KIT-FIT

A TEACHING/RESEARCH INNOVATION PLATFORM

Department of Architecture

College of Architecture and Planning
Ball State University

Fall Semester 2011

Directed by Steve Kendall, PhD (MIT'90), Professor of Architecture

with a class of 14 graduate architecture students, a visiting professor from Tianjin University, a construction management expert, with the support of a number of product manufacturers and engineering firms and a grant from the Department of Architecture "In-Situ Fund"

Basic Kit-Fit assumptions

- Tenants / Occupants preferences differ and change

- Developers can benefit deferring TI work until the specific occupancy of each demised space is known

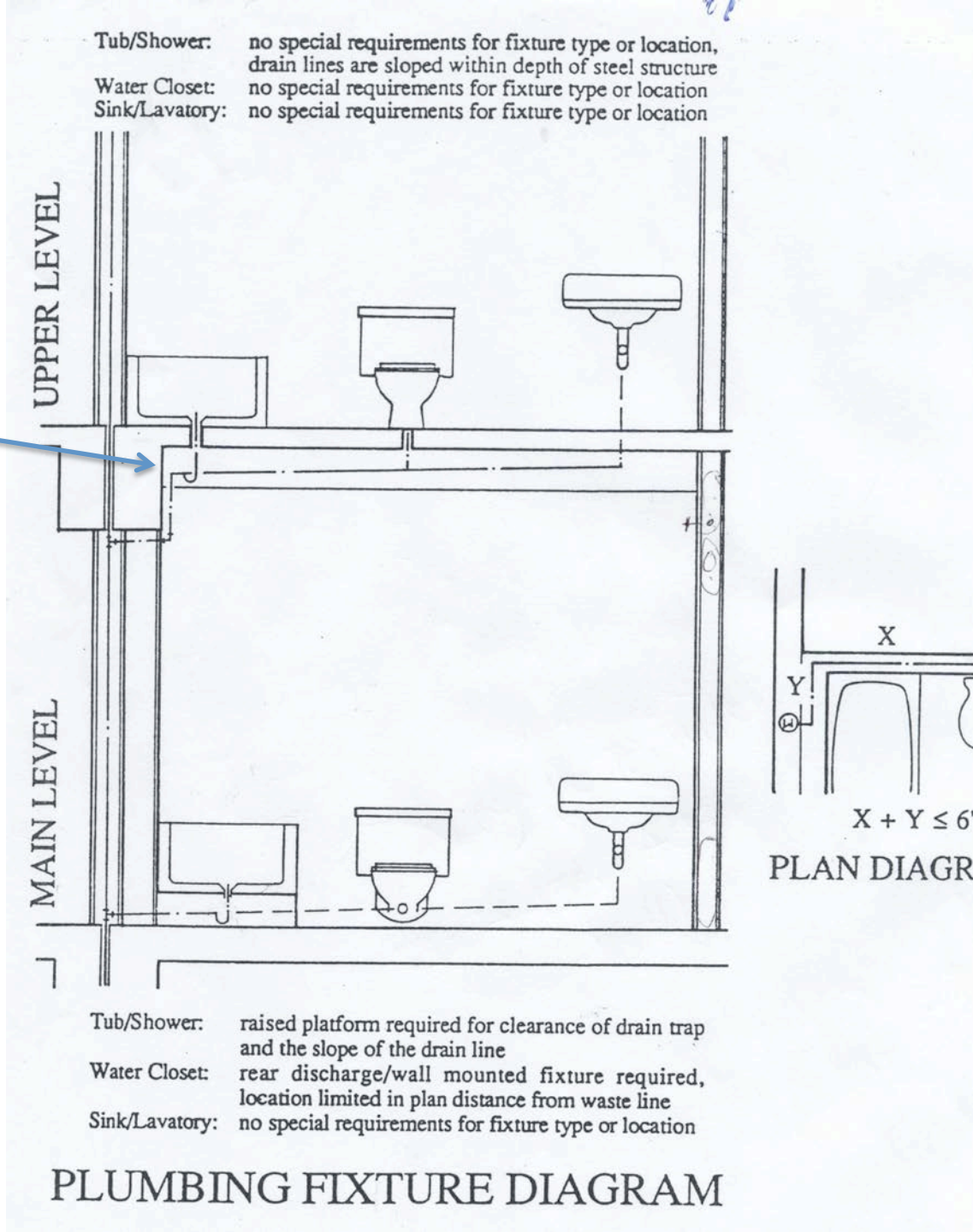
- Contractors can benefit by avoiding management and coordination conflicts, and by shortened production time per unit

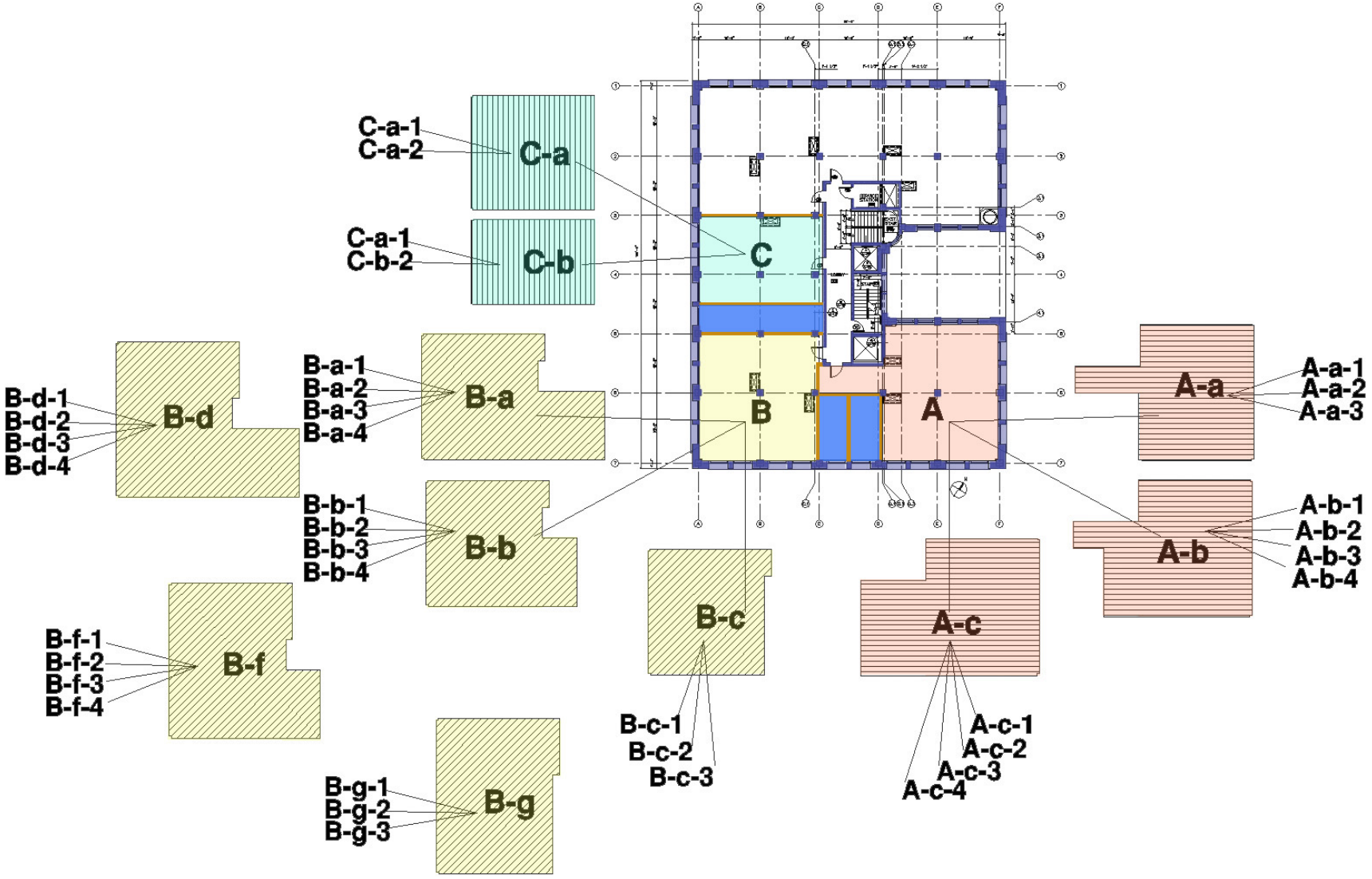
A SOCIO-ECONOMIC PRINCIPLE:

Everyone benefits when each occupant has a clear domain of its own

TECHNICAL PRINCIPLE:

Pipe penetrations through the floor into another tenant space can and should be avoided



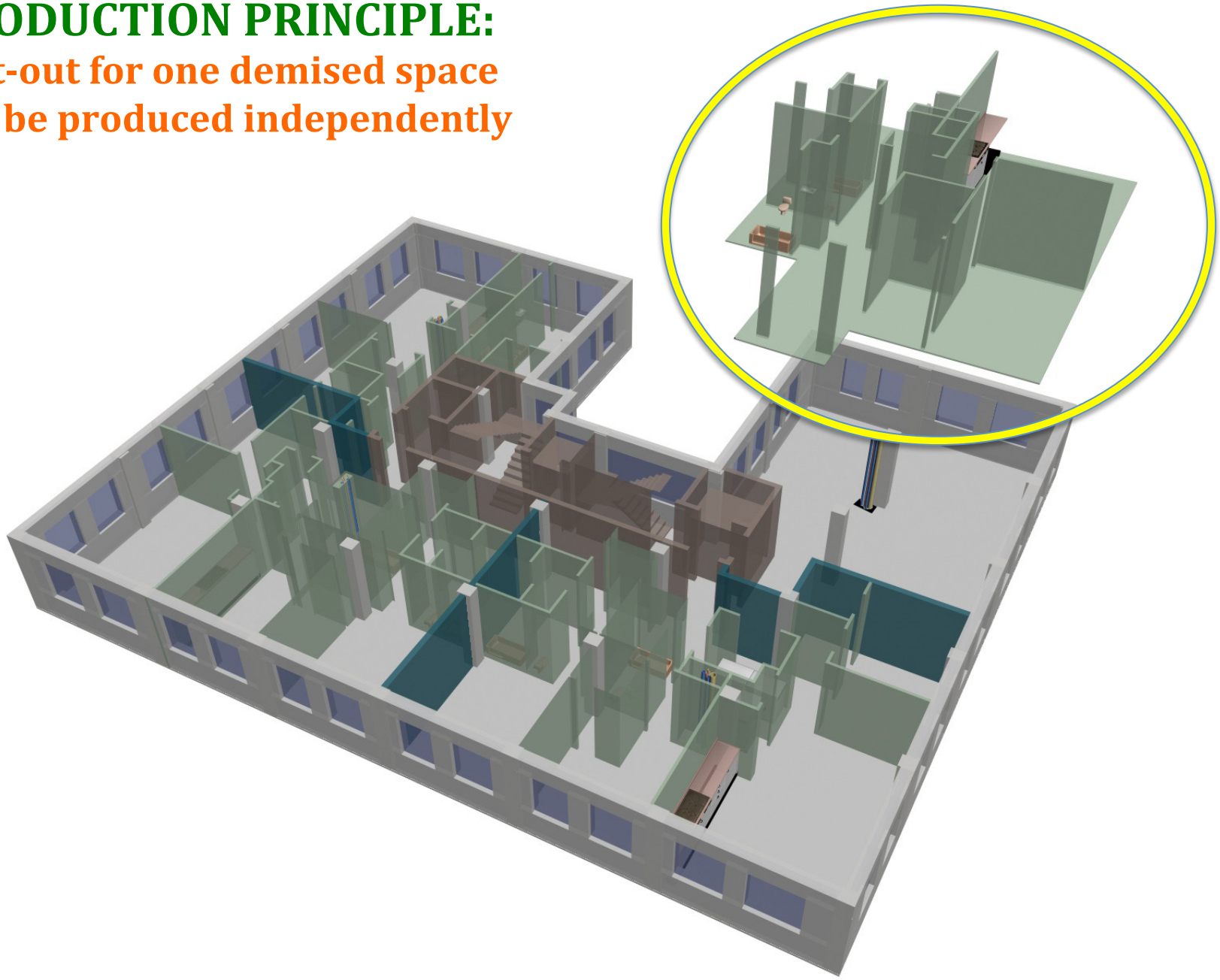


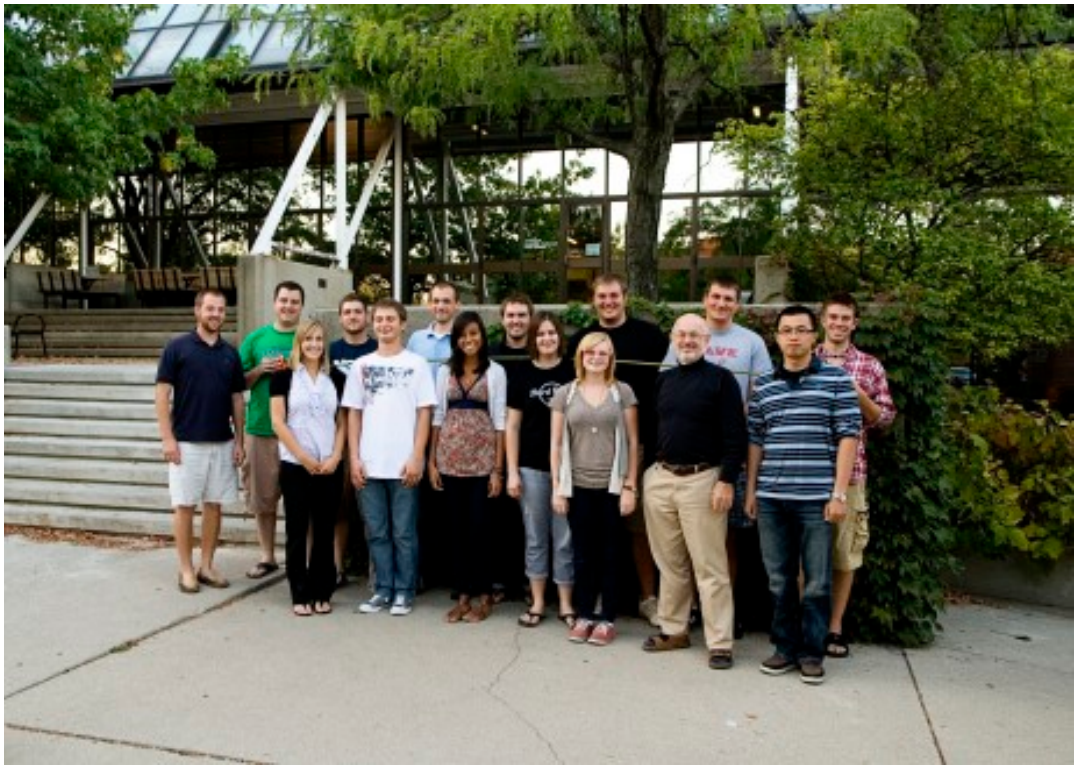
ARCHITECTURAL PRINCIPLE:

Capacity analysis enables decision flexibility and choice

PRODUCTION PRINCIPLE:

A fit-out for one demised space can be produced independently





A Research / Teaching Program

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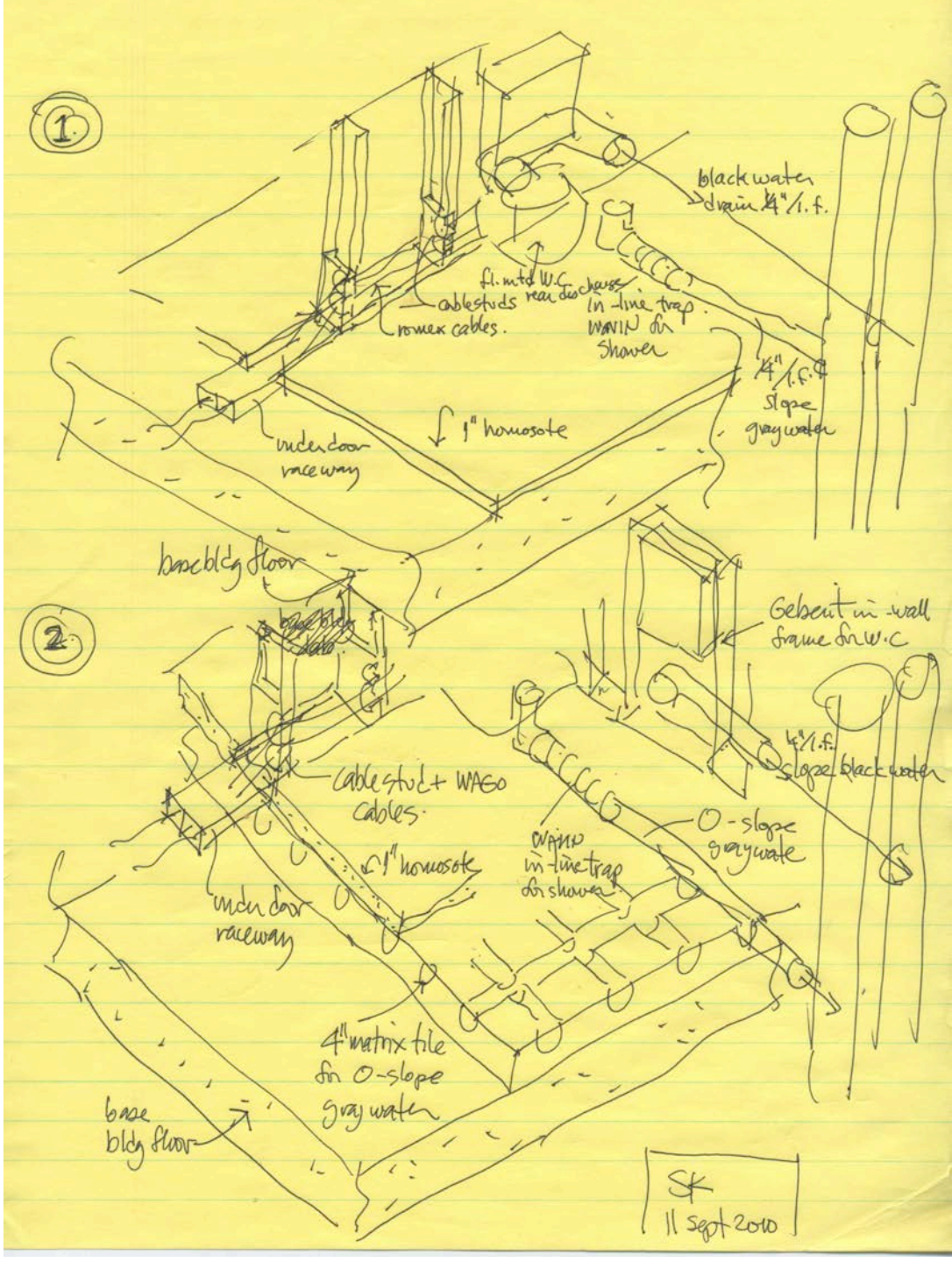
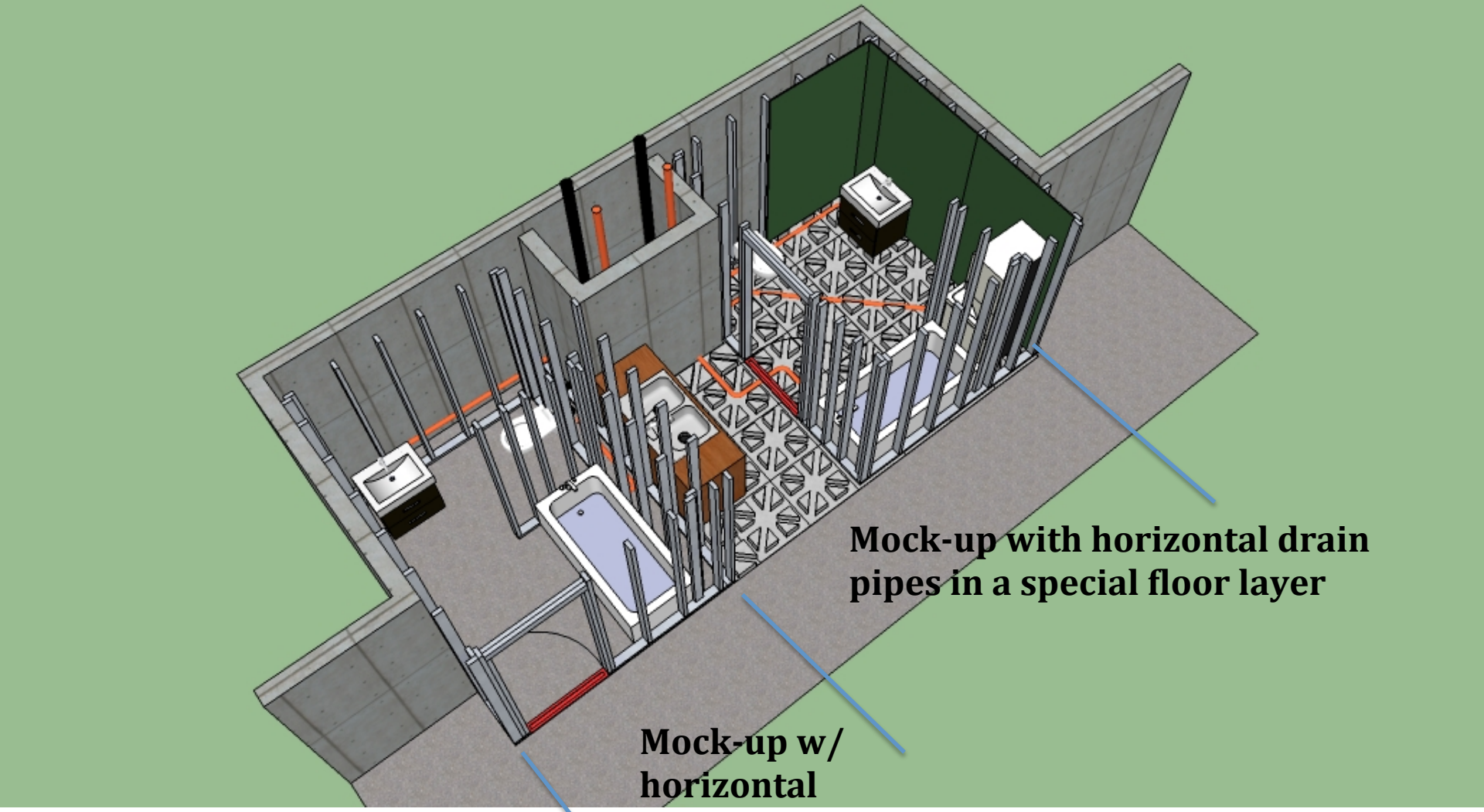

1.
black water drain 4"/l.f.
fl. mtd W.C rear discharge
in-line trap WAVIN for shower
cable studs romex cables.
4"/l.f. slope gray water
1" homosote
under door raceway
base bldg floor
2.
Cable stud + WAGO cables.
Gelcoat in-wall frame for W.C
4"/l.f. slope black water
0-slope gray water
WAVIN in-line trap for shower
1" homosote
under door raceway
4" matrix tile for 0-slope gray water
base bldg floor
SK
11 sept 2010



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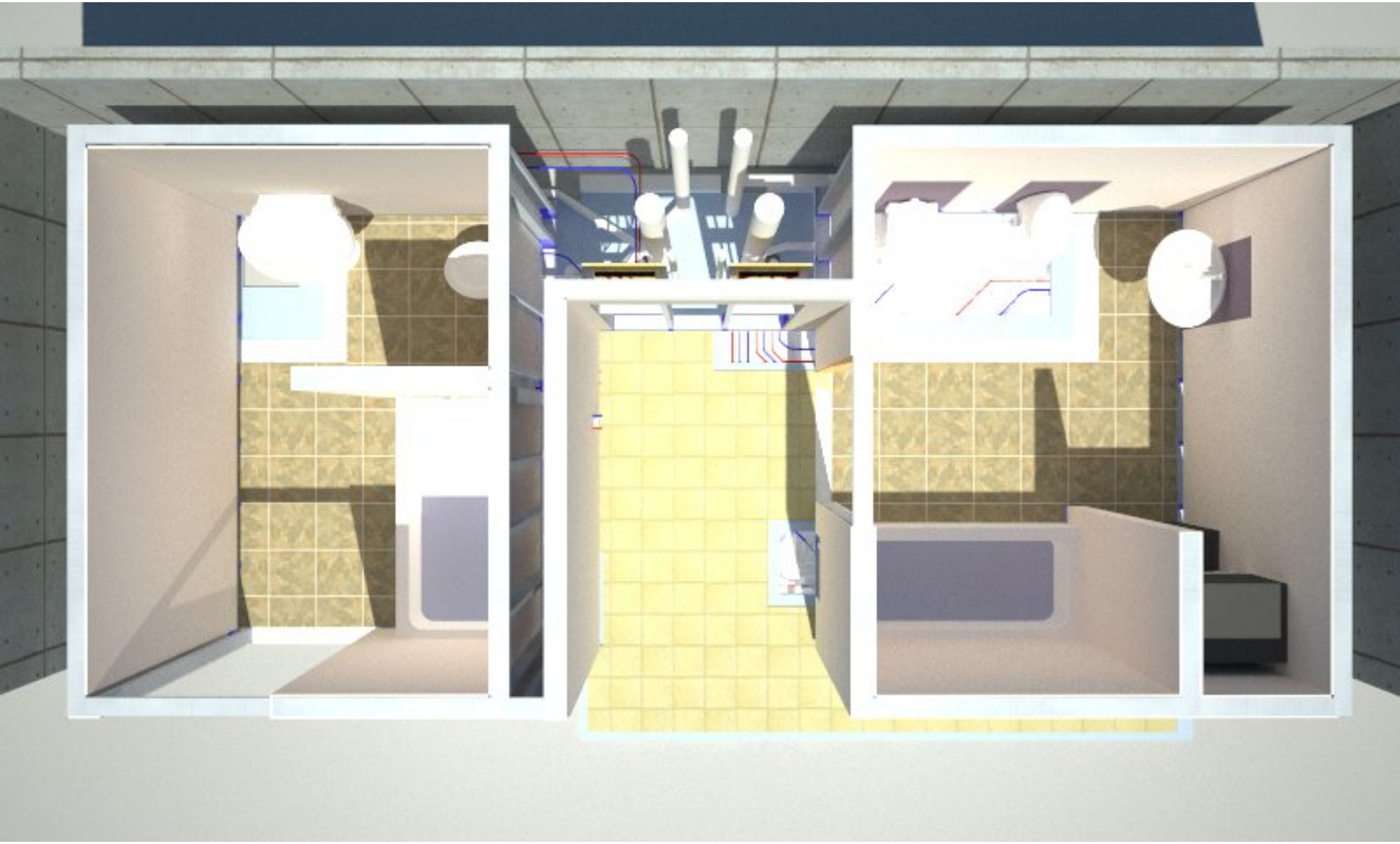
Two side-by-side mock-ups showing two basic piping strategies + other solutions



Technical Assumptions

1. Avoid floor penetrations at plumbing fixtures
2. Provide enhanced acoustical separation between floors
3. Speed on-site work
4. Use “open systems” design and construction methods that allow easier changes later

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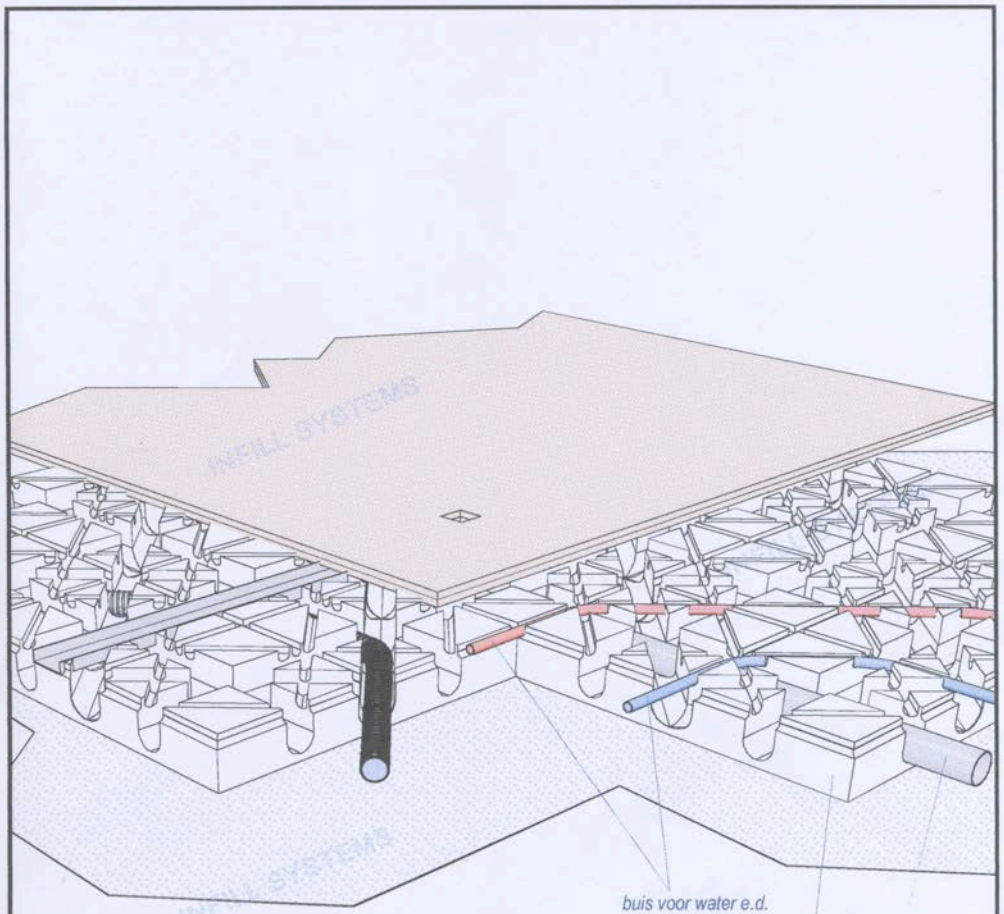

INFILL SYSTEMS B.V. oude delft 151 2611 ha delft, tel. 015 - 214 72 59

matrixtegel met leidingen en vloerplaat 2

TECHNICAL DESCRIPTION of the MATRIX TILE

The Matrix tile is a solid material applied on top of the leveled base building floor. Grooves of various sizes and located in several horizontal “zones” allow the secure placement of lines or conduits for various services, such as hot and cold water lines, gray-water drain lines (0-slope), hydronic heating pipes to radiators, floor heating, flat ventilation ducts, gas pipes and so on. This “tile” is covered after lines and conduits are installed.

Of particular significance is the opportunity to install 0-slope drain lines, in specific relation to the Matrix Tile, a method certified by KOMO-KIWA in 2009.

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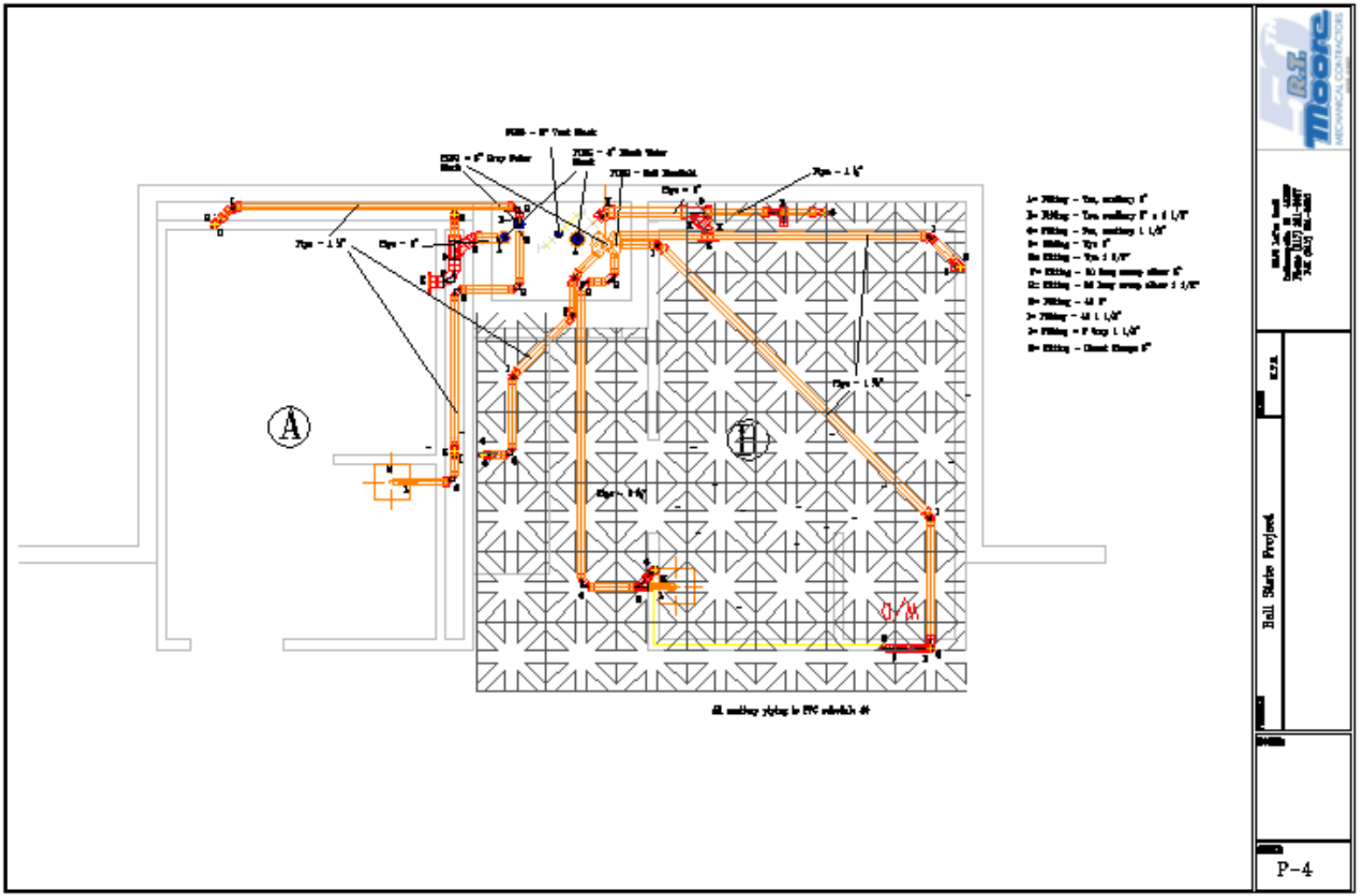

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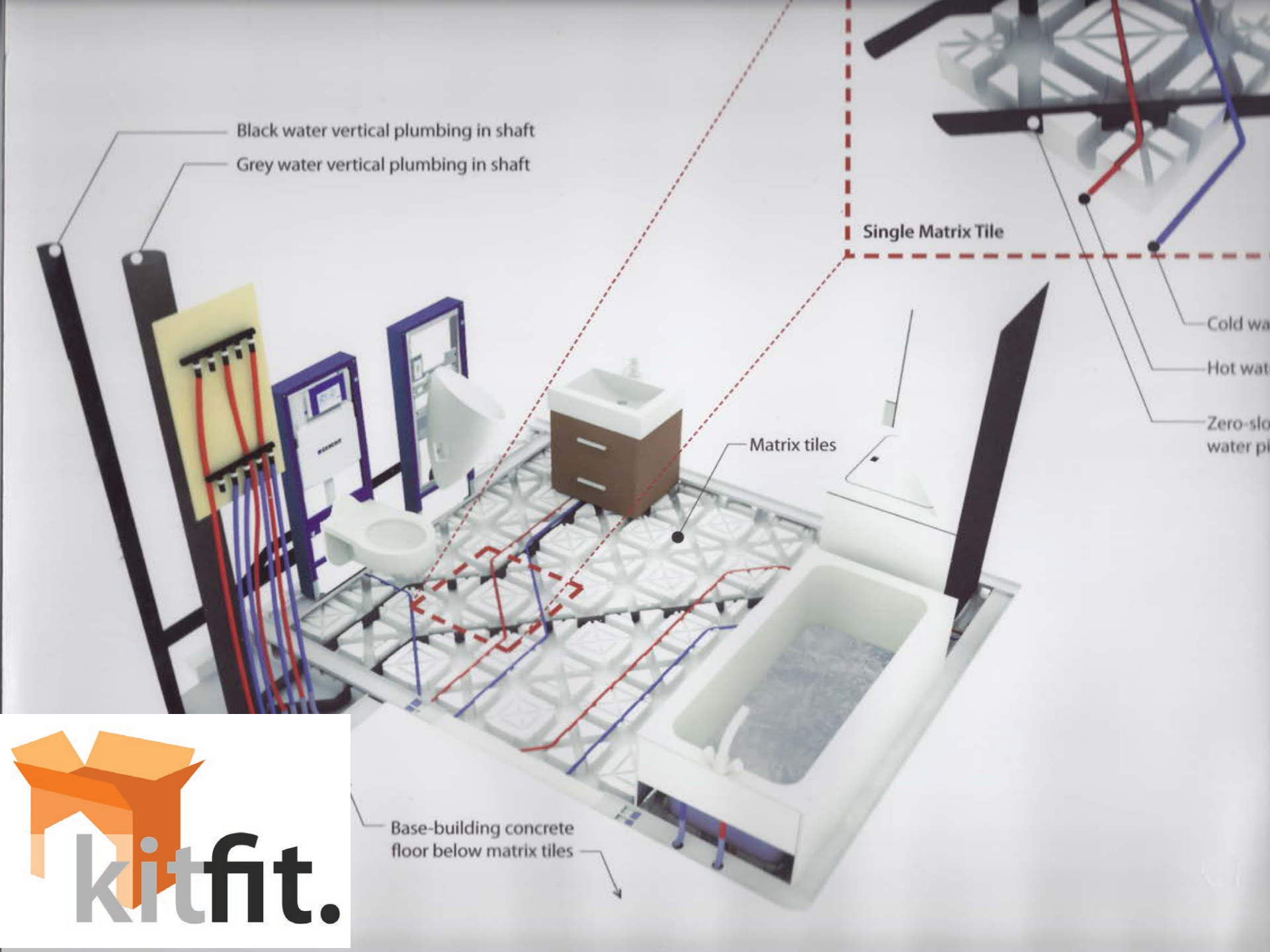
Black water vertical plumbing in shaft
Grey water vertical plumbing in shaft
Single Matrix Tile
Cold wa
Hot wat
Zero-slo
water pi
Matrix tiles
Base-building concrete
floor below matrix tiles

A product for positioning horizontal piping and ducts all within a demised space (avoiding floor penetrations at fixtures)

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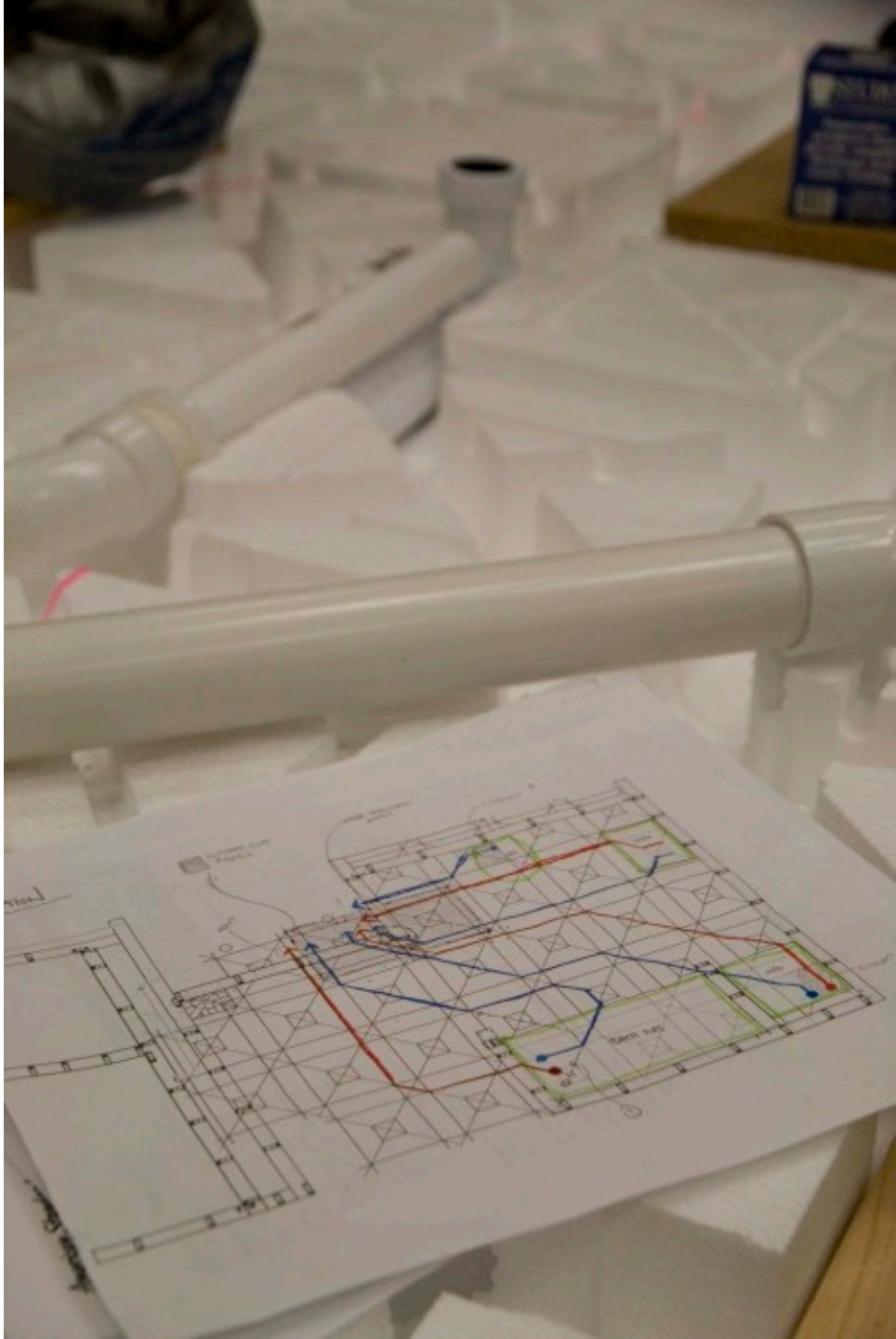

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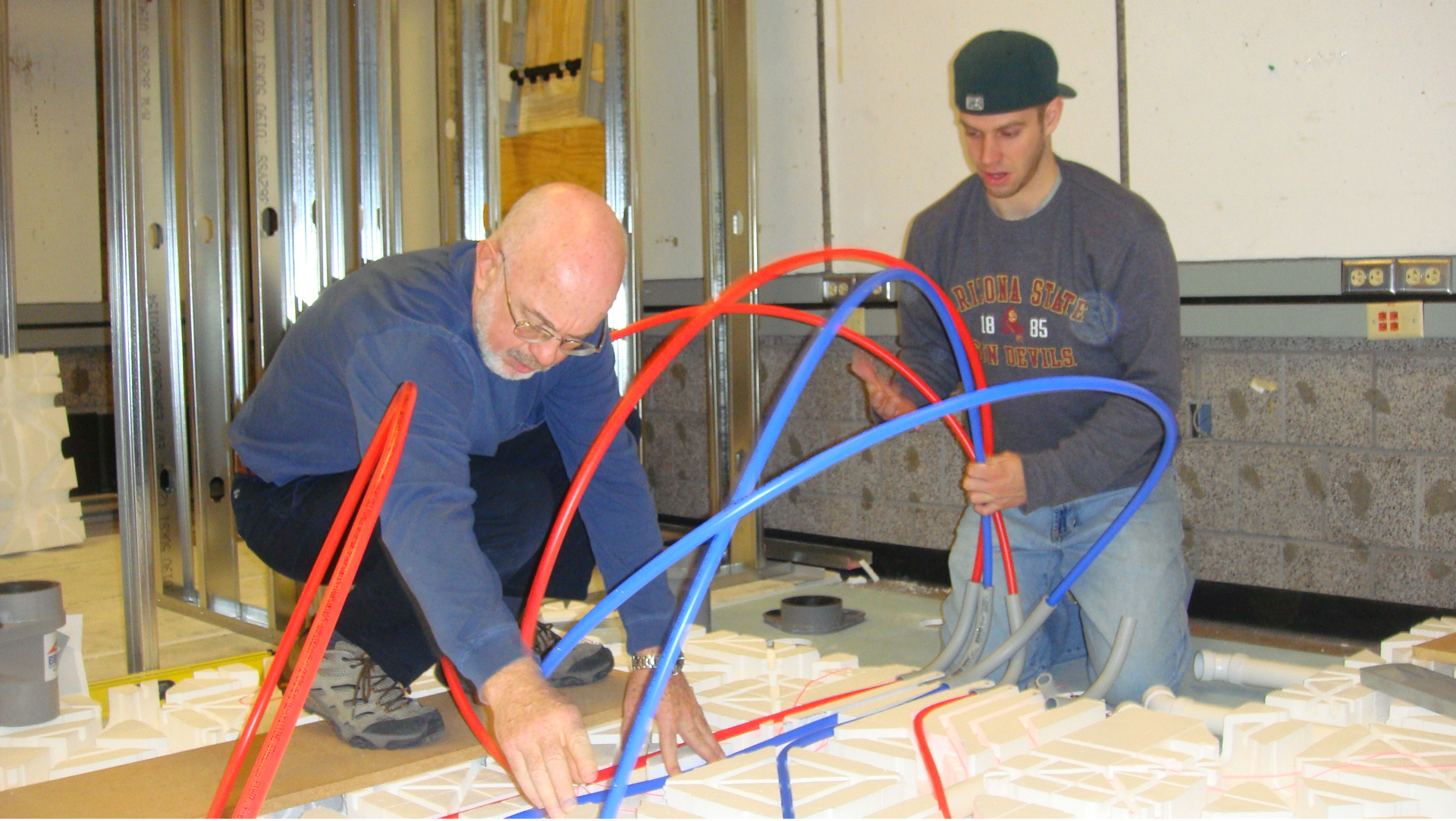

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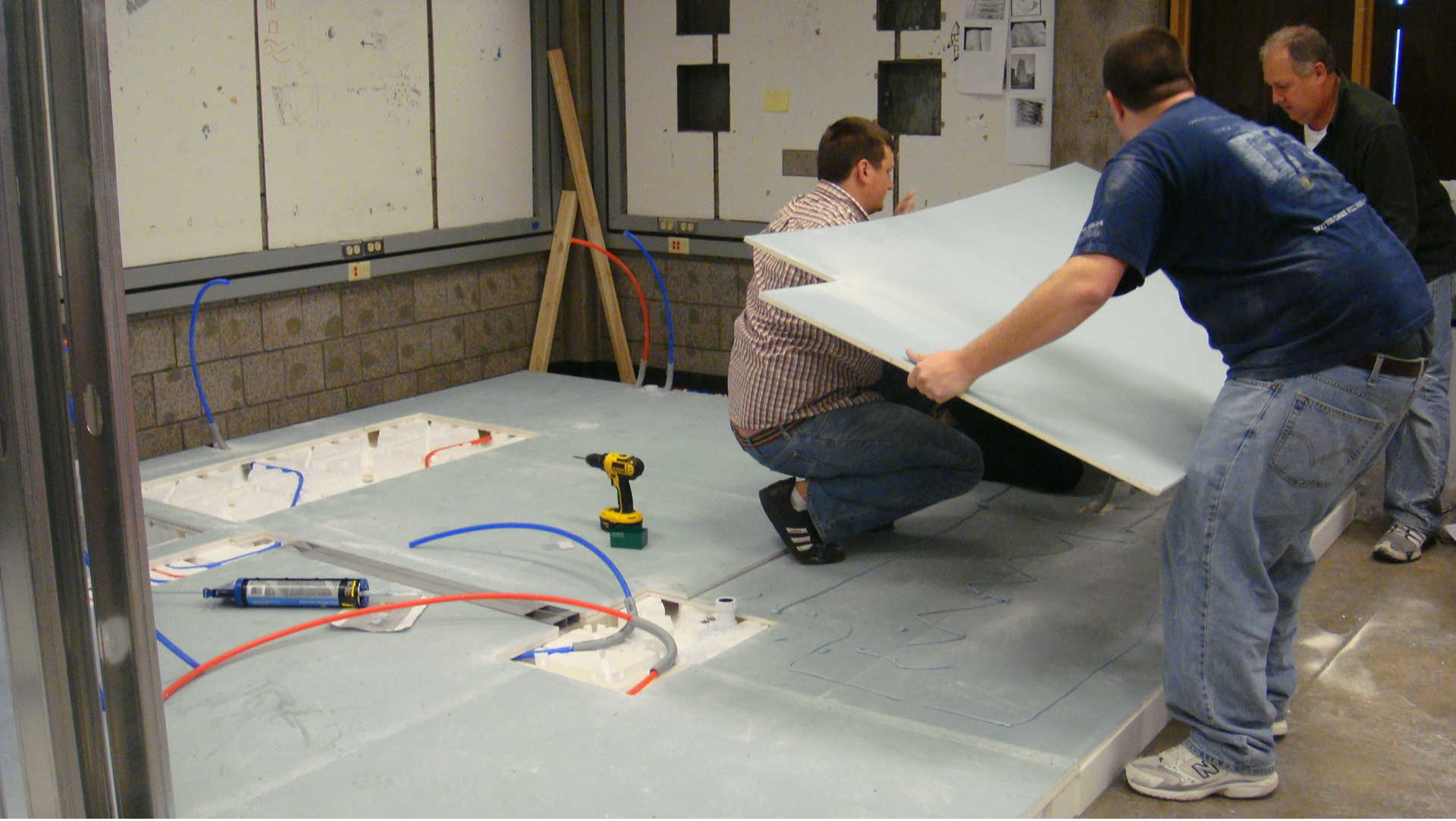

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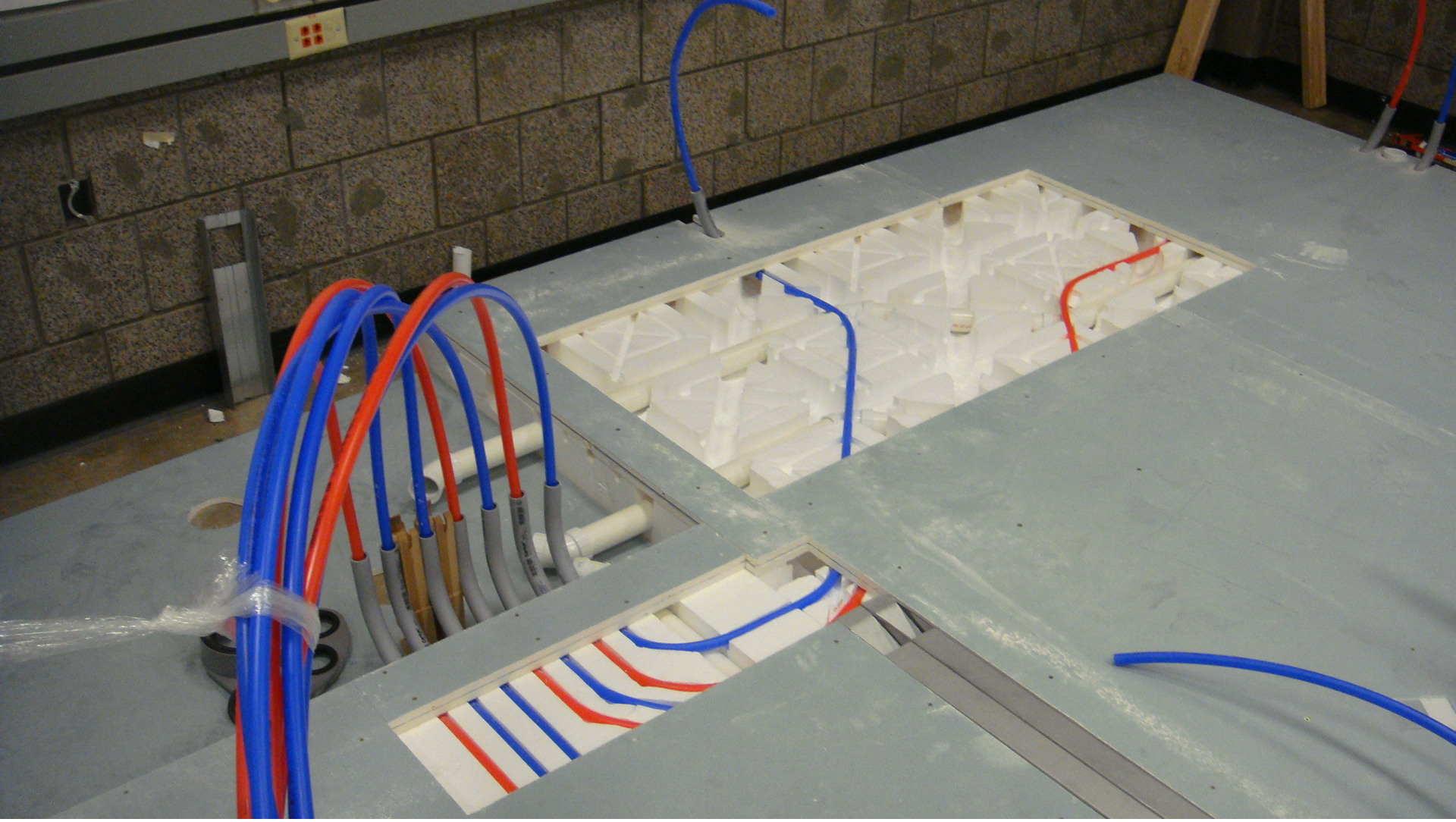

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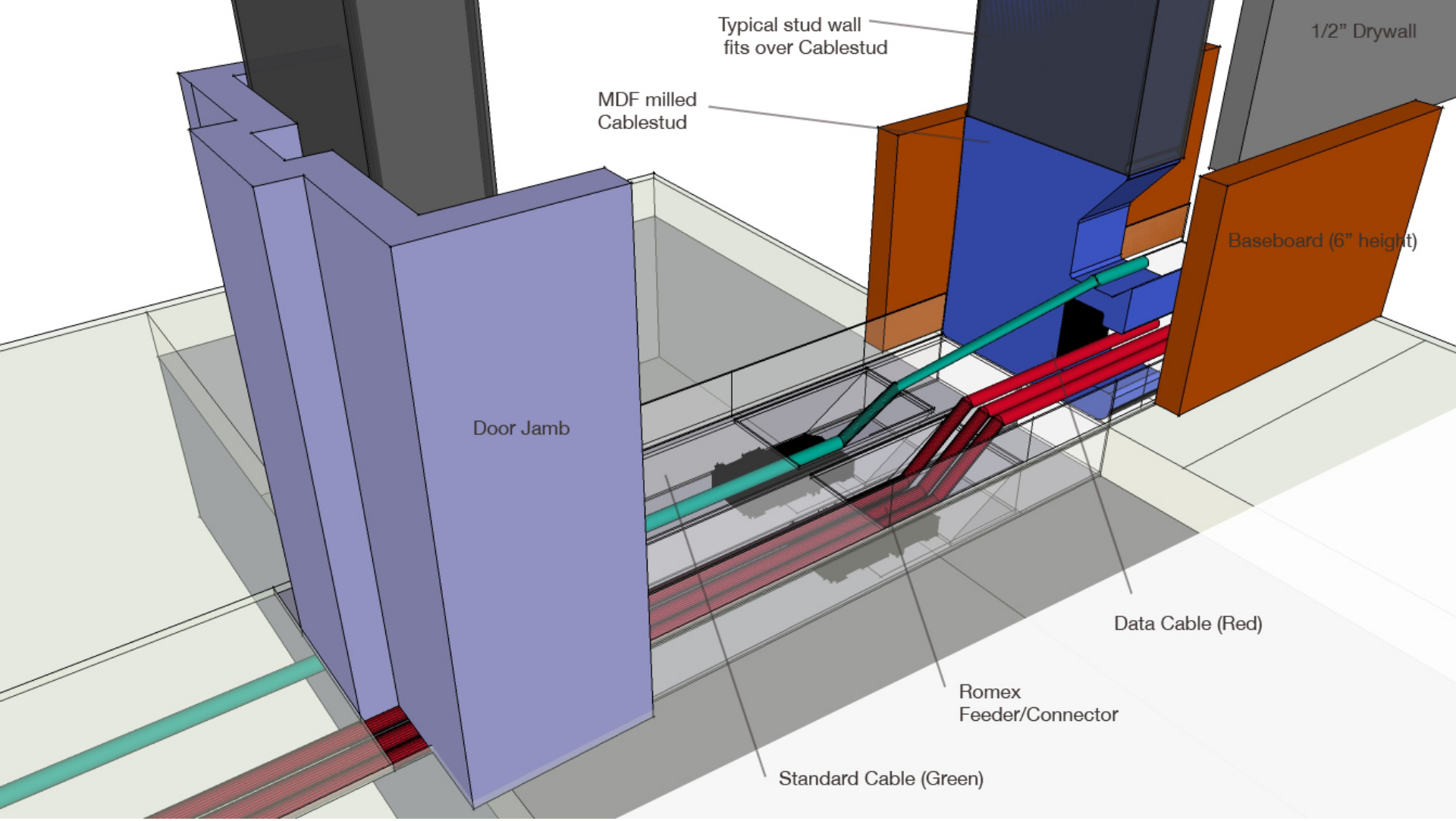
Typical stud wall
fits over Cablestud
1/2" Drywall
MDF milled
Cablestud
Baseboard (6" height)
Door Jamb
Data Cable (Red)
Romex
Feeder/Connector
Standard Cable (Green)

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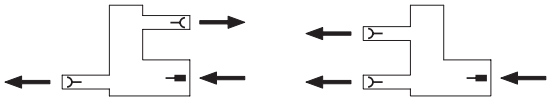
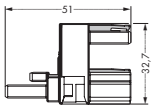
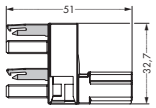
h-distribution connectors, 3 poles

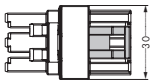
250 V/4 kV/3 25 A	250 V/4 kV/3 25 A
CCA	CCA

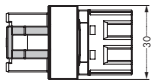
Color	Item no.	Pack. unit	Color	Item no.	Pack. unit
h-distribution connector, bi-directional, plug - socket / socket			**h-distribution connector, unidirectional, plug / socket - socket**		
black	**770-633** ●	50	black	**770-634** ●	50
white	**770-683** ○	50	white	**770-684** ○	50
			red *	**770-934** ●	50
for "flying leads", with 3. locking lever			for "flying leads", with 3. locking lever		
black	**770-635** ●	50	black	**770-636** ●	50
white	**770-685** ○	50	white	**770-686** ○	50
			red *	**770-936** ●	50
			* red available IV. quarter 2006		
black	**770-623**	25	black	**770-623**	25
white	**770-673**	25	white	**770-673**	25
black	**770-201**	100	black	**770-201**	100
white	**770-221**	100	white	**770-221**	100

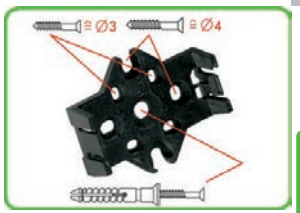






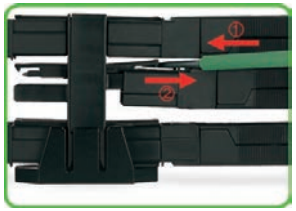






The mounting plates for distribution connector can be mounted using commercially available screws or nail-drive anchors.

The distribution connectors are latched when mounted on the mounting plate.



All distributor connections are locked and protected against accidental disconnection directly after mating.
Locking of any connection is released using a screwdriver, even if all connections are in use.

To release the distribution connector, unlock the latch using a screwdriver.

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Hep$_V$O is a unique hygienic self sealing waste valve that prevents the escape of foul sewer air from waste discharge systems

- Hep$_V$O actively maintains pressure equilibrium in soil and waste systems
- It opens under the water pressure of an appliance emptying and closed to form a tight seal after discharging under normal atmospheric conditions
- It performs the same function as a traditional water seal trap but unlike a trap it continues to
  - provide a reliable seal under all conditions
  - is not affected by evaporation, syphonage
  - or freezing conditions

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caroma®

Sydney Smart Dual Flush Back Outlet Closet Bowl.

Vitreous China 1.28/0.8 gal (4.8/3 ltr) Dual Flush High Efficiency (HET), Two Piece Washdown Toilet.

PLUMBERS INSTALLATION INSTRUCTIONS
PLEASE READ CAREFULLY BEFORE INSTALLATION

IMPORTANT:
Wax rings must not be used when installing this toilet bowl, as detailed in **Fig. 2**. A universal foam gasket for wall-mounted toilets is recommended.

Working Water Pressure:
USA & Canada: Recommended working water pressure is 20-80psi (140-550Kpa).

Closet Bowl Fixing Procedure:

1- It is essential for the installation of the Sydney Smart back outlet two piece washdown toilet that the closet flange be accurately set out on the finished wall as detailed in **Fig. 3**.

2- Position 'T' bolts and foam ring onto closet flange, as detailed in **Fig. 4**.

3- Position rear outlet adaptor onto 'T' bolts and secure onto foam ring with nuts as detailed in **Fig. 5**.

4- Apply soap solution to the rear outlet adaptor rubber seal. Slide bowl into position, mark bowl fixing hole positions, remove the bowl and drill holes.

5- Ensure that the area around the closet bowl is clean and free from building material.

6- Slide the closet bowl in the rear outlet adaptor and secure closet bowl with suitable fasteners. (fixing not supplied), available separately.

7- It is recommended that a bead of acetic cured silicone caulking is applied fully around base of the closet bowl.

8- Remove any excess silicone caulking.

Tank Fixing Procedure:

1- Ensure the foam seal is fitted onto the tail piece on the underside of the tank as detailed in **Fig. 6**.

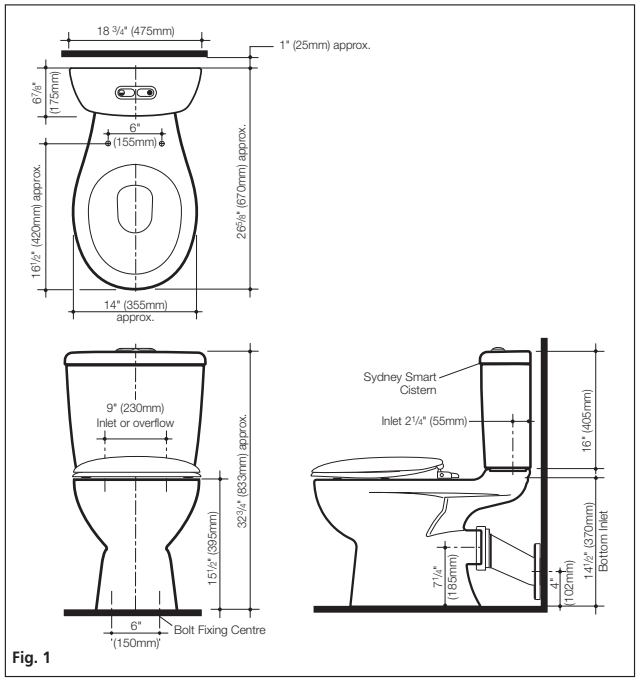

Fig. 1

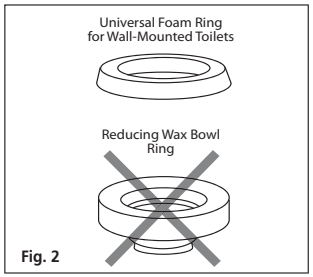

Fig. 2

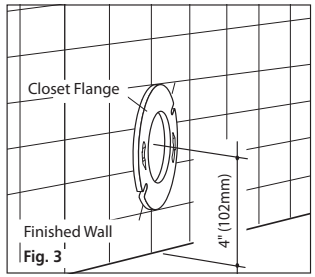

Fig. 3

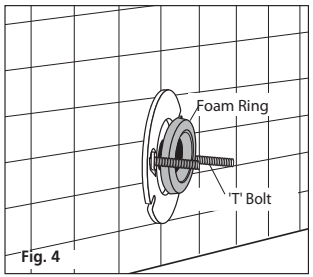

Fig. 4

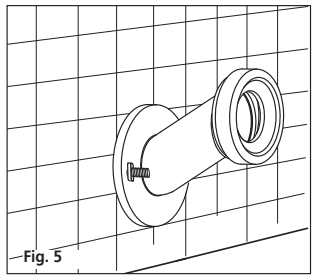
Fig. 5

(N) Non standard item. (Canada)

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NEXT PHASES

Complete CODE and MARKET ANALYSIS

Launch CableStud and the Matrix-Tile system in the market

Put KIT_FIT as a complete design/build service into the market.

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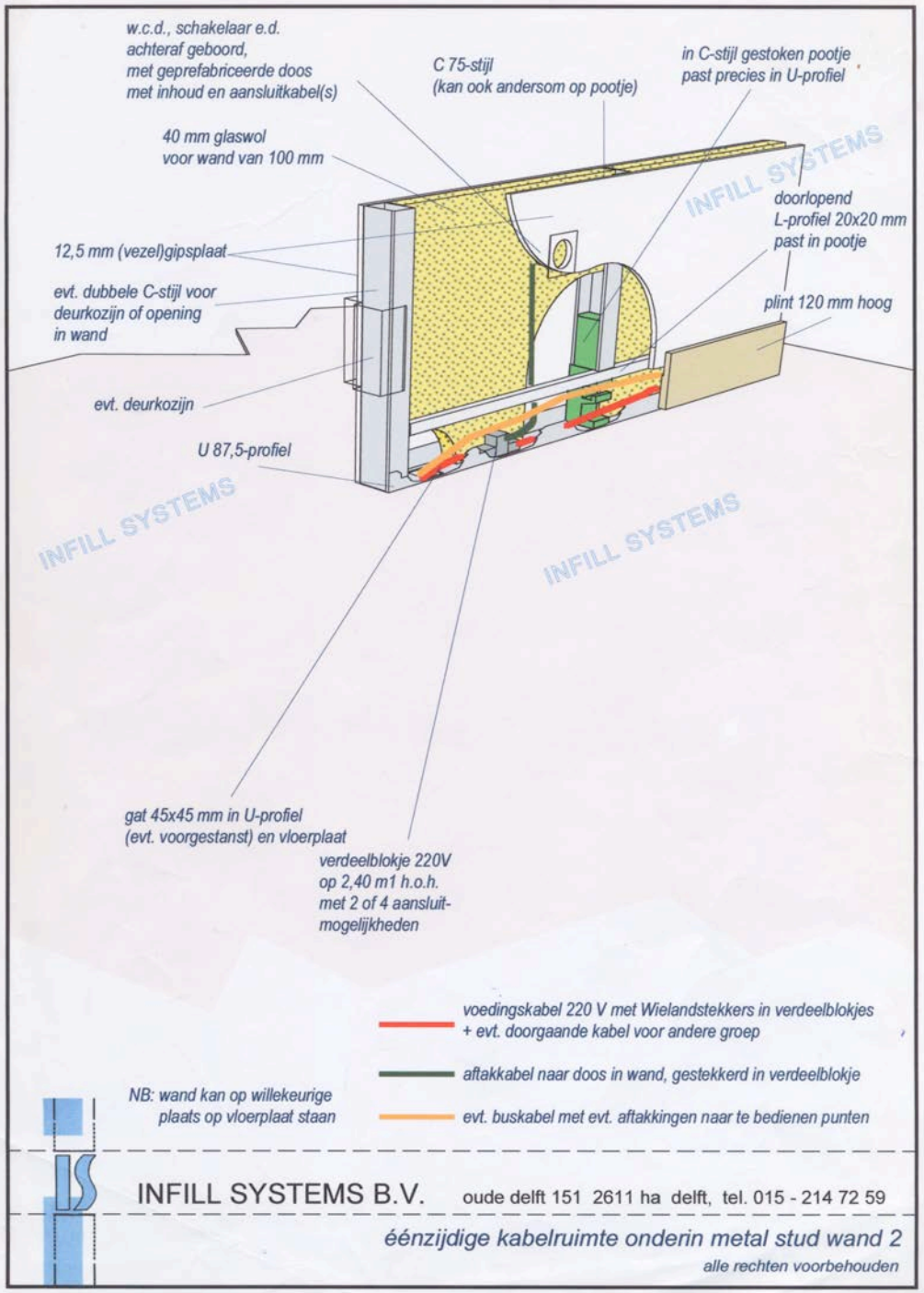
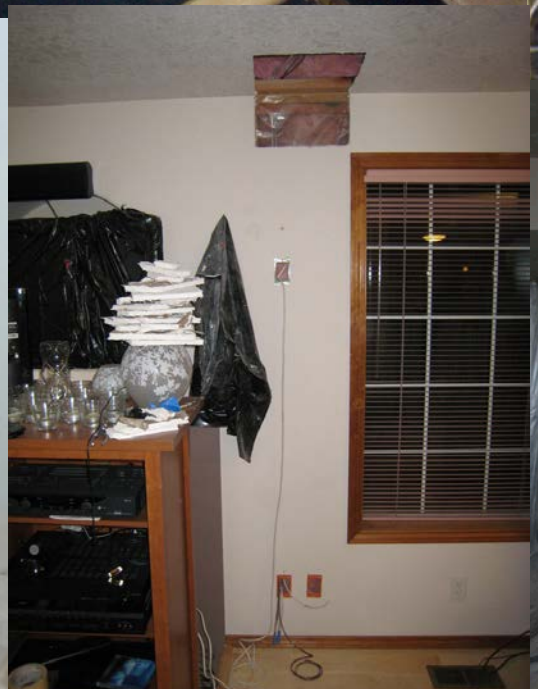
MORE INFORMATION ABOUT

CableStud

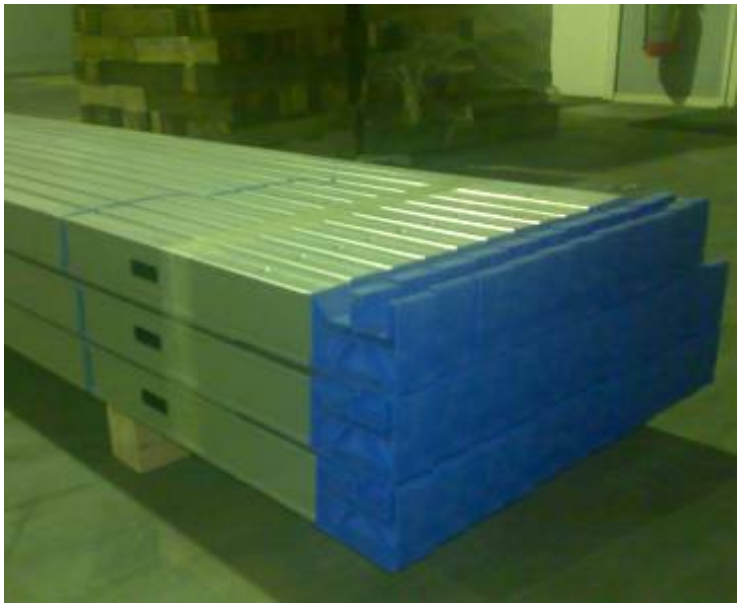
This product creates flexibility within a non-loadbearing metal stud (or wood stud) wall - within demised spaces - for solution of electrical/low-voltge installations.

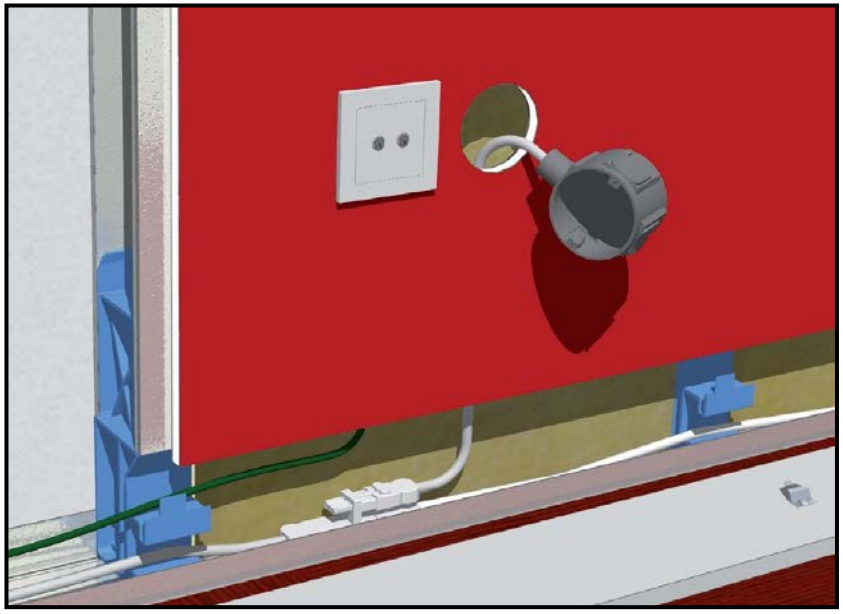


Solving Wire Management problems



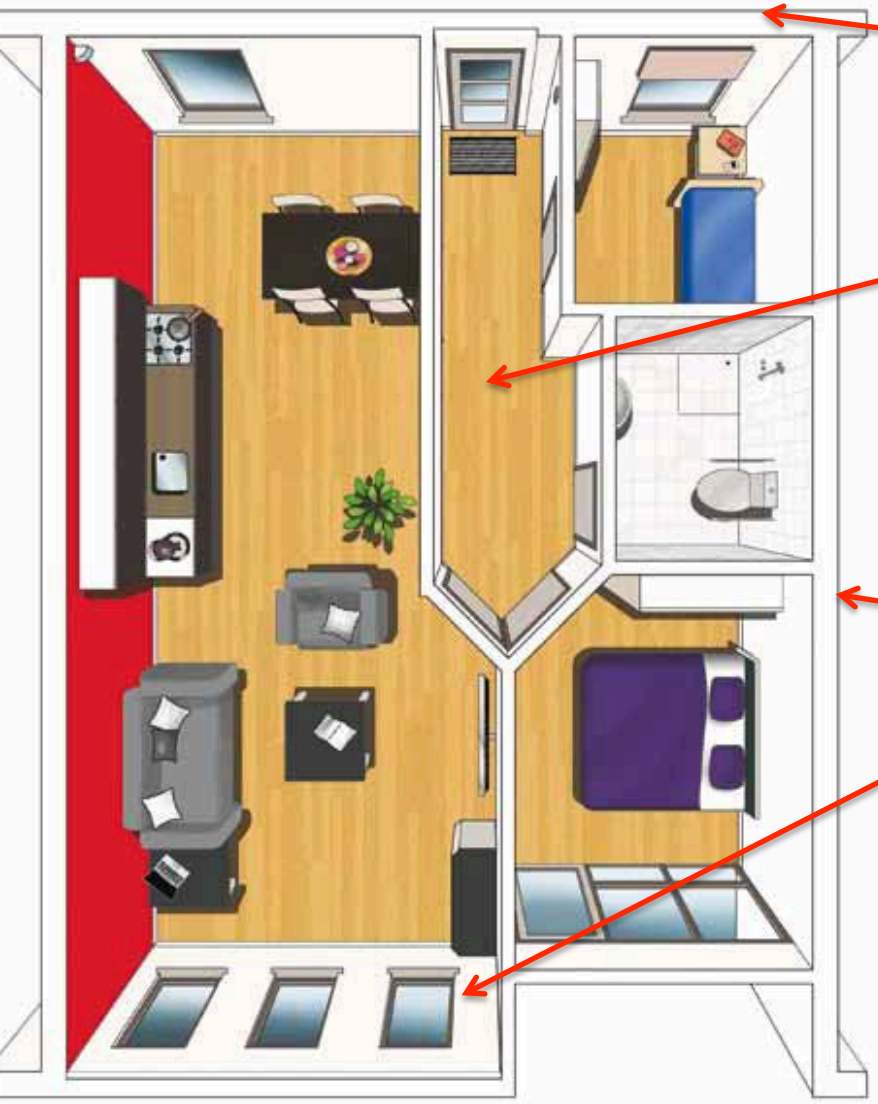
VALUE PROPOSITION

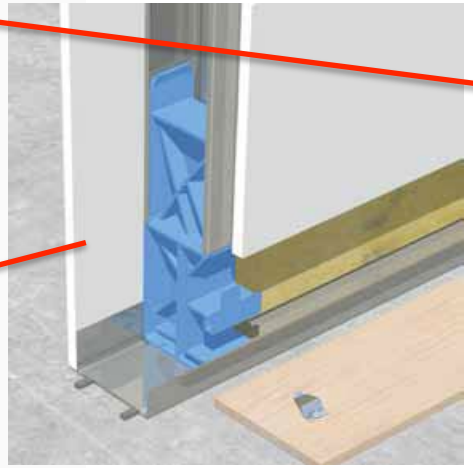




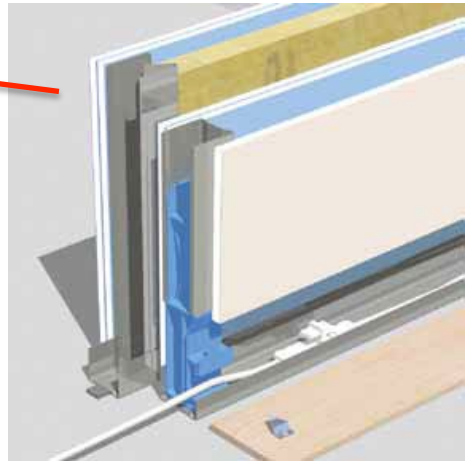
CableStud can be delivered by a supplier already inserted in the studs, or inserted on-site.

The electrical installation is done in one operation after drywall is installed, avoiding multiple visits by the electrician.

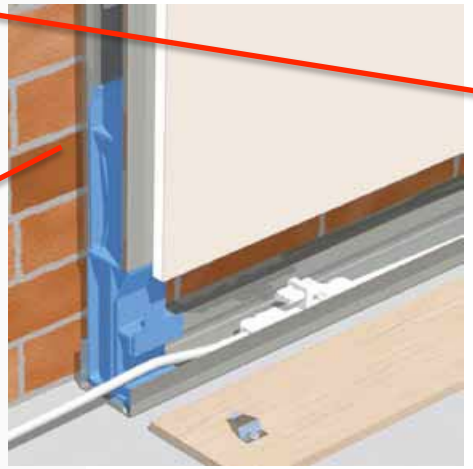




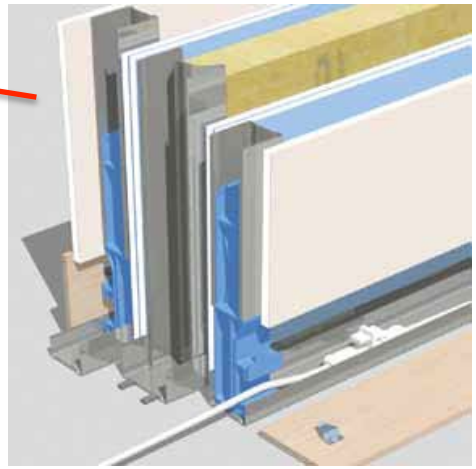
Typical partition wall



Liner wall against fire rated corridor wall



Liner wall against exterior wall



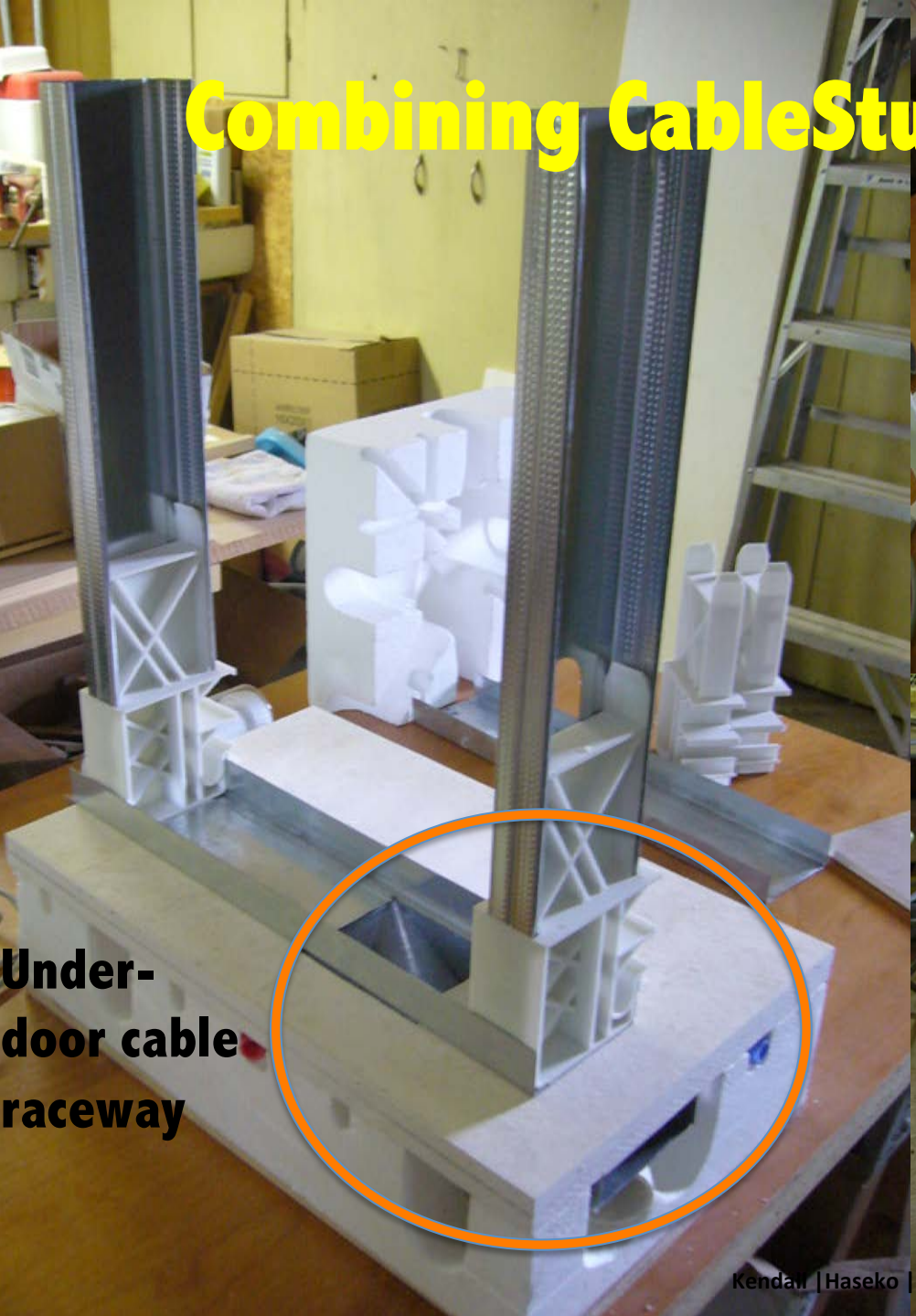
Liner walls on both sides of a unit separation wall

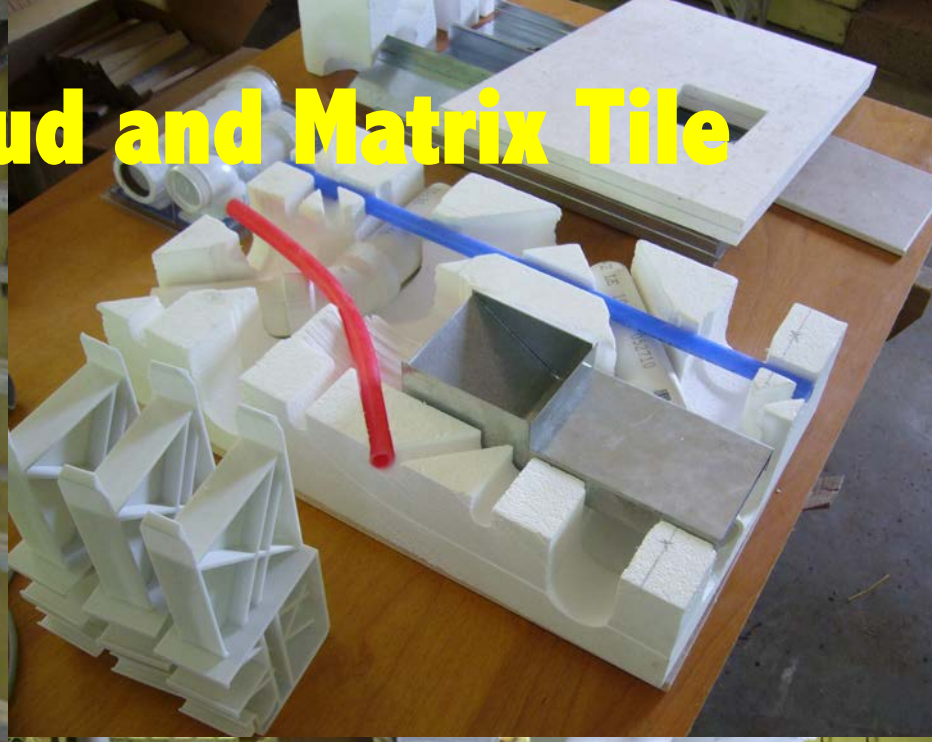
CABLESTUD wall types to meet all conditions

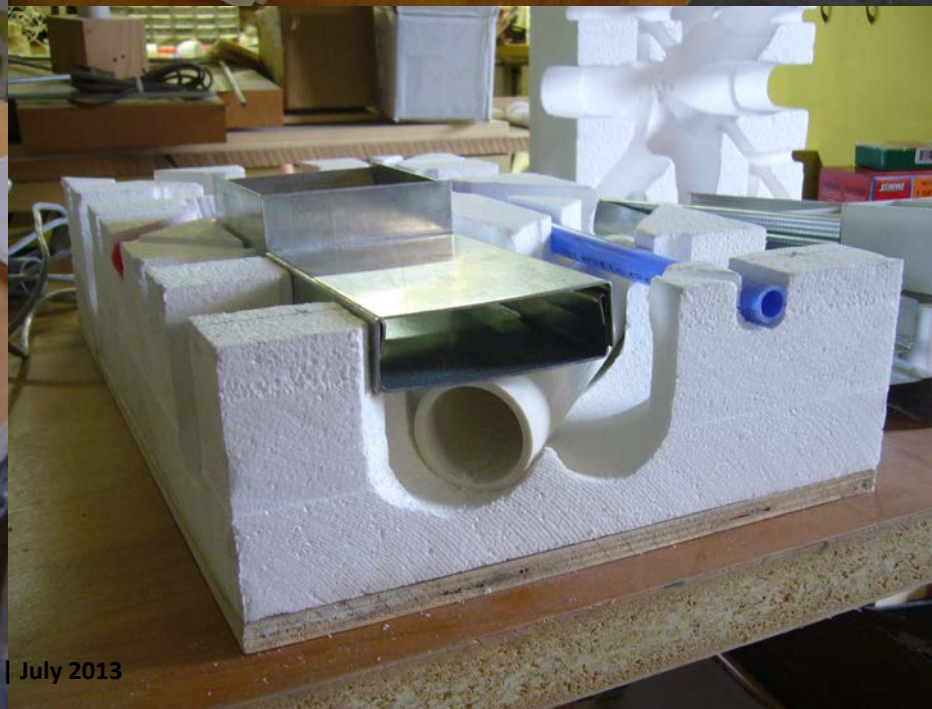
CABLESTUD Installation

Kendall |Haseko | July 2013

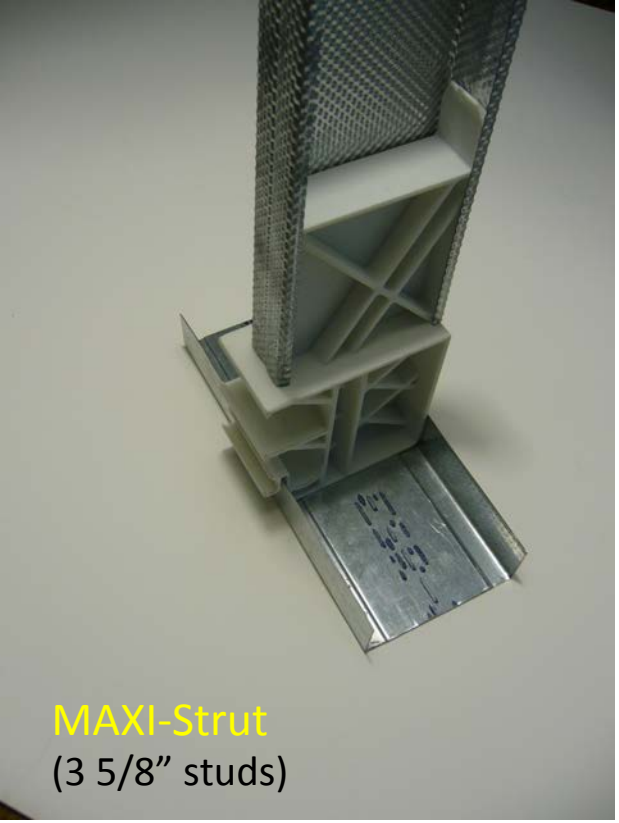
Combining CableStud and Matrix Tile



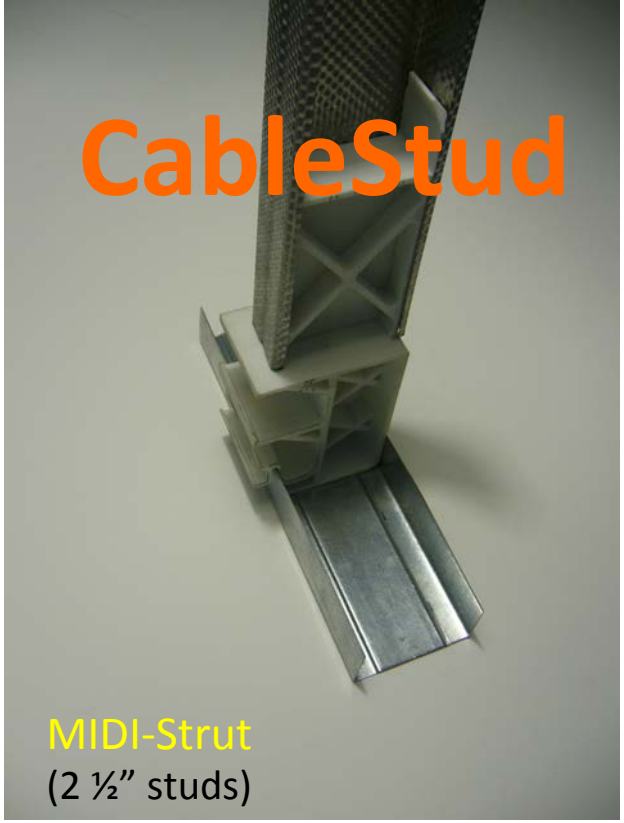




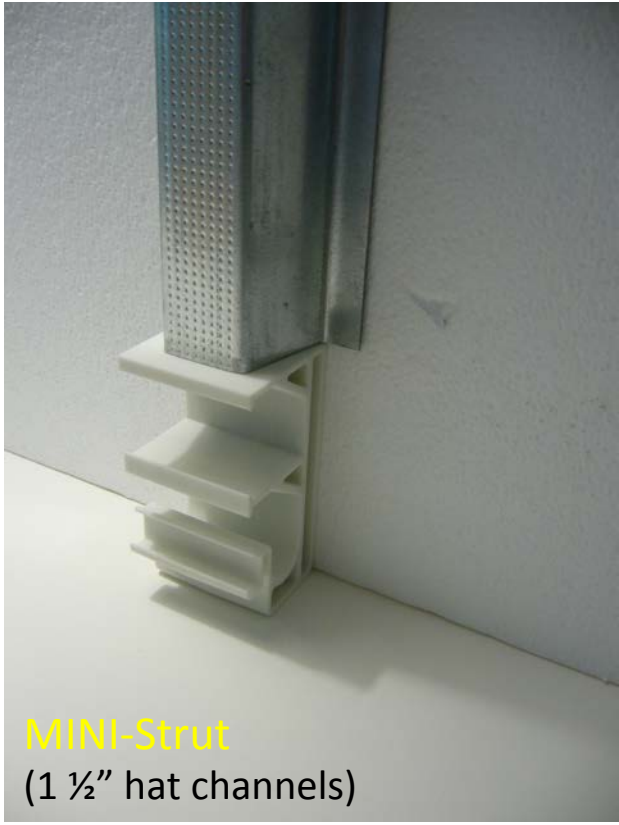
CableStud



MAXI-Strut
(3 5/8” studs)



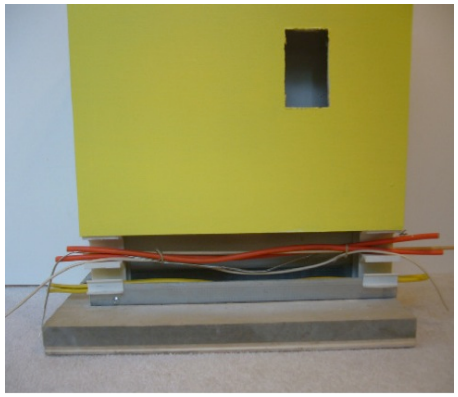
MIDI-Strut
(2 ½” studs)



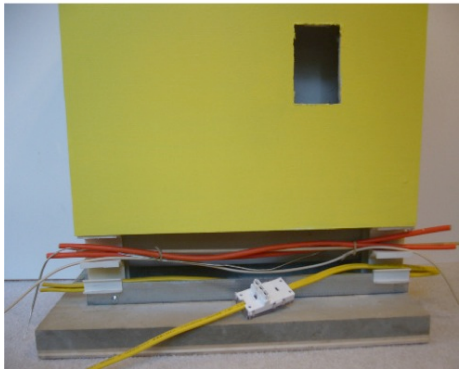
MINI-Strut
(1 ½” hat channels)

MICRO-Strut
(useful in wood-frame construction and with 7/8” hat channels)

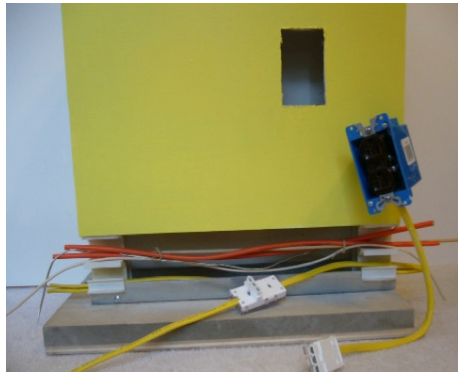
Wood base clip



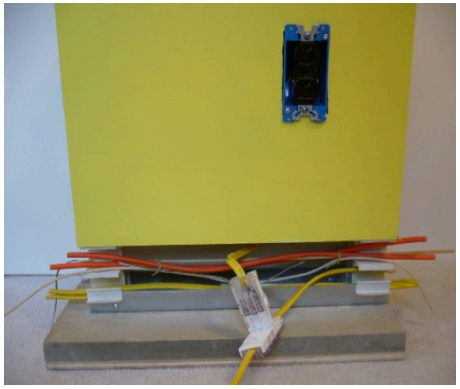
Step 1: remove baseboard; cut a hole in the drywall for the new device in desired position



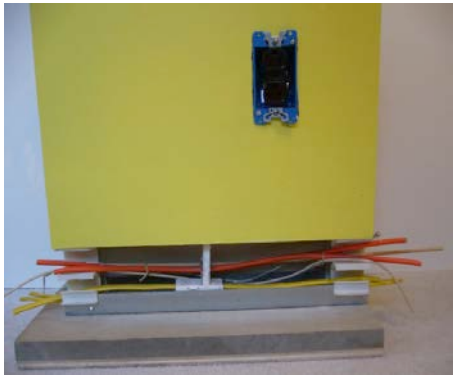
Step 2: select wire you want to tap into; install MOLEX self-contained power connector



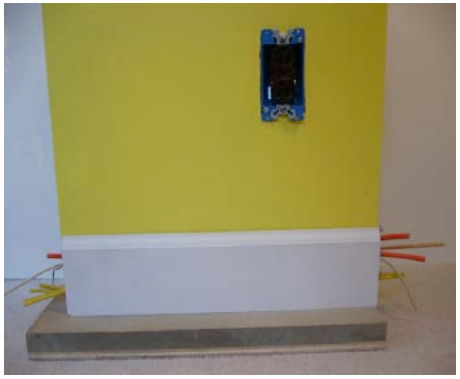
Step 3: wire a "rework" box with NM cable and attach a MOLEX "tap" to the other end



Step 4: insert junction box and drop cable into space behind the baseboard and snap into the Molex connector



Step 5: push cable back into the space made available by the CableStud



Step 5: reinstall the baseboard, and install the device in the junction box

CABLESTUD WIRING PROCESS

Electrical/Data Installations

- Sockets and switches for power and data
- Wall mounted light fixtures
- Thermostats
- Alarms
- Tele-medicine

CableStud is an "open" system, accommodating several wiring and devise systems (including Romex and MC cables), to meet varying code situations and customer preferences.

Primary Advantages

- **Flexibility in the building process:**
  - Quick adaptations are possible during the building process.
  - End-users can select socket and switch locations just before final installation.
  - Less coordination is needed: electrical installer will be on site less frequently (simplified building process).
  - Cables and outlets can be installed after gypsum board is installed.

- **Flexibility in use of the space:**
  - Allows for quick (and much less expensive) adaptation to new requirements.
  - Adaptation without ripping open the wall and destroying finishes.
  - No visible cables.
  - Usable for both data and electrical cables.

Sales and Pricing

- Sale of 100,000 units per year is expected in the Netherlands (additional sales expected in Germany, France, Italy, etc). GYPROC has an exclusive license in the European Community.
- An average apartment will use approximately 125 Cablestuds, adding perhaps $600 (materials + labor).

JUSTIFICATION OF EXTRA COST:

- Use of Cablestud reduces electrician costs by up to 50% during initial installation (electrician comes to the site once).
- Use of Cablestud significantly reduces later electrician costs when changes are made (average cost of moving one outlet averages $125.00).

WHO BENEFITS

Developers/Project investors
Contractors/Installers
Inhabitants/Users

APPLICATIONS

New construction
Adaptive reuse of entire buildings
One-unit-at-a-time renovation projects

- **Residential projects (townhouse, multifamily)**
- **Nursing homes**
- **Office buildings**
- **Medical offices**
- **Commercial and retail tenant spaces**

Conclusions

- **CableStud is now ready to be introduced into the US market, after passing ASTM fire tests**

- **Matrix tile system is being examined for code compliance**

- **KIT_FIT as a complete design/build service can be implemented without code changes**