

## Introduction

Construction Defect Estimating and Analysis is for anyone who needs to understand construction cost estimates in the context of construction defect litigation. The program is for construction, design, insurance, legal and property professionals. The presentation outlines a step-by-step method for planning, creating and delivering estimates for construction defect repairs, and discusses how estimates can be summarized, analyzed and compared.

The process begins with deciding on the level of detail and exactitude required. It continues with deciding on and organizing the components that will be included in the estimate, so that the scope of work and methods of construction can be documented and easily referenced, summarized and understood. Application of prices to the scope and method of construction is next. Ultimately an estimator will summarize, format, coordinate peer review, finalize and publish the completed estimate.

Updated: April 2012

## Program Outline

1. Introduction
2. Order of Magnitude (PFCS Level 1)
3. Putting It All Together
4. Conceptual & Preliminary (PFCS Levels 2 & 3)
5. Detailed & Bid/Construction/Trial Ready (PFCS Levels 4 & 5)
6. Estimate Analysis
7. Conclusion

## Learning Objectives

1. Understand the Fundamentals of Estimating
2. Orientation to Estimate Components
3. PFCS 5 Levels – 10 Steps of Estimating
4. Introduction to Analysis of Estimate & Construction Costs

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Estimating & Analysis

# Construction Defect Estimating & Analysis

Pete Fowler Construction Services, Inc.  
April 2012

Estimating & Analysis

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1. Introduction

- A. Program Introduction
- B. Program Outline
- C. Learning Objectives
- D. Who We are: PFCS
- E. Who We Are: Audience
- F. Back-Up Materials
- G. Estimating Basics

## A. Program Introduction

### Construction Defect Webinar Series

1. Window & Door Installation and Defects
2. Common Construction Defects (A Pictorial Review)
3. Analyzing Construction Defects
4. **Construction Defect Estimating and Analysis**
5. Allocation of Responsibility for Construction Defects
6. Structural Framing and Defects
7. Building Wall Construction and Defects
8. Foundation Construction and Defects
9. Evaluating Water Leakage of Buildings
10. Random Selection & Extrapolation of Construction Defects
11. Construction Defect Document Literacy
12. Roof Construction and Defects

## A. Program Introduction

Construction Defect Estimating and Analysis is for anyone who needs to understand construction cost estimates in the context of construction defect litigation. The program is for construction, design, insurance, legal and property professionals. The presentation outlines a step-by-step method for planning, creating and delivering estimates for construction defect repairs, and discusses how estimates can be summarized, analyzed and compared.

The process begins with deciding on the level of detail and exactitude required. It continues with deciding on and organizing the components that will be included in the estimate, so that the scope of work and methods of construction can be documented and easily referenced, summarized and understood. Application of prices to the scope and method of construction is next. Ultimately an estimator will summarize, format, coordinate peer review, finalize and publish the completed estimate.

## B. Program Outline

1. Introduction
2. Order of Magnitude (PFCS Level 1)
3. Putting It All Together
4. Conceptual & Preliminary (PFCS Levels 2-3)
5. Detailed & Bid/Construction/Trial (PFCS Levels 4-5)
6. Estimate Analysis
7. Conclusion

## C. Learning Objectives

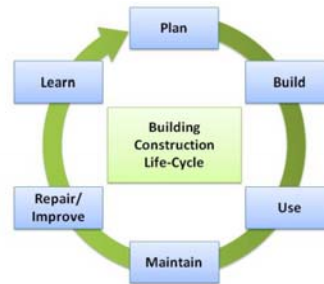
1. Understand the Fundamentals of Estimating
2. Orientation To Estimate Components
3. PFCS 5 Levels – 10 Steps of Estimating
4. Introduction to Analysis of Estimates & Construction Costs

### D. Who We Are: PFCS

Pete Fowler Construction Services, Inc. (PFCS) is a team of consultants with expertise in all phases of building construction. We specialize in creating real, practical solutions.

Services:

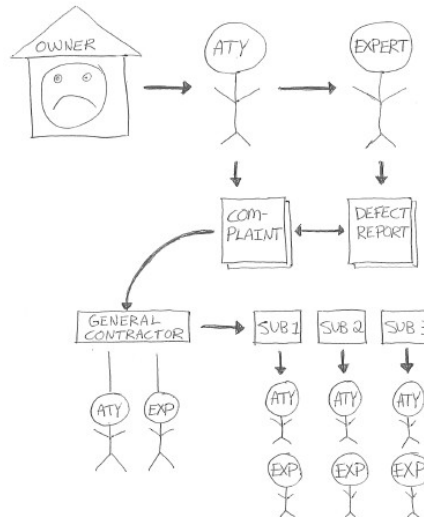
- **Cost Estimating**
- Construction Management
- Finance & Accounting
- Property Analysis
- Construction Claims Consulting
- Construction Defect Consulting
- Expert Witness Testimony
- Training & Education



### E. Who We Are:

Audience

Other?



## F. Back-Up Materials

1. Estimating Basics for Remodelers – JLC (1995)
2. An Estimating Checklist – JLC (1999)
3. Using Cost Books for Estimating – JLC (2004)
4. Estimating Basics for Remodelers (JLC October 1995)
5. The Burden of Labor (JLC March 1995)
6. Determining Labor Productivity Rates (JLC August 2004)
7. Developing Unit Cost Assemblies (JLC February 2005)
8. Using Cost Books for Estimating (JLC February 2004)
9. An Estimating Checklist (JLC April 1999)
10. A Spreadsheet Primer (JLC April 2000)
11. RSMeans Building Construction Cost Data 63<sup>rd</sup> Annual Edition 2005
12. RSMeans Mechanical Cost Data 28<sup>th</sup> Annual Edition 2005
13. Work Breakdown Structure Article (Wikipedia)
14. Teaching and Learning the Foundation of Construction Estimating – American Professional Constructor (2004)
15. The Nine Secrets of Estimating – ASPE (2003)
16. Estimating Costs of a Commercial Building using Unifomat II – Estimating Today (2009)
17. Bidding Large Jobs – JLC (2005)

## G. Estimating Basics 1 of 8

### *Identify or Estimate All Costs*

Costs are always an issue in solving building problems. But, it is my experience that cost is often not the primary issue, even if it appears to be.

To figure out project costs, we need to identify the steps between “where we are” and “where we want to be” and estimate the cost of the steps; it is not as hard as most people make it out to be. This is the heart of solving building problems. Like the Issues List, we can usually identify 5 to 15 steps that will move the situation to conclusion.



## G. Estimating Basics: Estimating v. Pricing 2 of 8

### ESTIMATING

- Detailed Costs
- Real or Hard Costs

### PRICING

- Availability
- Personal Relationships
- Access to Site
- Payment Dependability

## G. Estimating Basics: Purpose for Estimating 3 of 8

- Budget / Feasibility
- Project Control / Project Management
- Bid
- Proposal
- Insurance Claim
- Litigation

Estimating & Analysis
1. INTRODUCTION

## G. Estimating Basics 4 of 8

*Build the project on paper before the real world*

- Idea
- Feasibility Study
- Design
- Scope
- Drawings
- Costs
- Schedule

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Estimating & Analysis
1. INTRODUCTION

## G. Estimating Basics: Scope, Method & Costs 5 of 8

	New Construction	Remodeling	Construction Defect
Scope	Owner & Architect	Owner & GC	Trade Experts & Lead Expert
Method	Architect, Engineer & General Contractor	General Contractor	Plaintiff Experts & Estimator
Cost	General Contractor	General Contractor	Estimator

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## G. Estimating Basics 6 of 8

### *Tools of the Trade & Estimating Skills*

- Pencils and paper
- Colored pens or pencils for quantity take off
- Architectural and Engineering Scales (rulers)
- Labor / Crew Rates
- Historical Cost Data?
- Forms
- Check-Lists (CSI, Bid Documents, Site Investigation, Direct Cost, OH, Review)
- Calculator OR Computer?
  - Estimating Software?
  - Spreadsheet Software?
- Guide Books?

## G. Estimating Basics: Estimating Skills 7 of 8

- Plan Reading
- Understanding Construction
- Construction Math
- Computer Spreadsheets

Estimating & Analysis

1. INTRODUCTION

G. Estimating Basics – 5 Levels – 10 Steps 8 of 8

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**Level 5 Estimating**  
*5 Levels - 10 Steps*

Line	Steps	Level 1 Order of Magnitude	Level 2 Conceptual	Level 3 Preliminary	Level 4 Detailed	Level 5 Bid / Construction / Trial
1	Format	Summary Sheet Only	Add capital letters (or numbers if L1 are letters) with 2 to 15 items under each of the main categories	Conform with the WBS rules: Main Category, then capital letters or numbers, then alternate with each new level	See PFCS Samples for deeper and deeper levels. Conform to rules of WBS.	Final Pass for clarity and ease of making references and following all of the component parts
2	Scope	A Level 1 Work Breakdown Structure (WBS): 1 paragraph to 1 page. There are only basic quantities (no real QTO) in approximate figures	Add details with 2-10 categories each with letters and CSI codes. Basic QTO on main items (SF, FA, LF, etc.) Usually not calculated units like Cubic Yards (CY)	Level 2 WBS with letters, numbers, and CSI codes. More detailed QTO.	Complete, detailed QTO.	Final Pass. Check QTO on key items.
3	Time Labor	Little or no breakdown of labor / time in this step	Rough Estimate. Typical crews. Round numbers, slightly over estimating. No calls	Productivity rates. Use Walker's book on big #s	Use Walker's Labor Rates	Final Pass
4	Material	A guessimate. Little QTO. Quantities only - not cost of materials. Assembly level estimates at the most	QTO. Rough Estimate. Slightly over estimating. Books only for big #s. NO calls unless faster than book	Calls, Books, Maybe Alternatives	Calls, Bids, Alternatives refined	Final Pass
5	Equipment	WAG. Often none	Rough Estimate. No Calls	Calls, Books	Calls, Books, Bids	Final Pass
6	Subs	Unit prices, WAG. Use books only on B1Q #s	Books. NO calls	Some Calls	Lots of Calls. Maybe send info. Maybe Bids	Final Pass
7	GC's	% of Direct Cost	Reconsider % or Amount	Reconsider % or Amount	Broken Down	Same as L-4
8	OH	% of Direct Cost	Reconsider % or Amount	Reconsider % or Amount	Possibly Broken Down	Same as L-4
9	Profit	% of Direct Cost	Reconsider % or Amount	Reconsider % or Amount	Reconsider % or Amount	Reconsider % or Amount
10	Non-Construction	WAG	SWAG	More Support	More Support	Calls Bids
11	Time	1-4 Hours	1-32 Hours	16-100 Hours	50-200 Hours	100+ Hours

We will deal with this in more detail in section 3

# Level 5 Estimating

## 5 Levels - 10 Steps

		<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>
<b>Line</b>	<b>Steps</b>	<b>Order of Magnitude</b>	<b>Conceptual</b>	<b>Preliminary</b>	<b>Detailed</b>	<b>Bid / Construction / Trial</b>
1	Format	Summary Sheet Only	Add capital letters (or numbers if L1 are letters) with 2 to 15 items under each of the main categories	Conform with the WBS rules: Main Category, then capital letters or numbers, then alternate with each new level.	See PFCS Samples for deeper and deeper levels. Conform to rules of WBS.	Final Pass for clarity and ease of making references and following all of the component parts.
2	Scope	A Level 1 Work Breakdown Structure (WBS): 1 paragraph to 1 page. There are only basic quantities (no real QTO) in approximate figures	Add details with 2-10 categories each with letters and CSI codes. Basic QTO on main items (SF, FA, LF, etc.) Usually not calculated units like Cubic Yards (CY)	Level 3 WBS with letters, numbers, and CSI codes. More detailed QTO.	Complete, detailed QTO.	Final Pass. Check QTO on key items.
3	Time/Labor	Little or no breakdown of labor / time in this step	Rough Estimate, Typical crews, Round numbers, slightly over estimating. No calls	Productivity rates, Use Walker's book on big #'s	Use Walker's Labor Rates	Final Pass
4	Material	A guesstimate. Little QTO, Quantities only - not cost of materials. Assembly level estimates at the most	QTO, Rough Estimate, Slightly over estimating. Books only for big #'s, NO calls unless faster than book	Calls, Books, Maybe Alternatives	Calls, Bids, Alternatives refined	Final Pass
5	Equipment	WAG. Often none	Rough Estimate. No Calls	Calls, Books	Calls, Books, Bids	Final Pass
6	Subs	Unit prices, WAG, Use books only on BIG #'s	Books, NO calls	Some Calls	Lots of Calls, Maybe send info, Maybe Bids	Final Pass
7	GC's	% of Direct Cost	Reconsider % or Amount	Reconsider % or Amount	Broken Down	Same as L4
8	OH	% of Direct Cost	Reconsider % or Amount	Reconsider % or Amount	Possibly Broken Down	Same as L4
9	Profit	% of Direct Cost	Reconsider % or Amount	Reconsider % or Amount	Reconsider % or Amount	Reconsider % or Amount
10	Non-Construction	WAG	SWAG	More Support	More Support	Calls/Bids
11	Time:	1-4 Hours	2-24 Hours	16-100 Hours	50-200 Hours	100+ Hours

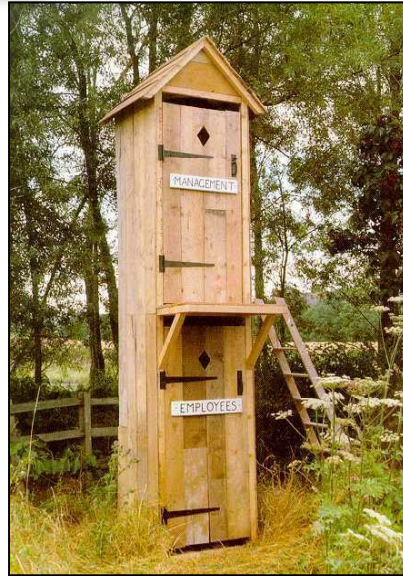
## Estimating & Analysis

### 2. Order of Magnitude (PFCS Level 1)

- A. Case Study: Otto's Outhouse
- B. 10 Steps: Level 1
- C. Case Study: Multi-Family Residential
- D. Case Study: Commercial
- E. Case Study: Your Room Using Unifomat

## Estimating &amp; Analysis

## 2. ORDER OF MAGNITUDE

A. Case Study <sup>1 of 3</sup>

*Our Simplified Case Study:  
Otto's Outhouse*

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## Estimating &amp; Analysis

## 2. ORDER OF MAGNITUDE

B. Case Study: 10 Steps: Level 1 <sup>2 of 3</sup>

1. Format: Summary Sheet only.
  2. Scope: A Level 1 Work Breakdown Structure (WBS): 1 paragraph to 1 page. There are only basic quantities (no real QTO) in approximate figures.
  3. Time (Labor): Little or no breakdown of labor / time in this step.
  4. Materials: A guesstimate. Little QTO, Quantities only - not cost of materials. Assembly level estimates at the most.
  5. Equipment: WAG. Often none.
  6. Independent Subcontractors: Unit prices, WAG, Use books only on BIG #'s
  7. General Conditions: % of Direct Cost
  8. Internal (Overhead) Costs: % of Direct Cost
  9. Profit: % of Direct Cost
  10. Non-Construction (Other) Costs: WAG
- (See 5 Levels – 10 Steps Matrix for comparison)

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2. ORDER OF MAGNITUDE

B. Case Study: Order of Magnitude 3 of 3

1. Grading & Excavation	\$ 1,000
2. Framing	\$ 1,000
3. Roofing	\$ 500
4. <u>Final Clean-Up</u>	<u>\$ 500</u>
5. SUB TOTAL	\$ 3,000
6. <u>Profit &amp; Overhead</u>	<u>\$ 1,000</u>
7. Total Construction Costs	\$ 4,000
8. <u>Other Project Costs</u>	<u>\$ 500</u>
9. TOTAL	\$ 4,500

Estimating & Analysis

2. ORDER OF MAGNITUDE

C. Case Study: Multi-Family Residential 1 of 2





Estimating & Analysis

2. ORDER OF MAGNITUDE

C. Case Study: Multi-Family Residential 2 of 2

P4	Pete Fowler	CONSTRUCTION	Services, Inc.	Job Name	Job #
CC				Date	By
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Item	Location	Code	Description	Quantity	Unit	Price	Total
<i>ExT - WPT</i>							
Blade	1	44-1		2		39,760	
	2			12		285,600	
	3			3		46,800	
	4			3		126,000	
<i>Total</i>							<i>547,960</i>
<i>47 units 1000 - 3,000 = 141,000</i>							
<i>Max</i>							<i>688,960</i>
<i>-20%</i>							<i>137,792</i>
<i>Cost Range</i>							<i>400,000 - 826,752</i>

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2. ORDER OF MAGNITUDE

D. Case Study: Commercial 1 of 2



Estimating & Analysis

2. ORDER OF MAGNITUDE

D. Case Study: Commercial 2 of 2

Pete Fowler  
CONSTRUCTION  
Services, Inc.

Order of Magnitude

Date:	January 31, 2008
To:	J.H.E.
From:	Pete Fowler Construction Services, Inc.
Project:	Thompson Gardens PFC'S Project #07-331 Address: 45 SW 32 <sup>nd</sup> Ave, Seaside, OR
Regarding:	Order of Magnitude Estimate
Note:	Confidential Estimate - Client and Attorney Work Product. Protected under all applicable evidence codes.

PFC'S has reviewed our inspection documentation of the exterior and interior of the building and also the results of the window testing that was performed on January 21 and 22, 2008. Our conclusions regarding the necessary repairs are as follows:

1. Replace the siding on the front (south) elevation only with a rain screen siding system (approximately 6800sf)
2. Replace the gypsum wall board (GWB) and oriented strand board sheathing as necessary at the front elevation (approximately 3000sf)
3. Replace all windows on the south elevation only (53 total)
4. Replace the Ply-Trim on the entire building with cedar or redwood dimensional lumber (approximately 6600lf)
5. Paint entire building (approximately 15,000sf)

Costs

#	Description	#	Units	\$/Unit	Total
1	Siding Replacement (South Side Only)	6,800	SF	20.00	136,000
2	GWB & OSB Replacement	3,000	SF	16.66	50,000
3	Windows	53	E.A.	250.00	13,250
4	Trim replacement (peel & stick, sealant joints)	6,000	LF	10.00	60,000
5	Paint	15,000	SF	2.00	30,000
6	Subtotal				289,250
7	P & O	40%			115,700
8	Total				\$ 404,950

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9320 SW Harbor Blvd., Suite 170, Portland, OR 97219 T: 503-246-3744 F: 503-240-9972

Estimating & Analysis

2. ORDER OF MAGNITUDE

E. Case Study: Your Room Using Uniformat 1 of 2

Level 1 Major Group Elements	Level 2 Group Elements	Level 3 Individual Elements
A SUBSTRUCTURE	A10 Foundations	A1010 Standard Foundations A1020 Special Foundations A1030 Slab on Grade
	A20 Basement Construction	A2010 Basement Excavation A2020 Basement Walls
B SHELL	B10 Super Structure	B1010 Floor Construction B1020 Roof Construction
	B20 Exterior Enclosure	B2010 Exterior Walls B2020 Exterior Windows B2030 Exterior Doors
	B30 Roofing	B3010 Roof Coverings B3020 Roof Openings
C INTERIORS	C10 Interior Construction	C1010 Partitions C1020 Interior Doors C1030 Fittings
	C20 Stairs	C2010 Stair Construction C2020 Stair Finishes
	C30 Interior Finishes	C3010 Wall Finishes C3020 Floor Finishes C3030 Ceiling Finishes

Estimating & Analysis

2. ORDER OF MAGNITUDE

E. Case Study: Your Room Using Uniformat 2 of 2

D SERVICES	D10 Conveying	D1010 Elevators & Lifts D1020 Escalators & Moving Walks D1090 Other Conveying Systems
	D20 Plumbing	D2010 Plumbing Fixtures D2020 Domestic Water Distribution D2030 Sanitary Waste D2040 Rain Water Drainage D2090 Other Plumbing Systems
	D30 HVAC	D3010 Energy Supply D3020 Heat Generating Systems D3030 Cooling Generating Systems D3040 Distribution Systems D3050 Terminal & Package Units D3060 Controls & Instrumentation D3070 Systems Testing & Balancing D3090 Other HVAC Systems & Equipment
	D40 Fire Protection	D4010 Sprinklers D4020 Standpipes D4030 Fire Protection Specialties D4090 Other Fire Protection Systems
	D50 Electrical	D5010 Electrical Service & Distribution D5020 Lighting and Branch Wiring D5030 Communications & Security D5090 Other Electrical Systems
F EQUIPMENT & FURNISHINGS	F10 Equipment	F1010 Commercial Equipment E1020 Institutional Equipment E1030 Vehicular Equipment E1090 Other Equipment
	E20 Furnishings	E2010 Fixed Furnishings E2020 Movable Furnishings
F SPECIAL CONSTRUCTION & DEMOLITION	F10 Special Construction	F1010 Special Structures F1020 Integrated Construction F1030 Special Construction Systems F1040 Special Facilities F1050 Special Controls and Instrumentation
	F20 Selective Building Demolition	F2010 Building Elements Demolition F2020 Hazardous Components Abatement

## Estimating & Analysis

### 3. Putting It All Together

- A. 10 Steps Summary
- B. 5 Levels – 10 Steps
- C. Decide on the Level of Detail
- D. A Sensible List
- E. Estimate Set-Up
- F. Relating the Parts
- G. Resources

Estimating & Analysis

3. PUTTING IT ALL TOGETHER

A. 10-Step Summary

1. *Format*
2. *Scope*
3. *Time (Labor)*
4. *Materials*
5. *Equipment*
6. *Independent Subcontractors*
7. *General Conditions (Project Specific OH)*
8. *Internal (Overhead) Costs*
9. *Profit*
10. *Non-Construction (Other) Costs*

Estimating & Analysis

3. PUTTING IT ALL TOGETHER

B. 5 Levels – 10 Steps

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**Level 5 Estimating**  
*5 Levels - 10 Steps*

Line	Steps	Level 1 Order of Magnitude	Level 2 Conceptual	Level 3 Preliminary	Level 4 Detailed	Level 5 Bid / Construction / Trial
1	Format	Summary Sheet Only	Add capital letters (or numbers if L1 are letters) with 2 to 15 items under each of the main categories	Conforms with the WBS rules: Main Category, then capital letters or numbers, then alternate with each new level	See PFC's samples for deeper and deeper levels. Conform to rules of WBS.	Final Pass for clarity and ease of making references and following all of the component parts.
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3	Time Labor	Little or no break-down of labor time in this step	Rough Estimate. Typical crews, Round numbers, slightly over estimating. No calls	Productivity rates, Use Walker's book on big #'s	Use Walker's Labor Rates	Final Pass
4	Material	A guesstimate. Little QTO. Quantities only, not cost of materials. Assembly level estimates at the most	QTO, Rough Estimate, Slightly over estimating. Books only for big #'s. NO calls unless faster than book	Calls, Books, Maybe Alternatives	Calls, Bids, Alternatives refined	Final Pass
5	Equipment	WAG. Often none	Rough Estimate. No Calls	Calls, Books	Calls, Books, Bids	Final Pass
6	Subs	Unit prices, WAG, Use books only on BIG #'s	Books, NO calls	Some Calls	Lots of Calls, Maybe send info. Maybe Bids	Final Pass
7	GC's	% of Direct Cost	Recorder % or Amount	Recorder % or Amount	Broken Down	Same as L1
8	OH	% of Direct Cost	Recorder % or Amount	Recorder % or Amount	Possibly Broken Down	Same as L1
9	Profit	% of Direct Cost	Recorder % or Amount	Recorder % or Amount	Recorder % or Amount	Recorder % or Amount
10	Non-Construction	WAG	SWAG	More Support	More Support	Calls Bids
11	Time:	1-4 Hours	2-24 Hours	16-100 Hours	50-200 Hours	100+ Hours

### C. Decide on the Level of Detail

*Level 1: Order of Magnitude*

*Level 2: Conceptual*

*Level 3: Preliminary*

*Level 4: Detailed*

*Level 5: Bid / Construction / Trial*

### D. A Sensible List <sup>1 of 2</sup>

1. Why This Matters
2. By Importance
3. Room-by-Room (Location by Location)
4. SB 800
5. By Who did the Work: CSI Codes
6. By Assembly: Unifomat (PFCS Standard)
7. Work Breakdown Structure

### D. A Sensible List 2 of 2

Consider outlining or organizing using:

- Use the Specifications or Project Manual, if one exists
- Project Activities
- CSI Master Format Codes
- UniFormat
- Residential List of Cost Categories
- Commercial / Industrial List of Cost Categories
- By Issue List or Defect List
- Homeowners List, Address or Unit Number
- **DELIVERABLE: Estimate Summary** sheet complete

### E. Estimate Setup

1. Outline items that will be on the Estimate Summary. Usually 5-20 items
2. Save estimate template to the file
3. Fill out Cover Page with all applicable information and identify the sheets you know will be included on the Table of Contents
4. Populate the Estimate Summary sheet with the items identified above
5. Apply any known Units on the Summary Sheet
6. Update figures and percentages below Sub-Total on the Summary
7. Copy the Estimate Summary line items to the Estimate Details sheet
8. Make 5 or more lines between each of the copied line items (categories)
9. Sum the items below each category on the Details page
10. Link line items in Estimate Summary sheet in the Direct Cost Total column to associated items copied to the Estimate Details in the Total column
11. Add sample data to check math on Estimate Details and Summary pages
12. Format the complete estimate for print including all headers and footers

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3. PUTTING IT ALL TOGETHER

## F. Relating the Parts 1 of 2

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3. PUTTING IT ALL TOGETHER

## F. Relating the Parts: Estimate Components 2 of 2

1. Title Page
2. Summary
3. Estimate Details
4. Unit Matrix / Room Schedule
5. Quantity Take Off Documentation
6. Labor and Crew Rates
7. Material Prices and Equipment Costs
8. Subcontractors Calls and Costs
9. General Conditions
10. Other Project Costs, including design, engineering, project management
11. Relocation

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**Estimating & Analysis** **3. PUTTING IT ALL TOGETHER**

**G. Resources 1 of 2**

**STANDARD ESTIMATING PRACTICE**  
Sixth Edition  
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