Mitigating the Use and Waste of Water in the Construction Sector Regarding Stucco

Author: John Beattie| Senior Capstone | Instructor: Dr. Sandra Bernal

THE UNIVERSITY OF ARIZONA
College of Architecture, Planning & Landscape Architecture

Introduction

Construction relies heavily on water for mixing, cleaning, and dust control. Stucco application stands out for its high-water demand due to multiple coats and curing cycles.
In Arizona's arid climate, stucco remains a dominant exterior finish for homes and commercial buildings. While valued for durability and thermal performance, its installation can consume thousands of gallons of potable water per project, especially during curing and site cleanup.

Literature Review

- The industry consumes around 15% of global freshwater, mainly for concrete and stucco mixing, curing, dust control, and equipment cleaning (CEMEX Ventures, 2023).

- Stucco is especially water-intensive: three-coat systems.
- Improper cleanup can discharge high pH plaster waste into soil and stormwater systems.
- A Recife, Brazil study found 57.9% of site water use was for workers, 16.9% for material processing, and 25.2% for tool washing and dust suppression (Ferreira et al., 2016). **(Figure 6)**

- ADEQ and ADWR promote reclaimed water for dust suppression and construction, reducing potable water dependence. Cities like Gilbert and Scottsdale have implemented municipal reclaimed water systems for reuse (ADEQ, 2023; GilbertAZ.gov, 2023).

Research Question

How can we cut back on water use in stucco construction?

Methodology

M1	**Case Study Observation** Material handling, stages of the stucco process, and water use practices.
M2	**Storytelling (interview)** With stucco foreman explored crew size, water use and mitigation ideas
Outcome	**Perception of Solutions** Evaluated solutions from jobsite observation, interviews, and some personal research that could reduce water waste.

M1

Material Handling

Figure 1

Figure 2

Figure 3

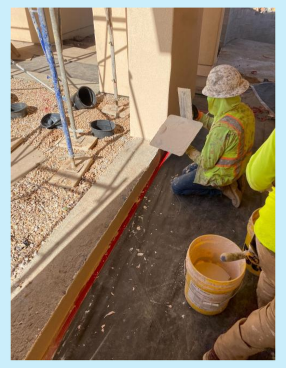

Figure 4

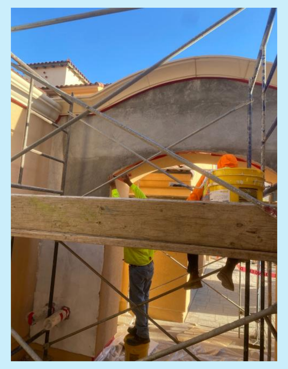

Figure 5

Stucco Process

Step 1: Wood sheathing has foam board, Tyvek and chicken wire applied **(Figure 1)**
Step 2: Stucco plaster is poured into a mixing silo **(Figure 2)**
Step 3: The mixing silo pumps the now mixed stucco into a hose, and it is then applied to the wall.
Step 4: After the first coat is applied, it is sprayed with water and left to cure for around 48-72 hours. This building received three coats with the same repeating process. **(Figure 3)**
Step 5: Color coat is applied via hose and then a hand touch up crew follows **(Figure 4)**
Step 6: A hand finishing crew comes and applies stucco to hard to reach and ornate areas **(Figure 5)**
Step 7: Clean up crew

Water use

In the stucco process, water was Used for the following:

Mixing the stucco plaster

Applying and curing

Clean up

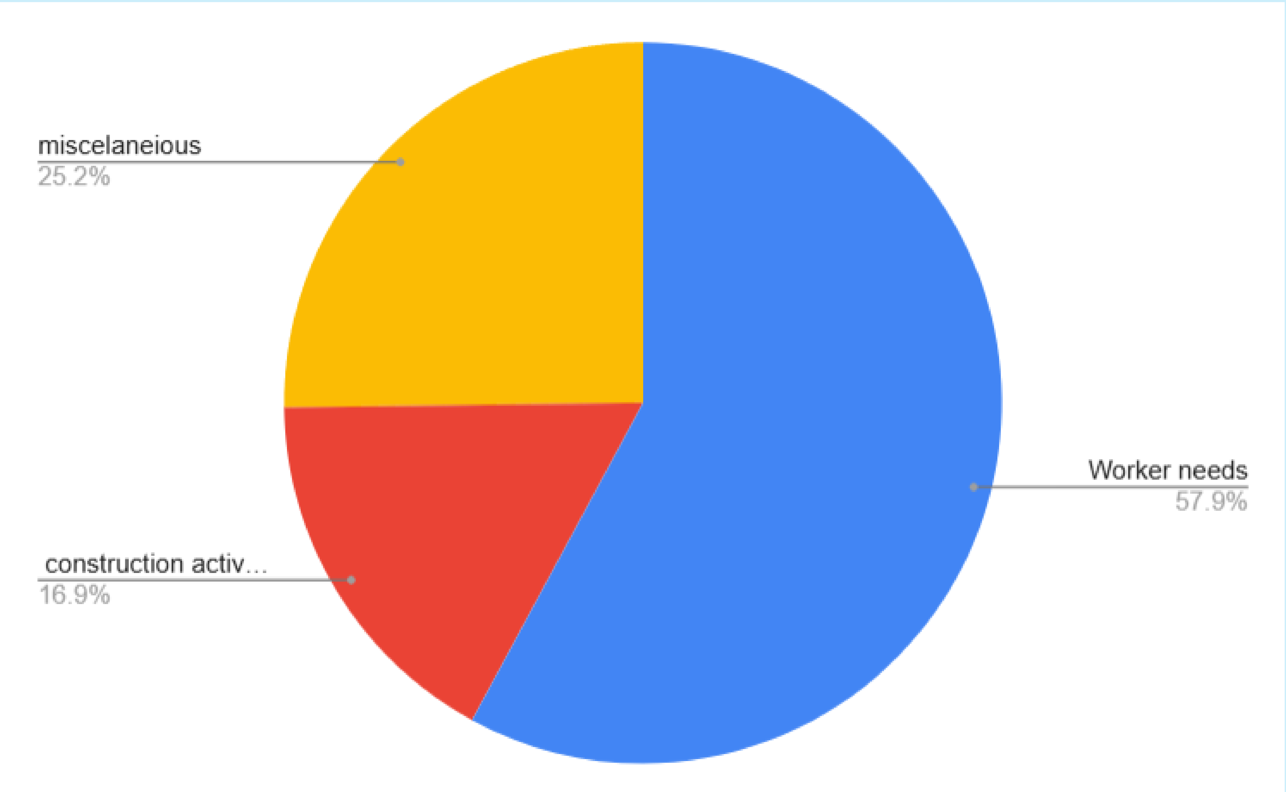

Figure 6

M2

Interview insights

Defining the stucco Process and how a stucco crew is organized (Fig. 7)

Provided reasoning as to the means and methods as to why the process is done this way

Gauged feedback on the idea of using reclaimed water

Suggestions on how less water can be used

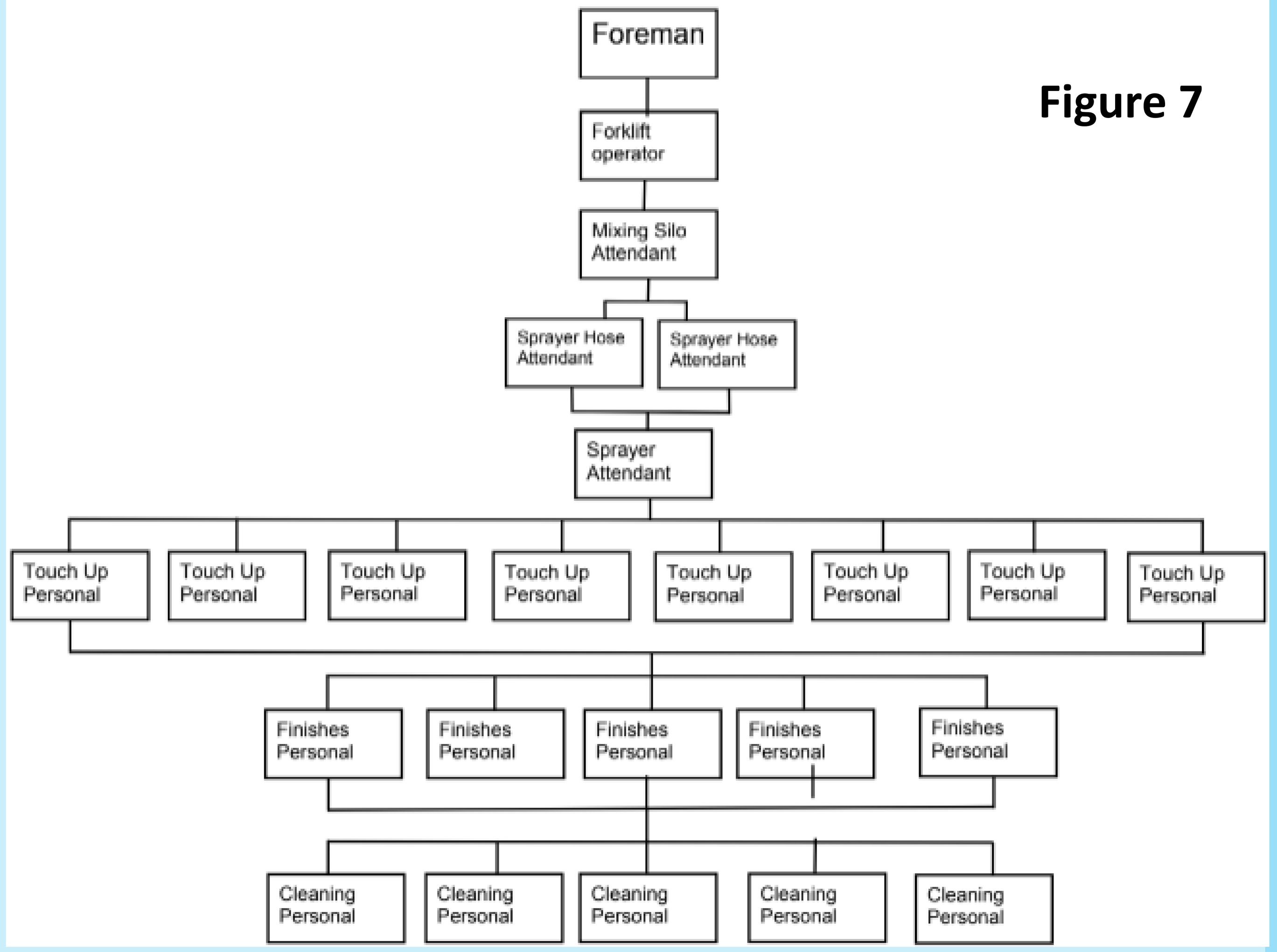

Figure 7

Discussion & Conclusion

Implementing water-saving strategies in stucco construction yields both immediate and long-term benefits, such as reduced water use, labor, and material waste. While challenges like upfront costs, regulatory inconsistencies, and contractor resistance exist, they can be addressed through education, contract updates, and early collaboration. By adopting methods like alternative materials, water tracking, and reclaimed water, the industry can make sustainable stucco practices a standard, especially in water-scarce regions like Arizona.

Perception of Solutions

Alternative Sheathing: Switching to DensGlass sheathing reduces the number of stucco coats, cutting water use by eliminating multiple base coats. Benefits include lower water consumption and minimized material waste. Barriers include higher initial costs and the need for contractor education.

Quantifying Water Use : Contractors currently estimate water needs informally. Establishing a standard (e.g., gallons per sq. ft.) could prevent overuse. Cemex estimates ~1.5 gallons of water per plaster bag. Integrating water tracking into site plans would enable real-time monitoring and environmental compliance.

Use of Reclaimed Water : Substituting potable water with reclaimed water for mixing and curing could conserve resources. Challenges include regulatory approval, inconsistent water quality, and limited contractor familiarity.

Revising Contracts : Contract language should require water budgeting, reclaimed water use, slurry containment, and submittals for compliance. Clear specifications can shift sustainability from theory to enforceable site practice.

References

Basic information about water reuse. (2019, August 13). US EPA. https://www.epa.gov/waterreuse/basic-information-about-water-reuse

Division, W. Q. (2025, January 17). *Recycled Water Rulemaking* . Arizona Department of Environmental Quality. https://azdeq.gov/recycled-water-rulemaking

Iribar, I. (n.d.). Construction industry's water problem. *For Construction Pros*. Retrieved May 7, 2025, from https://www.forconstructionpros.com/concrete/equipment-products/concrete-materials/article/22893285/cemex-ventures-construction-industrys-water-problem

Reclaimed water. (n.d.). Town of Gilbert, Arizona. Retrieved May 7, 2025, from https://www.gilbertaz.gov/departments/public-works/water/water-resources/reclaimed-water
Santos, C. P. dos, Silva, S. R. da, & Cerqueira, C. A. (2015, January 1).

Water consumption in construction sites in the city of Recife/PE. Unknown. https://www.researchgate.net/publication/297774249_Water_consumption_in_construction_sites_in_the_city_of_RecifePE

The Rise of Reclaimed Water: Reuse of Water in Arizona, Already Important, is Primed to Grow Alongside Increasing Scarcity of Other Water Sources. (2023, June 5). Law Offices of Snell & Wilmer. https://www.swlaw.com/blogs/environmental-and-natural-resources/2023/06/05/the-rise-of-reclaimed-water-reuse-of-water-in-arizona-already-important-is-primed-to-grow-alongside-increasing-scarcity-of-other-water-sources/

WJGoodloe. (n.d.). *SPEC SHEET*.

WQD. (n.d.). ADEQ. Retrieved May 7, 2025, from https://azdeq.gov/recycled-water

Pires dos Santos, Camilla & Silva, Simone & Cerqueira, C.A.. (2015). Water consumption in construction sites in the city of Recife/PE. 20. 1711-1726.