How modularity, block size and thin layer mortar can lead to higher productivity and sustainable constructions

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ABSTRACT
Concrete Block Masonry is by far the most common wall construction system in Costa Rica, accounting for more than 75% of wall construction. This predominant role is in steady decline, crippled by lagging productivity. While statistics show that a mason and a helper are able to lay above 400 CMUs of nominal size 150 x 200 x 400 mm per 8 hr shift in the United States, the average equivalent productivity in Costa Rica is only 100 CMUs. This paper briefly describes current improvement, resulting from training, that has doubled productivity. The paper concentrates on a broad and integral look at the construction requirements necessary to improve productivity. The resulting new masonry system (NMS) changes traditional masonry practices by increasing block dimensions, following a complete modular coordination approach, introducing thin layer mortar (TLM) to the country and changing the laying process. Productivity has been experimentally improved as much as eight times average. Our first pilot run on a housing project showed a 50% productivity improvement. The NMS decreases waste at the construction site from a national average of up to 15% to zero. It lowers the CO₂ footprint by 30% compared to traditional masonry. Water usage is cut by 24%; direct costs are driven down by 20%.

In short: by investing a modest amount in planning effort, the NMS provides a more cost effective, more productive and a more environmentally friendly way of masonry wall construction. Structurally, it does not change the fundamental nature of masonry. From a construction point of view, it brings the concept of modern precasting to masonry.

KEYWORDS: reinforced masonry, seismic, productivity, construction systems, thin layer mortar, modular masonry.