

Residential Bathroom and Tile Shower Addition During COVID-19 Quarantine

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This paper outlines the design and construction of a new code compliant bathroom including: a low profile shower pan, ceramic-tile shower enclosure, and new plumbing piping and fixtures. One of the main objectives was to complete the new shower which would be easily accessible and maintenance free in order to support a local elderly couple. The selection of this project took place during the COVID-19 pandemic approximately nine months after California issued the first mandatory statewide Stay-at-Home Order. During the early design and development stages an opportunity to collaborate with a local trades-person was identified as well as the need for the selected project. The new bathroom is located on the lower level of a one-and-a-half story home. Some of the primary onsite work activities in the project are: replacing old cast iron plumbing with ABS Pipe, framing a new interior wall, installing interior cement backer board at the shower enclosure, and tile installation on the bathroom floor and the shower walls. The goal of the project was to construct a fully accessible bathroom for an elderly couple within their budget and schedule. This paper will detail the steps, key takeaways, and overall process in order to help future students and industry professionals.

Key Words: Design, Tile, Construction, Shower, Local

Introduction

This project focused on the design and construction of a new bathroom to benefit and support a local elderly couple in need. The overall goal for this project was to provide a shower space that would be accessible and reliable for an elderly couple in Auburn, California. After finding the project the homeowners were contacted in order to discuss design as well as understand existing conditions of the room. The first idea that was discussed was to remove the freestanding bathtub in the homes' only full bathroom, and replace it with a shower pan and ceramic tile shower walls. A downfall of this option was its location on the upper-floor which made it more difficult to access, especially with crutches or a wheelchair. During the first meeting with the clients it seemed like this might be the only practical design option within the budget and resources. There were concerns with this option because the condition of the existing plumbing was unknown, The owners also wanted to add to the overall value of the home, so the idea to add a new bathroom, instead of updating on old bathroom was also a major option.

During the first meeting with the clients we made sure to discuss the overall budget, which was approximately \$1600.00. During the previous eight months of quarantine, the homeowners had encountered financial hardship due to unforeseeable conditions. Another important component of this project was urgency, which had originated a week prior to the first meeting when one of the homeowners had lost their ability to access their existing shower. With nearly all non-essential businesses closed due to statewide COVID-19 protocols the only temporary solution that the elderly couple had to travel to out-of-town relatives in order to use the shower. This temporary solution was appreciated by the homeowners but it was not ideal as it involved a higher risk of exposure to the virus.

Preconstruction

Networking & Coordination

With limited time and a minimal budget, the author reached out to the source that had brought the project to attention, in order to search for any additional funding or resources that could be committed to the project. Now that the homeowners' needs were clearly understood there was discussion on the material and resources that would be needed to achieve an affordable solution. At this point the source informed the author that within the church community a local tradesman had taken an interest in getting involved. Additionally, one of the only feasible ways to complete the project would require a financial donation to assist in the cost of labor.

With this development the author reached out to the tradesman to discuss the circumstances. The author explained the project goal, how he got involved, the initial budget and resources, and what useful information was gathered on the first visit to the home. The author also informed the tradesman of project management strategies that could be incorporated to the project in order to minimize waste of materials and labor. The tradesman was in agreement with these ideas and added that he would also be able to furnish the equipment needed for tile installation and supply a wide variety of tools for on-site work.

Design Options

With the team selected, which was the author and the tradesman with his apprentice available to assist, we quickly scheduled a visit to the project site in order to evaluate possible solutions to the homeowner's needs. With the tradesman now involved, access to equipment and home improvement experience were no longer issues that dictated the design. As the team considered alternatives to the initial proposition to remodel the freestanding tub, they identified a space on the lower level of the house that had an existing drain. The area to one side of the existing drain contained old 2x4 walls which enclosed the laundry room adjacent to the design area. The design proposition was to construct the new shower at the existing drain using an acrylic shower pan and ceramic tiles for the enclosure. Prior to installing the shower, the plumbing would be updated and two new walls would be framed to create the new bathroom. Measurements of the space were recorded and the concept was communicated to the homeowners for approval. Following the site visit, an AutoCAD drawing was drafted using the recorded measurements. The drawing included a six-foot by ten-foot three-quarter-style bathroom with the shower placed against the back wall. The steps to complete the model using AutoCAD included: drafting a plan, discussing with clients and tradesman, revising, editing, and

completing the final details. Creating an AutoCAD drawing early in the process was helpful in order to communicate design ideas and possibilities.

Work Sequence & Materials List

With the location of the new three-quarter bathroom confirmed, the final layout and dimensions were next to be confirmed. After that the next steps were to complete a rough schedule and a material quantity takeoff. The initial schedule included major work activities that were used to understand material costs and ensure procurement of all materials. Once all materials were identified a second draft of the schedule was created with a detailed breakdown of work activities. After the schedule was drafted, a meeting was scheduled with the local tradesman to review and finalize the schedule and quantity takeoff.

Work Plan and Procurement

During the next preconstruction meeting the material list was finalized, the material quantities were confirmed, and material procurement deadlines were identified. Another developing topic that was addressed during this meeting was the breakdown of work activities. Next, a detailed work sequence was created to support on-site labor efficiency. For a project this small, this scheduling technique could seem like a waste of time, however for the purpose of communicating the work plan with the financial sponsor, this method was used to establish a cost for labor prior to construction. With consideration to the nature of the project the tradesman agreed that a work breakdown structure could be built into the schedule. After a collaborative effort to refine the activity sequence and confirm schedule availability, the assisting tradesman and author finalized the construction schedule, shown in Figure 1 below.

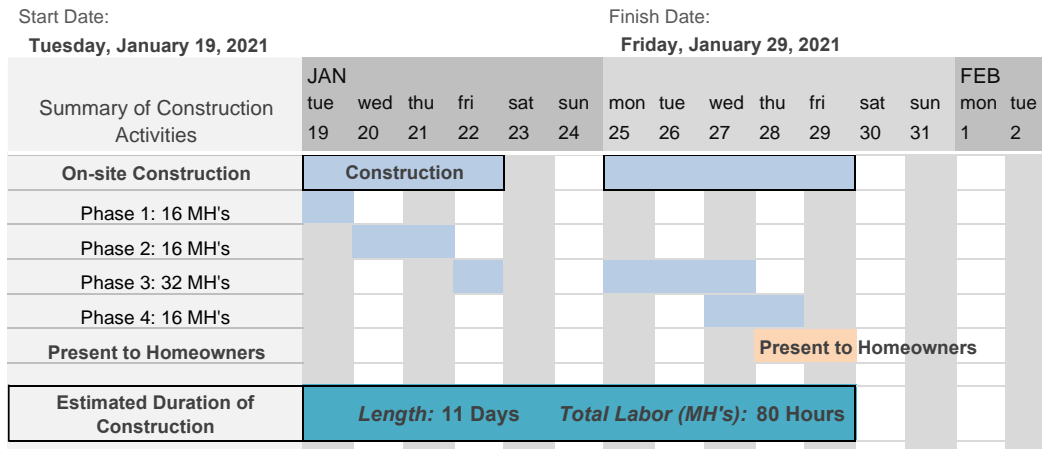


Figure 1. Summary of construction stages

Construction

Phase 1: Demo, Plumbing, Framing

When work on-site began the first objective was to update the plumbing in and around the project footprint. This phase of the work required coordination with the contractor and with his apprentice who were scheduled to work. A jackhammer was used to access cast iron sections which were replaced with 4" ABS DWV Pipe, and to create space for a new ABS P-trap for the shower. Another task that was addressed during this time was structural framing, which was only achievable after removing the old drywall. Once the studs were exposed, a few had to be replaced in order to ensure a proper surface for the tiles to be installed. At this point 2x4 studs were also used to frame a wall section which would serve as the front wall of the shower enclosure. During the first day of construction the schedule budgeted for 16 hours of labor between the local tradesman and his apprentice. The daily goals were met and there were no unexpected findings or delays. Photos of the existing piping is shown in Figure 2.

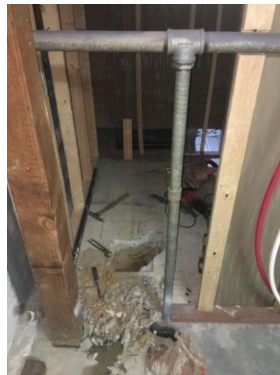


Figure 2a. Demo to access existing plumbing

Phase 2: Install Shower Pan and Prep Walls

Once the plumbing rough-in was complete, installing the shower pan was the next task completed. Next, the drain was installed in the shower pan and it was caulked, the edge of the shower pan was secured to wall studs. After securing the shower pan the team installed the shower valve and piping into the 1' wall section. Then the electrical rough-in and wall blocking were addressed, and the walls were prepared for cement backer board installation the following day.

The 3' x 5' cement backer boards were approximately 50 pounds each, and needed to be attached tight and level to one another. An important consideration for this stage is to procure the proper screws for attaching cement board, which are corrosion resistant and have a unique threading depth that can grip backer board. Cement backer board is a moisture resistant alternative to normal drywall. Aside from its moisture resistance, cement backer board is an ideal surface for tile installation because it is rigid, workable, and durable. After the walls were covered with backer board the first cover of fiberglass joint tape and adhesive was applied at the board seams, depressions, and gaps which is shown in Figure 2b.

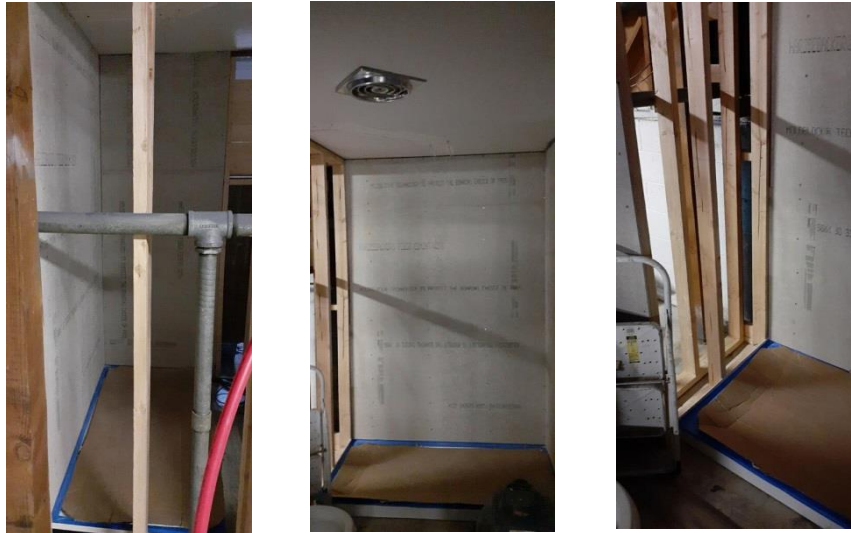


Figure 2b. Progress photos for shower pan and wall preparation

Phase 3: Tile Preparation and Install, Texture and Paint

On the fourth day of construction, the first task was sanding the fiberglass tape at the shower walls. Next, a second coat of tape/adhesive were installed, followed by installation of the metal trim pieces which run vertical to conceal the tile edge. After the shower was waterproofed and ready for tile, preparation and layout for the floor tiles was done using a chalk line, level, measuring tape, and straight edge. Once measurements and layout was complete the floor tiles were installed and left to cure over the weekend.

Following the 48hour curing period, the team arrived to fill grout at the floor tiles. Next, it was time to prepare the layout for installation of the wall tiles. When that was done the final activity of the day was to install the lower half of the wall tiles. The decision to schedule the lower and upper wall tiling on separate days was included in the work breakdown structure in order to accommodate the compounding weight of stacked rows.

The following day the tradesman's apprentice was scheduled to assist. The team began with installing the porcelain corner shelves, the remaining wall tiles, and applying texture to the drywall remaining walls. After that, the work crew filled grout on the lower half of the wall tiles and trimmed out and hung the bathroom door. Finally, our team painted the non-tile walls and ceiling which concluded the on-site work for the day.

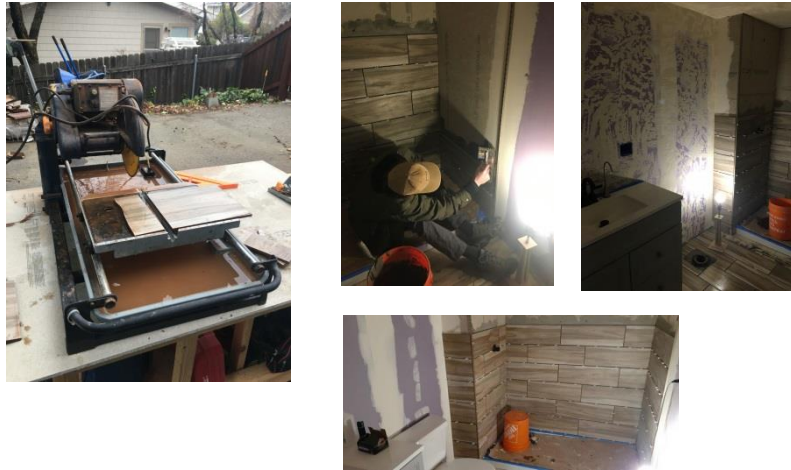


Figure 2c. Wet tile saw, tile installation, wall texture

Phase 4: Shower Door, Fixtures, Finishes

On the final day of construction, the team began by installing fixtures and finishes to complete the final plumbing and electrical requirements. This included shower hardware, lighting fixtures, and electrical covers and switches. The next task was to install the hanging 5' x 6' ANSI Certified 3/8 in. clear tempered Deco-Glass shower door which had been selected by the homeowners during the design stage. The shower door assembly included: a guide rail, door stoppers, glass brackets, 2x high forged rollers, threshold and cover, stainless steel door handles, and splash proof seals. The shower door installation began with measurements and preparation to confirm the attachment points were level, solid, and able to support the entire weight of the door. Then the crew proceeded to install the door beginning with the guide rail and finishing with splash proof seals. Once the shower door was properly assembled all that was left to complete the project was cleaning, minor touch-ups, and approval by the homeowners. On the following day the final project was revealed to the homeowners who were delighted with their brand new shower and bathroom.



Figure 2d. Bathroom door, finished tile, finished light fixture

Deliverables



Figure 3. Finished six-foot by ten-foot bathroom including shower

Supporting Documents

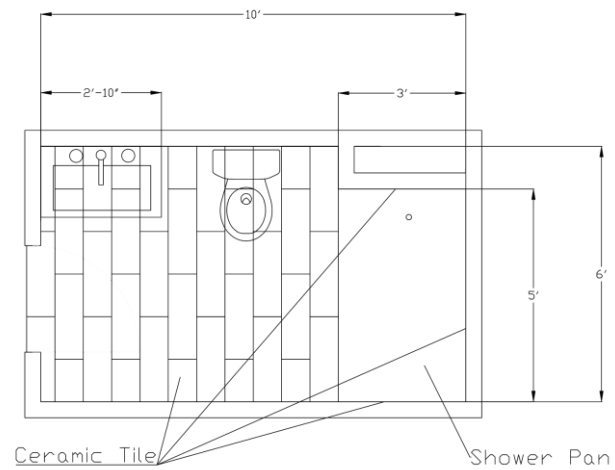


Figure 4. AutoCAD layout

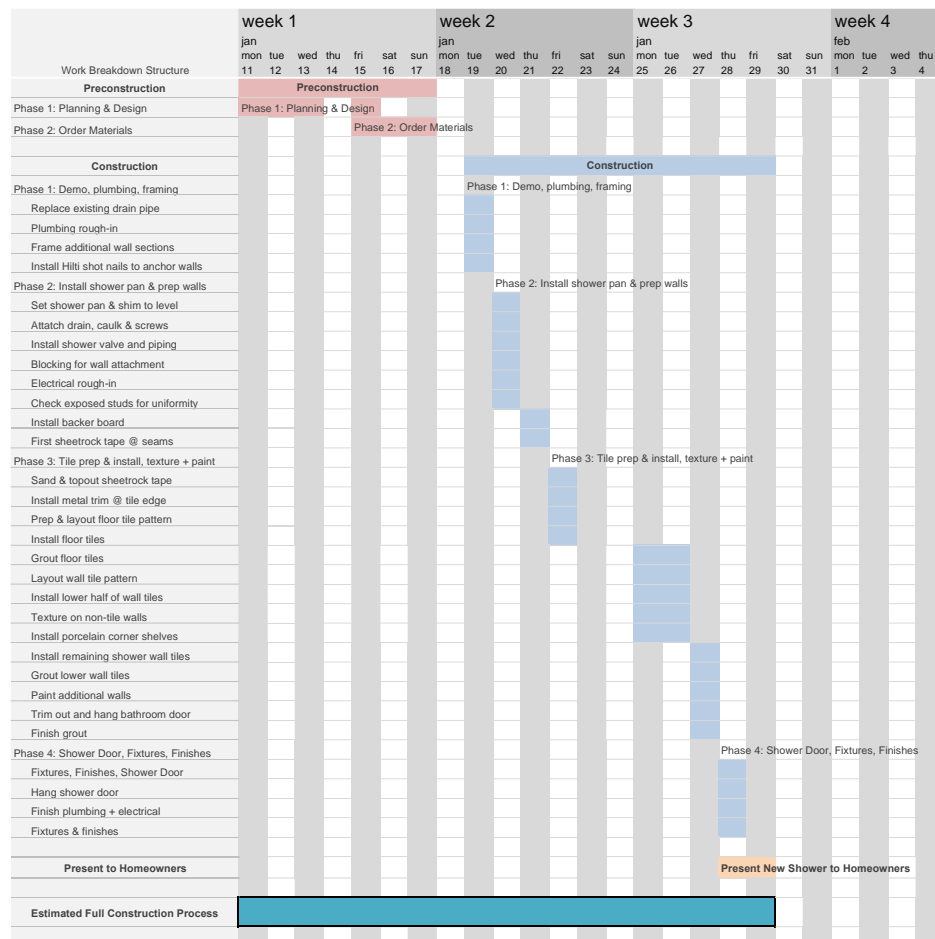


Figure 5. Work breakdown structure schedule

Project Analysis

The primary intention of the authors involvement with this project was to offer design, organization, and project management services to the homeowners in order to minimize their financial obligation. Throughout the development of this project the strategies used in the design, coordination, material procurement, scheduling, and project management resulted in a final product that exceeded the expectations of the homeowners. At the beginning of the project, one existing resource that was available was an inventory of ceramic tile. After understanding the project requirements and networking with the local community, it led to the discovery of a local tradesman who was interested

in assisting. These two resources, along with a potential financial donation to support the labor costs, were identified early in the design stage of the project and were used to evaluate different options. The goal during preconstruction was to identify the best achievable design within the budget. The purpose of creating AutoCAD drawings early in the design stage was to communicate and develop design ideas with all parties involved. The AutoCAD drawing was an effective tool to support early design discussion. The work breakdown structure was used to set clear expectations for the construction phase. It allowed the team to solidify the work sequence and man hours needed for each day of construction prior to the start of onsite work. The work breakdown structure also prompted early discussion of the labor expense, which helped reduce the chance of unforeseen costs throughout the construction phase. It also aided in minimizing the labor cost and supporting on-site labor efficiency. An added benefit of this project was the replacement of the existing plumbing lines and fixtures which was made possible by recruiting contributors, and providing clear project goals to support involvement. The residents now have a sense of confidence that their new shower, in addition to the plumbing, drainage, and valves will serve them for years to come. The peace of mind was especially appreciated by the clients who have gone through tough times and now will have one less thing to worry about. The improved design, better use of existing space, and proper installation of materials has also benefited the elderly couples pride of ownership and overall homeowner satisfaction.

Key Takeaways

Throughout the life of this project, the necessity to problem-solve and collaborate within a local non-profit network provided the author with a valuable experience, as well as being able to incorporate relevant construction management concepts as a means to accomplish the project. Prior to this experience the author did not anticipate the amount of community involvement and contribution that could be recruited once there was a clear plan of action. The practice of identifying and coordinating community labor involvement and financial contribution will be a useful skill that the author would like to apply to future projects to support local labor markets. Additionally, realizing the ability to give back to the community during a time of need was an accomplishment that will stay with the author for the rest of his life. This project also provided the author a chance to gain first-hand experience in the construction procedures such as coordinating with a local contractor and clients, designing a functional solution for the clients, and scheduling a detailed work breakdown to ensure timely completion of the project. All the while, the author also gained valuable technical knowledge from the seasoned assisting trades-person, including the opportunity to get feedback and instruction.