Gang-nail panel machine in a wood-frame open-wall panel factory in California

APPENDICES

Appendix A: Preliminary Inquiry Form for Potential Study Participants
Appendix B: Interview Script
Appendix C: Interview Results

Appendix A: Preliminary Inquiry Form for Potential Study Participants

Typology Matrix

Panelized Home Corporation

Builder Contact Info		Home Office: Fayetteville, NC 605 German Street
Service Region		SE - North Carolina - Fayetteville, Raleigh, Greenville, Wilmington and Greensboro; South Carolina - Florence and Columbia.
Builder Size		Medium
Technology Types Used (as % of total production over the past 5 years)	**Stick**	50
	Panelized on site	
	Panelized near site	10
	Panelized shipped, 3rd party	30
	Complete closed panel system	10
Labor Composition (as % of total staff over the past year)	**Administrative**	100
	General Contractor	
	Carpentry	
	Laborer	
Organization Structure (decision maker)	**Trade (sub-contractor)**	
	General Contractor	X
	Developer	
House Type (as % of total production over the past year)	**Single Family**	20
	Rowhouse	10
	Multifamily	70
Contact Reference		NAHB Building Systems Website
Notes		

Key

Region	Builder Size (Units/Year)	Technology Type	
Northeast = NE (CT, MA, ME, NH, NJ, NY, PA, RI, VT)	Small = < 25	Stick:	Panels are not used, entire home built on site.
Southeast = SE (AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, SC, TN, VA, WV)	Medium = 26-100	Panelized on -site:	Panels are built on site by either builder staff or subcontractor.
Northwest = NW (ID, MT, OR, WA, WY)	Large = > 100	Panelized near site:	Panels are constructed near site in a temporarily facility such as a garage or warehouse by builder staff for subcontractor.
Southwest = SW (AZ, CA, CO, NM, NV, OK, TX, UT)		Panelized shipped, 3rd party:	Panels are made away from site in a facility that is consistently used to make panels for a variety of clients.
Midwest= MID (IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI)		Complete closed panel system:	The entire home is delivered as a set of panels.

Appendix B: Interview Script

Panel Builder Interview Script (REVISED)

I am calling to interview you for the HUD panel research study. Several weeks ago, we conducted a preliminary survey with you about your company. I am following up with a more in-depth interview. This should take about 20 minutes, do you have time now? If not, when can we reschedule?

Our interview will be tape recorded so we can transcribe what has been said. Is this OK with you?

I'm going to start off gathering more background information about your company:

-Market served- region and income level (low/affordable, production, custom)
-Client types- nonprofit developer, affordable housing provider, private
-Age of company
-Growth of company over the past five years- growth, contraction
-Independently Owned or Franchised
-Number of fulltime employees
-Use of other advanced building technology--modular, HUD Code, energy-efficient technologies, OVE-framing
-Sources of framing labor
-Sources of panel systems- company name and location (proximity to the site)
-Panel types most often used--SIP, open-wall, etc.

The next series of questions are about the actual decision-making processes over the course of a project—especially the criteria and steps towards use or non-use of panel systems. We are now going to ask a series of questions about specific issues that might have led to your decision to use panels, but first maybe you would like to let us know if there were any issues or factors that come first to your mind.

1. Context of your practice
    a. Did competition with other builders influence your decision to use panels? If yes, how?
    b. Have homebuyers expressed an interest in panelized homes? If yes, how?
    c. Did local climate and energy performance influence the decision to use panels? If yes, how?
    d. Did regional hazards (earthquakes, hurricanes, termites) influence the decision to use panels? If yes, how?
    e. Did local building codes factor into the decision to use panels? If yes, how?
    f. Did your proximity to a panel supplier factor into the decision? If yes, how?
    g. Did access to information influence your decision? From where was it obtained?

2. Pre-Construction Decision Making
    a. How did you choose to use this particular panel system?
    b. Did cost (materials, labor, financing, etc.) factor into the decision? If yes, how?
    c. Did construction quality factor into the decision? If yes, how?
    d. Did construction efficiency factor into the decision? If yes, how?
    e. Did site accessibility factor into the decision? If yes, how?
    f. Did an architect, developer, or consultant influence your decision to use panels? If yes, how?
    g. Did the use of panels influence the home's design? If yes, how?
    h. Did you consider using different panel systems? If yes, why?
    i. Did you avoid particular types of panel systems? If yes, why?

3. Construction Decision Making
    a. Briefly describe the process of installing the panel system you most often use.
    b. Who installs the panels (your own workforce or sub)? If your own workforce, did you have to train your workforce on how to install the panel system? If yes, how did panel installation factor into your decision to use panels?
    c. How did panels affect the scheduling and timing of construction? How did you manage this? (software, additional administrative support, panel manufacturer assistance/software, etc.)
    d. Were there technical problems with the panel system? If yes, How were they resolved?
    e. How well did the panel system interface with other subsystems in the house? How well do panels connect one to the other? To the foundation? To subsystems/utilities?

4. Post-Construction and General Decision-Making Processes
    a. Did the use of panels require changes in your business practices? If yes, how?
    b. Did the use of panels require changes in your use of sub contractors? If yes, how?
    c. In regard to the panel component of the construction process, have some projects been more successful than others? Why?
    d. Ultimately, what factors contributed the greatest to guaranteeing the successful use of panel systems?
    e. Would you use this panel system again and under what circumstances? If not, why not?
    f. Are there any improvements to the panel system that you think should be made?

Summary

Is there anything we did not ask you about your experience with panels or with your decision to adopt technologies in general that would be beneficial to know?

At this point we would like to schedule a site visit. The site visit will take about a half-day. We will be documenting your panel construction process with photographs and possibly getting additional documentation from you and your staff. It would be ideal if we could come at a time when you are in the middle of a project. Are there three dates within the next three weeks that would work for you and your offices? We will be getting back to you shortly to finalize these dates. In the meantime, could you tell us if there are others in your office such as your staff, supervisor, or even some trades who we might meet while we're there?

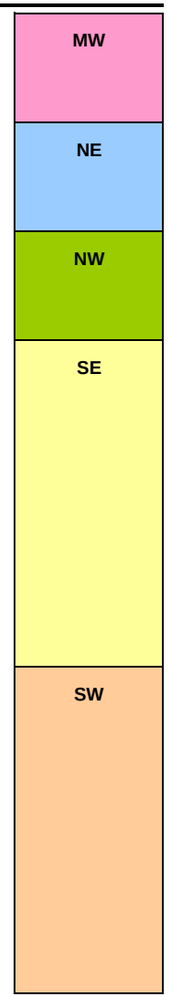
We would like to pass on some HUD PATH materials in order to keep you in touch with this study and its publication and the other resources that PATH offers builders. We'll bring that package with us during our visit.

Thank you very much for your time.

Appendix C: Interview Results

Interview Analysis by REGION

Builder's experience with panels



Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
MW	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP
NE	New York, NY	NE	Precast Insulated Panel	Low income - market rate, RowHs/MF	4 years	20-30	>100	Have worked with HUD, Energy Star	self/sub	Old Castle	Precast SIP
	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years		<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
NW	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Seattle, WA	NW	open wall	Affordable; public, nonprofits, MF	40 years	250	>100	Modular & pre-engineered components; some just-in-time delivery; hoisting.	99% sub	Local companies within 50 miles	open wall
SE	Cleremont, FL	SE	Precast Insulated Panel	Single family homes, esp. for RV's	25-30 years	7 (just in this division)	26-100	No other advanced technologies	sub (supplier)	Manning Quick Walls	Precast SIP
	Englewood, FL	SE	Hardiboard SIP	Gov't affordable housing providers	5 years	12	26-100	High-efficiency A/C, heat exchanger, solar hot water, water heater reclaim	sub/self homeowner	Homefront (self)	Hardiboard SIP
	Newnan, GA	SE	open wall	Primarily 1st time homebuyers	20 years	2	26-100 (45)	No other advanced technologies	sub	Wheeler's Building Supply	open wall
	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)
	Clemmons, NC	SE	open wall	Market rate spec for big developers	Past experience	hundreds	>100	Engineered components like 6" headers; rigid foam board insulation	self	Wicks Lumber, 84 Lumber	open wall
SW	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	Woodland Park, CO	SW	wood SIP	Custom homes, 2nd homes for retirees	20 years	3	26-100	TJI floor & roof, Optima R-47 roof insulation, ICF foundation, Formadrain.	sub	R-Control	wood SIP
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Telluride, CO	SW	wood SIP	Custom homes	20 years	2	<25 (2)	Radiant floors, ICF, manufacture lumber, SIPs, hi-performance windows, low-voltage circuitry.	sub (panel specific)	Winter; some R-control; Murus	wood SIP

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals
NE	New York, NY	NE	Precast Insulated Panel	Typically build w/ masonry and precast plank ceiling. Precast panels seemed a natural step: crane & erector already onsite. Panels cut out the masonry work. Also experimenting w/ foam & metal framing panels.	Time savings, same technology as foundation
	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
NW	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Seattle, WA	NW	open wall	They don't think SIPs or closed wall would work w/ utilities, etc. in walls. Choose open wall panel suppliers based on reputation, shop visits & drawings. Subs always ask "Who's the panelizer?" when bidding.	Flexibility of open walls
SE	Cleremont, FL	SE	Precast Insulated Panel	Jim has used panels in the past, and then a rep from this panel factory visited their offices. They were partially interested in panels due to the CMU shortage following the hurricanes.	Past experience, alternative to scarce materials
	Englewood, FL	SE	Hardiboard SIP	They weren't finding a product they liked, so they created a panel and steel framing system for the types of homes they are building and for the tough Florida climate. Panels are wood-free.	Created own product for superior quality, performance
	Newnan, GA	SE	open wall	Lee's supplier approached him. He hasn't considered SIPs due to current buyer types and budgets. He's seen savings all around, but #1 or #2 reason for using panels is reducing theft from the jobsite.	Better quality, less theft, local supplier
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier
	Clemmons, NC	SE	open wall	Big developers and builders pursue penalization as a means to reduce cost and improve productivity, and big lumber companies responded to their request. They select regional suppliers of open wall panels.	Reduce cost, raise productivity, use local suppliers
SW	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	Woodland Park, CO	SW	wood SIP	Ken was interested in panels he'd seen while traveling for another job and wanted to try them. R-Control was the 1st brand presented to them, the one they're most familiar with, and it's local.	Personal experience, local supplier
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Telluride, CO	SW	wood SIP	Panels 1st specified by an architect. Josh liked them & has since used them on his own home. Has worked with different SIP mfgs, based on insulating material & erection/fastening. Murus uses cam-lock system.	Personal experience - own home

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet
NE	New York, NY	NE	Precast Insulated Panel	They've been aware of panels and interested in them for a number of years, but previously they weren't able to make the numbers work out.	public domain
	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
NW	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Seattle, WA	NW	open wall	Information is available in the public domain, & anyone can understand the concepts. Walsh has to work to find manufacturers & assess their products/capabilities but general panel information is readily available.	public domain
SE	Cleremont, FL	SE	Precast Insulated Panel	Jim is familiar with SIPs from past experiences. In this instance, the panel supplier contacted them.	past experience, supplier
	Englewood, FL	SE	Hardiboard SIP	Information availability was very poor. They couldn't find a suitable product, so they elected to create their own.	good information is not available; found no suitable product
	Newnan, GA	SE	open wall	From the supplier.	supplier
	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website
	Clemmons, NC	SE	open wall	Generally large developer/builders interested in high productivity are active in research & are familiar with penalization as a tool for increasing that productivity.	own research
SW	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	Woodland Park, CO	SW	wood SIP	Ken worked as a distributor for another company & in his travels started to see SIPs used in other areas. He became interested & got information from salesmen at AFP (R-Control). This was pre-internet.	own experience with building product suppliers
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Telluride, CO	SW	wood SIP	Finds that Internet is a great source for educating himself about panels	internet/public domain

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings
NE	New York, NY	NE	Precast Insulated Panel	Structural concrete panel are costly, but offer speed & some construction savings. Decision was based more on a desire to try something new with potential than strict cost. Takes v. big project 2 make it pay.	higher, but better quality
	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
NW	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Seattle, WA	NW	open wall	Cost-driven decision. Walsh does 75% stick frame, 25% panels. Panels pay when schedule is tight, or space is tight. Sometimes they see labor savings. Can use apprentice carpenters rather than journeymen.	evaluated case-by-case; labor & material savings
SE	Cleremont, FL	SE	Precast Insulated Panel	Jim had to match the cost of panel construction to the cost of block construction.	cost similar to traditional construction
	Englewood, FL	SE	Hardiboard SIP	They were looking for labor savings (which took some time to actually happen).	labor savings
	Newnan, GA	SE	open wall	With panels, labor costs have decreased (less time, + hire less skilled crew), material costs decreased also. Much less waste on the jobsite; they save on hauling fees, too. Saving all the way around.	materials, labor and hauling savings
	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less
	Clemmons, NC	SE	open wall	They were able to reduce cost by half or better using penalization and repeating home designs.	dramatically reduce cost, cycle time with repeatable design
SW	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	Woodland Park, CO	SW	wood SIP	In the beginning material costs were higher & they had to hope to make up differences in labor savings. Now the gap is closing & he doesn't feel cost is much of a issue. His clients want SIPs.	slightly higher cost, but shrinking; quality, energy payback
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo finishing, etc. SIPs roofs are $$$, but excellent.	no cost difference in his region, clients want SIPs
	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Telluride, CO	SW	wood SIP	Feels $ is a tad higher for panels than stick frame (material $ > labor savings); mostly not an issue w/ his clients. Energy payback. One project never got built partly due to high markup cost from panel middleman.	slightly higher cost, but clients don't mind - energy payback

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality
NE	New York, NY	NE	Precast Insulated Panel	The panels are much more consistent. Much more uniform, much tighter, and being factory built means they don't have weather issues with their concrete.	better quality, consistency, tightness
	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
NW	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Seattle, WA	NW	open wall	With good panelizers, 99% of panels are correct & Walsh does very little modification. That is a quality enhancement. Ability to keep things dryer by getting the roo on faster is a quality enhancement.	much better
SE	Cleremont, FL	SE	Precast Insulated Panel	Quality wasn't a deciding factor from builder's perspective, but Jim feels homeowners like the panels because of their soundness: the home has a solid, quality feel.	not as critical - but homeowners respond to quality feel
	Englewood, FL	SE	Hardiboard SIP	The panels are very durable. Reduces the # of parts needed for the home structure (good for hurricanes). Reduced # of subs on the job means better quality, more control. Homeowners seek better quality.	better quality control, fewer subs
	Newnan, GA	SE	open wall	Panel quality is better; factory-made units are almost perfect, compared to a guy in the field trying to frame in the mud and rain.	better
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good
	Clemmons, NC	SE	open wall	Brian actually feels that the open wall panels initially didn't contribute to quality, but they have improved & they are actually better quality than stick now. Unless flimsy sheathing is spec'd.	better (took time to get there)
SW	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	Woodland Park, CO	SW	wood SIP	Big factor. Panels mean home is straight and true and less likely to be messed up by varying quality of local trades people.	better quality, straight & true
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90° corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Telluride, CO	SW	wood SIP	Based on his own research & experience, he feels SIPs homes are stronger.	stronger, better quality

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost
NE	New York, NY	NE	Precast Insulated Panel	The site seems to run cleaner and smoother without masons and masonry materials. Masons tend to tie up a job, & materials are messy; without them, many other trades could work at once. Can build in all weather.	much faster, & fewer trades increases efficiency
	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
NW	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Seattle, WA	NW	open wall	Building with panels is generally more efficient as long as site crews are prepared and familiar with the system. Need to be reading a screen, determination in which order to hoist the panels.	faster when crew is prepared
SE	Cleremont, FL	SE	Precast Insulated Panel	Speed was a big factor. They use a crane & the panels are erected very quickly. Homeowners like the quickness of the panels.	much faster, big factor
	Englewood, FL	SE	Hardiboard SIP	Are now seeing labor savings they needed, but it took several years of refinement to get field production levels up to levels supporting the cost. Fewer vendors to coordinate means less delays. Faster, predictable.	took years to see the productivity they wanted to make it pay. More predictable.
	Newnan, GA	SE	open wall	Efficiency has gone up considerably; Lee estimates it takes half the time to frame a home. Faster construction time also means getting out of the weather quickly.	faster
	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster
	Clemmons, NC	SE	open wall	This was the driving force. Framing times decreased and productivity increased dramatically. Even a new crew unfamiliar with panels would beat conventional framing speeds. Brian supervised 20-30 homes/ mo.	faster, speed is main motivator
SW	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	Woodland Park, CO	SW	wood SIP	Building with panels is efficient, especially with their earlier designs which were very simple & easily field-fabricated.	faster, especially with simpler designs
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Telluride, CO	SW	wood SIP	He feels that perhaps some of the increased material cost is offset by getting the homes weather tight faster. The theory is that they save labor; probably true but doesn't seem to be the major deciding factor.	not much faster

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point
NE	New York, NY	NE	Precast Insulated Panel	Energy efficiency was a factor. Precast panels outperform masonry for air tightness, and also much better for water tightness. They have experienced far fewer leak complaints.	strong influence, airtight & also much more watertight.
	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
NW	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Seattle, WA	NW	open wall	Not a big factor, as their moderate climate (Seattle) doesn't yield big thermal pressures. A bigger factor (than heating/cooling) is moisture: speed of panelized construction helps keep things dry.	no influence, moderate climate
SE	Cleremont, FL	SE	Precast Insulated Panel	Jim doesn't feel energy was the major motivator.	slight influence, not the major motivator
	Englewood, FL	SE	Hardiboard SIP	Energy efficiency is very important in Florida's harsh tropical climate.	very important
	Newnan, GA	SE	open wall	Not a deciding factor.	no influence
	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.
	Clemmons, NC	SE	open wall	Energy efficiency wasn't a consideration in the decision to use panels.	no influence
SW	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	Woodland Park, CO	SW	wood SIP	SIPs perform very well in cold Colorado winters.	strong influence, excellent performance
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Telluride, CO	SW	wood SIP	He believes energy efficiency is very important. In rural SW Colorado, fuel is especially expensive.	strong influence

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Chicago, IL	MW	wood SIP	No.	no
NE	New York, NY	NE	Precast Insulated Panel	Competition was maybe 2-3% of the decision.	very slight
	Ridgefield, CT	NE	wood SIP	No.	no
NW	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Seattle, WA	NW	open wall	Sure, anything to help keep costs down makes Walsh more competitive.	yes, reduce cost to compete
SE	Cleremont, FL	SE	Precast Insulated Panel	No.	no
	Englewood, FL	SE	Hardiboard SIP	No.	no
	Newnan, GA	SE	open wall	Moderate influence.	moderate
	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
	Cartersville, GA	SE	open wall (SIP in past)	No.	no
	Clemmons, NC	SE	open wall	Yes, as the companies strive to reduce their per-square-foot costs. They were very successful in beating the national average for these costs.	yes, reduce cost to compete
SW	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	Woodland Park, CO	SW	wood SIP	Yes; using energy efficient SIPs sets them apart from the crowd.	yes, energy niche
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
	Denver, CO	SW	wood SIP	No.	no
	Telluride, CO	SW	wood SIP	No.	no

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors
NE	New York, NY	NE	Precast Insulated Panel	No.	no.
	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
NW	Olympia, WA	NW	wood SIP	No.	no.
	Seattle, WA	NW	open wall	Codes were challenge. Nailing of sheathing needed to be inspected in factory prior to covering with gyp, but panels were from out-of-state. Walsh worked out compromise w/ inspectors. Put fire protect on inside.	challenge; educate Building Inspectors
SE	Cleremont, FL	SE	Precast Insulated Panel	No.	no.
	Englewood, FL	SE	Hardiboard SIP	Because use of these panels eliminates many of the parts/hardware that are typically needed, Brian feels it's actually easier to inspect & to meet code.	no; easier to inspect
	Newnan, GA	SE	open wall	No.	no.
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors
	Clemmons, NC	SE	open wall	When they started, introduced quite a few inspectors to panels. Some were OK with it immediately, and some wanted additional stamps and assurances.	educate Building Inspectors
SW	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	Woodland Park, CO	SW	wood SIP	As 1st panel builder in 3 or 4 counties, they had to educate building inspectors. Between ICBO approvals of SIPs and Ken's education efforts, the inspectors in their area are accepting of SIPs now.	educate Building Inspectors
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Telluride, CO	SW	wood SIP	No.	no.

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
NE	New York, NY	NE	Precast Insulated Panel	They were able to do design things with panels on an affordable housing project that they wouldn't have been able to afford to do with conventional materials.	promoted better design
	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
NW	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Seattle, WA	NW	open wall	Design comes first for their homes, then decision to use panels follows. In seismic neighborhoods, the hold down system being used is influenced by the choice of panel system.	no influence
SE	Cleremont, FL	SE	Precast Insulated Panel	No major influence, but simplicity helps with a successful panel installation.	simple design
	Englewood, FL	SE	Hardiboard SIP	Their panel system has certain span and loading restrictions, which influences them toward more modest sizes and simpler designs that work well for affordable homes.	simple design, limited roof spans
	Newnan, GA	SE	open wall	Not in Lee's homes, which are relatively simple. He thinks that in a more complex design, with lots of high ceilings etc., it would be more difficult (or less cost effective) to use panels.	no influence; uses simple home design
	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence
	Clemmons, NC	SE	open wall	Penalization is most successful when it's repetitive. For special design features, they would likely not try to use panels.	simple and repeatable designs key for success with panels
SW	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	Woodland Park, CO	SW	wood SIP	Their first panelized homes used stick-frame design, and they found it was inefficient. Now they try for 4' dimensions, 4' wide windows spaced 4' in from the edge, etc. This facilitates field fabrication.	openings follow panel dimensions for easy site fabrication
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Telluride, CO	SW	wood SIP	He assumes there are some qualification associated with use of panels, but doesn't know what they are. Architects he works with like and specify panels.	no obvious influence; architects prefer panels

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery
NE	New York, NY	NE	Precast Insulated Panel	Requires a very large project to make precast panels pay (forms specially made). Precaster fell behind, affected scheduling. 1st job 1 form was distorted; repaired in field. Some customization/adjustment needed.	late delivery, panel flaws
	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
NW	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Seattle, WA	NW	open wall	Panelizers not thinking like carpenters (measuring from edge of stud, not center). Initially had some problems coordinating locations of openings, plumbing stubs, and hold-down bolts. Need room for utilities in walls.	miscommunication w/ manufacturer; utilities interface
SE	Cleremont, FL	SE	Precast Insulated Panel	Occasional height errors, but easily resolved. Overall panel supplier/fabricator & their installers were great. Biggest problem was with Jim's engineer making the change. Also hard to put vent stacks in outside wall.	designer resistance, utilities interface
	Englewood, FL	SE	Hardiboard SIP	Expansion & contraction can be problematic. They use control joints & take care w/ their stucco, siding, finishes. They are constantly striving to improve their products, from quality to aesthetics details.	expansion/contraction.
	Newnan, GA	SE	open wall	Very rare manufacturing mistakes; usually field-corrected. Takes some organization to get timing correct, so panels are ordered before foundation is poured.	timing and coordination
	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews
	Clemmons, NC	SE	open wall	Manufacture. errors, mostly when one home in a batch has some 'optional' items. Ex: if homeowners choose between 2 window types, 1 may have different rough opening but the change is overlooked @ plant.	window openings in fabrication
SW	Encino, CA	SW	open wall; closed wall	None.	none
	Woodland Park, CO	SW	wood SIP	Infrequent manufacture. flaws: the two skins are slightly skewed from each other; the recessed cut isn't deep enough. Panels are forgiving; they just let the panel suppliers know. Some subs (esp. elect) resist change.	occasional panel flaws, resistance from subs
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Telluride, CO	SW	wood SIP	Experienced some fabrication errors. Field training w/ subs new to panels slows things some. Some elect problems w/ figuring out box locations. Precut chases may not line up. Custom homes hv outlet @ odd ht.	occasional fabrication errors, interface with electrical

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination
NE	New York, NY	NE	Precast Insulated Panel	Panels ready on time. Working out bugs: wanted the space connecting panels to resemble brick joints but it originally was wider. Doesn't leak like masonry, & better for maintenance (no efflorescence, tuck point).	repeatable design, timing schedule and delivery
	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
NW	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Seattle, WA	NW	open wall	When panelizers think like site carpenters, the builder has confidence in the shop drawings. Walsh has seasoned trained carpenters do careful reviews of all shop drawings & panel layout drawings. This is key.	good shop drawings reviewed by experienced builder
SE	Cleremont, FL	SE	Precast Insulated Panel	Panel supplier also has installation crew, and all went smoothly. Success comes from speedy installation & competitive price; more complicated house designs took longer & were less successful - not repeatable.	training from manufacturer, simple and repeatable design
	Englewood, FL	SE	Hardiboard SIP	Finding the right panel system for you. Good tech support. The more comprehensive the system the better, fabricated for ea. house with as many details in place as possible. Better quality control & predictability.	select appropriate panel/supplier
	Newnan, GA	SE	open wall	Redundant/repeatable design. Crew that's comfortable with panels. Competitive cost, speed of construction, getting out of the weather, and cutting down on theft are all measures of success.	experienced crews, repeatable home design
	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews
	Clemmons, NC	SE	open wall	Repetition - do the same floor plan over, or a limited number of floor plans. From both labor and production standpoint, this saves money. Also scheduling is key with panels. Check codes ahead & resolve any issues.	repeatable design, code research, scheduling
SW	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	Woodland Park, CO	SW	wood SIP	Superior product & energy efficiency. Design building around panel dimensions for easy field fab and speedy construction: on 1st homes w/ stick frame design, extra cutting negated anticipated labor savings.	train crews, design home's dimensions for easy site fab
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Telluride, CO	SW	wood SIP	Need some orientation w/ subs, esp. MEP; panels not common in area. Experienced panel installer is biggest factor for success. For use of a panel system in general, its success stems from energy efficiency.	experienced crew, educated subs

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB
NE	New York, NY	NE	Precast Insulated Panel	No. The builder has been aware of this type of panel for years and has only recently been able to justify cost.	-
	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
NW	Olympia, WA	NW	wood SIP	No.	-
	Seattle, WA	NW	open wall	Information is readily available in the public domain.	ALL
SE	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, only backwards. Lack of good information on existing panels systems caused them to create their own panel system.	Info is lacking
	Newnan, GA	SE	open wall	Yes, the supplier approached him and was convincing.	Panel Supplier
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking
	Clemmons, NC	SE	open wall	No.	-
SW	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	Woodland Park, CO	SW	wood SIP	Yes. The builder got information from a panel supplier, and from his own experience traveling the state working for a different building product supplier.	Panel Supplier
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Telluride, CO	SW	wood SIP	Information on the internet has been useful for the builder to educate himself about panels.	WEB

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems
NE	New York, NY	NE	Precast Insulated Panel	The builder dislikes EIFS (Exterior Insulation and Finish Systems).	Dislikes EIFS
	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
NW	Olympia, WA	NW	wood SIP	No.	-
	Seattle, WA	NW	open wall	Yes, closed-wall systems like SIPs because of the complications of putting utilities, etc. into walls.	SIPS because of close wall problems (utilities, etc)
SE	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, they avoided any panel with wood in it due to Florida's climate and termites.	Dislikes wood panels
	Newnan, GA	SE	open wall	They are not interested in panels like SIPs based on current buyer types and budgets.	SIPS because of budget
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget
	Clemmons, NC	SE	open wall	No.	-
SW	Encino, CA	SW	open wall; closed wall	No.	-
	Woodland Park, CO	SW	wood SIP	Yes. They avoided polyurethane-based SIPs because of health concerns, and selected EPS foam instead.	Dislikes closed cell foams, likes EPS
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Telluride, CO	SW	wood SIP	No.	-

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Chicago, IL	MW	wood SIP	No.	-
NE	New York, NY	NE	Precast Insulated Panel	No. They hired en experienced erection crew, and masons were eliminated, but other subs remained the same.	
	Ridgefield, CT	NE	wood SIP	No.	-
NW	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Seattle, WA	NW	open wall	No, framers understand both open panels and stick framing. However, some framing subs refuse to work with panels from certain suppliers because they have found them to be problematic.	Replaced resistant subs
SE	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	No.	-
	Newnan, GA	SE	open wall	Yes, the builder subs all framing and other trades and some subs were not comfortable switching to panels so he replaced them with crews that were comfortable with the technology.	Replaced resistant subs
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs
	Clemmons, NC	SE	open wall	No. Framing crews adjusted well to open wall panels, as did other subs.	OPEN WALL no changes needed
SW	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	Woodland Park, CO	SW	wood SIP	No. Crews and subs could generally be trained to use panels.	TRAINING ONLY
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Telluride, CO	SW	wood SIP	No. Just requires training.	TRAINING ONLY

Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin
NE	New York, NY	NE	Precast Insulated Panel	Connections could be improved a bit.	PRECAST: connections
	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
NW	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Seattle, WA	NW	open wall	A standardized system for labeling and communicating information about panels would be extremely helpful. Also he would like to see a higher quality of lumber used in panels.	OPEN WALL: labeling standards, higher quality lumber
SE	Cleremont, FL	SE	Precast Insulated Panel	Accommodation for vent stacks in outside walls; currently they run stacks on the outside of the wall and box it in.	PRECAST: vent stacks on exterior walls
	Englewood, FL	SE	Hardiboard SIP	Improvements are ongoing.	-
	Newnan, GA	SE	open wall	No.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING
	Clemmons, NC	SE	open wall	The 1/4" sheathing used by many manufacturers may meet code, but the builder prefers something stronger (thicker).	OPEN WALL: better sheathing
SW	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	Woodland Park, CO	SW	wood SIP	No.	-
	Kerrville, TX	SW	wood SIP	No.	-
	Grass Valley, CA	SW	wood SIP	No.	-
	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Telluride, CO	SW	wood SIP	No.	-

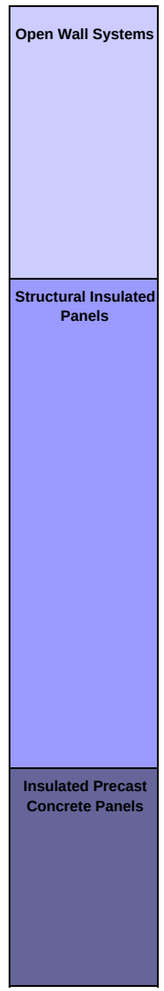
Interview Analysis by REGION

Region	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
MW	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered
NE	New York, NY	NE	Precast Insulated Panel	No. Proximity would only be a concern if it affects pricing.	NO, only if it affects pricing
	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
NW	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Seattle, WA	NW	open wall	Proximity matters as it affects transportation costs. Open wall panels are available from a variety of suppliers.	YES, transportation costs are considered
SE	Cleremont, FL	SE	Precast Insulated Panel	No.	NO
	Englewood, FL	SE	Hardiboard SIP	Not applicable - they are their own supplier.	-
	Newnan, GA	SE	open wall	Proximity plays a minor part in decision-making.	YES, transportation costs are considered
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered
	Clemmons, NC	SE	open wall	No. The large builder orders in such quantity, suppliers make efforts to deliver. Also there are many suppliers of open wall panels in the builder's region.	NO, because they are a large builder, suppliers make efforts to get their business
SW	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	Woodland Park, CO	SW	wood SIP	Yes. Having a panel supplier in Denver makes it convenient to ship panels to jobsites throughout the state.	YES, have panel distributor convenient to jobsites
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
	Denver, CO	SW	wood SIP	No.	NO
	Telluride, CO	SW	wood SIP	No. It hasn't in the past because clients of these custom homes can afford to transport the panels in; for a smaller budget home, proximity could potentially be a factor.	NO, clientele afford any transportation cost increase

Interview Analysis by PANEL TYPE

Builder's experience with panels

Panel Type



Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	Seattle, WA	NW	open wall	Affordable; public, nonprofits, MF	40 years	250	>100	Modular & pre-engineered components; some just-in-time delivery; hoisting.	99% sub	Local companies within 50 miles	open wall
	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)
	Newnan, GA	SE	open wall	Primarily 1st time homebuyers	20 years	2	26-100 (45)	No other advanced technologies	sub	Wheeler's Building Supply	open wall
	Clemmons, NC	SE	open wall	Market rate spec for big developers	Past experience	hundreds	>100	Engineered components like 6" headers; rigid foam board insulation	self	Wicks Lumber, 84 Lumber	open wall
Structural Insulated Panels	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Telluride, CO	SW	wood SIP	Custom homes	20 years	2	<25 (2)	Radiant floors, ICF, manufacture lumber, SIPs, hi-performance windows, low-voltage circuitry.	sub (panel specific)	Winter; some R-control; Murus	wood SIP
	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
	Woodland Park, CO	SW	wood SIP	Custom homes, 2nd homes for retirees	20 years	3	26-100	TJI floor & roof, Optima R-47 roof insulation, ICF foundation, Formadrain.	sub	R-Control	wood SIP
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years		<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP
	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Low income - market rate, RowHs/MF	4 years	20-30	>100	Have worked with HUD, Energy Star	self/sub	Old Castle	Precast SIP
	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Cleremont, FL	SE	Precast Insulated Panel	Single family homes, esp. for RV's	25-30 years	7 (just in this division)	26-100	No other advanced technologies	sub (supplier)	Manning Quick Walls	Precast SIP
	Englewood, FL	SE	Hardiboard SIP	Gov't affordable housing providers	5 years	12	26-100	High-efficiency A/C, heat exchanger, solar hot water, water heater reclaim	sub/self homeowner	Homefront (self)	Hardiboard SIP

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	Seattle, WA	NW	open wall	They don't think SIPs or closed wall would work w/ utilities, etc. in walls. Choose open wall panel suppliers based on reputation, shop visits & drawings. Subs always ask "Who's the panelizer?" when bidding.	Flexibility of open walls
	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier
	Newnan, GA	SE	open wall	Lee's supplier approached him. He hasn't considered SIPs due to current buyer types and budgets. He's seen savings all around, but #1 or #2 reason for using panels is reducing theft from the jobsite.	Better quality, less theft, local supplier
	Clemmons, NC	SE	open wall	Big developers and builders pursue penalization as a means to reduce cost and improve productivity, and big lumber companies responded to their request. They select regional suppliers of open wall panels.	Reduce cost, raise productivity, use local suppliers
Structural Insulated Panels	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Telluride, CO	SW	wood SIP	Panels 1st specified by an architect. Josh liked them & has since used them on his own home. Has worked with different SIP mfgs, based on insulating material & erection/fastening. Murus uses cam-lock system.	Personal experience - own home
	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
	Woodland Park, CO	SW	wood SIP	Ken was interested in panels he'd seen while traveling for another job and wanted to try them. R-Control was the 1st brand presented to them, the one they're most familiar with, and it's local.	Personal experience, local supplier
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Typically build w/ masonry and precast plank ceiling. Precast panels seemed a natural step: crane & erector already onsite. Panels cut out the masonry work. Also experimenting w/ foam & metal framing panels.	Time savings, same technology as foundation
	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Cleremont, FL	SE	Precast Insulated Panel	Jim has used panels in the past, and then a rep from this panel factory visited their offices. They were partially interested in panels due to the CMU shortage following the hurricanes.	Past experience, alternative to scarce materials
	Englewood, FL	SE	Hardiboard SIP	They weren't finding a product they liked, so they created a panel and steel framing system for the types of homes they are building and for the tough Florida climate. Panels are wood-free.	Created own product for superior quality, performance

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	Seattle, WA	NW	open wall	Information is available in the public domain, & anyone can understand the concepts. Walsh has to work to find manufacturers & assess their products/capabilities but general panel information is readily available.	public domain
	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website
	Newnan, GA	SE	open wall	From the supplier.	supplier
	Clemmons, NC	SE	open wall	Generally large developer/builders interested in high productivity are active in research & are familiar with penalization as a tool for increasing that productivity.	own research
Structural Insulated Panels	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Telluride, CO	SW	wood SIP	Finds that Internet is a great source for educating himself about panels	internet/public domain
	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
	Woodland Park, CO	SW	wood SIP	Ken worked as a distributor for another company & in his travels started to see SIPs used in other areas. He became interested & got information from salesmen at AFP (R-Control). This was pre-internet.	own experience with building product suppliers
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet
	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	They've been aware of panels and interested in them for a number of years, but previously they weren't able to make the numbers work out.	public domain
	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Cleremont, FL	SE	Precast Insulated Panel	Jim is familiar with SIPs from past experiences. In this instance, the panel supplier contacted them.	past experience, supplier
	Englewood, FL	SE	Hardiboard SIP	Information availability was very poor. They couldn't find a suitable product, so they elected to create their own.	good information is not available; found no suitable product

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	Seattle, WA	NW	open wall	Cost-driven decision. Walsh does 75% stick frame, 25% panels. Panels pay when schedule is tight, or space is tight. Sometimes they see labor savings. Can use apprentice carpenters rather than journeymen.	evaluated case-by-case; labor & material savings
	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less
	Newnan, GA	SE	open wall	With panels, labor costs have decreased (less time, + hire less skilled crew), material costs decreased also. Much less waste on the jobsite; they save on hauling fees, too. Saving all the way around.	materials, labor and hauling savings
	Clemmons, NC	SE	open wall	They were able to reduce cost by half or better using penalization and repeating home designs.	dramatically reduce cost, cycle time with repeatable design
Structural Insulated Panels	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Telluride, CO	SW	wood SIP	Feels $ is a tad higher for panels than stick frame (material $ > labor savings); mostly not an issue w/ his clients. Energy payback. One project never got built partly due to high markup cost from panel middleman.	slightly higher cost, but clients don't mind - energy payback
	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo	no cost difference in his region, clients want SIPs
	Woodland Park, CO	SW	wood SIP	In the beginning material costs were higher & they had to hope to make up differences in labor savings. Now the gap is closing & he doesn't feel cost is much of a	slightly higher cost, but shrinking; quality, energy payback
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings
	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Structural concrete panel are costly, but offer speed & some construction savings. Decision was based more on a desire to try something new with potential than strict cost. Takes v. big project 2 make it pay.	higher, but better quality
	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Cleremont, FL	SE	Precast Insulated Panel	Jim had to match the cost of panel construction to the cost of block construction.	cost similar to traditional construction
	Englewood, FL	SE	Hardiboard SIP	They were looking for labor savings (which took some time to actually happen).	labor savings

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	Seattle, WA	NW	open wall	With good panelizers, 99% of panels are correct & Walsh does very little modification. That is a quality enhancement. Ability to keep things dryer by getting the roo on faster is a quality enhancement.	much better
	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good
	Newnan, GA	SE	open wall	Panel quality is better; factory-made units are almost perfect, compared to a guy in the field trying to frame in the mud and rain.	better
	Clemmons, NC	SE	open wall	Brian actually feels that the open wall panels initially didn't contribute to quality, but they have improved & they are actually better quality than stick now. Unless flimsy sheathing is spec'd.	better (took time to get there)
Structural Insulated Panels	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Telluride, CO	SW	wood SIP	Based on his own research & experience, he feels SIPs homes are stronger.	stronger, better quality
	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
	Woodland Park, CO	SW	wood SIP	Big factor. Panels mean home is straight and true and less likely to be messed up by varying quality of local trades people.	better quality, straight & true
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90º corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	The panels are much more consistent. Much more uniform, much tighter, and being factory built means they don't have weather issues with their concrete.	better quality, consistency, tightness
	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Cleremont, FL	SE	Precast Insulated Panel	Quality wasn't a deciding factor from builder's perspective, but Jim feels homeowners like the panels because of their soundness: the home has a solid, quality feel.	not as critical - but homeowners respond to quality feel
	Englewood, FL	SE	Hardiboard SIP	The panels are very durable. Reduces the # of parts needed for the home structure (good for hurricanes). Reduced # of subs on the job means better quality, more control. Homeowners seek better quality.	better quality control, fewer subs

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	Seattle, WA	NW	open wall	Building with panels is generally more efficient as long as site crews are prepared and familiar with the system. Need to be reading a screen, determination in which order to hoist the panels.	faster when crew is prepared
	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster
	Newnan, GA	SE	open wall	Efficiency has gone up considerably; Lee estimates it takes half the time to frame a home. Faster construction time also means getting out of the weather quickly.	faster
	Clemmons, NC	SE	open wall	This was the driving force. Framing times decreased and productivity increased dramatically. Even a new crew unfamiliar with panels would beat conventional framing speeds. Brian supervised 20-30 homes/ mo.	faster, speed is main motivator
Structural Insulated Panels	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Telluride, CO	SW	wood SIP	He feels that perhaps some of the increased material cost is offset by getting the homes weather tight faster. The theory is that they save labor; probably true but doesn't seem to be the major deciding factor.	not much faster
	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
	Woodland Park, CO	SW	wood SIP	Building with panels is efficient, especially with their earlier designs which were very simple & easily field-fabricated.	faster, especially with simpler designs
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost
	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	The site seems to run cleaner and smoother without masons and masonry materials. Masons tend to tie up a job, & materials are messy; without them, many other trades could work at once. Can build in all weather.	much faster, & fewer trades increases efficiency
	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Cleremont, FL	SE	Precast Insulated Panel	Speed was a big factor. They use a crane & the panels are erected very quickly. Homeowners like the quickness of the panels.	much faster, big factor
	Englewood, FL	SE	Hardiboard SIP	Are now seeing labor savings they needed, but it took several years of refinement to get field production levels up to levels supporting the cost. Fewer vendors to coordinate means less delays. Faster, predictable.	took years to see the productivity they wanted to make it pay. More predictable.

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	Seattle, WA	NW	open wall	Not a big factor, as their moderate climate (Seattle) doesn't yield big thermal pressures. A bigger factor (than heating/cooling) is moisture: speed of panelized construction helps keep things dry.	no influence, moderate climate
	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.
	Newnan, GA	SE	open wall	Not a deciding factor.	no influence
	Clemmons, NC	SE	open wall	Energy efficiency wasn't a consideration in the decision to use panels.	no influence
Structural Insulated Panels	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Telluride, CO	SW	wood SIP	He believes energy efficiency is very important. In rural SW Colorado, fuel is especially expensive.	strong influence
	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
	Woodland Park, CO	SW	wood SIP	SIPs perform very well in cold Colorado winters.	strong influence, excellent performance
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point
	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Energy efficiency was a factor. Precast panels outperform masonry for air tightness, and also much better for water tightness. They have experienced far fewer leak complaints.	strong influence, airtight & also much more watertight.
	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Cleremont, FL	SE	Precast Insulated Panel	Jim doesn't feel energy was the major motivator.	slight influence, not the major motivator
	Englewood, FL	SE	Hardiboard SIP	Energy efficiency is very important in Florida's harsh tropical climate.	very important

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	Seattle, WA	NW	open wall	Sure, anything to help keep costs down makes Walsh more competitive.	yes, reduce cost to compete
	Cartersville, GA	SE	open wall (SIP in past)	No.	no
	Newnan, GA	SE	open wall	Moderate influence.	moderate
	Clemmons, NC	SE	open wall	Yes, as the companies strive to reduce their per-square-foot costs. They were very successful in beating the national average for these costs.	yes, reduce cost to compete
Structural Insulated Panels	Denver, CO	SW	wood SIP	No.	no
	Telluride, CO	SW	wood SIP	No.	no
	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
	Woodland Park, CO	SW	wood SIP	Yes; using energy efficient SIPs sets them apart from the crowd.	yes, energy niche
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Ridgefield, CT	NE	wood SIP	No.	no
	Chicago, IL	MW	wood SIP	No.	no
	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Competition was maybe 2-3% of the decision.	very slight
	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Cleremont, FL	SE	Precast Insulated Panel	No.	no
	Englewood, FL	SE	Hardiboard SIP	No.	no

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	Seattle, WA	NW	open wall	Codes were challenge. Nailing of sheathing needed to be inspected in factory prior to covering with gyp, but panels were from out-of-state. Walsh worked out compromise w/ inspectors. Put fire protect on inside.	challenge; educate Building Inspectors
	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors
	Newnan, GA	SE	open wall	No.	no.
	Clemmons, NC	SE	open wall	When they started, introduced quite a few inspectors to panels. Some were OK with it immediately, and some wanted additional stamps and assurances.	educate Building Inspectors
Structural Insulated Panels	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Telluride, CO	SW	wood SIP	No.	no.
	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
	Woodland Park, CO	SW	wood SIP	As 1st panel builder in 3 or 4 counties, they had to educate building inspectors. Between ICBO approvals of SIPs and Ken's education efforts, the inspectors in their area are accepting of SIPs now.	educate Building Inspectors
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
	Olympia, WA	NW	wood SIP	No.	no.
	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	No.	no.
	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Cleremont, FL	SE	Precast Insulated Panel	No.	no.
	Englewood, FL	SE	Hardiboard SIP	Because use of these panels eliminates many of the parts/hardware that are typically needed, Brian feels it's actually easier to inspect & to meet code.	no; easier to inspect

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	Seattle, WA	NW	open wall	Design comes first for their homes, then decision to use panels follows. In seismic neighborhoods, the hold down system being used is influenced by the choice of panel system.	no influence
	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence
	Newnan, GA	SE	open wall	Not in Lee's homes, which are relatively simple. He thinks that in a more complex design, with lots of high ceilings etc., it would be more difficult (or less cost effective) to use panels.	no influence; uses simple home design
	Clemmons, NC	SE	open wall	Penalization is most successful when it's repetitive. For special design features, they would likely not try to use panels.	simple and repeatable designs key for success with panels
Structural Insulated Panels	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Telluride, CO	SW	wood SIP	He assumes there are some qualification associated with use of panels, but doesn't know what they are. Architects he works with like and specify panels.	no obvious influence; architects prefer panels
	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Woodland Park, CO	SW	wood SIP	Their first panelized homes used stick-frame design, and they found it was inefficient. Now they try for 4' dimensions, 4' wide windows spaced 4' in from the edge, etc. This facilitates field fabrication.	openings follow panel dimensions for easy site fabrication
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	They were able to do design things with panels on an affordable housing project that they wouldn't have been able to afford to do with conventional materials.	promoted better design
	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Cleremont, FL	SE	Precast Insulated Panel	No major influence, but simplicity helps with a successful panel installation.	simple design
	Englewood, FL	SE	Hardiboard SIP	Their panel system has certain span and loading restrictions, which influences them toward more modest sizes and simpler designs that work well for affordable homes.	simple design, limited roof spans

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	None.	none
	Seattle, WA	NW	open wall	Panelizers not thinking like carpenters (measuring from edge of stud, not center). Initially had some problems coordinating locations of openings, plumbing stubs, and hold-down bolts. Need room for utilities in walls.	miscommunication w/ manufacturer; utilities interface
	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews
	Newnan, GA	SE	open wall	Very rare manufacturing mistakes; usually field-corrected. Takes some organization to get timing correct, so panels are ordered before foundation is poured.	timing and coordination
	Clemmons, NC	SE	open wall	Manufacture. errors, mostly when one home in a batch has some 'optional' items. Ex: if homeowners choose between 2 window types, 1 may have different rough opening but the change is overlooked @ plant.	window openings in fabrication
Structural Insulated Panels	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Telluride, CO	SW	wood SIP	Experienced some fabrication errors. Field training w/ subs new to panels slows things some. Some elect problems w/ figuring out box locations. Precut chases may not line up. Custom homes hv outlet @ odd ht.	occasional fabrication errors, interface with electrical
	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
	Woodland Park, CO	SW	wood SIP	Infrequent manufacture. flaws: the two skins are slightly skewed from each other; the recessed cut isn't deep enough. Panels are forgiving; they just let the panel suppliers know. Some subs (esp. elect) resist change.	occasional panel flaws, resistance from subs
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery
	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Requires a very large project to make precast panels pay (forms specially made). Precaster fell behind, affected scheduling. 1st job 1 form was distorted; repaired in field. Some customization/adjustment needed.	late delivery, panel flaws
	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Cleremont, FL	SE	Precast Insulated Panel	Occasional height errors, but easily resolved. Overall panel supplier/fabricator & their installers were great. Biggest problem was with Jim's engineer making the change. Also hard to put vent stacks in outside wall.	designer resistance, utilities interface
	Englewood, FL	SE	Hardiboard SIP	Expansion & contraction can be problematic. They use control joints & take care w/ their stucco, siding, finishes. They are constantly striving to improve their products, from quality to aesthetics details.	expansion/contraction.

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	Seattle, WA	NW	open wall	When panelizers think like site carpenters, the builder has confidence in the shop drawings. Walsh has seasoned trained carpenters do careful reviews of all shop drawings & panel layout drawings. This is key.	good shop drawings reviewed by experienced builder
	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews
	Newnan, GA	SE	open wall	Redundant/repeatable design. Crew that's comfortable with panels. Competitive cost, speed of construction, getting out of the weather, and cutting down on theft are all measures of success.	experienced crews, repeatable home design
	Clemmons, NC	SE	open wall	Repetition - do the same floor plan over, or a limited number of floor plans. From both labor and production standpoint, this saves money. Also scheduling is key with panels. Check codes ahead & resolve any issues.	repeatable design, code research, scheduling
Structural Insulated Panels	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Telluride, CO	SW	wood SIP	Need some orientation w/ subs, esp. MEP; panels not common in area. Experienced panel installer is biggest factor for success. For use of a panel system in general, its success stems from energy efficiency.	experienced crew, educated subs
	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
	Woodland Park, CO	SW	wood SIP	Superior product & energy efficiency. Design building around panel dimensions for easy field fab and speedy construction: on 1st homes w/ stick frame design, extra cutting negated anticipated labor savings.	train crews, design home's dimensions for easy site fab
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination
	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Panels ready on time. Working out bugs: wanted the space connecting panels to resemble brick joints but it originally was wider. Doesn't leak like masonry, & better for maintenance (no efflorescence, tuck point).	repeatable design, timing schedule and delivery
	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Cleremont, FL	SE	Precast Insulated Panel	Panel supplier also has installation crew, and all went smoothly. Success comes from speedy installation & competitive price; more complicated house designs took longer & were less successful - not repeatable.	training from manufacturer, simple and repeatable design
	Englewood, FL	SE	Hardiboard SIP	Finding the right panel system for you. Good tech support. The more comprehensive the system the better, fabricated for ea. house with as many details in place as possible. Better quality control & predictability.	select appropriate panel/supplier

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	Seattle, WA	NW	open wall	Information is readily available in the public domain.	ALL
	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking
	Newnan, GA	SE	open wall	Yes, the supplier approached him and was convincing.	Panel Supplier
	Clemmons, NC	SE	open wall	No.	-
Structural Insulated Panels	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Telluride, CO	SW	wood SIP	Information on the internet has been useful for the builder to educate himself about panels.	WEB
	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
	Woodland Park, CO	SW	wood SIP	Yes. The builder got information from a panel supplier, and from his own experience traveling the state working for a different building product supplier.	Panel Supplier
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
	Olympia, WA	NW	wood SIP	No.	-
	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	No. The builder has been aware of this type of panel for years and has only recently been able to justify cost.	-
	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, only backwards. Lack of good information on existing panels systems caused them to create their own panel system.	Info is lacking

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	No.	-
	Seattle, WA	NW	open wall	Yes, closed-wall systems like SIPs because of the complications of putting utilities, etc. into walls.	SIPS because of close wall problems (utilities, etc)
	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget
	Newnan, GA	SE	open wall	They are not interested in panels like SIPs based on current buyer types and budgets.	SIPS because of budget
	Clemmons, NC	SE	open wall	No.	-
Structural Insulated Panels	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Telluride, CO	SW	wood SIP	No.	-
	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
	Woodland Park, CO	SW	wood SIP	Yes. They avoided polyurethane-based SIPs because of health concerns, and selected EPS foam instead.	Dislikes closed cell foams, likes EPS
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
	Olympia, WA	NW	wood SIP	No.	-
	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	The builder dislikes EIFS (Exterior Insulation and Finish Systems).	Dislikes EIFS
	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, they avoided any panel with wood in it due to Florida's climate and termites.	Dislikes wood panels

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	Seattle, WA	NW	open wall	No, framers understand both open panels and stick framing. However, some framing subs refuse to work with panels from certain suppliers because they have found them to be problematic.	Replaced resistant subs
	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs
	Newnan, GA	SE	open wall	Yes, the builder subs all framing and other trades and some subs were not comfortable switching to panels so he replaced them with crews that were comfortable with the technology.	Replaced resistant subs
	Clemmons, NC	SE	open wall	No. Framing crews adjusted well to open wall panels, as did other subs.	OPEN WALL no changes needed
Structural Insulated Panels	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Telluride, CO	SW	wood SIP	No. Just requires training.	TRAINING ONLY
	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
	Woodland Park, CO	SW	wood SIP	No. Crews and subs could generally be trained to use panels.	TRAINING ONLY
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Ridgefield, CT	NE	wood SIP	No.	-
	Chicago, IL	MW	wood SIP	No.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	No. They hired en experienced erection crew, and masons were eliminated, but other subs remained the same.	0
	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	No.	-

Interview Analysis by PANEL TYPE

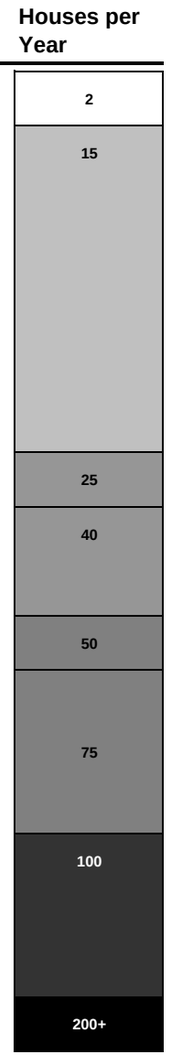
Panel Type	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	Seattle, WA	NW	open wall	A standardized system for labeling and communicating information about panels would be extremely helpful. Also he would like to see a higher quality of lumber used in panels.	OPEN WALL: labeling standards, higher quality lumber
	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING
	Newnan, GA	SE	open wall	No.	-
	Clemmons, NC	SE	open wall	The 1/4" sheathing used by many manufacturers may meet code, but the builder prefers something stronger (thicker).	OPEN WALL: better sheathing
Structural Insulated Panels	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Telluride, CO	SW	wood SIP	No.	-
	Grass Valley, CA	SW	wood SIP	No.	-
	Woodland Park, CO	SW	wood SIP	No.	-
	Kerrville, TX	SW	wood SIP	No.	-
	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	Connections could be improved a bit.	PRECAST: connections
	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Cleremont, FL	SE	Precast Insulated Panel	Accommodation for vent stacks in outside walls; currently they run stacks on the outside of the wall and box it in.	PRECAST: vent stacks on exterior walls
	Englewood, FL	SE	Hardiboard SIP	Improvements are ongoing.	-

Interview Analysis by PANEL TYPE

Panel Type	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
Open Wall Systems	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	Seattle, WA	NW	open wall	Proximity matters as it affects transportation costs. Open wall panels are available from a variety of suppliers.	YES, transportation costs are considered
	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered
	Newnan, GA	SE	open wall	Proximity plays a minor part in decision-making.	YES, transportation costs are considered
	Clemmons, NC	SE	open wall	No. The large builder orders in such quantity, suppliers make efforts to deliver. Also there are many suppliers of open wall panels in the builder's region.	NO, because they are a large builder, suppliers make efforts to get their business
Structural Insulated Panels	Denver, CO	SW	wood SIP	No.	NO
	Telluride, CO	SW	wood SIP	No. It hasn't in the past because clients of these custom homes can afford to transport the panels in; for a smaller budget home, proximity could potentially be a factor.	NO, clientele afford any transportation cost increase
	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
	Woodland Park, CO	SW	wood SIP	Yes. Having a panel supplier in Denver makes it convenient to ship panels to jobsites throughout the state.	YES, have panel distributor convenient to jobsites
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
Insulated Precast Concrete Panels	New York, NY	NE	Precast Insulated Panel	No. Proximity would only be a concern if it affects pricing.	NO, only if it affects pricing
	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Cleremont, FL	SE	Precast Insulated Panel	No.	NO
	Englewood, FL	SE	Hardiboard SIP	Not applicable - they are their own supplier.	-

Interview Analysis by HOUSES PER YEAR

Builder's experience with panels



Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
2	Telluride, CO	SW	wood SIP	Custom homes	20 years	2	<25 (2)	Radiant floors, ICF, manufacture lumber, SIPs, hi-performance windows, low-voltage circuitry.	sub (panel specific)	Winter; some R-control; Murus	wood SIP
15	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years		<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
25	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP
40	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Newnan, GA	SE	open wall	Primarily 1st time homebuyers	20 years	2	26-100 (45)	No other advanced technologies	sub	Wheeler's Building Supply	open wall
50	Woodland Park, CO	SW	wood SIP	Custom homes, 2nd homes for retirees	20 years	3	26-100	TJI floor & roof, Optima R-47 roof insulation, ICF foundation, Formadrain.	sub	R-Control	wood SIP
75	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)
	Cleremont, FL	SE	Precast Insulated Panel	Single family homes, esp. for RV's	25-30 years	7 (just in this division)	26-100	No other advanced technologies	sub (supplier)	Manning Quick Walls	Precast SIP
	Englewood, FL	SE	Hardiboard SIP	Gov't affordable housing providers	5 years	12	26-100	High-efficiency A/C, heat exchanger, solar hot water, water heater reclaim	sub/self homeowner	Homefront (self)	Hardiboard SIP
100	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	New York, NY	NE	Precast Insulated Panel	Low income - market rate, RowHs/MF	4 years	20-30	>100	Have worked with HUD, Energy Star	self/sub	Old Castle	Precast SIP
	Seattle, WA	NW	open wall	Affordable; public, nonprofits, MF	40 years	250	>100	Modular & pre-engineered components; some just-in-time delivery; hoisting.	99% sub	Local companies within 50 miles	open wall
200+	Clemmons, NC	SE	open wall	Market rate spec for big developers	Past experience	hundreds	>100	Engineered components like 6" headers; rigid foam board insulation	self	Wicks Lumber, 84 Lumber	open wall

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
2	Telluride, CO	SW	wood SIP	Panels 1st specified by an architect. Josh liked them & has since used them on his own home. Has worked with different SIP mfgs, based on insulating material & erection/fastening. Murus uses cam-lock system.	Personal experience - own home
15	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
25	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals
40	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Newnan, GA	SE	open wall	Lee's supplier approached him. He hasn't considered SIPs due to current buyer types and budgets. He's seen savings all around, but #1 or #2 reason for using panels is reducing theft from the jobsite.	Better quality, less theft, local supplier
50	Woodland Park, CO	SW	wood SIP	Ken was interested in panels he'd seen while traveling for another job and wanted to try them. R-Control was the 1st brand presented to them, the one they're most familiar with, and it's local.	Personal experience, local supplier
75	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier
	Cleremont, FL	SE	Precast Insulated Panel	Jim has used panels in the past, and then a rep from this panel factory visited their offices. They were partially interested in panels due to the CMU shortage following the hurricanes.	Past experience, alternative to scarce materials
	Englewood, FL	SE	Hardiboard SIP	They weren't finding a product they liked, so they created a panel and steel framing system for the types of homes they are building and for the tough Florida climate. Panels are wood-free.	Created own product for superior quality, performance
100	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	New York, NY	NE	Precast Insulated Panel	Typically build w/ masonry and precast plank ceiling. Precast panels seemed a natural step: crane & erector already onsite. Panels cut out the masonry work. Also experimenting w/ foam & metal framing panels.	Time savings, same technology as foundation
	Seattle, WA	NW	open wall	They don't think SIPs or closed wall would work w/ utilities, etc. in walls. Choose open wall panel suppliers based on reputation, shop visits & drawings. Subs always ask "Who's the panelizer?" when bidding.	Flexibility of open walls
200+	Clemmons, NC	SE	open wall	Big developers and builders pursue penalization as a means to reduce cost and improve productivity, and big lumber companies responded to their request. They select regional suppliers of open wall panels.	Reduce cost, raise productivity, use local suppliers

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
2	Telluride, CO	SW	wood SIP	Finds that Internet is a great source for educating himself about panels	internet/public domain
15	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
25	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet
40	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Newnan, GA	SE	open wall	From the supplier.	supplier
50	Woodland Park, CO	SW	wood SIP	Ken worked as a distributor for another company & in his travels started to see SIPs used in other areas. He became interested & got information from salesmen at AFP (R-Control). This was pre-internet.	own experience with building product suppliers
75	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website
	Cleremont, FL	SE	Precast Insulated Panel	Jim is familiar with SIPs from past experiences. In this instance, the panel supplier contacted them.	past experience, supplier
	Englewood, FL	SE	Hardiboard SIP	Information availability was very poor. They couldn't find a suitable product, so they elected to create their own.	good information is not available; found no suitable product
100	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	New York, NY	NE	Precast Insulated Panel	They've been aware of panels and interested in them for a number of years, but previously they weren't able to make the numbers work out.	public domain
	Seattle, WA	NW	open wall	Information is available in the public domain, & anyone can understand the concepts. Walsh has to work to find manufacturers & assess their products/capabilities, but general panel information is readily available.	public domain
200+	Clemmons, NC	SE	open wall	Generally large developer/builders interested in high productivity are active in research & are familiar with penalization as a tool for increasing that productivity.	own research

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
2	Telluride, CO	SW	wood SIP	Feels $ is a tad higher for panels than stick frame (material $ > labor savings); mostly not an issue w/ his clients. Energy payback. One project never got built partly due to high markup cost from panel middleman.	slightly higher cost, but clients don't mind - energy payback
15	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo finishing, etc. SIPs roofs are $$$, but excellent.	no cost difference in his region, clients want SIPs
	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
25	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings
40	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Newnan, GA	SE	open wall	With panels, labor costs have decreased (less time, + hire less skilled crew), material costs decreased also. Much less waste on the jobsite; they save on hauling fees, too. Saving all the way around.	materials, labor and hauling savings
50	Woodland Park, CO	SW	wood SIP	In the beginning material costs were higher & they had to hope to make up differences in labor savings. Now the gap is closing & he doesn't feel cost is much of a issue. His clients want SIPs.	slightly higher cost, but shrinking; quality, energy payback
75	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less
	Cleremont, FL	SE	Precast Insulated Panel	Jim had to match the cost of panel construction to the cost of block construction.	cost similar to traditional construction
	Englewood, FL	SE	Hardiboard SIP	They were looking for labor savings (which took some time to actually happen).	labor savings
100	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	New York, NY	NE	Precast Insulated Panel	Structural concrete panel are costly, but offer speed & some construction savings. Decision was based more on a desire to try something new with potential than strict cost. Takes v. big project 2 make it pay.	higher, but better quality
	Seattle, WA	NW	open wall	Cost-driven decision. Walsh does 75% stick frame, 25% panels. Panels pay when schedule is tight, or space is tight. Sometimes they see labor savings. Can use apprentice carpenters rather than journeymen.	evaluated case-by-case; labor & material savings
200+	Clemmons, NC	SE	open wall	They were able to reduce cost by half or better using penalization and repeating home designs.	dramatically reduce cost, cycle time with repeatable design

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
2	Telluride, CO	SW	wood SIP	Based on his own research & experience, he feels SIPs homes are stronger.	stronger, better quality
15	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90º corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
25	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality
40	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Newnan, GA	SE	open wall	Panel quality is better; factory-made units are almost perfect, compared to a guy in the field trying to frame in the mud and rain.	better
50	Woodland Park, CO	SW	wood SIP	Big factor. Panels mean home is straight and true and less likely to be messed up by varying quality of local trades people.	better quality, straight & true
75	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good
	Cleremont, FL	SE	Precast Insulated Panel	Quality wasn't a deciding factor from builder's perspective, but Jim feels homeowners like the panels because of their soundness: the home has a solid, quality feel.	not as critical - but homeowners respond to quality feel
	Englewood, FL	SE	Hardiboard SIP	The panels are very durable. Reduces the # of parts needed for the home structure (good for hurricanes). Reduced # of subs on the job means better quality, mor control. Homeowners seek better quality.	better quality control, fewer subs
100	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	New York, NY	NE	Precast Insulated Panel	The panels are much more consistent. Much more uniform, much tighter, and being factory built means they don't have weather issues with their concrete.	better quality, consistency, tightness
	Seattle, WA	NW	open wall	With good panelizers, 99% of panels are correct & Walsh does very little modification. That is a quality enhancement. Ability to keep things dryer by getting the roo on faster is a quality enhancement.	much better
200+	Clemmons, NC	SE	open wall	Brian actually feels that the open wall panels initially didn't contribute to quality, but they have improved & they are actually better quality than stick now. Unless flimsy sheathing is spec'd.	better (took time to get there)

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
2	Telluride, CO	SW	wood SIP	He feels that perhaps some of the increased material cost is offset by getting the homes weather tight faster. The theory is that they save labor; probably true but doesn't seem to be the major deciding factor.	not much faster
15	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
25	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost
40	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Newnan, GA	SE	open wall	Efficiency has gone up considerably; Lee estimates it takes half the time to frame a home. Faster construction time also means getting out of the weather quickly.	faster
50	Woodland Park, CO	SW	wood SIP	Building with panels is efficient, especially with their earlier designs which were very simple & easily field-fabricated.	faster, especially with simpler designs
75	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster
	Cleremont, FL	SE	Precast Insulated Panel	Speed was a big factor. They use a crane & the panels are erected very quickly. Homeowners like the quickness of the panels.	much faster, big factor
	Englewood, FL	SE	Hardiboard SIP	Are now seeing labor savings they needed, but it took several years of refinement to get field production levels up to levels supporting the cost. Fewer vendors to coordinate means less delays. Faster, predictable.	took years to see the productivity they wanted to make it pay. More predictable.
100	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	New York, NY	NE	Precast Insulated Panel	The site seems to run cleaner and smoother without masons and masonry materials. Masons tend to tie up a job, & materials are messy; without them, many other trades could work at once. Can build in all weather.	much faster, & fewer trades increases efficiency
	Seattle, WA	NW	open wall	Building with panels is generally more efficient as long as site crews are prepared and familiar with the system. Need to be reading a screen, determination in which order to hoist the panels.	faster when crew is prepared
200+	Clemmons, NC	SE	open wall	This was the driving force. Framing times decreased and productivity increased dramatically. Even a new crew unfamiliar with panels would beat conventional framing speeds. Brian supervised 20-30 homes/ mo.	faster, speed is main motivator

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
2	Telluride, CO	SW	wood SIP	He believes energy efficiency is very important. In rural SW Colorado, fuel is especially expensive.	strong influence
15	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
25	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point
40	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Newnan, GA	SE	open wall	Not a deciding factor.	no influence
50	Woodland Park, CO	SW	wood SIP	SIPs perform very well in cold Colorado winters.	strong influence, excellent performance
75	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.
	Cleremont, FL	SE	Precast Insulated Panel	Jim doesn't feel energy was the major motivator.	slight influence, not the major motivator
	Englewood, FL	SE	Hardiboard SIP	Energy efficiency is very important in Florida's harsh tropical climate.	very important
100	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	New York, NY	NE	Precast Insulated Panel	Energy efficiency was a factor. Precast panels outperform masonry for air tightness, and also much better for water tightness. They have experienced far fewer leak complaints.	strong influence, airtight & also much more watertight.
	Seattle, WA	NW	open wall	Not a big factor, as their moderate climate (Seattle) doesn't yield big thermal pressures. A bigger factor (than heating/cooling) is moisture: speed of panelized construction helps keep things dry.	no influence, moderate climate
200+	Clemmons, NC	SE	open wall	Energy efficiency wasn't a consideration in the decision to use panels.	no influence

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
2	Telluride, CO	SW	wood SIP	No.	no
15	Ridgefield, CT	NE	wood SIP	No.	no
	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Denver, CO	SW	wood SIP	No.	no
	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
25	Chicago, IL	MW	wood SIP	No.	no
40	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Newnan, GA	SE	open wall	Moderate influence.	moderate
50	Woodland Park, CO	SW	wood SIP	Yes; using energy efficient SIPs sets them apart from the crowd.	yes, energy niche
75	Cartersville, GA	SE	open wall (SIP in past)	No.	no
	Cleremont, FL	SE	Precast Insulated Panel	No.	no
	Englewood, FL	SE	Hardiboard SIP	No.	no
100	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	New York, NY	NE	Precast Insulated Panel	Competition was maybe 2-3% of the decision.	very slight
	Seattle, WA	NW	open wall	Sure, anything to help keep costs down makes Walsh more competitive.	yes, reduce cost to compete
200+	Clemmons, NC	SE	open wall	Yes, as the companies strive to reduce their per-square-foot costs. They were very successful in beating the national average for these costs.	yes, reduce cost to compete

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
2	Telluride, CO	SW	wood SIP	No.	no.
15	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
	Olympia, WA	NW	wood SIP	No.	no.
	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
25	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors
40	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Newnan, GA	SE	open wall	No.	no.
50	Woodland Park, CO	SW	wood SIP	As 1st panel builder in 3 or 4 counties, they had to educate building inspectors. Between ICBO approvals of SIPs and Ken's education efforts, the inspectors in their area are accepting of SIPs now.	educate Building Inspectors
75	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors
	Cleremont, FL	SE	Precast Insulated Panel	No.	no.
	Englewood, FL	SE	Hardiboard SIP	Because use of these panels eliminates many of the parts/hardware that are typically needed, Brian feels it's actually easier to inspect & to meet code.	no; easier to inspect
100	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	New York, NY	NE	Precast Insulated Panel	No.	no.
	Seattle, WA	NW	open wall	Codes were challenge. Nailing of sheathing needed to be inspected in factory prior to covering with gyp, but panels were from out-of-state. Walsh worked out compromise w/ inspectors. Put fire protect on inside.	challenge; educate Building Inspectors
200+	Clemmons, NC	SE	open wall	When they started, introduced quite a few inspectors to panels. Some were OK with it immediately, and some wanted additional stamps and assurances.	educate Building Inspectors

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
2	Telluride, CO	SW	wood SIP	He assumes there are some qualification associated with use of panels, but doesn't know what they are. Architects he works with like and specify panels.	no obvious influence; architects prefer panels
15	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
25	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
40	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Newnan, GA	SE	open wall	Not in Lee's homes, which are relatively simple. He thinks that in a more complex design, with lots of high ceilings etc., it would be more difficult (or less cost effective) to use panels.	no influence; uses simple home design
50	Woodland Park, CO	SW	wood SIP	Their first panelized homes used stick-frame design, and they found it was inefficient. Now they try for 4' dimensions, 4' wide windows spaced 4' in from the edge, etc. This facilitates field fabrication.	openings follow panel dimensions for easy site fabrication
75	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence
	Cleremont, FL	SE	Precast Insulated Panel	No major influence, but simplicity helps with a successful panel installation.	simple design
	Englewood, FL	SE	Hardiboard SIP	Their panel system has certain span and loading restrictions, which influences them toward more modest sizes and simpler designs that work well for affordable homes.	simple design, limited roof spans
100	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	New York, NY	NE	Precast Insulated Panel	They were able to do design things with panels on an affordable housing project that they wouldn't have been able to afford to do with conventional materials.	promoted better design
	Seattle, WA	NW	open wall	Design comes first for their homes, then decision to use panels follows. In seismic neighborhoods, the hold down system being used is influenced by the choice of panel system.	no influence
200+	Clemmons, NC	SE	open wall	Penalization is most successful when it's repetitive. For special design features, they would likely not try to use panels.	simple and repeatable designs key for success with panels

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
2	Telluride, CO	SW	wood SIP	Experienced some fabrication errors. Field training w/ subs new to panels slows things some. Some elect problems w/ figuring out box locations. Precut chases may not line up. Custom homes hv outlet @ odd ht.	occasional fabrication errors, interface with electrical
15	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
25	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery
40	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Newnan, GA	SE	open wall	Very rare manufacturing mistakes; usually field-corrected. Takes some organization to get timing correct, so panels are ordered before foundation is poured.	timing and coordination
50	Woodland Park, CO	SW	wood SIP	Infrequent manufacture. flaws: the two skins are slightly skewed from each other; the recessed cut isn't deep enough. Panels are forgiving; they just let the panel suppliers know. Some subs (esp. elect) resist change.	occasional panel flaws, resistance from subs
75	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews
	Cleremont, FL	SE	Precast Insulated Panel	Occasional height errors, but easily resolved. Overall panel supplier/fabricator & their installers were great. Biggest problem was with Jim's engineer making the change. Also hard to put vent stacks in outside wall.	designer resistance, utilities interface
	Englewood, FL	SE	Hardiboard SIP	Expansion & contraction can be problematic. They use control joints & take care w/ their stucco, siding, finishes. They are constantly striving to improve their products, from quality to aesthetics details.	expansion/contraction.
100	Encino, CA	SW	open wall; closed wall	None.	none
	New York, NY	NE	Precast Insulated Panel	Requires a very large project to make precast panels pay (forms specially made). Precaster fell behind, affected scheduling. 1st job 1 form was distorted; repaired in field. Some customization/adjustment needed.	late delivery, panel flaws
	Seattle, WA	NW	open wall	Panelizers not thinking like carpenters (measuring from edge of stud, not center). Initially had some problems coordinating locations of openings, plumbing stubs, and hold-down bolts. Need room for utilities in walls.	miscommunication w/ manufacturer; utilities interface
200+	Clemmons, NC	SE	open wall	Manufacture. errors, mostly when one home in a batch has some 'optional' items. Ex: if homeowners choose between 2 window types, 1 may have different rough opening but the change is overlooked @ plant.	window openings in fabrication

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
2	Telluride, CO	SW	wood SIP	Need some orientation w/ subs, esp. MEP; panels not common in area. Experienced panel installer is biggest factor for success. For use of a panel system in general, its success stems from energy efficiency.	experienced crew, educated subs
15	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
25	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination
40	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Newnan, GA	SE	open wall	Redundant/repeatable design. Crew that's comfortable with panels. Competitive cost, speed of construction, getting out of the weather, and cutting down on theft are all measures of success.	experienced crews, repeatable home design
50	Woodland Park, CO	SW	wood SIP	Superior product & energy efficiency. Design building around panel dimensions for easy field fab and speedy construction: on 1st homes w/ stick frame design, extra cutting negated anticipated labor savings.	train crews, design home's dimensions for easy site fab
75	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews
	Cleremont, FL	SE	Precast Insulated Panel	Panel supplier also has installation crew, and all went smoothly. Success comes from speedy installation & competitive price; more complicated house designs took longer & were less successful - not repeatable.	training from manufacturer, simple and repeatable design
	Englewood, FL	SE	Hardiboard SIP	Finding the right panel system for you. Good tech support. The more comprehensive the system the better, fabricated for ea. house with as many details in place as possible. Better quality control & predictability.	select appropriate panel/supplier
100	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	New York, NY	NE	Precast Insulated Panel	Panels ready on time. Working out bugs: wanted the space connecting panels to resemble brick joints but it originally was wider. Doesn't leak like masonry, & better for maintenance (no efflorescence, tuck point).	repeatable design, timing schedule and delivery
	Seattle, WA	NW	open wall	When panelizers think like site carpenters, the builder has confidence in the shop drawings. Walsh has seasoned trained carpenters do careful reviews of all shop drawings & panel layout drawings. This is key.	good shop drawings reviewed by experienced builder
200+	Clemmons, NC	SE	open wall	Repetition - do the same floor plan over, or a limited number of floor plans. From both labor and production standpoint, this saves money. Also scheduling is key with panels. Check codes ahead & resolve any issues.	repeatable design, code research, scheduling

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
2	Telluride, CO	SW	wood SIP	Information on the internet has been useful for the builder to educate himself about panels.	WEB
15	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
	Olympia, WA	NW	wood SIP	No.	-
	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
25	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB
40	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Newnan, GA	SE	open wall	Yes, the supplier approached him and was convincing.	Panel Supplier
50	Woodland Park, CO	SW	wood SIP	Yes. The builder got information from a panel supplier, and from his own experience traveling the state working for a different building product supplier.	Panel Supplier
75	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, only backwards. Lack of good information on existing panels systems caused them to create their own panel system.	Info is lacking
100	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	New York, NY	NE	Precast Insulated Panel	No. The builder has been aware of this type of panel for years and has only recently been able to justify cost.	-
	Seattle, WA	NW	open wall	Information is readily available in the public domain.	ALL
200+	Clemmons, NC	SE	open wall	No.	-

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
2	Telluride, CO	SW	wood SIP	No.	-
15	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
	Olympia, WA	NW	wood SIP	No.	-
	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
25	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems
40	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Newnan, GA	SE	open wall	They are not interested in panels like SIPs based on current buyer types and budgets.	SIPS because of budget
50	Woodland Park, CO	SW	wood SIP	Yes. They avoided polyurethane-based SIPs because of health concerns, and selected EPS foam instead.	Dislikes closed cell foams, likes EPS
75	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, they avoided any panel with wood in it due to Florida's climate and termites.	Dislikes wood panels
100	Encino, CA	SW	open wall; closed wall	No.	-
	New York, NY	NE	Precast Insulated Panel	The builder dislikes EIFS (Exterior Insulation and Finish Systems).	Dislikes EIFS
	Seattle, WA	NW	open wall	Yes, closed-wall systems like SIPs because of the complications of putting utilities, etc. into walls.	SIPS because of close wall problems (utilities, etc)
200+	Clemmons, NC	SE	open wall	No.	-

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
2	Telluride, CO	SW	wood SIP	No. Just requires training.	TRAINING ONLY
15	Ridgefield, CT	NE	wood SIP	No.	-
	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
25	Chicago, IL	MW	wood SIP	No.	-
40	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Newnan, GA	SE	open wall	Yes, the builder subs all framing and other trades and some subs were not comfortable switching to panels so he replaced them with crews that were comfortable with the technology.	Replaced resistant subs
50	Woodland Park, CO	SW	wood SIP	No. Crews and subs could generally be trained to use panels.	TRAINING ONLY
75	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Englewood, FL	SE	Hardiboard SIP	No.	-
100	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	New York, NY	NE	Precast Insulated Panel	No. They hired en experienced erection crew, and masons were eliminated, but other subs remained the same.	0
	Seattle, WA	NW	open wall	No, framers understand both open panels and stick framing. However, some framing subs refuse to work with panels from certain suppliers because they have found them to be problematic.	Replaced resistant subs
200+	Clemmons, NC	SE	open wall	No. Framing crews adjusted well to open wall panels, as did other subs.	OPEN WALL no changes needed

Interview Analysis by HOUSES PER YEAR

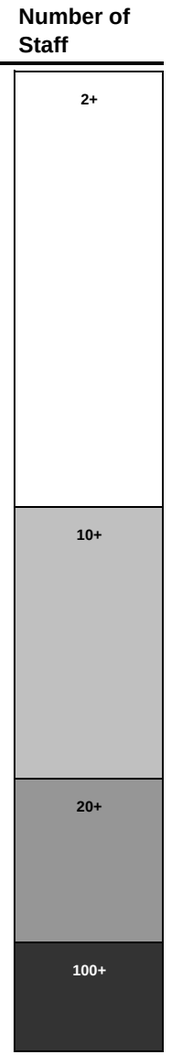
Houses per Year	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
2	Telluride, CO	SW	wood SIP	No.	-
15	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
	Grass Valley, CA	SW	wood SIP	No.	-
	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
	Kerrville, TX	SW	wood SIP	No.	-
25	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin
40	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Newnan, GA	SE	open wall	No.	-
50	Woodland Park, CO	SW	wood SIP	No.	-
75	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING
	Cleremont, FL	SE	Precast Insulated Panel	Accommodation for vent stacks in outside walls; currently they run stacks on the outside of the wall and box it in.	PRECAST: vent stacks on exterior walls
	Englewood, FL	SE	Hardiboard SIP	Improvements are ongoing.	-
100	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	New York, NY	NE	Precast Insulated Panel	Connections could be improved a bit.	PRECAST: connections
	Seattle, WA	NW	open wall	A standardized system for labeling and communicating information about panels would be extremely helpful. Also he would like to see a higher quality of lumber used in panels.	OPEN WALL: labeling standards, higher quality lumber
200+	Clemmons, NC	SE	open wall	The 1/4" sheathing used by many manufacturers may meet code, but the builder prefers something stronger (thicker).	OPEN WALL: better sheathing

Interview Analysis by HOUSES PER YEAR

Houses per Year	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
2	Telluride, CO	SW	wood SIP	No. It hasn't in the past because clients of these custom homes can afford to transport the panels in; for a smaller budget home, proximity could potentially be a factor.	NO, clientele afford any transportation cost increase
15	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Denver, CO	SW	wood SIP	No.	NO
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
25	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered
40	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Newnan, GA	SE	open wall	Proximity plays a minor part in decision-making.	YES, transportation costs are considered
50	Woodland Park, CO	SW	wood SIP	Yes. Having a panel supplier in Denver makes it convenient to ship panels to jobsites throughout the state.	YES, have panel distributor convenient to jobsites
75	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered
	Cleremont, FL	SE	Precast Insulated Panel	No.	NO
	Englewood, FL	SE	Hardiboard SIP	Not applicable - they are their own supplier.	-
100	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	New York, NY	NE	Precast Insulated Panel	No. Proximity would only be a concern if it affects pricing.	NO, only if it affects pricing
	Seattle, WA	NW	open wall	Proximity matters as it affects transportation costs. Open wall panels are available from a variety of suppliers.	YES, transportation costs are considered
200+	Clemmons, NC	SE	open wall	No. The large builder orders in such quantity, suppliers make efforts to deliver. Also there are many suppliers of open wall panels in the builder's region.	NO, because they are a large builder, suppliers make efforts to get their business

Interview Analysis by NUMBER OF STAFF

Builder's experience with panels



Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
2+	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years	2	<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Telluride, CO	SW	wood SIP	Custom homes	20 years	2	<25 (2)	Radiant floors, ICF, manufacture lumber, SIPs, hi-performance windows, low-voltage circuitry.	sub (panel specific)	Winter; some R-control; Murus	wood SIP
	Newnan, GA	SE	open wall	Primarily 1st time homebuyers	20 years	2	26-100 (45)	No other advanced technologies	sub	Wheeler's Building Supply	open wall
	Woodland Park, CO	SW	wood SIP	Custom homes, 2nd homes for retirees	20 years	3	26-100	TJI floor & roof, Optima R-47 roof insulation, ICF foundation, Formadrain.	sub	R-Control	wood SIP
	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
	Cleremont, FL	SE	Precast Insulated Panel	Single family homes, esp. for RV's	25-30 years	7 (just in this division)	26-100	No other advanced technologies	sub (supplier)	Manning Quick Walls	Precast SIP
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
	Englewood, FL	SE	Hardiboard SIP	Gov't affordable housing providers	5 years	12	26-100	High-efficiency A/C, heat exchanger, solar hot water, water heater reclaim	sub/self homeowner	Homefront (self)	Hardiboard SIP
	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)
	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
20+	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP
	New York, NY	NE	Precast Insulated Panel	Low income - market rate, RowHs/MF	4 years	20-30	>100	Have worked with HUD, Energy Star	self/sub	Old Castle	Precast SIP
100+	Seattle, WA	NW	open wall	Affordable; public, nonprofits, MF	40 years	250	>100	Modular & pre-engineered components; some just-in-time delivery; hoisting.	99% sub	Local companies within 50 miles	open wall
	Clemmons, NC	SE	open wall	Market rate spec for big developers	Past experience	hundreds	>100	Engineered components like 6" headers; rigid foam board insulation	self	Wicks Lumber, 84 Lumber	open wall

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
2+	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Telluride, CO	SW	wood SIP	Panels 1st specified by an architect. Josh liked them & has since used them on his own home. Has worked with different SIP mfgs, based on insulating material & erection/fastening. Murus uses cam-lock system.	Personal experience - own home
	Newnan, GA	SE	open wall	Lee's supplier approached him. He hasn't considered SIPs due to current buyer types and budgets. He's seen savings all around, but #1 or #2 reason for using panels is reducing theft from the jobsite.	Better quality, less theft, local supplier
	Woodland Park, CO	SW	wood SIP	Ken was interested in panels he'd seen while traveling for another job and wanted to try them. R-Control was the 1st brand presented to them, the one they're most familiar with, and it's local.	Personal experience, local supplier
	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
	Cleremont, FL	SE	Precast Insulated Panel	Jim has used panels in the past, and then a rep from this panel factory visited their offices. They were partially interested in panels due to the CMU shortage following the hurricanes.	Past experience, alternative to scarce materials
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
	Englewood, FL	SE	Hardiboard SIP	They weren't finding a product they liked, so they created a panel and steel framing system for the types of homes they are building and for the tough Florida climate. Panels are wood-free.	Created own product for superior quality, performance
	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier
	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
20+	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals
	New York, NY	NE	Precast Insulated Panel	Typically build w/ masonry and precast plank ceiling. Precast panels seemed a natural step: crane & erector already onsite. Panels cut out the masonry work. Also experimenting w/ foam & metal framing panels.	Time savings, same technology as foundation
100+	Seattle, WA	NW	open wall	They don't think SIPs or closed wall would work w/ utilities, etc. in walls. Choose open wall panel suppliers based on reputation, shop visits & drawings. Subs always ask "Who's the panelizer?" when bidding.	Flexibility of open walls
	Clemmons, NC	SE	open wall	Big developers and builders pursue penalization as a means to reduce cost and improve productivity, and big lumber companies responded to their request. They select regional suppliers of open wall panels.	Reduce cost, raise productivity, use local suppliers

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
2+	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Telluride, CO	SW	wood SIP	Finds that Internet is a great source for educating himself about panels	internet/public domain
	Newnan, GA	SE	open wall	From the supplier.	supplier
	Woodland Park, CO	SW	wood SIP	Ken worked as a distributor for another company & in his travels started to see SIPs used in other areas. He became interested & got information from salesmen at AFP (R-Control). This was pre-internet.	own experience with building product suppliers
	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
	Cleremont, FL	SE	Precast Insulated Panel	Jim is familiar with SIPs from past experiences. In this instance, the panel supplier contacted them.	past experience, supplier
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
	Englewood, FL	SE	Hardiboard SIP	Information availability was very poor. They couldn't find a suitable product, so they elected to create their own.	good information is not available; found no suitable product
	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website
	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
20+	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet
	New York, NY	NE	Precast Insulated Panel	They've been aware of panels and interested in them for a number of years, but previously they weren't able to make the numbers work out.	public domain
100+	Seattle, WA	NW	open wall	Information is available in the public domain, & anyone can understand the concepts. Walsh has to work to find manufacturers & assess their products/capabilities, but general panel information is readily available.	public domain
	Clemmons, NC	SE	open wall	Generally large developer/builders interested in high productivity are active in research & are familiar with penalization as a tool for increasing that productivity.	own research

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
2+	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Telluride, CO	SW	wood SIP	Feels $ is a tad higher for panels than stick frame (material $ > labor savings); mostly not an issue w/ his clients. Energy payback. One project never got built partly due to high markup cost from panel middleman.	slightly higher cost, but clients don't mind - energy payback
	Newnan, GA	SE	open wall	With panels, labor costs have decreased (less time, + hire less skilled crew), material costs decreased also. Much less waste on the jobsite; they save on hauling fees, too. Saving all the way around.	materials, labor and hauling savings
	Woodland Park, CO	SW	wood SIP	In the beginning material costs were higher & they had to hope to make up differences in labor savings. Now the gap is closing & he doesn't feel cost is much of a issue. His clients want SIPs.	slightly higher cost, but shrinking; quality, energy payback
	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo finishing, etc. SIPs roofs are $$$, but excellent.	no cost difference in his region, clients want SIPs
	Cleremont, FL	SE	Precast Insulated Panel	Jim had to match the cost of panel construction to the cost of block construction.	cost similar to traditional construction
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
	Englewood, FL	SE	Hardiboard SIP	They were looking for labor savings (which took some time to actually happen).	labor savings
	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less
	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
20+	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings
	New York, NY	NE	Precast Insulated Panel	Structural concrete panel are costly, but offer speed & some construction savings. Decision was based more on a desire to try something new with potential than strict cost. Takes v. big project 2 make it pay.	higher, but better quality
100+	Seattle, WA	NW	open wall	Cost-driven decision. Walsh does 75% stick frame, 25% panels. Panels pay when schedule is tight, or space is tight. Sometimes they see labor savings. Can use apprentice carpenters rather than journeymen.	evaluated case-by-case; labor & material savings
	Clemmons, NC	SE	open wall	They were able to reduce cost by half or better using penalization and repeating home designs.	dramatically reduce cost, cycle time with repeatable design

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
2+	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Telluride, CO	SW	wood SIP	Based on his own research & experience, he feels SIPs homes are stronger.	stronger, better quality
	Newnan, GA	SE	open wall	Panel quality is better; factory-made units are almost perfect, compared to a guy in the field trying to frame in the mud and rain.	better
	Woodland Park, CO	SW	wood SIP	Big factor. Panels mean home is straight and true and less likely to be messed up by varying quality of local trades people.	better quality, straight & true
	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
	Cleremont, FL	SE	Precast Insulated Panel	Quality wasn't a deciding factor from builder's perspective, but Jim feels homeowners like the panels because of their soundness: the home has a solid, quality feel.	not as critical - but homeowners respond to quality feel
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
	Englewood, FL	SE	Hardiboard SIP	The panels are very durable. Reduces the # of parts needed for the home structure (good for hurricanes). Reduced # of subs on the job means better quality, more control. Homeowners seek better quality.	better quality control, fewer subs
	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good
	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90° corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
20+	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality
	New York, NY	NE	Precast Insulated Panel	The panels are much more consistent. Much more uniform, much tighter, and being factory built means they don't have weather issues with their concrete.	better quality, consistency, tightness
100+	Seattle, WA	NW	open wall	With good panelizers, 99% of panels are correct & Walsh does very little modification. That is a quality enhancement. Ability to keep things dryer by getting the roo on faster is a quality enhancement.	much better
	Clemmons, NC	SE	open wall	Brian actually feels that the open wall panels initially didn't contribute to quality, but they have improved & they are actually better quality than stick now. Unless flimsy sheathing is spec'd.	better (took time to get there)

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
2+	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Telluride, CO	SW	wood SIP	He feels that perhaps some of the increased material cost is offset by getting the homes weather tight faster. The theory is that they save labor; probably true but doesn't seem to be the major deciding factor.	not much faster
	Newnan, GA	SE	open wall	Efficiency has gone up considerably; Lee estimates it takes half the time to frame a home. Faster construction time also means getting out of the weather quickly.	faster
	Woodland Park, CO	SW	wood SIP	Building with panels is efficient, especially with their earlier designs which were very simple & easily field-fabricated.	faster, especially with simpler designs
	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
	Cleremont, FL	SE	Precast Insulated Panel	Speed was a big factor. They use a crane & the panels are erected very quickly. Homeowners like the quickness of the panels.	much faster, big factor
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
	Englewood, FL	SE	Hardiboard SIP	Are now seeing labor savings they needed, but it took several years of refinement to get field production levels up to levels supporting the cost. Fewer vendors to coordinate means less delays. Faster, predictable.	took years to see the productivity they wanted to make it pay. More predictable.
	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster
	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
20+	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost
	New York, NY	NE	Precast Insulated Panel	The site seems to run cleaner and smoother without masons and masonry materials. Masons tend to tie up a job, & materials are messy; without them, many other trades could work at once. Can build in all weather.	much faster, & fewer trades increases efficiency
100+	Seattle, WA	NW	open wall	Building with panels is generally more efficient as long as site crews are prepared and familiar with the system. Need to be reading a screen, determination in which order to hoist the panels.	faster when crew is prepared
	Clemmons, NC	SE	open wall	This was the driving force. Framing times decreased and productivity increased dramatically. Even a new crew unfamiliar with panels would beat conventional framing speeds. Brian supervised 20-30 homes/ mo.	faster, speed is main motivator

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
2+	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Telluride, CO	SW	wood SIP	He believes energy efficiency is very important. In rural SW Colorado, fuel is especially expensive.	strong influence
	Newnan, GA	SE	open wall	Not a deciding factor.	no influence
	Woodland Park, CO	SW	wood SIP	SIPs perform very well in cold Colorado winters.	strong influence, excellent performance
	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
	Cleremont, FL	SE	Precast Insulated Panel	Jim doesn't feel energy was the major motivator.	slight influence, not the major motivator
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
	Englewood, FL	SE	Hardiboard SIP	Energy efficiency is very important in Florida's harsh tropical climate.	very important
	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.
	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
20+	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point
	New York, NY	NE	Precast Insulated Panel	Energy efficiency was a factor. Precast panels outperform masonry for air tightness, and also much better for water tightness. They have experienced far fewer leak complaints.	strong influence, airtight & also much more watertight.
100+	Seattle, WA	NW	open wall	Not a big factor, as their moderate climate (Seattle) doesn't yield big thermal pressures. A bigger factor (than heating/cooling) is moisture: speed of panelized construction helps keep things dry.	no influence, moderate climate
	Clemmons, NC	SE	open wall	Energy efficiency wasn't a consideration in the decision to use panels.	no influence

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
2+	Ridgefield, CT	NE	wood SIP	No.	no
	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Denver, CO	SW	wood SIP	No.	no
	Telluride, CO	SW	wood SIP	No.	no
	Newnan, GA	SE	open wall	Moderate influence.	moderate
	Woodland Park, CO	SW	wood SIP	Yes; using energy efficient SIPs sets them apart from the crowd.	yes, energy niche
	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
	Cleremont, FL	SE	Precast Insulated Panel	No.	no
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
	Englewood, FL	SE	Hardiboard SIP	No.	no
	Cartersville, GA	SE	open wall (SIP in past)	No.	no
	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
20+	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	Chicago, IL	MW	wood SIP	No.	no
	New York, NY	NE	Precast Insulated Panel	Competition was maybe 2-3% of the decision.	very slight
100+	Seattle, WA	NW	open wall	Sure, anything to help keep costs down makes Walsh more competitive.	yes, reduce cost to compete
	Clemmons, NC	SE	open wall	Yes, as the companies strive to reduce their per-square-foot costs. They were very successful in beating the national average for these costs.	yes, reduce cost to compete

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
2+	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Telluride, CO	SW	wood SIP	No.	no.
	Newnan, GA	SE	open wall	No.	no.
	Woodland Park, CO	SW	wood SIP	As 1st panel builder in 3 or 4 counties, they had to educate building inspectors. Between ICBO approvals of SIPs and Ken's education efforts, the inspectors in their area are accepting of SIPs now.	educate Building Inspectors
	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
	Cleremont, FL	SE	Precast Insulated Panel	No.	no.
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
	Englewood, FL	SE	Hardiboard SIP	Because use of these panels eliminates many of the parts/hardware that are typically needed, Brian feels it's actually easier to inspect & to meet code.	no; easier to inspect
	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors
	Olympia, WA	NW	wood SIP	No.	no.
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
20+	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors
	New York, NY	NE	Precast Insulated Panel	No.	no.
100+	Seattle, WA	NW	open wall	Codes were challenge. Nailing of sheathing needed to be inspected in factory prior to covering with gyp, but panels were from out-of-state. Walsh worked out compromise w/ inspectors. Put fire protect on inside.	challenge; educate Building Inspectors
	Clemmons, NC	SE	open wall	When they started, introduced quite a few inspectors to panels. Some were OK with it immediately, and some wanted additional stamps and assurances.	educate Building Inspectors

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Number of Staff	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
2+	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Telluride, CO	SW	wood SIP	He assumes there are some qualification associated with use of panels, but doesn't know what they are. Architects he works with like and specify panels.	no obvious influence; architects prefer panels
	Newnan, GA	SE	open wall	Not in Lee's homes, which are relatively simple. He thinks that in a more complex design, with lots of high ceilings etc., it would be more difficult (or less cost effective) to use panels.	no influence; uses simple home design
	Woodland Park, CO	SW	wood SIP	Their first panelized homes used stick-frame design, and they found it was inefficient. Now they try for 4' dimensions, 4' wide windows spaced 4' in from the edge, etc. This facilitates field fabrication.	openings follow panel dimensions for easy site fabrication
	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Cleremont, FL	SE	Precast Insulated Panel	No major influence, but simplicity helps with a successful panel installation.	simple design
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
	Englewood, FL	SE	Hardiboard SIP	Their panel system has certain span and loading restrictions, which influences them toward more modest sizes and simpler designs that work well for affordable homes.	simple design, limited roof spans
	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence
	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
20+	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	New York, NY	NE	Precast Insulated Panel	They were able to do design things with panels on an affordable housing project that they wouldn't have been able to afford to do with conventional materials.	promoted better design
100+	Seattle, WA	NW	open wall	Design comes first for their homes, then decision to use panels follows. In seismic neighborhoods, the hold down system being used is influenced by the choice of panel system.	no influence
	Clemmons, NC	SE	open wall	Penalization is most successful when it's repetitive. For special design features, they would likely not try to use panels.	simple and repeatable designs key for success with panels

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
2+	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Telluride, CO	SW	wood SIP	Experienced some fabrication errors. Field training w/ subs new to panels slows things some. Some elect problems w/ figuring out box locations. Precut chases may not line up. Custom homes hv outlet @ odd ht.	occasional fabrication errors, interface with electrical
	Newnan, GA	SE	open wall	Very rare manufacturing mistakes; usually field-corrected. Takes some organization to get timing correct, so panels are ordered before foundation is poured.	timing and coordination
	Woodland Park, CO	SW	wood SIP	Infrequent manufacture. flaws: the two skins are slightly skewed from each other; the recessed cut isn't deep enough. Panels are forgiving; they just let the panel suppliers know. Some subs (esp. elect) resist change.	occasional panel flaws, resistance from subs
	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
	Cleremont, FL	SE	Precast Insulated Panel	Occasional height errors, but easily resolved. Overall panel supplier/fabricator & their installers were great. Biggest problem was with Jim's engineer making the change. Also hard to put vent stacks in outside wall.	designer resistance, utilities interface
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
	Englewood, FL	SE	Hardiboard SIP	Expansion & contraction can be problematic. They use control joints & take care w/ their stucco, siding, finishes. They are constantly striving to improve their products, from quality to aesthetics details.	expansion/contraction.
	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews
	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
20+	Encino, CA	SW	open wall; closed wall	None.	none
	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery
	New York, NY	NE	Precast Insulated Panel	Requires a very large project to make precast panels pay (forms specially made). Precaster fell behind, affected scheduling. 1st job 1 form was distorted; repaired in field. Some customization/adjustment needed.	late delivery, panel flaws
100+	Seattle, WA	NW	open wall	Panelizers not thinking like carpenters (measuring from edge of stud, not center). Initially had some problems coordinating locations of openings, plumbing stubs, and hold-down bolts. Need room for utilities in walls.	miscommunication w/ manufacturer; utilities interface
	Clemmons, NC	SE	open wall	Manufacture. errors, mostly when one home in a batch has some 'optional' items. Ex: if homeowners choose between 2 window types, 1 may have different rough opening but the change is overlooked @ plant.	window openings in fabrication

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Number of Staff	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
2+	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Telluride, CO	SW	wood SIP	Need some orientation w/ subs, esp. MEP; panels not common in area. Experienced panel installer is biggest factor for success. For use of a panel system in general, its success stems from energy efficiency.	experienced crew, educated subs
	Newnan, GA	SE	open wall	Redundant/repeatable design. Crew that's comfortable with panels. Competitive cost, speed of construction, getting out of the weather, and cutting down on theft are all measures of success.	experienced crews, repeatable home design
	Woodland Park, CO	SW	wood SIP	Superior product & energy efficiency. Design building around panel dimensions for easy field fab and speedy construction: on 1st homes w/ stick frame design, extra cutting negated anticipated labor savings.	train crews, design home's dimensions for easy site fab
	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
	Cleremont, FL	SE	Precast Insulated Panel	Panel supplier also has installation crew, and all went smoothly. Success comes from speedy installation & competitive price; more complicated house designs took longer & were less successful - not repeatable.	training from manufacturer, simple and repeatable design
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
	Englewood, FL	SE	Hardiboard SIP	Finding the right panel system for you. Good tech support. The more comprehensive the system the better, fabricated for ea. house with as many details in place as possible. Better quality control & predictability.	select appropriate panel/supplier
	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews
	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
20+	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination
	New York, NY	NE	Precast Insulated Panel	Panels ready on time. Working out bugs: wanted the space connecting panels to resemble brick joints but it originally was wider. Doesn't leak like masonry, & better for maintenance (no efflorescence, tuck point).	repeatable design, timing schedule and delivery
100+	Seattle, WA	NW	open wall	When panelizers think like site carpenters, the builder has confidence in the shop drawings. Walsh has seasoned trained carpenters do careful reviews of all shop drawings & panel layout drawings. This is key.	good shop drawings reviewed by experienced builder
	Clemmons, NC	SE	open wall	Repetition - do the same floor plan over, or a limited number of floor plans. From both labor and production standpoint, this saves money. Also scheduling is key with panels. Check codes ahead & resolve any issues.	repeatable design, code research, scheduling

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
2+	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Telluride, CO	SW	wood SIP	Information on the internet has been useful for the builder to educate himself about panels.	WEB
	Newnan, GA	SE	open wall	Yes, the supplier approached him and was convincing.	Panel Supplier
	Woodland Park, CO	SW	wood SIP	Yes. The builder got information from a panel supplier, and from his own experience traveling the state working for a different building product supplier.	Panel Supplier
	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
	Englewood, FL	SE	Hardiboard SIP	Yes, only backwards. Lack of good information on existing panels systems caused them to create their own panel system.	Info is lacking
	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking
	Olympia, WA	NW	wood SIP	No.	-
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
20+	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB
	New York, NY	NE	Precast Insulated Panel	No. The builder has been aware of this type of panel for years and has only recently been able to justify cost.	-
100+	Seattle, WA	NW	open wall	Information is readily available in the public domain.	ALL
	Clemmons, NC	SE	open wall	No.	-

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
2+	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Telluride, CO	SW	wood SIP	No.	-
	Newnan, GA	SE	open wall	They are not interested in panels like SIPs based on current buyer types and budgets.	SIPS because of budget
	Woodland Park, CO	SW	wood SIP	Yes. They avoided polyurethane-based SIPs because of health concerns, and selected EPS foam instead.	Dislikes closed cell foams, likes EPS
	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
	Englewood, FL	SE	Hardiboard SIP	Yes, they avoided any panel with wood in it due to Florida's climate and termites.	Dislikes wood panels
	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget
	Olympia, WA	NW	wood SIP	No.	-
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
20+	Encino, CA	SW	open wall; closed wall	No.	-
	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems
	New York, NY	NE	Precast Insulated Panel	The builder dislikes EIFS (Exterior Insulation and Finish Systems).	Dislikes EIFS
100+	Seattle, WA	NW	open wall	Yes, closed-wall systems like SIPs because of the complications of putting utilities, etc. into walls.	SIPS because of close wall problems (utilities, etc)
	Clemmons, NC	SE	open wall	No.	-

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
2+	Ridgefield, CT	NE	wood SIP	No.	-
	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Telluride, CO	SW	wood SIP	No. Just requires training.	TRAINING ONLY
	Newnan, GA	SE	open wall	Yes, the builder subs all framing and other trades and some subs were not comfortable switching to panels so he replaced them with crews that were comfortable with the technology.	Replaced resistant subs
	Woodland Park, CO	SW	wood SIP	No. Crews and subs could generally be trained to use panels.	TRAINING ONLY
	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
	Englewood, FL	SE	Hardiboard SIP	No.	-
	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs
	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
20+	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	Chicago, IL	MW	wood SIP	No.	-
	New York, NY	NE	Precast Insulated Panel	No. They hired en experienced erection crew, and masons were eliminated, but other subs remained the same.	0
100+	Seattle, WA	NW	open wall	No, framers understand both open panels and stick framing. However, some framing subs refuse to work with panels from certain suppliers because they have found them to be problematic.	Replaced resistant subs
	Clemmons, NC	SE	open wall	No. Framing crews adjusted well to open wall panels, as did other subs.	OPEN WALL no changes needed

Interview Analysis by NUMBER OF STAFF

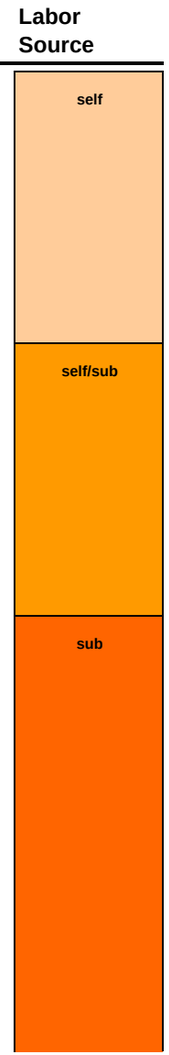
Number of Staff	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
2+	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Telluride, CO	SW	wood SIP	No.	-
	Newnan, GA	SE	open wall	No.	-
	Woodland Park, CO	SW	wood SIP	No.	-
	Grass Valley, CA	SW	wood SIP	No.	-
	Cleremont, FL	SE	Precast Insulated Panel	Accommodation for vent stacks in outside walls; currently they run stacks on the outside of the wall and box it in.	PRECAST: vent stacks on exterior walls
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
	Englewood, FL	SE	Hardiboard SIP	Improvements are ongoing.	-
	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING
	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Kerrville, TX	SW	wood SIP	No.	-
20+	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin
	New York, NY	NE	Precast Insulated Panel	Connections could be improved a bit.	PRECAST: connections
100+	Seattle, WA	NW	open wall	A standardized system for labeling and communicating information about panels would be extremely helpful. Also he would like to see a higher quality of lumber used in panels.	OPEN WALL: labeling standards, higher quality lumber
	Clemmons, NC	SE	open wall	The 1/4" sheathing used by many manufacturers may meet code, but the builder prefers something stronger (thicker).	OPEN WALL: better sheathing

Interview Analysis by NUMBER OF STAFF

Number of Staff	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
2+	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Denver, CO	SW	wood SIP	No.	NO
	Telluride, CO	SW	wood SIP	No. It hasn't in the past because clients of these custom homes can afford to transport the panels in; for a smaller budget home, proximity could potentially be a factor.	NO, clientele afford any transportation cost increase
	Newnan, GA	SE	open wall	Proximity plays a minor part in decision-making.	YES, transportation costs are considered
	Woodland Park, CO	SW	wood SIP	Yes. Having a panel supplier in Denver makes it convenient to ship panels to jobsites throughout the state.	YES, have panel distributor convenient to jobsites
	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
	Cleremont, FL	SE	Precast Insulated Panel	No.	NO
10+	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
	Englewood, FL	SE	Hardiboard SIP	Not applicable - they are their own supplier.	-
	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered
	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
20+	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered
	New York, NY	NE	Precast Insulated Panel	No. Proximity would only be a concern if it affects pricing.	NO, only if it affects pricing
100+	Seattle, WA	NW	open wall	Proximity matters as it affects transportation costs. Open wall panels are available from a variety of suppliers.	YES, transportation costs are considered
	Clemmons, NC	SE	open wall	No. The large builder orders in such quantity, suppliers make efforts to deliver. Also there are many suppliers of open wall panels in the builder's region.	NO, because they are a large builder, suppliers make efforts to get their business

Interview Analysis by LABOR SOURCE

Builder's experience with panels



Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
self	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP
	Clemmons, NC	SE	open wall	Market rate spec for big developers	Past experience	hundreds	>100	Engineered components like 6" headers; rigid foam board insulation	self	Wicks Lumber, 84 Lumber	open wall
	Seattle, WA	NW	open wall	Affordable; public, nonprofits, MF	40 years	250	>100	Modular & pre-engineered components; some just-in-time delivery; hoisting.	99% sub	Local companies within 50 miles	open wall
self/sub	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	New York, NY	NE	Precast Insulated Panel	Low income - market rate, RowHs/MF	4 years	20-30	>100	Have worked with HUD, Energy Star	self/sub	Old Castle	Precast SIP
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Englewood, FL	SE	Hardiboard SIP	Gov't affordable housing providers	5 years	12	26-100	High-efficiency A/C, heat exchanger, solar hot water, water heater reclaim	sub/self homeowner	Homefront (self)	Hardiboard SIP
sub	Woodland Park, CO	SW	wood SIP	Custom homes, 2nd homes for retirees	20 years	3	26-100	TJI floor & roof, Optima R-47 roof insulation, ICF foundation, Formadrain.	sub	R-Control	wood SIP
	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years		<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
	Cleremont, FL	SE	Precast Insulated Panel	Single family homes, esp. for RV's	25-30 years	7 (just in this division)	26-100	No other advanced technologies	sub (supplier)	Manning Quick Walls	Precast SIP
	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Telluride, CO	SW	wood SIP	Custom homes	20 years	2	<25 (2)	Radiant floors, ICF, manufacture lumber, SIPs, hi-performance windows, low-voltage circuitry.	sub (panel specific)	Winter; some R-control; Murus	wood SIP
	Newnan, GA	SE	open wall	Primarily 1st time homebuyers	20 years	2	26-100 (45)	No other advanced technologies	sub	Wheeler's Building Supply	open wall
	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
self	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals
	Clemmons, NC	SE	open wall	Big developers and builders pursue penalization as a means to reduce cost and improve productivity, and big lumber companies responded to their request. They select regional suppliers of open wall panels.	Reduce cost, raise productivity, use local suppliers
	Seattle, WA	NW	open wall	They don't think SIPs or closed wall would work w/ utilities, etc. in walls. Choose open wall panel suppliers based on reputation, shop visits & drawings. Subs always ask "Who's the panelizer?" when bidding.	Flexibility of open walls
self/sub	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	New York, NY	NE	Precast Insulated Panel	Typically build w/ masonry and precast plank ceiling. Precast panels seemed a natural step: crane & erector already onsite. Panels cut out the masonry work. Also experimenting w/ foam & metal framing panels.	Time savings, same technology as foundation
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Englewood, FL	SE	Hardiboard SIP	They weren't finding a product they liked, so they created a panel and steel framing system for the types of homes they are building and for the tough Florida climate. Panels are wood-free.	Created own product for superior quality, performance
sub	Woodland Park, CO	SW	wood SIP	Ken was interested in panels he'd seen while traveling for another job and wanted to try them. R-Control was the 1st brand presented to them, the one they're most familiar with, and it's local.	Personal experience, local supplier
	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
	Cleremont, FL	SE	Precast Insulated Panel	Jim has used panels in the past, and then a rep from this panel factory visited their offices. They were partially interested in panels due to the CMU shortage following the hurricanes.	Past experience, alternative to scarce materials
	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Telluride, CO	SW	wood SIP	Panels 1st specified by an architect. Josh liked them & has since used them on his own home. Has worked with different SIP mfgs, based on insulating material & erection/fastening. Murus uses cam-lock system.	Personal experience - own home
	Newnan, GA	SE	open wall	Lee's supplier approached him. He hasn't considered SIPs due to current buyer types and budgets. He's seen savings all around, but #1 or #2 reason for using panels is reducing theft from the jobsite.	Better quality, less theft, local supplier
	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
self	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet
	Clemmons, NC	SE	open wall	Generally large developer/builders interested in high productivity are active in research & are familiar with penalization as a tool for increasing that productivity.	own research
	Seattle, WA	NW	open wall	Information is available in the public domain, & anyone can understand the concepts. Walsh has to work to find manufacturers & assess their products/capabilities but general panel information is readily available.	public domain
self/sub	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	New York, NY	NE	Precast Insulated Panel	They've been aware of panels and interested in them for a number of years, but previously they weren't able to make the numbers work out.	public domain
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Englewood, FL	SE	Hardiboard SIP	Information availability was very poor. They couldn't find a suitable product, so they elected to create their own.	good information is not available; found no suitable product
sub	Woodland Park, CO	SW	wood SIP	Ken worked as a distributor for another company & in his travels started to see SIPs used in other areas. He became interested & got information from salesmen at AFP (R-Control). This was pre-internet.	own experience with building product suppliers
	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
	Cleremont, FL	SE	Precast Insulated Panel	Jim is familiar with SIPs from past experiences. In this instance, the panel supplier contacted them.	past experience, supplier
	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Telluride, CO	SW	wood SIP	Finds that Internet is a great source for educating himself about panels	internet/public domain
	Newnan, GA	SE	open wall	From the supplier.	supplier
	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
self	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo finishing, etc. SIPs roofs are $$$, but excellent.	no cost difference in his region, clients want SIPs
	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings
	Clemmons, NC	SE	open wall	They were able to reduce cost by half or better using penalization and repeating home designs.	dramatically reduce cost, cycle time with repeatable design
	Seattle, WA	NW	open wall	Cost-driven decision. Walsh does 75% stick frame, 25% panels. Panels pay when schedule is tight, or space is tight. Sometimes they see labor savings. Can use apprentice carpenters rather than journeymen.	evaluated case-by-case; labor & material savings
self/sub	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	New York, NY	NE	Precast Insulated Panel	Structural concrete panel are costly, but offer speed & some construction savings. Decision was based more on a desire to try something new with potential than strict cost. Takes v. big project 2 make it pay.	higher, but better quality
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Englewood, FL	SE	Hardiboard SIP	They were looking for labor savings (which took some time to actually happen).	labor savings
sub	Woodland Park, CO	SW	wood SIP	In the beginning material costs were higher & they had to hope to make up differences in labor savings. Now the gap is closing & he doesn't feel cost is much of a issue. His clients want SIPs.	slightly higher cost, but shrinking; quality, energy payback
	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
	Cleremont, FL	SE	Precast Insulated Panel	Jim had to match the cost of panel construction to the cost of block construction.	cost similar to traditional construction
	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Telluride, CO	SW	wood SIP	Feels $ is a tad higher for panels than stick frame (material $ > labor savings); mostly not an issue w/ his clients. Energy payback. One project never got built partly due to high markup cost from panel middleman.	slightly higher cost, but clients don't mind - energy payback
	Newnan, GA	SE	open wall	With panels, labor costs have decreased (less time, + hire less skilled crew), material costs decreased also. Much less waste on the jobsite; they save on hauling fees, too. Saving all the way around.	materials, labor and hauling savings
	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
self	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality
	Clemmons, NC	SE	open wall	Brian actually feels that the open wall panels initially didn't contribute to quality, but they have improved & they are actually better quality than stick now. Unless flimsy sheathing is spec'd.	better (took time to get there)
	Seattle, WA	NW	open wall	With good panelizers, 99% of panels are correct & Walsh does very little modification. That is a quality enhancement. Ability to keep things dryer by getting the roo on faster is a quality enhancement.	much better
self/sub	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	New York, NY	NE	Precast Insulated Panel	The panels are much more consistent. Much more uniform, much tighter, and being factory built means they don't have weather issues with their concrete.	better quality, consistency, tightness
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90º corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Englewood, FL	SE	Hardiboard SIP	The panels are very durable. Reduces the # of parts needed for the home structure (good for hurricanes). Reduced # of subs on the job means better quality, more control. Homeowners seek better quality.	better quality control, fewer subs
sub	Woodland Park, CO	SW	wood SIP	Big factor. Panels mean home is straight and true and less likely to be messed up by varying quality of local trades people.	better quality, straight & true
	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
	Cleremont, FL	SE	Precast Insulated Panel	Quality wasn't a deciding factor from builder's perspective, but Jim feels homeowners like the panels because of their soundness: the home has a solid, quality feel.	not as critical - but homeowners respond to quality feel
	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Telluride, CO	SW	wood SIP	Based on his own research & experience, he feels SIPs homes are stronger.	stronger, better quality
	Newnan, GA	SE	open wall	Panel quality is better; factory-made units are almost perfect, compared to a guy in the field trying to frame in the mud and rain.	better
	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
self	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost
	Clemmons, NC	SE	open wall	This was the driving force. Framing times decreased and productivity increased dramatically. Even a new crew unfamiliar with panels would beat conventional framing speeds. Brian supervised 20-30 homes/ mo.	faster, speed is main motivator
	Seattle, WA	NW	open wall	Building with panels is generally more efficient as long as site crews are prepared and familiar with the system. Need to be reading a screen, determination in which order to hoist the panels.	faster when crew is prepared
self/sub	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	New York, NY	NE	Precast Insulated Panel	The site seems to run cleaner and smoother without masons and masonry materials. Masons tend to tie up a job, & materials are messy; without them, many other trades could work at once. Can build in all weather.	much faster, & fewer trades increases efficiency
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Englewood, FL	SE	Hardiboard SIP	Are now seeing labor savings they needed, but it took several years of refinement to get field production levels up to levels supporting the cost. Fewer vendors to coordinate means less delays. Faster, predictable.	took years to see the productivity they wanted to make it pay. More predictable.
sub	Woodland Park, CO	SW	wood SIP	Building with panels is efficient, especially with their earlier designs which were very simple & easily field-fabricated.	faster, especially with simpler designs
	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
	Cleremont, FL	SE	Precast Insulated Panel	Speed was a big factor. They use a crane & the panels are erected very quickly. Homeowners like the quickness of the panels.	much faster, big factor
	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Telluride, CO	SW	wood SIP	He feels that perhaps some of the increased material cost is offset by getting the homes weather tight faster. The theory is that they save labor; probably true but doesn't seem to be the major deciding factor.	not much faster
	Newnan, GA	SE	open wall	Efficiency has gone up considerably; Lee estimates it takes half the time to frame a home. Faster construction time also means getting out of the weather quickly.	faster
	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
self	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point
	Clemmons, NC	SE	open wall	Energy efficiency wasn't a consideration in the decision to use panels.	no influence
	Seattle, WA	NW	open wall	Not a big factor, as their moderate climate (Seattle) doesn't yield big thermal pressures. A bigger factor (than heating/cooling) is moisture: speed of panelized construction helps keep things dry.	no influence, moderate climate
self/sub	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	New York, NY	NE	Precast Insulated Panel	Energy efficiency was a factor. Precast panels outperform masonry for air tightness, and also much better for water tightness. They have experienced far fewer leak complaints.	strong influence, airtight & also much more watertight.
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Englewood, FL	SE	Hardiboard SIP	Energy efficiency is very important in Florida's harsh tropical climate.	very important
sub	Woodland Park, CO	SW	wood SIP	SIPs perform very well in cold Colorado winters.	strong influence, excellent performance
	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
	Cleremont, FL	SE	Precast Insulated Panel	Jim doesn't feel energy was the major motivator.	slight influence, not the major motivator
	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Telluride, CO	SW	wood SIP	He believes energy efficiency is very important. In rural SW Colorado, fuel is especially expensive.	strong influence
	Newnan, GA	SE	open wall	Not a deciding factor.	no influence
	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
self	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
	Chicago, IL	MW	wood SIP	No.	no
	Clemmons, NC	SE	open wall	Yes, as the companies strive to reduce their per-square-foot costs. They were very successful in beating the national average for these costs.	yes, reduce cost to compete
	Seattle, WA	NW	open wall	Sure, anything to help keep costs down makes Walsh more competitive.	yes, reduce cost to compete
self/sub	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	New York, NY	NE	Precast Insulated Panel	Competition was maybe 2-3% of the decision.	very slight
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Englewood, FL	SE	Hardiboard SIP	No.	no
sub	Woodland Park, CO	SW	wood SIP	Yes; using energy efficient SIPs sets them apart from the crowd.	yes, energy niche
	Ridgefield, CT	NE	wood SIP	No.	no
	Cleremont, FL	SE	Precast Insulated Panel	No.	no
	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Denver, CO	SW	wood SIP	No.	no
	Telluride, CO	SW	wood SIP	No.	no
	Newnan, GA	SE	open wall	Moderate influence.	moderate
	Cartersville, GA	SE	open wall (SIP in past)	No.	no

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
self	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors
	Clemmons, NC	SE	open wall	When they started, introduced quite a few inspectors to panels. Some were OK with it immediately, and some wanted additional stamps and assurances.	educate Building Inspectors
	Seattle, WA	NW	open wall	Codes were challenge. Nailing of sheathing needed to be inspected in factory prior to covering with gyp, but panels were from out-of-state. Walsh worked out compromise w/ inspectors. Put fire protect on inside.	challenge; educate Building Inspectors
self/sub	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	New York, NY	NE	Precast Insulated Panel	No.	no.
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
	Olympia, WA	NW	wood SIP	No.	no.
	Englewood, FL	SE	Hardiboard SIP	Because use of these panels eliminates many of the parts/hardware that are typically needed, Brian feels it's actually easier to inspect & to meet code.	no; easier to inspect
sub	Woodland Park, CO	SW	wood SIP	As 1st panel builder in 3 or 4 counties, they had to educate building inspectors. Between ICBO approvals of SIPs and Ken's education efforts, the inspectors in their area are accepting of SIPs now.	educate Building Inspectors
	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
	Cleremont, FL	SE	Precast Insulated Panel	No.	no.
	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Telluride, CO	SW	wood SIP	No.	no.
	Newnan, GA	SE	open wall	No.	no.
	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
self	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Clemmons, NC	SE	open wall	Penalization is most successful when it's repetitive. For special design features, they would likely not try to use panels.	simple and repeatable designs key for success with panels
	Seattle, WA	NW	open wall	Design comes first for their homes, then decision to use panels follows. In seismic neighborhoods, the hold down system being used is influenced by the choice of panel system.	no influence
self/sub	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	New York, NY	NE	Precast Insulated Panel	They were able to do design things with panels on an affordable housing project that they wouldn't have been able to afford to do with conventional materials.	promoted better design
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Englewood, FL	SE	Hardiboard SIP	Their panel system has certain span and loading restrictions, which influences them toward more modest sizes and simpler designs that work well for affordable homes.	simple design, limited roof spans
sub	Woodland Park, CO	SW	wood SIP	Their first panelized homes used stick-frame design, and they found it was inefficient. Now they try for 4' dimensions, 4' wide windows spaced 4' in from the edge, etc. This facilitates field fabrication.	openings follow panel dimensions for easy site fabrication
	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
	Cleremont, FL	SE	Precast Insulated Panel	No major influence, but simplicity helps with a successful panel installation.	simple design
	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Telluride, CO	SW	wood SIP	He assumes there are some qualification associated with use of panels, but doesn't know what they are. Architects he works with like and specify panels.	no obvious influence; architects prefer panels
	Newnan, GA	SE	open wall	Not in Lee's homes, which are relatively simple. He thinks that in a more complex design, with lots of high ceilings etc., it would be more difficult (or less cost effective) to use panels.	no influence; uses simple home design
	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
self	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery
	Clemmons, NC	SE	open wall	Manufacture. errors, mostly when one home in a batch has some 'optional' items. Ex: if homeowners choose between 2 window types, 1 may have different rough opening but the change is overlooked @ plant.	window openings in fabrication
	Seattle, WA	NW	open wall	Panelizers not thinking like carpenters (measuring from edge of stud, not center). Initially had some problems coordinating locations of openings, plumbing stubs, and hold-down bolts. Need room for utilities in walls.	miscommunication w/ manufacturer; utilities interface
self/sub	Encino, CA	SW	open wall; closed wall	None.	none
	New York, NY	NE	Precast Insulated Panel	Requires a very large project to make precast panels pay (forms specially made). Precaster fell behind, affected scheduling. 1st job 1 form was distorted; repaired in field. Some customization/adjustment needed.	late delivery, panel flaws
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Englewood, FL	SE	Hardiboard SIP	Expansion & contraction can be problematic. They use control joints & take care w/ their stucco, siding, finishes. They are constantly striving to improve their products, from quality to aesthetics details.	expansion/contraction.
sub	Woodland Park, CO	SW	wood SIP	Infrequent manufacture. flaws: the two skins are slightly skewed from each other; the recessed cut isn't deep enough. Panels are forgiving; they just let the panel suppliers know. Some subs (esp. elect) resist change.	occasional panel flaws, resistance from subs
	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
	Cleremont, FL	SE	Precast Insulated Panel	Occasional height errors, but easily resolved. Overall panel supplier/fabricator & their installers were great. Biggest problem was with Jim's engineer making the change. Also hard to put vent stacks in outside wall.	designer resistance, utilities interface
	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Telluride, CO	SW	wood SIP	Experienced some fabrication errors. Field training w/ subs new to panels slows things some. Some elect problems w/ figuring out box locations. Precut chases may not line up. Custom homes hv outlet @ odd ht.	occasional fabrication errors, interface with electrical
	Newnan, GA	SE	open wall	Very rare manufacturing mistakes; usually field-corrected. Takes some organization to get timing correct, so panels are ordered before foundation is poured.	timing and coordination
	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
self	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination
	Clemmons, NC	SE	open wall	Repetition - do the same floor plan over, or a limited number of floor plans. From both labor and production standpoint, this saves money. Also scheduling is key with panels. Check codes ahead & resolve any issues.	repeatable design, code research, scheduling
	Seattle, WA	NW	open wall	When panelizers think like site carpenters, the builder has confidence in the shop drawings. Walsh has seasoned trained carpenters do careful reviews of all shop drawings & panel layout drawings. This is key.	good shop drawings reviewed by experienced builder
self/sub	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	New York, NY	NE	Precast Insulated Panel	Panels ready on time. Working out bugs: wanted the space connecting panels to resemble brick joints but it originally was wider. Doesn't leak like masonry, & better for maintenance (no efflorescence, tuck point).	repeatable design, timing schedule and delivery
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Englewood, FL	SE	Hardiboard SIP	Finding the right panel system for you. Good tech support. The more comprehensive the system the better, fabricated for ea. house with as many details in place as possible. Better quality control & predictability.	select appropriate panel/supplier
sub	Woodland Park, CO	SW	wood SIP	Superior product & energy efficiency. Design building around panel dimensions for easy field fab and speedy construction: on 1st homes w/ stick frame design, extra cutting negated anticipated labor savings.	train crews, design home's dimensions for easy site fab
	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
	Cleremont, FL	SE	Precast Insulated Panel	Panel supplier also has installation crew, and all went smoothly. Success comes from speedy installation & competitive price; more complicated house designs took longer & were less successful - not repeatable.	training from manufacturer, simple and repeatable design
	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Telluride, CO	SW	wood SIP	Need some orientation w/ subs, esp. MEP; panels not common in area. Experienced panel installer is biggest factor for success. For use of a panel system in general, its success stems from energy efficiency.	experienced crew, educated subs
	Newnan, GA	SE	open wall	Redundant/repeatable design. Crew that's comfortable with panels. Competitive cost, speed of construction, getting out of the weather, and cutting down on theft are all measures of success.	experienced crews, repeatable home design
	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
self	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB
	Clemmons, NC	SE	open wall	No.	-
	Seattle, WA	NW	open wall	Information is readily available in the public domain.	ALL
self/sub	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	New York, NY	NE	Precast Insulated Panel	No. The builder has been aware of this type of panel for years and has only recently been able to justify cost.	-
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
	Olympia, WA	NW	wood SIP	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, only backwards. Lack of good information on existing panels systems caused them to create their own panel system.	Info is lacking
sub	Woodland Park, CO	SW	wood SIP	Yes. The builder got information from a panel supplier, and from his own experience traveling the state working for a different building product supplier.	Panel Supplier
	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Telluride, CO	SW	wood SIP	Information on the internet has been useful for the builder to educate himself about panels.	WEB
	Newnan, GA	SE	open wall	Yes, the supplier approached him and was convincing.	Panel Supplier
	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
self	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems
	Clemmons, NC	SE	open wall	No.	-
	Seattle, WA	NW	open wall	Yes, closed-wall systems like SIPs because of the complications of putting utilities, etc. into walls.	SIPS because of close wall problems (utilities, etc)
self/sub	Encino, CA	SW	open wall; closed wall	No.	-
	New York, NY	NE	Precast Insulated Panel	The builder dislikes EIFS (Exterior Insulation and Finish Systems).	Dislikes EIFS
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
	Olympia, WA	NW	wood SIP	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, they avoided any panel with wood in it due to Florida's climate and termites.	Dislikes wood panels
sub	Woodland Park, CO	SW	wood SIP	Yes. They avoided polyurethane-based SIPs because of health concerns, and selected EPS foam instead.	Dislikes closed cell foams, likes EPS
	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Telluride, CO	SW	wood SIP	No.	-
	Newnan, GA	SE	open wall	They are not interested in panels like SIPs based on current buyer types and budgets.	SIPS because of budget
	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
self	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
	Chicago, IL	MW	wood SIP	No.	-
	Clemmons, NC	SE	open wall	No. Framing crews adjusted well to open wall panels, as did other subs.	OPEN WALL no changes needed
	Seattle, WA	NW	open wall	No, framers understand both open panels and stick framing. However, some framing subs refuse to work with panels from certain suppliers because they have found them to be problematic.	Replaced resistant subs
self/sub	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	New York, NY	NE	Precast Insulated Panel	No. They hired en experienced erection crew, and masons were eliminated, but other subs remained the same.	0
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Englewood, FL	SE	Hardiboard SIP	No.	-
sub	Woodland Park, CO	SW	wood SIP	No. Crews and subs could generally be trained to use panels.	TRAINING ONLY
	Ridgefield, CT	NE	wood SIP	No.	-
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Telluride, CO	SW	wood SIP	No. Just requires training.	TRAINING ONLY
	Newnan, GA	SE	open wall	Yes, the builder subs all framing and other trades and some subs were not comfortable switching to panels so he replaced them with crews that were comfortable with the technology.	Replaced resistant subs
	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
self	Grass Valley, CA	SW	wood SIP	No.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin
	Clemmons, NC	SE	open wall	The 1/4" sheathing used by many manufacturers may meet code, but the builder prefers something stronger (thicker).	OPEN WALL: better sheathing
	Seattle, WA	NW	open wall	A standardized system for labeling and communicating information about panels would be extremely helpful. Also he would like to see a higher quality of lumber used in panels.	OPEN WALL: labeling standards, higher quality lumber
self/sub	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	New York, NY	NE	Precast Insulated Panel	Connections could be improved a bit.	PRECAST: connections
	Kerrville, TX	SW	wood SIP	No.	-
	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Englewood, FL	SE	Hardiboard SIP	Improvements are ongoing.	-
sub	Woodland Park, CO	SW	wood SIP	No.	-
	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
	Cleremont, FL	SE	Precast Insulated Panel	Accommodation for vent stacks in outside walls; currently they run stacks on the outside of the wall and box it in.	PRECAST: vent stacks on exterior walls
	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Telluride, CO	SW	wood SIP	No.	-
	Newnan, GA	SE	open wall	No.	-
	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING

Interview Analysis by LABOR SOURCE

Labor Source	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
self	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered
	Clemmons, NC	SE	open wall	No. The large builder orders in such quantity, suppliers make efforts to deliver. Also there are many suppliers of open wall panels in the builder's region.	NO, because they are a large builder, suppliers make efforts to get their business
	Seattle, WA	NW	open wall	Proximity matters as it affects transportation costs. Open wall panels are available from a variety of suppliers.	YES, transportation costs are considered
self/sub	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	New York, NY	NE	Precast Insulated Panel	No. Proximity would only be a concern if it affects pricing.	NO, only if it affects pricing
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Englewood, FL	SE	Hardiboard SIP	Not applicable - they are their own supplier.	-
sub	Woodland Park, CO	SW	wood SIP	Yes. Having a panel supplier in Denver makes it convenient to ship panels to jobsites throughout the state.	YES, have panel distributor convenient to jobsites
	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
	Cleremont, FL	SE	Precast Insulated Panel	No.	NO
	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Denver, CO	SW	wood SIP	No.	NO
	Telluride, CO	SW	wood SIP	No. It hasn't in the past because clients of these custom homes can afford to transport the panels in; for a smaller budget home, proximity could potentially be a factor.	NO, clientele afford any transportation cost increase
	Newnan, GA	SE	open wall	Proximity plays a minor part in decision-making.	YES, transportation costs are considered
	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered

Interview Analysis by CLIENT TYPE (affordable, production...)

Builder's experience with panels

Interview Analysis by CLIENT TYPE (affordable, production...)

Client Type	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
affordable	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	New York, NY	NE	Precast Insulated Panel	Low income - market rate, RowHs/MF	4 years	20-30	>100	Have worked with HUD, Energy Star	self/sub	Old Castle	Precast SIP
	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Englewood, FL	SE	Hardiboard SIP	Gov't affordable housing providers	5 years	12	26-100	High-efficiency A/C, heat exchanger, solar hot water, water heater reclaim	sub/self homeowner	Homefront (self)	Hardiboard SIP
	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Seattle, WA	NW	open wall	Affordable; public, nonprofits, MF	40 years	250	>100	Modular & pre-engineered components; some just-in-time delivery; hoisting.	99% sub	Local companies within 50 miles	open wall
	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP
production	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years		<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
	Cleremont, FL	SE	Precast Insulated Panel	Single family homes, esp. for RV's	25-30 years	7 (just in this division)	26-100	No other advanced technologies	sub (supplier)	Manning Quick Walls	Precast SIP
	Newnan, GA	SE	open wall	Primarily 1st time homebuyers	20 years	2	26-100 (45)	No other advanced technologies	sub	Wheeler's Building Supply	open wall
	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)
	Clemmons, NC	SE	open wall	Market rate spec for big developers	Past experience	hundreds	>100	Engineered components like 6" headers; rigid foam board insulation	self	Wicks Lumber, 84 Lumber	open wall

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Client Type	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	New York, NY	NE	Precast Insulated Panel	Typically build w/ masonry and precast plank ceiling. Precast panels seemed a natural step: crane & erector already onsite. Panels cut out the masonry work. Also experimenting w/ foam & metal framing panels.	Time savings, same technology as foundation
	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Englewood, FL	SE	Hardiboard SIP	They weren't finding a product they liked, so they created a panel and steel framing system for the types of homes they are building and for the tough Florida climate. Panels are wood-free.	Created own product for superior quality, performance
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Seattle, WA	NW	open wall	They don't think SIPs or closed wall would work w/ utilities, etc. in walls. Choose open wall panel suppliers based on reputation, shop visits & drawings. Subs always ask "Who's the panelizer?" when bidding.	Flexibility of open walls
	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals
production	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
	Cleremont, FL	SE	Precast Insulated Panel	Jim has used panels in the past, and then a rep from this panel factory visited their offices. They were partially interested in panels due to the CMU shortage following the hurricanes.	Past experience, alternative to scarce materials
	Newnan, GA	SE	open wall	Lee's supplier approached him. He hasn't considered SIPs due to current buyer types and budgets. He's seen savings all around, but #1 or #2 reason for using panels is reducing theft from the jobsite.	Better quality, less theft, local supplier
	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier
	Clemmons, NC	SE	open wall	Big developers and builders pursue penalization as a means to reduce cost and improve productivity, and big lumber companies responded to their request. They select regional suppliers of open wall panels.	Reduce cost, raise productivity, use local suppliers

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Client Type	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	New York, NY	NE	Precast Insulated Panel	They've been aware of panels and interested in them for a number of years, but previously they weren't able to make the numbers work out.	public domain
	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Englewood, FL	SE	Hardiboard SIP	Information availability was very poor. They couldn't find a suitable product, so they elected to create their own.	good information is not available; found no suitable product
	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Seattle, WA	NW	open wall	Information is available in the public domain, & anyone can understand the concepts. Walsh has to work to find manufacturers & assess their products/capabilities but general panel information is readily available.	public domain
	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet
production	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
	Cleremont, FL	SE	Precast Insulated Panel	Jim is familiar with SIPs from past experiences. In this instance, the panel supplier contacted them.	past experience, supplier
	Newnan, GA	SE	open wall	From the supplier.	supplier
	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website
	Clemmons, NC	SE	open wall	Generally large developer/builders interested in high productivity are active in research & are familiar with penalization as a tool for increasing that productivity.	own research

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Client Type	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	New York, NY	NE	Precast Insulated Panel	Structural concrete panel are costly, but offer speed & some construction savings. Decision was based more on a desire to try something new with potential than strict cost. Takes v. big project 2 make it pay.	higher, but better quality
	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo finishing, etc. SIPs roofs are $$$, but excellent.	no cost difference in his region, clients want SIPs
	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Englewood, FL	SE	Hardiboard SIP	They were looking for labor savings (which took some time to actually happen).	labor savings
	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Seattle, WA	NW	open wall	Cost-driven decision. Walsh does 75% stick frame, 25% panels. Panels pay when schedule is tight, or space is tight. Sometimes they see labor savings. Can use apprentice carpenters rather than journeymen.	evaluated case-by-case; labor & material savings
	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings
production	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
	Cleremont, FL	SE	Precast Insulated Panel	Jim had to match the cost of panel construction to the cost of block construction.	cost similar to traditional construction
	Newnan, GA	SE	open wall	With panels, labor costs have decreased (less time, + hire less skilled crew), material costs decreased also. Much less waste on the jobsite; they save on hauling fees, too. Saving all the way around.	materials, labor and hauling savings
	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less
	Clemmons, NC	SE	open wall	They were able to reduce cost by half or better using penalization and repeating home designs.	dramatically reduce cost, cycle time with repeatable design

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Client Type	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	New York, NY	NE	Precast Insulated Panel	The panels are much more consistent. Much more uniform, much tighter, and being factory built means they don't have weather issues with their concrete.	better quality, consistency, tightness
	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Englewood, FL	SE	Hardiboard SIP	The panels are very durable. Reduces the # of parts needed for the home structure (good for hurricanes). Reduced # of subs on the job means better quality, mor control. Homeowners seek better quality.	better quality control, fewer subs
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Seattle, WA	NW	open wall	With good panelizers, 99% of panels are correct & Walsh does very little modification. That is a quality enhancement. Ability to keep things dryer by getting the roo on faster is a quality enhancement.	much better
	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality
production	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90° corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
	Cleremont, FL	SE	Precast Insulated Panel	Quality wasn't a deciding factor from builder's perspective, but Jim feels homeowners like the panels because of their soundness: the home has a solid, quality feel.	not as critical - but homeowners respond to quality feel
	Newnan, GA	SE	open wall	Panel quality is better; factory-made units are almost perfect, compared to a guy in the field trying to frame in the mud and rain.	better
	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good
	Clemmons, NC	SE	open wall	Brian actually feels that the open wall panels initially didn't contribute to quality, but they have improved & they are actually better quality than stick now. Unless flimsy sheathing is spec'd.	better (took time to get there)

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Client Type	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	New York, NY	NE	Precast Insulated Panel	The site seems to run cleaner and smoother without masons and masonry materials. Masons tend to tie up a job, & materials are messy; without them, many other trades could work at once. Can build in all weather.	much faster, & fewer trades increases efficiency
	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Englewood, FL	SE	Hardiboard SIP	Are now seeing labor savings they needed, but it took several years of refinement to get field production levels up to levels supporting the cost. Fewer vendors to coordinate means less delays. Faster, predictable.	took years to see the productivity they wanted to make it pay. More predictable.
	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Seattle, WA	NW	open wall	Building with panels is generally more efficient as long as site crews are prepared and familiar with the system. Need to be reading a screen, determination in which order to hoist the panels.	faster when crew is prepared
	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost
production	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
	Cleremont, FL	SE	Precast Insulated Panel	Speed was a big factor. They use a crane & the panels are erected very quickly. Homeowners like the quickness of the panels.	much faster, big factor
	Newnan, GA	SE	open wall	Efficiency has gone up considerably; Lee estimates it takes half the time to frame a home. Faster construction time also means getting out of the weather quickly.	faster
	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster
	Clemmons, NC	SE	open wall	This was the driving force. Framing times decreased and productivity increased dramatically. Even a new crew unfamiliar with panels would beat conventional framing speeds. Brian supervised 20-30 homes/ mo.	faster, speed is main motivator

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Client Type	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	New York, NY	NE	Precast Insulated Panel	Energy efficiency was a factor. Precast panels outperform masonry for air tightness, and also much better for water tightness. They have experienced far fewer leak complaints.	strong influence, airtight & also much more watertight.
	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Englewood, FL	SE	Hardiboard SIP	Energy efficiency is very important in Florida's harsh tropical climate.	very important
	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Seattle, WA	NW	open wall	Not a big factor, as their moderate climate (Seattle) doesn't yield big thermal pressures. A bigger factor (than heating/cooling) is moisture: speed of panelized construction helps keep things dry.	no influence, moderate climate
	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point
production	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
	Cleremont, FL	SE	Precast Insulated Panel	Jim doesn't feel energy was the major motivator.	slight influence, not the major motivator
	Newnan, GA	SE	open wall	Not a deciding factor.	no influence
	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.
	Clemmons, NC	SE	open wall	Energy efficiency wasn't a consideration in the decision to use panels.	no influence

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Client Type	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	New York, NY	NE	Precast Insulated Panel	Competition was maybe 2-3% of the decision.	very slight
	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
	Denver, CO	SW	wood SIP	No.	no
	Englewood, FL	SE	Hardiboard SIP	No.	no
	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Seattle, WA	NW	open wall	Sure, anything to help keep costs down makes Walsh more competitive.	yes, reduce cost to compete
	Chicago, IL	MW	wood SIP	No.	no
production	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	Ridgefield, CT	NE	wood SIP	No.	no
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
	Cleremont, FL	SE	Precast Insulated Panel	No.	no
	Newnan, GA	SE	open wall	Moderate influence.	moderate
	Cartersville, GA	SE	open wall (SIP in past)	No.	no
	Clemmons, NC	SE	open wall	Yes, as the companies strive to reduce their per-square-foot costs. They were very successful in beating the national average for these costs.	yes, reduce cost to compete

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Client Type	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	New York, NY	NE	Precast Insulated Panel	No.	no.
	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Englewood, FL	SE	Hardiboard SIP	Because use of these panels eliminates many of the parts/hardware that are typically needed, Brian feels it's actually easier to inspect & to meet code.	no; easier to inspect
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
	Olympia, WA	NW	wood SIP	No.	no.
	Seattle, WA	NW	open wall	Codes were challenge. Nailing of sheathing needed to be inspected in factory prior to covering with gyp, but panels were from out-of-state. Walsh worked out compromise w/ inspectors. Put fire protect on inside.	challenge; educate Building Inspectors
	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors
production	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
	Cleremont, FL	SE	Precast Insulated Panel	No.	no.
	Newnan, GA	SE	open wall	No.	no.
	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors
	Clemmons, NC	SE	open wall	When they started, introduced quite a few inspectors to panels. Some were OK with it immediately, and some wanted additional stamps and assurances.	educate Building Inspectors

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Client Type	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	New York, NY	NE	Precast Insulated Panel	They were able to do design things with panels on an affordable housing project that they wouldn't have been able to afford to do with conventional materials.	promoted better design
	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Englewood, FL	SE	Hardiboard SIP	Their panel system has certain span and loading restrictions, which influences them toward more modest sizes and simpler designs that work well for affordable homes.	simple design, limited roof spans
	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Seattle, WA	NW	open wall	Design comes first for their homes, then decision to use panels follows. In seismic neighborhoods, the hold down system being used is influenced by the choice of panel system.	no influence
	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
production	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
	Cleremont, FL	SE	Precast Insulated Panel	No major influence, but simplicity helps with a successful panel installation.	simple design
	Newnan, GA	SE	open wall	Not in Lee's homes, which are relatively simple. He thinks that in a more complex design, with lots of high ceilings etc., it would be more difficult (or less cost effective) to use panels.	no influence; uses simple home design
	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence
	Clemmons, NC	SE	open wall	Penalization is most successful when it's repetitive. For special design features, they would likely not try to use panels.	simple and repeatable designs key for success with panels

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Client Type	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Encino, CA	SW	open wall; closed wall	None.	none
	New York, NY	NE	Precast Insulated Panel	Requires a very large project to make precast panels pay (forms specially made). Precaster fell behind, affected scheduling. 1st job 1 form was distorted; repaired in field. Some customization/adjustment needed.	late delivery, panel flaws
	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Englewood, FL	SE	Hardiboard SIP	Expansion & contraction can be problematic. They use control joints & take care w/ their stucco, siding, finishes. They are constantly striving to improve their products, from quality to aesthetics details.	expansion/contraction.
	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Seattle, WA	NW	open wall	Panelizers not thinking like carpenters (measuring from edge of stud, not center). Initially had some problems coordinating locations of openings, plumbing stubs, and hold-down bolts. Need room for utilities in walls.	miscommunication w/ manufacturer; utilities interface
	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery
production	Encino, CA	SW	open wall; closed wall	None.	none
	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
	Cleremont, FL	SE	Precast Insulated Panel	Occasional height errors, but easily resolved. Overall panel supplier/fabricator & their installers were great. Biggest problem was with Jim's engineer making the change. Also hard to put vent stacks in outside wall.	designer resistance, utilities interface
	Newnan, GA	SE	open wall	Very rare manufacturing mistakes; usually field-corrected. Takes some organization to get timing correct, so panels are ordered before foundation is poured.	timing and coordination
	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews
	Clemmons, NC	SE	open wall	Manufacture. errors, mostly when one home in a batch has some 'optional' items. Ex: if homeowners choose between 2 window types, 1 may have different rough opening but the change is overlooked @ plant.	window openings in fabrication

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Client Type	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	New York, NY	NE	Precast Insulated Panel	Panels ready on time. Working out bugs: wanted the space connecting panels to resemble brick joints but it originally was wider. Doesn't leak like masonry, & better for maintenance (no efflorescence, tuck point).	repeatable design, timing schedule and delivery
	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Englewood, FL	SE	Hardiboard SIP	Finding the right panel system for you. Good tech support. The more comprehensive the system the better, fabricated for ea. house with as many details in place as possible. Better quality control & predictability.	select appropriate panel/supplier
	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Seattle, WA	NW	open wall	When panelizers think like site carpenters, the builder has confidence in the shop drawings. Walsh has seasoned trained carpenters do careful reviews of all shop drawings & panel layout drawings. This is key.	good shop drawings reviewed by experienced builder
	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination
production	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
	Cleremont, FL	SE	Precast Insulated Panel	Panel supplier also has installation crew, and all went smoothly. Success comes from speedy installation & competitive price; more complicated house designs took longer & were less successful - not repeatable.	training from manufacturer, simple and repeatable design
	Newnan, GA	SE	open wall	Redundant/repeatable design. Crew that's comfortable with panels. Competitive cost, speed of construction, getting out of the weather, and cutting down on theft are all measures of success.	experienced crews, repeatable home design
	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews
	Clemmons, NC	SE	open wall	Repetition - do the same floor plan over, or a limited number of floor plans. From both labor and production standpoint, this saves money. Also scheduling is key with panels. Check codes ahead & resolve any issues.	repeatable design, code research, scheduling

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Client Type	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	New York, NY	NE	Precast Insulated Panel	No. The builder has been aware of this type of panel for years and has only recently been able to justify cost.	-
	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Englewood, FL	SE	Hardiboard SIP	Yes, only backwards. Lack of good information on existing panels systems caused them to create their own panel system.	Info is lacking
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
	Olympia, WA	NW	wood SIP	No.	-
	Seattle, WA	NW	open wall	Information is readily available in the public domain.	ALL
	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB
production	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Newnan, GA	SE	open wall	Yes, the supplier approached him and was convincing.	Panel Supplier
	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking
	Clemmons, NC	SE	open wall	No.	-

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Client Type	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Encino, CA	SW	open wall; closed wall	No.	-
	New York, NY	NE	Precast Insulated Panel	The builder dislikes EIFS (Exterior Insulation and Finish Systems).	Dislikes EIFS
	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Englewood, FL	SE	Hardiboard SIP	Yes, they avoided any panel with wood in it due to Florida's climate and termites.	Dislikes wood panels
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
	Olympia, WA	NW	wood SIP	No.	-
	Seattle, WA	NW	open wall	Yes, closed-wall systems like SIPs because of the complications of putting utilities, etc. into walls.	SIPS because of close wall problems (utilities, etc)
	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems
production	Encino, CA	SW	open wall; closed wall	No.	-
	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Newnan, GA	SE	open wall	They are not interested in panels like SIPs based on current buyer types and budgets.	SIPS because of budget
	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget
	Clemmons, NC	SE	open wall	No.	-

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Client Type	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	New York, NY	NE	Precast Insulated Panel	No. They hired en experienced erection crew, and masons were eliminated, but other subs remained the same.	0
	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Englewood, FL	SE	Hardiboard SIP	No.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Seattle, WA	NW	open wall	No, framers understand both open panels and stick framing. However, some framing subs refuse to work with panels from certain suppliers because they have found them to be problematic.	Replaced resistant subs
	Chicago, IL	MW	wood SIP	No.	-
production	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	Ridgefield, CT	NE	wood SIP	No.	-
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Newnan, GA	SE	open wall	Yes, the builder subs all framing and other trades and some subs were not comfortable switching to panels so he replaced them with crews that were comfortable with the technology.	Replaced resistant subs
	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs
	Clemmons, NC	SE	open wall	No. Framing crews adjusted well to open wall panels, as did other subs.	OPEN WALL no changes needed

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Client Type	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	New York, NY	NE	Precast Insulated Panel	Connections could be improved a bit.	PRECAST: connections
	Grass Valley, CA	SW	wood SIP	No.	-
	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Englewood, FL	SE	Hardiboard SIP	Improvements are ongoing.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Seattle, WA	NW	open wall	A standardized system for labeling and communicating information about panels would be extremely helpful. Also he would like to see a higher quality of lumber used in panels.	OPEN WALL: labeling standards, higher quality lumber
	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin
production	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
	Kerrville, TX	SW	wood SIP	No.	-
	Cleremont, FL	SE	Precast Insulated Panel	Accommodation for vent stacks in outside walls; currently they run stacks on the outside of the wall and box it in.	PRECAST: vent stacks on exterior walls
	Newnan, GA	SE	open wall	No.	-
	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING
	Clemmons, NC	SE	open wall	The 1/4" sheathing used by many manufacturers may meet code, but the builder prefers something stronger (thicker).	OPEN WALL: better sheathing

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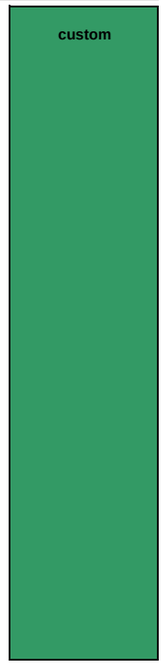
Client Type	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
affordable	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	New York, NY	NE	Precast Insulated Panel	No. Proximity would only be a concern if it affects pricing.	NO, only if it affects pricing
	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
	Denver, CO	SW	wood SIP	No.	NO
	Englewood, FL	SE	Hardiboard SIP	Not applicable - they are their own supplier.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Seattle, WA	NW	open wall	Proximity matters as it affects transportation costs. Open wall panels are available from a variety of suppliers.	YES, transportation costs are considered
	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered
production	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
	Cleremont, FL	SE	Precast Insulated Panel	No.	NO
	Newnan, GA	SE	open wall	Proximity plays a minor part in decision-making.	YES, transportation costs are considered
	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered
	Clemmons, NC	SE	open wall	No. The large builder orders in such quantity, suppliers make efforts to deliver. Also there are many suppliers of open wall panels in the builder's region.	NO, because they are a large builder, suppliers make efforts to get their business

Interview Analysis by CLIENT TYPE (continued... custom homes)

Builder's experience with panels

Client Type



Interview Analysis by CLIENT TYPE (continued... custom homes)

Client Type	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
custom	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	Woodland Park, CO	SW	wood SIP	Custom homes, 2nd homes for retirees	20 years	3	26-100	TJI floor & roof, Optima R-47 roof insulation, ICF foundation, Formadrain.	sub	R-Control	wood SIP
	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years		<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Telluride, CO	SW	wood SIP	Custom homes	20 years	2	<25 (2)	Radiant floors, ICF, manufacture lumber, SIPs, hi-performance windows, low-voltage circuitry.	sub (panel specific)	Winter; some R-control; Murus	wood SIP
	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)
	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP

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Client Type	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	Woodland Park, CO	SW	wood SIP	Ken was interested in panels he'd seen while traveling for another job and wanted to try them. R-Control was the 1st brand presented to them, the one they're most familiar with, and it's local.	Personal experience, local supplier
	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Telluride, CO	SW	wood SIP	Panels 1st specified by an architect. Josh liked them & has since used them on his own home. Has worked with different SIP mfgs, based on insulating material & erection/fastening. Murus uses cam-lock system.	Personal experience - own home
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier
	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals

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Client Type	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	Woodland Park, CO	SW	wood SIP	Ken worked as a distributor for another company & in his travels started to see SIPs used in other areas. He became interested & got information from salesmen at AFP (R-Control). This was pre-internet.	own experience with building product suppliers
	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Telluride, CO	SW	wood SIP	Finds that Internet is a great source for educating himself about panels	internet/public domain
	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website
	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet

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Client Type	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	Woodland Park, CO	SW	wood SIP	In the beginning material costs were higher & they had to hope to make up differences in labor savings. Now the gap is closing & he doesn't feel cost is much of a issue. His clients want SIPs.	slightly higher cost, but shrinking; quality, energy payback
	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo finishing, etc. SIPs roofs are $$$, but excellent.	no cost difference in his region, clients want SIPs
	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Telluride, CO	SW	wood SIP	Feels $ is a tad higher for panels than stick frame (material $ > labor savings); mostly not an issue w/ his clients. Energy payback. One project never got built partly due to high markup cost from panel middleman.	slightly higher cost, but clients don't mind - energy payback
	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less
	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings

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Client Type	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
custom	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	Woodland Park, CO	SW	wood SIP	Big factor. Panels mean home is straight and true and less likely to be messed up by varying quality of local trades people.	better quality, straight & true
	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90° corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Telluride, CO	SW	wood SIP	Based on his own research & experience, he feels SIPs homes are stronger.	stronger, better quality
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good
	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality

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Client Type	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	Woodland Park, CO	SW	wood SIP	Building with panels is efficient, especially with their earlier designs which were very simple & easily field-fabricated.	faster, especially with simpler designs
	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Telluride, CO	SW	wood SIP	He feels that perhaps some of the increased material cost is offset by getting the homes weather tight faster. The theory is that they save labor; probably true but doesn't seem to be the major deciding factor.	not much faster
	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster
	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost

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Client Type	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	Woodland Park, CO	SW	wood SIP	SIPs perform very well in cold Colorado winters.	strong influence, excellent performance
	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Telluride, CO	SW	wood SIP	He believes energy efficiency is very important. In rural SW Colorado, fuel is especially expensive.	strong influence
	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.
	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point

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Client Type	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
custom	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	Woodland Park, CO	SW	wood SIP	Yes; using energy efficient SIPs sets them apart from the crowd.	yes, energy niche
	Ridgefield, CT	NE	wood SIP	No.	no
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
	Denver, CO	SW	wood SIP	No.	no
	Telluride, CO	SW	wood SIP	No.	no
	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
	Cartersville, GA	SE	open wall (SIP in past)	No.	no
	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Chicago, IL	MW	wood SIP	No.	no

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Client Type	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	Woodland Park, CO	SW	wood SIP	As 1st panel builder in 3 or 4 counties, they had to educate building inspectors. Between ICBO approvals of SIPs and Ken's education efforts, the inspectors in their area are accepting of SIPs now.	educate Building Inspectors
	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Telluride, CO	SW	wood SIP	No.	no.
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors
	Olympia, WA	NW	wood SIP	No.	no.
	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors

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Client Type	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	Woodland Park, CO	SW	wood SIP	Their first panelized homes used stick-frame design, and they found it was inefficient. Now they try for 4' dimensions, 4' wide windows spaced 4' in from the edge, etc. This facilitates field fabrication.	openings follow panel dimensions for easy site fabrication
	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Telluride, CO	SW	wood SIP	He assumes there are some qualification associated with use of panels, but doesn't know what they are. Architects he works with like and specify panels.	no obvious influence; architects prefer panels
	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence
	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs

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Client Type	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
custom	Encino, CA	SW	open wall; closed wall	None.	none
	Woodland Park, CO	SW	wood SIP	Infrequent manufacture. flaws: the two skins are slightly skewed from each other; the recessed cut isn't deep enough. Panels are forgiving; they just let the panel suppliers know. Some subs (esp. elect) resist change.	occasional panel flaws, resistance from subs
	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Telluride, CO	SW	wood SIP	Experienced some fabrication errors. Field training w/ subs new to panels slows things some. Some elect problems w/ figuring out box locations. Precut chases may not line up. Custom homes hv outlet @ odd ht.	occasional fabrication errors, interface with electrical
	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews
	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery

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Client Type	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	Woodland Park, CO	SW	wood SIP	Superior product & energy efficiency. Design building around panel dimensions for easy field fab and speedy construction: on 1st homes w/ stick frame design, extra cutting negated anticipated labor savings.	train crews, design home's dimensions for easy site fab
	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Telluride, CO	SW	wood SIP	Need some orientation w/ subs, esp. MEP; panels not common in area. Experienced panel installer is biggest factor for success. For use of a panel system in general, its success stems from energy efficiency.	experienced crew, educated subs
	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews
	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination

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Client Type	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	Woodland Park, CO	SW	wood SIP	Yes. The builder got information from a panel supplier, and from his own experience traveling the state working for a different building product supplier.	Panel Supplier
	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Telluride, CO	SW	wood SIP	Information on the internet has been useful for the builder to educate himself about panels.	WEB
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking
	Olympia, WA	NW	wood SIP	No.	-
	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB

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Client Type	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
custom	Encino, CA	SW	open wall; closed wall	No.	-
	Woodland Park, CO	SW	wood SIP	Yes. They avoided polyurethane-based SIPs because of health concerns, and selected EPS foam instead.	Dislikes closed cell foams, likes EPS
	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Telluride, CO	SW	wood SIP	No.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget
	Olympia, WA	NW	wood SIP	No.	-
	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems

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Client Type	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
custom	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	Woodland Park, CO	SW	wood SIP	No. Crews and subs could generally be trained to use panels.	TRAINING ONLY
	Ridgefield, CT	NE	wood SIP	No.	-
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Telluride, CO	SW	wood SIP	No. Just requires training.	TRAINING ONLY
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs
	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Chicago, IL	MW	wood SIP	No.	-

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Client Type	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
custom	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	Woodland Park, CO	SW	wood SIP	No.	-
	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
	Kerrville, TX	SW	wood SIP	No.	-
	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Grass Valley, CA	SW	wood SIP	No.	-
	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Telluride, CO	SW	wood SIP	No.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING
	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin

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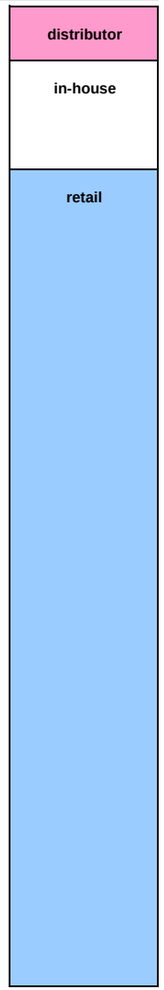
Client Type	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
custom	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	Woodland Park, CO	SW	wood SIP	Yes. Having a panel supplier in Denver makes it convenient to ship panels to jobsites throughout the state.	YES, have panel distributor convenient to jobsites
	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
	Denver, CO	SW	wood SIP	No.	NO
	Telluride, CO	SW	wood SIP	No. It hasn't in the past because clients of these custom homes can afford to transport the panels in; for a smaller budget home, proximity could potentially be a factor.	NO, clientele afford any transportation cost increase
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered
	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered

Interview Analysis by PANEL SOURCE

Builder's experience with panels



Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	Client Types	Age of Company	Number Employees	Houses per Year	Other Advanced Technologies	Labor Source	Panel Source	Panel Type
distributor	Grass Valley, CA	SW	wood SIP	20% affordable; rest custom for retirees	25 years	7	<25	ICFs; light tubes	Self	Distributes R-Control panels	wood SIP
in-house	Encino, CA	SW	open wall; closed wall	Single family, affordable & custom	5 years	20	26-100	None yet; planning air2air exchangers; more complex panels; holistic construction.	self/sub	Self; have mfg facility	open wall; closed wall
	Englewood, FL	SE	Hardiboard SIP	Gov't affordable housing providers	5 years	12	26-100	High-efficiency A/C, heat exchanger, solar hot water, water heater reclaim	sub/self homeowner	Homefront (self)	Hardiboard SIP
retail	New York, NY	NE	Precast Insulated Panel	Low income - market rate, RowHs/MF	4 years	20-30	>100	Have worked with HUD, Energy Star	self/sub	Old Castle	Precast SIP
	Woodland Park, CO	SW	wood SIP	Custom homes, 2nd homes for retirees	20 years	3	26-100	TJI floor & roof, Optima R-47 roof insulation, ICF foundation, Formadrain.	sub	R-Control	wood SIP
	Ridgefield, CT	NE	wood SIP	Both custom and spec homes	6 years		<25	Superior Wall, OVE framing, truss walls, R-joists, open web trusses, diff. insulation.	sub	Easy Build (Canada), Murus	wood SIP
	Kerrville, TX	SW	wood SIP	Low-moderate income; some custom	6 years	fluctuates 8-25	<25	ICFs; looking at Agriboard panels.	50% sub, 50% self	R-Control from Chapman Panel	wood SIP
	Cleremont, FL	SE	Precast Insulated Panel	Single family homes, esp. for RV's	25-30 years	7 (just in this division)	26-100	No other advanced technologies	sub (supplier)	Manning Quick Walls	Precast SIP
	Chicago, IL	MW	Precast Insulated Panel	Multifamily, town homes, & custom	3 years	2	26-100	No other advanced technologies	sub	Dukane Precast, Naperville IL	Precast SIP
	Denver, CO	SW	wood SIP	Custom homes, affordable end	5-6 yrs	2	<25	ICF, Air Exchangers, Geothermal, Modular.	Sub	AFP or Premier	wood SIP
	Telluride, CO	SW	wood SIP	Custom homes	20 years	2	<25 (2)	Radiant floors, ICF, manufacture lumber, SIPs, hi-performance windows, low-voltage circuitry.	sub (panel specific)	Winter; some R-control; Murus	wood SIP
	Newnan, GA	SE	open wall	Primarily 1st time homebuyers	20 years	2	26-100 (45)	No other advanced technologies	sub	Wheeler's Building Supply	open wall
	Holiday, FL	SE	Metal SIP (Steel/Al)	Custom homes & nonprofit developers	17 years	11	20	PEX plumbing; all homes are Energy Star certified	self	Metals USA	Metal SIP (Steel/Al)
	Cartersville, GA	SE	open wall (SIP in past)	Range, from starter to multimillion custom	6 years	12	26-100	All homes are ENERGY STAR, Healthy Homes, advanced framing, hi-R foam insulation	sub	Wheeler's Building Supply	open wall (SIP in past)
	Olympia, WA	NW	wood SIP	Big range; affordable to multimillion	20 years	12	26-100 (10-25)	ICFs, radiant floors, wastewater heat recovery, recycled wood, foam insulation.	self/sub	Premier Panels in WA	wood SIP
	Chicago, IL	MW	wood SIP	Range of incomes, low to high	7 years	22	<25	Have a reputation for using photovoltaics, green & energy efficiency projects	self	WH Porter in Holland, MI	wood SIP
	Clemmons, NC	SE	open wall	Market rate spec for big developers	Past experience	hundreds	>100	Engineered components like 6" headers; rigid foam board insulation	self	Wicks Lumber, 84 Lumber	open wall
	Seattle, WA	NW	open wall	Affordable; public, nonprofits, MF	40 years	250	>100	Modular & pre-engineered components; some just-in-time delivery; hoisting.	99% sub	Local companies within 50 miles	open wall

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	How did you choose this particular panel system?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Architect David Wright (passive solar design) introduced Jim & other N. CA builders to SIPs in early 90's. Jim had used open wall panels, but felt it was like table framing & couldn't compare to quality/value of SIPs.	Energy efficiency, quality, advanced technology
in-house	Encino, CA	SW	open wall; closed wall	Developed this panel system to reduce waste, reduce cycle time, improve quality. Shortcuts very common w/ CA builders. Skilled labor shortage. Experimenting w/ holistic construction approach, like European model.	Created own product for superior quality, performance
	Englewood, FL	SE	Hardiboard SIP	They weren't finding a product they liked, so they created a panel and steel framing system for the types of homes they are building and for the tough Florida climate. Panels are wood-free.	Created own product for superior quality, performance
retail	New York, NY	NE	Precast Insulated Panel	Typically build w/ masonry and precast plank ceiling. Precast panels seemed a natural step: crane & erector already onsite. Panels cut out the masonry work. Also experimenting w/ foam & metal framing panels.	Time savings, same technology as foundation
	Woodland Park, CO	SW	wood SIP	Ken was interested in panels he'd seen while traveling for another job and wanted to try them. R-Control was the 1st brand presented to them, the one they're most familiar with, and it's local.	Personal experience, local supplier
	Ridgefield, CT	NE	wood SIP	They heard about panels at tradeshows, etc. A consulting client used Murus panels and liked them; after researching, Mike felt comfortable with everything he learned. Avoided closed-cell foam for environmental reasons.	Experience with other builders
	Kerrville, TX	SW	wood SIP	SIPs offer superior energy performance & quality. Have used different mfg's but Chapman has best quality & service, & will soon offer 1/16 tolerances. Considered open wall, but it lacks the speed & energy efficiency.	Speed of erection, less waste offset material cost
	Cleremont, FL	SE	Precast Insulated Panel	Jim has used panels in the past, and then a rep from this panel factory visited their offices. They were partially interested in panels due to the CMU shortage following the hurricanes.	Past experience, alternative to scarce materials
	Chicago, IL	MW	Precast Insulated Panel	He heard of the product through word of mouth. After visiting the plant site (it's also in Illinois) and example homes, he decided to use it for its speed of installation and energy efficiency. A good fit for his projects.	Time & energy savings
	Denver, CO	SW	wood SIP	Based on interest and experience with passive solar design and energy efficiency, he followed progress of SIPs for several years before trying them. The first SIPs house was for himself and he liked it.	Research, personal experience
	Telluride, CO	SW	wood SIP	Panels 1st specified by an architect. Josh liked them & has since used them on his own home. Has worked with different SIP mfgs, based on insulating material & erection/fastening. Murus uses cam-lock system.	Personal experience - own home
	Newnan, GA	SE	open wall	Lee's supplier approached him. He hasn't considered SIPs due to current buyer types and budgets. He's seen savings all around, but #1 or #2 reason for using panels is reducing theft from the jobsite.	Better quality, less theft, local supplier
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris previously worked for a metal SIP manufacturer. Has used wood SIPs, but metal = 1/2 the wt, no termite risk, & no splines. He selected his current metal SIP supplier because of superior service and quality.	Supplier's service; termite resistance
	Cartersville, GA	SE	open wall (SIP in past)	Selection is very budget-driven. David likes SIPs, but he gets equivalent R w/ his foam insulation, so SIPs are more expensive. Wheeler is nearby, & they hoped open wall would offer some speed/labor savings.	Depends on budget, local supplier
	Olympia, WA	NW	wood SIP	Scott had reputation for interest in energy efficiency. Client requested SIPs, so he tried them; was very pleased. The panels proved to be everything the salesman said: quieter, stronger, straighter, & more energy efficient.	Energy efficiency, quality
	Chicago, IL	MW	wood SIP	The project team wanted to build a very efficient, green home. Architects suggested looking into SIPs. David was familiar, but hadn't gotten around to trying them yet. The panel supplier they use is 70 miles away.	Energy efficiency, green building goals
	Clemmons, NC	SE	open wall	Big developers and builders pursue penalization as a means to reduce cost and improve productivity, and big lumber companies responded to their request. They select regional suppliers of open wall panels.	Reduce cost, raise productivity, use local suppliers
	Seattle, WA	NW	open wall	They don't think SIPs or closed wall would work w/ utilities, etc. in walls. Choose open wall panel suppliers based on reputation, shop visits & drawings. Subs always ask "Who's the panelizer?" when bidding.	Flexibility of open walls

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	Where did you obtain information about panels?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Jim has been involved in SIPA since 1991. First introduced to panels by an architect.	architect, SIPA
in-house	Encino, CA	SW	open wall; closed wall	Mike Elliott studied panels in grad school (architecture) and has been involved with them ever since; Alman is both fabricator and general contractor, but emphasis is on the design and fabrication.	grad school
	Englewood, FL	SE	Hardiboard SIP	Information availability was very poor. They couldn't find a suitable product, so they elected to create their own.	good information is not available; found no suitable product
retail	New York, NY	NE	Precast Insulated Panel	They've been aware of panels and interested in them for a number of years, but previously they weren't able to make the numbers work out.	public domain
	Woodland Park, CO	SW	wood SIP	Ken worked as a distributor for another company & in his travels started to see SIPs used in other areas. He became interested & got information from salesmen at AFP (R-Control). This was pre-internet.	own experience with building product suppliers
	Ridgefield, CT	NE	wood SIP	Trade shows, conferences and the internet.	public domain: trade shows, conferences, internet
	Kerrville, TX	SW	wood SIP	From SIPA and from panel manufacturers; they didn't really find all that much good information available. They decided to take a chance and build one to figure it out themselves.	information isn't very good but use SIPA, suppliers
	Cleremont, FL	SE	Precast Insulated Panel	Jim is familiar with SIPs from past experiences. In this instance, the panel supplier contacted them.	past experience, supplier
	Chicago, IL	MW	Precast Insulated Panel	Word of mouth, site visits to the panel supplier.	own research, public domain, visiting suppliers
	Denver, CO	SW	wood SIP	He feels the manufacturers do a poor job of providing information and descriptions; he used panels in spite of the manufacturer info, not because of it.	not enough good information from manufacturers
	Telluride, CO	SW	wood SIP	Finds that Internet is a great source for educating himself about panels	internet/public domain
	Newnan, GA	SE	open wall	From the supplier.	supplier
	Holiday, FL	SE	Metal SIP (Steel/Al)	SIPA, and Chris actually worked for a different metal panel manufacturer at one time so he's very familiar.	worked for a supplier. SIPA
	Cartersville, GA	SE	open wall (SIP in past)	Information is available if you dig a little for it, but mostly he feels it's pretty scarce. They are members of EEBA, and David got almost all of his information from that Building Science website.	info is scarce; use EEBA membership, Building Science website
	Olympia, WA	NW	wood SIP	Introduced to panels through a client request, and has continued using the same manufacturer.	client request
	Chicago, IL	MW	wood SIP	Information these days is readily available on the web.	internet
	Clemmons, NC	SE	open wall	Generally large developer/builders interested in high productivity are active in research & are familiar with penalization as a tool for increasing that productivity.	own research
	Seattle, WA	NW	open wall	Information is available in the public domain, & anyone can understand the concepts. Walsh has to work to find manufacturers & assess their products/capabilities but general panel information is readily available.	public domain

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	How did cost factor into the decision to use panels?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Stopped comparing cost b/c differences were so trivial. High labor costs in N. CA makes panels cheaper in some areas. Jim saves his high-paid skilled workers fo	no cost difference in his region, clients want SIPs
in-house	Encino, CA	SW	open wall; closed wall	Affordability is key, both from materials and from cycle time. They do lots of work w/ non-profit affordable housing groups. Lower cost by adding more elements with factory labor, less with field labor, less waste	more value, material & time savings
	Englewood, FL	SE	Hardiboard SIP	They were looking for labor savings (which took some time to actually happen).	labor savings
retail	New York, NY	NE	Precast Insulated Panel	Structural concrete panel are costly, but offer speed & some construction savings. Decision was based more on a desire to try something new with potential than strict cost. Takes v. big project 2 make it pay.	higher, but better quality
	Woodland Park, CO	SW	wood SIP	In the beginning material costs were higher & they had to hope to make up differences in labor savings. Now the gap is closing & he doesn't feel cost is much of a	slightly higher cost, but shrinking; quality, energy payback
	Ridgefield, CT	NE	wood SIP	Labor costs are so high in the NE that despite higher material cost, SIPs save some labor so it helps balance out the cost. They've only done 2 SIPs homes, so still assessing cost.	may be higher material cost, but lower labor costs
	Kerrville, TX	SW	wood SIP	Bill feels materials were originally a wash, but panels now cost more due to shortage of OSB (hurricanes in FL, etc). He sees savings in "speed money" - fast erection, in using less skilled labor, & in less waste.	slightly higher cost, but speed in erection
	Cleremont, FL	SE	Precast Insulated Panel	Jim had to match the cost of panel construction to the cost of block construction.	cost similar to traditional construction
	Chicago, IL	MW	Precast Insulated Panel	Cost comparisons were done, but it was almost neutral.	cost similar to traditional construction
	Denver, CO	SW	wood SIP	Not a big factor; cost is a wash. Also keep in mind how energy costs will continue to go up.	not important
	Telluride, CO	SW	wood SIP	Feels $ is a tad higher for panels than stick frame (material $ > labor savings); mostly not an issue w/ his clients. Energy payback. One project never got built partly due to high markup cost from panel middleman.	slightly higher cost, but clients don't mind - energy payback
	Newnan, GA	SE	open wall	With panels, labor costs have decreased (less time, + hire less skilled crew), material costs decreased also. Much less waste on the jobsite; they save on hauling fees, too. Saving all the way around.	materials, labor and hauling savings
	Holiday, FL	SE	Metal SIP (Steel/Al)	Cost is always a factor, but Chris prefers to work with metal panels.	not important, loves panel quality
	Cartersville, GA	SE	open wall (SIP in past)	When lumber prices went up, they had already locked in rates for panels so T&M was considerably less than stick framing. Since then, prices adjusted & now they're going back to stick framing for less cost.	evaluated as prices fluctuate; currently stick costs less
	Olympia, WA	NW	wood SIP	He figures he pays more for materials but labor is quicker. Ultimately he believes in paying a little more for a far superior product, and convinces homeowners likewise because energy payback is so substantial.	slightly higher cost, but superior product w/ payback
	Chicago, IL	MW	wood SIP	SIPs project was affordable housing, so cost was critical. SIPs package costs more than lumber framing package, & hoped to make up some in labor savings, which seems to be the case.	higher costs seem to be offset by labor savings
	Clemmons, NC	SE	open wall	They were able to reduce cost by half or better using penalization and repeating home designs.	dramatically reduce cost, cycle time with repeatable design
	Seattle, WA	NW	open wall	Cost-driven decision. Walsh does 75% stick frame, 25% panels. Panels pay when schedule is tight, or space is tight. Sometimes they see labor savings. Can use apprentice carpenters rather than journeymen.	evaluated case-by-case; labor & material savings

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	How did quality factor into the decision to use panels?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Improves 500%. Today's lumber is poor; panels = pristine product, so finishes look great. Avoid typical jobsite problems: design errors caught during fabrication; coordination work w/ subs is done ahead.	better quality, performance; stick lumber quality declining
in-house	Encino, CA	SW	open wall; closed wall	They achieve much better quality control in manufacturing facility. The more elements that can be added in the factory (siding, plumbing, electrical) the better they believe overall quality will be.	quality control
	Englewood, FL	SE	Hardiboard SIP	The panels are very durable. Reduces the # of parts needed for the home structure (good for hurricanes). Reduced # of subs on the job means better quality, more control. Homeowners seek better quality.	better quality control, fewer subs
retail	New York, NY	NE	Precast Insulated Panel	The panels are much more consistent. Much more uniform, much tighter, and being factory built means they don't have weather issues with their concrete.	better quality, consistency, tightness
	Woodland Park, CO	SW	wood SIP	Big factor. Panels mean home is straight and true and less likely to be messed up by varying quality of local trades people.	better quality, straight & true
	Ridgefield, CT	NE	wood SIP	With SIPs, you get a wall that is as close to airtight as possible.	airtight construction
	Kerrville, TX	SW	wood SIP	Quality is hugely improved in panels: straight, true, 90° corners. Lumber quality isn't what it used to be with more warping, knots, etc. Also panels resist mold and fire better.	better quality, performance; stick lumber quality declining
	Cleremont, FL	SE	Precast Insulated Panel	Quality wasn't a deciding factor from builder's perspective, but Jim feels homeowners like the panels because of their soundness: the home has a solid, quality feel.	not as critical - but homeowners respond to quality feel
	Chicago, IL	MW	Precast Insulated Panel	Cliff particularly likes the soundproofing qualities of building with this panel. Sound attenuation is key in multifamily buildings and connected town homes.	better soundproofing
	Denver, CO	SW	wood SIP	Panels make for straighter, stronger, better insulated houses. Improved quality is the main reason for using panels; better than the best stick-frame. Comfortable homes w/ no drafts. Also green, using young trees.	much better performance
	Telluride, CO	SW	wood SIP	Based on his own research & experience, he feels SIPs homes are stronger.	stronger, better quality
	Newnan, GA	SE	open wall	Panel quality is better; factory-made units are almost perfect, compared to a guy in the field trying to frame in the mud and rain.	better
	Holiday, FL	SE	Metal SIP (Steel/Al)	Chris feels that metal SIPs yield a high-quality home.	better quality w/ metal
	Cartersville, GA	SE	open wall (SIP in past)	Panels quality was good. For either panels or stick, framing has to be good quality and David aims to have his product be significantly better than his competition's	good
	Olympia, WA	NW	wood SIP	Most noticeable: callbacks went down to zero. No cracking, twisting, shrinking problems, fewer imperfections, siding looks better. From a engineering perspective, he can use less hardware and keep the house strong.	better quality reduces callbacks
	Chicago, IL	MW	wood SIP	In general they thought SIPs would produce a quality house, and they're happy with results.	better quality
	Clemmons, NC	SE	open wall	Brian actually feels that the open wall panels initially didn't contribute to quality, but they have improved & they are actually better quality than stick now. Unless flimsy sheathing is spec'd.	better (took time to get there)
	Seattle, WA	NW	open wall	With good panelizers, 99% of panels are correct & Walsh does very little modification. That is a quality enhancement. Ability to keep things dryer by getting the roo on faster is a quality enhancement.	much better

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	How did construction efficiency factor into the decision?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Fully fabricated projects are ideal; shows off touted super fast installation . Some builders buy "cut-and-scoop" pkgs w/ precut openings, then add headers, etc in field to preserve work for their field guys.	faster for fully fabricated panels, not site fabricated
in-house	Encino, CA	SW	open wall; closed wall	Construction efficiency is their major motivator; this is what keeps their customers (developers & homeowners) satisfied. Main advantage of their panels is reduced cycle time.	faster, speed is main motivator
	Englewood, FL	SE	Hardiboard SIP	Are now seeing labor savings they needed, but it took several years of refinement to get field production levels up to levels supporting the cost. Fewer vendors to coordinate means less delays. Faster, predictable.	took years to see the productivity they wanted to make it pay. More predictable.
retail	New York, NY	NE	Precast Insulated Panel	The site seems to run cleaner and smoother without masons and masonry materials. Masons tend to tie up a job, & materials are messy; without them, many other trades could work at once. Can build in all weather.	much faster, & fewer trades increases efficiency
	Woodland Park, CO	SW	wood SIP	Building with panels is efficient, especially with their earlier designs which were very simple & easily field-fabricated.	faster, especially with simpler designs
	Ridgefield, CT	NE	wood SIP	They haven't used the system enough to have seen major efficiency improvements, but Mike feels that this will improve as his crews become accustomed to using panels.	faster with crew experience
	Kerrville, TX	SW	wood SIP	Efficiency was absolutely a factor. Not only framing but sheathing and insulation are complete much more quickly.	faster, carries past framing into insulating, finishing
	Cleremont, FL	SE	Precast Insulated Panel	Speed was a big factor. They use a crane & the panels are erected very quickly. Homeowners like the quickness of the panels.	much faster, big factor
	Chicago, IL	MW	Precast Insulated Panel	Speed was the major influence in Cliff's decision to use panels. Lowers securing costs, less theft, lower general conditions for heating, etc. when you get enclosed faster.	faster, speed is major motivator, also more secure
	Denver, CO	SW	wood SIP	Despite touting this as a main selling point, experiences show it's not much faster. Note: they do site fabrication of SIPs panels.	not much faster
	Telluride, CO	SW	wood SIP	He feels that perhaps some of the increased material cost is offset by getting the homes weather tight faster. The theory is that they save labor; probably true but doesn't seem to be the major deciding factor.	not much faster
	Newnan, GA	SE	open wall	Efficiency has gone up considerably; Lee estimates it takes half the time to frame a home. Faster construction time also means getting out of the weather quickly.	faster
	Holiday, FL	SE	Metal SIP (Steel/Al)	Construction efficiency is not a major motivator, but it's a lot faster than traditional construction. Even if framing time takes a while (use uses fairly small crews & field fabs), the insulation, etc. is already done.	somewhat faster, but not major factor
	Cartersville, GA	SE	open wall (SIP in past)	They did not see the improved efficiency they had hoped for. David thinks it was because their contractor couldn't seem to keep a consistent labor force, so they were always battling a learning curve.	not faster
	Olympia, WA	NW	wood SIP	It takes them a couple weeks to frame up a house using panels, but he estimates they save at least a week's worth of labor.	somewhat faster
	Chicago, IL	MW	wood SIP	Yes, this is where they hoped to recoup some added material cost.	faster, recoups labor cost
	Clemmons, NC	SE	open wall	This was the driving force. Framing times decreased and productivity increased dramatically. Even a new crew unfamiliar with panels would beat conventional framing speeds. Brian supervised 20-30 homes/ mo.	faster, speed is main motivator
	Seattle, WA	NW	open wall	Building with panels is generally more efficient as long as site crews are prepared and familiar with the system. Need to be reading a screen, determination in which order to hoist the panels.	faster when crew is prepared

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	How did energy efficiency factor into the decision?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Energy efficiency is the main thrust of how he sells panels and panel homes. He stresses whole-wall energy testing, which is where SIPs really shine.	strong influence, main selling point
in-house	Encino, CA	SW	open wall; closed wall	Strong influence. Alman builds in the desert, and by making homes more efficient (2x6 walls, R-19, double glazed windows) he can downsize A/C units, saving $ up front and in operation costs.	strong influence, downsized mechanicals.
	Englewood, FL	SE	Hardiboard SIP	Energy efficiency is very important in Florida's harsh tropical climate.	very important
retail	New York, NY	NE	Precast Insulated Panel	Energy efficiency was a factor. Precast panels outperform masonry for air tightness, and also much better for water tightness. They have experienced far fewer leak complaints.	strong influence, airtight & also much more watertight.
	Woodland Park, CO	SW	wood SIP	SIPs perform very well in cold Colorado winters.	strong influence, excellent performance
	Ridgefield, CT	NE	wood SIP	Energy efficiency ranks up near structural integrity in terms of importance. This is the major advantage of SIPs.	strong influence, along with structural integrity
	Kerrville, TX	SW	wood SIP	A very big factor in harsh Texas climate.	strong influence
	Cleremont, FL	SE	Precast Insulated Panel	Jim doesn't feel energy was the major motivator.	slight influence, not the major motivator
	Chicago, IL	MW	Precast Insulated Panel	The panels have a superior R-rating and anything that helps lower the homeowner's utility bills also helps them to afford Cliff's product.	strong influence, appeals to homeowners
	Denver, CO	SW	wood SIP	Strong influence. He feels SIPs outperform any other type of framing.	strong influence
	Telluride, CO	SW	wood SIP	He believes energy efficiency is very important. In rural SW Colorado, fuel is especially expensive.	strong influence
	Newnan, GA	SE	open wall	Not a deciding factor.	no influence
	Holiday, FL	SE	Metal SIP (Steel/Al)	Energy efficiency is a big selling point, & he markets to this niche. Metal SIPs well suited to FL climate: withstand moisture, storms (engineered to withstand hurricane-force winds), & metal is termite resistant.	strong influence along with climate (disaster resistance)
	Cartersville, GA	SE	open wall (SIP in past)	Outlook caters to a niche market; whatever framing/panel method they use, they are using advanced insulation methods that achieve very high R-values (R-23 whole-wall).	no influence, same insulation for stick or panel.
	Olympia, WA	NW	wood SIP	Scott was involved in local utility programs to encourage efficiency prior to building with panels. Decision to use SIPs resulted from his search for ways to make their homes more energy efficient and healthier.	strong influence
	Chicago, IL	MW	wood SIP	Energy efficiency was the major reason for deciding to use SIPs.	strong influence, main selling point
	Clemmons, NC	SE	open wall	Energy efficiency wasn't a consideration in the decision to use panels.	no influence
	Seattle, WA	NW	open wall	Not a big factor, as their moderate climate (Seattle) doesn't yield big thermal pressures. A bigger factor (than heating/cooling) is moisture: speed of panelized construction helps keep things dry.	no influence, moderate climate

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	Did competition with other builders influence the decision?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	No.	yes, energy niche
in-house	Encino, CA	SW	open wall; closed wall	All builders are trying to reduce their cycle time to stay competitive. That's what panels do for them.	yes, reduce cycle time to compete
	Englewood, FL	SE	Hardiboard SIP	No.	no
retail	New York, NY	NE	Precast Insulated Panel	Competition was maybe 2-3% of the decision.	very slight
	Woodland Park, CO	SW	wood SIP	Yes; using energy efficient SIPs sets them apart from the crowd.	yes, energy niche
	Ridgefield, CT	NE	wood SIP	No.	no
	Kerrville, TX	SW	wood SIP	Slightly; Bill believes panels create a superior home.	yes, better quality
	Cleremont, FL	SE	Precast Insulated Panel	No.	no
	Chicago, IL	MW	Precast Insulated Panel	No.	no
	Denver, CO	SW	wood SIP	No.	no
	Telluride, CO	SW	wood SIP	No.	no
	Newnan, GA	SE	open wall	Moderate influence.	moderate
	Holiday, FL	SE	Metal SIP (Steel/Al)	No. About 5 other builders in the region use metal SIPs.	yes, energy niche
	Cartersville, GA	SE	open wall (SIP in past)	No.	no
	Olympia, WA	NW	wood SIP	No. No one else in his area is doing it, so he has carved out a market niche as a 100% SIPs builder for past 11 years.	yes, energy niche
	Chicago, IL	MW	wood SIP	No.	no
	Clemmons, NC	SE	open wall	Yes, as the companies strive to reduce their per-square-foot costs. They were very successful in beating the national average for these costs.	yes, reduce cost to compete
	Seattle, WA	NW	open wall	Sure, anything to help keep costs down makes Walsh more competitive.	yes, reduce cost to compete

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	Did local building codes factor into the decision?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Once builders take the time to educate local building inspectors, the inspectors really like them.	educate Building Inspectors
in-house	Encino, CA	SW	open wall; closed wall	Codes make it more difficult but don't prevent use of panels. Alman is advancing their factory-inspected "closed wall" panels; they hope to have not just framing but wiring/plumbing inspected in the factory.	need to educate Building Inspectors
	Englewood, FL	SE	Hardiboard SIP	Because use of these panels eliminates many of the parts/hardware that are typically needed, Brian feels it's actually easier to inspect & to meet code.	no; easier to inspect
retail	New York, NY	NE	Precast Insulated Panel	No.	no.
	Woodland Park, CO	SW	wood SIP	As 1st panel builder in 3 or 4 counties, they had to educate building inspectors. Between ICBO approvals of SIPs and Ken's education efforts, the inspectors in their area are accepting of SIPs now.	educate Building Inspectors
	Ridgefield, CT	NE	wood SIP	Mike feels that building inspectors are getting used to having lots of new technologies come up; as long as it's stamped somewhere, they don't seem to want to know about anything in too much detail.	educate Building Inspectors
	Kerrville, TX	SW	wood SIP	They educated local building inspectors via video, specs, research & presentations; that way inspectors weren't surprised in the field.	educate Building Inspectors
	Cleremont, FL	SE	Precast Insulated Panel	No.	no.
	Chicago, IL	MW	Precast Insulated Panel	No.	no.
	Denver, CO	SW	wood SIP	No, but he feels local building codes might discourage builders since inspectors are not overly familiar with SIPs.	no, but Building Inspector usually not familiar with panels
	Telluride, CO	SW	wood SIP	No.	no.
	Newnan, GA	SE	open wall	No.	no.
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	no.
	Cartersville, GA	SE	open wall (SIP in past)	No; they spent some extra time explaining the first couple and the inspectors have been pretty good to work with.	educate Building Inspectors
	Olympia, WA	NW	wood SIP	No.	no.
	Chicago, IL	MW	wood SIP	A major challenge; weird Chicago code. Had to get special approval from the City to use SIPs, but only covers 25 site-specific homes; couldn't get approval written into code. Had to bring in experts from MI.	major challenge; educate Building Inspectors
	Clemmons, NC	SE	open wall	When they started, introduced quite a few inspectors to panels. Some were OK with it immediately, and some wanted additional stamps and assurances.	educate Building Inspectors
	Seattle, WA	NW	open wall	Codes were challenge. Nailing of sheathing needed to be inspected in factory prior to covering with gyp, but panels were from out-of-state. Walsh worked out compromise w/ inspectors. Put fire protect on inside.	challenge; educate Building Inspectors

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	How do panels influence home design?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	No. All building products are sold in 2' and 4' increments, so that's what homes are designed in anyway. Jim designs 80% of the homes he builds.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
in-house	Encino, CA	SW	open wall; closed wall	Their focus is on having their panelized system be adaptable to the way homes are designed, not the other way around. They plan to certify the system (not a particular design) so all panels can be plant-inspected.	no influence
	Englewood, FL	SE	Hardiboard SIP	Their panel system has certain span and loading restrictions, which influences them toward more modest sizes and simpler designs that work well for affordable homes.	simple design, limited roof spans
retail	New York, NY	NE	Precast Insulated Panel	They were able to do design things with panels on an affordable housing project that they wouldn't have been able to afford to do with conventional materials.	promoted better design
	Woodland Park, CO	SW	wood SIP	Their first panelized homes used stick-frame design, and they found it was inefficient. Now they try for 4' dimensions, 4' wide windows spaced 4' in from the edge, etc. This facilitates field fabrication.	openings follow panel dimensions for easy site fabrication
	Ridgefield, CT	NE	wood SIP	He doesn't believe it affected the design.	no influence
	Kerrville, TX	SW	wood SIP	No changes necessary. They prefab. They've done all sorts of combinations: timber framed, steel framed, stick frame w/ SIPs roof, etc.	no influence, fully fabricated at factory
	Cleremont, FL	SE	Precast Insulated Panel	No major influence, but simplicity helps with a successful panel installation.	simple design
	Chicago, IL	MW	Precast Insulated Panel	No influence.	no influence
	Denver, CO	SW	wood SIP	Using panels should influence window & door placement (these panels are site-fab) to minimize waste.	openings follow panel dimensions for easy site fabrication
	Telluride, CO	SW	wood SIP	He assumes there are some qualification associated with use of panels, but doesn't know what they are. Architects he works with like and specify panels.	no obvious influence; architects prefer panels
	Newnan, GA	SE	open wall	Not in Lee's homes, which are relatively simple. He thinks that in a more complex design, with lots of high ceilings etc., it would be more difficult (or less cost effective) to use panels.	no influence; uses simple home design
	Holiday, FL	SE	Metal SIP (Steel/Al)	Use of panels does occasionally limit home design. He uses panels for the roof and there are definitely some span limitations there.	some influence in limiting roof spans
	Cartersville, GA	SE	open wall (SIP in past)	As with stick framing, they tried to stick with 2' increments to minimize wasted materials; no major influence.	no influence
	Olympia, WA	NW	wood SIP	When using roof SIPs, Scott turns "attic space" into livable space, getting more square footage per home footprint; 800 square feet for a 4-bed, 2-bath, great room concept home	more conditioned space with SIPs roof
	Chicago, IL	MW	wood SIP	Using SIPs didn't have an influence in terms of dimensions (used prefab), but they were using SIPs roof, and therefore incorporated cathedral ceiling because it's so easy to do with SIPs.	no influence in walls/layout, fully fabricated at factory; cathedral ceilings with SIPs roofs
	Clemmons, NC	SE	open wall	Penalization is most successful when it's repetitive. For special design features, they would likely not try to use panels.	simple and repeatable designs key for success with panels
	Seattle, WA	NW	open wall	Design comes first for their homes, then decision to use panels follows. In seismic neighborhoods, the hold down system being used is influenced by the choice of panel system.	no influence

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	What problems have you encountered when using panels?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Very rarely, glue fails & panels delaminate. Once they used panels between floors & got "drumming effect." When new builders try to do all field-fab, it can get messy & long & become a "bad panel experience."	occasional panel flaws
in-house	Encino, CA	SW	open wall; closed wall	None.	none
	Englewood, FL	SE	Hardiboard SIP	Expansion & contraction can be problematic. They use control joints & take care w/ their stucco, siding, finishes. They are constantly striving to improve their products, from quality to aesthetics details.	expansion/contraction.
retail	New York, NY	NE	Precast Insulated Panel	Requires a very large project to make precast panels pay (forms specially made). Precaster fell behind, affected scheduling. 1st job 1 form was distorted; repaired in field. Some customization/adjustment needed.	late delivery, panel flaws
	Woodland Park, CO	SW	wood SIP	Infrequent manufacture. flaws: the two skins are slightly skewed from each other; the recessed cut isn't deep enough. Panels are forgiving; they just let the panel suppliers know. Some subs (esp. elect) resist change.	occasional panel flaws, resistance from subs
	Ridgefield, CT	NE	wood SIP	On 1st home people mis-communicated & they had to do field adjustments as a result. He though the issues were resolved very reasonably. Would like to try simpler connections, like cam-lock instead of splines.	miscommunication with manufacturer, crews
	Kerrville, TX	SW	wood SIP	He finds panels very easy to work with. Some panel suppliers from the past had more errors w/ dimensions, but he's happy with Chapman. They spend some time training new subs.	time for sub education
	Cleremont, FL	SE	Precast Insulated Panel	Occasional height errors, but easily resolved. Overall panel supplier/fabricator & their installers were great. Biggest problem was with Jim's engineer making the change. Also hard to put vent stacks in outside wall.	designer resistance, utilities interface
	Chicago, IL	MW	Precast Insulated Panel	Misplaced wall plates, plumbing & HVAC openings: miscommunication between Cliff's architect (new to panels) & mfg's draftsmen. B4 trades often selected locations for their pipe; now architect has more responsibility.	miscommunication w/ architect, locating openings & utilities
	Denver, CO	SW	wood SIP	Poor information from contractors. Incorrect pre-fabrication; now they do all site-fab. Plumbers need some training (some area builders put stacks in outside walls) as do electricians.	miscommunication surrounding fabrication drawings
	Telluride, CO	SW	wood SIP	Experienced some fabrication errors. Field training w/ subs new to panels slows things some. Some elect problems w/ figuring out box locations. Precut chases may not line up. Custom homes hv outlet @ odd ht.	occasional fabrication errors, interface with electrical
	Newnan, GA	SE	open wall	Very rare manufacturing mistakes; usually field-corrected. Takes some organization to get timing correct, so panels are ordered before foundation is poured.	timing and coordination
	Holiday, FL	SE	Metal SIP (Steel/Al)	There have been no major problems. Chris previously had some issues with wiring the panels, but it's been resolved. Some electricians are resistant, but he's found some willing to work w/ panels.	electrician resistance, utilities interface
	Cartersville, GA	SE	open wall (SIP in past)	No real problems other than having to always train new crews. They aren't seeing the payback in dollars right now so they are planning to stop using panels for the time being.	constantly training new crews
	Olympia, WA	NW	wood SIP	Mistakes & homeowner changes are relatively easy to fix by field-cutting. Some subs are resistant the first time. He would like his manufacturer to put plates & headers in ahead of time to make it easier in the field.	sub resistance, homeowner changes
	Chicago, IL	MW	wood SIP	Sometimes supplier was a little late with the panels. Occasionally panels are mis-cut; either reorder or prefab in field. Weather concerns: walls are tight, so didn't want to erect in rain to avoid sealing moisture inside.	late delivery
	Clemmons, NC	SE	open wall	Manufacture. errors, mostly when one home in a batch has some 'optional' items. Ex: if homeowners choose between 2 window types, 1 may have different rough opening but the change is overlooked @ plant.	window openings in fabrication
	Seattle, WA	NW	open wall	Panelizers not thinking like carpenters (measuring from edge of stud, not center). Initially had some problems coordinating locations of openings, plumbing stubs, and hold-down bolts. Need room for utilities in walls.	miscommunication w/ manufacturer; utilities interface

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	What factors contribute the greatest to successful use of panels?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Well-detailed fabrication drawings are biggest key to success. Fabricator scheduler have a staff builder to do final review. Jim recommends full fabrication, or at least partial. Subs must be open to learning something new.	good shop drawings reviewed by experienced builder
in-house	Encino, CA	SW	open wall; closed wall	Reduced cycle time=success. Some home types more profitable: 4-bed model for 1st-time buyers is great. The more work & inspection done in plant, the better: quality control, waste, less $, faster construction, security	careful engineering, planning, training, coordination
	Englewood, FL	SE	Hardiboard SIP	Finding the right panel system for you. Good tech support. The more comprehensive the system the better, fabricated for ea. house with as many details in place as possible. Better quality control & predictability.	select appropriate panel/supplier
retail	New York, NY	NE	Precast Insulated Panel	Panels ready on time. Working out bugs: wanted the space connecting panels to resemble brick joints but it originally was wider. Doesn't leak like masonry, & better for maintenance (no efflorescence, tuck point).	repeatable design, timing schedule and delivery
	Woodland Park, CO	SW	wood SIP	Superior product & energy efficiency. Design building around panel dimensions for easy field fab and speedy construction: on 1st homes w/ stick frame design, extra cutting negated anticipated labor savings.	train crews, design home's dimensions for easy site fab
	Ridgefield, CT	NE	wood SIP	For the first job, they hired an advisor from Murus to supervise panel construction. Mike feels panels have been successful because they offer superior air tightness & energy benefits, which appeal to clients.	training from manufacturer
	Kerrville, TX	SW	wood SIP	SIPs are easy to build with; some training req'd. Addition of Timbor (borate) to panels & Chaplan's 20-year guarantee = peace of mind. Benefits: Fire insurance can drop 20%; Indy Mac Bank & others offer incentives.	train crews, select quality panels
	Cleremont, FL	SE	Precast Insulated Panel	Panel supplier also has installation crew, and all went smoothly. Success comes from speedy installation & competitive price; more complicated house designs took longer & were less successful - not repeatable.	training from manufacturer, simple and repeatable design
	Chicago, IL	MW	Precast Insulated Panel	Careful coordination w/ supplier/delivery. $$$ Crane, need panels on time; Cliff had all made ahead. Select architects/subs who understand panels (may need training, site visits). Veteran erectors. Speed = success.	experienced crew, timing schedule and delivery
	Denver, CO	SW	wood SIP	Feels site-fab saves money. Prefers to use jumbo panels, the largest sizes possible.	big panels, cost savings through onsite fabrication
	Telluride, CO	SW	wood SIP	Need some orientation w/ subs, esp. MEP; panels not common in area. Experienced panel installer is biggest factor for success. For use of a panel system in general, its success stems from energy efficiency.	experienced crew, educated subs
	Newnan, GA	SE	open wall	Redundant/repeatable design. Crew that's comfortable with panels. Competitive cost, speed of construction, getting out of the weather, and cutting down on theft are all measures of success.	experienced crews, repeatable home design
	Holiday, FL	SE	Metal SIP (Steel/Al)	In-house labor eliminates constant learning curve (subbed all labor when he stick-framed). Increased information on panels (SIPA, energystar.net) & Energy Star promo leads people to him, often thru his website.	experienced in-house crews, not subbed labor
	Cartersville, GA	SE	open wall (SIP in past)	Projects where crews were most familiar w/ the panels went most smoothly. David isn't using panels now due to cheap & quick labor in their area; feels in the North & NE w/ high labor rates panels might be best.	experienced crews
	Olympia, WA	NW	wood SIP	He keeps an experienced crew member onsite. 1st time, they hired a whole experienced crew & watched; next one, they had a panel rep out to advise. Want to assemble whole walls in warehouse, place w/ crane.	training, experienced crews, learning from manufacturer
	Chicago, IL	MW	wood SIP	Delivery of panels, roof panels/trusses, lumber etc. takes some coordination (on tight sites) but increases jobsite security & gets workers out of weather faster. Key to success is a good carpentry crew.	training, experienced crew, scheduling and coordination
	Clemmons, NC	SE	open wall	Repetition - do the same floor plan over, or a limited number of floor plans. From both labor and production standpoint, this saves money. Also scheduling is key with panels. Check codes ahead & resolve any issues.	repeatable design, code research, scheduling
	Seattle, WA	NW	open wall	When panelizers think like site carpenters, the builder has confidence in the shop drawings. Walsh has seasoned trained carpenters do careful reviews of all shop drawings & panel layout drawings. This is key.	good shop drawings reviewed by experienced builder

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	Did access to information influence your decision to use panels?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	No. The builder has been familiar with panels for many years, including involvement with SIPA since 1991.	Trade groups
in-house	Encino, CA	SW	open wall; closed wall	Probably. The builder researched panels in graduate school and has worked for panel manufacturers before, also.	ALL
	Englewood, FL	SE	Hardiboard SIP	Yes, only backwards. Lack of good information on existing panels systems caused them to create their own panel system.	Info is lacking
retail	New York, NY	NE	Precast Insulated Panel	No. The builder has been aware of this type of panel for years and has only recently been able to justify cost.	-
	Woodland Park, CO	SW	wood SIP	Yes. The builder got information from a panel supplier, and from his own experience traveling the state working for a different building product supplier.	Panel Supplier
	Ridgefield, CT	NE	wood SIP	Yes, somewhat. The builder learned about SIPs at various trade shows and conferences.	Trade groups
	Kerrville, TX	SW	wood SIP	No. The builder felt there wasn't enough good information available, though they used SIPA and suppliers for data. Ultimately they decided to experiment on a single house to see how it went.	Info is lacking
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Chicago, IL	MW	Precast Insulated Panel	No.	-
	Denver, CO	SW	wood SIP	No. The builder feels that information provided by the manufacturers is very poor, and they decided to use panels in spite of, not because of, the information available.	Info from suppliers is poor
	Telluride, CO	SW	wood SIP	Information on the internet has been useful for the builder to educate himself about panels.	WEB
	Newnan, GA	SE	open wall	Yes, the supplier approached him and was convincing.	Panel Supplier
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. The builder used to work for a metal SIP panel manufacturer, so was an expert in the panel type. He also obtained information from SIPA.	Trade groups
	Cartersville, GA	SE	open wall (SIP in past)	No. Info is available if you dig for it; as a member of EEBA the builder was aware of panel technology.	Info is lacking
	Olympia, WA	NW	wood SIP	No.	-
	Chicago, IL	MW	wood SIP	No. The builder feels information on SIPs is readily available on the web.	WEB
	Clemmons, NC	SE	open wall	No.	-
	Seattle, WA	NW	open wall	Information is readily available in the public domain.	ALL

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Panel Source	Interviewee	Region	Panel Type	Did you avoid particular types of panels systems? If yes, why?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	Yes. The builder used open wall panels a time or two in the distant past, but doesn't think it can come close to matching the quality of SIPs.	Open wall, lower quality than SIPS
in-house	Encino, CA	SW	open wall; closed wall	No.	-
	Englewood, FL	SE	Hardiboard SIP	Yes, they avoided any panel with wood in it due to Florida's climate and termites.	Dislikes wood panels
retail	New York, NY	NE	Precast Insulated Panel	The builder dislikes EIFS (Exterior Insulation and Finish Systems).	Dislikes EIFS
	Woodland Park, CO	SW	wood SIP	Yes. They avoided polyurethane-based SIPs because of health concerns, and selected EPS foam instead.	Dislikes closed cell foams, likes EPS
	Ridgefield, CT	NE	wood SIP	Chose expanded polystyrene (EPS) panels over closed-cell foam for the environmental benefits and to have a thicker wall.	Dislikes closed cell foams, likes EPS
	Kerrville, TX	SW	wood SIP	Yes. They considered open wall panels but feel that SIPs are more efficient both in terms of energy and construction time.	Open wall, less efficient than SIPS
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Chicago, IL	MW	Precast Insulated Panel	No. This panel was a good fit for the builder and his company.	-
	Denver, CO	SW	wood SIP	Yes. Enercept (a particular SIPs manufacturer), which only offers fully fabricated panels. The builder prefers raw or partially-fabricated panels.	fully fabricated SIPS
	Telluride, CO	SW	wood SIP	No.	-
	Newnan, GA	SE	open wall	They are not interested in panels like SIPs based on current buyer types and budgets.	SIPS because of budget
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Although he has used OSB-skin SIPs, he prefers to avoid wood because of termites in Florida.	Dislikes wood panels
	Cartersville, GA	SE	open wall (SIP in past)	Builder is willing to try any type of panel once. They have built with SIPs in the past at clients' request, but cannot justify the cost for their typical projects.	SIPS because of budget
	Olympia, WA	NW	wood SIP	No.	-
	Chicago, IL	MW	wood SIP	They are aware of other panel types (steel stud panels) but didn't seriously consider them.	Dislikes other panel systems
	Clemmons, NC	SE	open wall	No.	-
	Seattle, WA	NW	open wall	Yes, closed-wall systems like SIPs because of the complications of putting utilities, etc. into walls.	SIPS because of close wall problems (utilities, etc)

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Panel Source	Interviewee	Region	Panel Type	Did the use of panels require changes in your use of subcontractors?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	No. It really only affects the electricians.	Replaced resistant subs, Electricians Especially
in-house	Encino, CA	SW	open wall; closed wall	No. Crews and subs must be trained, but they have the basic skills to transition to open wall panels.	TRAINING ONLY
	Englewood, FL	SE	Hardiboard SIP	No.	-
retail	New York, NY	NE	Precast Insulated Panel	No. They hired en experienced erection crew, and masons were eliminated, but other subs remained the same.	0
	Woodland Park, CO	SW	wood SIP	No. Crews and subs could generally be trained to use panels.	TRAINING ONLY
	Ridgefield, CT	NE	wood SIP	No.	-
	Kerrville, TX	SW	wood SIP	No. The builder trained subs to be comfortable with the panels.	TRAINING ONLY
	Cleremont, FL	SE	Precast Insulated Panel	No.	-
	Chicago, IL	MW	Precast Insulated Panel	Yes. The precast panels are more inflexible than cast-in-place concrete, requiring electricians and plumbers to get really familiar with the product before using it since field changes are difficult. Subs not willing to change were replaced.	PRECAST less flexible for subs, Some subs resistance
	Denver, CO	SW	wood SIP	No. It just requires some sub education.	TRAINING ONLY
	Telluride, CO	SW	wood SIP	No. Just requires training.	TRAINING ONLY
	Newnan, GA	SE	open wall	Yes, the builder subs all framing and other trades and some subs were not comfortable switching to panels so he replaced them with crews that were comfortable with the technology.	Replaced resistant subs
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes, some are very resistant to change, particularly electricians.	Replaced resistant subs, Electricians Especially
	Cartersville, GA	SE	open wall (SIP in past)	Yes, they changed and there have been no problems making the transition.	Replaced resistant subs
	Olympia, WA	NW	wood SIP	No, just training unless the sub is resistant to learning something new - then a change would be needed.	TRAINING ONLY
	Chicago, IL	MW	wood SIP	No.	-
	Clemmons, NC	SE	open wall	No. Framing crews adjusted well to open wall panels, as did other subs.	OPEN WALL no changes needed
	Seattle, WA	NW	open wall	No, framers understand both open panels and stick framing. However, some framing subs refuse to work with panels from certain suppliers because they have found them to be problematic.	Replaced resistant subs

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Panel Source	Interviewee	Region	Panel Type	Are there any improvements to the panel system that you think should be made?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	No.	-
in-house	Encino, CA	SW	open wall; closed wall	The builder makes its own panels and is working on a factory-inspected, "closed wall" system that would even include utilities.	closed wall system with utilities
	Englewood, FL	SE	Hardiboard SIP	Improvements are ongoing.	-
retail	New York, NY	NE	Precast Insulated Panel	Connections could be improved a bit.	PRECAST: connections
	Woodland Park, CO	SW	wood SIP	No.	-
	Ridgefield, CT	NE	wood SIP	Connections could be improved. He is interested to try out a cam-lock or other types of panel connectors in addition to basic splines.	SIPS: connections
	Kerrville, TX	SW	wood SIP	No.	-
	Cleremont, FL	SE	Precast Insulated Panel	Accommodation for vent stacks in outside walls; currently they run stacks on the outside of the wall and box it in.	PRECAST: vent stacks on exterior walls
	Chicago, IL	MW	Precast Insulated Panel	Making sure that the steel wall plates are flush.	PRECAST: flush wall plates
	Denver, CO	SW	wood SIP	As a field-fabricating panel builder, they would like to see panels sold as a stock lumber-yard type product in a couple sizes, not just as a special order product.	SIPS: stock sizes sold in lumber yards
	Telluride, CO	SW	wood SIP	No.	-
	Newnan, GA	SE	open wall	No.	-
	Holiday, FL	SE	Metal SIP (Steel/Al)	No.	-
	Cartersville, GA	SE	open wall (SIP in past)	No. The builder mentions the importance of good training (which can be initiated or aided by the manufacturer).	TRAINING
	Olympia, WA	NW	wood SIP	Possibly assembling whole walls with plates and headers all in place, either put together by the supplier or by the builder in a warehouse. Then complete sides of the house would be erected with a crane.	SIPS: plates and headers preinstalled (fully fabricated?), Complete exterior claddings
	Chicago, IL	MW	wood SIP	The builder is interested in treated panels for termite resistance, but his current supplier doesn't offer these. Also is interested in possibility of using a structural drywall skin on the interior in place of OSB.	SIPS: termite resistance, drywall as a skin
	Clemmons, NC	SE	open wall	The 1/4" sheathing used by many manufacturers may meet code, but the builder prefers something stronger (thicker).	OPEN WALL: better sheathing
	Seattle, WA	NW	open wall	A standardized system for labeling and communicating information about panels would be extremely helpful. Also he would like to see a higher quality of lumber used in panels.	OPEN WALL: labeling standards, higher quality lumber

Interview Analysis by PANEL SOURCE

Panel Source	Interviewee	Region	Panel Type	Did proximity to a panel supplier factor into the decision? If yes, how?	Analysis
distributor	Grass Valley, CA	SW	wood SIP	No. The current manufacturer is close, 2 hours away, but the builder previously got panels from Washington state or Arizona. Trucking costs need to be considered, but the cost increase is not significant enough to be a major deterrent.	NO, transportation costs are not a problem
in-house	Encino, CA	SW	open wall; closed wall	Not applicable - they are their own supplier.	-
	Englewood, FL	SE	Hardiboard SIP	Not applicable - they are their own supplier.	-
retail	New York, NY	NE	Precast Insulated Panel	No. Proximity would only be a concern if it affects pricing.	NO, only if it affects pricing
	Woodland Park, CO	SW	wood SIP	Yes. Having a panel supplier in Denver makes it convenient to ship panels to jobsites throughout the state.	YES, have panel distributor convenient to jobsites
	Ridgefield, CT	NE	wood SIP	No. The builder is located in the Northeast and has used panel suppliers in Pennsylvania and Canada.	NO
	Kerrville, TX	SW	wood SIP	No. The builder has purchased panels from as far as 300 miles away. His supplier moved closer, which is great for reducing shipping, but having to transport panels is not a major deterrent.	NO, because they are a large builder, suppliers make efforts to get their business
	Cleremont, FL	SE	Precast Insulated Panel	No.	NO
	Chicago, IL	MW	Precast Insulated Panel	Yes. Dukane Precast, 30 miles away, is the only supplier of this type of panel in the area.	YES, panels nearby
	Denver, CO	SW	wood SIP	No.	NO
	Telluride, CO	SW	wood SIP	No. It hasn't in the past because clients of these custom homes can afford to transport the panels in; for a smaller budget home, proximity could potentially be a factor.	NO, clientele afford any transportation cost increase
	Newnan, GA	SE	open wall	Proximity plays a minor part in decision-making.	YES, transportation costs are considered
	Holiday, FL	SE	Metal SIP (Steel/Al)	Yes. Metals USA has dealers in several regions.	YES, nearby distributors
	Cartersville, GA	SE	open wall (SIP in past)	Yes. Although the builder looked at suppliers from further away, transportation costs outweighed any product cost savings.	YES, transportation costs are considered
	Olympia, WA	NW	wood SIP	Initially, yes. Later other suppliers from further away approached the builder, but he was satisfied with the original supplier.	Initially YES, but later NO
	Chicago, IL	MW	wood SIP	SIPs are light but bulky, so transportation cost is considered.	YES, transportation costs are considered
	Clemmons, NC	SE	open wall	No. The large builder orders in such quantity, suppliers make efforts to deliver. Also there are many suppliers of open wall panels in the builder's region.	NO, because they are a large builder, suppliers make efforts to get their business
	Seattle, WA	NW	open wall	Proximity matters as it affects transportation costs. Open wall panels are available from a variety of suppliers.	YES, transportation costs are considered