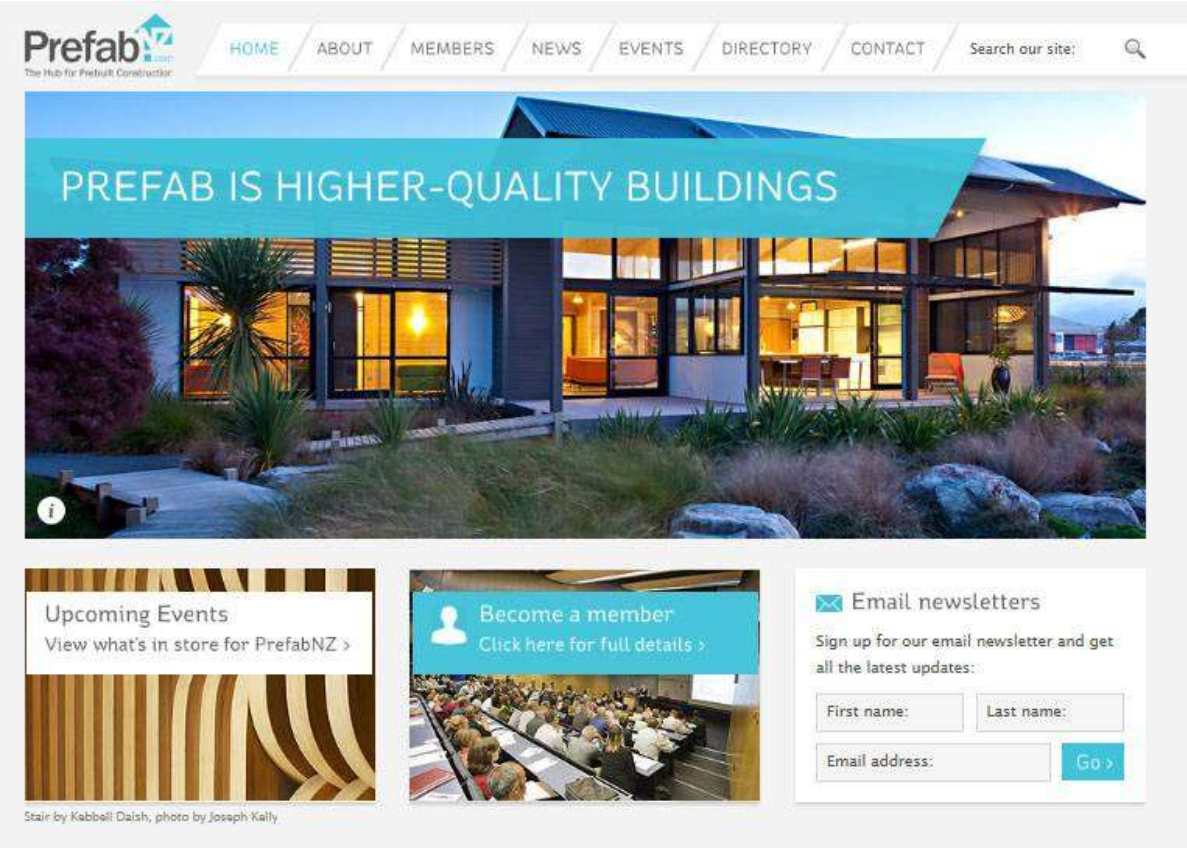
NZ Prefab :
prefabrication as a safer construction alternative

Construction Clients Group

Pamela Bell, PrefabNZ CEO, 29 August 2012

Who is PrefabNZ?



PrefabNZ is a front-door portal for prefab information and a catalyst for prefab collaboration

What does PrefabNZ do?

- Online Prefab Directory
- Prefab Toolkit
- Monthly Prefab Newsletter
- Prefab Education / Events
- Creating Prefab Marketing Opportunities
- Major Prefab Projects

Your Questions:

1. What is prefab?
2. What can we learn from the past?
3. What's going on in prefab today?
4. How is prefabrication safer?
5. Where to next?

What is prefab?

- **prefab /** prefabrication
  = construction off site = offsite = OSM

- prefab **complements** traditional methods

- prefab can be any material and any size
  = component, panel, module, hybrid, complete

What does prefab look like?





Component - Panel (2D) - Module (3D) - Hybrid - Complete Building

Why is prefab important?

*Prefab is **"a critical agent in invention** in architecture, formal and material research, and sustainability."*

MOMA, New York, 'Home Delivery' exhibition text 2008 (Bergdoll and Christensen).

What is great about prefab?

- **potential merits:**
  - increased quality (Q)
  - shorter time-frames (T)
  - cost-savings (C)
  - efficient resource use (S)

  = safe + sustainable

How sustainable is prefab?

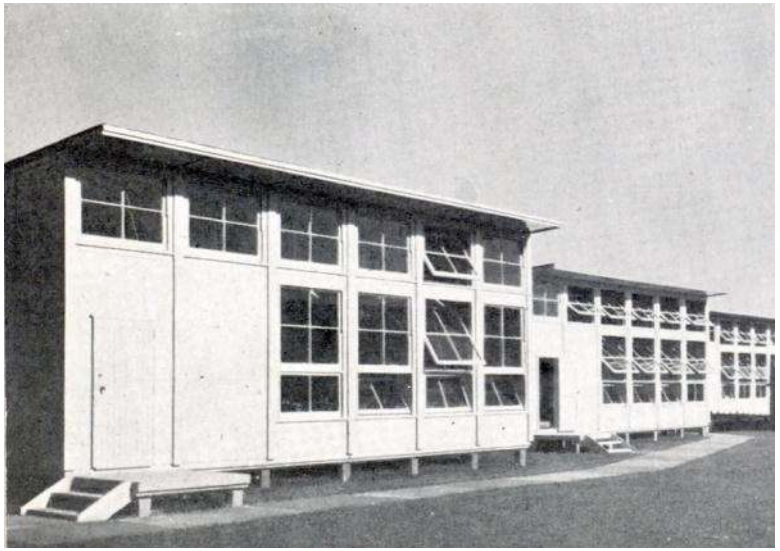
- **save material and energy resources:**
  - 90% waste can be reduced
  - 50% saving in construction energy use
  - easier capture and reuse of materials
  - efficient computer-controlled cutting
  - reduced defects
  - closer tolerances for better life-cycle thermal performance

- **reduced carbon footprint:**
  - less transport
  - smaller floor area
  - less energy use
  - and material choices

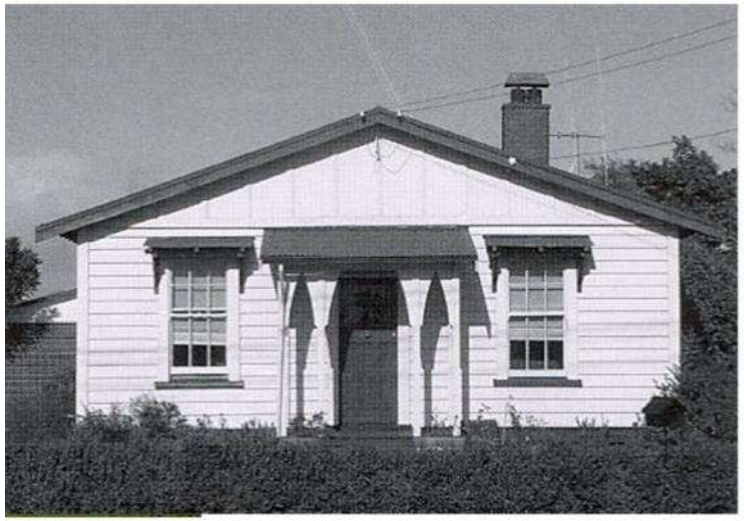
- **social sustainable benefits:**
  - less noise, pollution, scaffolding and traffic at site
  - reduce habitat disturbance at site
  - safe, healthy, controlled indoor environment
  - correct use of materials (save 18%)
  - protect materials from wet weather
  - designs for flexibility and disassembly

What is tricky about prefab?

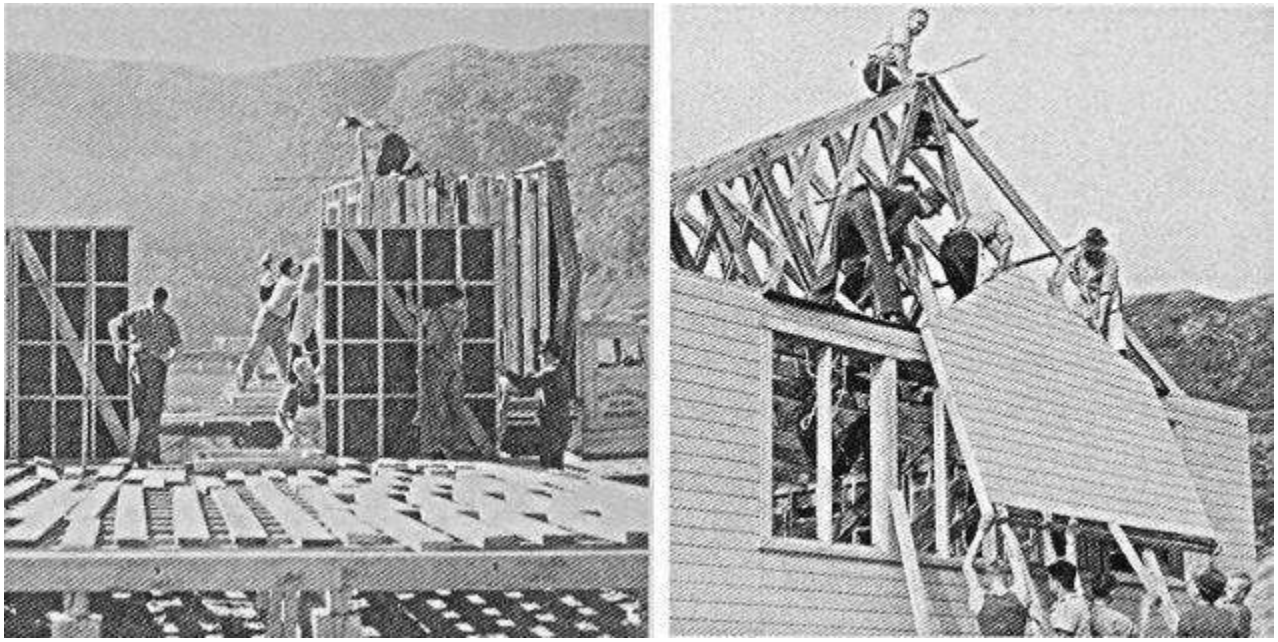
- **potential challenges:**
  - misperceptions
  - individual site context
  - transport box restrictions
  - limited market size
  - start-up costs



Prefab through the ages:

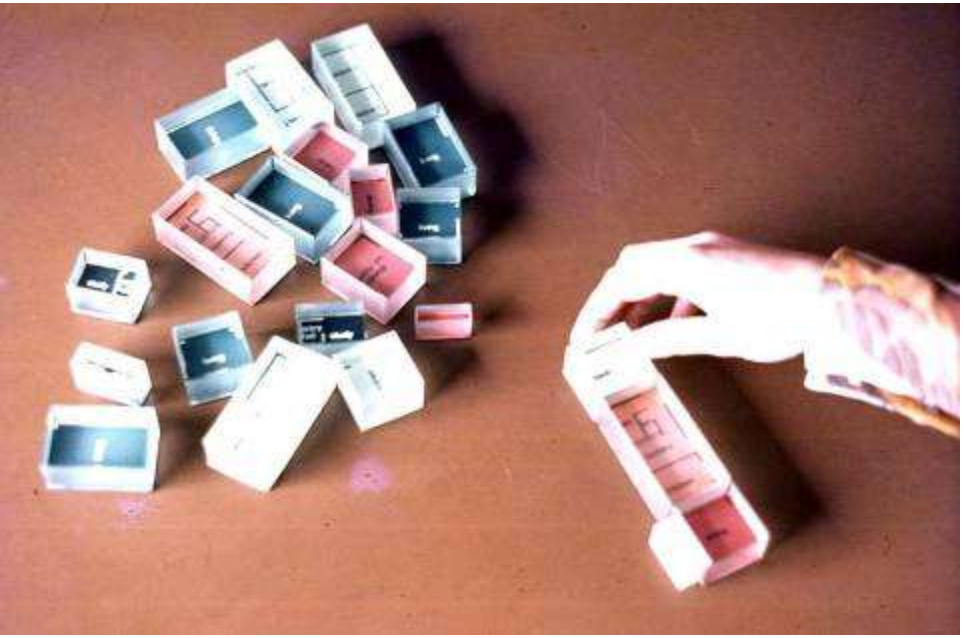


Railway Houses 1920s : 1,600 houses over a 6 year period
Frankton factory to service North Island
Traditional build in South Island



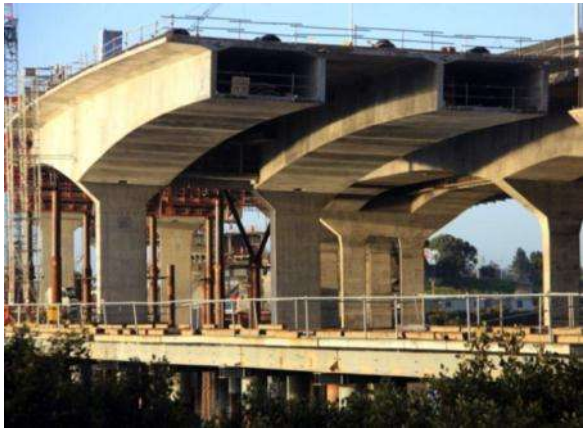
Post WWII State House panel program 1940s-50s
Trained carpenters leading gangs of ex-servicemen

Hydro-scheme housing 1960s-70s:
De Geest Construction made 900 houses from workshops in Oamaru and Cromwell



Industrialised Building Systems 1970s:
Bold forecasts of 1,200 houses per year from four proposed facilities

Prefab today = S, M, L, XL:



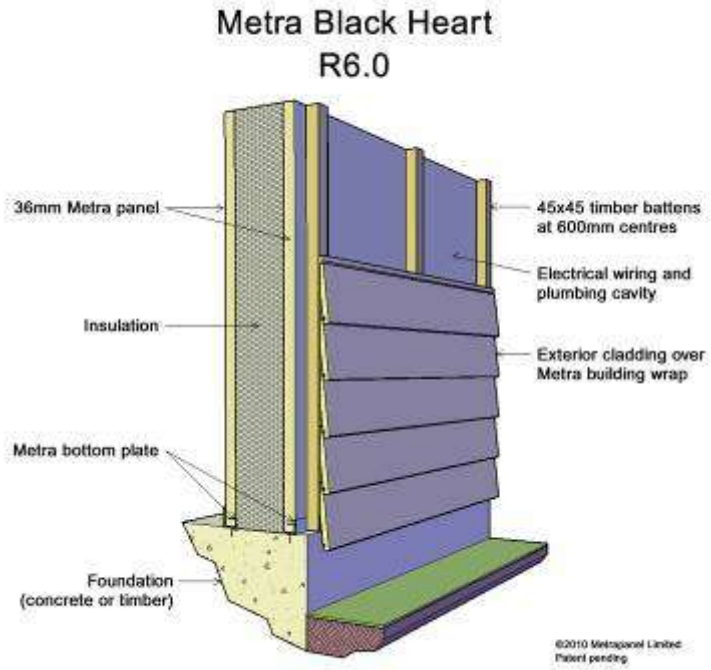
Prefab today = cross-disciplinary:

First Light team, Victoria University of Wellington + industry
US Department of Energy Solar Decathlon – 3rd Overall 2011

Lifemark

homestar

Phillip Leather Builders + Metrapanel in Huntly
Four to Hawkes Bay, 6 on site (4 by inmates)



Irving Smith Jack, WR Jacks and Xlam
First CLT panels in the Southern Hemisphere

NZIA 2011 National Winner: Architex

NZIA 2011 Local Winner: SGA + Studio 19

Future Proofing Schools (Victoria, Australia) Sustainable Environment Winner: CMA+U

USA: green modern prefab

UK: brick n-tile prefab

Australia: Sekisui Japan

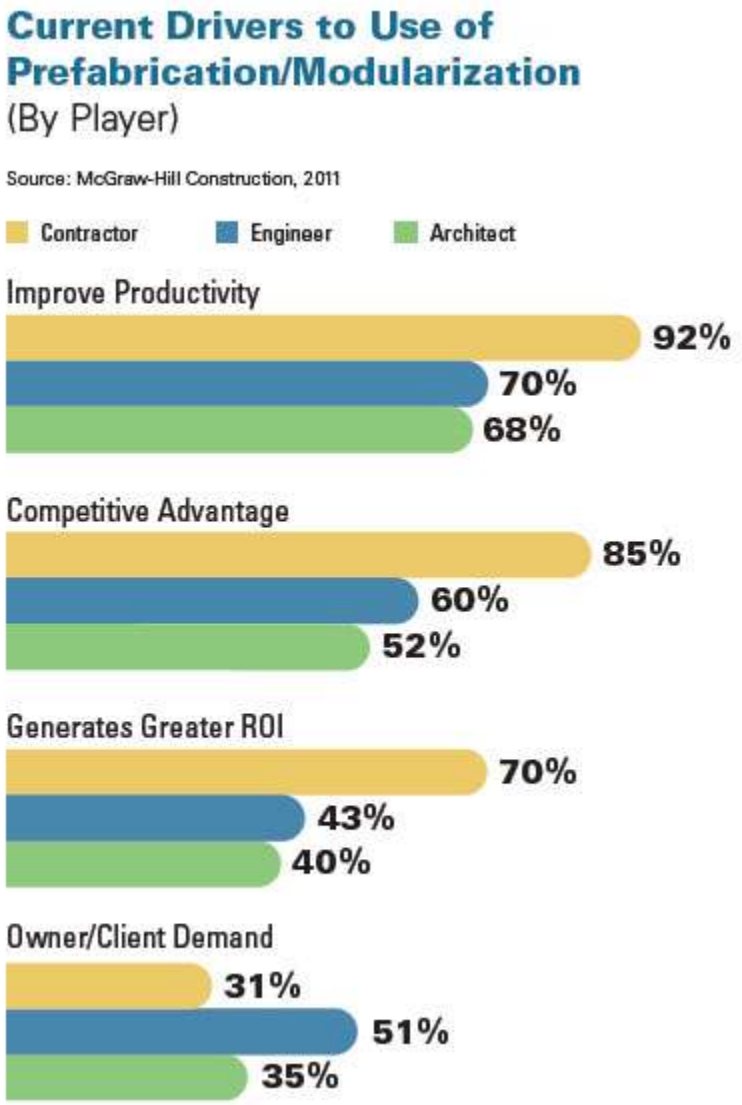
UK: multi-storey timber

China: Broad builds T300 30-storey hotel in 360 hours (15 days) ***– NO ACCIDENTS***
See it to believe it: http://www.youtube.com/watch?v=Hdpf-MQM9vY

Current context:

"Prefabrication and Modularisation: Increasing Productivity in the Construction Industry" (McGraw Hill Smart Market Report 2011)

- *Architects, engineers and contractors believe the primary drivers to future prefab usage are improvements in project quality schedule, cost and **safety***
- *34% respondents believe **prefab can improve site safety***
- *Increase construction site safety - resulting in fewer accidents and **lower insurance costs***



"Reduced Construction Risks"
(Module Co, UK)

- *In the UK, 2.2 million workers + 2,800 people have died in last 25 years*

- *Offsite manufacture occurs in **a controlled factory environment***
- *Multiple storey facilities are constructed at ground level*
- *Safety measure can be strictly imposed and easy to monitor*
- *The factory uses a local workforce which are accustomed to the tasks they are performing*

- *At site, fewer contractors, deliveries, construction area and overall disruption **reduce health and safety risks (**as little as 20% time on site)*




"Advancing the Competitiveness and Efficiency of the US Construction Industry" (NRC / NIST)

Greater use of prefab, preassembly, modular and offsite fabrication:

- *Greater use of automated equipment for large object placement*
- *Greater use of IT (eg. radio-frequency ID tags, mobile digital devices)*
- *Process improvements (eg. prefabrication)*
- *Result in **improved job-site safety**, lower waste and better quality*
- *Primary barrier is the traditional linear segmentation and sequencing of design and construction processes*
- *Need a skilled labour force with communication, collaboration and management skills*

"Construction Users Roundtable"
(NRC / NIST 2007)

Increased workers safety through:

- ***Reduced exposure*** *to inclement weather, extremes or hazardous operations*
- ***Better working conditions*** *– components traditionally constructed at height or in confined spaces can be fabricated offsite and hoisted into place using cranes*
- ***More controlled conditions*** *(indoors, labour supervision, tool security)*

"Safety Hazards to Workers in Modular Home Construction" (West Virginia University, US)

- *More frequent chainsaw use*
- *Riding on roofs without protection*
- *Risk of crushing while standing under modules / homes*

"London Olympic Safety Legacy" (Loughborough University, UK)

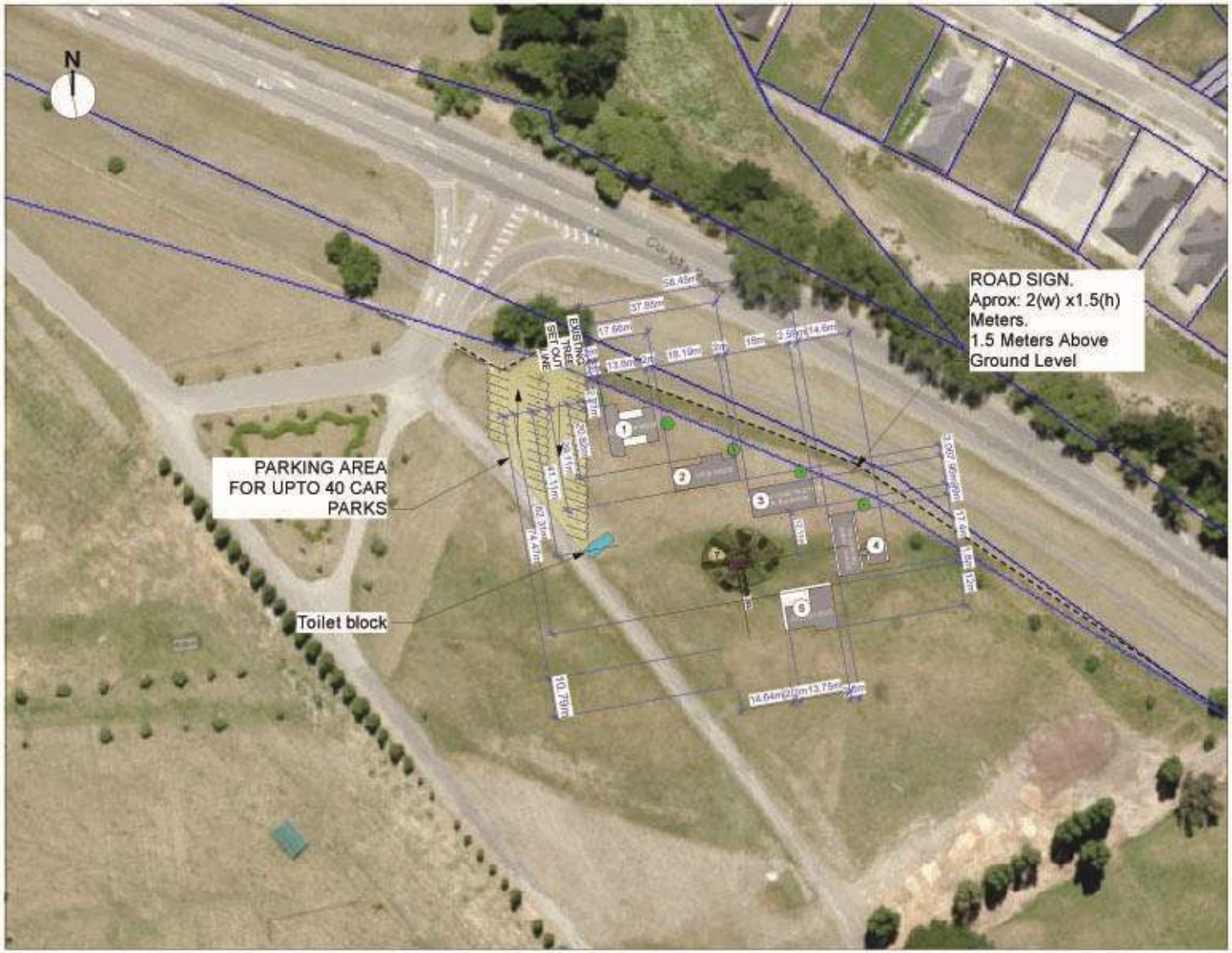
1. *Lead from the top*
2. *Develop competent supervisors*
3. *Foster an open, inclusive, positive safety culture*
4. *Reward good behaviour*
5. *Review and learn*

Where to next:

- High-quality
- Architect design
- Sustainable features
- Permanent materials
- Fast assembly
- Compliant engineering
- Affordable ($200-300k)

Creating a buzz at HIVE:

- HIVE Home Innovation Village
- Showcasing off-the-shelf housing options for displaced homeowners
- Impartial show-home village on Council land
- UK & European precedents for a ‘one-stop shop’
- Open April 2012 – February 2014



1 Show Home
KEITH HAY SHOWHOMES & ARCHITEX

2 Show Home
LOCKWOOD (Canterbury)

3 Show Home
FALCON CONSTRUCTION LTD

And ALLIED CONCRETE

4 Show Home
WILSON & HILL ARCHITECTS & LAINGS HOMES

5 **Habode IHSL**

7 SITE OFFICE
The Snug. Min 6M distance from all show homes

GENERAL NOTE
Refer to each individual show home drawing set for local access ramp into show home

T GENERAL NOTE
Protect all Trees.

FIRE SEPERATION
Maintain Minimum 1M clear of any built to show homes exterior walls.

SITE OFFICE: Maintain 6M clear of all other buildings

Site Set Out Plan
REVISION 3,
December 4th 2011

PrefabNZ

Housing Innovation Expo
(HIVE)

1 **SITE SET OUT PLAN**
Scale: 1:1000

HIVE Housing Teams:

Stage One (4 houses):
- Laing Homes / Wilson & Hill
- Keith Hay Homes / Architex
- Falcon Construction / Allied
- Lockwood Canterbury

Potential Stage Two (6 houses):
- Beacon Pathway / NZ Steel
- Bainbridge Homes / Module NZ
- Ekokit by Hybrid Homes
- Touchwood
- Force 10 NZ
- BART


LAING
HOMES
RELOCATING THE FUTURE


0800 KEITH HAY

Kiwi Prefab:
cottage to cutting edge

December 1st 2012 - March 31st 2013
Exhibition and Book with Victoria University, Puke Ariki, New Plymouth

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