ARIZONA MASONRY COUNCIL + LAST ARCHITECTS

Southwest Guide to Masonry

Our Purpose

BUILDING A STRONGER FOUNDATION FOR ARIZONA'S MASONRY INDUSTRY

The Arizona Masonry Council, Inc. (AMC) established in July of 2018 is a non-profit formed with the overall goal of promoting the interests of the concrete masonry industry in Arizona.
Our mission is to create significant and lasting positive change for the Arizona masonry industry and to reinforce that our systems provide the premier building envelope solution in the minds of public and private owners, developers, architects, engineers, general contractors, and the general public.
AMC represents and supports both Masonry Contractors and Block Producers in Arizona. AMC focuses on four main pillars:

+ **Education & Promotion**
+ **Workforce Development**
+ **Building Code & Material Standard Advocacy**
+ **Government Relations**

LAST Architects is a partnership formed by a shared belief in the potential of the built environment to uplift the lives of its inhabitants. With over 25 years of combined experience, Brad Lang and Eric Sterner established LAST as a practice dedicated to civic life and the public realm. Through a commitment to place-making rooted in a research-focused, collaborative, and performance-based approach, LAST seeks integrated design solutions in service of community and collective memory.

+ **LAST promotes a process of engagement**, facilitating conversations between all project constituents
+ **LAST distills disparate sets information**, from cultural & historical to financial & legal into cohesive project frameworks
+ **LAST reveals, discovering design solutions greater than our preconceptions**, devised to amplify meaning and clarity

At LAST, sustainable solutions are inherent to our process – with each project, we strive for meaning and purpose derived from the opportunity of place – designed to last, to the last detail, for a lasting impact.

Executive Summary

purpose + approach

Unlike other Masonry Systems Guides, The Southwest Guide to Masonry undertakes a comparative analysis model, where masonry systems are put in relation to other common enclosure systems – specifically, those enclosure systems most commonly associated with multi-family housing. The Masonry Systems Guides out there implicitly assume the project is of masonry. Our resource guide positions itself to demonstrate why your project can and should be of masonry. We are directed towards an audience deciding between systems. ***Through the comprehensive nature of our approach, we are advocating for and undoing the many presumptions owners and architects may have about masonry and its viability for their projects.***
Another important aspect our guide brings forth is inspirational – the SW region has an incredible collection of masonry precedents. Many guides have incredible amounts of information, but you're not necessarily excited by masonry's potential upon first read. Technical guides tend toward "typical" conditions to capture their audience. ***We are supplementing the Comparative Analysis with inspiring Case Studies that illustrate creative applications of masonry to show its depth and breadth as a material.***

What are we doing for 2024?

Our request continues the work begun in 2022. The case study research is currently being evaluated by series of discipline specific experts in cost, wall assemblies, and sustainability to understand and quantify their differences.
We are adding additional evaluations to be undertaken. These include, performance in carbon sequestration and embodied energy. ***This funding round will support embodied energy and carbon sequestration research as wall as support the development of a Continuing Education presentation outlining findings of the comparative analysis*** *looking broadly and critically at the many assumptions that pervade the use of masonry as it relates to multi-family housing.*

View Our Progress of the Guide:

https://www.dropbox.com/scl/fi/hie2c7b3f9s1i6jsxvuqd/24-0131-Pamphlet_Spreads-IN-PROGRESS-DRAFT-OF-GUIDE.pdf?rlkey=vr2q0z565yx58iwaxl2nxx6ix&dl=0

The Team

The Southwest Guide to Masonry was conceived and being led by the Arizona Masonry Council Technical Committee with LAST Architects serving as the Principal Investigators.

The 2023-24 Technical Committee members are:

+ **Canan D'Avela,** Director of Technology, Codes, Technical Sales, Concrete Products Group
+ **Dave Endres**, VP Technical Sales Superlite Block
+ **Ed Freyermuth,** Technical Consultant
+ **David Peloke**, Vice President of Operations, Masonry Division at Sun Valley Construction, Inc
+ **Paul Scott**, SE Partner, Caruso Turley Scott
+ **Cary Zieg**, Senior Project Manager, Sutter Masonry
+ **Danny Fyffe**, Vice President, Fyffe Masonry
+ **Jeff Funkhouser**, Project Manager, Sun Valley Construction
+ **Rick Perry**, North American Sales Development, ACM Chem

LAST Architects is:

+ **Eric Sterner**, Co-Founding Principal
+ **Brad Lang** AIA, Co-Founding Principal

Exhibit

Table of Contents

Working together with the Arizona Masonry Council Technical Committee, the below table of contents were derived as the information necessary for a holistic and meaningful guide that will be broad in its information, but focused and detail oriented in each sub-section.

The Southwest Guide to Masonry is an evolving document, with new articles, resources, and case studies added throughout its existence. The flexible nature of the document means it can exist online as a pdf, selectively printed as a pamphlet, or eventually bound as a book.

Table of Contents

HISTORY
Origins +
Vernacular +
Contemporary +

Technical resources will go beyond standard shapes and bonds and address sustainability issues related life-cycle cost and energy, to budgetary performance both short and long-term.

TECHNICAL
Standards +
code -
Products +
Resources +
Sustainability +
Cost +

Case Studies will be the premiere showcase for groundbreaking masonry work across the southwest. Case Studies will combine technical and aesthetic information with manufacturer and construction testimonials. The aim is to personalize the work capturing all aspects of its production and execution closing the gap between disciplines.

CASE STUDIES
Block +
Brick +
Stone +
Veneer +
Gabion +
NEW Carbon Sequestration Analysis +

NEW

The finalized Guide will become a AIA CES Learning Unit Presentation and given among architects, developers, general contractors, facility managers, engineers, etc. in the Southwest region

EDUCATION
Institutions +
Workforce Development +
Promotion +

Reference materials to include Design-Assist options, tradespeople, manufacturers, etc. in a single location, with the goal to reinforce AZ Masonry Council's Southwest Guide to Masonry as the first stop for anyone seeking information.

REFERENCE
Manufacturers +
Suppliers +
Contractors/Masons +
Architects/Designers +
Government +
Bibliography +

Exhibit

Baseline Assembly and Comparison

In order to contextualize the various properties and conditions of masonry, the Guide adopts a comparative analysis methodology using a common baseline wall assembly. The wall assembly proposes a standard 4-story, multi-family structure with balcony. The multi-family model was chosen as the Guide's initial departure point given the growth of the southwest region and the current need for housing. From this common organization and assembly, various structural and enclosure pairings will be examined.

BASELINE WALL ASSEMBLY

Occcpancy: Residential Group R-2

Occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature

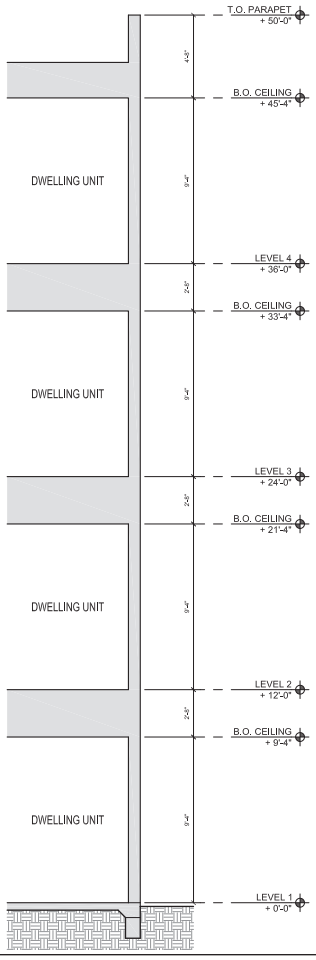
Institutional Group I-1 (condition 1)

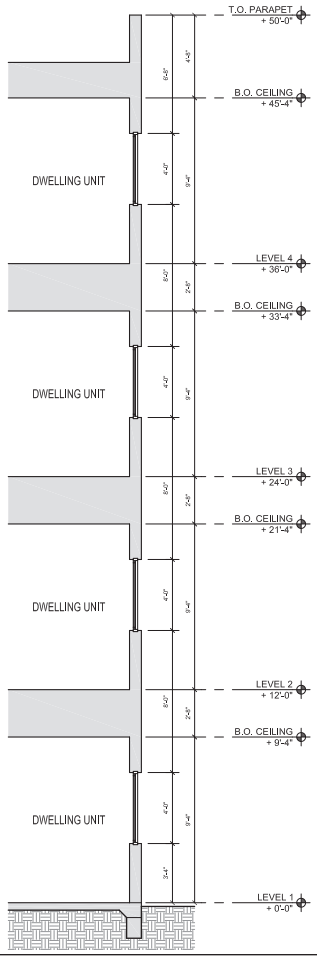
Buildings, structures or portions thereof for more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised environment and receive custodial care.

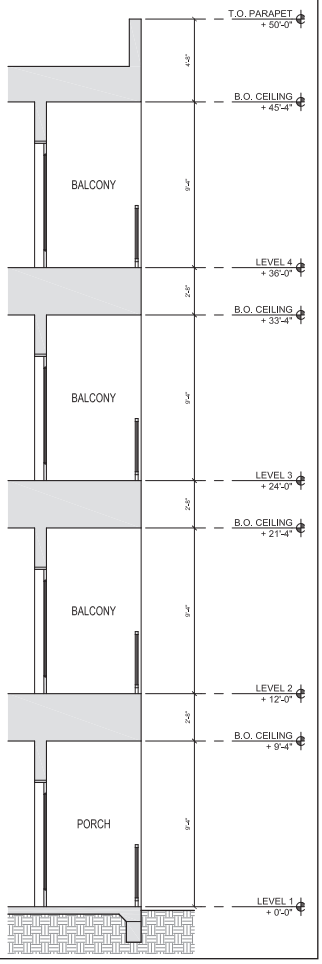
Height: 50' above grade plane

Stories: 4 above grade plane

Permissible Construction Types:	R-2	I-1 (condition 1)
	V-A (S13R)(S)	V-A (S)
	IV (NS)(S13R)(S)	IV (NS)(S)
	III-A&B (NS)(S13R)(S)	III-A (NS)(S)
	II-A&B (NS)(S13R)(S)	III-B (S)
	I-A&B (NS)(S13R)(S)	II-A (NS)(S)
		II-B (S)
		I-A&B (NS)(S13R)(S)







How will the "Baseline Assemblies" be evaluated?

Through comparison of systems and materials, the above baseline assemblies will be examined and compared to and against the assemblies listed on the right that highlight framing and cladding, concrete, various forms of masonry and stone applications and metal panel. Common to the Southwest, these assemblies comprise most of the existing and new buildings in the area. It is the goal of the comparison not to highlight just the positives, but reveal where some applications render greater success as defined by several parameters discussed in the next section of the guide.

COMPARATIVE ASSEMBLIES

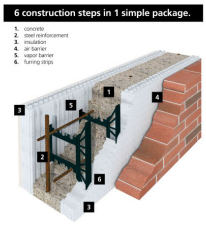
systems + materials

FRAMING CLADDING

+ Cement Plaster
+ Metal Panel
+ Fiber-cement
+ Brick Veneer

CONCRETE

+ Insulating Concrete Forms



+ Precast Concrete Wall Panels
+ Tilt-up Concrete Panels

MASONRY & STONE

+ Thin Cast Stone Veneer
+ Brick Veneer

From:

https://www.masoncontractors.org/pdf/Choosing-the-Right-Masonry-System-for-your-Budget.pdf

+ Brick Veneer over a Reinforced Brick Bearing Wall
+ Brick Veneer over a Concrete Block Bearing Wall
+ Brick Veneer over a Steel Stud Structural Wall
+ Concrete Block Veneer over a Steel Stud Structural System
+ Brick Veneer over a Wood Stud Structural Wall
+ Concrete Block Veneer over a Wood Stud Structural System
+ Brick Single-Wythe Bearing Wall
+ Concrete Block Single-Wythe Bearing Wall

METAL

+ Insulated Metal Panels

Exhibit

Guide

Through comparative means through the lens of various wall assemblies, the guide will showcase not only technical information and best practices of building, but will also showcase current products and costs relative to date of publishing. Most importantly will be the "Assessment" where both pros and cons will be listed by the comparison as well as challenges and opportunities. The broadness of review allows for the readers to take points both pertinent to them but also reveal new information perhaps unknown or readily unavailable to them previously.

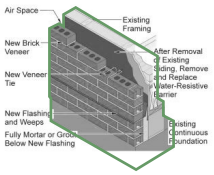
How will the Guide communicate this information?

Through imagery, hyperlinks, text and of course case studies, the guide collects and organizes data for easy use for any type of user or during any phase of a project. The information in many cases will be monitored for accuracy as codes, pricing and products inevitably change. The ease of quickly updating hyperlinks makes the guide easily malleable for future updates.

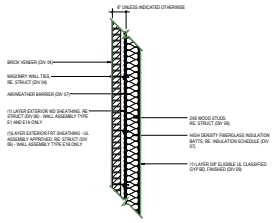
Will the Guide speak to the broad spectrum of approaches of using each type of assembly given the various climates in the Southwest?

Using the climate classifications given by the 2021 IECC, the Southwest uniquely has in common the fact that the warm, moist air that does approach and travel across the Southwest is converted to precipitation primarily by encountering the cold air masses that lie above the region's mountains, highlands and, to a lesser degree, high plateaus. Were it not for this dramatic topography, the Southwest would be much more of a desert than it is. That said, the various conditions that exist in the Southwest will apply to other regions around the United States and will apply on a national level. Using our Hot, Mixed, Warm and Cool dry climate designations we will evaluate each assembly with climate in mind.

Wall Assembly | Brick Veneer over a Wood Stud Structural Wall



Axonometric



Detail Wall Assembly

Description:

This system gives you many of the advantages of more expensive systems with a lower cost.You still have a tough, beautiful skin and a weather-shedding cavity. However, Building Codes will not allow you to install relieving angles attached to a combustible structural system so this wall assembly cannot be used for walls over 30 feet in height.

Notes:

+ *Be careful with window sills, flashings and weep systems. If water penetrates past the sheathing it can rot the wood studs.*
+ *The lintels over windows must bear on the brick veneer because it is non-combustible.They cannot be attached to the studs.This sometimes limits the size of the windows.*

Statistics:

+ R-Value:
+ Cost ($/sf):
+ Life Expectancy (years):
+ Embedded Energy:
+ Maintenance and Repair:
+ Quantities:

Code Considerations:

+ Construction Type
+ Height
+ Fire Rating/Separation

Products:

+ Brick
+ Insulation
+ Waterproofing

3D View

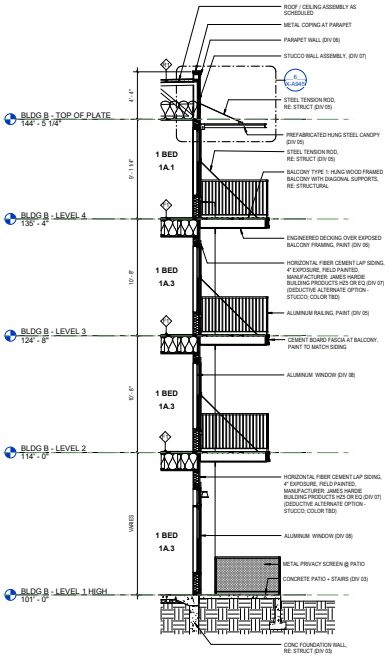
Assessment:

This system gives you many of the advantages of more expensive systems with a lower cost.You still have a tough, beautiful skin and a weather-shedding cavity. However, Building Codes will not allow you to install relieving angles attached to a combustible structural system so this wall assembly cannot be used for walls over 30 feet in height.

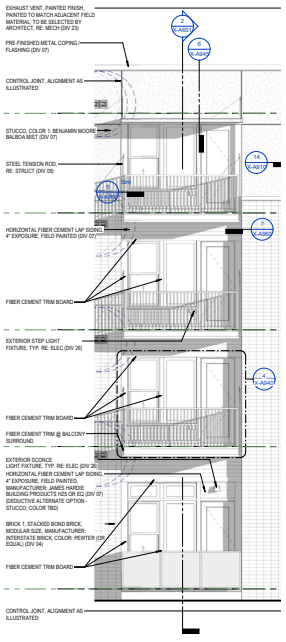
+ Pros/Cons:
+ Challenges/Opportunities

Precedent:

Project Credits:



Wall Section | 1/16" = 1'-0"

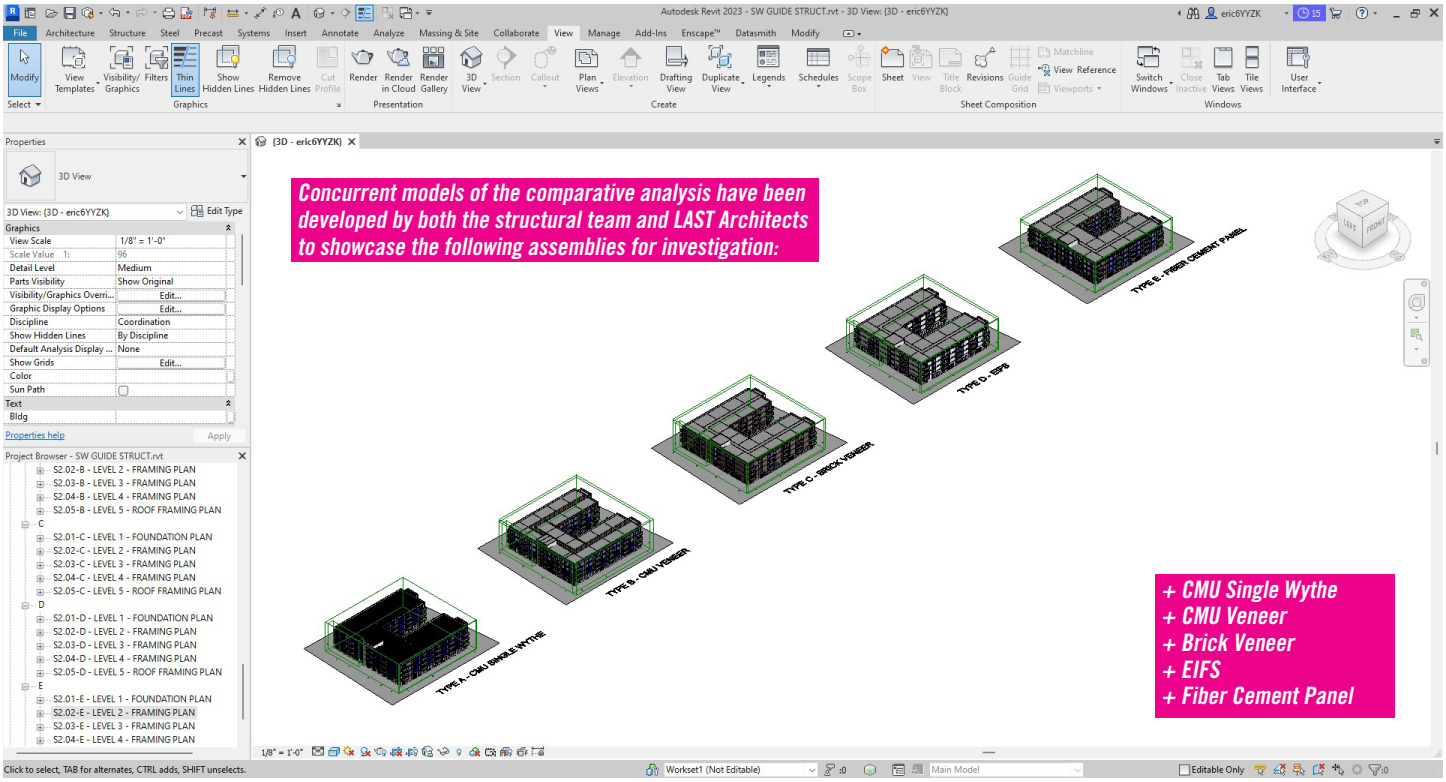


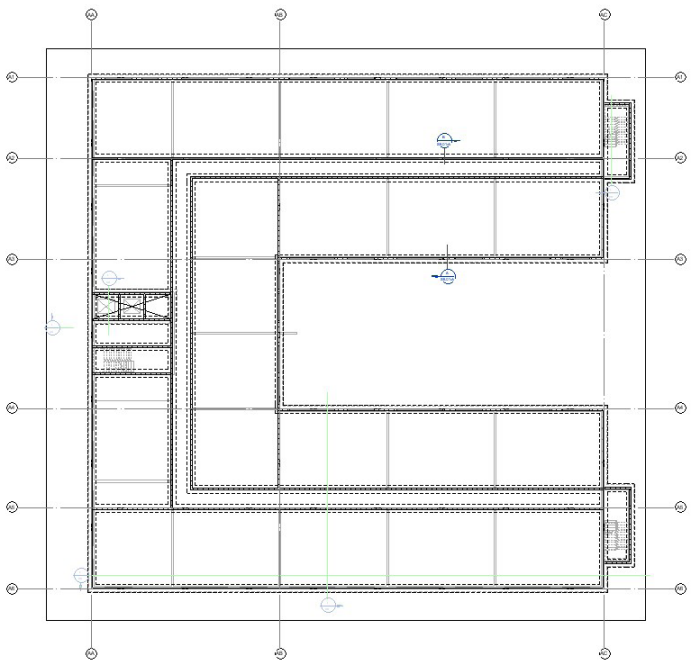
Partial Elevation | 1/16" = 1'-0"

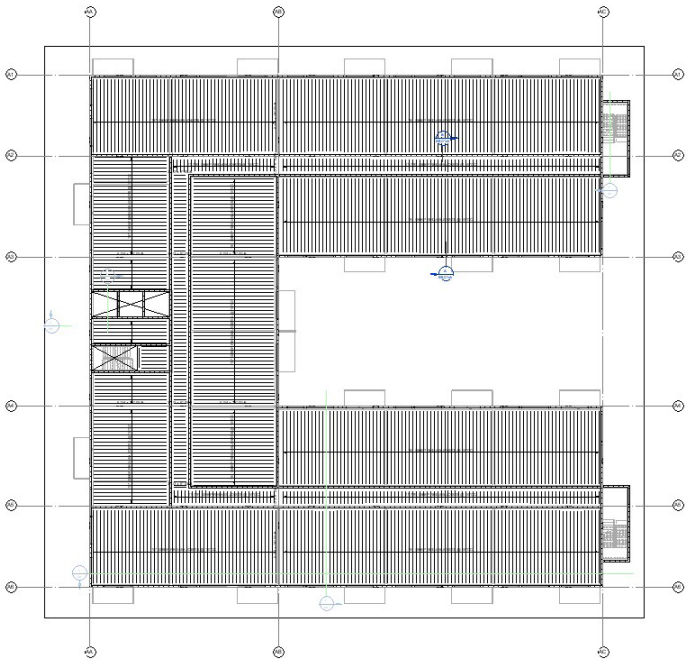
Exhibit

Comparative Analysis Structural Development

As the basis for various evaluation categories, a baseline model is being developed for each of the five initial wall assemblies. Currently undergoing structural development, upon completion the five models will be subject to specific analysis across a spectrum of performance criteria included below.







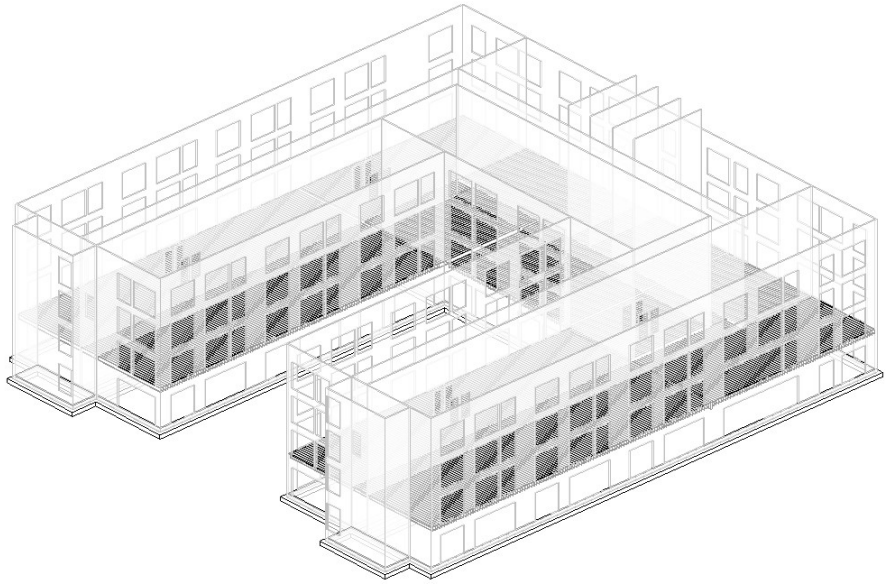
Framing Plans have been developed for each of the building types for further investigation.

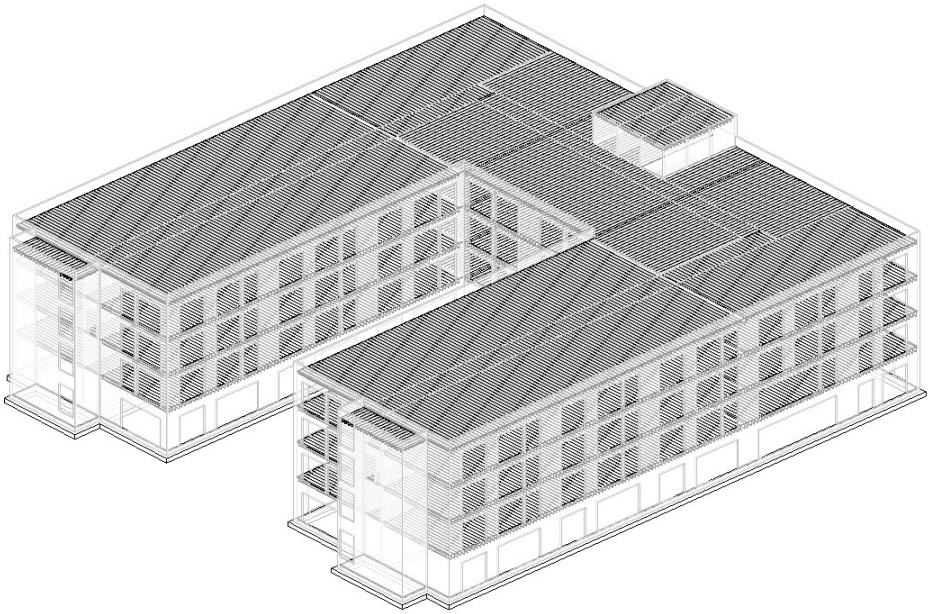
Exhibit

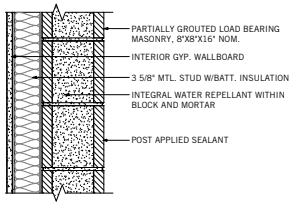
Wall Assemblies

Evaluation Matrix

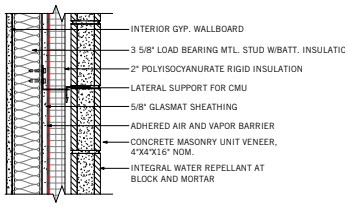
Cost	Performance	Engineering
Upfront	Energy Efficiency	Primary Structure
Life-cycle	Durability	Foundation Type
Schedule	Water Intrusion	Floor Type
Material Availability	Mold Resistance	Roof Type
Insurance	Snow/Freezing	Wood or Metal Studs



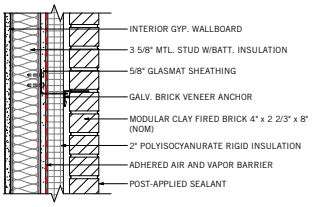




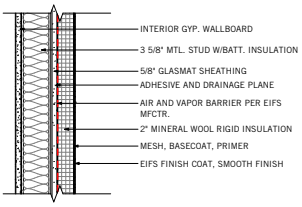
A-CMU SINGLE WYTHE



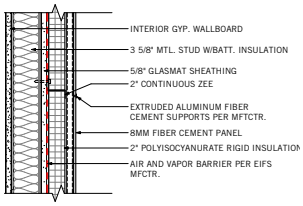
B-CMU VENEER



C-BRICK VENEER



D-EIFS



E-FIBER CEMENT SIDING

Exhibit

Case Study

The Case Studies will highlight thought-provoking work that reveals possibilities and clarifies our understanding of current means and methods. The Case Studies will showcase projects not only as glossy images, but tell the story of process, macro impact and micro solutions to affirm readers understanding or challenge preconceptions.

How will the Case Studies be chosen?

Through the dynamic backgrounds of our technical committee, the Arizona Masonry Council, and a large connection with many contractors and architects in the southwest, we will seek projects internally that seek to reveal the possibilities or highlight the unique properties of masonry. The projects will be of any building type but must be located in the southwest. Additionally, the Arizona Masonry Council Southwest Masonry Awards allow for much access to some of the best projects in our area. While we will highlight many recently built projects, we also want to showcase projects that provide insight into the long-term benefits of masonry while also evaluating the ability for masonry to serve as a long-lasting material that withstands the intensities of our environment.

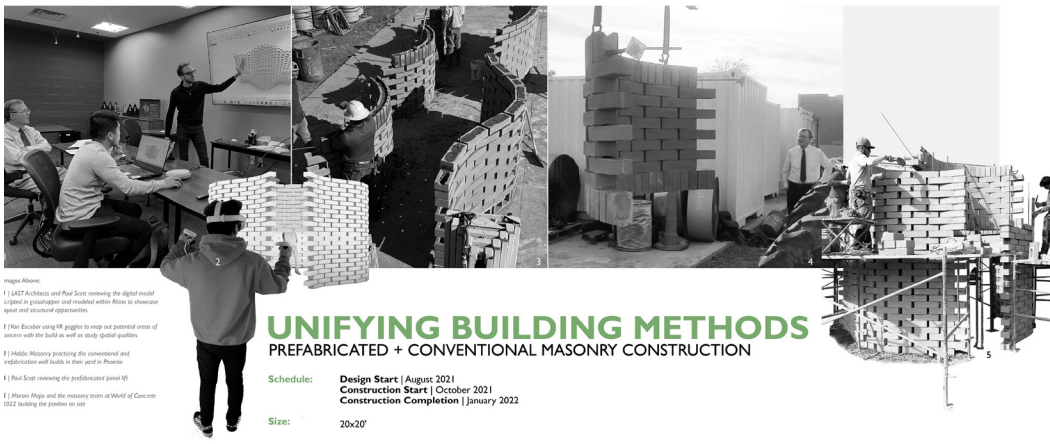
How will the Case Studies be showcased?

Through both digital and printed means, the Case Studies will be showcased both as standalone projects highlighted in the Southwest Guide to Masonry under "Case Studies." However, Case Studies will also serve as references to similar conditions in other topics of the book such as "History" or under the sub-section "Sustainability." While the Southwest Guide to Masonry is being assembled and created, the Arizona Masonry Council will be highlighting one project a month in their publications that are received widely via email to their members.

Additional Case Studies:

+ **Marfa House** - DUST Architects

+ **Jones Studio Office** - Jones Studio Architects



images Above:
1 | LAST Architects and Paul Scott reviewing the digital model scripted in grasshopper and modeled within Rhino to showcase layout and structural opportunities
2 | Van Escobar using VR goggles to map out potential areas of concern with the build as well as study spatial qualities
3 | Hobbs Masonry practicing the conventional and prefabrication wall builds in their yard in Phoenix
4 | Paul Scott reviewing the prefabricated panel lift
5 | Moroni Mejia and the masonry team at World of Concrete 2022 building the pavilion on site

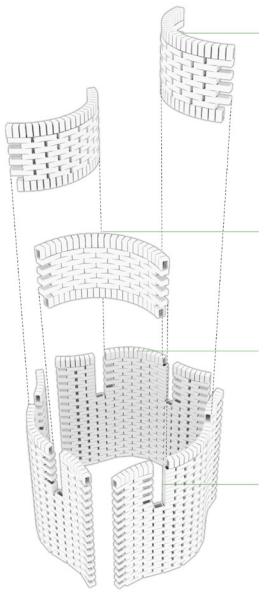
UNIFYING BUILDING METHODS

PREFABRICATED + CONVENTIONAL MASONRY CONSTRUCTION

Schedule: **Design Start** | August 2021
Construction Start | October 2021
Construction Completion | January 2022

Size: 20x20'

Project Team: **LAST Architects** | *Eric Sterner, Brad Lang,Van Escobar*
Hobbs Masonry | *Moroni Mejia, David Esquivel*
Sutter Masonry | *Mike Gray*
Journeyman Masonry | *Jacob Brooks*
Caruso Turley Scott | *Paul Scott*
Arizona Masonry Council | *Cassie Mejia, Dawn Rogers*



PREFABRICATION

With a short build-time and the necessity for travel already inherent in our approach, how could prefabrication serve to add intricacy and precision to the composition?

The pavilion serves as a field test for various design techniques currently piquing the interest of the team. At the forefront of our investigation is masonry prefabrication.

Three radial walls, made porous with the absence of vertical grouting, serve multiple purposes;
1) structurally tying the conventionally-laid bulge walls together
2) defining a layered spatial sequence from outside-in
3) spanning across the walls as a raised beam creating a passageway to the central space

BOND BEAM

Working only with donated standard module block - how can the pavilion expand people's understanding and expectations of block masonry beyond the conventional?

With the quality control inherent in prefabrication processes, the prefab walls became opportunities to explore various masonry conventions - orthogonality, solidity, and compression, in unconventional ways.

Soldier top and bottom bond beams with two #4 bars and tension rods placed at 48" o.c. sandwich the vertical open joint curving block.

CONVENTIONAL

How can block serve to define a space of veiled light and flowing surface?

Conventional laid block afforded additional formal explorations to juxtapose the strict radial prefabricated segments. Embracing the orthogonal modularity of the block to create a sinuous form outside a platonic geometry like the circle and rectangle further expanded our thinking and exploration.

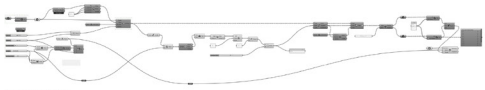
Conventional laid block in a meandering, bulging arrangement, introduces variation across its length. The blocks relationship to each other is not consistent like with the radial walls. Here the craftsmanship of the builders is paramount to ensure consistency and wanted dynamism across the face.

CONNECTION

What are the opportunities present in combining prefab with conventional? What type of compositional and aesthetic results are possible with this marriage of methodologies?

The combination of prefab and conventional components becomes an honorific moment given our approach. The prefab walls are stitched into the conventional bulging walls with their zippered connection celebrated.

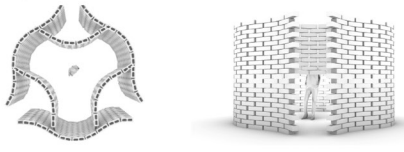
While possible to ensure the radial wall met the bulge wall perpendicularly to downplay and hide their connection, our approach was to resolve a variable connection and explore the emergent qualities such a connection brings.

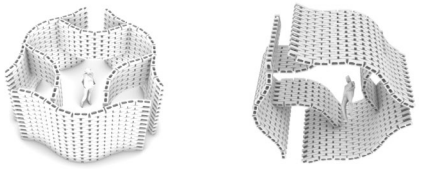


PROCESS

How can the utilization of digital tools optimize the analogue construction process?

The team utilized parametric modeling tools to quickly visualize block assembly through rapid prototyping to discover form. Utilizing our native software rhino and plugin grasshopper, we were able to test and solidify questions of spatial arrangements within the constraints of block modulation.





SPACE

How can masonry block, with its rigid and orthagonal nature, be challenged in an unconventional form?

The form uses curvature to express contrasting phenomena. With components that contrast and intersect, the pavilion explores compression and relief. The prefabricated elements span to creating a feeling of lightness with a material that is heavy.

Exhibit

Case Study ----------→ **Taliesin West Historical Preservation Research**

Provided by Taliesin West

LAST Architects with Fred Prozzilo, (VP of collections for Taliesin West) reviewing Wright's proposed masterplan drawing of his dwelling.

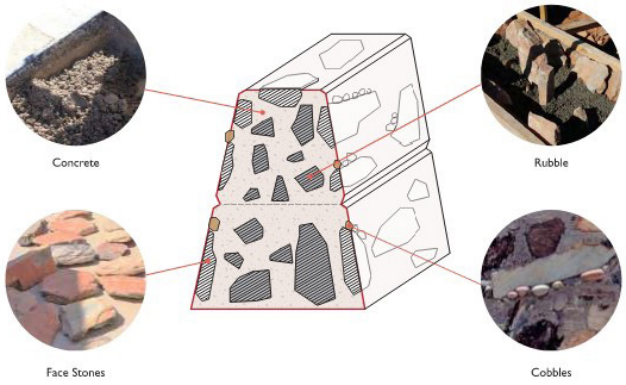


Figure 1.2. Cross-sectional view of a desert masonry wall, showing four different material compositions. (Source: images from frankllaydwright.org, "New Desert Masonry Gateway Structure Unveiled at Taliesin West")

ic examples of desert masonry to identify decay mechanisms and propose preservation treatment strategies.

1.2 Material Composition

Desert masonry is a hybrid system of concrete and natural local stone. As shown in Figure 1.2, it consists of mainly four components: the local quartzite desert rock used as face stone and rubble, and cobbles or "goose eggs," local sand, and Portland cement. The concrete mixture is a dry pack consisting of approximately one-part grey Portland cement, four parts local sand (sourced from nearby washes), and minimal water. The face rocks, visible when the formwork is removed, are typically large flat surface rock naturally split off from nearby larger formations. They are relatively thin, flat on one side, and in various colors, from black to rusty red. Rubble, also sourced from the surrounding area, is added to the core of the walls to provide stable fill, control shrinkage of the concrete mass, support the face rocks, and lessen the need for more expensive cement in this hybrid system. Lastly, goose egg cobbles, 3–8-inch smooth round stones, are placed on top edges of the face rocks to prevent the concrete mixture from spilling out and over.[1]

1 Hariri, Gilda. "Taliesin as Text: The Story of the Desert Masonry at Taliesin West." Frank Lloyd Wright Quarterly Volume 29, Issue 1 (2018). 25

1.3 Significance to Taliesin West

Desert masonry embodies Wright's philosophy of organic architecture, which emphasizes the harmonious integration of buildings and landscapes. Used extensively throughout Taliesin West, its incorporation in almost every building makes it a unifying site element (Figure 1.3). Utilizing locally sourced stones and coarse sand, desert masonry is an integral component in shaping the massing and visual appearance of Taliesin West seamlessly blending with the surrounding desert floor. Additionally, the sloping rooflines imitate the shape of the nearby mountains, creating a visual unity and connection with the natural world reflecting Wright's organic architecture vision (Figure 1.4). Its formal references to Meso-American masonry, especially in its battered platform mound forms, grounds it literally given the lack of subsurface foundations and figuratively as an indigenous regional architecture (Figure 1.5).

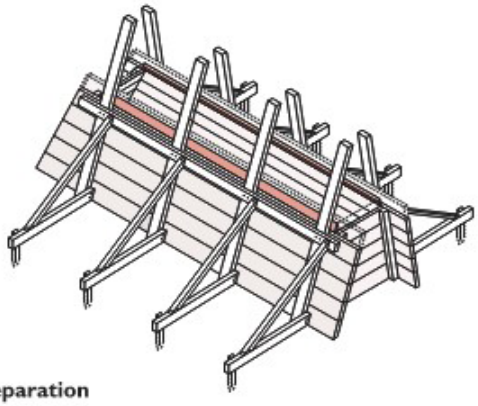
Desert masonry also represents a distinctive construction system that employs slip-form construction techniques. Slip forming is a masonry method in which stones and mortar are built up in courses or 'lifts' of stone set in a concrete matrix utilizing low wooden formwork that can be "slipped up"

Gathered information about the importance of the site and methodology for constructing Wright's desert masonry.

Figure 1.3. Desert masonry structures extensively built throughout the site. (Source: Atlas of Place, "Frank Lloyd Wright: Taliesin West, 1937–1959, 659AR" & "Ezra Stoller Archive: Frank Lloyd Wright: Taliesin West, 1950", https://library.artstor.org/asset/ASTOLLERIG.)

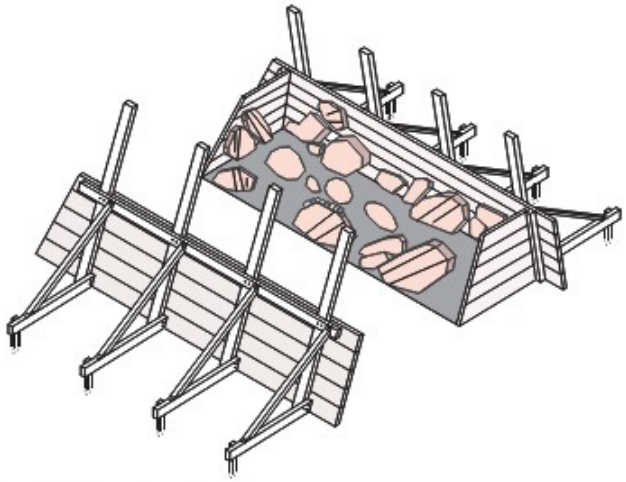
Of great importance will be highlighting the process and construction of these admired masonry elements.

Construction Process | Diagrams explaining steps taken to achieve desert masonry.

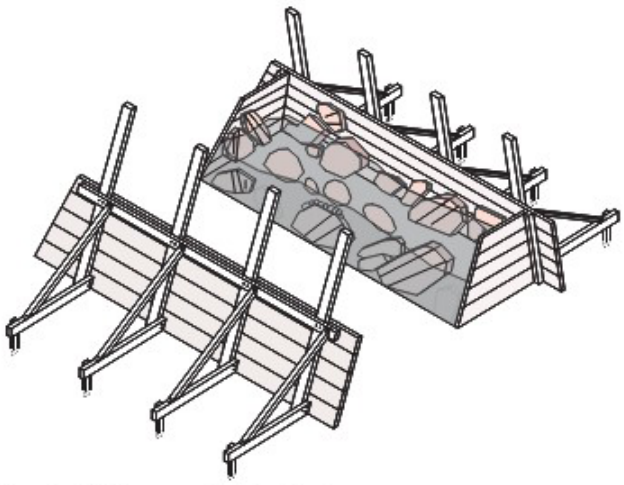


Step 1: Site preparation
The first step is to prepare the site and clear away plants and debris. There was no need for foundations or footings because the soil is dense and hard enough.

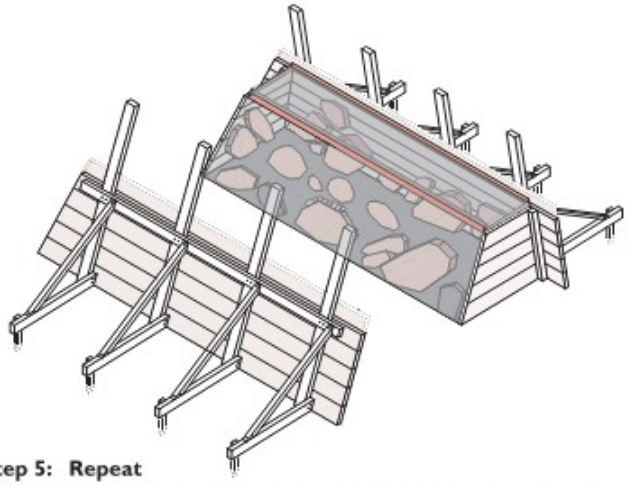
Step 2: Construction of the formwork
In slipform construction, the forms are low and constructed to the height of the first pour, with six inch-wide retaining boards and bracing.



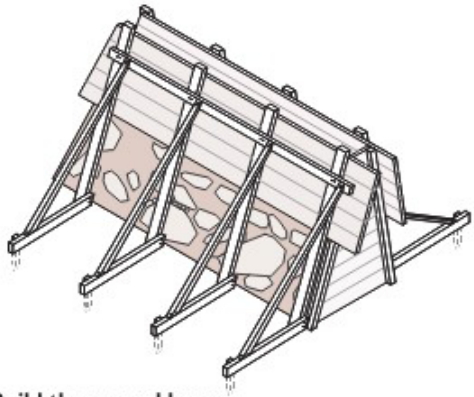
Step 3: Place face stones
The face stones are then placed against the forms and goose eggs used to fill gaps between face stones and the form to prevent concrete spill out. Rubble is placed in the center to fill the core and to hold the face rocks in place.



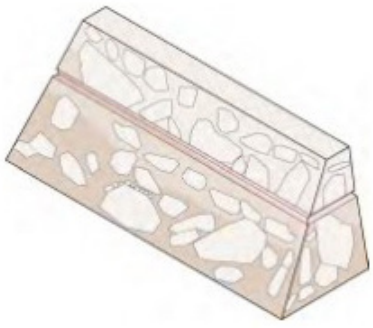
Step 4: Pack concrete into the form
The concrete mix is then packed into the form. A dry concrete mix is shoveled and tamped into the spaces between the stones, preventing the mixture from running down over the outer face of the face stones.



Step 5: Repeat
Stones and packing concrete are added until raised to the height of the triangular rustication strip. (Rustiction was inspired by the striations found in Canyon walls)



Step 6: Build the second layer
After 24 hours, the formwork is removed, flipped, and positioned at the top of the first lift and the process starts again this time with scaffolding for access. Slipforming allows the reuse of the forms from the lower part and simply reverses it to the second layer.



Step 7: Remove formwork & clean surface
Wooden forms are removed and the surfaces are cleaned. Some walls were finished with a clay slurry to conceal the grey color of the concrete.

Budget

Funding Request + Anticipated Expenses

Southwest Guide to Masonry

Budget Total

The LAST team requires funding to continue our work with both the Comparative Analysis and Case Studies, plus the development of a Continuing Education Presentation, and are asking the funds to be distributed quarterly.

LAST Architects - Principal Investigators

Time for Research and Documentation

45 hours per month needed of dedicated time by LAST staff

this amount of hours proposed was determined as we distilled the exhibits showcased in the grant application and learned collectively all that will be encompassed within the Southwest Guide to Masonry

12 month duration of work

4 quarters in 12 months ..... **TOTAL: $30,000**

Note:

The Arizona Masonry Council and NCMA, will each be supplementing 1/3 of the funds in support of this grant proposal (2/3 total) to ensure coverage for (1) year of completing the guide and new documentation.

Question Responses

Does the project address a major challenge facing the industry?

In the Southwest, masonry is seeing a shrinking market share in major markets like housing. The reasons for this change are many – more building system options, evolving performance goals, both short-term and long-term by owners and developers, and a general perception surrounding the accessibility and viability of masonry as a uniquely high-end product. **The Southwest Guide to Masonry is conceived to deal with this challenge on multiple fronts with a one-stop source for both technical, and inspirational masonry content.**

The industry is unarguably robust, with a lot of available information. However, the industry is often challenged by the accessibility and presentation of the information, creating a narrower audience for its message. **The Guide's fundamental purpose is to be a broad resource for all stakeholders in the AEC industry – not just Architects and Contractors, but Owners, Client Representatives, and Facility Managers to present masonry as a potential solution in the early decision-making window of projects.**

Are the goals and objectives and the plans and procedures for achieving them well-developed, worthwhile, and realistic?

The goal is to develop a Southwest Guide to Masonry with the objective to raise awareness and market share for masonry across the region. What could be seen as a formidable task becomes less so when broken down into its constituent parts. **The Guide is composed of two foundational research types – the Comparative Analysis and Case Studies.** Each is then supplemented by interviews, featurettes, product resources, etc. The component pieces guard against what is often a tripping point for major research initiatives – unrealistic deliverables.

For instance, as the more quantitative Comparison Analysis is being prepared, quarterly Case Studies are being delivered and shared. The work does not remain hidden for long stretches of time. The goal achieving strategy of a consistent roll out of sections and content keeps the research moving and fresh, allowing the team to address current industry issues and relevant projects as they arise.

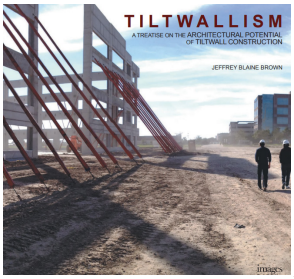
Please Note: as of the time of this submission we have a complete Case Study, with multiple ones in various stages of development. (see "Exhibit - Case Study Example)

Is the project informed by research in teaching and learning, current issues, what others have done, and relevant literature?

The Southwest Guide to Masonry was conceived as the next evolution in Masonry understanding and promotion. We are not starting from scratch and are building upon industry knowledge and previous efforts to not only inform our approach, but to enhance our reach and audience.

The question regarding "what others have done" is an interesting one. Our involvement through previous design work exposed us to a similar and quite successful undertaking by another competing industry – the Tilt-up Concrete Association and their sponsored research publication: "Tiltwallism, A Treatise on the Architectural Potential of Tiltwall Construction." We saw firsthand how this resource elevated an industry known for flat and repetitive architectural responses by expanding people's perception of Tiltwall as a potential design solution.

While masonry's challenges differ, the format of creating a comprehensive guide that presents more akin to an inspiration book filled with answers to the material's most pressing and pertinent questions to decision makers looking to specify masonry in their projects.



captures of "Tiltwallism"

Does the project have the potential to provide fundamental improvements in teaching and/or learning through effective uses of technology?

We see technology as a means to overcoming the issue of access and relevancy. **Where traditional publications can stagnate, the flexibility provided by digital formats and the ease by which they can be shared, offered, and updated will be key to improving the educational mission of the Guide.** Digital formats offer other advantages as well – hyperlinking both within and to outside resources will only expand the Guide's reach and usability.

Question Responses continued

Is the project supported by adequate facilities and resources, and by an institutional and department commitment?
The project has the full backing of the AZ Masonry Council who have already allocated resources to get the project started.

What are the broader impacts of the proposed outcomes?
A broader impact inherent in the approach to the Guide is bridging the gap that often exists between various industry stakeholders. This is true especially between Owners, Architects, and the craftspeople in the field. This disconnect often comes at the expense of the project via misinterpretations or avenues unexplored. The Guide will focus on the entire ecosystem of masonry. Case studies will not only be explored through the Owner, Architect, and Contractor, but also the suppliers and masons themselves.
Opening communication between all parties will be one of the more impactful outcomes of the Guide.

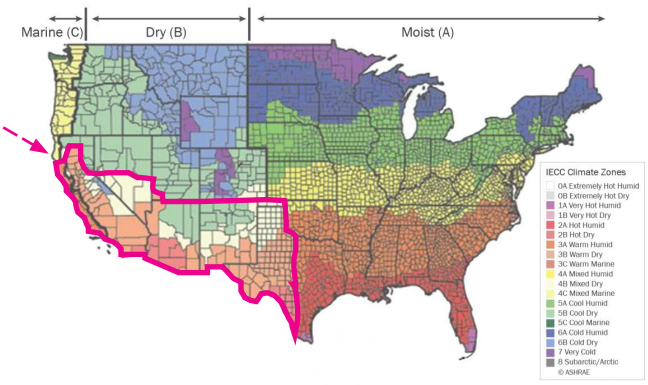
To what extent will the results of the project contribute to the improvement of the masonry industry as a whole?
The SW Guide to Masonry will result in a greater understanding as to the Total Value Package of masonry use in building projects. From this understanding, additional project opportunities will come. And those opportunities will be better informed from both an artistic and technical lens.
+ The guide will support strengthened dialogue across disciplines and encourage more engagement and input from masons during the early stages of project conception and development.
+ Case Studies will showcase the amazing work coming from the region, inspiring others to use masonry as a focal material for their projects in smart and creative ways.

Are the plans for evaluation of the project appropriate and adequate?
With quarterly deliverables, the Southwest Guide maintains its accountability through the life of the Grant. Quarterly evaluations for multiple points of engagement and feedback so we will continue to refine the work with our successive efforts.

Are the results of the project likely to be useful nation-wide?
Building systems, especially enclosure systems perform at their peek when designed for the climate they inhabit. For this reason, the SW Guide to Masonry has a regional focus based on 2021 IECC Climate Zones

+ 2B; Hot Dry
+ 3B; Warm Dry
+ 4B; Mixed Dry
+ 5B; Cool Dry

→ Southwest



That said, the ideas and information provided will have national reach. Masonry projects from the Southwest continue to garner national interest through award programs and publications. The uniqueness of the Southwest climate informs design thinking and approaches that has historically pushed the bounds of masonry and its expression. The Southwest remains an epicenter of mason thought and experimentation and because so, maintains a national following.

Question Responses continued

Is all budget information included? Is it complete and unambiguous?

We have attempted to provide a complete and clear budget to meet the goals of the project. **The project relies heavily on the time of experts and specialists to document, organize, and present needed information.** Compensation for their time and efforts supporting the Masonry industry is needed.

Is the cost of the project realistic?

As we have started the project, we come to the Masonry Foundation Grant Submittal with a clear understanding of the financial needs of the project. **With matching funds from the AZ Masonry Council, the project will have the resources necessary to carry through on the ambitious but focused nature of the project.**

How will the progress of the project be measured and reported?

The Guide progress will be reported quarterly with a new Case Study and Wall System analysis available for review. **The approach we've taken is to ensure periodic updates with presentable/marketable work so there is a consistent engagement with the Masonry and affiliated AEC communities.**

How will the requested funds be needed, i.e., will start-up funds be needed, how are payments requested?

Start-up funds have been provided by the AZ Masonry Council and the research project is underway. We require funding to continue our work with both the Comparative Analysis and Case Studies, Education Class Certification and the addition of Carbon Sequestration Case Studies. We are asking the funds to be distributed quarterly.