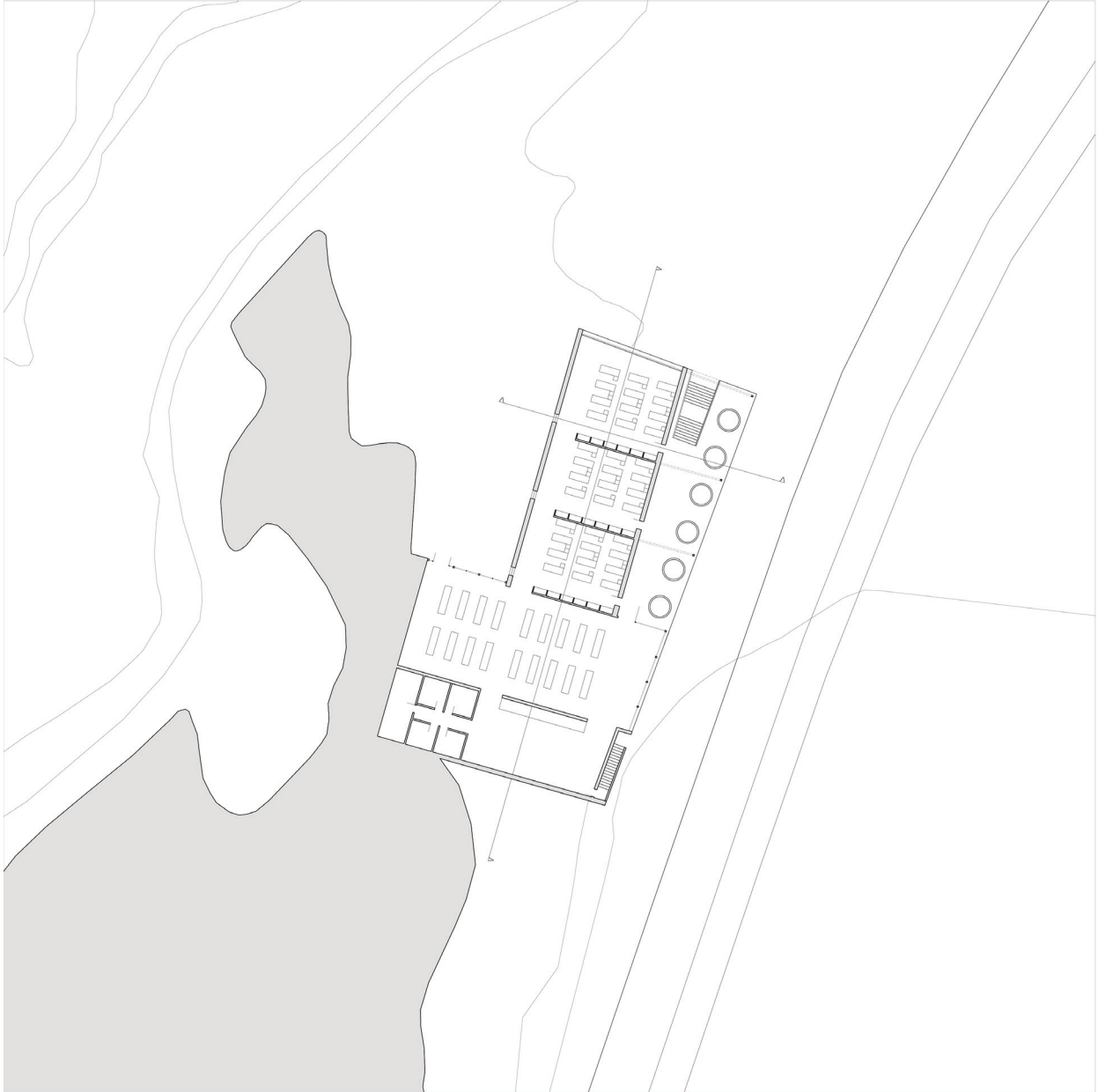


Figure 70: Reception Hall Plan
Source: Author



Figure 71: Reception Hall and Bell Tower Section
Source: Author

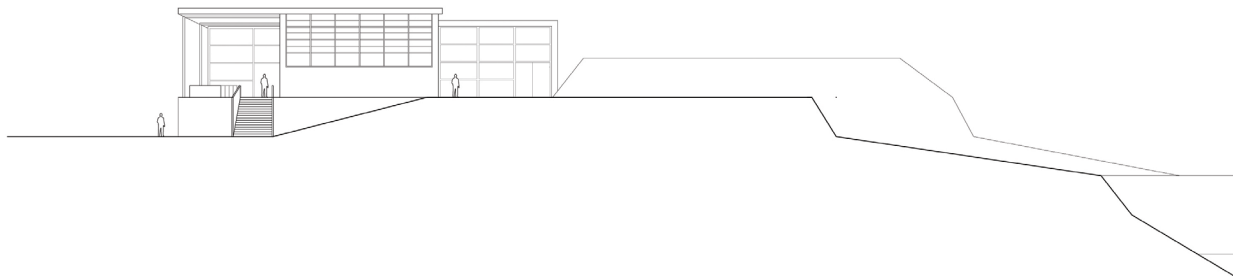


Figure 72: Reception Hall Northeast Elevation
Source: Author

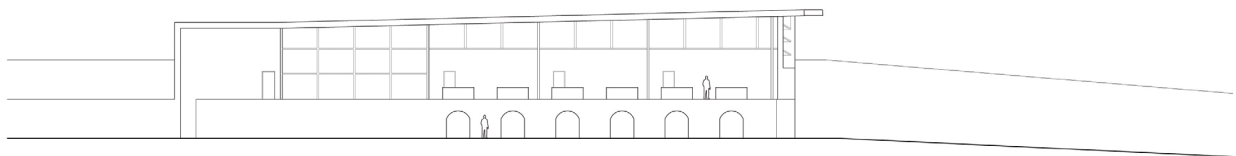


Figure 73: Reception Hall Southeast Elevation
Source: Author



Figure 74: Reception Hall Longitudinal Section
Source: Author



Figure 75: Reception Hall Transverse Section
Source: Author

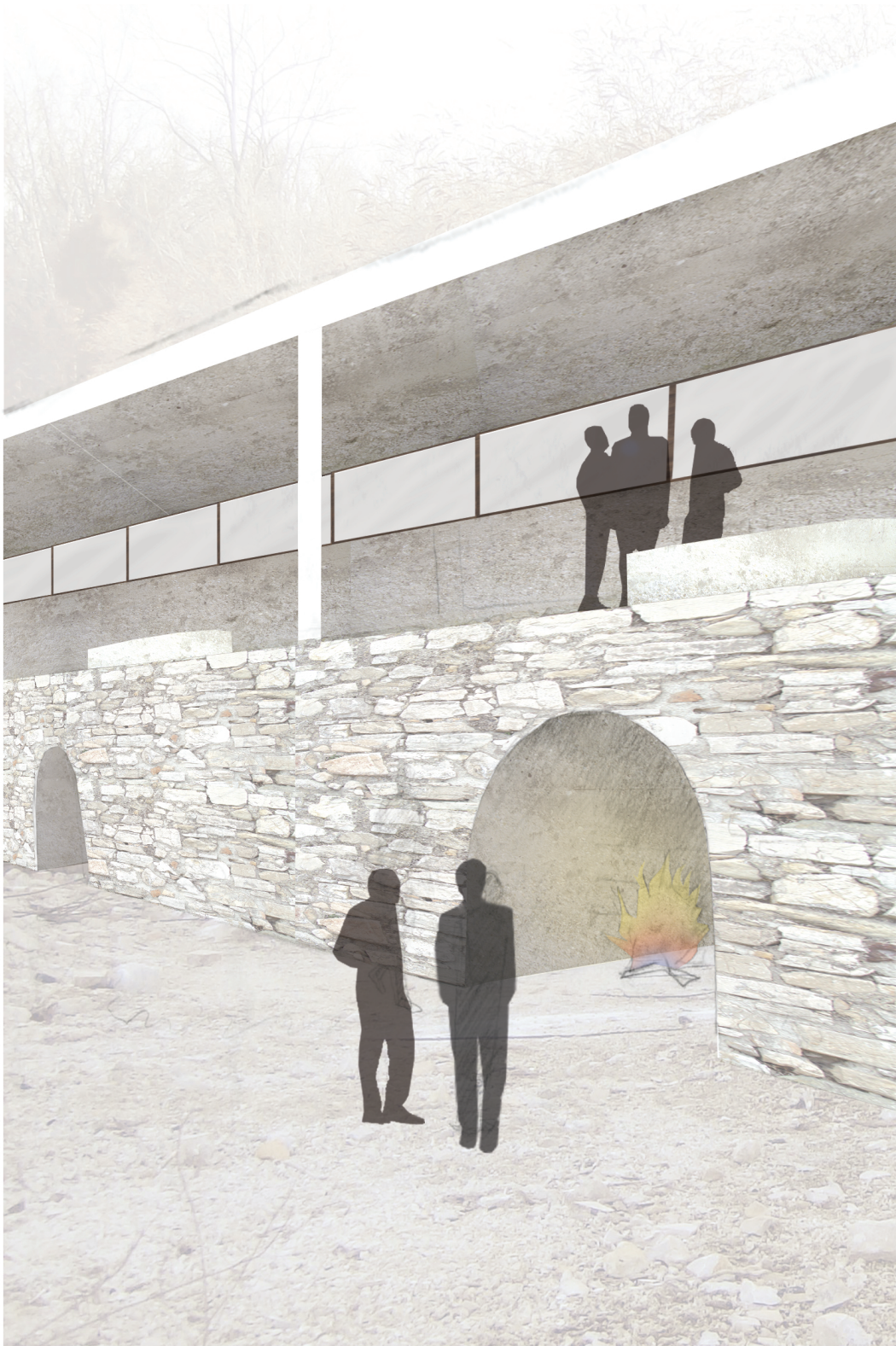


Figure 76: Reception Hall Kilns
Source: Author

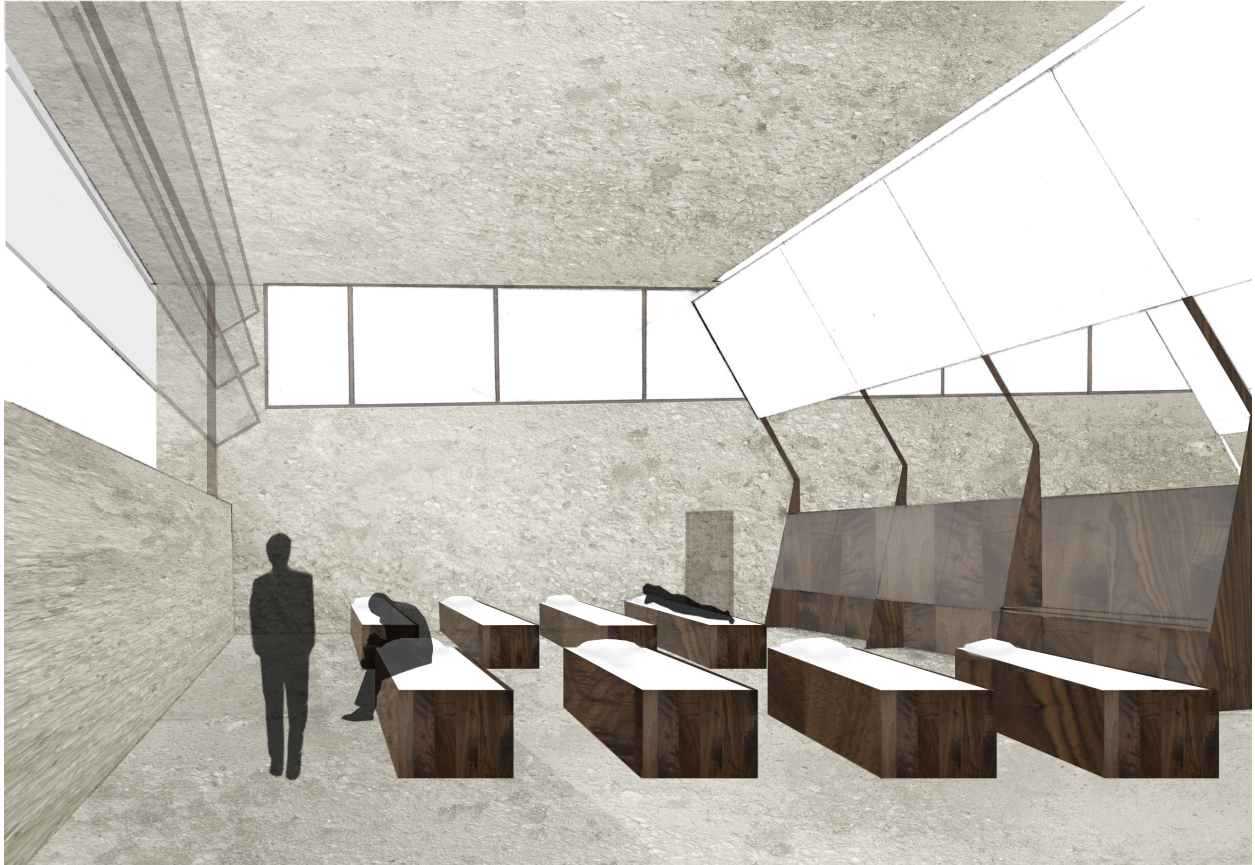


Figure 77: Reception Hall Interior
Source: Author

Vita

Heather Cope was born and raised in Morrilton, Arkansas. Upon graduating from Wonderview High School in 2002, she received her Bachelor of Science degree in Mathematics from Arkansas Tech University in 2006. She earned her Master of Architecture degree in 2009 from the University of Tennessee, Knoxville.