STUDY REPORT

SR 259 (2012)

Value of Time Savings in New Housing

IC Page

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Preface

This is a one off-report quantifying the dollar savings that could arise from quicker construction of housing. Savings for both the builder and owner are investigated.

Acknowledgments

This work was funded by the Building Research Levy.

Note

This report is intended for builders and aims to encourage them to improve their processes so that construction time and costs are reduced.

The Value of Time Savings in New Housing

BRANZ Study Report SR 259

IC Page

Abstract

Quicker construction can be of significant advantage to builders because it improves their cash flow and profit. This study was conducted to identify the theoretical cost savings arising from shorter construction times for new housing. The report does not discuss how time can be saved. Instead, it considers the affect on profit and cashflow of reducing time between the various sequential steps rather than looking at possible savings from, for example, more efficient use of labour. Hence, the report is primarily concerned with the overall duration of the project rather than resource use efficiencies.

The savings estimated were shown to a number of builders and their feedback indicated the main advantage of quicker construction was greater profit and reduced overhead per house. There is also cashflow advantages dependant on the contractual arrangements. For spec-built housing, reduced construction time unambiguously provides a cashflow advantage to the builder. However, in fixed-price contracts, progress payments are usually staged to provide positive cashflow and so a reduced construction time will not automatically result in cashflow savings to the builder.

Contents Page

Figures Page

Tables Page

1. INTRODUCTION

This report outlines the advantages of quicker construction of new housing. There are a variety of reasons why quicker construction may be beneficial to builders and owners. Where time savings arise from better project management, then both parties can experience lower costs to complete the house. For the builder, faster completion may improve cashflow and it enables overheads to be spread over more projects, thereby increasing profit. For the owner, quicker construction may result in lower rental costs.

The report is primarily concerned with the overall duration of the project and its affect on cashflow rather than resource use efficiencies. In other words, we are looking at the effect of a reduction in total lapsed time. This may arise from one or the other of running two or more work areas concurrently rather than sequentially, or minimising the temporary diversion of resources to other projects. The same total amount of labour is used, but over less elapsed time. Alternatively, the use of pre-fabricated components can reduce elapsed time and the volume of on-site labour. Further savings can arise through more efficient use of labour – for example, the same output for fewer labour hours. However, these efficiency type savings are not the prime consideration of this report.

The benefits to the builder of shorter lapsed time are influenced by the type of contract. There are different cost implications to the builder with a fixed-price contract compared to a labour-only type contract. The various contracts used in the industry, and their affect on cashflow, are briefly discussed later.

2. SUMMARY

Quicker construction has cost advantages for builders and the size of the saving depends on the type of builder and their contractual details:

- The larger builders with fixed-price contracts save about $1600 per house per week of time saved.
- A significant reason for this saving is they can build more houses per year and hence reduce their fixed overheads per house (i.e. sales, marketing and administration etc). These savings are typically $1100 per house per week saved for the larger group builders (approximately 90 houses per year).
- The other $500 gain is from the profits obtained from the additional houses built per year spread over all houses built in the year.
- The small scale builders (approximately three houses per year) with fixed-price contracts save about $1000 per house per week of time saved. Their savings are lower than the larger builders because their overheads are near zero and hence they do not reap the benefit of spreading overheads over more houses that occur with the larger builders.
- Speculative builders both large and small have bigger savings than builders using progress payment contracts because they carry the interest payments on the land as well as the construction, hence the dollar effects of time saved are larger.
- Quicker construction may reduce the amount of interest the builder pays on working cashflow (those funds required for labour and materials). But these savings are small, as the progress payments match the outgoings (i.e. the net

effect of client payments less the builder's outgoings does not much change with a speed-up in construction).

- From the client's perspective, the advantage of quicker construction is they have the satisfaction of taking early ownership with an improved lifestyle and they may reap the benefit of less rental payments on their existing accommodation.

3. GREATER PROFIT AND REDUCED OVERHEADS

An obvious advantage of quicker construction is builders can earn more profit in a year. For example, if a builder can save one week in a "normal" construction period of 18 weeks this is a 6% time saving and hence 6% more houses can be erected per year. For a small builder this translates into several thousand dollars profit per year and more for a large scale builder.

The other advantage of producing more houses per year to larger scale builders is their fixed costs per house are reduced, effectively increasing their profit margins. These costs include a sales team, showhome and advertising costs, which collectively amount to around $21,000 per house sold (based on data for a group home builder erecting about 90 homes per year). So any additional houses sold due to quicker construction effectively have a saving of about $21,000 per house in cost which is straight profit. Further details are in Table 1.

The next two sections examine the various types of contract used in construction and how they affect the cashflow to the builder.

4. CONTRACTUAL ARRANGEMENTS

The cashflow advantages depend on the type of contracts used by builders. The main types of contract are:

- Fixed-price
- Labour-only
- Hourly rate plus margin on materials
- Spec-built house.

A fixed-price contract is for the construction of a new house and the land may or may not be included. Usually a deposit and progress payments are required. The design may be a one-off or a "standard" design from a group builder. The latter usually has a showhome which gives the owner a fair idea of the final product and owners are able to make minor changes to the design.

A labour-only contract is one where the owner provides the land and design, manages the project including sub-contractors, and provides the materials. The builder keeps a record of hours worked and invoices for these at regular intervals.

An hourly rate and materials supply contract is used when the scope of work is difficult to determine before commencement. The builder manages the project and sub-contractors, and obtains materials. There is no fixed price, though hourly rates and estimated sub-contractor amounts are provided before the start of work.

A spec-built house contract is one where the builder constructs the house, and sells the land and house package after completion of the work. The advantage to the owner is they know exactly what they are getting for the sale price.

There are advantages to the owner with quicker construction with any of these contractual arrangements. The obvious advantage is that having made the decision to purchase a new house the owners will be keen to enjoy the amenities as soon as possible. There will be financial advantages from savings in rent if they do not own their previous house. If they do own their existing house there are cashflow advantages in certainty of date tenure including the settlement dates on the existing property.

For the builder there are financial advantages for the first and last contractual arrangements outlined above. There may appear to be little advantage in quick construction in the second and third contractual arrangements where the builder is effectively paid on a cost-plus basis. However, builder reputation is affected by how efficiently they operate, as clients closely watch on-site progress, and customers talk to friends and acquaintances about their experience with the builder. So even with cost-plus contracts there is an incentive for builders to complete construction as quickly as possible, albeit the benefits are difficult to quantify. This report is mainly focused on fixed-price and spec-built contracts.

5. CASH FLOW WITH SPEC-BUILT AND FIXED-PRICE CONTRACTS

The dollar advantages of quicker construction for a typical new house are shown in Figure 1 and Table 1. The two cases represented are spec-built and fixed-price contract houses with progress payments.

In the first instance the builder does not get paid until the house is sold, so there is an obvious advantage to him/her with quicker construction. The costs are reduced because the interest payments on the borrowings to fund the house construction (and in many cases the land holding costs) are reduced. The savings are significant, particularly when land is included, as shown in the table.

For the fixed-price contract the cashflow situation is not as clear cut. Because the builder receives regular progress payments the builder's funding costs may be small or nil. In contracts where the initial deposit is quite large the builder will have a positive cashflow throughout the project and it would appear to be to his/her advantage to prolong the project, particularly where the payments are greater than the outgoings in the early and middle stages. As stated above, client monitoring of progress is a constraint on this behaviour, although this assumes a knowledgeable client.

In most contracts sighted by the author of this report, the progress payment schedule fairly closely matches the builder's outgoings, so owners are paying for real progress. Also, the banks providing mortgages often monitor on-site progress against progress payments to safeguard their lending.

The initial deposit amount is not specified in the New Zealand Master Builders' Federation (NZMBF) or the Certified Builders' Association of New Zealand (CBANZ) contracts but is believed to be a fairly small percentage (typically 2% to 5% of the total contract). A value of 3% was used in the example, which is for a typical new house of about 190 sqm in floor area and single storey, from a larger sized group builder.

The example uses a payment schedule similar to that recommended by CBANZ for the fixed-price contract, consisting of a deposit and seven progress payments.

The cashflow advantages of quicker construction in the fixed-price contract case turned out to be quite small or negative. It shows changes in interest payments of between negative $131 and positive $58 per house, depending on the time saved. Negative amounts arise when cashflow balances are reduced due to expensive material purchases being brought forward. These are small amounts and are not significant in terms of the overall cost. A three-week time saving (reducing construction from 18 to

15 weeks) was found to be optimal but the results will be different for other payment schedules and the size of the deposit. In any case the amounts are so small they are within the margins of error involved in the calculations and assumptions.

The main cost advantage of quicker construction, for both types of contract, was found to be that the administration and sales/marketing overheads were reduced. The larger builder is able to organise more houses per year using the existing overhead and the overhead per new house is reduced.

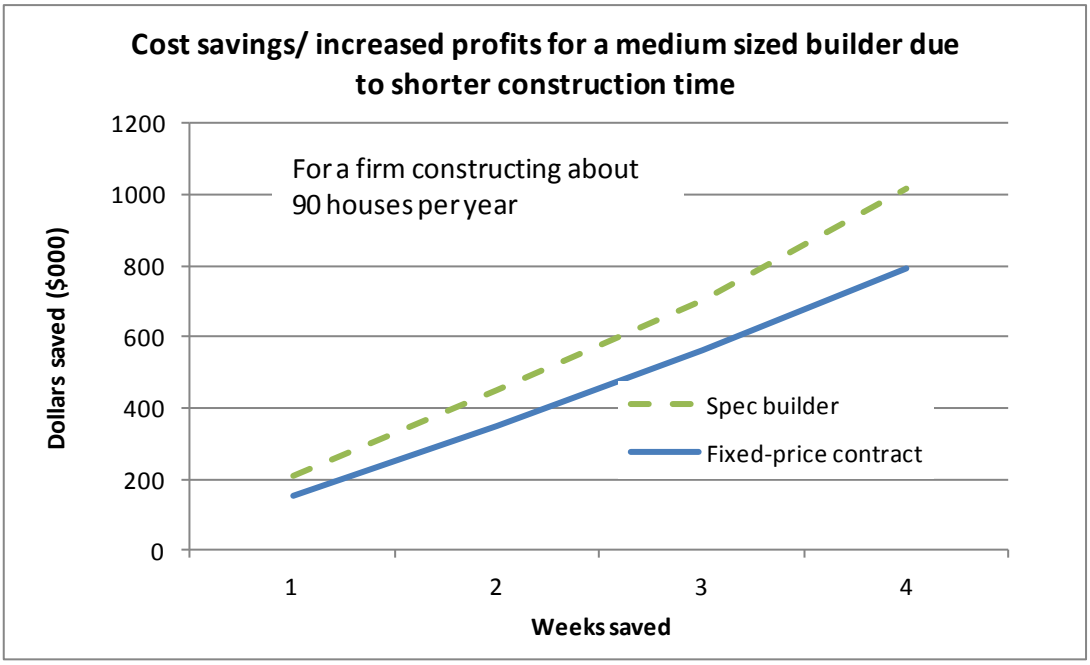

Figure 1 Cost Savings for Fixed-Price and Spec-built Houses

Table 1 details the savings calculation for the larger builder. Whether spec or fixed-price builder, the main savings arise due to the reduced overhead per house as more are built with quicker construction. The cost of running a showhome, sales team and advertising is large for the volume builders, and these marginal overhead costs are effectively zero for a modest (say +20%) house number increase. The other main advantage of quicker construction is more houses and hence greater profit is earned per year.

The small scale builder does not have the overheads associated with large builders and hence these economies from quicker construction are not available to the small builder, see Table 2.

However, as slightly more houses are built by the small builder the profits increase. Note, the sale price and profits per house ($20,000) for small builders are assumed to be higher than for large scale builders ($10,900).

Table 1 Quicker Construction Cost Savings for Medium to Large Scale Builders

Savings from reduced construction time for a medium sized firm (base case 87 houses per year)				
		Dollars savings (000$ per year)		
Saving in weeks	**One**	**Two**	**Three**	**Four**
Spec Builder				
Land holding costs (1)	31	66	105	151
Bank loan interest payment savings (2)	16	39	43	73
Increased profit with more houses per year (3)	56	119	190	271
OH spread over more houses per year (4)	107	228	365	522
	211	452	703	1017
Savings per house	2.3	4.6	6.7	9.1
Fixed price Contract (5)				
Bank loan interest payment savings (6)	-12	0	6	-1
Increased profit with more houses per year	56	119	190	271
OH spread over more houses per year (5)	107	228	365	522
	151	347	561	792
Savings per house	1.6	3.5	5.4	7.1
Base case	Houses per yr with time savings			
Houses per year 87	92	98	104	112
(1) Assume land cost $ 250,000	per hse.			
Finance costs 7%				
House cost $ 228,800	excl GST			
(2) For spec house all costs until house is sold are borrowed.				
(3) Profit per house assumed to be 10900	$/hse			
(4) Overheads i.e. admin, sales centre, advertising = $	21,000	per hse		
Normal elapsed time on typical house =	18	weeks		
(5) Fixed price contract with progress payments. Assume owner provides land, or else pays the full land cost up-front.				
(6) For a fixed price contract progress payments provide the cashflow. The payments are usually staged so that the cashflow is positive, but this depends on the contract details. Shorter construction times may reduce interest payments on cashflow compared to the base case (18 weeks), hence the negative savings for some cases. See Tables 4 to 8 for cashflow calcs for the base case, and 1,2,3,& 4 weeks time savings.				

Table 2 Quicker Construction Cost Savings for Small Scale Builders

Savings from reduced construction time for a small firm (base case 3 houses per year)							
					Dollars savings (000$ per year)		
			Saving in weeks	**One**	**Two**	**Three**	**Four**
Spec Builder							
	Land holding costs (1)			1.1	2.3	3.6	5.2
	Bank loan interest payment savings (2)			0.7	1.8	1.9	3.3
	Increased profit with more houses per year (3)			3.5	7.5	12.0	17.1
	OH spread over more houses per year (4)			na	na	na	na
				5.3	11.5	17.6	25.6
			Savings per house	1.7	3.4	4.9	6.6
Fixed price Contract (5)							
	Bank loan interest payment savings (6)			-0.4	0.0	0.2	0.0
	Increased profit with more houses per year			3.5	7.5	12.0	17.1
	OH spread over more houses per year (4)			na	na	na	na
				3.1	7.5	12.2	17.1
			Savings per house	1.0	2.2	3.4	4.4
			Base case	Houses per yr with time savings			
Houses per year			3.0	3.2	3.4	3.6	3.9
(1) Assume land cost $			250,000	per hse.			
		Finance costs	7%				
		House cost $	300,000	excl GST			
(2) For spec house all costs until house is sold are borrowed.							
(3) Profit per house assumed to be			20,000	$/hse			
(4) Overheads i.e. admin, sales centre, advertising is assumed to be zero for a small builder.							
	Normal elapsed time on typical house =			18	weeks		
(5) Fixed price contract with progress payments. Assume owner provides land, or else							
	pays the full land cost up-front.						
(6) For a fixed price contract progress payments provide the cashflow. The payments							
	are usually staged so that the cashflow is positive, but this depends on the contract						
	details. Shorter construction times may reduce interest payments on cashflow						
	compared to the base case (18 weeks), hence the negative savings for some cases.						
	See Tables 4 to 8 for cashflow calcs for the base case, and 1,2,3,& 4 weeks time savings.						

The payment schedules used in the calculations are shown in able 3. This schedule is based on CBANZ recommendations, though other schedules could be used. For example, the NZMBF contract in Table 4 lists significantly more items – 16 in total. However, it is not likely this many payments would be made in a typical contract and other schedules are unlikely to significantly alter the net cashflow position. So for simplicity, the Certified Builders schedule was used.

The cashflow is affected by which activities can be reduced in time and savings have been estimated by BRANZ in able 3, ranging from one to four weeks.

Table 3 Duration by Activity

Duration by construction activity New house, Fixed price, Progress payments					
		Duration of activity (weeks)			
			Save	Save	Save	Save
Activity		Normal	1 week	2 weeks	3 weeks	4 weeks
Establishment	Preliminary, finalise design, obtain consents	4	4	4	3	3
Floor down	Completion of foundations and floor	2	2	2	2	2
Frame erected	All roof and wall framing	2	2	2	2	2
Closed-in	Wall and roof claddings, doors, windows installed	2	2	2	2	2
Other 1	Linings, fixtures, finishing	3	3	2	2	2
Other 2	Painting, plumbing, electrical	4	3	3	3	2
Final payment	Before possession (issue of CCC)	1	1	1	1	1
	Total duration (weeks) =	18	17	16	15	14

6. DISCUSSION

It is well known that cashflow is a vital parameter for businesses. For typical contracts used by builders with progress payments, the timing of the client payments approximately matches the builders' expenses (labour and materials and sub-contractor payments). Builders will in fact attempt to have payments slightly leading expenses so they have positive cashflow most of the time.

This research has shown the contractual arrangements used by builders, particularly the deposit amount and staging of progress payments, will affect profit levels. In a sample of over 140 builders, the majority were found to use progress payments but "spec builders" numbered quite low in this regard, see Figure 2.

It turns out that for most contractual arrangements with progress payments, the effect of saving on lapsed time has a quite small affect on cashflow. It is only when the fixed overheads can be spread over more houses that significant advantages arise with time reduction. This is the situation for medium and large builders with a large sales force/administration overhead.

However, for the small builder (approximately three houses per year), overheads are small and cashflow advantages of quicker construction are also small, assuming they are already operating efficiently in terms of labour utilisation. The exception is for spec-built houses where any time savings have significant cashflow advantages because of the large amount of committed capital.

The detailed calculations of cashflow for progress payment fixed-price contracts are illustrated in Table 5 to Table 9. The main output from each table is an estimate of interest received from the cashflow during the contract. This is compared to the normal construction period, arbitrarily set at 18 weeks. The assumption is that builders are receiving/paying interest on the balance each week. This may not represent reality because the financial terms of the funding may differ from this. However, it still represents a theoretical measure of the financial performance of the various options.

There are advantages to owners as well as builders from quicker construction, especially where they are renting. Time saved in moving into their new home is a bonus for them and will help improve the reputation of the builder.

The research has not considered the efficiency advantages where less resource input is required. For example, the use of pre-fabricated components reduces on-site labour and reduces lapsed time. In this case the cost savings from reduced on-site labour and

lapsed time are offset by the likely extra cost of the prefabricated component compared to on-site fabrication. In some cases the pre-fabricated item may be supplied cheaper than the builder can construct on site, e.g. wall frames and trusses. But most other potential prefabricated components will need lapsed time saving arguments to justify their extra cost. If the savings are greater than the prefabrication premium then use of the prefab option could be justified.

Another way to improve resource efficiency is through better on-site labour utilisation. This is not the main topic of this report. However, efficiencies may be achieved through better management – for example, less time wasted waiting on materials or sub-contractors). Suppose there is a one-week saving out of the 18 weeks assumed for normal construction (i.e. a 6% improvement) and this saving is from efficiencies of labour use (i.e. less labour input per unit of output), then the cost saving is about $2100 per house which is well worth achieving and is a feasible target for management on most projects. In addition to this is the lapsed time savings of about $1600 per week saved for the larger builders, as per Table 1. This simple calculation suggests that builders should ensure they are using their labour efficiently and then look for opportunities to reduce the lapsed time of their projects.

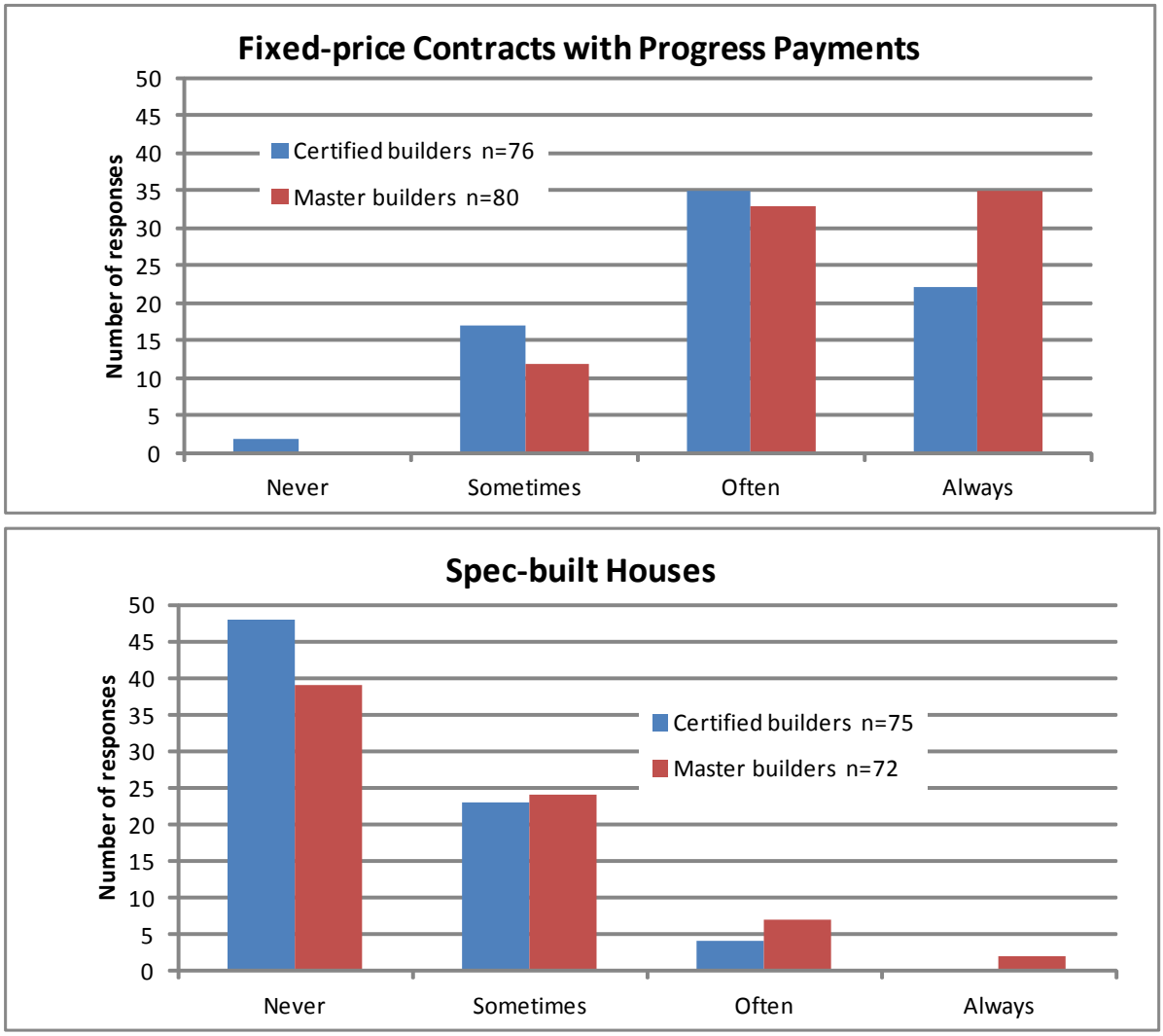

Figure 2 Types of Contract

Table 4 Payment Schedules – New Housing

Certifed Builders Association of New Zealand			Enter
			$
			amount
Deposit	(amount not specified)		
Establishment	Preliminary, consents, special material purchases		
Floor down	Completion of foundations and floor		
Frame erected	All roof and wall framing		
Closed-in	Wall and roof claddings, doors, windows installed		
Other	To be specified (one or more payments for linings,		
	painting, plumbing/ electrical, etc)		
Final payment	Before possession		
		Total	
NZ Master Builders Federation			$
Deposit	(amount not specified)	%	amount
Foundations and floor		10	
All wall framing		15	
Allroof framing		5	
Roof and fascia		8	
All exterior dooors and windows		9	
All wall claddings		10	
All exerior painting & coatings		2	
Pre-wire, pre-plumbing, insulation		6	
All linings		5	
Interior doors arch scotia		3	
Interior stopping		3	
All interior painting & coatings		4	
Kitchen & bathrooms		6	
Plumbing & electrical		6	
Hardware & tiling		3	
Final payment		5	
		100	Total
Major builder		%	
Deposit		3.5	
Obtain consents		10	
Footing and slab down		15	
All frames up		18	
Roof on, windows in		18	
Ext cladding and doors.		18	
Linings, painted		14.5	
Final payment		3	
		100.0	Total

Table 5 Cashflow Details "Normal" Construction Time

Normal time for construction (18 weeks)							Blders	Contract	Activity	Cummulative												
							expenses	paymts	Time	Time	Builders expenses %						Builders expenses $K					
Activity items							$ K	(Expenses +profit)	weeks	weeks	P&G	Labour	Materials	Subbies	Total	P&G	Labou	Materials	Subbies	Admin OH	Total	
						%																
Deposit						3.1	6.7	7.0			100				100	6.7	0.0	0.0	0.0		6.7	
Establishment	Preliminary, finalise design, obtain consents.					5.1	11.1	11.6	4	4	100				100	11.1	0.0	0.0	0.0		11.1	
Floor down	Completion of foundations and floor					10.8	23.6	24.8	2	6		20	80		100	0.0	4.7	18.9	0.0		23.6	
Frame erected	All roof and wall framing					7.5	16.4	17.3	2	8		30	70		100	0.0	4.9	11.5	0.0		16.4	
Closed-in	Wall and roof claddings, doors, windows installed					16.9	36.9	38.7	2	10		30	70		100	0.0	11.1	25.8	0.0		36.9	
Other	Linings, fixtures, finishing					27.8	60.5	63.6	3	13		30	40	30	100	0.0	18.2	24.2	18.2		60.5	
	Painting, plumbing, electrical.					8.8	19.1	20.1	4	17			30	70	100	0.0	0.0	5.7	13.4		19.1	
Final payment	Before possession (issue of CCC)					3.1	6.7	7.0	1	18	100				100	6.7	0.0	0.0	0.0		6.7	
Franchise/ admin OH	(Admin, sales centre, advertising, construction					16.9	36.9	38.7													36.9	
	management, sales comission, slippage.)				Total	100.0	218.0	228.9	18	weeks						24.5	38.9	86.2	31.5	36.9	218.0	
																11.2%	17.8%	39.5%	14.5%	16.9%	100.0%	
	$K								allow 2 weeks lag for materials and subbies payments									Cummulative		Interest		Spec blders
Cost house	218										Builders expenses $K					Income $K		Net income		earned in week		Interest paid
Profit	5%	10.9							Week	Admin C	P&G	Labour	Materials	Subbies				$K		$K		$K
Contract price	228.9								0							7.0		7.0				
Interest rate	7%								1	2.0								5.0		0.007		0.002
									2	2.0								2.9		0.004		0.004
					$ saved with labour efficiencies				3	2.0								0.9		0.001		0.006
Rivera (191 sqm house) 2011	$K	%	Wks saved	1	2	3	4		4	2.0	17.8					20.2		1.3		0.002		0.025
Materials	92.5	40.4%	42.5%	2127	4254	6381	8508		5	2.0		2.4						-3.1		-0.004		0.029
Builders labour	38.2	16.7%	17.6%	savings are calculated as					6	2.0		2.4				29.1		21.6		0.029		0.033
Sub-contractors	31.9	13.9%	14.7%	Cost house ($218K) x Lab % (17.6%) x					7	2.0		2.5						17.1		0.023		0.038
P&G	17.1	7.5%	7.9%	Wks saved (1)/ 18 wks					8	2.0		2.5	18.9			21.6		15.2		0.020		0.060
Franchise OH	37.8	16.5%	17.4%						9	2.0		5.5						7.6		0.010		0.068
Profit	11.3	4.9%							10	2.0		5.5	11.5			43.0		31.6		0.043		0.086
GST	40.4								11	2.0		6.1						23.5		0.032		0.094
	269.2								12	2.0		6.1	25.8					-10.4		-0.014		0.126
	228.8	100.0%	100.0%						13	2.0		6.1				70.0		51.5		0.069		0.134
	217.5								14	2.0								49.4		0.067		0.136
									15	2.0			24.2	18.2				5.0		0.007		0.179
									16	2.0								2.9		0.004		0.181
									17	2.0						28.7		29.6		0.040		0.183
									18	2.0	6.7					9.2		30.0		0.040		0.191
									19				5.7	13.4				10.9		0.015		0.210
										36.9	24.5	38.9	86.2	31.5	218.0	228.9	Total interest earned =			0.394		1.785

Table 6 Cashflow Details One-week Construction Time Saving

Save 1 week's time on construction								Blders	Contract		Activity	Cummulative												
								expenses	paymts		Time	Time	Builders expenses %					Builders expenses $K						
Activity items								$ K	(Expenses +profit)		weeks	weeks	P&G	Labour	Materials	Subbies	Total	P&G	Labour	Materials	Subbies	Admin OH	Total	
							%																	
Deposit							3.1	6.7	7.0				100				100	6.7	0.0	0.0	0.0		6.7	
Establishment		Preliminary, finalise design, obtain consents.					5.1	11.1	11.6		4	4	100				100	11.1	0.0	0.0	0.0		11.1	
Floor down		Completion of foundations and floor					10.8	23.6	24.8		2	6		20	80		100	0.0	4.7	18.9	0.0		23.6	
Frame erected		All roof and wall framing					7.5	16.4	17.3		2	8		30	70		100	0.0	4.9	11.5	0.0		16.4	
Closed-in		Wall and roof claddings, doors, windows installed					16.9	36.9	38.7		2	10		30	70		100	0.0	11.1	25.8	0.0		36.9	
Other		Linings, fixtures, finishing					27.8	60.5	63.6		3	13		30	40	30	100	0.0	18.2	24.2	18.2		60.5	
		Painting, plumbing, electrical.					8.8	19.1	20.1		3	16			30	70	100	0.0	0.0	5.7	13.4		19.1	
Final payment		Before possession (issue of CCC)					3.1	6.7	7.0		1	17	100				100	6.7	0.0	0.0	0.0		6.7	
Franchise/ admin OH							16.9	36.9	38.7														36.9	
						Total	100.0	218.0	228.9		17	weeks						24.5	38.9	86.2	31.5	36.9	218.0	
																		11.2%	17.8%	39.5%	14.5%	16.9%	100.0%	
		$K									allow 2 weeks lag for materials and subbies payments									Cummulative		Interest		Spec blders
Cost house		218											Builders expenses $K					Income $K		Net income		earned in week		Interest paid
Profit		5%	10.9								Week	Admin OH	P&G	Labour	Materials	Subbies				$K		$K		$K
Contract price		228.9									0							7.0		7.0				
Interest rate		7%									1	2.2								4.9		0.007		0.003
											2	2.2								2.7		0.004		0.006
											3	2.2								0.5		0.001		0.009
Rivera (191 sqm house) 2011			$K	%							4	2.2	17.8					20.2		0.8		0.001		0.036
		Materials	92.5	40.4%	42.5%						5	2.2		2.4						-3.7		-0.005		0.042
	Builders labour		38.2	16.7%	17.6%						6	2.2		2.4				29.1		20.9		0.028		0.048
	Sub-contractors		31.9	13.9%	14.7%						7	2.2		2.5						16.2		0.022		0.054
		P&G	17.1	7.5%	7.9%						8	2.2		2.5	18.9			21.6		14.3		0.019		0.086
	Franchise OH		37.8	16.5%	17.4%						9	2.2		5.5						6.5		0.009		0.096
		Profit	11.3	4.9%							10	2.2		5.5	11.5			43.0		30.4		0.041		0.122
		GST	40.4								11	2.2		6.1						22.2		0.030		0.133
			269.2								12	2.2		6.1	25.8					-11.9		-0.016		0.179
			228.8	100.0%	100.0%						13	2.2		6.1				70.0		49.9		0.067		0.190
			217.5								14	2.2			24.2	18.2				5.4		0.007		0.250
											15	2.2								3.2		0.004		0.253
			10	houses at one time							16	2.2								1.0		0.001		0.256
			30.6	per manager							17	2.2	6.7					28.7		20.8		0.028		0.268
											18				5.7	13.4		9.2		10.9		0.015		0.293
											19													
												36.9	24.5	38.9	86.2	31.5	218.0	228.9		Total interest earned =		0.262		2.322
																						-0.131	savings	0.177
									=profit/hse x int rate x (10 hse/manager x (52weeks-17weeks) + 10hse/mang*(52-17*2)))											Tot interest earned/yr		15.8	$K	-2.907
																				Tot profit/yr		333.4	$K	

Table 7 Cashflow Details Two Weeks' Construction Time Saving

Save 2 weeks' time on construction			Blders	Contract	Activity	Cummulative												
			expenses	paymts	Time	Time	Builders expenses %					Builders expenses $K						
Activity items			$ K		weeks	weeks	P&G	Labour	Materials	Subbies	Total	P&G	Labour	Materials	Subbies	Admin OH	Total	
		%																
Deposit		3.1	6.7	7.0			100				100	6.7	0.0	0.0	0.0		6.7	
Establishment	Preliminary, finalise design, obtain consents.	5.1	11.1	11.6	4	4	100				100	11.1	0.0	0.0	0.0		11.1	
Floor down	Completion of foundations and floor	10.8	23.6	24.8	2	6		20	80		100	0.0	4.7	18.9	0.0		23.6	
Frame erected	All roof and wall framing	7.5	16.4	17.3	2	8		30	70		100	0.0	4.9	11.5	0.0		16.4	
Closed-in	Wall and roof claddings, doors, windows installed	16.9	36.9	38.7	2	10		30	70		100	0.0	11.1	25.8	0.0		36.9	
Other	Linings, fixtures, finishing	27.8	60.5	63.6	2	12		30	40	30	100	0.0	18.2	24.2	18.2		60.5	
	Painting, plumbing, electrical.	8.8	19.1	20.1	3	15			30	70	100	0.0	0.0	5.7	13.4		19.1	
Final payment	Before possession (issue of CCC)	3.1	6.7	7.0	1	16	100				100	6.7	0.0	0.0	0.0		6.7	
Franchise/ admin OH		16.9	36.9	38.7													36.9	
	Total	100.0	218.0	228.9	16	weeks						24.5	38.9	86.2	31.5	36.9	218.0	
												11.2%	17.8%	39.5%	14.5%	16.9%	100.0%	

	$K		allow 2 weeks lag for materials and subbies payments								Cummulative	Interest	Spec blders
Cost house	218				Builders expenses $K						Income $K	Net income	earned in week	Interest paid
Profit	5%	10.9	Week	Admin OH	P&G	Labour	Materials	Subbies				$K	$K	$K
Contract price	228.9		0								7.0	7.0		
Interest rate	7%		1	2.3								4.7	0.006	0.003
			2	2.3								2.4	0.003	0.006
			3	2.3								0.1	0.000	0.009
			4	2.3	17.8						21.3	1.3	0.002	0.036
			5	2.3		2.4						-3.3	-0.004	0.043
			6	2.3		2.4					29.7	21.7	0.029	0.049
			7	2.3		2.5						16.9	0.023	0.055
			8	2.3		2.5	18.9				22.1	15.3	0.021	0.087
			9	2.3		5.5						7.5	0.010	0.098
			10	2.3		5.5	11.5				43.6	31.7	0.043	0.124
			11	2.3		9.1						20.3	0.027	0.139
			12	2.3		9.1	25.8				68.4	51.5	0.069	0.189
			13	2.3								49.2	0.066	0.192
			14	2.3			24.2	18.2				4.5	0.006	0.252
			15	2.3							27.3	29.6	0.040	0.256
			16	2.3	6.7						9.5	30.0	0.040	0.268
			17				5.7	13.4				10.9	0.015	0.293
			18											
			19											
				36.9	24.5	38.9	86.2	31.5	218.0	228.9	Total interest earned =		0.396	2.101
											savings		0.003 savings	0.398
											Tot interest earned/yr		8.2 $K	-10.495
											Tot profit/yr		0.0 $K	

Table 8 Cashflow Details Three Weeks' Construction Time Saving

Save 3 weeks' time on construction			Blders	Contract	Activity	Cummulative												
			expenses	paymts	Time	Time	Builders expenses %					Builders expenses $K						
Activity items			$ K		weeks	weeks	P&G	Labour	Materials	Subbies	Total	P&G	Labour	Materials	Subbies	Admin OH	Total	
		%																
Deposit		3.2	6.9	7.3			100				100	6.9	0.0	0.0	0.0		6.9	
Establishment	Preliminary, finalise design, obtain consents.	5.1	11.1	11.6	3	3	100				100	11.1	0.0	0.0	0.0		11.1	
Floor down	Completion of foundations and floor	10.8	23.6	24.8	2	5		20	80		100	0.0	4.7	18.9	0.0		23.6	
Frame erected	All roof and wall framing	7.5	16.4	17.3	2	7		30	70		100	0.0	4.9	11.5	0.0		16.4	
Closed-in	Wall and roof claddings, doors, windows installed	16.9	36.9	38.7	2	9		30	70		100	0.0	11.1	25.8	0.0		36.9	
Other	Linings, fixtures, finishing	27.6	60.1	63.1	2	11		30	40	30	100	0.0	18.0	24.0	18.0		60.1	
	Painting, plumbing, electrical.	8.8	19.1	20.1	3	14			30	70	100	0.0	0.0	5.7	13.4		19.1	
Final payment	Before possession (issue of CCC)	3.2	6.9	7.3	1	15	100				100	6.9	0.0	0.0	0.0		6.9	
Franchise/ admin OH		16.9	36.9	38.7													36.9	
		100.0	218.0	228.9	15	weeks						24.9	38.8	86.0	31.4	36.9	218.0	
												11.4%	17.8%	39.5%	14.4%	16.9%	100.0%	

	$K	
Cost house	218	
Profit	5%	10.9
Contract price	228.9	
Interest rate	7%	

allow 2 weeks lag for materials and subbies payments

		Builders expenses $K					Income $K	Cummulative Net income	Interest earned in week	Spec blders Interest paid
Week	Admin (	P&G	Labour	Materials	Subbies			$K	$K	$K
0							7.3	7.3		
1	2.5							4.8	0.006	0.003
2	2.5							2.4	0.003	0.007
3	2.5	18.0					19.9	1.8	0.002	0.034
4	2.5		2.4					-3.0	-0.004	0.041
5	2.5		2.4				30.4	22.5	0.030	0.047
6	2.5		2.5					17.6	0.024	0.054
7	2.5		2.5	18.9			22.8	16.6	0.022	0.086
8	2.5		5.5					8.6	0.012	0.097
9	2.5		5.5	11.5			44.3	33.3	0.045	0.123
10	2.5		9.0					21.9	0.029	0.138
11	2.5		9.0	25.8			68.6	53.2	0.072	0.189
12	2.5							50.7	0.068	0.192
13	2.5			24.0	18.0		25.6	31.8	0.043	0.252
14	2.5	6.9					10.0	32.5	0.044	0.264
15	2.5							30.0	0.040	0.268
16				5.7	13.4			10.9	0.015	0.293
17										
18										
19										
	36.9	24.9	38.8	86.0	31.4	218.0	228.9	Total interest earned =	0.452	2.087
									0.058 savings	0.412
								Tot interest earned/yr	8.7 $K	-10.055
								Tot profit/yr	0.0 $K	

Table 9 Cashflow Details Four Weeks' Construction Time Saving

Save 4 weeks' time on construction				Blders	Contract	Activity	Cummulative													
				expenses	paymts	Time	Time	Builders expenses %					Builders expenses $K							
Activity items				$ K		weeks	weeks	P&G	Labour	Materials	Subbies	Total	P&G	Labour	Materials	Subbies	Admin OH	Total		
			%																	
Deposit			3.2	6.9	7.3			100				100	6.9	0.0	0.0	0.0		6.9		
Establishment	Preliminary, finalise design, obtain consents.		5.1	11.1	11.6	3	3	100				100	11.1	0.0	0.0	0.0		11.1		
Floor down	Completion of foundations and floor		10.8	23.6	24.8	2	5		20	80		100	0.0	4.7	18.9	0.0		23.6		
Frame erected	All roof and wall framing		7.5	16.4	17.3	2	7		30	70		100	0.0	4.9	11.5	0.0		16.4		
Closed-in	Wall and roof claddings, doors, windows installed		16.9	36.9	38.7	2	9		30	70		100	0.0	11.1	25.8	0.0		36.9		
Other	Linings, fixtures, finishing		27.6	60.1	63.1	2	11		30	40	30	100	0.0	18.0	24.0	18.0		60.1		
	Painting, plumbing, electrical.		8.8	19.1	20.1	2	13			30	70	100	0.0	0.0	5.7	13.4		19.1		
Final payment	Before possession (issue of CCC)		3.2	6.9	7.3	1	14	100				100	6.9	0.0	0.0	0.0		6.9		
Franchise/ admin OH			16.9	36.9	38.7													36.9		
			100.0	218.0	228.9	14	weeks						24.9	38.8	86.0	31.4	36.9	218.0		
													11.4%	17.8%	39.5%	14.4%	16.9%	100.0%		
	$K					allow 2 weeks lag for materials and subbies payments									Cummulative		Interest		Spec blders	
Cost house	218							Builders expenses $K					Income $K		Net income		earned in week		Interest paid	
Profit	5%	10.9				Week	Admin C	P&G	Labour	Materials	Subbies				$K		$K		$K	
Contract price	228.9					0							7.3		7.3					
Interest rate	7%					1	2.6								4.6		0.006		0.004	
						2	2.6								2.0		0.003		0.007	
						3	2.6	18.0					19.9		1.3		0.002		0.035	
						4	2.6		2.4						-3.7		-0.005		0.042	
						5	2.6		2.4				30.4		21.7		0.029		0.048	
						6	2.6		2.5						16.6		0.022		0.055	
						7	2.6		2.5	18.9			22.8		15.3		0.021		0.088	
						8	2.6		5.5						7.2		0.010		0.099	
						9	2.6		5.5	11.5			44.3		31.8		0.043		0.125	
						10	2.6		9.0						20.1		0.027		0.141	
						11	2.6		9.0	25.8			68.6		51.3		0.069		0.191	
						12	2.6								48.6		0.065		0.195	
						13	2.6			24.0	18.0		25.6		29.5		0.040		0.255	
						14	2.6	6.9					10.0		30.0		0.040		0.268	
						15				5.7	13.4				10.9		0.015		0.293	
						16														
						17														
						18														
						19														
							36.9	24.9	38.8	86.0	31.4	218.0	228.9		Total interest earned =		0.387		1.844	
																	-0.007	savings	0.655	
															Tot interest earned/yr		9.1	$K	-9.615	
															Tot profit/yr		0.0	$K		