Analysis of the Change Order Process for the Neighborhood Stabilization Program at the University of Southern Mississippi

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Abstract - Change orders are the standard legal mean in the construction industry to modify contracts. A change order is a written agreement between the general contractor and the client to modify one or more aspects of a construction contract. The change order may include adding, deleting or modifying any aspects of the original construction contract including but not limited to scope, price, and timeframe among others. [Mississippi Legislature 2011]. Change orders are usually composed before or during the construction phase.

This report provides a student view on the similarities and differences of the change order process for the Neighborhood Stabilization Program at the University of Southern Mississippi (USM) and processes used by other organizations. The student worked with the construction team and learned details of the change orders process. The change orders process involved several steps including : 1- Identify the need to alter the construction project; 2- Compile all of the needed change order documents; 3- Analyze the content of the change orders; 4- Evaluate the effect of the change order on the project price/budget; 5- Estimate the impact of the change order on the project time; 6- Process for approval or denial of the changer order; and 7- Communication with the stakeholders Processing change orders is an important skill in the construction industry because most construction projects at some point in time will have change orders and someone will have to address and act accordingly. The students had the opportunity to have hands-on experience and learn at USM. This process will be valuable to the students and will stay with them throughout their career.

Change orders are relevant to everyone involved in the project especially to the owner and the contractor. These stakeholders are affected the most because of their possible impact on price, time and/or operation of the facility. Change orders also affect the workers in that it changes their scope of the activities to be performed.

Keywords: Change Orders, Process, Housing, Rehabilitation, Analysis

INTRODUCTION

Change orders are the standard legal mean in the construction industry to modify contracts. A change order is a written agreement between the general contractor and the client to modify one or more aspects of a construction contract. The change order may include adding, deleting or modifying any aspects of the original construction contract including but not limited to scope, price, and timeframe among others. [Mississippi Legislature, 2011] Change orders are usually composed before or during the construction phase.

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CHANGE ORDER PROCESS

This report provides a student view on the similarities and differences of the change order process for the Neighborhood Stabilization Program at the University of Southern Mississippi (USM) and processes used by other organizations. The student worked with the construction team and learned details of the change orders process. The change orders process involved several steps including: 1- Identify the need to alter the construction project; 2- Compile all of the needed change order documents; 3- Analyze the content of the change orders; 4- Evaluate the effect of the change order on the project price/budget; 5- Estimate the impact of the change order on the project time; 6- Process for approval or denial of the changer order; and 7- Communication with the stakeholders.

Processing change orders is an important skill in the construction industry because most construction projects at some point in time will have change orders and someone will have to address them and act accordingly. The students had the opportunity to have hands-on experience and learn at USM. This process will be valuable to the students and will stay with them throughout their career.

Change orders are relevant to everyone involved in the project especially to the owner and the contractor. These stakeholders are affected the most because of their possible impact on price, time and/or operation of the facility. Change orders also affect the workers in that it changes their scope of the activities to be performed. Change orders can range from very minor projects to larger ones that take more time. When the change order scope of work is long it will push the finishing date of the project to a later date. Not all change orders are as time consuming, they can be as simple as changing the brand name for a certain object. Every company's change order will be different in one way or another. Although they differ, they will have the same concept. Figure 1 shows a process that is somewhat different from the USM process, but they both reach the same goal of processing a change in the construction process.

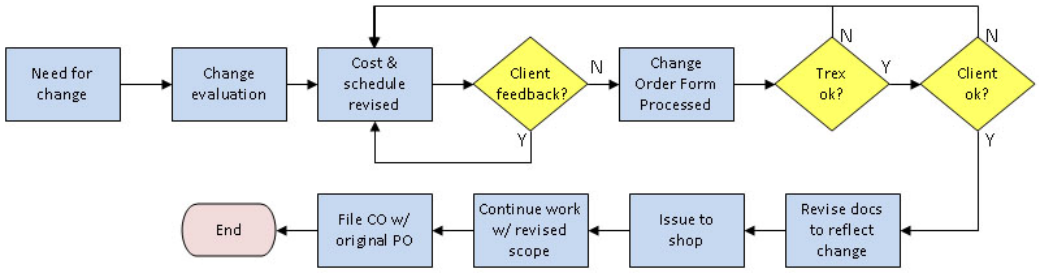

Figure 1. This is an example flow chart from a company named T-Rex Engineers.

Identifying the need to Alter the Construction Project

As stated before, the change order process has several different steps. The first step in the change order process is identifying the need to alter the construction project. In the neighborhood stabilization project, there is not just one person that is in charge of identifying the need to alter the current project at the time. Several different people can recognize the need for a change order in the project. Being that the contractor is on site the most the contractor will identify issues that are in line for a change order. The housing urban development representatives also suggest that certain issues be fixed with a change order. Representatives from the University of Southern Mississippi, the students and professor, make trips to view the houses. While the university representatives are doing a walkthrough of the houses, they inspect the house and find the issues that call for a change order request. The majority of the time these issues are spotted during a walkthrough when multiple parties are on site. During these walkthroughs the identification of these issues is collaborative between the parties. The representatives from the university use an appendix with all activities list. This appendix can be seen in Figure 2. Some of the issues found on one house will apply to the other houses and therefore a request for multiple change orders is put in.

Appendix A1 - Activities and Prices

House: 4959 Laurel Oak Dr.

ID	DESCRIPTION	Quantity	Unit of Measure	Unit Price	Total Price
1	Mailbox (Gibraltar Industries Standard Size Galvanized Steel with heavy-dut steel Drive-in Post Kit or Equivalent) or if applicable match Neighborhood Covenant		Each		[redacted]
2	Paint Shutters Existing Color		SF		
3	Remove Roof Felt and Shingles and assess Sheathing to check for bad wood		SF		
4	Architechtual Shingle Roof (GAF 30 Yr Natural Shadow Barkwood Sg or Equivalent) Replace Sheathing, vents, and piping where necessary		Sq.		
5	Felt (United Roofing MFG. Co FGUR30 15Lb. Or Equivalent)		Sq.		
6	Repair and/or Replace Exterior Trim, Fascia, and Soffit to match existing		LF		
7	Front Door (Feather River Medina Zinc Fanlite Smooth Fiberglass six panel or Equivalent)		Each		
8	Keyless Front Door Hardware(Kwikset Satin Nickel Single Cylinder Keyless Entry Deadbolt Featuring Smartkey)		Each		
9	Door Bell (Satin Nickel 2 note or Equivelent)		Each		
10	Remove Exterior Doors		Each		
11	Exterior Door (Masonite Smooth Fiberglass six panel with dead bolt lock set or Equivalent)		Each		
12	Remove Interior Doors		Each		
13	Interior Doors (Steves 6 Panel Molded Hollow Core or Equivalent, Also use 3' wide doors where possible)		Each		
14	Door Hardware (Kwikset Lido Bed/Bath Lever Satin Nickel or Equivalent)		Each		
15	Satin Nickel Spring Everbuilt Door Stops		Each		
16	Closet Doors to match existing dimensions (JELD-WEN 6 Panel Molded Bifold or Equivalent)		Each		
17	Closet Shelving (Rubbermaid Free Sliding shelf to fit existing area)		LF		
18	Remove Windows		Each		
19	Windows to match current size or larger without special orders (American Crafstman, an Andersen Co. 2301 Double Hung Vinyl with LowE3 Insulated Glass, Argon Gas, Grilles and Screen or Equivalent)		Each		

Figure 2. This is the first page of the appendix used during walkthroughs that helps to identify issues that may possibly need a change order.

Compile all the Needed Change Order Documents

When the issues are found, change order request documents must be compiled. Change order documents are needed when sending in the request for a change order. The contractor if requesting a change order must complete and send back a change order. The change order request form must be sent to the representatives of the university. In the change order request form, the change in the scope of work must be specified. The contractor must also include, along with scope of work, the price that they will complete it for. These documents must be formed even if there is not a change in the price of work. Figure 3 present the document sent when requesting a change order.

[redacted]

Change Order #47

[redacted]

Customer: [redacted]
Address: [redacted] **Date:** 10/24/11
Project: NSP- Package #1
Contract Change Order #: 47 **Unit Change Order #** 16
Contact: [redacted]
General Job Description: [redacted]

FOR APPROVAL TO:	Owner	Architect	Contractor	Field
	X			
The Contract is changed as follows:			Unit	Total
a. The original contract sum was			$ [redacted]	$ [redacted]
b. The net change by previously authorized change order			$ [redacted]	$ [redacted]
c. The contract sum prior to this change was			$ [redacted]	$ [redacted]
d. The contract sum will be increased by this change in the amount of			$ [redacted]	$ [redacted]
e. The new contract sum including this change order will be			$ [redacted]	$ [redacted]
The contract time will be increased by	days	0		
The date of substantial completion as of the date of this change is		TBD	awaiting NTP	

NOTE: This change order does not include changes in the contract Sum, Contract Time or Guaranteed Maximum Price which have been authorized by construction change directive until the cost and time have been agreed upon by both the owner and contractor in which case a change order is executed to supersede the construction directive

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER

Owner	Title	Date
[redacted]	[redacted]	10/24/11
Contractor	Title	Date
Architect	Tile	Date

Change Description	Unit	Qty	Cost	Total
1. Install new Gibraltor mailbox on wood post	each	1.00	$ [redacted]	$ [redacted]
				$ -

Change Specification/Comments

Figure 3. Change Order Form Used in this Project

Analyze The Content Of The Change Orders.

When these change order documents are sent in they must be analyzed. Several people are involved when deciding on approval for these documents. Not every change order request that is sent in is approved. The representatives from the university are the ones who discuss the request forms. While analyzing the documents, the representatives must take into consideration how the overall project with be affected by this change order. When analyzing the request change order a few things must be considered: 1. Price, 2. Time and 3. Materials. Change orders can affect the project by price and the time of completion of the entire project. The materials must be taken into consideration also because of their price and efficiency. While considering the change order the materials must be chosen by the best price for the best efficiency. If the change order is not entirely necessary, then it is usually denied. Figure 4 shows a sample change order document. For protection, names of all parties have been left off. This document has all the necessary information for a change order form. Notice that while the information presented in this form is different than the previous one, both serve the same purpose.

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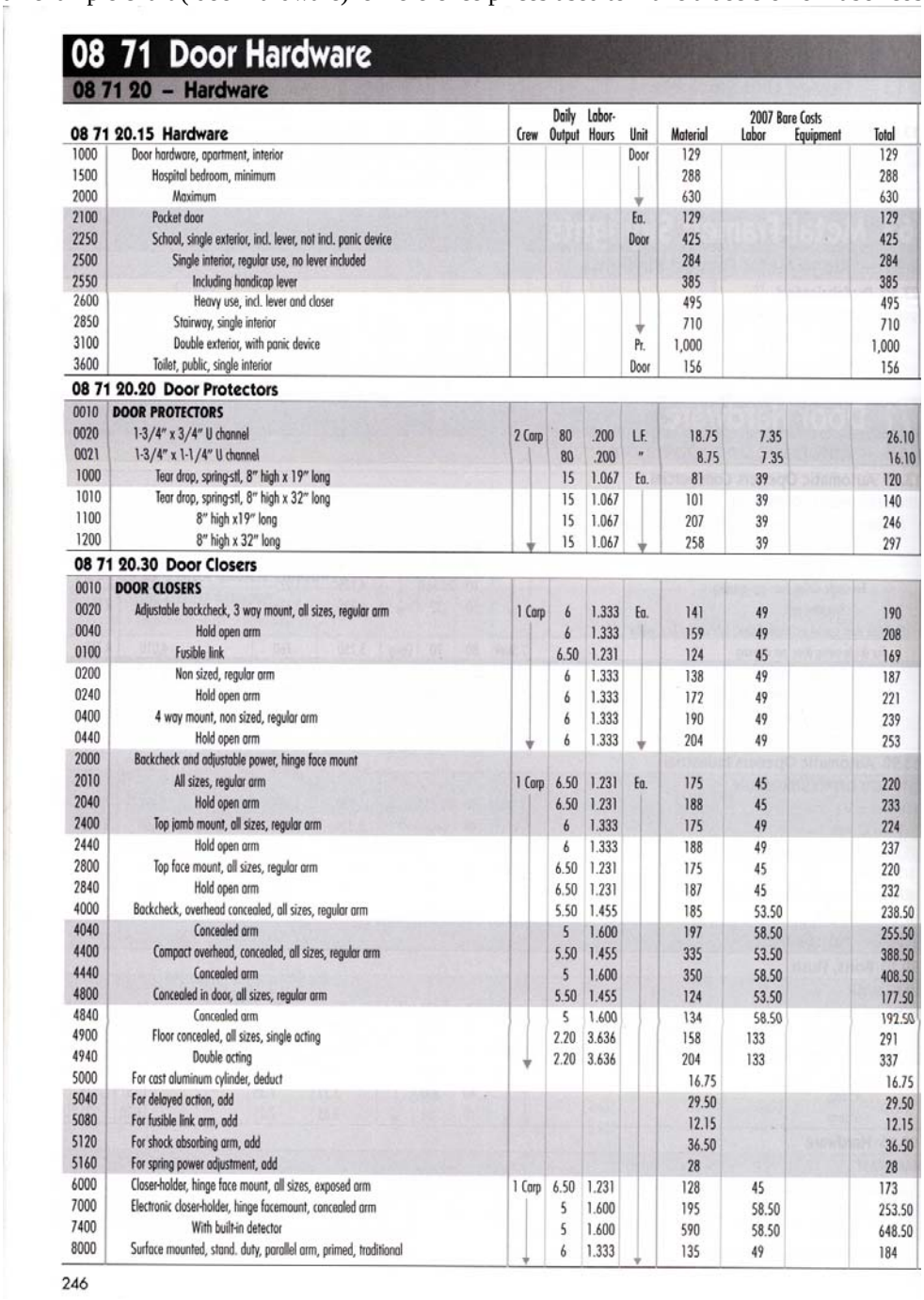
CONTRACT CHANGE ORDER	
CONTRACTOR:	CHANGE ORDER No. PROJECT: PROJECT No.
OWNER:	ENGINEER:
DATE OF ISSUE:	EFFECTIVE DATE:
The Contractor is hereby directed to make the following changes in the Contract Documents. **Description:** **Reason for Change Order:** **Attachments:** (List documents supporting change and justifying cost and time)	
CHANGE IN CONTRACT PRICE: Original Contract Price: $	**CHANGE IN CONTRACT TIMES**: Original Contract Times: (calendar days or dates)
Net changes from previous C. O.'s No. to $	Net changes from previous C. O.'s No. to (calendar days)
Contract Price Prior to this Change Order: $	Contract Times prior to this Change Order: (calendar days or dates)
Net Increase (decrease) of this Change Order: $	Net Increase (decrease) of this Change Order: (calendar days)
Contract Price with all Approved Change Orders: $	Contract Times with all Approved Change Orders: (calendar days or dates)
RECOMMENDED: (Engineer) By: Date:	APPROVED: (Owner) By: Date:
ACCEPTED: (Contractor) By: Date:	REVIEWED: (Funding Agency) By: Date:

Figure 4. Sample Change Order Form

Evaluate The Effect Of The Change Order On The Project Price/Budget

The price effect of the requested change order is a primary concern to those who are evaluating the change order request. Prices of change orders can range from extremely high to miniscule. This part of the evaluation plays a major role in the approval because of the budget. Some of the change orders that are approved do in fact save the owners money. A change order cannot be processed without approval. When evaluating the change order price is a huge concern. Change order request that are equal to or greater than ten percent of the total project price are taken into more consideration. The request of small values is usually approved easier than the larger ones. Figure 5 shows an example chart (door hardware) of reference prices used to make a decision on labor cost.



08 71 Door Hardware

08 71 20 – Hardware

	08 71 20.15 Hardware	Crew	Daily Output	Labor-Hours	Unit	2007 Bare Costs Material	Labor	Equipment	Total
1000	Door hardware, apartment, interior				Door	129			129
1500	Hospital bedroom, minimum					288			288
2000	Maximum					630			630
2100	Pocket door				Ea.	129			129
2250	School, single exterior, incl. lever, not incl. panic device				Door	425			425
2500	Single interior, regular use, no lever included					284			284
2550	Including handicap lever					385			385
2600	Heavy use, incl. lever and closer					495			495
2850	Stairway, single interior					710			710
3100	Double exterior, with panic device				Pr.	1,000			1,000
3600	Toilet, public, single interior				Door	156			156
	08 71 20.20 Door Protectors								
0010	**DOOR PROTECTORS**								
0020	1-3/4" x 3/4" U channel	2 Carp	80	.200	L.F.	18.75	7.35		26.10
0021	1-3/4" x 1-1/4" U channel		80	.200	"	8.75	7.35		16.10
1000	Tear drop, spring-stl, 8" high x 19" long		15	1.067	Ea.	81	39		120
1010	Tear drop, spring-stl, 8" high x 32" long		15	1.067		101	39		140
1100	8" high x19" long		15	1.067		207	39		246
1200	8" high x 32" long		15	1.067		258	39		297
	08 71 20.30 Door Closers								
0010	**DOOR CLOSERS**								
0020	Adjustable backcheck, 3 way mount, all sizes, regular arm	1 Carp	6	1.333	Ea.	141	49		190
0040	Hold open arm		6	1.333		159	49		208
0100	Fusible link		6.50	1.231		124	45		169
0200	Non sized, regular arm		6	1.333		138	49		187
0240	Hold open arm		6	1.333		172	49		221
0400	4 way mount, non sized, regular arm		6	1.333		190	49		239
0440	Hold open arm		6	1.333		204	49		253
2000	Backcheck and adjustable power, hinge face mount								
2010	All sizes, regular arm	1 Carp	6.50	1.231	Ea.	175	45		220
2040	Hold open arm		6.50	1.231		188	45		233
2400	Top jamb mount, all sizes, regular arm		6	1.333		175	49		224
2440	Hold open arm		6	1.333		188	49		237
2800	Top face mount, all sizes, regular arm		6.50	1.231		175	45		220
2840	Hold open arm		6.50	1.231		187	45		232
4000	Backcheck, overhead concealed, all sizes, regular arm		5.50	1.455		185	53.50		238.50
4040	Concealed arm		5	1.600		197	58.50		255.50
4400	Compact overhead, concealed, all sizes, regular arm		5.50	1.455		335	53.50		388.50
4440	Concealed arm		5	1.600		350	58.50		408.50
4800	Concealed in door, all sizes, regular arm		5.50	1.455		124	53.50		177.50
4840	Concealed arm		5	1.600		134	58.50		192.50
4900	Floor concealed, all sizes, single acting		2.20	3.636		158	133		291
4940	Double acting		2.20	3.636		204	133		337
5000	For cast aluminum cylinder, deduct					16.75			16.75
5040	For delayed action, add					29.50			29.50
5080	For fusible link arm, add					12.15			12.15
5120	For shock absorbing arm, add					36.50			36.50
5160	For spring power adjustment, add					28			28
6000	Closer-holder, hinge face mount, all sizes, exposed arm	1 Carp	6.50	1.231		128	45		173
7000	Electronic closer-holder, hinge facemount, concealed arm		5	1.600		195	58.50		253.50
7400	With built-in detector		5	1.600		590	58.50		648.50
8000	Surface mounted, stand. duty, parallel arm, primed, traditional		6	1.333		135	49		184

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Figure 5 Reference Cost

Estimate The Impact Of The Change Order On The Project Time

The other impact of the change order request that must be evaluated is the time of the new scope of work. Not all change orders lengthen the time of the project. With this project the time change of the change orders are zero days. This is not the case with other project change orders. In other projects, a change orders can interfere with the critical path of a project. When the change order interferes with the critical path it can slow the project greatly. Some of the bigger change orders can lengthen the time of the project exponentially. This usually happens will the desired work of the change order delays all of the other current work. The Figure 6 shows an example schedule of one of the projects. This example shows the critical path that could be interrupted by a change order.

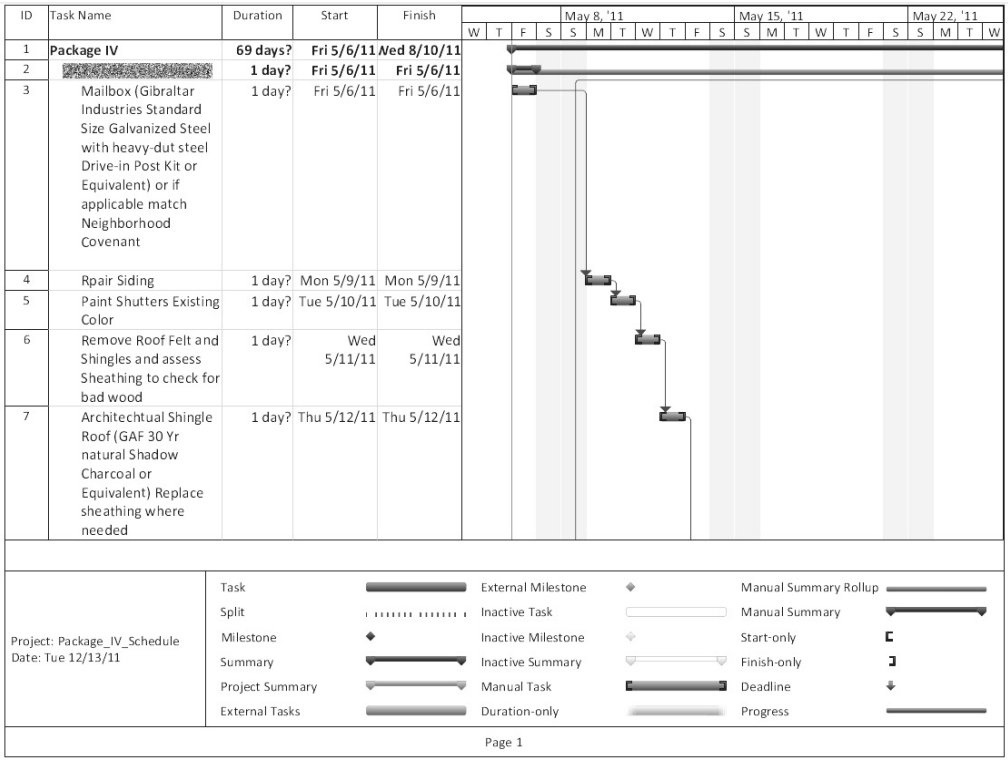

Figure 6. Sample Gantt Chart

Process For Approval Or Denial Of The Change Order

Once both the impact of time and change of price are evaluated, the decision of approving or denying will take place. The decision is made on the necessity of the impact on the project. After making the decision, the change orders are then grouped into two different categories. The change orders that are approved are then sent on to be processed. The change orders that are not approved are then sent back to the contractor which leads to the next step in the process.

Communication With The Stakeholders

The change orders that are approved are then put into a letter form. The change orders are listed by house on this form. Underneath each house, the description and price impact of each change order is listed. The prices of all the change orders in the form are then added together. The overall price is either added or deducted from the last overall price of the package. Once this form is completed the change orders are then sent to be processed. When the change orders are processed, the money is released for them. If the requested change order is denied, it is then sent back to the contractor. When the change order is sent back to the contractor, communication between the owners and the contactor begins. The two parties then try to agree on an appropriate change order. Once agreed

upon the change order is then processed. Figure 7 shows an example communication sent regarding a change order for the NSP project.

XXXX
There are TWELVE additional change orders for Package XXX- Jackson, MS (Details in attached files) and as follows:

FIVE change orders for Package IV- House1 135 Camero Dr.:

1- Change Order #10 Extensive HVAC Duct	ADD	$ (#57)
2- Change Order #11 Piping and Drainage	ADD	$ (#58)
3- Change Order #12 Smoke Detector Battery	ADD	$ (#59)
4- Change Order #13 Bath Tub Plumbing	ADD	$ (#60)
5- Change Order #14 Install Bathroom Sink	ADD	$(#61)

TWO change orders for Package IV- House6 150 Chatham Cr.

1- Change Order #14 Replace Interior Door	ADD	$ (#62)
2- Change Order #16 Install Smoke Detector Battery	ADD	$ (#63)

FIVE change order for package IV- House 3 322 Barbara

1- Change Order # 10 French Security Doors	ADD	$ (#64)
2- Change Order # 12 Install Smoke Detector Battery	ADD	$ (#65)
3- Change Order # 13 REDUCE 492 from 18	DEDUCT	$ (#66)
4- Change Order # 14 Install Carpet and Trim	ADD	$ (#67)
5- Change Order # 16 Replace Shed Roof	ADD	$ (#68)

Summary:
I would like to request that you to authorize the change orders #10,#11,#12,#13,#14 for 135 Camero Dr., #14,#16 for 150 Chatham Cr., #10,#12,#13,#14,#16 for 322 Barbara. With a total impact cost of $ ADD. Therefore, The P.O 51382 corresponding to Package IV (originally $) will change from the last modified amount of $to $ (ADD $).

Figure 7. Sample Communication Document

LESSONS LEARNED

There following are the three main lessons learned as part of this project:

- The student being able to acknowledge when there is a need for a change order. After identifying the issue, the student has learned what action needs to take place to correct the issue.
- In addition to identifying the issue and the appropriate correction, the student also learns how the process of a change order takes place. The student learns how to process a change order from start to finish.
- While processing a change order, the student learns the overall impact of a change order on the entire project from time to price.

CONCLUSION

This report is from the student's experience of processing change orders for the Neighborhood Stabilization Program for the University of Southern Mississippi. This report includes the students' perception of the change order process for the University of Southern Mississippi. It offers the steps of the change order process and how the steps of this process are executed. In this report, an example change order form and an example change order process flow chart is provided. Along with the report the lessons learned by the student are included.

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