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Single-Family Housing Construction Cost in the Greater Baton Rouge Area

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SINGLE-FAMILY HOUSING CONSTRUCTION COST IN THE GREATER BATON ROUGE
AREA

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Science

in

The Department of Construction Management

by
Justin Pierce Estes
B.A., Louisiana State University, 2008
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ABSTRACT

Most research focused on housing costs has noted a paucity of empirical cost data for residential construction, and researchers have suggested that collecting these data for individual metropolitan areas is ideal. The goal of this study is to obtain these data and compare them to national average sources to determine how well national data represent local costs. Data collection included obtaining prices from big box stores and through a survey of local Baton Rouge residential contractors for material, square foot and assembly costs for the major components of a house (i.e. foundation, wall, roof).

From the material cost data evaluated, the results suggest that the average difference between RS Means and locally collected material cost data is minimal; however, RS Means costs were higher than locally collected costs for 67% of the evaluated items. RS Means assembly costs were found to be statistically different from local cost data for 64% of the assemblies tested. Average square foot costs for new residential construction in East Baton Rouge Parish were found to be in the range of \$106-\$108/SF, excluding the cost of land. NAHB percentage of construction cost data were not statistically different from Baton Rouge percentage of construction costs for the majority of construction stages. Average costs for wind mitigation in the Baton Rouge area were found to be \$1.06/SF to increase the roof nailing pattern, \$2.34/sf to apply secondary water resistance, and \$3.97/SF to install engineered floor-to-wall connectors.

These results provide insight into housing cost data for new construction; conceptual budgets for architects during the design stage; quick estimates by those not actively engaged in the construction industry, including homeowners; and provide data for hazard-related loss calculations and future housing economics research.

CHAPTER 1: INTRODUCTION

Olsen (1987), Smith (1988), and Somerville (1999) all noted a scarcity of empirical housing cost data. Rosenthal (1999) recognized the importance of housing cost data and noted how difficult these data are to obtain. Seventeen years later, this paucity of data still exists. Much of the research concerning housing costs has been performed by economists (e.g. Poterba, Weil et al. 1991, Green and Hendershott 1996, Mayer and Somerville 2000), limiting application of the existing data by construction professionals and researchers. The most widely used housing cost resources are the National Association of Homebuilders (NAHB) and R.S. Means (2013). Data from NAHB are publicly available only in nationally-averaged format, and both sources provide more detailed data through subscriptions or printed manuals, updated quarterly. While uses of these data do exist, these detailed data may be too expensive and too technical for the average homeowner and small housing contractors to quickly determine construction costs, whether for new construction or for a remodel, retrofit, or renovation.

Additionally, and more importantly, commercially available cost data are riddled with shortcomings, including out-of-date methodologies, (e.g. union vs. non-union labor), bias, and lack of updating (Somerville, 1999). DiPasquale and Wheaton (1994) noted it is best to analyze housing cost data over a smaller domain (e.g. individual metropolitan areas); however, these data are generally not available. Stakeholders affected by the housing industry need access to reliable cost data to make more informed economic decisions concerning new housing construction, remodels, retrofits, or renovations. Different sources of housing construction cost data exist; however, it is unclear the quality of the data, which source of data should be used, or how different cost sources compare when applied to new construction, remodels, retrofits, or renovations in the greater Baton Rouge, Louisiana, area.

1.1 Problem Statement

Due to lack of transparent construction cost data within the Baton Rouge metropolitan area, the quality of available construction cost data is uncertain.

1.2 Hypothesis

The underlying hypothesis of this research is that actual material and housing construction cost data in the greater Baton Rouge area are significantly different from published national average and detailed component cost data, adjusted for location.

The specific research questions, formulated as hypotheses, are:

- H_{01} : Local Material Costs \neq Published RS Means Material Data
- H_{02} : Local Assembly Costs \neq Published RS Means Assembly Data
- H_{03} : Local Square Foot Costs \neq Published RS Means Square Foot Data
- H_{04} : Local Percentage Costs \neq Published NAHB Percentage Data

1.3 Goals of the Study

The goal of this research is to understand if differences exist between national average and local housing cost data. In order to address this goal, four objectives are identified:

1. Collect current material cost data in the greater Baton Rouge area from big box stores in UNIFORMAT II format.
2. Collect current housing construction cost data in the greater Baton Rouge area by surveying local residential contractors.
3. Determine the current average \$/SF of single-family housing in Baton Rouge based on survey results.
4. Test if collected cost data are accurately reflected by component-level and averaged national sources.

1.4 Relevance

This research will provide insight into housing cost data for new construction; conceptual budgets for architects during the design stage; quick estimates by those not actively engaged in the construction industry, including homeowners; and provide data for hazard-related loss calculations and future housing economics research. UNIFORMAT II is a standardized building element classification framework. Collection and presentation of data in this format will facilitate integration of the methods and results of this study in future research. In addition to meeting the goals of this study, data were collected to improve understanding of cost data and implementation frequency for wind hazard mitigation.

CHAPTER 2: ANALYSIS OF HOUSING CONSTRUCTION COSTS

2.1 Introduction

The purpose of this chapter is to test whether location-adjusted R.S. Means and NAHB cost data are significantly different from actual cost data in the greater Baton Rouge area. Data were obtained by collecting pricing data from big box stores and a construction cost survey was developed and administered to residential contractors registered in East Baton Rouge Parish, Louisiana. UNIFORMAT II format is used to organize and compare these data. Further, the current average square foot price determined for Baton Rouge single-family construction is also tested against RS Means national average square foot price, locally adjusted. NAHB national averages, represented as percentage of total cost, are tested against the Baton Rouge square foot price average.

2.2 RS Means Data

Construction costs presented in *RS Means Residential Cost Data* (RS Means, 2013) are national averages. RS Means cost indices are printed yearly and are designed to be used by trained professionals for estimating and budgeting. There are three methods by which single-family residential housing cost data are presented: square foot cost using established classes, assemblies by price per unit, and division by individual component. RS Means (2013) groups single-family residential housing into four classes: economy, average, custom, and luxury. Table 2.1 provides the criteria for each class. It is noted that many of the details in Table 2.1 do not truly reflect current housing construction practices. For example, “average” housing does not have air conditioning, which is virtually not found in southern Louisiana. Additionally, 1.5 baths may not be representative of a “luxury” home, as these homes may have two or three full bathrooms at a minimum.

Assemblies unit pricing is by RS Means by providing a list of materials with specifications for different options for overall components of the house. The quantity of material needed per unit is provided with a cost for that material quantity per unit and a cost for installation of that material per unit. Multiple cost analyses are possible with this method of presentation.

Table 2.1 RS Means Housing Classes (RS Means 2013)

Class	Criteria
Economy	mass produced from stock plans, 1 full bath & kitchen, hot air, materials & workmanship are sufficient to meet codes
Average	simple design from standard plans, 1 full bath & kitchen, hot air, materials & workmanship are average
Custom	distinct residence from designer's plan, 1.5 bath & kitchen, hot and cold air, materials & workmanship are above average
Luxury	unique residence from architect's plans, 1.5 bath & kitchen, hot and cold air, many special features, extraordinary materials & workmanship

Division pricing is presented for each of the CSI 33 divisions, ranging from general requirements to utilities. Data are provided for each division line item and description for the following: crew, daily output, labor-hours, unit, material, labor, and equipment. The multiple variables make this method of presentation difficult to analyze.

The objective of RS Means (2013) is to collect data from all aspects of the construction industry and present these data in an organized format for professionals in the industry to understand. The exact method of data collection is unknown, other than engaging all sectors of the industry in the data collection. To adjust these cost data to specific locations, the cost is multiplied by the specified factor for that city.

2.3 NAHB Data

An NAHB construction cost survey is conducted every two years (Taylor 2015). NAHB's methodology is adjusted yearly in an effort to achieve reaching the ideal sample of homebuilders (Taylor 2015). Starting in 2013, the survey divided construction costs into 8 major stages of

construction, with 36 sections under the appropriate construction stage. These stages are sitework, foundation, framing, exterior finishes, major systems rough-ins, interior finishes, final steps, and other. In 2013, results were presented as a percentage of construction cost. Results from the 2015 survey were published in November 2015. NAHB distributed the questionnaire via email to a nationwide sample of 4,090 homebuilders, although the results are derived from only 33 usable responses (Taylor 2015). Because this research was conducted to collect local Baton Rouge cost data for 2014, NAHB data for 2014 were estimated by averaging 2013 and 2015 data (Table 2.2).

Table 2.2 NAHB Published and Estimated Data (adapted from Taylor 2015)

NAHB Stage	NAHB 2013	NAHB 2015	Estimated 2014
1. Sitework	6.8%	5.6%	6.2%
2. Foundation	9.5%	11.6%	10.6%
3. Framing	19.1%	18.0%	18.6%
4. Exterior Finishes	14.4%	15.0%	14.7%
5. Major Systems Rough-ins	13.4%	13.1%	13.3%
6. Interior Finishes	29.3%	29.6%	29.5%
7. Final Steps	6.6%	6.8%	6.7%
8. Other	9.0%	0.5%	0.7%

2.4 Unifomat

In the 1970's, the American Institute of Architects (AIA) and the General Services Administration (GSA) were both working on developing a building element classification framework for building construction. Both organizations ultimately agreed on a common format, which became known officially as UNIFORMAT. In the 1990's, The National Institute of Standards and Technology (NIST) of the Technology Administration under the U.S. Department of Commerce developed a new format for classifying building elements, UNIFORMAT II.

The benefits of UNIFORMAT II are that it provides a standardized format for collecting and analyzing historical data to use in estimating and budgeting future projects; it provides a checklist for the cost estimation process as well as the creativity phase of the value engineering

job plan. It facilitates communications among members of a project team regarding the scope of work and costs in each discipline, and it establishes a database for automated cost estimating.

Charette and Marshall (1999) explain UNIFORMAT II in great detail and the application of the format in providing a standardization for cost analysis. The ASTM UNIFORMAT II Elemental Cost Summary and Analysis spreadsheet provided by Charette Consultants Inc. is commercially available and was used in the research analysis.

2.5 Methodology

In this research, the major steps taken to answer the four research questions were:

1. Determine the assemblies and materials outlined in R.S. Means to analyze
2. Collect cost data from stores and contractors
3. Develop and conduct a survey of local residential contractors for cost data
4. Test to determine if the differences between the collected and published data are statistically significant, if possible.

2.5.1 Definition of Assembly and Materials for Data Collection

The ASTM UNIFORMAT II Elemental Cost Summary and Analysis spreadsheet provided by Charette Consultants Inc. was used in this study as a platform to compare the locally-collected data to the RS Means data. An analysis of each source's data was performed, and the results of the analyses were compared and presented. The assemblies included in the survey were presented within the element designation in the spreadsheet. Because the spreadsheet allows for detailed elemental costs, the specifications of the assemblies were entered into the spreadsheet. The specifications were entered as shown in the RS Means Assemblies Cost Tables (RS Means, 2014). Within the contractor survey, assemblies were presented in the same format to provide a uniform platform for collecting the most accurate, consistent data. The assembly specifications in the

survey match the RS Means assembly specifications, and these are the same specifications listed in the detailed elemental costs of the UNIFORMAT II Elemental Cost Summary and Analysis.

Referring to the levels of grouping elements in UNIFORMAT, initial selection of the elements of the single-family house was conducted. The Level 3 individual elements shown in Table 2.3 were selected for material and construction cost data collection, constituting the substructure, structure, and superstructure of a home (i.e. foundation, walls, roof). These elements and materials are applicable to single-family housing construction in the great Baton Rouge area.

Table 2.3 Assembly and Materials Selection

Level 1: Major Elements	Level 2: Group Elements	Level 3: Individual Elements	RS Means Assembly	Materials
A Substructure	A10 Foundations	A1010 Standard Foundation	8"x18" Footing	concrete, dowels
		A1020 Special Foundation	8" Block Wall	cmu, reinforcement, rigid insulation, mortar, anchor bolts
		A1030 Slab on Grade	4" Slab	concrete, vapor barrier, wire mesh
B Shell	B10 Superstructure	B1010 Floor Construction	2"x12" Floor Framing System	joists, bridging, box sills, girder, subfloor, furring
		B1020 Roof Construction	2"x6" Gable Roof Framing	rafters, ceiling joists, ridge board, fascia board, rafter tie, soffit nailer, sheathing, furring
		B1020 Roof Construction	2"x6" Hip Roof Framing	hip rafters, jack rafter, ceiling joists, fascia board, soffit nailer, sheathing, furring
	B20 Exterior Closure	B2010 Exterior Walls	2"x4" Exterior Wall Framing	studs, plates, bracing, sheathing
			2"x6" Exterior Wall Framing	studs, plates, bracing, sheathing
			Common Brick Veneer	brick, wall ties, building paper, molding
	B30 Roofing	B3010 Roof Coverings	Asphalt Gable Roof	shingles, drip edge, felt, ridge shingles, soffit & fascia, rake trim
			Asphalt Hip Roof	shingles, drip edge, felt, ridge shingles, soffit & fascia

2.5.2 Material Cost Data Collection and Comparison

For the first research question, unit cost data were collected from a local builder's supply and big box stores for the materials for each assembly outlined in Table 2.3. Material cost data collected in UNIFORMAT were compared to RS Means material cost, locally adjusted. A numerical and percentage of difference was determined. The price collected was entered into the UNIFORMAT analysis.

H_{01} : Local Material Costs \neq Published RS Means Material Data could not be statistically tested, as the local material cost represents a sample of data, and RS Means cost is a mean value, with the range not available. Therefore, these data were compared with published assembly-level material cost data included in RS Means (2013) after application of the appropriate location adjustment factor. The absolute and relative cost differences were determined and analyzed further to identify ranges, averages, and trends.

2.5.3 Assembly Construction Cost Data Collection and Comparison

To address the second research question, a contractor price survey was developed. The purpose of the survey was to collect current material discount, profit margin, square foot cost, assembly cost per unit, and hazard mitigation cost. Material and profit margin were asked using multiple choice format. The contractor was asked to enter a price per unit for each assembly outlined in Table 2.2. For hazard mitigation costs, these questions were structured with multiple choice and data entry format.

The desired target population was defined as a residential contractor listed in East Baton Rouge Parish that built at least two houses in 2014. A search of contractors by parish was conducted in June 2014 on the Louisiana State Licensing Board for Contractors website (www.lslbc.louisiana.gov). The survey (Appendix A) was administered in two segments: 1) an initial phone survey was conducted to determine if the registered party was part of the target

population, and 2) if the contractor was part of the target population, an email was sent with the online survey link conducted through surveymonkey.com.

The second hypothesis, H_{02} : Local Assembly Costs \neq Published RS Means Assembly Data, was tested using a one-sample, two-tailed t-test comparing two sample means (Equation 2.1):

$$t_{df} = \frac{\bar{X} - \mu}{s_e / \sqrt{n}} \quad (\text{Equation 2.1})$$

where \bar{X} is the mean of local assembly costs, μ is the published RS means data, s_e is the standard error for the collected local assessable costs, n is the number of observations, and $df=n-1$ is the degrees of freedom for the t-test.

2.5.4 Square Foot Construction Cost Data Collection and Comparison

Contractor survey results were also used along with RS Means to address the third research question. Square foot cost was determined through the survey by asking each contractor to enter a budget for each of the 16 CSI Divisions of a house. The mean, standard deviation, and percentage of total cost were determined based on the responses for each division. A second analysis totaled the 16 divisions for each contractor response, and then the mean and standard deviation were determined from these totals.

RS Means (2013) groups single-family residential housing into four classes: economy, average, custom, and luxury. The national square foot price is given for each class, which represents an average cost of the building construction, excluding land, but including overhead and profit. The RS Means Location Factor for Baton Rouge is 0.82, which is multiplied by the national average to derive the location-adjusted square foot price. Both the national average and Baton Rouge location-adjusted square foot prices are provided in Table 2.4.

H_{03} : Local Square Foot Costs \neq Published RS Means Square Foot Data, could not be statistically tested, as the survey results again represent a sample of data, and R.S. Means cost is a mean, with the range not available. These data were therefore compared with published SF-level housing cost data included in R.S. Means (2013) after application of the location adjustment factor. The absolute and relative cost differences were determined for comparison and discussed.

Table 2.4 RS Means Square Foot Pricing, National Average and Location-Adjusted for Baton Rouge, \$/SF

Class	National Average	Baton Rouge Adjusted
Economy	\$91.60	\$75.11
Average	\$104.95	\$86.06
Custom	\$112.35	\$92.13
Luxury	\$140.10	\$114.88

2.5.5 Percentage of Construction Cost Data Collection and Comparison

To evaluate the similarity between the NAHB percentages of construction cost for the fourth research question, the 16 CSI divisions were grouped together for this analysis according to the 8 stage breakdown of the NAHB survey. The mapping shown in Table 2.5 was used to assign multiple CSI divisions matched to each stage, without splitting of divisions. Mapping these divisions with each NAHB stage allowed for statistical testing between these percentages.

Table 2.5 CSI Division to NAHB Stage Match-up

NAHB Stage	CSI Division															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Sitework	X	X														
2. Foundation			X													
3. Framing						X										
4. Exterior Finishes				X	X			X								
5. Major Systems Rough-ins															X	X
6. Interior Finishes							X		X	X		X				
7. Final Steps											X					
8. Other													X	X		

The fourth hypothesis, H_{04} : Local Percentage Costs \neq Published NAHB Percentage Data, was tested for each stage using a two-tailed z-score test comparing two sample proportions (Equation 2.2):

$$Z = \frac{(p_1 - p_2) - 0}{\sqrt{p(1-P)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad (\text{Equation 2.2})$$

where p_1 is the local percentage costs, p_2 is the published NAHB percentage data, n_1 is the number of observations for local percentage costs, n_2 is the number of observations for the published NAHB data, and p is the pooled sample proportions estimated using Equation 2.3:

$$p = \frac{p_1 \times n_1 + p_2 \times n_2}{n_1 + n_2} \quad (\text{Equation 2.3})$$

2.6 Results

In this section, the survey response rate is first discussed and results of general data questions are provided. The remaining sections address each research question, ordered as material cost, assembly cost, square foot cost and percentage cost results.

2.6.1 Survey Respondents and General Data Collection

The search of contractors by parish generated a list of 288 residential contractors in East Baton Rouge Parish, which was defined as the initial population (Louisiana License Boarding for Contractors 2014). All contractors were initially contacted through the telephone number provided from the extracted list of contractors and registration information. Of the 288 contractors, 23 telephone numbers listed were no longer in service, 124 contractors were not able to be contacted (i.e., no answer and did not return messages), 9 contractors refused to participate, and 54 contractors were classified as outside the target population category (e.g., built only one house in 2014, or a commercial contractor that keeps a residential license as well, but not active). Once

the initial phone survey was conducted, a total of 78 contractors of the 288 were determined to be part of the target population (Table 2.6).

Table 2.6 Initial Phone Survey to Determine Target Population

Response	# of Contractors
Disconnected	23
No Answer	124
Declined	9
Not Target Population	54
Target Population	78
Initial Population	288

These 78 contractors were emailed the link to the second segment of the survey, which was administered online via Survey Monkey. Twenty-seven contractors participated by completing the survey (34.6% response rate). If the contractor did not have the data, they were instructed to put “0” for the answer. Any “0” entries were excluded from the analysis. Any entries left blank were also excluded.

Referencing the survey in Appendix A, Question 22, the average number of houses built by survey respondents in 2014 was 10.27. Referencing the survey in Appendix A, Question 1 was asked to determine if contractors receive a material discount and the current discount rate that contractors receive (Table 2.7).

Table 2.7 Survey Q1-2: Materials Discount

	# of Responses	% of Responses	Mean Discount (%)
Yes	23	85	8.14
No	4	15	
Total Responses	27		

Eighty-five percent of respondents reported that they receive some form of discount from material suppliers, while 15% reported not receiving any form of discount on materials purchased for the construction process. Of the 85% of respondents that receive a discount, 57% of them reported receiving a 10% discount, while 17% reported receiving a 5% discount. In addition, the

“Others” all reported receiving 2% discount. Of the responses, the average materials discount received by respondents from supply houses in 2014 was 8.14%.

Question 3 asked for the typical profit margin on a project. Thirty percent responded with “10 to 11%” profit, 22% reported “9 to 10%” profit, another 22% reported “11 to 12%” profit, while 15% responded with “Other.” Because this question was formatting with multiple choice answers in a range criterion, an absolute average profit margin was not possible to determine.

2.6.2 Locally Collected Material Cost Data vs. RS Means

Local and RS Means costs for the specified materials of the assemblies are presented in the UNIFORMAT spreadsheet (Table 2.8) as discussed in methodology, where the quantity (quan.) of each material for the assembly was taken from RS Means, unit cost is the collected local price, the material (mat.) cost is calculated by multiplying the quantity with the unit cost, the RS Means cost represents the Baton Rouge location-adjusted material cost, the delta was determined by subtracting the local material cost from RS Means cost, and the relative difference (% diff) was calculated by dividing the delta by the RS Means cost.

Table 2.8 Material Costs: Comparison of Local Survey Results to RS Means

Ref	Item Description	Quan	Unit	Unit Cost	Mat. Cost	RS Means*	Delta	% Diff
A1010	Standard Foundations							
	Footing, 8" d x 18" w x House Perimeter		L.F.					
100	Concrete, 3000 psi	0.040	C.Y.	105.00	4.20	3.57	-0.63	-18%
105	1/2" dowels, 2' long, 6' O.C.	0.166	Ea.	2.29	0.38	0.11	-0.27	-246%
A1020	Special Foundations							
	8" Wall, Grouted, Full Height		S.F.					
100	concrete block, 8" x 16" x 8"	1.000	S.F.	1.34	1.34	2.64	1.30	49%
105	masonry reinforcement	0.750	L.F.	0.35	0.26	0.16	-0.10	-64%
110	1" rigid polystyrene insulation	1.000	S.F.	0.48	0.48	0.47	-0.01	-2%
115	mortar, solid	1.000	S.F.	1.11	1.11	1.02	-0.09	-9%
120	anchor bolts, 1/2" dia, 8" long, 4' O.C.	0.060	Ea.	1.07	0.06	0.08	0.02	20%

(Table 2.8 continued)

Ref	Item Description	Quan	Unit	Unit Cost	Mat. Cost	RS Means*	Delta	% Diff
A1030	Slab on Grade							
	4" Thick Slab		S.F.					
100	Concrete, 3000 psi	0.012	C.Y.	105.00	1.26	1.07	-0.19	-18%
105	Polyethylene vapor barrier, .006 thick	1.000	S.F.	0.05	0.05	0.03	-0.02	-67%
110	Welded Wire fabric, 6 x 6, 10/10 (W1.4/W1.4)	1.100	S.F.	0.14	0.15	0.15	0.00	0%
B1010	Floor Construction							
	2" x 12", 16" OC Floor Framing System		S.F.					
100	Wood joists, 2" x 12", 16" OC	1.000	L.F.	1.14	1.14	1.39	0.25	18%
105	Bridging, 1" x 3", 6' OC	0.080	Pr.	0.20	0.02	0.04	0.02	60%
110	Box sills, 2" x 12"	0.150	L.F.	1.14	0.17	0.21	0.04	19%
115	Girder, built up from three 2" x 12"	0.125	L.F.	3.42	0.43	0.52	0.09	18%
120	Sheathing, plywood, subfloor, 5/8" CDX	1.000	S.F.	0.52	0.52	0.67	0.15	22%
125	Furring, 1" x 3", 16" OC	1.000	L.F.	0.20	0.20	0.34	0.14	41%
B1020	Roof Construction							
	2" x 6" Rafters, 16" OC, 4/12 Pitch Gable End Roof		S.F.					
100	Rafters, 2" x 6", 16" OC, 4/12 pitch	1.170	L.F.	0.46	0.54	0.61	0.07	12%
105	Ceiling joists, 2" x 4", 16" OC	1.000	L.F.	0.32	0.32	0.34	0.02	6%
110	Ridge board, 2" x 6"	0.050	L.F.	0.46	0.02	0.02	0.00	0%
115	Fascia board, 2" x 6"	0.100	L.F.	0.46	0.05	0.06	0.01	23%
120	Rafter tie, 1" x 4", 4' OC	0.060	L.F.	0.24	0.01	0.02	0.01	28%
125	Soffit nailer (outrigger), 2" x 4", 24" OC	0.170	L.F.	0.32	0.05	0.06	0.01	9%
130	Sheathing, exterior, plywood, CDX, 1/2" thick	1.170	S.F.	0.75	0.88	0.62	-0.26	-42%
135	Furring strips, 1" x 3", 16" OC	1.000	L.F.	0.20	0.20	0.34	0.14	41%
B1020	Roof Construction							
	2" x 6" Rafters, 16" OC, 4/12 Pitch Hip Roof		S.F.					
100	Hip rafters, 2" x 8", 16" OC, 4/12 pitch	0.160	L.F.	0.63	0.10	0.12	0.02	16%
105	Jack rafters, 2" x 6", 16" OC, 4/12 pitch	1.430	L.F.	0.46	0.66	0.74	0.08	11%
110	Ceiling joists, 2" x 6", 16" OC	1.000	L.F.	0.46	0.46	0.52	0.06	12%

(Table 2.8 continued)

Ref	Item Description	Quan	Unit	Unit Cost	Mat. Cost	RS Means*	Delta	% Diff
115	Fascia board, 2" x 8"	0.220	L.F.	0.63	0.14	0.17	0.03	18%
120	Soffit nailer (outrigger), 2" x 4", 24" OC	0.220	L.F.	0.32	0.07	0.07	0.00	0%
125	Sheathing, exterior, plywood, CDX, 1/2" thick	1.570	S.F.	0.75	1.18	0.84	-0.34	-40%
130	Furring strips, 1" x 3", 16" OC	1.000	L.F.	0.20	0.20	0.34	0.14	41%
B2010	Exterior Walls							
	2" x 4", 16" OC Exterior Wall Framing System		S.F.					
00	2" x 4" studs, 16" OC	1.000	L.F.	0.32	0.32	0.34	0.02	6%
105	Plates, 2" x 4", double top, single bottom	0.375	L.F.	0.32	0.12	0.12	0.00	0%
110	Corner bracing, let-in, 1" x 6"	0.063	L.F.	0.35	0.02	0.05	0.03	56%
115	Sheathing, 1/2" plywood, CDX	1.000	S.F.	0.51	0.51	0.53	0.02	4%
B2010	Exterior Walls							
	2" x 6", 24" OC Exterior Wall Framing System		S.F.					
100	2" x 6" studs, 24" OC	0.750	L.F.	0.46	0.35	0.39	0.05	12%
105	Plates, 2" x 6", double top, single bottom	0.375	L.F.	0.46	0.17	0.20	0.03	14%
110	Corner bracing, let-in, 1" x 6"	0.063	L.F.	0.35	0.02	0.05	0.03	56%
115	Sheathing, 1/2" plywood, CDX	1.000	S.F.	0.51	0.51	0.53	0.02	4%
B2010	Exterior Walls							
	Common Brick Veneer		S.F.					
100	Brick, select common, running bond	1.000	S.F.	3.09	3.09	4.00	0.91	23%
105	Wall ties, 7/8" x 7", 22 gauge	1.000	Ea.	0.08	0.08	0.12	0.04	33%
110	Building paper	1.100	S.F.	0.10	0.11	0.14	0.03	21%
115	Molding, brick	0.125	L.F.	1.43	0.18	0.06	-0.12	-198%
B3010	Roof Coverings							
	Asphalt, roof shingles, Gable End Roof		S.F.					
100	Shingles, inorganic class A, 210-235 lb./sq. 4/12 pitch	1.160	S.F.	0.70	0.81	0.88	0.07	8%
105	Drip edge, metal, 5"	0.150	L.F.	0.23	0.03	0.07	0.04	51%
110	15# felt building paper	1.300	S.F.	0.08	0.10	0.07	-0.03	-49%
115	asphalt ridge shingles	0.042	L.F.	2.34	0.10	0.07	-0.03	-40%
120	soffit & fascia, 1' overhang	0.083	L.F.	2.64	0.22	0.31	0.09	29%
125	rake trim, 1" x 6"	0.040	L.F.	0.87	0.03	0.04	0.01	13%

(Table 2.8 continued)

Ref	Item Description	Quan	Unit	Unit Cost	Mat. Cost	RS Means*	Delta	% Diff
B3010	Roof Coverings							
	Asphalt, roof shingles, Hip Roof		S.F.					
100	Shingles, inorganic class A, 210-235 lb./sq. 4/12 pitch	1.570	S.F.	0.70	1.10	1.16	0.06	5%
105	Drip edge, metal, 5"	0.122	L.F.	0.23	0.03	0.06	0.03	53%
110	15# felt building paper	1.800	S.F.	0.08	0.14	0.09	-0.05	-60%
115	asphalt ridge shingles	0.075	L.F.	2.34	0.18	0.14	-0.04	-25%
120	soffit & fascia, 1' overhang	0.120	L.F.	2.64	0.32	0.45	0.13	30%

*The Location Factor for Baton Rouge (0.82) has been applied.

If the cost delta and relative difference are negative, whether in cents or percentage, the local material cost is higher than the RS Means cost. If the cost delta and relative difference are positive, the RS Means material cost is higher than the local cost.

Because the local material costs shown in Table 2.8 represent sample data without a range, the hypothesis, H_{01} : Local Material Costs \neq Published RS Means Material Data could not be statistically tested, but of the 54 materials contained in Table 2.8, 14 (26%) had negative cost differences, meaning locally collected costs were higher than RS Means. Thirty-six items (67%) had positive cost difference, meaning RS Means costs were higher than locally collected. Four items (7%) were equal. From the 54 data lines presented in Table 2.8, the minimum and maximum cost differences are presented in Table 2.9. The range of these values and the mean absolute and relative cost differences are also presented.

Table 2.9 Collective Statistics Describing Material Cost Differences

	Min	Max	Range	Mean
Delta (Absolute)	-\$0.63	\$ 1.30	\$ 1.93	\$ 0.04
% Difference (Relative)	-246%	60%	306%	0%

2.6.3 Assembly Construction Cost Results

The second analysis tested local survey assembly construction cost against RS Means national averaged assembly construction cost, locally adjusted. The results are presented in Table 2.10. Installation costs for earthen fill material are provided in RS Means, but material costs are not provided; therefore, the total price per unit from RS Means is not accurate and this assembly could not be statistically tested.

Table 2.10 Q5-16: Residential Assemblies Unit Cost - Baton Rouge

Assembly	Mean	Standard Deviation	RS Means*	Two Tail T-Test		
				t-Value	D. F.	P Value
Foundations						
Earthen Fill \$/cyd	17.89	7.76	n/a	n/a	10	n/a
8" x 18" Concrete Footing \$/LF	8.52	3.29	11.23	-2.469	8	0.039**
8" Block Wall \$/SF	13.91	7.15	13.10	0.323	7	0.756
4" Concrete Floor Slab \$/SF	7.58	3.74	2.94	3.918	9	0.004**
2" x 12", 16" O.C. Floor Framing \$/SF	7.79	3.06	6.87	0.847	7	0.425
Exterior Walls						
2" x 4" Wall Framing \$/SF	6.52	3.51	2.59	3.534	9	0.006**
2" x 6" Wall Framing \$/SF	7.24	3.39	2.57	4.364	9	0.002**
Brick Veneer	7.78	2.88	11.95	-4.577	9	0.001**
Roofing Systems						
Gable End Roof Framing \$/SF	8.78	2.99	5.64	3.319	9	0.009**
Hip Roof Framing \$/SF	8.98	3.00	7.96	1.073	9	0.311
Gable End Roofing \$/SF	8.40	5.48	3.68	2.584	8	0.032**
Hip Roof Framing \$/SF	6.96	3.68	4.70	1.845	8	0.102

*The Location Factor for Baton Rouge (0.82) has been applied.

** This Assembly is significantly different $\alpha=0.05$

Hypothesis H_{02} : Local Assembly Costs \neq Published RS Means Assembly Data, is rejected for four of the eleven assemblies. For the other seven assemblies, the hypothesis is failed to be rejected, meaning that a significant difference was found for 64% of the assemblies tested.

2.6.4 Square Foot Construction Cost Results

Question 4 of the survey asked for the contractor to provide a price per square foot (\$/SF) budget for each of the CSI 16 Divisions. The mean, standard deviation, and percentage of total cost for each division are shown in Table 2.11. When these divisions are added together, the sum represents a total cost per square foot (\$/SF) for a new construction single-family house in the Baton Rouge Area, excluding the cost of land.

Table 2.11 Survey Q4: Price Per Square Foot (\$/SF) by CSI Divisions

Division	Mean	Standard Deviation	% of Total Cost
1. General Requirements	7.98	7.28	7.40%
2. Existing Conditions	2.26	1.30	2.09%
3. Concrete	7.88	1.83	7.31%
4. Masonry	7.42	4.48	6.88%
5. Metals	1.00	0.73	0.93%
6. Wood, Plastics, Composites	20.10	8.02	18.64%
7. Thermal & Moisture Protection	3.16	3.22	2.93%
8. Openings - Doors & Windows	8.64	5.85	8.01%
9. Finishes	14.85	8.69	13.77%
10. Specialties	5.35	4.08	4.97%
11. Equipment	6.84	1.90	6.35%
12. Furnishings	7.17	2.85	6.65%
13. Special Construction	2.41	3.84	2.23%
14. Conveying Systems	1.55	2.70	1.43%
15. Mechanical	5.73	3.77	5.31%
16. Electrical	5.48	1.64	5.08%
Total 16 Division \$/SF for Baton Rouge:	107.81	62.19	100%
Total Responses = 12			

The second analysis totaled the 16 divisions for each contractor response, and then the mean and standard deviation were determined from these totals. The mean of these sums also represents \$/SF for a new construction single-family house in the Baton Rouge Area (Table 2.12).

Table 2.12 Survey Q4: Price Per Square Foot (\$/SF) by sum

	Mean	Standard Deviation
Contractor's Sum:	106.30	21.80

Hypothesis, H_{03} : Local Square Foot Costs \neq Published RS Means Square Foot Data, could not be statistically tested with the data collected. Both \$/SF derived above fall between the custom and luxury class pricing for Baton Rouge, presented in Table 2.4.

Questions 17-19 were asked to determine the current status of hazard mitigation construction in single-family housing in greater Baton Rouge. These questions were asked to collect current cost data for wind resistant houses. The averaged costs for these mitigation practices are shown in Table 2.13.

Table 2.13 Hazard Mitigation Costs (\$/SF)

Mitigation	Mean	# of Responses
Nail Pattern Increase	1.06	9
Secondary Water Resistance	2.34	9
Engineered Floor-to-Wall Connectors	3.97	9

2.6.5 Percentage of Construction Cost Results

As discussed in 2.5.4, estimated NAHB percentages were compared to the CSI 16 Divisions after the mapping of divisions to stages (Table 2.5). Results of the two-tailed t-test comparing two proportions are shown in Table 2.14.

Table 2.14 Comparison of Locally Collected and NAHB Construction Cost Percentages

NAHB Stage	Estimated 2014	Local Survey	Two Proportions Z-Test				
			p	n ₁	n ₂	Z	P-values
1. Sitework	6.2%	9.50%	0.0708	33	12	-1.175	0.2402
2. Foundation	10.6%	7.31%	0.0972	33	12	1.029	0.3037
3. Framing	18.6%	18.64%	0.1861	33	12	-0.010	0.9920
4. Exterior Finishes	14.7%	15.83%	0.1500	33	12	-0.302	0.7626
5. Major Systems							
Rough-ins	13.3%	10.39%	0.1252	33	12	0.827	0.4081
6. Interior Finishes	29.5%	28.32%	0.2919	33	12	0.271	0.7861
7. Final Steps	6.7%	6.35%	0.0661	33	12	0.128	0.8979
8. Other	0.7%	3.67%	0.0149	33	12	-2.172	0.0298 **

** This Assembly is significantly different $\alpha = 0.05$

Hypothesis, H_{04} : Local Percentage Costs \neq Published NAHB Percentage Data, is rejected for seven of the eight stages. The hypothesis failed to be rejected for the stage “Other,” which is the final stage where miscellaneous costs are grouped.

2.7 Discussion

The above observations provide insight into the methodology of R.S. Means materials cost data. Although there is evidence of consistency among material costs, there is also evidence of inconsistency. Further analysis of more materials in RS Means should be performed to have a better understanding of how many consistencies and inconsistencies exist.

The results from the survey provide evidence that the average Baton Rouge single-family house currently being built is of the custom and luxury class categories established in RS Means. However, the survey did not establish the quality of homes the respondents built; therefore, this information is suggested for future data collection. Further, as discussed in conjunction with Table 2.1, the RS Means housing classes may be antiquated and in need of update to represent current home construction criteria. NAHB’s surveying process appears to be successful in collecting accurate data, at least as representative of the Baton Rouge housing market. The percentage cost of construction are likely to be fairly consistent across the country, regardless of the price per square foot of construction. Because Baton Rouge’s current percentage of cost of construction is in line with NAHB’s percentages, this indicates that these national averages can be useful in further research.

The results presented in the Table 2.14 show a striking connection between the two sources. The 2014 Local Survey data compared to NAHB provide insight into the success of NAHB’s surveying process. The small range of variance between local and NAHB percentage of

construction costs validates both local data acquired through the survey in Baton Rouge and NAHB national average data.

CHAPTER 3: CONCLUSIONS

Analysis of the four research questions outlined in this research provide beneficial insight into the housing construction cost data available for professional use. The implementation of UNIFORMAT II into the research was successful for individual material comparisons, although the intent of the classification platform is for overall elements. The macro intent of UNIFORMAT II was successfully demonstrated for use in a micro application. This investigation shows UNIFORMAT II to be a beneficial tool with multiple applications for use in the estimating process. The specific conclusions of this research are:

- Material costs presented in RS Means had a mean difference from local costs of \$0.04 (0%) for the 54 materials evaluated, although RS Means costs were higher than locally collected costs for 67% of the evaluated items.
- Based on a contractor survey, assembly costs presented in RS Means were found to be statistically different from local cost data for 64% of the assemblies tested.
- Average square foot costs for new residential construction in East Baton Rouge Parish are in the range of \$106-\$108/SF, excluding the cost of land. For future comparison, RS Means definition of housing classes should be revised to represent current housing criteria.
- Percentage of construction costs presented by NAHB were not statistically different from Baton Rouge percentage of construction costs at the $\alpha = 0.05$ level.
- Based on a contractor survey, average costs for wind mitigation in the Baton Rouge area were \$1.06/SF to increase the roof nailing pattern, \$2.34/sf to apply secondary water resistance, and \$3.97/SF to install engineered floor-to-wall connectors.

3.1 Further Study

There are a number of aspects of this research that warrant further study. First, some of the survey response choices provided a range, which prevented the determination of an exact mean. In future research, it is recommended to provide single percentage options or allow the contractor to enter an exact percentage. Secondly, for data that were entered as exact figures, over half of these responses were provided in whole numbers with no decimals. To obtain more precise data, the instructions of the survey could be more explicit, and further specify perimeters of data entered in the survey. Third, the better data collected were those obtained face-to-face with the contractors, in their office setting. NAHB conducts follow-up calls during the survey process to verify data; at the local level, the face-to-face method would be ideal to obtain the best data.

Because this research focused primarily on the main structural components of a single-family house, the full benefits of using UNIFORMAT for analysis were not realized. To better understand the costs associated with the secondary components of a house, the next step in this research should attempt collecting assembly cost data for these areas.

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APPENDIX A: SURVEY INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL

ACTION ON EXEMPTION APPROVAL REQUEST



TO: Carol Friedland
Construction Management

FROM: Dennis Landin
Chair, Institutional Review Board

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8892
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

DATE: March 12, 2015

RE: IRB# E9251

TITLE: Single-family residential construction cost in East Baton Rouge Parish

New Protocol/Modification/Continuation: New Protocol

Review Date: 3/12/2015

Approved X Disapproved _____

Approval Date: 3/12/2015 Approval Expiration Date: 3/11/2018

Exemption Category/Paragraph: 2b

Signed Consent Waived?: Yes

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable): _____

Protocol Matches Scope of Work in Grant proposal: (if applicable) _____

By: Dennis Landin, Chairman 

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.

8. SPECIAL NOTE:

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.lsu.edu/irb>*

APPENDIX B: RESIDENTIAL CONTRACTOR SURVEY

The survey consists of three instruments – a phone survey to identify residential contractors that meet our target population for number of buildings/volume of work built in 2014, an email link for those identified in the target population, and an online survey. All copies of survey instruments are included here.

Phone Survey

Hello, my name is Justin Estes, and I am a graduate student in the Bert S. Turner Department of Construction Management at LSU working under the direction of Dr. Carol Friedland. Our department is researching current local single-family housing construction costs. We received your information from the Louisiana State Licensing Board for Contractors website, and we are calling all residential contractors registered in East Baton Rouge Parish to participate in a brief survey.

The Institutional Review Board of Louisiana State University has approved this survey. There are no known risks associated with this study. Data from this survey will be published in aggregate form only; individual responses will not be published. Source data will not be shared with any third party unless disclosure is required by law. If you have questions about your rights, data protection, or other concerns, you are invited to contact Dr. Dennis Landin, LSU Institutional Review Board at (225)578-8692, irb@lsu.edu. Additional questions regarding study specifics can be directed to the Principal Investigator, Dr. Carol J. Freidland, Assistant Professor, Bert S. Turner Department of Construction Management, Louisiana State University, (225)578-1155, freidland@lsu.edu. Participation in this survey is voluntary.

Do you consent to participate? (Yes or No. If yes, continue with script. If no, “Thank you for your time.”

If possible, I would like to speak with the head estimator in the office to answer a few questions. But first, I would like to confirm your company’s information.

What is your current home office address?

How many office employees do you have? And what are their positions/titles?

How many houses did your company build in 2014?

Thank you. Can I speak with the head estimator now?

(Make same introduction as the beginning to estimator)

A recent review by our department of published literature found that 97% of research studies used cost data from RS Means. Our department is researching local residential construction costs in relation to RS Means. Our hypothesis is that RS Means is not representative of actual costs in our area.

(Pause)

Would you say you agree or disagree with that statement? Agree Disagree Other

If Other, please explain. _____

Do you use RS Means for estimating new projects? Yes No

If no, what is your method of estimating new construction projects? _____

How are overhead expenses calculated for each project? _____

If percentage of total cost, what is your typical overhead expense percentage? _____

Our goal is collect current accurate residential construction cost representative of the Baton Rouge area and compare average costs to RS Means to test our hypothesis. Would you be willing to fill out a short online survey of cost information? If you complete the survey online, you will get a copy of our averaged results.

If yes, to whom should we send the survey link? _____

Thank you for your time.

Email Link for Online Survey

Subject: LSU Construction Management Online Survey – Residential Costs in Baton Rouge Area

Dear [Residential Contractor Contact Name],

Thank you for your initial responses to our telephone survey regarding residential costs in the Baton Rouge area. You are receiving this follow up email because you agreed to participate in our online survey. The survey asks for information about current residential pricing in the Baton Rouge area. We request that you complete the survey with information for a typical single-family house your company built in 2014 by clicking the following link:

<https://www.surveymonkey.com/s/ResidentialCost>.

Please contact me directly with any questions or concerns at friedland@lsu.edu or (225) 578-1155.

Thank you,

Dr. Carol Friedland

Bert S. Turner Department of Construction Management
Louisiana State University

Online Survey – see following pages

Single-family residential construction cost in East Baton Rouge Parish

The purpose of this survey is to gather current construction cost data for single-family residential construction in the greater Baton Rouge area to benchmark costs to assist residents in making more informed decisions concerning renovations, remodels, retrofits, and new construction. Information gained from the study will increase the understanding of costs incurred during the residential construction process. Results will be used to aid citizens and local governments in developing mitigation and resilience strategies. Respondents that complete the online survey will receive a copy of the aggregate results. The survey is open to Residential Contractors registered with the Louisiana State Licensing Board for Contractors (LSLBC) located in East Baton Rouge Parish.

You are invited to take part in this approximately, 20 minute, 24 question long, online survey to investigate current residential costs in the Baton Rouge area.

This survey has been approved by the Institutional Review Board at Louisiana State University. There are no known risks associated with this study. Data from this survey will be published in aggregate form only; individual responses will not be published. Source data will not be shared with any third party unless disclosure is required by law. If you have questions about your rights, data protection, or other concerns, you are invited to contact Dr. Dennis Landin, LSU Institutional Review Board at (225) 578-8692, irb@lsu.edu, www.lsu.edu/irb. Please direct additional questions regarding study specifics to the Principal Investigator, Dr. Carol J. Friedland, Assistant Professor, Bert S. Turner Department of Construction Management, Louisiana State University, (225) 578-1155, friedland@lsu.edu.

We thank you very much for taking time to participate in this survey. By pressing the "Next" button, you consent to participate in this study.

Single-family residential construction cost in East Baton Rouge Parish

General Survey Instructions and Use of Data

A recent review by our department of published literature found that 97% of research studies used cost data from RS Means. Our department is researching local residential construction costs in relation to RS Means. Our hypothesis is that RS Means is not representative of actual costs in our area.

To test this hypothesis, this survey will collect generalized cost information representative of construction costs in the Baton Rouge area. To complete the survey, this you are asked to provide current pricing information for a typical single-family house your company built in 2014.

The results of this research will be used to assist residents in making more informed decisions concerning renovations, remodels, retrofits, and new construction.

Single-family residential construction cost in East Baton Rouge Parish

Materials and Profit Margin Cost Data

Please answer the following questions regarding materials pricing discounts and profit margin for a typical home your company built in 2014. The purpose of these questions is to compare against RSMeans assumptions for materials discounts and profit margins.

1. Does your company have a discount agreement with materials supply houses/providers?

☐ Yes

☐ No

2. If the answer to Question 1 is YES, what is the typical expected discount when making a materials purchase?

☐ 5%

☐ 10%

☐ 15%

☐ 20%

☐ 25%

☐ 30%

☐ Other (please specify)

3. What was the typical profit margin on single-family houses your company built in 2014?

☐ 3-4%

☐ 5-6%

☐ 7-8%

☐ 8-9%

☐ 9-10%

☐ 10-11%

☐ 11-12%

☐ Other (please specify)

Single-family residential construction cost in East Baton Rouge Parish

Square Foot Cost Data

The data collected on this page will be used to compare against RSMeans square foot pricing for general residential construction. Please provide general budgeting information for each division, representative of 2014 cost data.

The cost information provided should reflect labor, materials, and equipment needed for each division, but should not include project overhead (these should be specified in Division 1 - General Requirements), main office overhead, or profit.

4. Please provide the average installed price per square foot of a typical single-family house your company has recently built for each of the following CSI divisions. (\$/SF for each division)

1) General Requirements - field supervision, insurance, temporary facilities, etc.

2) Existing Conditions - sitework

3) Concrete - formwork, rebar

4) Masonry

5) Metal - pipe, louvers, vents, etc.

6) Wood, Plastics, Composites - lumber, joists, roof, etc.

7) Thermal & Moisture Protection-insulation, flashing, etc.

8) Openings - Doors & Windows

9) Finishes - stains, paints, floor coverings

10) Specialties - fireplace, finish upgrades

11) Equipment - appliances, hvac

12) Furnishings - cabinets

13) Special Construction

14) Conveying Systems

15) Mechanical

16) Electrical

Single-family residential construction cost in East Baton Rouge Parish

Foundations Unit Price Data

This page asks for unit price cost information for foundation-specific materials and/or specialized configurations. The purpose of these questions is to compare against RSMeans assembly prices, so specific assemblies are shown.

Please provide the combined material, labor, and equipment cost for each assembly based on a completed single-family house your company built in 2014. Please do not re-estimate these assemblies. The unit price should include dollars and cents and should include only the number (not the unit), i.e. \$6.48. If your company did not construct the specific assembly as specified in 2014, please enter "0" as your unit price for that assembly.

The cost information provided should reflect labor, materials, and equipment needed for each division, but should not include overhead or profit.

5. What is the current price of earthen fill per cubic yard (CY), delivered, installed and compacted for foundations?

6. What would be your unit cost (\$/LF) for this Footing System as specified?

8" THICK BY 18" WIDE FOOTING (Source: 2014 RS Means)

Concrete, 3000 psi

Place concrete, direct chute

Forms, footing, 4 uses

Reinforcing, ½" diameter bars, 2 each

Keyway, 2" x 4", beveled, 4 uses

Dowels, ½" diameter bars, 2' long, 6' O.C.

7. What would be your unit cost (\$/SF) for this Block Wall System as specified?

8" WALL, GROUTED, FULL HEIGHT (Source: 2014 RS Means)

Concrete block, 8" x 16" x 8"

Masonry reinforced, every second course

Parging, plastering with portland cement plaster, 1 coat

Dampproofing, bituminous coating, 1 coat

Insulation, 1" rigid polystyrene

Grout, solid, pumped

Anchor bolts, 1/2" diameter, 8" long, 4' O.C.

Sill plate, 2" x 4", treated

8. What would be your unit cost (\$/SF) for this Floor Slab System as specified?

4" THICK SLAB (Source: 2014 RS Means)

Concrete, 3000 psi, 4" thick

Place concrete, direct chute

Bank run gravel, 4" deep

Polyethylene vapor barrier, .006" thick

Edge forms, expansion material

Welded wire fabric, 6 x 6, 10/10 (W1.4/W1.4)

Steel trowel finish

9. What would be your unit cost (\$/SF) for this Floor Framing System as specified?

2" x 12", 16" O.C. (Source: 2014 RS Means)

Wood joists, 2" x 12", 16" O.C.

Bridging, 1" x 3", 6' O.C.

Box sills, 2" x 12"

Concrete filled steel column, 4" diameter

Girder, built up from three 2" x 12"

Sheathing, plywood, subfloor, 5/8" CDX

Furring, 1" x 3", 16" O.C.

Single-family residential construction cost in East Baton Rouge Parish

Exterior Wall Unit Price Data

This page asks for unit price cost information for exterior wall-specific materials and/or specialized configurations. The purpose of these questions is to compare against RSMeans assembly prices, so specific assemblies are shown.

Please provide the combined material, labor, and equipment cost for each assembly based on a completed single-family house your company built in 2014. Please do not re-estimate these assemblies. The unit price should include dollars and cents and should include only the number (not the unit), i.e. \$6.48. If your company did not construct the specific assembly as specified in 2014, please enter "0" as your unit price for that assembly.

The cost information provided should reflect labor, materials, and equipment needed for each division, but should not include overhead or profit.

10. What would be your unit cost (\$/SF) for an Exterior Wall Framing System as specified?

2" x 4", 16" O.C. (Source: 2014 RS Means)

2" x 4" studs, 16" O.C.

Plates, 2"x 4", double top, single bottom

Corner bracing, let-in, 1" x 6"

Sheathing, 1/2" plywood, CDX

11. What would be your unit cost (\$/SF) for an Exterior Wall Framing System as specified?

2" x 6", 24" O.C. (Source: 2014 RS Means)

2" x 6", 24" O.C. studs,

Plates, 2"x 6", double top, single bottom

Corner bracing, let-in, 1" x 6",

Sheathing, 1/2" plywood, CDX?

12. What would be your unit cost (\$/SF) for a Brick/Stone Veneer System as specified?

SELECT COMMON BRICK (Source: 2014 RS Means)

Brick, select common, running bond

Wall ties, 7/8" x 7", 22 gauge

Building paper, spunbonded polypropylene

Trim, pine, painted

Single-family residential construction cost in East Baton Rouge Parish

Roofing Systems Unit Price Data

This page asks for unit price cost information for roofing-specific materials and/or specialized configurations. The purpose of these questions is to compare against RSMeans assembly prices, so specific assemblies are shown.

Please provide the combined material, labor, and equipment cost for each assembly based on a completed single-family house your company built in 2014. Please do not re-estimate these assemblies. The unit price should include dollars and cents and should include only the number (not the unit), i.e. \$6.48. If your company did not construct the specific assembly as specified in 2014, please enter "0" as your unit price for that assembly.

The cost information provided should reflect labor, materials, and equipment needed for each division, but should not include overhead or profit.

13. What would be your unit cost (\$/SF) for a Gable End Roof Framing System as specified?

2" x 6" RAFTERS, 16" O.C., 4/12 pitch (Source: 2014 RS Means)

Rafters, 2" x 6", 16" O.C., 4/12 pitch

Ceiling joists, 2" x 4", 16" O.C.

Ridge board, 2" x 6"

Fascia board, 2" x 6"

Rafter tie, 1" x 4", 4' O.C.

Soffit nailer (outrigger), 2" x 4", 24" O.C.

Sheathing, exterior, plywood, CDX, 1/2" thick

Furring strips, 1" x 3", 16" O.C.

14. What would be your unit cost (\$/SF) for a Hip Roof Framing System as specified?

2" x 6", 16" O.C., 4/12 pitch (Source: 2014 RS Means)

Hip rafters, 2" x 8", 4/12 pitch

Jack rafters 16" O.C.

Ceiling joists, 2" x 6", 16" O.C.

Fascia board, 2" x 8"

Soffit nailer (outrigger), 2" x 4", 24" O.C.,

Sheathing, ½" exterior plywood, CDX

Furring strips, 1" x 3", 16" O.C.

15. What would be your unit cost (\$/SF) for a Gable End Roofing System as specified?

ASPHALT, ROOF SHINGLES, CLASS A (Source: 2014 RS Means)

Shingles, inorganic class A, 210-235 lb./sq., 4/12 pitch

Drip edge, metal, 5" wide

Building paper, #15 felt

Ridge shingles, asphalt

Soffit & fascia, white painted aluminum, 1' overhang

Rake trim, 1" x 6"

Rake trim, prime and paint

Gutters, seamless, aluminum painted

Downspouts, aluminum painted

16. What would be your unit cost (\$/SF) for a Hip Roof Roofing System as specified?

ASPHALT, ROOF SHINGLES, CLASS A (Source: 2014 RS Means)

Shingles, inorganic, class A, 210-235 lb./sq., 4/12 pitch

Drip edge, metal, 5" wide

Building paper, #15 felt

Ridge shingles, asphalt

Soffit & fascia, white painted aluminum, 1' overhang

Gutter, seamless, aluminum, painted

Downspouts, aluminum, painted

Single-family residential construction cost in East Baton Rouge Parish

Specialties Unit Price Data

This page asks for unit price cost information for specialties-specific materials and/or specialized configurations. The purpose of these questions is to compare against RSMeans assembly prices, so specific assemblies are shown.

Please provide the combined material, labor, and equipment cost for each assembly based on a completed single-family house your company built in 2014. Please do not re-estimate these assemblies. The unit price should include dollars and cents and should include only the number (not the unit), i.e. \$6.48. If your company did not construct the specific assembly as specified in 2014, please enter "0" as your unit price for that assembly.

The cost information provided should reflect labor, materials, and equipment needed for each division, but should not include overhead or profit.

17. Have you installed storm-rated metal or composite shutters on a home?

☐ Yes

☐ No

18. If the answer to Question 17 is YES, what was the price per square foot (\$/SF) for the shutters on that home?

Metal (\$/SF)

Composite (\$/SF)

19. If a homeowner wanted you to increase the nail pattern on the home's roof framing system from 6d @ 6 in / 12 in nail spacing to 8d @ 6 in / 6 in spacing, what would be the upcharge in material and labor for this upgrade? (\$/SF)

20. If a homeowner wanted you to applied a secondary water resistant within the roofing system by applying bituminous tape to all seams of roof sheathing before felt, what would be the upcharge for material and labor for this upgrade? (\$/SF)

21. If a homeowner wanted you to strengthen the exterior wall framing system by using Simpson floor-to-wall connection brackets and wall-to-roof connections brackets, what would be the price per square foot for this upgrade? (\$/SF)

Single-family residential construction cost in East Baton Rouge Parish

Demographic Data

22. How many single family homes did your company complete in 2014?

Number of homes

23. No personally identifiable information has been collected in this survey. However, if you would like to receive a copy of the aggregated results of the survey, please enter your email address.

24. If you give consent for us to contact you regarding any of the answers you've provided, please provide your email address here.

25. Do you have any other comments, questions, or concerns?

Thank you for participation in this survey. If you have any other questions or comments regarding the survey, please contact Dr. Carol Friedland at friedland@lsu.edu.

VITA

Justin Estes, a native of Shreveport, Louisiana, received his Bachelor of Arts in General Studies from Louisiana State University (LSU) in May 2008. He was accepted in the LSU College of Engineering majoring in construction management. He anticipates graduating with his Master of Science degree in May 2016. He plans to continue promoting stronger building methods throughout his career in construction.