ROBUST Project
Structural concept

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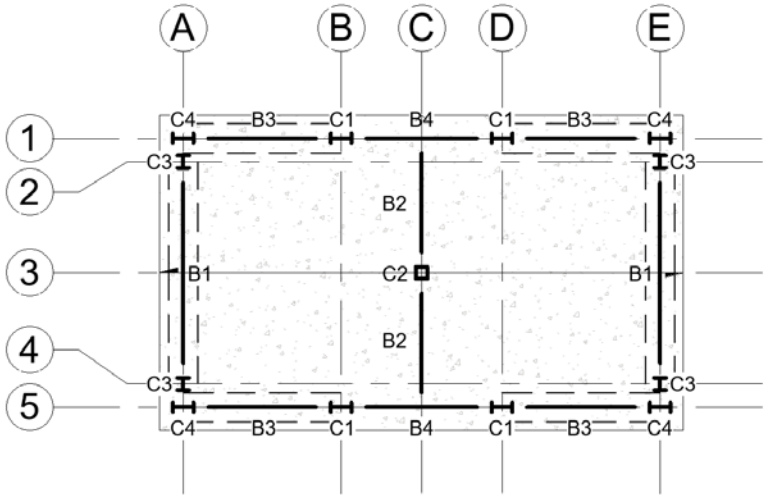
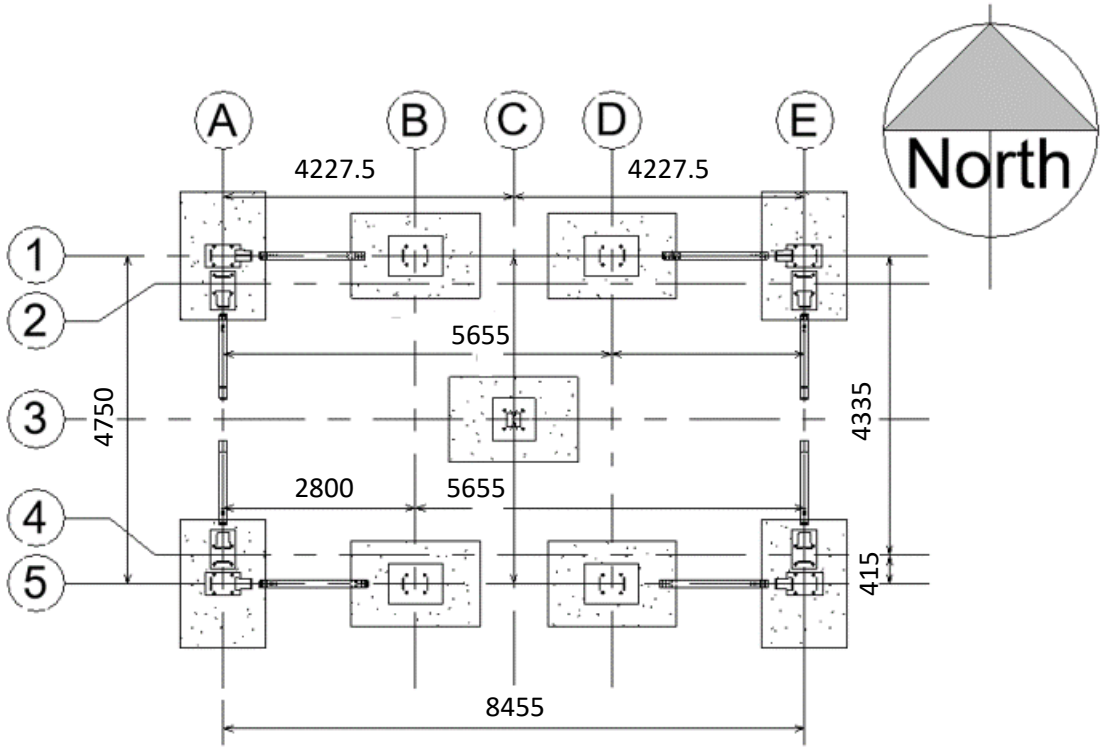
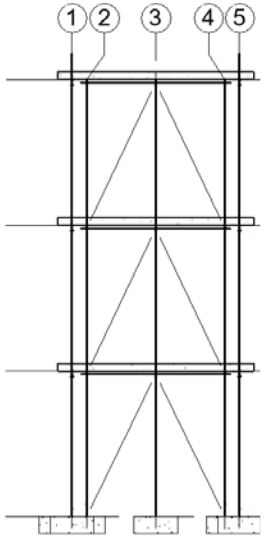
QuakeCoRE Steel-themed Meeting

24-May-2018

Layout of structure: 1 of 2



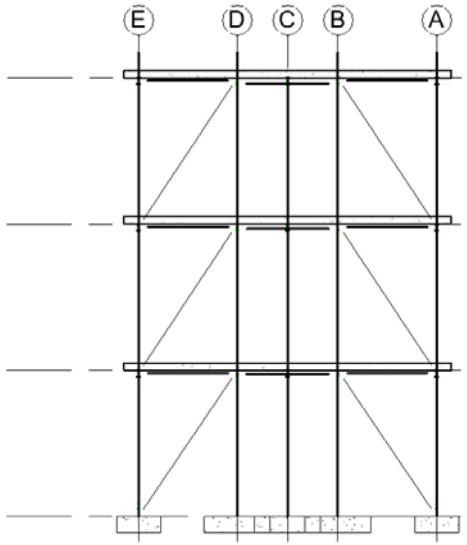




Level 3

Level 2

Level 1

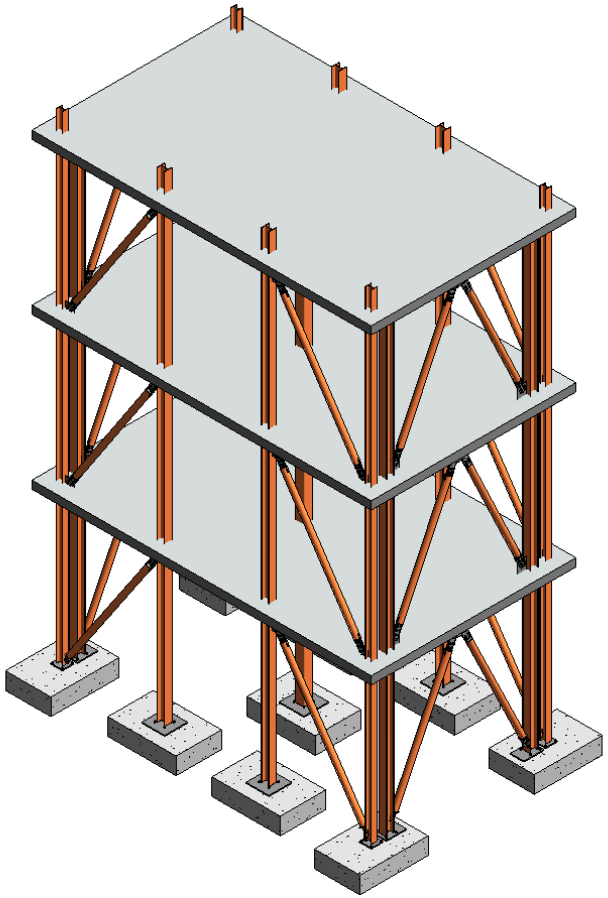


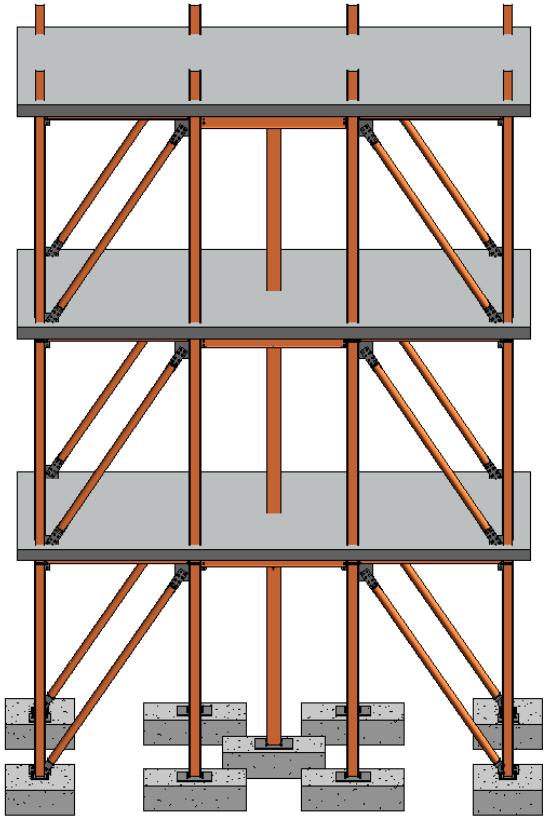
Level 3

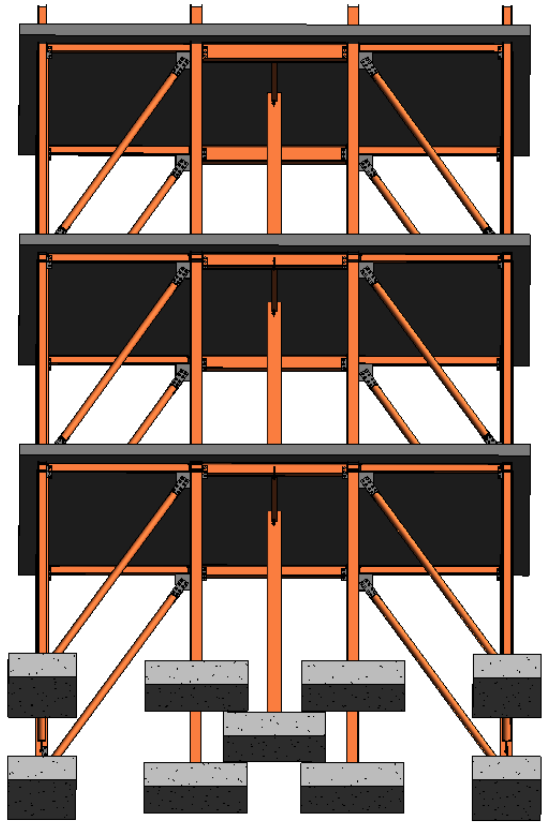
Level 2

Level 1

Layout of structure: 2 of 2







Structure Weight

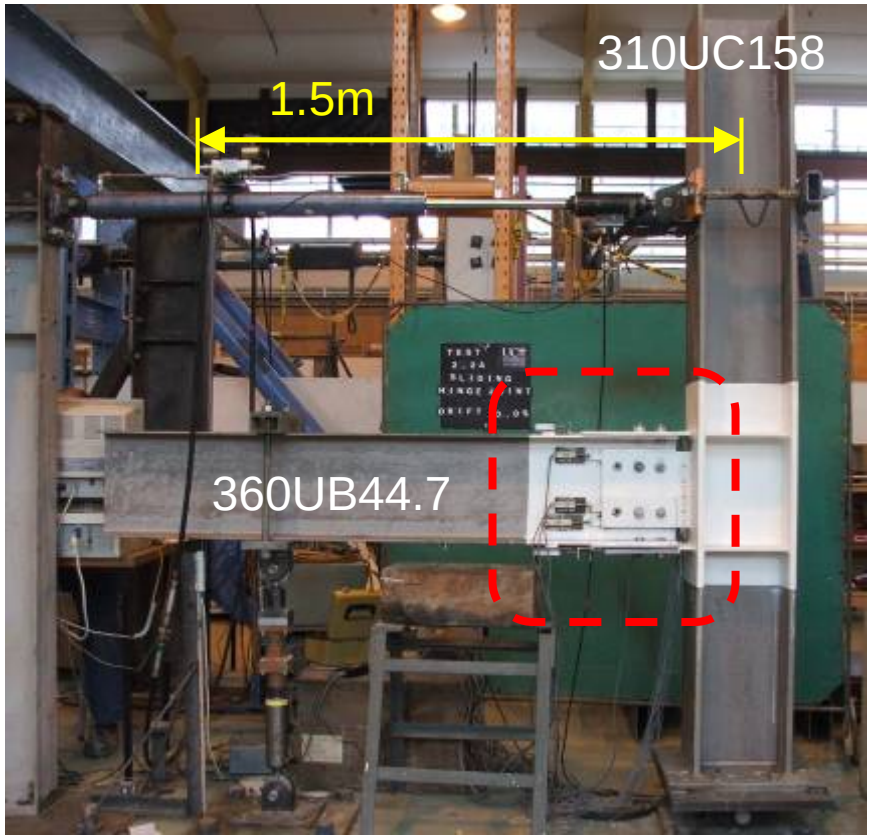
- Permanent action (PA): Self weight of column, beam, floor and non-structural element (NSE)
- Imposed action (IA): Extra slab (150 mm thick on level 1 and 2, 200 mm thick on level 3)
- Assumptions for NSE: 0.5 kPa

Level	PA (kN)				IA (kN)	Total (kN)
	Column	Beam	Floor	NSE		
1	35.54	14.26	107.42	17.5	124.5	299.22
2	35.54	11.96	107.42	17.5	124.5	296.92
3	21.87	7.54	107.42	17.5	166	320.33
Total	92.95	33.76	322.26	52.5	415	916.47

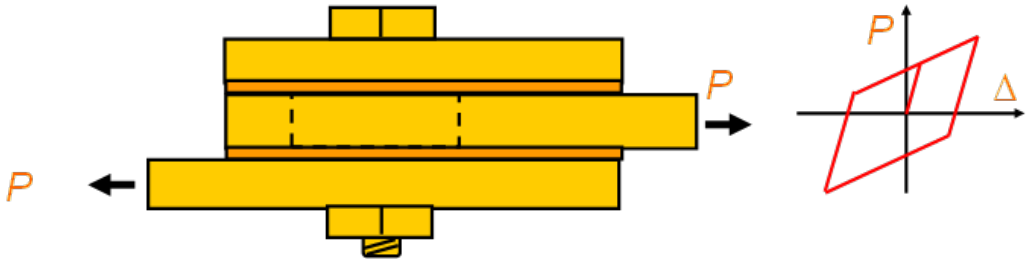
Design considerations

- Based on the design for Wellington Soil Class C, importance level IL2.
- The ductility factor $\mu=3$ and structural performance factor $S_p=0.7$
- Equivalent static method (ESM)
- Push-over analysis (to be undertaken in the near future)
- Numerical integration time history analysis (to be undertaken in the near future)

SHJAFC and RSFJ

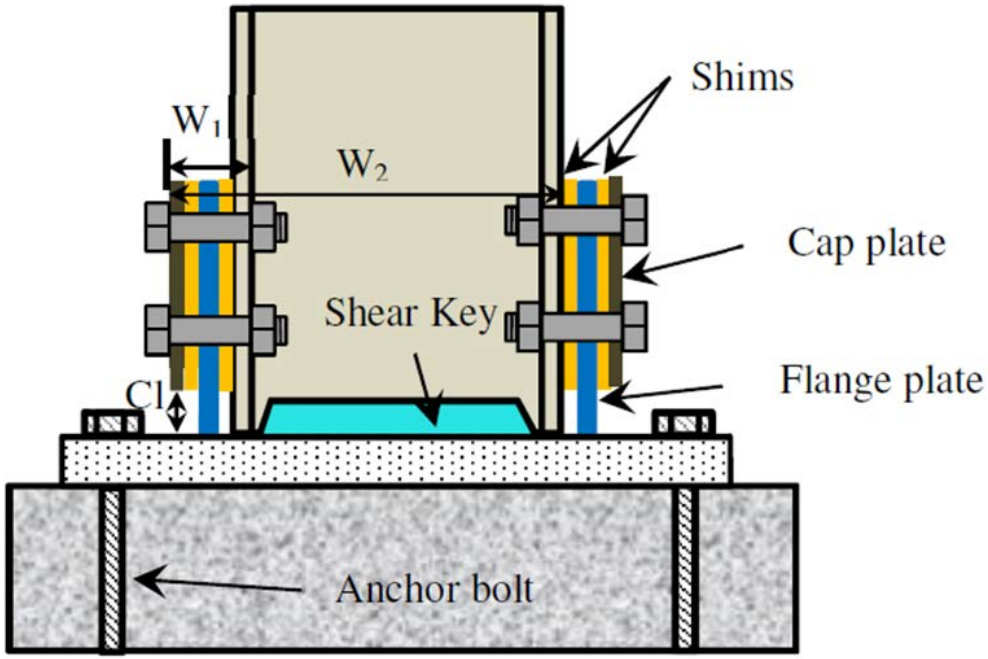


SHJ



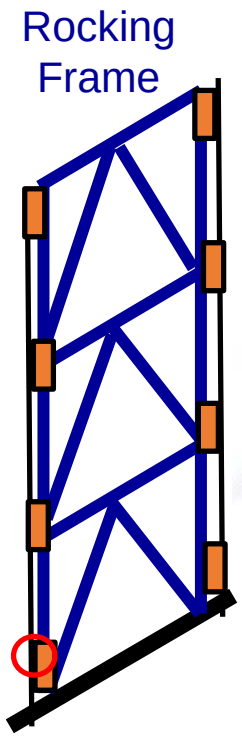
RSFJ

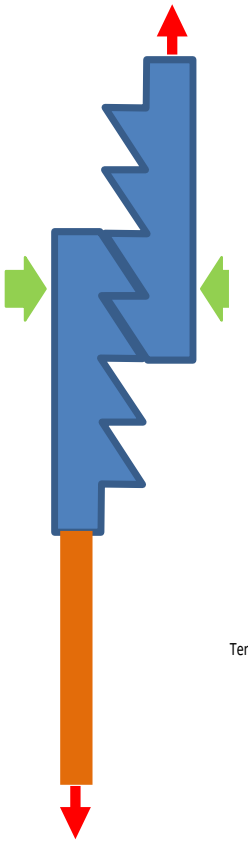
Column base

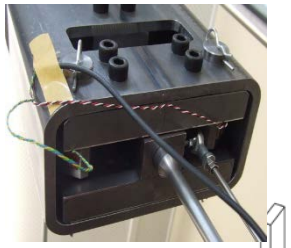


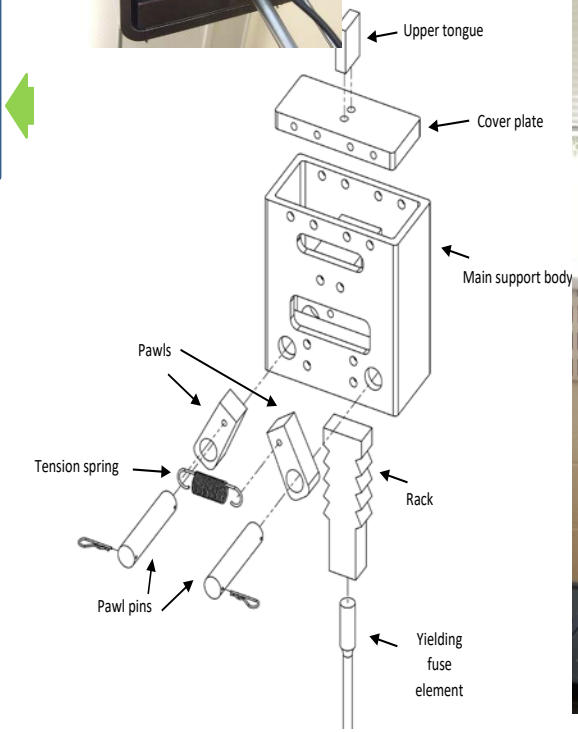
AFC column base

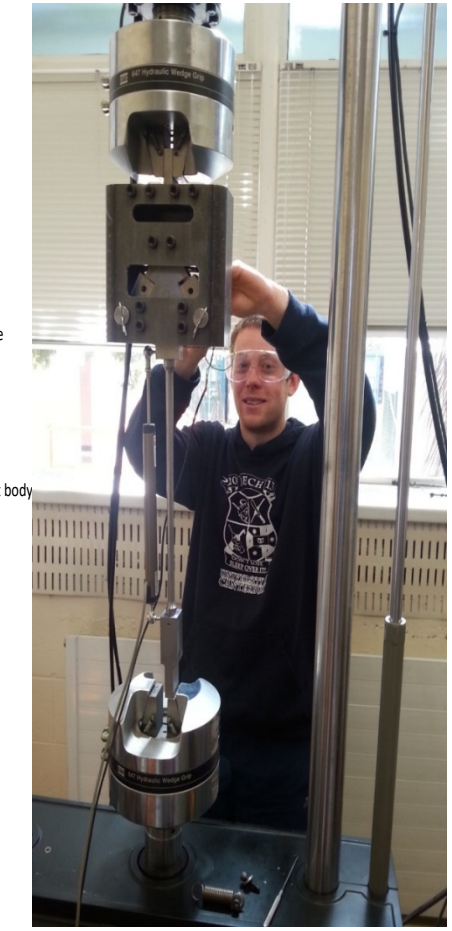
Grip N Grab


Rocking
Frame






Upper tongue
Cover plate
Main support body
Pawls
Tension spring
Rack
Pawl pins
Yielding
fuse
element



Test configuration 1 of 2

Testing configuration code	Options in longitudinal direction		Options in transverse direction	
	Super structure	Column base	Super structure	Column base
MM1	MRF-SHJAFC (middle bay)	AFC	MRF-SHJAFC	AFC
MB1			AFC braces (inverted V)	Fixed
MR1			Conventional brace + Rocking + GnG	AFC
BM1	AFC braces (external bays)	Fixed	MRF-SHJAFC	AFC
BB1			AFC braces (inverted V)	Fixed
BR1			Conventional brace + Rocking + GnG	AFC
MB-M1	MRF-SHJAFC + AFC braces	AFC/Fixed	MRF-SHJAFC	AFC
MB-B1			AFC braces (inverted V)	Fixed
MB-R1			Conventional brace + Rocking + GnG	AFC
MRR2	MRF-RSFJ (middle bay)	AFC	RSFJ rocking frame	AFC
BTRR2	RSFJ-tension-only brace (external bays)	AFC		
BTCRR2	RSFJ brace (T/C, external bays)	AFC		

Test configuration 2 of 2

Loading	
Limit state	Directions
SLS	X
	Y
	Bi
ULS	X
	Y
	Bi

- For each of the testing configuration mentioned in previous slide, 6 loading stages will be tested.
- All the test configurations will be run with and without non-structural element separately.
- MCE will be also considered to be imposed on selected configuration(s) pushing the building into its limits.

Many thanks!