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## Paper Session II-A - Spin-Offs in Construction Cost Estimation

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**GLOBAL COMPETITION  
THE 34TH AEROSPACE SPIN-OFF IN  
CONSTRUCTION ESTIMATING - A VIDEO  
or  
HOW DID THE SUCCESSFUL LOW BIDDER GET LOW AND  
MAKE MONEY?**

by

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Introduction/Abstract

The 34th Aerospace spin-off estimating tool is a video—*How Did the Successful Low Bidder Get Low to Make Money?* or *Construction Estimating, Cost Engineering, and Bidding Strategy*. Some of the other spin-offs, as presented at the 33rd Space Congress in April 1996, are new exciting tools for estimating fiber optic cable, fine tuning the number of bidder concepts, the Kennedy Space Center (KSC) cost index, six volumes of Joe Brown's seminar workbooks, five volumes of Aerospace Price Books, four Aerospace Cost Estimating Seminars on "How to Use These Tools and Spin-Offs," three tools for estimating the cost of remote controls pneumatic panels, and KSC Real Property Inventory [40] of aerospace facilities with over 60 pages of facilities that now shows the current cost of the VAB at over \$182 million. This video shows the global competition and costing of five international/global projects with budget and total cost comparisons. This paper and the video document the five new aerospace case studies/stories of how the low bidder got low with over fifteen ways the low bidder got low. The five case studies are: (1) orbiter landing facility, (2) shuttle mods to launch Pad LC 39 - Pad A, (3) LC 39 - Pad B, (4) the Orbiter Processing Facility, and (5) LC-36 - Ready Room Mods.

*How Does the Low Successful Bidder Get Low and Make Money?*; sixteen stories and case studies; over 70 ways low bidders got low for offices-warehouses-retail stores-clothing processing facility, churches-schools, big buildings, VAB, space station processing facility, airports, tunnels, pipe lines, and aerospace space shuttle launch and landing facilities with fifteen keys to successful bidding and construction, including: 5 detail cost estimate summaries; 10 lists of bids; 15 ways to make government estimating more accurate, featuring 6 small jobs of \$112,000 to \$1 million, 10 medium size projects of \$3 million to \$100 million, and comments on three super or mega projects or \$5 billion to \$24 billion with bidding secrets, construction methods, and unique and unusual ways the low bidders have gotten low and successfully made money. Another title could be "Analysis, Bidding, Cost Estimating, Cost Engineering, and Strategy." This paper was developed after reviewing over 1,250 bids and projects costing near \$150 billion and offers many cost engineering answers to successful construction with a unique, exciting concept using the Apollo, space shuttle, and space station, case studies, and the excitement of space exploration, aerospace manned rocket launches, and computerization to teach construction estimating, bid strategy, and cost analysis

as we look forward to futuristic moon base construction for mining of Helium 3. This presentation contains simple to complex ideas and methods contractors have used to successfully rise above the competitive bidding system for \$100,000 to \$120,000,000 projects. These projects are: Goodwill warehouse-office-retail store-clothing processing facility, St. Pius Church-School, Church of the Resurrection, Orlando Girls' High School, Jacksonville University Lift-Slab Dormitory, Orlando Interstate Expressway, Cape Kennedy Umbilical Tower at Launch Complex 17, alterations to Launch Complex 34 Mobile Service Structure (MSS), Kennedy Space Center's Launch Complex 39 MSS, and the Vehicle Assembly Building - the world's largest building at the time of construction, space shuttle and space station launch and processing facilities. This series of stories is meant to challenge your thinking - call it "conceptual estimating," "brainstorming," or "cost engineering" - the scientific techniques applied to problems of cost estimation, cost control, and profitability.

## Background

Soon after I graduated from the University of Florida in 1959, my new boss said, "Construction is the biggest legalized gambling racket in the country." Startled as I was, I came back with, "What about the stock market?" since I was also a new student of the stock market. Our discussion, pro and con, continued, but my thoughts often go back to his statement as I hear talk about construction, legalized gambling, the recent drastic falls and giant rises in the stock market, etc. A better question might be "Is the biggest legalized gambling racket in the country construction or the stock market?" Since then, while estimating or reviewing over 9 billion dollars' worth of cost estimating, and studying over \$150 billion, I have often said, "They bid that job too low," or "They would lose their shirts on that job." Many contractors have said the same things. Many others have gone broke trying to be successful. But time has taught me that many have succeeded in their construction bids. So much so that I started making a personal study of successful, innovative bidding, looking at the more positive point of view.

Since landing on the moon was once thought impossible, it is one of man's greatest success stories. To me, the building of today's Spaceport at Kennedy Space Center, Florida, is one of construction's greatest success stories. This construction feat enabled the launching of the Apollo space vehicles to the moon ahead of schedule. You can see by these stories that the successful low bidder can get low and make money even though construction may be "the biggest legalized gambling racket in the country."

**General - Low Bidder's Introduction -** Three of the major problems of engineering and construction during the 60's, 70's, 80's, and 90's are time, money, and performance. Many R&D new and unusual projects were costing 2 to 5 times the budget costs—a few near 10 times the budget.

**Examples:** The Alaska pipeline had a budget of \$900 million. It is said that it was based on three requirements: a 48" pipeline, using a string on a globe to get 800 miles length, and \$1 million per mile with a 12-1/2% contingency. The actual cost (as disclosed in the movie, "800 Miles of Winter," by Caterpillar [36] ) was near \$9 billion. Murphy's International Airport #1 was budgeted for \$110 million and cost nearly \$310 million [32]. Murphy's International Airport #2 (M.I.A. #2) budgeted at \$1.5 billion and an actual cost near \$5 billion and more recently, the Euro-Tunnel or Chunnel (as it was called on my visit to the work zone in France in April 1990) was budgeted at \$5 to \$8 billion with a cost of \$17 to \$24 billion, including financing cost [27].

But in this paper, we are going to concentrate on the successes of a particular part - that of cost estimating, bidding, cost analysis and construction, and how the successful low bidder got low and made money. Also, how the government estimates can be more accurate, with 16 bid stories of over 70 ways and 15 keys to successful bidding and construction.

The “Low Bidder” video documenting successful projects may also become a controversial one with even more importance than originally conceived.

#### QUESTIONS FOR:

**Aerospace Managers, Engineers, Technicians:** Have you ever wanted a good video reference of the construction, estimating, and bidding of the major aerospace facilities at Kennedy Space Center? Do you know how much they cost—the VAB, the Orbiter Landing Facility (OLF), and the Space Station Processing Facility? Do you know how they were built? When they were built? How do these facilities stack-up for global competition? As a potential bidder on aerospace projects, wouldn't you like to know these estimating bidding and construction secrets? Why? So you can prepare a more successful proposal. Do you know how much a total aerospace launch facility costs? Do you know the size? Do you know the total number of square feet?

**Cost Engineers:** Have you ever wanted some good, actual examples where cost engineering has been used successfully? This video shows the use of detailed cost estimating, planning and scheduling, cost control, value engineering cost analysis and construction methods, and bid strategy, etc., and yet has the excitement of moon launches and the space program.

**Contractors:** Was your company one of the over 100 bidders on these projects? Do you know how the low bidder got low to make money? How many of these over 70 ways do you know about? How many are your company secrets?

**For Educators/Engineering Construction:** Haven't your students asked, “How did the low bidder get low?” Haven't you always wanted a video to answer these questions with detailed estimates, actual case studies, and graphic ways the low bidder made money? What are the (Joe Brown's) fifteen keys to successful bidding and construction?

**For Estimators:** Don't you want to know how to get low on your next few jobs? These estimating “ways” secrets can help you. Learn them before the other contractors find out about them.

**For Government Estimators:** Do you need to improve your estimates? Do you know about the fifteen ways that worked to give fair and reasonable government estimates on over 165 bid projects on R&D projects within 6% of the low successful bids? How many of these 70 “ways” low bidders got low are important in successful management of your bid projects. Many are important to keep government projects within the budget and the 6 - 10% change order contingencies limit.

**For Construction, Engineering Contractors, and Estimating Students:** How many estimating, bidding, and construction secrets can you find in these 35 references? 10...50....100.... or none?

**Four-Part Series:** This Presentation is Part 2 of a 4-part series on construction estimating and bidding strategy. (See “Low Bidder” chart.)

**Part I** How does the successful low bidder get low - 11 stories/case studies for commercial, industrial offices, retail stores, schools, churches, roads, and college dormitories with over 20 ways low bidder got low.

**Part II** Part II is about 5 stories/case studies the low bidder got low with over 15 ways for \$300,000 to \$22 million projects.

LOW BIDDER CHART			
GLOBAL PROJECTS		COST	REFERENCES
1. Alaska - 800-mile 48" pipeline		\$ 9,000,000,000	#36, 34, 19
2. Chunnel - Euro -Tunnel		24,000,000,000	#27, 34, 19
3. M.I.A. #1 - Airport Expansion		310,000,000	#32, 34, 19
4. M.I.A. #2 Murphy's International Airport #2		5,000,000,000	#37, 34, 19
5. KSC Aerospace Launch Facilities		1,409,130,600 *	#40, 3, 35, 24
6. LC-39 - Largest Rocket Assembly Building		\$ 182,601,300 *	#40, 1, 3, 35, 24
PART I WAYS LOW BIDDER GOT LOW - LOW BIDS ROUNDED			
1. Goodwill Office Retail Sales,			
Processing Facility	7 WAYS	113,000	#19
2. St. Pius Church, School	5 WAYS	176,000	#20
3. OR.GHS - Girl's High School	6 WAYS	200,000	#21
4. Resurrection Church	1 WAY	200,000 ***	#2
5. University Dormitories	1 WAY	300,000 ***	#1, 19
6. Interstate Highway #4	1 WAY	500,000 ***	#1, 34
7. Launch Complex #17 - 2 towers	2 WAYS	275,000	#1, 7
8. Launch Complex #34 - Mods &			
Platform	2 WAYS	3,533,000	#1, 38
9. Mobile Service Structure	4 WAYS	11,587,000	#1, 38
10. VAB Outfit Bay #2 & Ext.			
Platform	2 WAYS	6,592,000	#7, 35
11. VAB Arch. Struct., Mech. & Elect.			
LCC	8 WAYS	63,366,000	#1, 3, 35
PART II			
12. OLF, World's Longest Runway? XII **	10 WAYS	21,812,000	#4, 5, 6, 24
13. LC 39 PAD A Shuttle Launch			
PADs Mods XIII **	2 WAYS	18,749,000	#19, 34, 9
14. LC 39 PAD B Shuttle Launch			
PADs Mods XIV **	2 WAYS	17,195,000	#34
15. Orbiter Processing Facility XV **	1 WAY	8,500,000	#34, 26
PART III			
16. SSPF 18 Total Ways Space Station			
Office/Processing Facility XVI	7 WAYS /18 WAYS	56,215,000	#10, 11, 15, 13, 28, 25
17. LC 36 Ready Room Refurbishment XVII **			
Gov. Study - \$843,038,600 - 7400 Bids	23 WAYS	(368,387)****	#39, 31, 23, 9, 14
Gov. Est. KSC based on over			#9, 14
30 Tools/Spin-Offs	15 WAYS	-----	#12
Sub-Total 73 Low-Bidder Ways			
Low Bidder Only	-	\$ 209,313,000	
* Real Prop. Inventory. ** Low Bidder Case Studies *** Estimated ROM ****New - not in totals - added 1/1/97			

(Reference 40 also lists 7,698,300 SF of facilities with a total cost of \$1,409,180,595 for all of KSC facilities.)

**Story XII** Shuttle Landing Facility - 10 Ways, as John Geil Said in the "Low Bidder" Video Script

One of the first projects for the Shuttle was the runway. To accommodate the Shuttle, and to insure usability well into the future, the specifications called for a 15,000-foot long runway, 300 feet wide. The concrete was to be placed in one continuous pour, sixteen inches thick. In designing and building the runway, a unit price, due to the variation in estimating excavation, was used for the over 2,726,500 cubic yards of unclassified excavation. This helped NASA and KSC managers eliminate the contractor contingencies for variations in quantity in bidding the job and also provided a strong basis for negotiating additional excavation if unforeseen site conditions were encountered. Good planning and scheduling, excellent design, and effective cost control procedures resulted in the nearly \$22,000,000 project being completed *six months* ahead of schedule. Many other factors contributed to the successful bidder getting low—and making money. Keeping in mind that cost-growth due to design deficiencies can easily eat up any calculated profit, the team—

A&E, government, and low bid contractor—was particularly careful and thorough in the design and construction process. The final cost-growth calculation was less than one-tenth of one percent, and there were no claims for additional cost or time. The contractor also used a strategy for controlling cost escalation. All sub-contractors and suppliers were asked to bid the job *without* escalation, since the successful contractor figured on buying everything as soon as the contract was awarded. This got all the materials, supplies, and equipment on the job so that they could be paid for by the buyer with little or no price escalation. When the job was finished, the contractor further profited by taking most of his heavy equipment to Alaska for work on the pipeline - that \$9 billion project. As might be expected, there was a large range separating the low bid and the high bid. The lowest bidder was declared non-responsive because of an error in the amended quantity of unclassified excavation, so the contract went to the second bidder. See NASA's *System Summary for the Shuttle Landing Facility* (see Figure #1). This shows part of the process used by cost engineers at KSC to analyze large projects as a detail overview for construction management so that future projects can be handled even better.

<b>BID ABSTRACT</b>				
TASK I - CONSTRUCTION SPACE SHUTTLE LANDING FACILITY - KSC, FLORIDA, PCN 75892				
IFB NO. CC 10-0035-4	ISSUED 1-10-74	OPENED 3-8-74		
2,726,550 CU. YDS.		JOB		
BIDDER	1-UNIT	1-ESTIMATE	2-ESTIMATE	TOTAL
#1. Non-Responsive Low Bidder	0.75	\$1,700,775.00*	\$ 19,568,000.00	\$ 21,568,775.00*
Error		(2,044,912.50)	(should have been)	21,912,912.50
#2. Successful Low Bidder	0.80	2,181,240.00	19,631,497.00	21,812,737.00
#3	1.00	2,726,550.00	19,173,450.00	21,900,000.00
#4	1.35	3,680,842.50	20,306,050.00	23,986,592.50
#5	1.60	4,362,480.00	20,537,000.00	24,899,480.00
#6 Government Estimate	.86	2,344,833.00	22,756,047.00**	25,100,880.00
#7	1.00	2,726,550.00	23,120,116.00	25,846,666.00
#8	1.00	2,726,550.00	23,915,000.00	26,641,550.00
#9	1.00	2,862,825.00	24,600,000.00	27,462,825.00
#10	1.00	2,725,550.00	24,895,057.00	27,621,607.00
#11	1.20	3,489,984.00	25,338,332.00	28,828,316.00
#12	4.16	9,433,632.00*	19,666,368.00	29,100,000.00*
Error - should have been	-	(11,342,448.00)		31,005,816.00
#13	1.25	3,408,125.00	26,000,000.00	29,408,125.00
*Error unit price based on initial quantity of 2,267,700 CY unclassified excavation.				
**Included 10% escalation in government estimate.				

## XII. Shuttle Landing Facility - (10 Ways Low Bidder Got Low and Comments)

**Way # 39.** Unit prices in bidding and cost control. Over 2 million CY earth work unclassified excavation bid at unit price \$.80 - \$4.16. Helps eliminate contractor and government contingencies, thus saving money.

**Way # 40.** Planned early completion. Actual completion 6 months early.

**Way # 41.** Escalation bidding strategies saved all escalation.

**Way # 42.** Use same equipment for upcoming pipe line job (Alaska).

**Way # 43.** Special planning and scheduling - computerized.

**Way # 44.** Order materials and equipment early to get paid early - a contract clause allowed payment when delivered.

**Way # 45.** By having materials and equipment on the job early. It gave the workers an extra push to start the tasks earlier and finish early.



- Way # 46.** Order materials and equipment early to save escalation.  
Excellent design by A&E virtually eliminated change orders and cost over-run.
- Way # 47.** Built rail spur and batch plant at site with its own work forces (the low bidder had a specialized group and equipment).
- Way # 48.** Specialized continuous concrete runway poured at 16" thick using new unique paving machines..  
Computerized planning and scheduling by NASA, A&E, saving time and money.

**XIII. Shuttle Launch Pad Mods for Shuttle Pad LC 39A - 2 Ways**

Launch Complex 39, PAD A - Modifications and Conversion to Shuttle Mobile Launcher #1

- Way # 49.** Steel sub-contractor created his Galaxy Crane to dismantle the 446 foot tower and erect part of it on the launch pad.
- Way # 50.** Limited bidding - only five bidders

The LC-39 Pad A and Mobile Launcher was bid June 25, 1975, with \$18,749,000. For ease of tracking, this was separated into \$12,449,000 for Pad A and \$6,300,000 for Mobile Launcher Platform #1, Package 1. One of the major parts of this project was the disassembly of the 446 foot high Apollo Launcher Umbilical Tower and a steel, ship-like platform. The platform became MLP #1 with part of the tower being mounted permanently on the launch pad and part hauled to the KSC Industrial Area five miles south to the Launch Equipment Test Facility (LETF). The low bidder was successful in disassembly and moving it in large sections. His economically efficient method was probably a major reason for his successful low bid. A color picture of this success was featured on the front cover of "Engineering News Record" (ENR), February 3, 1977. This again proved, as mentioned in *How Does the Successful Low Bidder Get Low and Make Money?* The low bidder can successfully complete the job through ingenuity, hard work, efficient management, creativity, good labor productivity, and imaginative engineering ability to see beyond the adding up of numbers to actually effect their selection to be successful. The selection of the most efficient method by imagination and ingenuity is one of the most important ingredients for successful construction at a profit. Another major part of the Pad A portion was a new design concept - that of the Hinged Space Truss to rotate and support the Payload Change-out Room (PCR). This was also featured in the ENR backup story, *Hinge Space Truss Will Support Shuttle Cargo Room*. This design concept allows the payloads (cargoes, satellites, space lab, etc.) to be checked out and/or installed on the launch pad in the vertical position thus saving critical launch processing time for critical payloads.

<b>ABSTRACT OF BIDS</b>		
TASK 1 - PCN 77126 - CONSTRUCTION OF MODIFICATIONS TO CONVERT MOBILE LAUNCHER NO. 3 TO MOBILE LAUNCHER PLATFORM NO. 1 AND MODIFICATIONS TO CONVERT LAUNCH PAD 39A FOR THE SPACE SHUTTLE - PCN - 77112, KSC, FLORIDA IFB #CC-10-0032-4 ISSUED 4/22/75, BID 6/25/75.		
BIDDER	TOTAL	
I. Low Bidder	\$ 18,749,000	-7% (Below GE)
II.	21,500,000	
III.	19,600,000	
IV.	26,689,800	
V.	32,269,200	
VI. Government estimate -	20,125,095	3/6

**XIV. LC 39 - Pad B Shuttle Mods - 2 Ways the Same Steel Sub-Contractor Wins Again With His Same Unique System**

LC-39 Launch Complex 39, Pad B, Shuttle Modifications, Pad B (See list of Launch Complex 39, Pad B bids.)

**Way # 51.** Use Galaxy Crane again to dismantle and erect tower at Pad B - the same steel sub-contractor.

**Way # 52.** Limited bidding - only five bidders, many the same as Launch Complex 39 - PAD A.

<b>ABSTRACT OF BIDS</b>						
IFB 10-0055-8 of 5/16/78 Bid June 30, 1978, LC-39B Shuttle Modifications, PCNs 81910 and 77113						
LC-39 Shuttle Modifications, PCNs 81910 and 77113						
			TASK II		TASK III	
			PRECAST PRESTRESSED		STEEL FOUNDATION PILES	
BIDDER	BASE BID TASK I	(12" X 12") 2000 LF		(14" OR 16") 44,000 LF		TOTAL
1.	\$16,229,000	\$14.00/LF	\$28,000	\$27.00	\$1,188,000	\$17,445,000
2.	\$16,599,000	\$14.00/LF	\$28,000	\$24.00	\$1,056,000	\$17,683,000
3.	\$16,157,000	\$13.00/LF	\$26,000	\$23.00	\$1,012,000	\$17,195,000
4.	\$16,261,754	\$17.00/LF	\$34,000	\$25.00	\$1,100,000	\$17,395,000
5.	\$16,389,400	\$14.00/LF	\$28,000	\$23.00	\$1,012,000	\$17,429,400
6. Government Estimate	\$14,165,340	\$22.37/LF	\$44,740	\$25.18	\$1,107,920	\$15,318,000
<b>Scope and Description</b>						
This work consisted of 3500 tons of structural steel, shuttle service and access tower (SSAT) foundations for RSS with 4400 C.Y. concrete and 320 tons rebar, a 300,000 gal. elevated tank and 5100 LF of 2" to 114" piping for sound suppression system, a 2855.5 KVA electrical system with lightning mast, 2 elevators, mods to hammerhead crane, slide wire system, misc. plumbing, fire protections and ECS, earthwork, etc.						

**XV. Orbiter Processing Facility Phase 1 - 1 Way Team Work in Bidding**

A 52,800 square foot High & Low Bay Facility used to process the orbiter space vehicles for launch and on return from space to remove payload and refurbish for next launch and payload. The high bay is 197 feet x 150 feet x 97 feet high. As you can see from the system summary and the following bids, this was a very good government estimate. It has been said that the government estimate was probably based on better quotes and sub-bids than the low bidder. "We were very successful on this project," the low bidder's manager recently acknowledged. (A change orders' growth of 8.8% may have also helped.)

**Way # 53.** Special sub-contractor team work. (A closed shop team work effort helped them win this bid.)

<b>BID ABSTRACT</b>			
1.	Government Estimate	\$8,500,128	\$9,462,000
2.	Low bidder	8,733,300 (+ 2.7%)	9,623,000
3.		9,077,000	9,690,000
4.		9,095,000	9,716,000
5.		9,169,000	9,744,000
6.		9,199,000	10,952,000

The government estimate mark-ups were PT&I 20%, sales tax 4%, contractor overhead 3%, profit 5%, bond 1%, and escalation of 5% for this 600-day contract, started 6/27/75 and completed 4/15/77 with a cost growth of 8.8%. The government estimate was 1,353 tons of steel at \$1,208/ton or \$30.76/SF., 39,600 LF of steel and concrete piling, 55,072 SF of insulated siding, \$1,720,272 mechanical or 32.50/SF and \$1,100,067 electrical at \$20.83/SF. See detailed system summary, Figure #2, for more details such as concrete, special hangar doors, air conditioning, sprinklers, light fixtures, etc.

**XVII. Launch Complex 36 - Ready Room Refurbishment - 4 Ways**

LC-36 Ready Room Refurbishment at Cape Canaveral Air Force Station, bid 11/2/84, has special merit in our low bidder series as the low bidder just told me (November 1996) how he got low on this project. As you can see, the bids also show this important bid strategy to be very important.

# FIGURE No. 2 - ORBITER PROCESSING FACILITY SYSTEM SUMMARY

SYSTEM SUMMARY OF GOVERNMENT ESTIMATE FOR BUILDINGS													
DRAWING NO.	SHEETS	PCN	LOCATION	ESTIMATOR	CHECKER	PROJECT	SHEET	OF	DATE				
79K05423	186	76389	KSC LC-39 (West of VAB)	KAAS, SSVK/Pierce, PRC	GVC, SSVK/Thomson, PRC	Orbiter Processing Facility Phase I	2	1	3/30/81				
WORK ORDER/CONTRACT		ARCHITECT/ENGINEER		SUBMITTED		CODE		NOT ESCALATED					
PRC 0897 NASTO.8840		Seelye, Stevenson, Value & Knecht, N.Y.C. (SSVK)		76389		C 100		3/30/81					
CONSTRUCTION COSTS													
DIV. TITLE	QTY	UNIT	\$/UNIT	\$/BSF	TOTAL	DIV. TOTAL	QTY	UNIT	\$/BSF	TOTAL	DIV. TOTAL	COMMENTS	
1. GNL CONCR.	40,070	CY	40.59	30.81	1,611,180	1,611,180	52,800	SF	1.63	1.63	85,978	Union Construct. Completed 4/25/77	
2. SITE WORK	14	ACRE	1128.	.30	15,790	1,626,570	6,249	SF	1.54	.18	9,611	1. FAIR 2. AVERAGE 3. GOOD 4. VERY IRREGULAR 5. SOPHISTICATED	
3. CONCRETE	1,133	LY	31.19	.67	35,339	1,661,909	11,324	SF	1.41	.30	15,953	A. SQUARE B. RECTANGULAR C. IRREGULAR D. VERY IRREGULAR E. DESIGN DATA	
4. MASONRY	40,070	CY	3.37	2.56	134,950	1,796,859	32,466	SF	0.43	.27	14,047	BLOG. TYPE: Airplane Hangar CAPACITY: One S1S (Orbiter) STRUC. FRAME: Steel EXTERIOR WALL: Metal Siding w/Insul.&Conc.Blk. HEIGHT: One STORIES 95'-0" HB FT. 25'-0" LB GROUND FLOOR AREA: 52,800 SF TOTAL FLOOR AREA: 52,800 SF VOLUME: 3,240,717 CF @ 82.93 CPCE PERCENT AIR CONDITIONED: 100% 643.8 TONS OTHER: HB 197' X 150' LB 236' X 98'	
5. METALS	1,128	TON	1092.	1.62	1,231,253	1,798,086	21,700	SF	4.67	1.92	101,373	SPECIAL FEATURES COC \$9,500,146 PRC and DD-SED. Burdens: p. 81, 20% S. Tax 4%, 0-Head 3%, Profit 5%, Bond 1%, Escalation 5%, A/C for AHU only, chillers part of VAB A/C Sys. *EXTERIOR MECH. & Elec. & Site Work * CONSTRUCTION BID DATA I/FB 10-0028-3	
6. WOOD/PLASTICS	145	LF	3.20	.01	464	1,800,550	1,800,550	1	SYS	72,724.	1.38	72,724	TOTAL BLDG. SF: 52,800 ARCH/STRUC. \$ 61.64 /BSF \$ 3,254,728 INTERIOR MECH. \$ 23.90 /BSF \$ 1,261,834 INTERIOR ELEC. \$ 11.99 /BSF \$ 633,072 TOTAL INTERIOR: \$ 97.53 /BSF \$ 5,149,634 TOTAL EXTERIOR: \$ 48.33 /BSF \$ 2,552,003 TOTAL CONSTR. \$ 145.86 /BSF \$ 7,701,637 ADDITIONAL Amend \$ .69 /BSF \$ 36,675 Spl. Cond. B. \$ 14.43 /BSF \$ 761,816 TOTAL PROJECT EST. \$ 160.99 /BSF \$ 8,500,128 BID DATE: 5-14-75 A-6/27/75 C 4/15/77 AWARDED TO Frank Briscoe, Inc. \$ 8,733,300 CONSTRUCTION TIME SPAN: 600 CALENDAR DAYS NO. OF BIDDERS: 12 POSITION OF GOVT. EST. 1 PERCENT DIFFERENCE: 14.1% AWARD BID AND GOVT. EST. 2.7
7. MOISTURE PROTECT.	52,800	SF	9.61	9.61	507,635	1,808,191	2,634	KVA	418.	20.83	1,100,067	Gov't. Estimate 8,500,128 Frank Briscoe, Inc. BIDDERS 8,733,300 Continental Consol. 9,074,000 Tuttle White Con. Co. \$ 9,095,000 J.A. Jones Con. Co. \$ 9,169,000 Butler & Oenbrink \$ 9,199,000 Bay-Con General \$ 9,462,000 McCoskey Co. Inc. \$ 9,623,000 McManus Longe, Brockhall \$ 9,690,000 R&D Constructors, Inc. \$ 9,715,000 Greenhut Con. Co. (H) \$ 9,744,600 Morrison-Knudsen, Inc. \$ 10,592,000	
8. DOORS & GLASS	37	EA	9830	6.89	363,707	1,808,191	2,634	KVA	118.35	5.90	*311,745		
9. FINISHES	30	EA	410.37	.23	12,311	1,820,502	225	EA	37.19	.16	8,368		
10. SPECIAL DOORS	6	EA	74.50	6.36	335,997	1,820,502	310	LF	14.81	.09	* 4,492		
11. EQUIPMENT	288	SF	8.81	.05	2,537	1,823,039	17	EA	.920.	.30	15,639		
12. FURNISHINGS	1	EA	12,862	.24	12,862	1,835,901	6	EA	1092.	.12	6,553		
13. SPECIAL CONSTR.													
14. CONVEYING SYS.													
15. MECHANICAL													
16. ELECTRICAL													
17. LIGHTING FIXTURES													
18. CABLE & WIRE													
19. CONDUIT & CABLE TRAY													
20. EXTER. SVCS. LIGHTING													
21. UNIFORM PWR.													
22. UCS (CCS)													
23. SUB STA.													
24. RECEPTACLES													
25. DUCT													
26. PANEL BOARDS													
27. FMR & SWITCH													
28. OTHER MISC.													
PROJECT TOTALS										7,701,637			

**Way # 100.** He rounded his bid down to an odd number such as 7 with no zeros. He knew his main competition always rounded to even zeros. A check on other bid projects with some bidders also shows this bit of rounding. My boss, “the church builder” also told me of this many years ago. They liked 7’s and 9’s, too. (This was also noted in the SRB rotating processing facility bid 3/29/82 with two low bidders tied at \$7,247,000, causing NASA and the two low bidders lots of extra work (see system summary APB, Vol. 3, pages 42 - 46 and reference 31).

<b>BID ABSTRACT</b>			
The bids for LC-36 Ready Room Refurbishment were:			
1.	Low bidder	264,887 odd	8. 291,341 odd
2.	(zeros)	265,000 even	9. 293,808 even
3.	(zeros)	268,900 even	10. Gov Estimates 309,640 even
4.	(zeros)	279,500 even	11. 319,876 even
5.		287,301 odd	12. 333,700 even
6.	(zeros)	287,730 even	13. 373,943 odd
7.		290,699 odd	14. 379,000 even

Notice how many rounded to even zeros - and the 5 bidders with odd numbers.

**Way #101.** On mods and refurbishment projects, he also noted it is easier to make money on change orders. In checking this project out, it was discovered the close-out cost was 39% over the original bid. So he did make a good profit on change orders.

**Way #102.** Used a unique asbestos removal method - cut and bag - it, and removed to eliminate excessive upgrading cost.

**Way #103.** Did it themselves - not subcontracting it out. Other bidder used specialized asbestos contractor bids.

In summary, four new important points to remember:

1. Good detail planning and scheduling like CPM (Critical Path Method) in bidding and construction pays off in more profits when you can plan and finish a job early; but most important is actually doing it—like on the OLF runway and the space station processing facility where they planned on finishing early, but in their CPM and at the pre-award conference, noted they would start the punch-list inspection six months earlier than normal and they actually finished the project several months early.
2. The second important point is that, on many jobs, it is not just one way that helps the low bidder get low and make money, it may be 5 to 10 ways - like the runway - 10 ways, the VAB - 8 ways, or SSPF - 18 ways.
3. The third point is why a 60-minute video is important for contractors, educators, government, cost estimators, and cost engineers, and aerospace managers, etc. Your time is important, and with the work at \$20 to \$100 per hour, you can spend 10 hours to 1,000 hours getting and reading the over 30 technical papers and reference books or you can get this video for 10 hours of your \$35.00/hr. time and spend one hour on it. The video package will include over 35 important references, over 40 pages of technical reports, summary of five detail cost estimates - the actual successful cost estimates used on these projects and budgeting for future jobs. What better case stories and answers can you ask for?

## Video Epilog

4. A fourth important point is a Caution For All Bidders: Excessive claims and change orders can cause an otherwise successful and profitable job to turn sour. One case comes to mind where a minor sub-contractor claimed several million dollars' worth of extra costs. An independent evaluation showed the claim was excessive at 10 to 17 times bid costs. This claim may end up in the courts. It is most important that all claims and change orders be fair and reasonable for the government, owners, architects, engineers, contractors, sub-contractors, and construction workers. Part 2, 3, and 4 of this low bidder series may be useful when and if that case (excessive claims) goes to court in 1997, 1998, or 1999, and, therefore, may also become a controversial series for its documentation, revealing secrets, methods, and bid strategy.

## SUMMARY

In summary, Part 2 of this 4-part series gives examples of some of Joe Brown's "Keys to Successful Construction and Bidding," such as, Key #15 - Construction Methods, - the Galaxy Crane, Key #12 - Computerization on the OLF Runway, and Key #11 - Detail Planning and Scheduling CPM, Key #2 - Imagineering - Designing and Engineering A New Lifting Device - Galaxy Crane, Key #14 - Bidding Strategy, rounding his bid down to odd numbers. With the *Low Bidder* video, you can see the Galaxy crane in action along with unique concrete forms, the siding rail cars, paving machines, and team work—construction methods for more successful bidding and construction. You can see that the selection of the best low bidder ways and the right combination of the construction and bidding keys can be critical in successful construction at a profit.

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 A video for Global Competition

Professional Experience: Joseph A. Brown, CCE has prepared and reviewed construction cost estimates amounting to over \$8 billion. He is a graduate of the University of Florida, BBC (1959). He has been a consultant to commercial, industrial, and residential complex interests, including work for the Walt Disney World Contemporary Resort Hotel. He has received AACE's Fellow Award, the Charles V. Keane Distinguished Service Award, the prestigious astronauts "Silver Snoopy," and the NASA Commendation Award for professional excellence and his contributions to the success of the manned space efforts. He has successfully prepared estimates for the U. S. Army Corps of Engineers and Air Force facilities. Mr. Brown has written a six volume estimating workbook. He was formerly employed by NASA at Kennedy Space Center, where he specialized in construction cost engineering as Senior Advisor and Coordinator for Development of Cost Engi-

neering and Estimating and presently is a construction cost consultant. He has just completed an estimating and bidding strategy video, "How Does the Low Bidder Get Low and Make Money?" - fifteen case studies, over 70 ways low bidders got low for: offices/warehouses, schools, big buildings, VAB, space station processing facility, launch Pads 39 A and B, airports, runways, and aerospace landing facilities. He is documenting the over 40 engineers, contractors, and government estimating tools he created and helped to develop.

Education: Bachelor of Building Construction, BBC, 1959, University of Florida

Professional Society Affiliations: AACE International Member - certified 1976-1997  
Society of Cost Estimating & Analysis - Member

Seminars: 34 cost engineering seminars, U. S., Canada, AACE, Colleges and Universities  
Over 1000 students, from 17 countries, 6 Continents

Publications, Papers, and Patents: 30 Technical papers on cost engineering, etc., five NASA  
Technical Briefs - published, low bidder video - 1996.

Honors Received: AACE "Fellow," "Silver Snoopy," Charles V. Keane Distinguished  
Service Award, NASA Commendation Award

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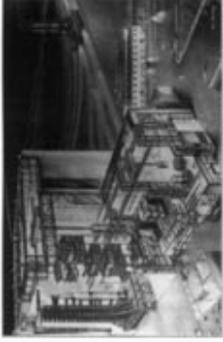
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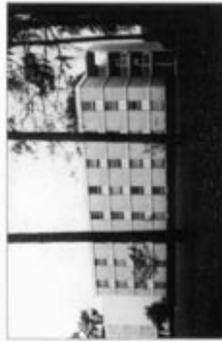


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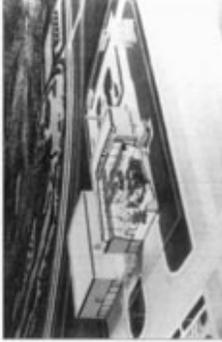


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