

How to Estimate the Cost of Interior Building Finishes from Schematic Drawings

CPE Candidate No. 0714108

December 2014

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Section 1 Introduction

This technical paper is intended to provide the reader with a general understanding of performing professional construction estimating services as they relate to interior building finishes from Schematic Drawings. Schematic Drawings are the first set of measured drawings in the design process. Typically Schematic Drawings have very limited, if any, documentation of interior finishes. Schematic Drawings primarily focus on having the right type and size of spaces. They do not include a Room Finish Schedule or specifications. The detailed information on interior finishes is usually included with the next phase of the design process in the Design Development documents. Sometimes the designer may provide a Design Narrative with the Schematic Drawings with some general information on the types of interior finishes. A construction estimator must understand the client's standard level of finishes and the standard level of finishes of comparable spaces.

Main CSI (Construction Specifications Institute 2004 MasterFormat) Division

Division 09 Finishes

Main CSI (Construction Specifications Institute 2004 MasterFormat) Subdivisions

09 20 00	Plaster and Gypsum Board
09 30 00	Tiling
09 50 00	Ceilings
09 60 00	Floorings
09 70 00	Wall Finishes
09 80 00	Acoustical Treatment
09 90 00	Painting and Coatings

Brief Description

The author will discuss the requirements of the Construction Estimator to review the Schematic plans and any other available information, to develop an estimate for interior finishes. This paper will be presented generally from the point of view of a Construction Manager in the Midwest Region of the United States. The goal of the schematic estimate is to provide the client and/or designer the necessary information to make the decision to continue through the Design Development Phase of the project. It is relatively easy to make changes in the design at this early stage of a project. A sample set of drawings and cost estimate is also provided in sections 8 and 9 for reference.

Section 2 Types of Methods of Measurements

Quantity take-offs for interior finishes measure all the visible surfaces within a building. This includes the ceiling, flooring and walls. Each space or room within a building should be independently taken-off. A simple matrix similar to a Room Finish Schedule should be developed. This may require more upfront work to create this tool, however it is often helpful in case an assumption of a space is incorrect or changes are requested. The room matrix can be easily adjusted without having to perform more take-offs.

Ceilings and Flooring are measured by the horizontal square footage (SQ FT). Wall Base is measured by the perimeter of the space, or lineal footage (LN FT). Wall tile, wall treatment and painting are measured by the vertical square footage (SQ FT). There are some unique items that may be counted (EACH) or carried as an allowance (ALLO) at this point in the estimating process.

For spaces that are square or rectangular, it is simple to calculate the area by multiplying the width by the length. Often there are irregular spaces that require more complex geometry calculations, especially spaces that have angular or curved walls. When measuring irregular spaces, an estimator should measure slightly beyond the room, especially at cut outs to account for waste and slower production rates at these areas. There are several take-off software programs out in the market and within the industry that can assist in calculating these types of spaces. If the ceiling and flooring are measured on the same floor plan, use a hatch pattern for one of the two items and a solid color for the other to help distinguish them from each other.

In addition to taking off the floor and ceiling area of a space, the perimeter of the room should also be calculated. This will be used for not only the wall base, but also to help estimate other wall surfaces. The height of the space also needs to be calculated. Often the height of a space is not available on the Schematic Drawings. In this case a standard wall height of 10' per story can be assumed. For the wall

area, it may be necessary to adjust if there is glazing, casework or other furnishings on the wall.

For items like doors, frames, exposed metal or other single items, these should be individually counted for painting during the estimating process.

An allowance is often used at this phase of the design process. This may be for special drop soffits that may become part of the design, or possibly for an accent wall or other wall graphics not yet designed.

Section 3 Project Specific Factors to Consider in Takeoff and Pricing

There are some specific factors to consider when pricing interior finishes at any phase of the design documents. The quantity, location and weather all have an impact on the cost of interior finishes. Consideration of all three of these factors is important during this phase of the estimating process.

Small Quantities vs. Large Quantities

The general rule of thumb that there are cost savings for larger volume applies to interior finishes. When there are large spaces or several similar spaces, the labor productivity for installation increases and the amount of material waste decreases. Furthermore, manufacturers often provide discounted pricing for high volume of materials. For smaller spaces, the finish work is generally more tedious. There are more cut outs and this is much more labor intensive. Also, there are some fixed pricing items on projects, such as equipment, that proportionally burdens smaller projects more verse being spread out over a larger project.

Geographic Location

The location of the project within the United States generally has an effect on the cost of interior finishes. The labor rates will vary from area to area. It is important to take into consideration, demographics during the estimating process. A highly populated area such as New York or California, for example, will have higher labor rates due to the higher cost of living versus a more rural area. There may also be a transportation factor depending on the location of project. A project in a more rural area may require materials to be shipped a much longer distance. Remote projects may also require workers to stay in temporary lodging.

Seasonal effect on work

Most interior finish work can only be installed once a project is reasonably weather enclosed. High levels

of moisture and low temperatures restrict the installation of finishes. In some warmer areas of the country, the weather is not as much of a factor for construction. However in the Northern part of the Country, the schedule for the interior finishes is much more restricted during the winter season. In these parts of the Country, there may be a higher cost to complete the work in the Spring/Summer when there is a high demand to complete as much work as possible during the peak construction season. The cost to install finishes may be lower during the winter season when contractors are looking to keep their employees steadily working through down seasons, however, this can easily be offset on the overall construction budget with the cost of temporary enclosures and heat.

In summary, factors such as; quantity, location and schedule all affect the pricing of interior finishes for a project. An estimator should always take into consideration these aspects and be able to adjust or modify their unit pricing accordingly by these factors. Also, an estimator should always include a list of assumptions, clarifications and exclusions within their estimate as to how the estimate was derived.

Section 4 Overview of Labor, Material, Equipment, Indirect Costs and Approach to Markups

At the schematic design phase, many of the costs and percentages for interior finishes are based upon industry standard, time tested historical data from other similar type projects.

Labor, Material and Equipment

The labor, material, and equipment costs for interior finishes are generally calculated as a single unit price. These unit prices have been developed over time. The general rule of thumb for these unit prices is that the material is about half the cost and installation is the other half. The cost of the material is generally known and slightly increases over the years.

An estimator may use the actual labor and equipment costs of a crew from a recently completed project and back this into the area of the previous project. This will give a relatively accurate labor and material unit cost.

Indirect Costs and Mark-Up

The indirect costs and mark-up are usually an industry standard percentage at the Schematic Design phase of the project. The indirect costs typically cover a contingency for both design and construction. These percentages may vary depending on the type of project and comfort level in the design. The Design Contingency could cover any material upgrades as the design progresses. The Construction Contingency covers changes in the project during construction.

The indirect costs also cover any general conditions items such bonds/insurance, submittals, dumpsters, or other temporary measures necessary to complete the work. The mark-up on the project can vary depending on the delivery method. This could range between 5%-10% on a typical project. Generally, the higher the risk to the contractor on the project, the higher the mark-up range.

Section 5 Special Risk Considerations

There are a few other major factors to consider in pricing interior finishes that can also affect cost. These are; new construction vs renovations, open specifications vs sole source, and project schedule.

New Construction vs. Renovations

Interior finish pricing can be impacted by the type of construction project. On a new project there may be several coordination issues with other aspects of the project. Issues such as ductwork and piping runs may require a drywall soffit ceiling transition. A drywall drop soffit is a much higher unit cost than a typical lay in ceiling or a standard drywall ceiling.

New concrete floors require a long period of time to properly cure to remove the moisture before flooring can be installed. If the proper moisture level is not met, the floor adhesive may not work. Sometimes a sealer is applied to ensure proper adhesion of the flooring and to meet the project schedule.

On a renovation project, there may be a lot more cutting and patching or protection to existing surfaces. There can also exist, some hidden conditions such as a poor floor under carpeting or tile. This may require an extensive amount of floor preparation before the new floor can be installed. Hazardous material such as asbestos and lead paint is also a concern in renovations. An estimator should request a copy of any inspections from the client. This should also be noted on the estimate.

Open Specifications vs. Sole Source

Most projects have at least 2 to 3 equivalent manufacturers listed in the specifications for many items, including interior finishes. This is done to keep the manufacturers honest and the pricing competitive. However, some projects may have only one acceptable product. This sole source specification may exist because the project has to match existing finishes or the product provides a certain aesthetic value to the design. This may place a slight premium on the cost of the material. Another risk with sole source manufacturers may be the lead time of unique finishes. Some products are produced overseas. If this is

the case, the estimator should contact the manufacturer and request pricing and lead times in lieu of assuming the pricing based upon previous projects. This is an opportunity to educate the client and/or designer to the situation and suggest opening the specification to other manufacturers. This can be done as alternates to help establish some bid protection in the project.

Project Schedule

The project schedule may affect pricing of interior finishes. If the work must be completed outside the traditional day shift or within a compressed schedule, additional costs for labor, material and other direct costs may need to be included. Some projects are scheduled to run multiple shifts to expedite the project without having multiple trades within the same space. The mechanical, electrical and plumbing contractors may work the day shift and the interior finish trades follow behind at night. The work may also be scheduled for after core work hours so as not to disrupt the daily operations of the client. Many times a client will evaluate this premium cost of construction option versus the cost to temporarily shut down or relocate their business.

Section 6 Ratios and Analysis (Testing the Bid)

Once the take-off and pricing is complete there are two simple tests that should be performed to help validate the interior finishes estimate and identify any irregularities. The estimator should check the overall quantity of area and the composite unit pricing.

Quantity

The first test of the bid is to make sure all the interior space has been covered. An estimator should add up all the floor area and ceiling area to check this against the overall building area. The estimator needs to remember to include the ceilings that are painted and floors that only receive a sealer even though these are covered in the painting section of the estimate. The total area of finishes should be within about 10% of the overall building area. The difference between the total overall area and the measured area is to account for items like wall thickness, elevators, stairways, mechanical, etc. that are included in the overall building area, but do not receive an actual interior finish.

Unit Cost

Even though each project is unique, interior building finishes for commercial buildings typically fall in an average cost per square foot range. \$5-\$10 per square foot for standard flooring, \$5-\$7 per square foot for standard ceilings and \$1-\$5 per square foot for painting and walls finishes. Overall, \$15 per square foot is a good average baseline number to check against. For projects with higher end finishes, such as terrazzo flooring, it is easy to identify the difference.

Section 7 Other Pertinent Information

There are some other factors that may be unique to the project that should be reviewed and considered for cost impact to pricing interior finishes on a project. These factors can include workforce availability, Trade Unions and Green building initiatives.

Workforce Availability

The Construction Estimator must be aware of the availability of local trade contractors. In areas that have a high level of construction or very rural areas, there may be a shortage of qualified workers. This shortage may increase the pricing within the estimate as bidders plan to put their workforce on overtime to meet the schedule without adding employees, or use lower production rates because they are adding employees who will require more training and oversight.

Labor Unions

Depending on the funding source or client requirements, the project may be required to have Union work force, local Prevailing Wage Rates or Federal Wage Rates. These labor rates are typically slightly more than a project without these requirements. The Prevailing Wage rates vary from region to region. These labor requirements should be noted within the estimate.

Green Building

Most interior finishes that are produced today meet the minimum requirements for environmentally friendly standards. There has been a push within the industry to use more green products to help the environment. There are some projects that seek a higher level of green construction related to the materials depending on the client, project and sometimes the use of Federal Grants and funding. This can substantially raise the cost of the material within a project but the reuse of material to maintain higher green standards are preferred by the client especially if has a longer material life.

Section 8 Sample Schematic Drawing Plan

Figure 1

On this page is a partial schematic floor plan drawing of a typical school building addition. The interior finishes have been noted on the plan.

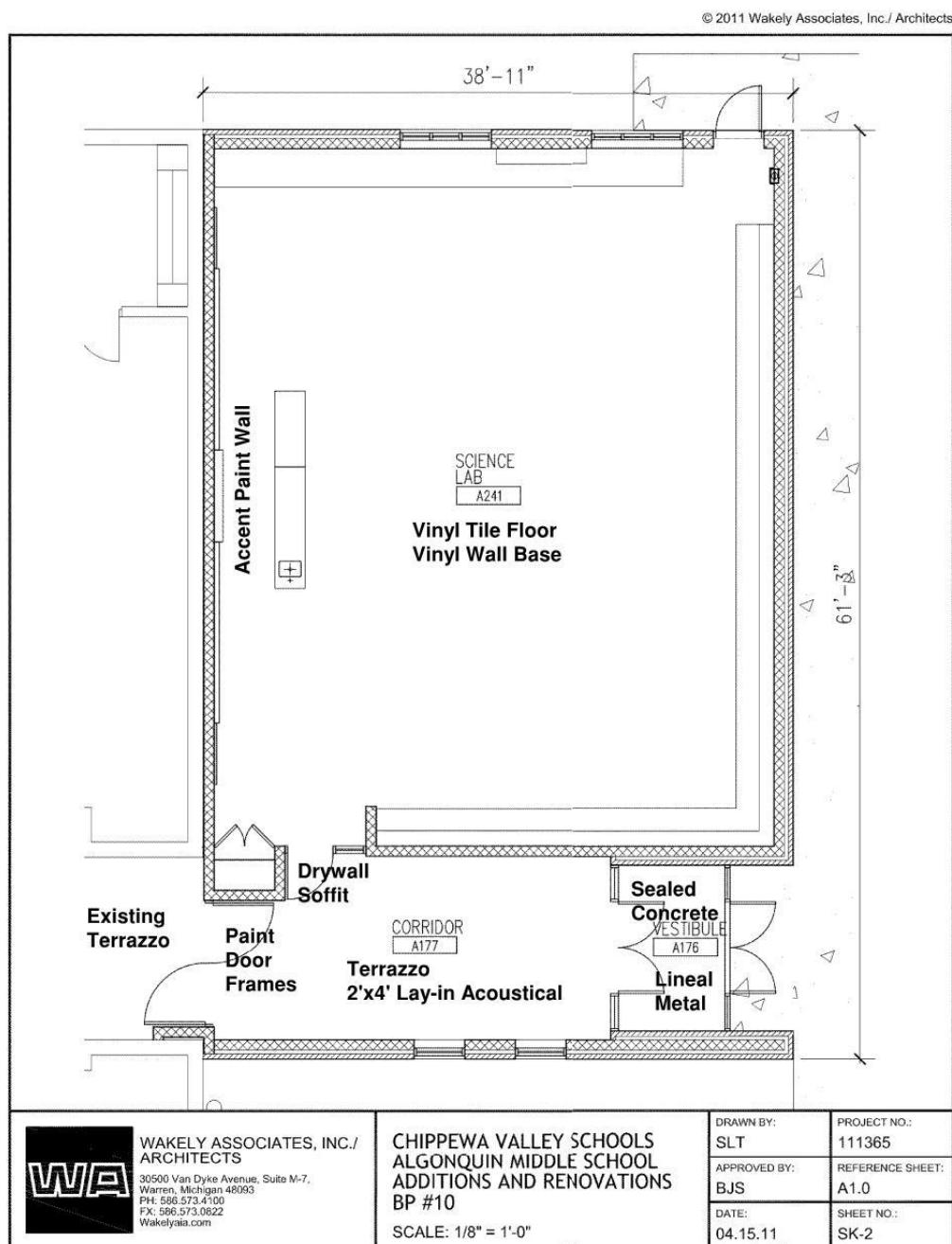


Figure 2

On this page is a composite floor plan from the schematic design drawings. The interior finishes have been measured and quantified.



Section 9 Sample Estimate – Take-off and Pricing Sheet

**SOME SCHOOL DISTRICT
ABC MIDDLE SCHOOL
ADDITIONS & RENOVATIONS
SCHEMATIC ESTIMATE**

**Estimate Date: 12/15/14
Total Area: 100,000 SF
Additions: 5,922 SF
Renovations: 11,808 SF**

Description	QTY	UNIT	UNIT COST	TOTAL
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DIVISION 9 – FINISHES

CEILING

Drywall drop soffit	34	SQFT	10.00	\$340
Lay-in acoustical 2'x2', tegular	3,416	SQFT	6.00	\$20,496
Lay-in acoustical 2'x4'	749	SQFT	5.00	\$3,745
Lineal metal ceiling	236	SQFT	15.00	\$3,540
Replace 2'x4' ceiling	557	SQFT	5.00	\$2,785
<u>Exposed (see painting)</u>	817	SQFT	0.00	\$0
Ceiling subtotal:	5,309	SQFT	5.83	\$30,906

FLOORING

Carpet, rolled	2,305	SQFT	5.00	\$11,525
Vinyl, tiles	3,429	SQFT	4.00	\$13,716
Terrazzo at corridors	766	SQFT	23.00	\$17,618
Wood at gym	6,931	SQFT	18.00	\$124,758
Athletic Flooring	814	SQFT	12.00	\$9,768
Epoxy Flooring (see painting)	1,906	SQFT	0.00	\$0
<u>Sealed concrete (see painting)</u>	240	SQFT	0.00	\$0
Flooring Subtotal:	10,091	SQFT	17.58	\$177,385

WALL TREATMENT

Wall Base, vinyl	1,000	LNFT	1.00	\$1,000
<u>Acoustical, weight room</u>	1	ALLO	5,000.00	\$5,000
Wall Treatment subtotal:				\$6,000

PAINTING

Walls	5,000	SQFT	1.00	\$5,000
Walls, accent	1,270	SQFT	1.00	\$1,270
Door frames	17	EACH	100.00	\$1,700
Epoxy Flooring	1,906	SQFT	8.00	\$15,248
Sealed concrete	240	SQFT	3.00	\$720
<u>Exposed ceiling</u>	817	SQFT	2.00	\$1,634
Painting Subtotal:				\$25,572

TOTAL DIVISION 9 - FINISHES:	17,730	SQFT	13.53	\$239,863
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**SOME SCHOOL DISTRICT
ABC MIDDLE SCHOOL
ADDITIONS & RENOVATIONS
SCHEMATIC ESTIMATE**

Total Area: 100,000 SF

Estimate Date: 12/15/14

Description	QTY	UNIT	UNIT COST	TOTAL
INDIRECT COSTS				
Design Contingency	2.5%	OF	\$239,863	\$5,996
Construction Contingency	7.5%	OF	\$245,859	\$18,439
General Conditions	3.0%	OF	\$245.859	\$7,375
Contractor OH&P	6.2%	OF	\$271,673	\$16,843
Indirect Costs Subtotal:				\$48,653

TOTAL INTERIOR FINISH ESTIMATE: \$288,516

Section 10 Glossary

Lay-in Acoustical Ceiling

The standard ceiling in many commercial buildings is a 2'x4' lay-in ceiling tile. These tiles are installed in a metal grid system. This system is more economical than a drywall ceiling and allows easier access above the ceiling for maintenance.

Vinyl Floor Tile (VCT)

The standard flooring in many commercial buildings is a 12"x12" tile. The tile is glued down to the concrete floor. This is a cost effective durable product that is easy to clean and maintain.

Exposed Ceiling

An exposed ceiling is a ceiling that does not have a surface below it. This is common in mechanical rooms and gymnasiums. Most times this ceiling is painted to hide the mechanical lines, plumbing, etc.

Section 11 References

The floor plans used within section 8 of this technical paper are the property of Wakley Associates of Warren, Michigan and are used with their expressed written permission.