

Draw Your Way to an Estimate

Getting Started with CAD-Assisted Estimating and Take-Off

International Builders' Show 2007

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Dynami Solutions, LLC



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What we'll cover:

- What is CAD-assisted estimating and how can you start using it ?
- Changes Required in Your Approach/Workflow
- Examples of CAD Products
 - Couple things on my laptop
- Your Questions

Housekeeping

- Cell Phones
- NAHB
- Evaluations
- Business Cards w Snail-Mail
 - Report Examples
 - “Process Your Company”

Who's the BIM-Master?

- BIM – “Building Information Modeling”
 - More than just sticks/bricks.
 - Ergonomics, aging-in-place, traffic patterns...
 - Energy consumption and waste management
 - Lifespan tracking or parts and pieces (it's time to replace the dishwasher....)
 - Construction Scheduling (“4D CAD”)
- BIM = “Lifecycle of the Building “
 - Design and Construction is <10% of the building lifecycle. What about the other 90% ?
- CAD-assisted estimating is a small part of BIM

Why?

- You need to do estimates... and you're already using CAD !
- Take advantage of the entire project lifecycle, not just design/construction
 - They who own the data own the project!
- You're spending too much time taking off drawings.
 - Cut T.O. time from days to minutes
(eventually... and with the right software)
- Your CAD operators already know building
 - Make better use of your existing staff
- Estimating/CAD/Sales... It's all you...
 - Draw once, use for many operations
- You're looking for better accuracy
 - Production builders - < 1% material variance.

Reasons NOT TO

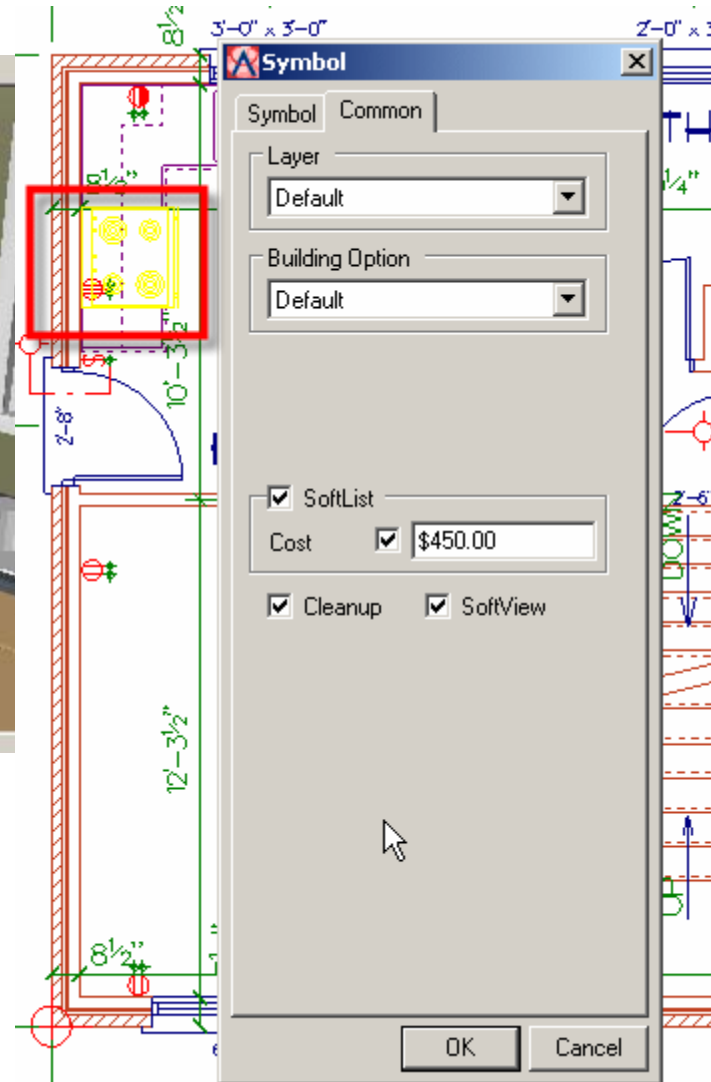


- Just bought the CAD, big quote due tomorrow morning...
- You want to avoid learning how to count past 10...
- You want to fire your estimator...

How it Works

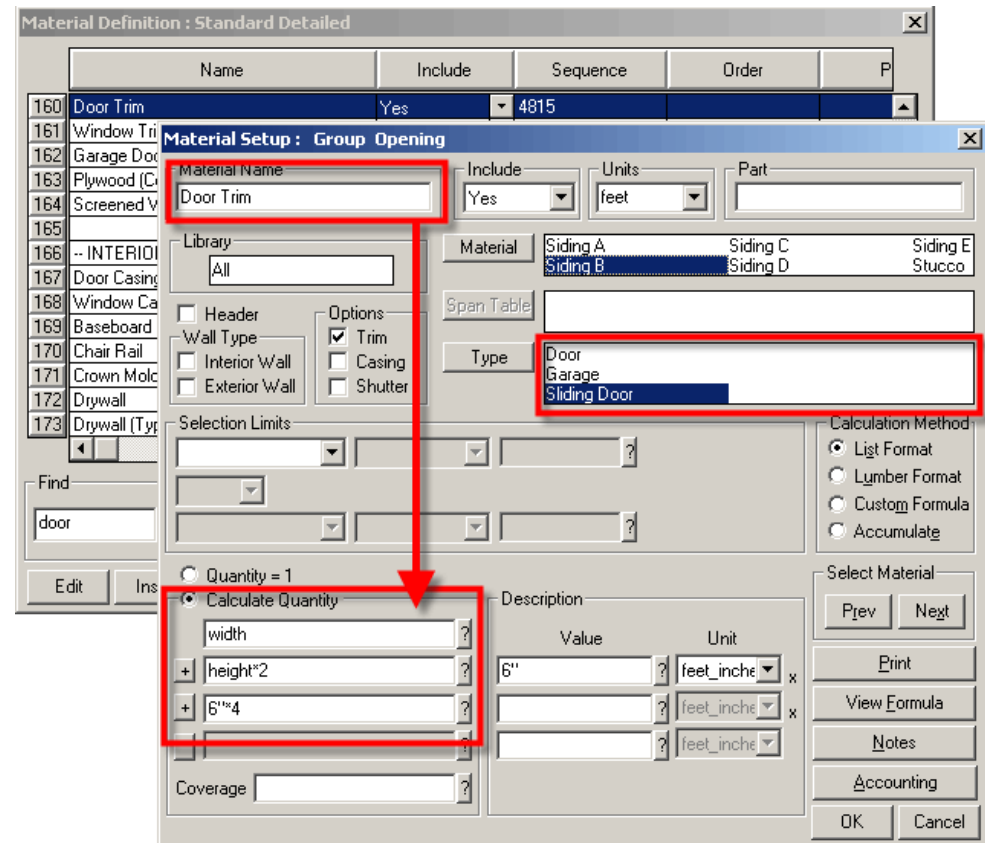
- **CAD serves as “Digitizer”, saving input steps**
- **Basic:** Building Objects or symbols on drawings are directly “read” and counted
 - Ex. plumbing fixtures, windows, electrical fixtures
- **Intermediate:** Advanced Properties of these items triggers other calculations
 - Ex. Window hardware...outlet boxes.....labor to install
- **Advanced:** Items are calculated/extrapolated from other quantities. Financial calculations may be included
 - Ex. Wall assembly: LF or Area of wall is translated into various material counts. Studs, Insulation, sheathing, drywall
- **Reporting:** Results are reported directly by the application or exported as delimited file that can be opened in a spreadsheet or other estimating program.

Direct Counts



Extended Properties

- IF “lavatory counter” THEN “include faucet”
- IF “Interior Door” THEN “include trim”



Advanced Assembly Formulas

The screenshot displays a software interface for material definition. On the left, a list of materials includes 'Wall Sheathing' at index 71. The main window is titled 'Material Definition : Standard Detailed' and contains a 'Material Setup : Group Wall' dialog box. This dialog has several sections: 'Material Name' (Wall Sheathing), 'Include' (Yes), 'Units' (shts), and 'Part'. Below these are 'Wall Part' (Wall), 'Load' (Both), and 'Length' (Center). A red box highlights the 'Calculate Material For Walls Containing Materials' section, which includes a 'Select' button and the text 'Sheathing'. To the right, an 'Accounting Information' dialog box shows 'Cost' (\$12.50), 'Alternate Cost A' (\$15.50), 'Alternate Cost B' (\$16.75), and a 'Multiply Cost By' checkbox checked with a value of 1.34. The 'Tracking' section includes 'Sequence' (3128), 'Account' (310028), 'Order', 'Part' (SHW-4-8), and 'Item' (OSB Sheathing). The 'Billing' section shows 'Labor' (\$0.00), 'Markup' (0.00%), and 'Waste' (10.00%). At the bottom, there are 'Undo', 'Cut', 'Copy', and 'Paste' buttons. A text area at the bottom of the main window contains assembly formulas, with a red box highlighting the following code:

```
Caution: Sequence sensitive!  
before:  
@thickness=0  
@area=0  
process:  
@thickness=thickness  
@area=@area+area+(floor_depth*length)  
after:  
@final_area=@area+gable_sheathing  
list(@final_area/32,@thickness,4',8')
```

Reporting:

The image shows two overlapping windows. The top window is titled 'Generate Project Estimate' and displays a 'Project Estimate' report for 'Project1'. The report lists various construction items with their descriptions and quantities. The bottom window is 'Microsoft Excel - Project1.XLS', showing the same data exported into a spreadsheet format with columns for Division, Description, Quantity, Unit, Price, and Cost.

Division	Description	Quantity	Unit	Price	Cost
6110	2 x 6 x 8'	169	Ea.	\$4.56	\$770.64
6110	2 x 4 x 8'	93	Ea.	\$2.96	\$275.28
6110	Stud Count	184	Studs	\$0.00	
6110	1" x 3" Furring- 16" O.C.	1987.51	S. F.	\$0.21	\$417.38
6160	1" x 3" Bridging 6" O.C. -	1987.51	S. F.	\$0.02	\$39.75
6160	1/2" Standard Spruce Sheathing	1983.89	S. F.	\$0.54	\$1,071.30
6160	4' x 8' Plywood Sheathing	129	Sheet	\$0.00	
6450	5/8" Plywood Subfloor Sheathing	1987.51	S. F.	\$0.68	\$1,351.51
6450	3/8" x 3-1/8" MDF Baseboard	114.02	L.F.	\$0.50	\$57.01
6450	3/8" x 2-1/8" MDF Casing	33.04	L.F.	\$0.38	\$12.56
6450	3/8" x 3-1/8" MDF Baseboard	86.61	L.F.	\$0.50	\$43.31
6450	3/8" x 3-1/8" MDF Baseboard	3.69	L.F.	\$0.50	\$1.85
6450	3/8" x 3-1/8" MDF Baseboard	47.59	L.F.	\$0.50	\$23.80
7190	6 mil Poly Vapor Barner	1983.89	S. F.	\$0.02	\$39.68
7200	1" Foil Faced Rigid Insulation	1791.89	S. F.	\$0.86	\$1,541.03
7210	6" R20 Fiberglass Insulation	1227.04	S. F.	\$0.36	\$441.73
7210	3-1/2" R12 Fiberglass Insulation	756.85	S. F.	\$0.22	\$166.51
7460	Common Siding	1791.89	S. F.	\$0.75	\$1,343.92
7460	Siding Trim	1791.89	S. F.	\$0.39	\$698.84
7550	Asphalt Felt Paper	1791.89	S. F.	\$0.02	\$35.84
8210	28" Hinged Door	1	Ea.	\$45.00	\$45.00
8500	1-5/8" x 8" Vinyl Clad Sill	2.58	L.F.	\$0.41	\$1.06
9250	4' x 8' Drywall Sheet Count	66	Sheet		
9250	1/2" Standard Sheetrock Drywall	1983.89	S. F.	\$0.34	\$674.52
9260	1 Pound Drywall Screws	18.85	lbs	\$2.75	\$51.84
9640	Hardwood Floor 1	1987.51	S. F.	\$4.99	\$9,917.67
9910	Paint	4.67	Gallo	\$25.00	\$116.75
				Total Cost:	\$19,138.74

- Ability to export to spreadsheet or other application
- Ability to create custom reports, vary TO for each model
 - Cut Lists
 - Room Schedules
 - Trade Contractor
 - Load Lists

Software

- A CAD application with Take-off support
 - Basic:
 - Accurate reporting of areas and lengths
 - Ability to report basic “counts” (Number of Sinks, etc.)
 - Advanced:
 - Ability to create/customize parametric items
 - Ability to reference items via part numbers or SKUs
 - Ability to create and modify assemblies and take-off formulas
 - Comma/Tab Delimited Export
 - Direct Integration with estimating applications
- Knowledge of Excel or other Spreadsheet
 - or an estimating application with text import capability support

Basic C-AE Products

THIS IS NOT A COMPLETE LIST !

- Cadsoft 3D Home Architect (\$90)
 - Basic areas, lengths, and counts
 - Only DIY product we found that is usable
- AutoCAD LT /Visio/ other basic 2D products
 - can do basic counts of components/blocks
- Chief Architect, SoftPlan LT, DataCAD
 - Good counts, good export, not very configurable
- ArchT, DataCAD, VectorWorks, ADT, ArchiCAD
 - Require programming, configurations, add-ins

see February JLC article www.jlconline.com

Advanced C-AE Products

- Cadsoft Envisioneer (www.cadsoft.com \$795)
 - Advanced C-AE, single database approach
- SoftPlan Pro/ SoftList (www.softplan.com \$2900+/-)
 - Very good self-contained reporting engine
- CADSoft Build!/AP-Design
- BuildersCAD w/Framing
- SolidBuilder
 - Manufacturing-ready framing /cutlist packages

Related Technology

- Xactimate Sketch (www.xactimate.com)
- CAD estimator (www.cadestimator.com)
 - Bring Your Own CAD (or photos)
- OnCenter (www.oncenter.com)
 - On-screen takeoff
- Vertigraph (www.vertigraph.com/)
 - BidScreen XL

None of the above are really “CAD-assisted Estimating

General Changes to Workflow

- CAD Model must accurately represent what was sold
 - Think “Model” not “Drawings”
 - Objects and assemblies, not lines
- Provide Access to Model
 - Centralized (network or Internet)
 - Appropriate CAD software and/or viewers

Delay the “Fork in the Road”

- **Old way:**
 - 3D model, if any, is for presentation only.
 - No attention to objects
 - Working drawing clean-up begins immediately.
- **C-AE Way:**
 - 3D model must contain all necessary information at all times.
 - Split for “Working drawings” comes at very end of process if at all Example: “Exploding” cabinets to hide some lines also removes them from the take-off

Changes to Workflow – Estimating

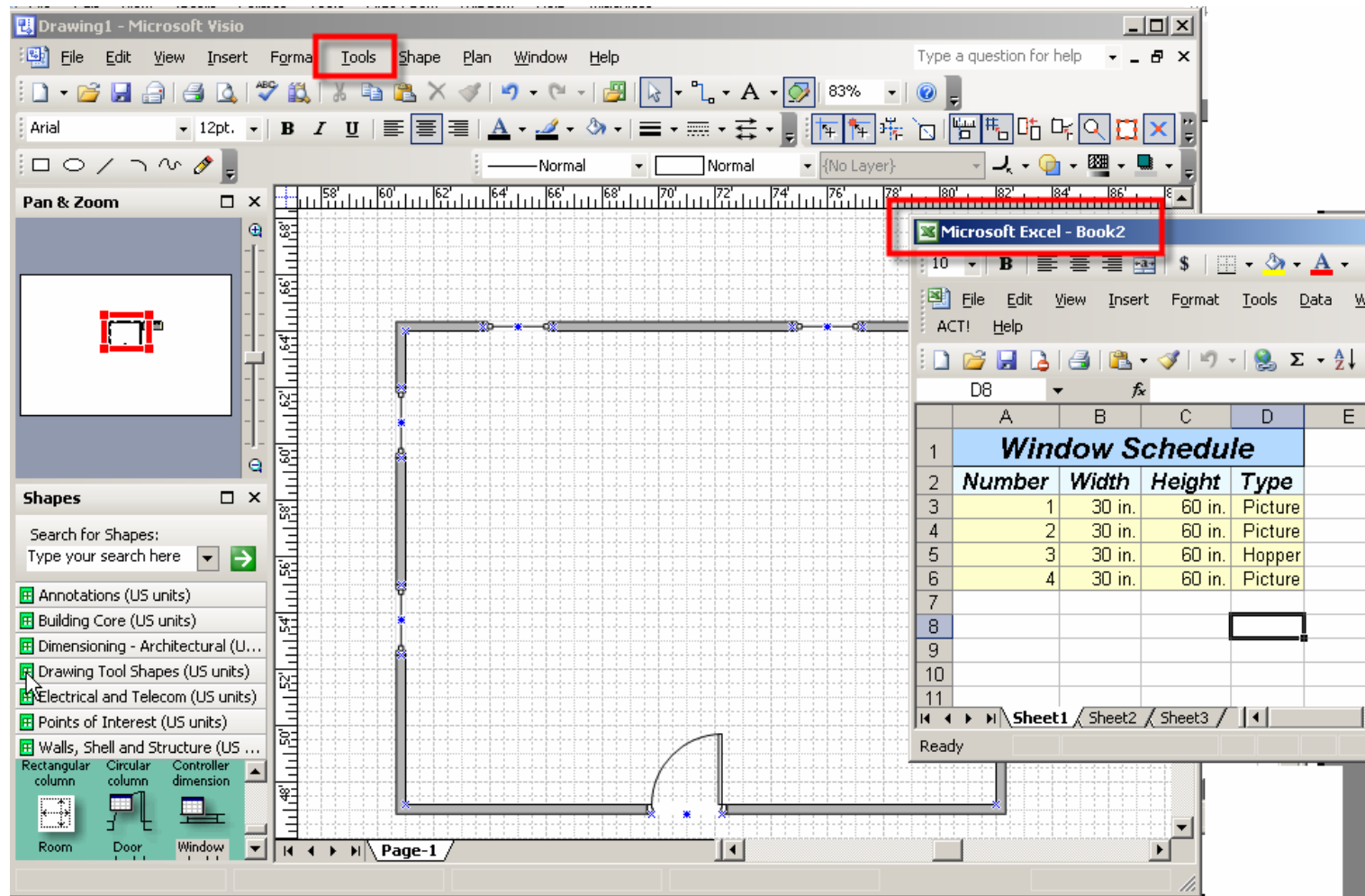
Estimating Dept. has critical role in production and maintenance of the CAD building model

- Estimating must drive all drafting decisions
 - How items are defined in software
 - Formulas, assemblies, extrapolated items
 - What is added to the drawings
 - How items are added to the drawings
- Estimating must oversee drawing quality 3Cs
 - Clarity... Consistency...Completeness
- Estimating must understand...
 - take-off portion of the CAD software
 - import/export capability and formats
- Estimating responsible for closed-loop feedback from field
 - Estimating responsible for overseeing corrections to the model
- Estimators will need seats of CAD software or related viewers.

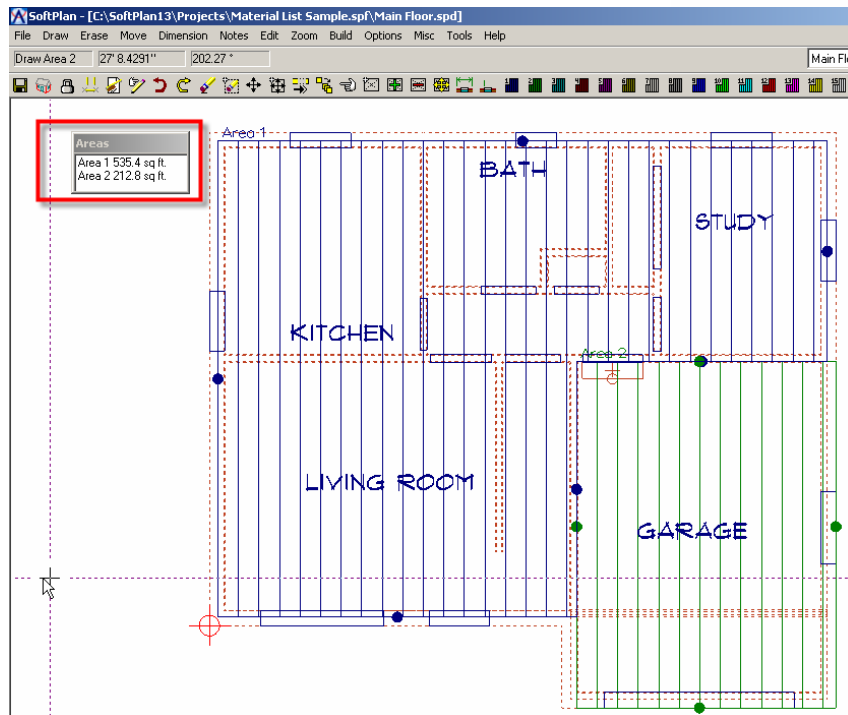
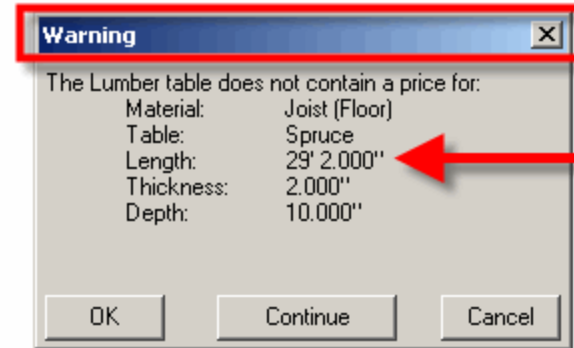
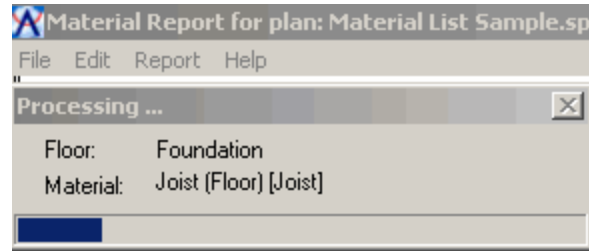
Crawl-Walk-Run

- **Crawl:**
 - Estimating dept. starts to “own” process
 - Develop QC for what is on drawings
 - Pick Low-hanging fruit from any CAD program
 - Basic item counts as available, lengths, areas
 - Use basic onscreen visual Cues
 - Take advantage of “Ticklers”
 - Include basic quantities on drawings
 - Generate simple item counts
(# of a particular symbol)

Crawl: Item counts



Crawl: Onscreen Information and "Ticklers"



Crawl-Walk-Run

- **Walk:**
 - Basic fixture/millwork ‘schedules’ on drawings
 - Generate simple reports/export files
 - Start to verify against known quantities
 - Develop closed-loop reporting and revision mechanism

Walk: Auto-generated Schedules on drawings

The screenshot shows a software interface with a menu open. The menu path is: Building > Interiors > Drafting > Schedules > Door Schedule... A red box highlights a door element on the drawing, with a red arrow pointing to the 'Door Schedule...' menu item. Below the drawing is a table titled 'First Floor Openings' with the following data:

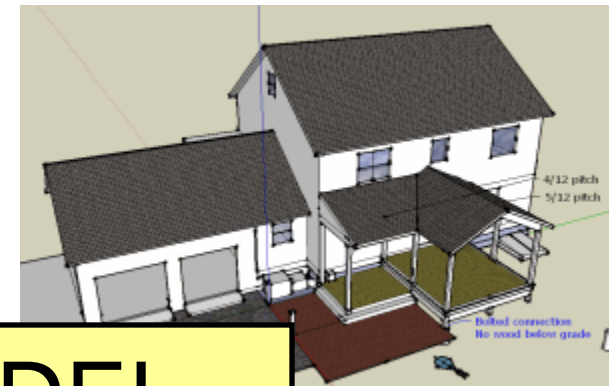
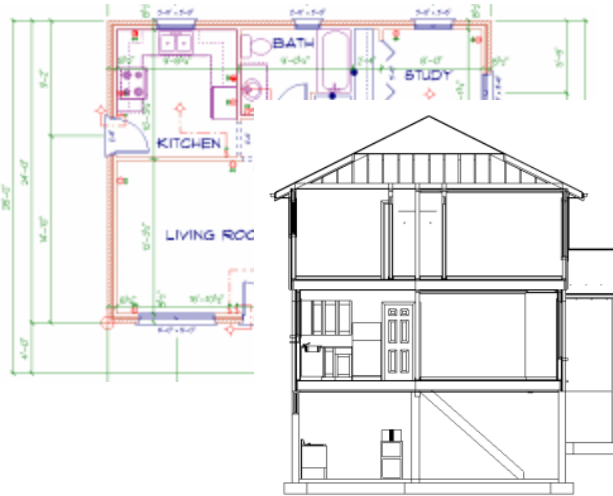
Mark	Size	Description	Count
1	6'-8" X 5'	60" Double French Door	1
2	7' X 16'	16" X 7' Fold-Up Door	1
3	6'-8" X 2'-8"	32" 9-Lite Steel Door	1
4	6'-8" X 6'	6' Sliding Glass Door	2
5	6'-8" X 2'-6"	30" Hinged Door	5
6	6'-8" X 5'	60" Double French Door	1
7	6'-8" X 2'-6"	30" Bi-Fold Door	2
8	6'-8" X 2'-8"	32" Bi-Fold Door	1

Crawl-Walk-Run

- **Run:**

- Model defines take-offs, presentation materials, and working drawings
- Model is centrally available (network/Internet) to all who need to access it
- Define Parametric objects, by part #/SKU
- Complex assembly formulas, extrapolated materials and labor organized by cost code
- Reports formatted for loads, cutlists, allowance items, other complex custom reports
- Automated integration with Excel, other estimating software
- Review closed-loop feedback and continual improvement of drawings/model on a regular basis

Run:



BUILDING MODEL

Material Report for plan: Material List Sample.rvt

Material	Description	Qty	Units	Cost	Misc	Labor	Total
21	EXCAVATION & FOUNDATION						
22	EXCAVATION & BACKFILL						
24	Concrete Footing						
25	Concrete Wall						
26	Glass (Wing)						
27	Glass (Grid)						
29	Anchor Bolt						
29	Rebar (Footing)						
30	Rebar (Wall)						
31	Wipeup Tile						
32	Subtotal						
33	WATERPROOFING						
34	Damages/Waterp						
35	Subtotal						
37	TERMITE PROTECT						
38	Subtotal						
40	ROUGH STRUCTURE						
41	Subtotal						
42	STRUCTURAL STEEL						
43	Green Beam						
45	Subtotal						
46	FRAMING						
47	Subtotal						
48	Roofs						
49	Subtotal						
50	Windows						
51	Subtotal						
52	FLOOR FRAMING						
53	Subtotal						
54	PT Slab Plate						
55	Ring Joist/Floor						
56	Subtotal						

Agreement of Sale

As-Sold Estimates

Purchase Orders

Cut-lists

Trade Contractor
specs and instruction



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General Drawing Guidelines

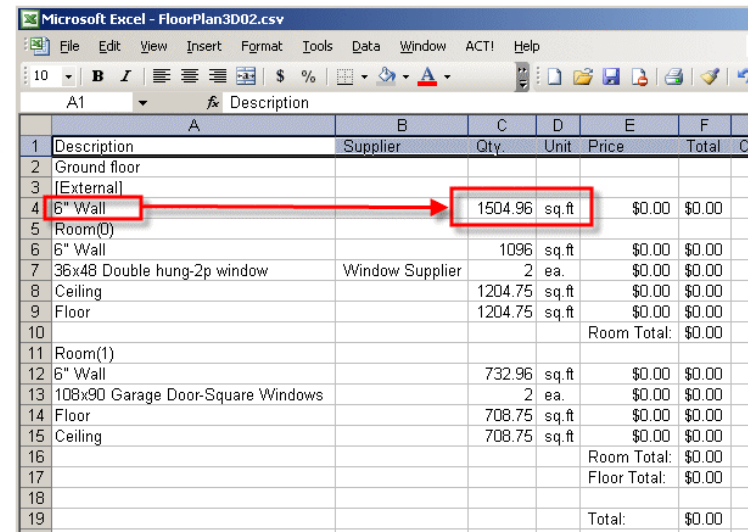
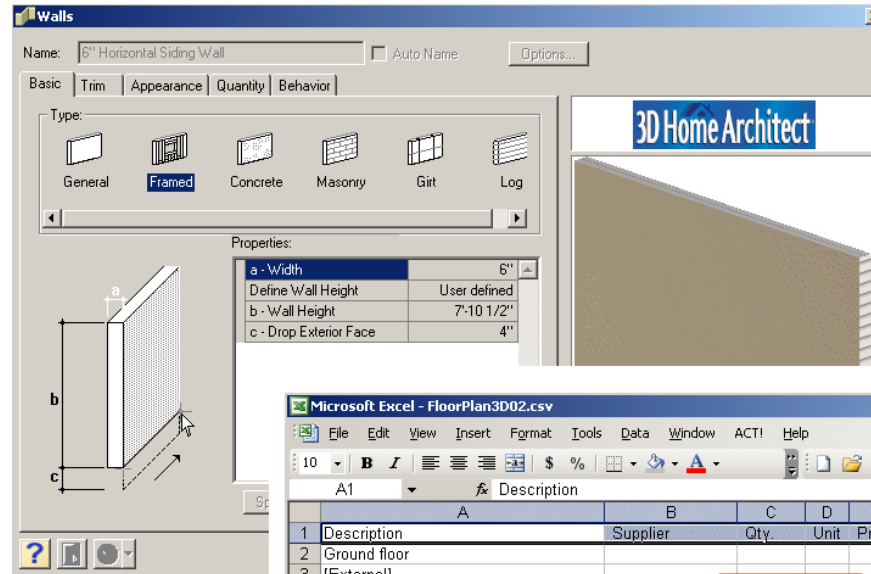
- **Version Control is Critical**
 - Naming Conventions
 - ex. **120606-Jones-A1-JLS.spd**
- Use requirements checklists
 - Consistent sales/selections sheets, specs, etc.
- Place Objects where they exist in real world
 - Ex. – Basement stair object goes on foundation drawing, not first floor plan.
- Avoid Object Duplication between floors

Tips/Tricks

- Provide schedules/counts/SF directly on drawings whenever possible
- Some products allow you to place fields/variables/placeholders
- Take advantage of 2-way schedules when possible
- Take advantage of shortcuts when appropriate:
 - “Notes” with assigned cost to represent an allowance

DIY vs. Pro 2D/3D Products

- DIY:
 - Configuration at highest object level only.
 - Can accurately report only SF.
 - Item TOs etc. are fixed by the software developer
 - Still useful for basic areas, etc.

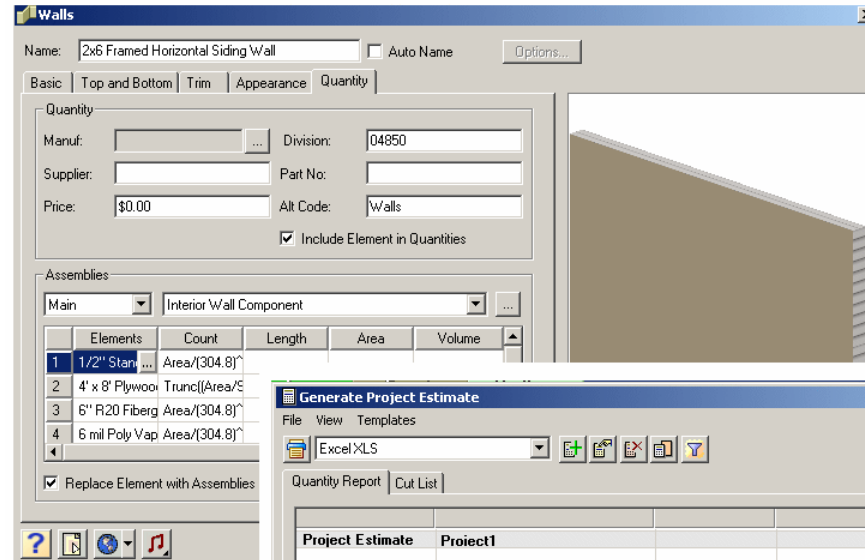


	A	B	C	D	E	F
	Description	Supplier	Qty.	Unit	Price	Total
1	Description					
2	Ground floor					
3	(External)					
4	6" Wall		1504.96	sq. ft	\$0.00	\$0.00
5	Room(0)					
6	6" Wall		1096	sq. ft	\$0.00	\$0.00
7	36x48 Double hung-2p window	Window Supplier	2	ea.	\$0.00	\$0.00
8	Ceiling		1204.75	sq. ft	\$0.00	\$0.00
9	Floor		1204.75	sq. ft	\$0.00	\$0.00
10					Room Total:	\$0.00
11	Room(1)					
12	6" Wall		732.96	sq. ft	\$0.00	\$0.00
13	108x90 Garage Door-Square Windows		2	ea.	\$0.00	\$0.00
14	Floor		708.75	sq. ft	\$0.00	\$0.00
15	Ceiling		708.75	sq. ft	\$0.00	\$0.00
16					Room Total:	\$0.00
17					Floor Total:	\$0.00
18						
19					Total:	\$0.00

DIY vs. Pro 2D/3D Products

- PRO

- Configuration at every level of detail.
- Complete accounting definitions
- Per-piece and consolidated take-offs
- Flexible reporting options



Project Estimate	Project1				
Ground Floor					
Division	Description	Quantity	Unit	Price	Co
06110	2 x 6 x 8'	169.00	Ea.	\$4.56	\$77
06110	2 x 4 x 8'	93.00	Ea.	\$2.96	\$27
06110	Stud Count	184.00	Studs	\$0.00	\$0.0
06110	1" x 3" Furring- 16" O.C	1987.51	S.F.	\$0.21	\$41
06110	1" x 3" Bridging 6' O.C - 16" Centers	1987.51	S.F.	\$0.02	\$39
06160	1/2" Standard Spruce Sheathing	1983.89	S.F.	\$0.54	\$1.0
06160	4' x 8' Plywood Sheathing Count	129.00	Sheet	\$0.00	\$0.0
06160	5/8" Plywood Subfloor Sheathing	1987.51	S.F.	\$0.68	\$1.3
06450	3/8" x 3-1/8" MDF Baseboard	114.02	L.F.	\$0.50	\$57
06450	3/8" x 2-1/8" MDF Casino	33.04	L.F.	\$0.38	\$12
06450	3/8" x 3-1/8" MDF Baseboard	86.61	L.F.	\$0.50	\$43
06450	3/8" x 3-1/8" MDF Baseboard	3.69	L.F.	\$0.50	\$1.8
06450	3/8" x 3-1/8" MDF Baseboard	47.53	L.F.	\$0.50	\$23
07190	6 mil Poly Vapor Barrier	1983.89	S.F.	\$0.02	\$39
07200	1" Foil Faced Rigid Insulation	1791.89	S.F.	\$0.86	\$1.5
07210	6" R20 Fiberglass Insulation	1227.04	S.F.	\$0.36	\$44
07210	3-1/2" R12 Fiberglass Insulation	756.85	S.F.	\$0.22	\$16
07460	Common Siding	1791.89	S.F.	\$0.75	\$1.3
07460	Siding Trim	1791.89	S.F.	\$0.39	\$69

Thanks for Coming !

- My contact information !



Joe Stoddard

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