How to Estimate the Cost of Early Concept Projects Using Parametric BIM Software and Capture the Costs of Missing Information

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Introduction

This paper intends to describe the general process of utilizing BIM software to prepare parametric, early-stage estimates. The nature of this topic does not lend itself to a full step-by-step approach due to myriad project types and nuances. The overarching paradigm presented herein closely reflects that utilized by the D-Profiler software platform, however the general approach can be applied to multiple software combinations. A full description of this software is beyond the intent of this paper.

Main CSI Division: Division 1 – General Requirements

Specific Sub-Division: 01 11 31.50 Models

Brief Description of Subject Matter: Building Information Modeling or "BIM", is no longer new technology; it is now incorporated during the construction phase of many projects. However the application of BIM during the early stages of construction (conceptual through schematic) is a relatively new paradigm and hence involves a very different approach. The fundamental process is similar to traditional parametric estimating, but relies on computer-generated cost drivers that can be manipulated quickly to update a cost estimate real-time. A properly-built cost estimate relying on this paradigm focuses the estimator's efforts in order to maximize efficiency.

Types and Methods of Measurement

Understanding the basic steps of parametric estimating in general is crucial in leveraging concept-level BIM software. The term "parametric estimating" implies the method of utilizing a very small number of known variables (such as the overall project area, number of floors or systems descriptions for example) to drive both scope and costs by relating those back to historical data. The estimator begins this process by first documenting all known variables, in order to segregate them from unknown variables. While more variables help hone cost to a closer degree of accuracy, there are four variables which are always required in order to generate a meaningful estimate: location, function, overall area and number of floors. Without these baseline variables, there is no context for the derived cost, and therefore they must always be considered mandatory.

After the baseline variables are defined, the next step is to identify key cost drivers which will have a major impact on overall cost output. While there is no standard definition for what these drivers are, examples include: identification of mechanical and electrical systems, determination of floor-to-floor building height as well as building perimeter, assumption for ratio of façade finish materials, and adjacency to existing building (just to name a few). This step not only flushes out additional detail crucial to the overall cost and context, but also forces the estimator to focus the effort on variables which directly influence the majority of the costs.

After key cost drivers are determined, the next step in parametric estimating is to make considerations for the balance of scope which cannot yet be defined; this critical step fills in information gaps that might otherwise be overlooked. Undefined scope plugs range from the detailed (e.g. one fire extinguisher cabinet for every 2,500 sf of area) to the broad (e.g. $ 75 / sf of interior fit-out cost). Sometimes the act of determining the methodology for filling in gaps indirectly elicits new cost drivers (e.g. if the estimator decides that a $ / sf fit-out approach won't suffice in the lobby because of a water feature, that water feature may become a segregated cost driver). The level of detail associated with these logic-plugs is directly proportional to the amount of information available.

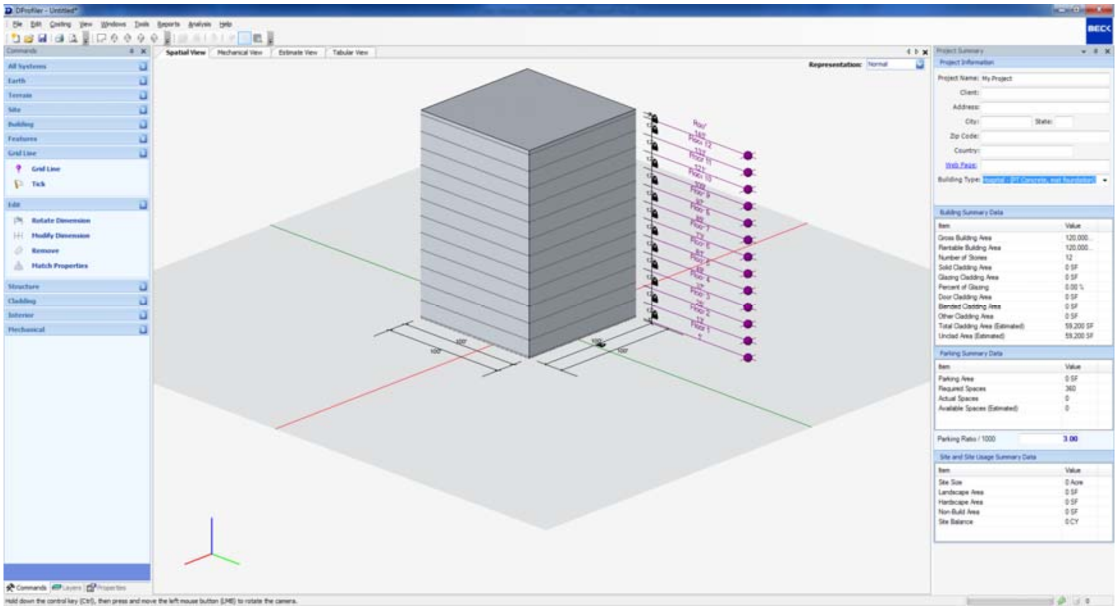
INTEGRATING BIM INTO PARAMETRIC ESTIMATING

Generally, utilizing BIM software in the parametric estimating process follows the exact same methodology as the parametric method described above, however substitutes modeled graphics for the baseline variables and key cost drivers, while at the same time pulling historical information / ratios for all non-defined scope. While several BIM platforms exist in the market (Revit, Tekla, ArchiCAD, Bentley, Sketchup, and others), the only product that focuses solely on application during the early conceptual phases is D-Profiler by Beck Technology. D-Profiler is a conceptual modeling tool which relies on user-defined databases in conjunction with simple graphical representation to parametrically model costs.

Although "BIM" software conjures up sleek images of sophisticated models and renderings (thus showcasing the "M" of "Building Information Modeling"), the key to the applicability of BIM during conceptual stages is actually the information contained in the databases, or the "I." The database links the modeled parameters with the applicable line items, often in conjunction with variable ratios. For example, the building perimeter directly drives the linear footage of firesafing, while the gross floor areas of level one directly links to the slab on grade finish area.

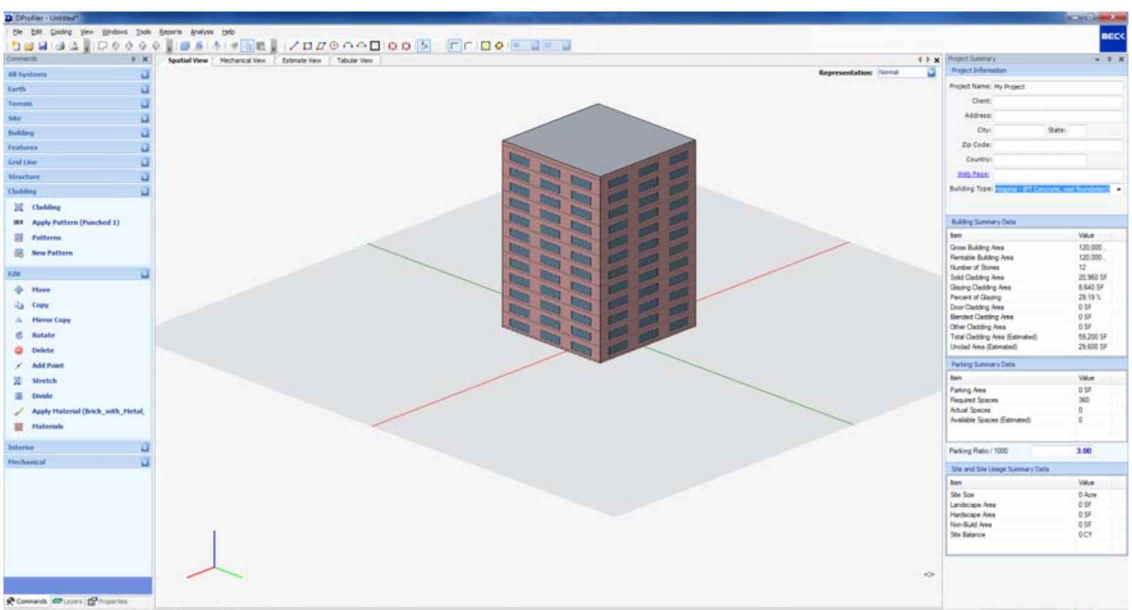
A helpful analogy is that modeling construction level documents using a tool like Revit can be thought of as building a statue with Legos™ (compiling brick-by-brick until the whole work is complete). In comparison conceptual estimating using a tool like D-Profiler can be thought of as carving a sculpture from a block of ice (in other words, starting with an already "complete" starting point and honing the shape to later provide detail and definition). The difference showcases how the latter process focuses on an "outside-in" approach based first on broad-strokes and last on detailed refinement.

The first step of defining baseline variables is accomplished primarily by means of simple geometric modeling. The overall shape determines building area, the proximity of this shape determines adjacency to existing building(s) if applicable, and the measured vertical gridlines determine floor-to-floor height as well as number of floors. The selected building type determines the function (e.g. school vs. hospital), and finally the chosen database determines geographic project location. Accomplishing these steps satisfies the four baseline variable requirements.



Initial modeling effort required to define the four mandatory baseline variables.

From here, key cost drivers are assigned to further refine the model. Façade ratios can either be applied to the exterior envelope (e.g. North façade = 60% brick veneer system, 10% metal panel system, 30% punched window system) or actually "painted" on if specific patterns are known. Site elements such as parking areas, stall count, landscaped areas, canopies, pedestrian footpaths, etc. are also modeled.



"Painting" the façade on to the model to define skin assemblies, and thus flushing out a key cost driver

Certain key cost drivers which cannot necessarily be graphically modeled are chosen as user-defined variables. For example, a 4-pipe hydronic VAV system rather than chilled beam HVAC system is controlled by a single variable to indicate the selected system. A similar numeric value determines if upper floor assemblies are slab on metal deck or post-tensioned concrete. Likewise, various exterior canopy types (e.g. standing seam metal canopy vs open-framed lumber) toggle via user-defined variables rather than detailed modeling.

While the ratios contained in the parametric database will populate the estimate with initial values, these must be checked and potentially modified. For example, the automatically-generated elevator and stairwell count are verified and adjusted if necessary. Likewise, exterior door counts that are initially populated with "typical" values are adjusted to match project-specific requirements. This step involves an iterative "honing" that not only refines the model but also garners key discussion and decisions. Often this discussion occurs organically as a result of reviewing and adjusting the initial default quantities.

During this process (which can often be accomplished during a relatively short design charrette), the team should take note of which assumptions are generally agreed-to compared with which assumptions are precarious leaps of faith. This not only helps isolate risk, but also documents team consensus throughout the process. One-off scope (such as rock-blasting, asbestos abatement, ground water contamination mitigation, etc.) will not be automatically populated into the model, and therefore requires discussion to ensure that scope is adequately captured as a lump sum line item.

THE DATA BEHIND THE MODEL

The efficacy of parametric BIM estimating depends entirely on the quality and completeness of the linked database. Every organization should carefully review how their database functions to ensure its methodology mirrors the logic behind traditional estimating practices. The database is essentially the

DNA of a parametric BIM estimate, directing how the model's properties link to build detailed assemblies.

In the example below (chosen for its simplicity) the area of exterior brick veneer drawn onto the skin of the model drives 8 estimate line items:

Classification ID	Description	Formula	Unit of Measure	Unit Price
04.71.00 0001	Brick veneer	Area	S.F.	43.76
09.22.00 0002	Exterior metal stud framing, 6" 18 ga at 16" O.C.	Area	S.F.	10.14
06.16.00 0001	Exterior walls, densglas	Area	S.F.	2.83
07.21.00 0001	R-19 batt insulation, exterior walls	Area	S.F.	1.26
09.29.00 0001	5/8" thick gypsum board X, finished, interior of exterior	Area	S.F.	3.53
09.91.00 0005	Paint walls	Area	S.F.	0.82
01.54.00 0001	Scaffolding	Area	S.F.	1.65
07.25.00 0001	Weather barrier membrane	Area	S.F.	3.00

"Behind the curtains" view of database line items linked to any brick veneer shapes drawn in the model

This example is very straightforward since all quantities are directly linked to the area drawn, however other assemblies are more complex. For example, a single ply roof assembly (shown below) drives 23 different line items. Some items are governed by the area, others by the perimeter, and still others by built-in ratios (such as the AccessHatchCount ratio which by default assumes one roof access hatch per 10,000 square feet of roof area). Still others are toggled on and off depending on a user-defined variable which selects between various structural systems. If this variable is set as structural steel, a combination of logic tied to the model's drawn properties derives the steel weight, the fireproofing area, the metal deck area, the perimeter edging length, the deck fill volume, the deck finish area, and the deck rebar weight. However conversely, if a cast-in-place concrete structural system is set, this assembly will instead be comprised of concrete volume, formwork area, rebar weights, etc..

The database is filled with many ratios that can all be controlled and modified. For example, the default ratio of motorized window shades to manual window shades is set by default at an arbitrary 20%, however if the team knows a particular project will be closer to a 50% ratio, then a very simple adjustment will flow the logic throughout the entire estimate. A well-built database allows these variables to be easily modified rather than relying on fixed numbers embedded within database equations.

Classification ID	Description	Formula	Unit of Measure	Unit Price
07.53.00 0001	Single ply membrane roofing	Area	S.F.	8.00
07.22.00 0001	Rigid roof insulation, poly iso insulation	Area	S.F.	3.88
07.72.00 0002	Walkway pads	Perimeter*.25*3	S.F.	10.00
07.72.00 0001	Access hatch	AccessHatchCount	Ea.	2644.18
05.12.00 0001	Structural Steel	IF(RoofStructureOption = 1, ROUND(Area*RoofSteel/ConvertToTons,2),0)	Ton	3269.38
05.12.00 0002	Miscellaneous bolts and connections	IF(RoofStructureOption = 1, ROUND(Area*RoofSteel/ConvertToTons*MiscSteel,2),0)	Ton	4197.26
07.81.00 0001	Fireproofing to steelwork	IF(RoofStructureOption = 1, ROUND(Area*RoofSteel/ConvertToTons*(1+MiscSteel),2),0)	Ton	307.49
05.31.00 0002	1 1/2", 18 ga. metal deck	IF(RoofStructureOption = 1, Area,0)	S.F.	4.30
05.31.00 0003	Deck Edging, 16 Ga	IF(RoofStructureOption = 1, Perimeter,0)	L.F.	8.57
03.31.00 0014	3 1/2" thick lightweight concrete topping, incl reinforcing	IF(RoofStructureOption = 1, Area,0)	S.F.	5.54
03.35.00 0007	Finish to floor deck fill	IF(RoofStructureOption = 1, Area,0)	S.F.	0.71
03.31.00 0015	CIP Elevated Roof Slab Concrete	IF(RoofStructureOption = 2,ROUND(Area*ElevatedSlabDepth/12/ConvertToCY*(1+ConcreteWaste)),0)	C.Y.	187.28
03.11.00 0010	Formwork to elevated floor slab soffit	IF(RoofStructureOption = 2, Area,0)	S.F.	9.09
03.11.00 0011	Formwork elevated floor slab edge	IF(RoofStructureOption = 2, ROUND(Perimeter*ElevatedSlabDepth/12),0)	S.F.	8.10
03.21.00 0015	CIP Elevated Roof Slab Reinforcing steel	IF(RoofStructureOption = 2, Area*ElevatedSlabRebar,0)	Lb.	1.04
03.35.00 0008	Finish to elevated roof slab	IF(RoofStructureOption = 2, Area,0)	S.F.	0.71
03.31.00 0015	CIP Elevated Roof Slab Concrete	IF(RoofStructureOption = 3,ROUND(Area*ElevatedSlabDepth/12/ConvertToCY*(1+ConcreteWaste)),0)	C.Y.	187.28
03.11.00 0010	Formwork to elevated floor slab soffit	IF(RoofStructureOption = 3, Area,0)	S.F.	9.09
03.11.00 0011	Formwork elevated floor slab edge	IF(RoofStructureOption = 3, ROUND(Perimeter*ElevatedSlabDepth/12),0)	S.F.	8.10
03.21.00 0015	CIP Elevated Roof Slab Reinforcing steel	IF(RoofStructureOption = 3, Area*ElevatedSlabPTRebar,0)	Lb.	1.04
03.21.00 0014	Elevated Floor Slab Post Tensioning	IF(RoofStructureOption = 3, Area*ElevatedSlabPTTendons,0)	Lb.	2.65
03.35.00 0008	Finish to elevated roof slab	IF(RoofStructureOption = 3, Area,0)	S.F.	0.71
03.41.00 0001	Precast double T beams, 12'-0" wide x 2'-2" deep	IF(RoofStructureOption = 4, Area,0)	S.F.	12.66

A more complex assembly for the roof system, which hinges on areas, perimeters, user-defined variables, and ratios

Specific Factors to Consider Affecting Takeoff and Pricing

Parametric BIM estimating can be either incredibly efficient or horrendously inaccurate depending on how it is applied. As should be evident from the examples provided earlier, the process is strong in analyzing core and shell geometry, sitework, and high level cost drivers, but weak in analyzing interiors and atypical or inherently unique scope. Therefore it follows that parametric BIM estimating is better suited for new-build projects that have several benchmark references (such as office buildings, schools, medical office buildings, etc.) than for renovation projects, tenant fit-outs, or projects that are very unique in nature (churches, museums, custom homes, etc.). The onus is on the estimator to determine when parametric estimating should or should not be used, and what limitations need to be accounted for throughout its application.

Even though the output from a parametric BIM estimate can be very detailed and nuanced, the estimating effort should focus primarily on the baseline variables and the key cost drivers rather than on vetting out specific scope that does not drive the overall cost (such as the exact count of interior doors). This is integral to the 80/20 rule of thumb, which stipulates how 80 percent of the benefit flows from just 20 percent of the work. For an estimator this means that focusing one's efforts on the critical variables only (i.e. the 20% of the work) will define the majority of the key cost drivers associated with the final cost (i.e. the 80% of the benefit).

PARAMETRIC BIM SYMBOLICALLY REPRESENTS SCOPE, NOT LITERALLY

Even though BIM tools can provide a very representative graphic depiction of a project, the visualization is symbolic rather than literal. For example, if an exterior canopy is to be priced as a cost per square foot of covered area, then it only matters that the horizontal projection be modeled. Graphically depicting the vertical columns in this case does not impact the costs, and therefore would be purely aesthetic and unnecessary. Likewise if ratios or allowances drive one-off scope (e.g. entry water features, complex porte cocheres, parking equipment, etc.) then the costing of such items can be accomplished simply by means of an added line item in the estimate rather than by graphically depicting a visual model…potentially a very time-consuming process. If the primary intent is to generate an accurate cost estimate, then care needs to be taken to ensure that effort is focused only on cost-drivers, not on aesthetics.

SMALL QUANTITIES VS LARGE QUANTITIES

Databases are built such that they can be applied to all manner of project sizes, both big and small. However, as described later in this paper, care must be taken to critically analyze the final estimate as a whole so that price adjustments are accounted for at either end of the spectrum (both very large projects with excellent economies of scale as well as very small projects that may be skewed by mobilization costs). While in theory it is possible to create databases which build in “trigger points” to account for this, doing so is highly impractical.

GEOGRAPHIC LOCATION

All costs generated through parametric estimating are impacted by the project geography, which is why location is one of the four “baseline” variables noted earlier. The database selection accounts for pricing adjustments for location, and in this manner, material, labor, equipment, and indirect markup can all be handled identically as with traditional estimating methods.

Other regional considerations outside of pricing are also handled by means of separate databases. For example, on healthcare projects in California, structural steel is substantially more expensive than in other states due to standards set by the Office of Statewide Health Planning and Development (OSHPD). This is more than just a price adjustment, and in fact represents a scope adjustment specific to the location. This is the reason why unique, regional databases are so integral to the accuracy of a parametric estimate generated with BIM software.

SEASONAL EFFECT ON WORK

Other than the aforementioned location factor associated with the linked database, there is nothing inherent about the parametric BIM estimating process that allows a deep-dive analysis of seasonal effect on work. Typically due to the early nature of conceptual estimates, this kind of detail would not be explored in great depths, but rather handled with a contingency factor to be carried until design progresses. If certain trades are known early-on to be involved in an adverse season (foundation work in the winter for example) then individual line item pricing can be modified accordingly if the team determines this is a critical cost driver.

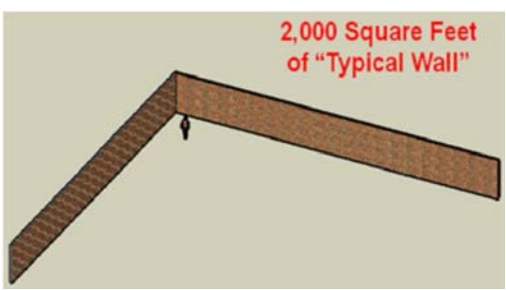
Overview of Labor, Material, Equipment, and Markup

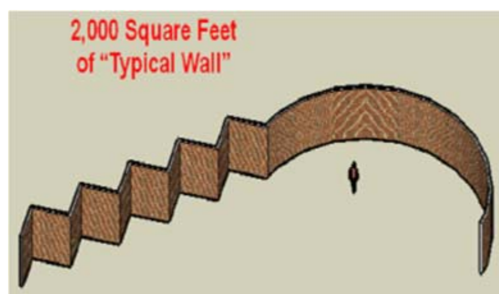
By populating estimates with detailed line items rather than high level metrics, the traditional split between material, labor, equipment, and markup is maintained and may be analyzed in exactly the same manner as with a traditionally-measured estimate. Note that some very high level metrics which still rely on a high level cost per square foot approach (such as mechanical and electrical scope) will depend of a percentage-driven split between material, labor, and equipment, however this is the exception to the rule rather than the norm.

Special Risk Considerations

CRITICAL ANALYSIS

Even though there is a substantial degree of automation associated with much of the parametric estimating process, it's important to never lose sight of the importance critical analysis plays in the overall process. Consider the following example, which depicts two separate scenarios, each where 2,000 sf of "typical wall" is drawn into a model:

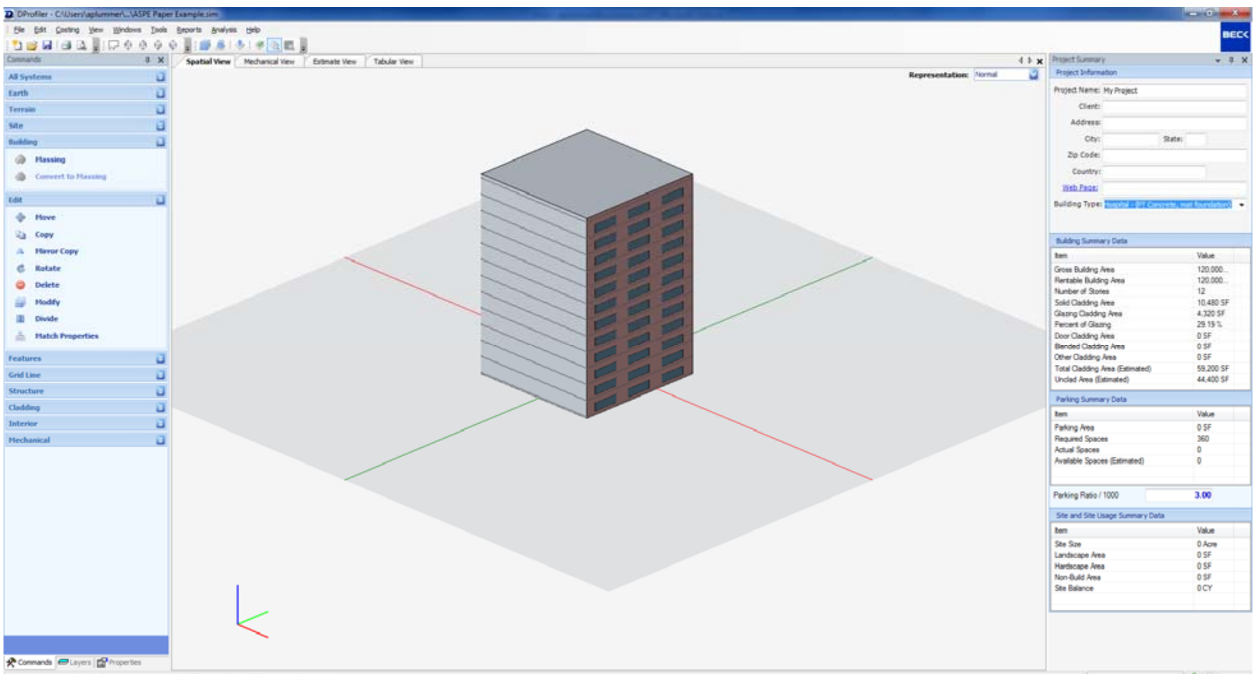




Most estimators could quickly identify that the second scenario will warrant a cost premium to account for complex layout, however relying solely on automated BIM estimating will not provide this intuitive analysis. For this reason output provided by a parametric BIM estimate must be thoroughly reviewed for appropriateness and context.

FILLING IN GAPS AND ELIMINATING AMBIGUITY

The caveat to the "outside-in" method of parametric estimating is that it requires extremely high level cost/scope plugs to account for undefined information. One example to illustrate this point is the building's façade. Upon the first shaping of the baseline variables, the façade is not yet defined, and therefore requires an estimate line item called "unclad façade area" set to an average skin cost (based on historical averages). This is obviously very ambiguous, and thus defining the skin area becomes one of the first cost drivers to address. As the skin is "painted in", the unclad façade area quantity tapers towards zero as the defined skin areas increase, thus refining out ambiguity.



In this example, the east face of the building is characterized by defined, drawn façade systems while the south face is characterized by "unclad façade." As more systems are drawn on the south face, the area quantity of "unclad façade" begins to reduce until it approaches zero.

READING REPORT RESULTS IN PROPER CONTEXT

The end result of this process is a very detailed cost report, however it's crucial to remember the context of the process and understand its limitations. While ratios and databases can drive an assumed count of interior doors, the team should understand there is a range of roughly 10-20% surrounding this assumed quantity that can shift the quantities in either direction as the design progresses and doors are actually drawn onto a set of plans.

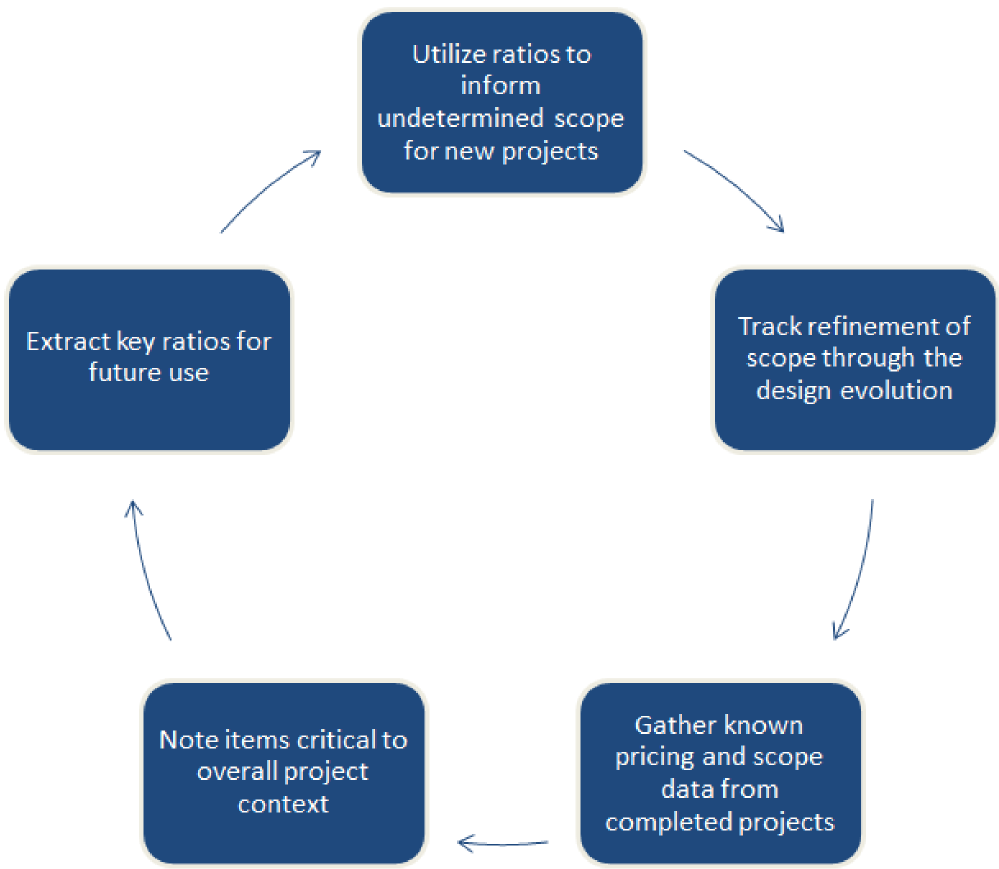
Ratios and Analysis

Ratios are more than just useful in parametric BIM estimating, they are essential. Ratios drive all scope that is not explicitly modeled or user-defined. Because conceptual BIM hinges on definition of the overall building mass rather than the building interiors, ratios initially drive almost all interior scope items. The data driving the ratios are contained within the database, and are informed by previous projects of a similar nature. For this reason different ratios need to be applied for different building types; a hospital will have significantly more doors per square foot than a library for example.

Even within similar building types, care needs to be given to ensure that ratios are representative of final design intent. Following the door-per-square-foot example above, an office building with an open-concept floor plan will have a substantially lower door ratio than an office building with individual offices. The project team must determine which variables require modification from “default” based on the 80/20 rule.

In a properly-built database, certain ratios act as trigger points to change the nature of certain scope items. For example, if a building is modeled at five stories or higher, it may trigger the elevators to switch from hydraulic to traction. These trigger points are determined on the initial creation of the database by means of “if/then” equations, and should essentially happen “behind the scenes” as the user modifies the model. Other such examples of scope derived from building height trigger points include roof screens, window washing systems, missile-resistant glass, and other code-related issues.

Hand-in-hand with the importance of these ratios in driving the creation of a new estimate is the importance of gathering data from completed projects in order to verify/update ratios. Such data includes overall cost per square foot, floor-to-skin area ratios (to drive the average skin cost paired with the "unclad façade area" line item described earlier), mechanical/electrical cost per square foot values, and interior scope ratios such as partitions, doors, finishes, etc.. Context is also very important for backwards analysis; unique aspects such as off-hours work, bedrock in the excavation area, site access limitations, etc. can throw off ratios if not properly noted and accounted for.



The flow process for harvesting, then utilizing ratios

Miscellaneous Pertinent Information

As has been demonstrated, parametric estimates hinge on a substantial amount of assumed information, making them most useful at the early stages of design (conceptual through early schematic). After this stage, the estimator should switch paradigms back to the traditional quantity takeoff approach in order to properly capture all available design detail.

However, even though detail is assumed at the early stages rather than measured, it is still a more useful tool to the project team than high level cost per square foot metrics, because it allows a means of tracking the latter estimates backwards, and thereby determining specifically how the project scope is trending. For example, an assumed door quantity at conceptual design (based on historical ratios) can be compared to the actual door quantity shown at design development to identify where and why the doors scope is trending over or under budget. Such an analysis is not possible with a high level cost for Division 8 as a whole, which makes no attempt to cast such detail.

Even though these ratios and assumptions may ultimately prove to vary from the final design, they help elicit team feedback more effectively than placing the onus fully on the design team themselves to cast the first assumptions without the benefit of historical benchmark cost/scope data.

Conclusion

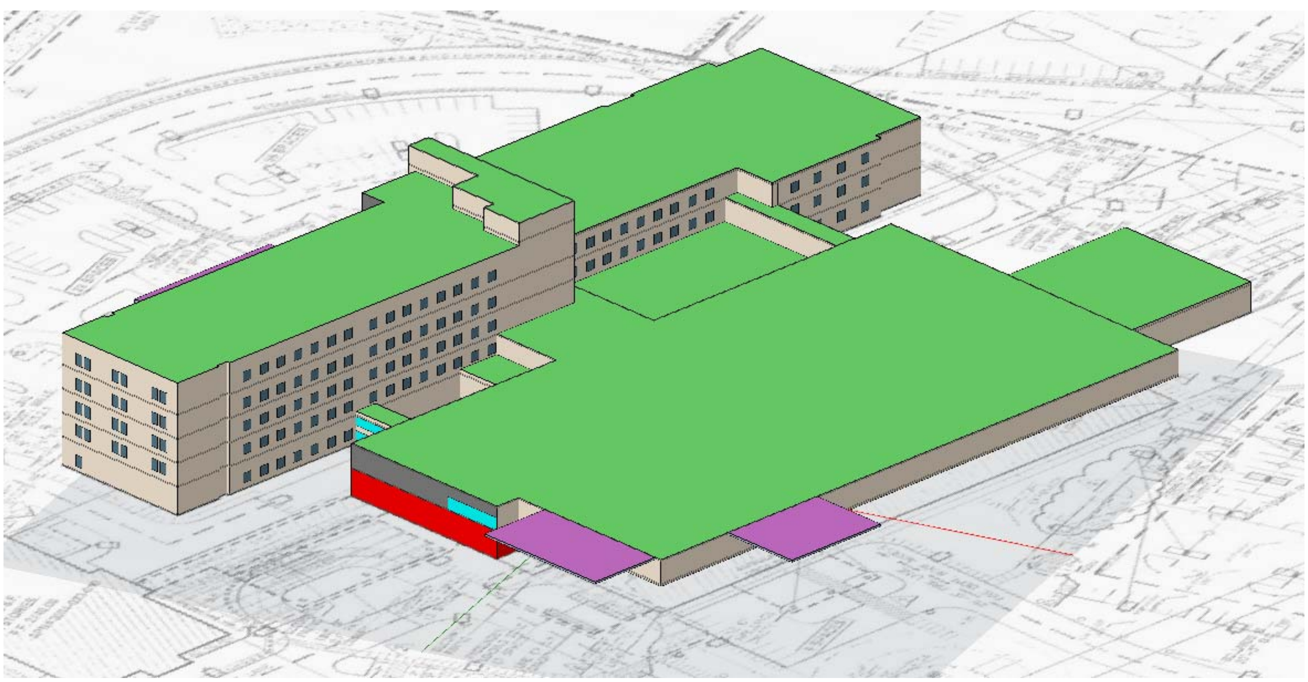
Despite the emergence of new software platforms that make the interface with parametric BIM estimating more fluid and user-friendly, the general concept is not a substantial departure from traditional estimating methodology for early-level projects. Although baseline variables and key cost drivers are defined in a more intuitive and easily-communicated, the fundamental mechanics are generally quite similar to those used in traditional parametric estimating. However, by integrating this sleek new technology into the front-end of project design, estimators become a much more integrated member of the team as they use a cost estimating tool to drive much more than just cost estimating. Critical analysis, identification of key cost-drivers, and evaluation of what-if scenarios can all be accomplished real-time, thus challenging long-standing paradigms and placing the estimator in a new role as the custodian of living estimates.

Sample Sketches

Representative sketches to reinforce the process described herein have been included above with the applicable subject being addressed.

Sample Take-Off and Pricing Sheet

The subject of this paper doesn't lend itself to a specific takeoff / pricing sheet, however below are two pages extracted from the final estimate report along with accompanying screenshot:



Estimate Name: Cost Estimate

Estimate Number: EST - 030540

Profiler

6/29/2015

Division	Description	Quantity	Unit	Unit Price	Cost	Cost / Area
01.00.00	**GENERAL REQUIREMENTS**					
01.50.00	**TEMPORARY FACILITIES AND CONTROLS**					
0001	Scaffolding	112,377.65	S.F.	$1.65	$185,423.12	$0.50
Total -	TEMPORARY FACILITIES AND CONTROLS				$185,423.12	$0.50
Total -	**GENERAL REQUIREMENTS**				**$185,423.12**	**$0.50**
03.00.00	**CONCRETE**					
03.10.00	**CONCRETE FORMING AND ACCESSORIES**					
0002	Continuous Footing Formwork	4,333.20	S.F.	$6.87	$29,769.07	$0.08
0003	Grade Beam Formwork	32,880.00	S.F.	$6.58	$216,350.40	$0.59
0004	Pile Cap Formwork	19,680.00	S.F.	$7.45	$146,616.00	$0.40
0006	Slab on Grade Formwork	2,166.60	L.F.	$7.14	$15,469.52	$0.04
0008	CIP Column Formwork	47,178.00	S.F.	$14.66	$691,629.48	$1.88
0009	CIP Shear Wall Formwork	106,150.50	S.F.	$14.94	$1,585,888.47	$4.31
0010	Formwork to elevated floor slab soffit	244,529.33	S.F.	$9.09	$2,222,771.57	$6.05
0011	Formwork elevated floor slab edge	6,083.62	S.F.	$8.10	$49,277.36	$0.13
0012	CIP Beam Formwork	256,200.00	S.F.	$11.61	$2,974,482.00	$8.09
Total -	CONCRETE FORMING AND ACCESSORIES				$7,932,253.86	$21.58
03.20.00	**CONCRETE REINFORCING**					
0002	Continuous Footing Reinforcement	47,665.17	Lb.	$1.04	$49,571.78	$0.13
0003	Grade Beam Reinforcement	109,600.00	Lb.	$1.04	$113,984.00	$0.31
0004	Pile Cap Reinforcement	180,400.00	Lb.	$1.04	$187,616.00	$0.51
0006	Slab on Grade Reinforcing steel	246,101.67	Lb.	$1.04	$255,945.74	$0.70
0008	CIP Column Reinforcement	432,465.00	Lb.	$1.12	$484,360.80	$1.32
0009	CIP Shear Wall Reinforcement	973,046.25	Lb.	$1.12	$1,089,811.80	$2.96
0010	CIP Elevated Floor Slab Reinforcing steel	978,117.30	Lb.	$1.04	$1,017,241.99	$2.77
0011	CIP Beam Reinforcing steel	939,400.00	Lb.	$1.04	$976,976.00	$2.66
Total -	CONCRETE REINFORCING				$4,175,508.12	$11.36
03.30.00	**CAST-IN-PLACE CONCRETE**					
0001	Finish to Slab On Grade	123,050.84	S.F.	$0.71	$87,366.09	$0.24

Page 3/14 Monday, June 29, 2015 3:08 PM

Beck Technology, Ltd.

Estimate Name: Cost Estimate

Estimate Number: EST - 030540

Profiler

6/29/2015

Division	Description	Quantity	Unit	Unit Price	Cost	Cost / Area
08.40.00	**ENTRANCES**					
0001	Aluminum windows/storefront, vision glazing, generic	14,034.84	S.F.	$74.82	$1,050,086.44	$2.86
0002	Aluminum door set, double, tempered glass	3.00	Pair	$7,116.57	$21,349.71	$0.06
Total -	ENTRANCES				$1,071,436.15	$2.91
08.50.00	**WINDOWS**					
0001	Interior glazing	1,132.15	S.F.	$60.84	$68,879.82	$0.19
Total -	WINDOWS				$68,879.82	$0.19
08.70.00	**HARDWARE**					
0001	Exterior door panic hardware, per leaf	23.00	Ea.	$704.78	$16,209.94	$0.04
0002	Automatic door opening, per double leaf set	3.00	Ea.	$3,381.34	$10,144.02	$0.03
0003	Interior door panic hardware, per leaf	76.00	Ea.	$738.20	$56,103.20	$0.15
Total -	HARDWARE				$82,457.16	$0.22
Total -	**OPENINGS**				**$4,095,598.84**	**$11.14**
09.00.00	**FINISHES**					
09.20.00	**PLASTER AND GYPSUM BOARD**					
0001	5/8" thick gypsum board X, finished, interior of exterior	98,342.81	S.F.	$3.53	$347,150.14	$0.94
0001	Cementitious backerboard at tiled walls	20,584.49	S.F.	$3.94	$81,102.89	$0.22
0001	Exterior plaster, walls	94,554.25	S.F.	$13.77	$1,302,012.07	$3.54
0001	Miscellaneous blocking/strapping and backing	283,036.72	S.F.	$0.10	$28,303.67	$0.08
0002	Exterior metal stud framing, 6" 18 ga at 16" O.C.	98,342.81	S.F.	$10.14	$997,196.14	$2.71
0002	Interior Partition, 5/8" thick, finished (l4), type X	1,824,348.23	S.F.	$3.31	$6,038,592.64	$16.43
0003	Interior Partition, 5/8" thick, unfinished	50,676.34	S.F.	$2.25	$114,021.76	$0.31
0004	Interior Partition, 1" thick coreboard at shaft walls	50,676.34	S.F.	$4.16	$210,813.57	$0.57
0005	Gypsum board ceilings, including framing	28,303.67	S.F.	$13.33	$377,287.95	$1.03
0006	Gypsum board soffit drops, including framing	171,689.46	S.F.	$15.97	$2,741,880.75	$7.46
0008	Interior Partition, 6", 16 GA, at 16" OC, OSHPD	50,676.34	S.F.	$9.01	$456,593.82	$1.24
0009	Interior Partition, 3 5/8", 16 GA, at 16" OC, OSHPD	405,410.72	S.F.	$7.51	$3,044,634.49	$8.28
0010	Interior Partition, 3 5/8", 20 GA, at 16" OC, OSHPD	405,410.72	S.F.	$6.48	$2,627,061.45	$7.15
0011	Interior Partition, 2 1/2", 20 GA, at 24" OC, furring, OSHPD	152,029.02	S.F.	$5.76	$875,687.15	$2.38

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Beck Technology, Ltd.

Terminology / Glossary

Design Charrette: A condensed design meeting, typically occurring over the course of a day or less, in which critical stakeholders discuss, analyze, and determine key decisions driving overall project design

Firesafing: A non-combustible material used as a fire barrier around the perimeter of the floors of a building

If/Then Equations: A programming term that compares two or more sets of data points and tests the results

Lump Sum: A single line item value in an estimate representing an allowance rather than a defined, measurable quantity

OSHPD (The Office of Statewide Health Planning and Development): A regulatory government entity established to monitor construction and seismic safety activities within California hospitals and skilled nursing facilities

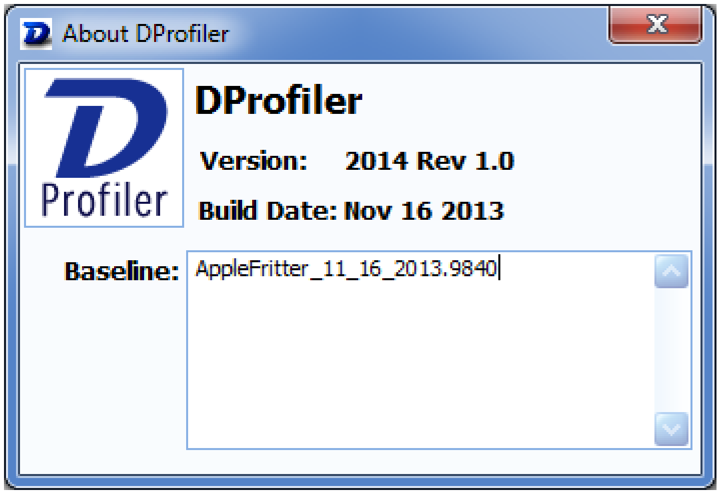
Parametric Estimating: An estimating process the relies on a statistical relationship between historical data and other variables.

Porte Cochere: A covered entrance large enough for vehicles to pass through

User-Defined Variable: A numeric value used in lieu of a modeled value to drive estimate quantities

References

No outside materials have been reference in this paper. Some screenshots above have been taken from the D-Profiler platform by Beck Technologies, per the following version, build-date, and baseline:



All images generated from this software have been created by the author.