Construction Systems Comparison

Factor	Green Precast Modular	Blockwork	Conventional Panels	Lightweight Steel Frame
Build Concept	▪ A single trade and subcontract package ▪ Cast complete rooms in one piece and install with a single lift ▪ Sub-terrain structures	▪ Requires separate structures of beams, columns and floor system using precast ▪ Wall in-fills need more jointing detail ▪ Must use separate floor system for multi-level	▪ Flat elements cast on flat table and installed individually and require numerous joints, brackets and grouting	▪ Steel lightweight frame, clad with gypsum or cement sheet. Many joints to flush fill. ▪ Requires top/bottom elements install first due to tolerances or structure complete for site measure.
Factory Production	▪ Monolithic cast of wall units and ceiling, to between the equivalent of 5 and 14 flat panels ▪ No brackets, props or vertical joints required ▪ Customizable for penetrations and openings ▪ Repetitious production of a module	▪ More on-site trades: reinforcement, brick or block laying and rendering ▪ On-site labour intensive ▪ Load-bearing needs to be steel and concrete reinforcement ▪ Concrete pump and untidy	▪ Larger factory area for equivalent production and many more vertical joints	▪ Can be panelised but needs to be fixed prior to final cladding. ▪ Access issues for larger premade elements. ▪ Many joints to finish
Insulation	▪ Closed joints reducing locations for air transfer ▪ Mould internal foam layer sandwich panel (200-210mm) ▪ External UV reflective coating (up to 100%), available in 45 colours	▪ N/A	▪ Must be cast in foam, walls have a perimeter boarder not containing insulation ▪ Many vertical joints ▪ Cast in foam layer does not extend to full area of panel	▪ Can be placed in wall cavity, or post fixed.
Wastage	▪ Walls and roof act together structurally minimizing the volume of concrete, steel and reinforcing bars leading to less wastage	▪ Excessive site wastage, cleanup, disposal: cutting of bricks and blocks, pallets, mortar, sand piles, hoses and water	▪ Minimum 2 layers of reinforcing for insulated walls ▪ Requires extra 12m of vertical jointing per room	▪ Room sizes not always as per standard steel & cladding sheet lengths.
Finishes	▪ Internal and external paint can be applied in the production process	▪ Only achieved by site application, increased labour cost and inferior accuracy ▪ Coloured bricks available but generally need to apply another finish or lining	▪ Factory painting not possible due to multiple joints ▪ Colour variation as panels are poured separately ▪ More visible joints	▪ Much flushing and filling of joints on site. ▪ Pre-painting not usually possible due to multiple joints.
Labour	▪ Hydraulic mould requires 8 men to operate up to 80m^2 per 12 hours ▪ Installation requires 3 people	▪ Labour intensive ▪ Requires more site amenities, supervision, temporary services and scaffolding	▪ Each panel requires 2 man-days (≈10 man-days for 5 panels)	▪ Labour intensive to assemble as many pieces and several different materials required to complete.

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Installation	▪ A single lift ▪ No propping or levelling ▪ Minimal site fittings, brackets and dowels ▪ Solid working platform immediately available for subsequent levels ▪ Erect 4-5 levels in one day ▪ Greater accuracy, monolithic construction reduces bracket and joint costs ≈$100 per room	▪ Slow ▪ Labour intensive ▪ Greater overhead costs	▪ Multiple small lifts causes delays, 2 levels per day max ▪ 5 crane movements to install 1 panel ▪ Individual propping and levelling ▪ Less accuracy with accumulating errors ▪ No immediate working platform until all jointing is completed	▪ Multiple small lifts, 2 levels per day max. ▪ Individual piece propping & leveling. ▪ Post installation access is difficult until floors & other structural elements complete & clad.
Transport and lifting	▪ 1 crane to extract and place for yard and site	▪ Extensive scaffolding, materials hoist and safety provisions	▪ Need approximately 8 cranes on site	▪ Can be flat packed. Generally lightweight. ▪ Require site storage areas. ▪ Difficult to “load” building until all bracing done.
Services	▪ Windows and door frames, electrical and plumbing conduits built into mould ▪ Can cast holes in roof slabs for vertical plumbing service running from top to bottom of building	▪ Must be progressively manually built in or chased in later	▪ Impractical to factory install windows ▪ Corner electrical joining impossible ▪ Plumbing service holes more difficult	▪ Impractical to factory install windows. MEP coordination extremely difficult and practically better to do on site.
Hydronic cooling/ heating	▪ Pipes can be cast into floor for efficient cooling/heating	▪ Not possible	▪ Difficult/impossible to do with hollow core planks	▪ Coordination of connections through all the elements generally make it more practical to do insitu once installed.
Safety	▪ Modern lifting techniques ▪ Safe working platforms ▪ Limited access to external surface required	▪ Excessive site labour with potentially high injury risk ▪ Loose power leads, hoses and scaffolding creates safety risks	▪ Installation requires temporary phase (propping) with added safety requirement	▪ Sigtnificant site labour with potentially high injury risk ▪ Loose power leads, hoses and scaffolding creates safety risks ▪