Steven Winter Associates, Inc.
Building Systems Consultants

Cost Analysis

Conner Homes Demonstration Project

Incorporating Proposed Changes
to the HUD Mobile Home
Construction and Safety Standards

H-5533
B.1.31.007
TASK 3

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9 February 1984

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EXECUTIVE SUMMARY

The report constitutes the final addition to the open docket of the August 16, 1983 proposed rulemaking by HUD on the Mobile Home Construction and Safety Standards.

A demonstration project was conducted to verify the estimate of the proposed consumer cost impact previously issued by HUD under contract HC-5491.

Table 4 of this report details the comparison of consumer cost impacts using several methods of calculation. It is shown that the long term production impact of the proposed changes on the demonstration program models is less than $100.00.

SECTION I

INTRODUCTION

On August 16, 1983, HUD published in the Federal Register a series of proposed changes to the current version of the Federal Manufactured Home Construction and Safety Standards (CFR Vol. 48, No. 159, page 37,136 - 37,195). Among the supporting documentation for that proposed rulemaking was a report* projecting the cost impact of a series of proposed changes on typical homes built by the manufactured housing industry. The projected costs of several of these changes proposed by HUD were disputed by industry sources and, as a result, HUD arranged to conduct a Demonstration Project in association with the Manufactured Housing Institute (MHI) and the Conner Homes Corporation in order to attempt to verify the accuracy of HUD's cost projections. This Demonstration Project involved the construction of both "standard" units (built to Conner Homes' typical specifications) and "demonstration" units (incorporating many of the changes included in the proposed rulemaking).

The construction of the units took place during the week of November 28, 1983 at the Conner Homes plant in Newport, N.C.

Steven Winter Associates, Inc., under contract to HUD to assist in the evaluation and verification of the cost of the proposed changes, has prepared this report in order to document and summarize the results of the Demonstration Project. The estimated cost of the proposed changes that Steven Winter Associates has developed reflects its best efforts to assign values to the individual changes.

Steven Winter Associates, Inc., has made no attempt to justify or place value on the cost-effectiveness of the specific changes; rather we have limited our analysis to the actual cost impact as measured by the Demonstration Project.

* Cost/Benefit Analysis of Mobile Home Regulations, prepared jointly by Technology, and Economics, Inc., of Cambridge, MA., and Steven Winter Associates, Inc., of New York City, under Contract HC-5491. This report is referred to below as the 1982 T&E/SWA Report.

SECTION II

DEVELOPMENT OF THE PROPOSED DESIGN

HUD staff identified a total of approximately 200 proposed changes in the draft standards that potentially impacted the design and/or construction of a manufactured home. These HUD-identified changes ranged from minor editorial changes to more significant items, such as changes to transportation requirements, energy conservation levels, and formaldehyde control, each of which could potentially require major consideration by industry professionals. The specific homes to which these various changes would be applied, and which would then be evaluated in the demonstration project, were selected by M.H.I. from the standard production models of Conner Homes Corporation.

Each of these proposed changes was then evaluated for applicability to the models selected in a series of meetings with Conner Homes Corporation personnel and technical representatives of HUD.

HUD determined that all of these changes fell into one of three categories: 1) Design changes necessary to meet the proposed standard; 2) Present construction meeting proposed standards; and 3) Proposed standards not covered. Each of these categories of proposed changes as they relate to designs of Conner Homes Corporation is briefly discussed below.

DESIGN CHANGES NECESSARY TO MEET THE PROPOSED STANDARD

More than thirty proposed changes required a change in the design of the standard Conner Homes Corporation unit in order to either bring the home into compliance with the proposed standards, or to demonstrate the cost savings due to the added flexibility or the deregulatory nature of the proposed standards.

The demonstration homes were modified to incorporate these design changes. As described below, in the Section entitled "Details of the On-Site Cost Analysis and Data Collection Process," an inspection and material count was made during the production phase of the Demonstration Project to assign costs to these individual changes. Each of these design changes, as they were incorporated into the single wide and the double wide homes, are listed in Appendix I and II, and were provided to SWA by HUD staff.

PRESENT CONSTRUCTION MEETING PROPOSED STANDARDS

Some combinations of the existing design, material selection, quality control program or customer amenity package of Conner Homes Corporation were determined to be already sufficient to comply with the proposed standards. For more than 50 of the changes included in the proposed

standards, HUD determined the present practice of Conner Homes to be acceptable. For this reason, the demonstration homes were not modified. For a listing of these items, as provided by HUD, refer to Appendix III. In the section of the report entitled "Details of Process Utilized for On-Site Cost Analysis and Data Collection," the estimated cost impact of each of these changes is detailed.

PROPOSED STANDARDS NOT COVERED

The remainder of the proposed changes identified by HUD were not included in the Demonstration Project. The reasons for not considering these changes fell primarily into seven categories: 1) Many changes were primarily editorial in nature and did not require any change in the design of a home; 2) some changes only affected the paperwork, forms, and certificates that are a part of the HUD standard compliance process; 3) some changes required the use of new or changed materials that were not available to the manufacturer; 4) certain changes involved optional changes that the manufacturer chose not to implement primarily for marketing reasons; 5) some changes were not applicable due to geographical design consideration; 6) certain changes were not applicable to the specific designs being evaluated; and 7) funding was not available to evaluate certain proposed testing criteria. Appendix IV of this report includes a summary list of the proposed standards not covered by this Demonstration Program. For additional detail, the package of HUD-approved documents contains a complete analysis of each of these items.

DISCUSSION OF UNIT DESIGNS

o Instances of Over-Design

Conner Homes Corporation decided on the specific details incorporated into the designs of the standard homes. Where details exceeded the HUD minimum proposed standards (such as upgraded floor joists in the single section homes), they have neither been deleted from the design, nor factored out of the base cost of the two standard units. The result of this is that "base costs" of the standard homes are somewhat above the cost to construct homes which just meet the minimum requirements of the standards.

o Instances of Under-Design

During the intense engineering review of the standard units, certain aspects of the approved designs or production practices where identified as possibly being less than would be required for minimum HUD-Code compliance (such as insufficient wind load resistance or an inadequate number of shear walls). These items have not been added to the Conners standard design or to the base cost of the standard units.

o Optional Features Permitted by the Proposed Standards

This Demonstration Project involved a comparison between two homes, the standard units, as manufactured by Conner Homes Corporation and the same two units as modified by HUD to conform to the proposed Manufactured Housing Construction and Safety Standards (MHCSS). Where the proposed MHCSS provides an option, such as deletion of bedroom closets, or relocation of utility connection locations, Conner Homes Corporation had the choice whether or not to incorporate such an option in the revised homes.

o Limitation of Some Changes to Conner's Design

It should be noted that there are several proposed changes in the categories of "Design Changes" and "Proposed Standards Not Covered" that only impact particular designs of a given manufacturer, or possibly, only have an impact if the manufacturer chooses to incorporate them into a given design. For example, a series of items that provide design flexibility is included in the proposed standards. For a manufacturer that does not choose to take advantage of such flexibility, neither any associated added costs nor any savings will be incurred. In this Demonstration Project, several of these items have had a cost impact, including the following:

o Examples of Design Flexibility

1) The proposed standard, for example, allows the use of an air gap, or a "high loop" on a built-in dishwasher. For a unit designed without a dishwasher there is clearly no impact of this proposed flexibility. For a unit designed with a dishwasher that includes an air gap, the choice by the home manufacturer not to switch to a high loop would reflect no cost impact of this proposed flexibility.

   For a home manufacturer who includes an automatic dishwasher installed with an air gap, this proposed flexibility provides an opportunity to evaluate the cost, marketing, and production of a different approach and leaves the decision of making a change in the hands of the home manufacturer. In the case of Conner Homes Corporation, this particular home design, in this particular Demonstration Project, this high loop/air gap example (see item G-10, Table 3) results in a small, per home, cost savings.

2) In another case, such a decision to implement a "flexibility item" has led to increased costs. The proposed standards provide three alternative means of demonstrating that a particular home design complies with the transportation requirements of Subpart J. A manufacturer can demonstrate compliance:
   1) by calculation
   2) by testing
   3) by maintaining a proven track record of prior damage-free transportation of the same home design.

The particular home designs chosen for the demonstration project were not untried designs, but rather were identical to designs from Conner's standard model line and had been transported many times before. Thus, it would have been perfectly acceptable to base a demonstration of compliance with the proposed transportation portions of the standard on the prior experience of Connor's with these home designs.

Such an approach in this Demonstration Project would have resulted in no additional costs but would have left the proposed modifications to the transportation portion of the proposed standards undemonstrated. In the interest of providing more information through the Demonstration Project, the decision was made, by HUD and Conner, to demonstrate transportation compliance through the calculation method.

Such a decision has implications on the cost of the design of the unit, and possibly on the production of the unit. Without question, HUD incurred costs in the preparation of the engineering calculations necessary to determine if the particular designs, both single and double wide, did in fact comply with the proposed transportation criteria.

When the engineering calculations resulted in requirements for design changes (see item J-4, in Tables 2 and 3), further design costs were incurred by HUD and Conner Homes. Finally, as these modified units (i.e., with the transportation design changes incorporated) are constructed in the production plant, real labor and material cost impacts are measurable.

Of the three types of costs, the latter are included in both Tables 2 and 3. Extra costs to Conner Homes Corporation for design and material specification changes are absorbed in the "overhead multipliers" and shown in Table 4.

The costs incurred by HUD for engineering and design are not included in this report.

SECTION III

DESCRIPTION OF FACILITIES AND AVAILABLE RESOURCES AT CONNER'S MANUFACTURING LOCATION

GENERAL

The demonstration project took place at the manufacturing facilities of Conner Homes Corporation in Newport, N.C. The plant site consisted of three main buildings, miscellaneous small structures and sheds, and a railroad siding servicing the property. As shown in Figure 1, the main buildings were all in close proximity to each other.

Plant A was the site of the construction of the double wide units, and contained the production offices of Conner Homes Corp. Plant B, the newer of the two buildings, was the site for the construction of the single wide units.

Both Plant A and Plant B were served by a single frame shop that constructed all of the various sized frames used by Conners.

USE OF PLANTS FOR DEMONSTRATION PROJECT

Plant B is used to construct larger single wide homes with widths up to 16 feet and lengths up to 74 feet. Plant A was formerly the Conner Homes Corporation double wide plant but is now typically used to construct smaller single wide homes of widths up to 14 feet. The use of Plant A, and its production crew for the construction of two double wide units in the midst of a single wide assembly line, thus represented an unusual situation. This unusual plant and crew utilization would adversely influence the production efficiency of any double wide units inserted into the line, and in particular a "special" unit attended by extra inspectors and outside observers.

PLANT SHIFTS AND CREWS

The Conner's facility is staffed by two full shifts each day, five days a week. The normal payroll is about 650 persons, with a larger crew working the day shift than on the evening shift. Work schedules for the two shifts are as follows:

	First Shift	Second Shift
Shift Start	7:00 AM	4:00 PM
First Break	9:20-9:30	6:00-6:10
	or 9:40-9:50	or 6:20-6:30
Meal Break	11:30-12:00	8:00-8:30
Second Break	1:30-1:40	10:00-10:10
	or 1:50-2:00	or 10:20-10:30
End of Shift	3:30 PM	12:30 AM

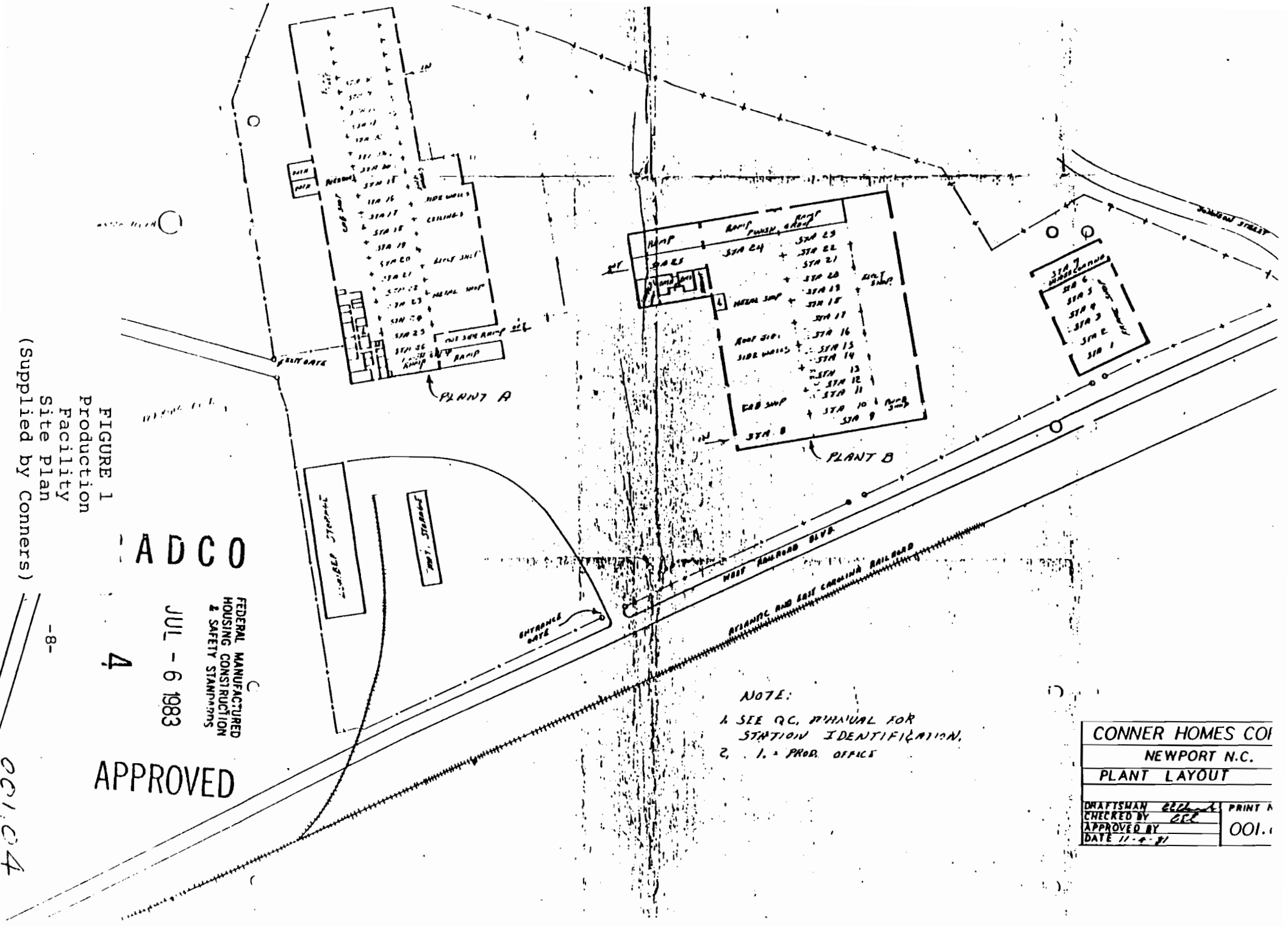

FIGURE 1
Production
Facility
Site Plan
(Supplied by Conners)

001.C4

OVERALL PRODUCTION TIME OF ALL UNITS

As noted in Table 1, the above referenced breaks, meals, and shift changes are deleted from the recorded production time needed to construct the various units. Table 1, thus provides an actual record of the time each unit was on the line and available to be worked on by the production crew.

o IMPACT ON PLANT LABOR OF DEMONSTRATION PROJECT

The production labor supplied by Conners for this Demonstration Project was identical to the production crew normally working on the two assembly lines. No additional production personnel were added and the hourly payroll was not increased. Due to the special attention received by these four units (two standard units, and two demonstration units), supervisory staff worked beyond their usual schedules, but this did not add to the plant payroll total.

SECTION IV

DETAILS OF THE ON-SITE COST ANALYSIS AND DATA COLLECTION PROCESS

DEMONSTRATION PROJECT PERSONNEL

Representatives of Steven Winter Associates, Inc. were physically present at the Conner Homes plants during the entire time needed to construct the four different homes. Mr. Alexander Grinnell, a registered architect, monitored the construction of the two single wide homes in Plant B. Mr. Donald Carr, a graduate civil engineer, monitored the construction of the double wide homes in Plant A.

In addition to the representatives of Steven Winter Associates, Inc., HUD was represented by Mr. Richard Mendlen, Standards Officer of the Office of Manufactured Housing and Construction Standards. A team of inspectors, headed by Mr. Ashok Goswami, repesented the National Conference of States on Building Codes and Standards (NCSBCS). NCSBCS assumed the responsibility for assuring that the demonstration homes were constructed in accordance with the approved plans and specifications.

A team of observers from the manufactured housing industry also attended. Mr. Charles Muessig and Mr. Frank Walter were present during the entire production process.

Conner Homes Corporation was represented by Mr. John Swecker, the Senior Vice President of Manufacturing. Radco, as the IPIA under contract to Conner Homes, was represented by Mr. Henry Omson and Mr. Duane Keplinger.

DETAILS OF HOME CHARACTERISTICS

The single wide homes measured 68 feet long and 14 feet wide, and in the material that follows will be referred to as the 6814 Standard Home and the 6814 Demonstration Home.

The double wide homes measured 52 feet long and 24 feet wide, each half built on two 12 foot wide frames. Each double wide home, thus, has an A side, and a B side. In the material that follows, these four frames will be referred to as the 5224 Standard Home A, the 5224 Standard Home B, the 5224 Demonstration Home A, and the 5224 Demonstration Home B.

COMMENTS ON THE LABOR COST ISSUE

Prior to the commencement of the production phase of the project, the issue of how to identify and record the labor costs related to the design changes resulting from the proposed standards was extensively discussed. One option discussed was to actually measure the time

required of each worker involved in work on any of the design change items, first on the standard home, and then on the demonstration home. By applying the total hourly cost to Conner of each such worker, two separate labor costs could be determined, one each for the standard and the demonstration home, on an item by item basis. The option was not used as it was generally agreed that this approach would be impractical to implement and would not produce reliable results because it could not accurately consider the learning curve issue.

Another approach, and the one ultimately used, was to follow the procedure currently in use by Conner Homes Corporation, in which an experience-based multiplier was applied to the direct material costs after appropriate adjustment for material waste. HUD decided that this was an acceptable approach after verification at the production facility of the following items:

1. The same production crew, with the same total labor cost, constructed both the standard units and the demonstration units.

2. The total overall time to construct both the standard and the demonstration units was substantially the same.

Table 1 indicates the overall production time requirements to construct the six separate frames that make up the four homes in this Demonstration Project. As can be seen, the demonstration homes were produced in times very comparable to the standard homes.

THE FOCUS OF THE REPORT ON COST DIFFERENTIALS

By the commencement of the actual production phase, many design and material issues had been addressed and resolved. The resolution of these issues, such as transportation calculations, wind load calculations, and thermal requirements, effectively narrowed the focus of the data collection requirements to the final list of design changes necessary to permit the demonstration homes to comply with the proposed standards.

TABLE 1

Production Time Requirements to
Construct Single and Double Wide Homes

Frame Designation	Time in to Frame Shop	Time on the Line	Time out of Main Plant	Total Elapsed Production time (hours:minutes)
Single Wide Standard	11/28, 8:05am	11/28, 2:00pm	11/29, 4:00pm	21:15
Single Wide Demo	11/28, 8:05am	11/28. 3:00pm	11/29, 5:30pm	21:10
Double Wide Std "A"	11/28, 8:05am	11/28, 2:15pm	11/30, 12:00am	25:35
Double Wide Std "B"	11/28, 10:05am	11/28, 5:05pm	11/30, 9:10am	27:00
Double Wide Demo "A"	11/28, 11:25am	11/28, 6:00pm	11/30, 11:23am	27:18
Double Wide Demo "B"	11/28, 8:05am	11/28, 7:46pm	11/30, 12:20pm	28:29

Note: Elapsed time does not include breaks, lunches, shift changes, time waiting to go on to production line, or time in paint shop.

Elapsed time does include any waiting time on the production line itself.

As the cost estimating contractor, Steven Winter Associates, Inc., was under contract to document the additional costs or the cost savings attributable to the changes to the demonstration homes. The cost of the standard homes, both single wide and double wide, was to be accepted as the base measurement cost. The intent of this report is to analyze the cost differences between the standard home and the demonstration home, and as such, it will not reference the total cost of either home.

ON SITE TASKS

The primary task of the cost contractor was seen to be two-fold:

First, Steven Winter Associates, Inc. would verify the unit cost information contained on the Conner Cost Sheets (CCS) in order to satisfy HUD that the CCS could be accurately used as a basis for developing item-by-item cost differences. This was accomplished by a thorough examination of the vendor files, the material quotes and various material supply contracts maintained by Mr. Butch Hooker of Conner Homes. The cost contractor and the HUD representative were satisfied that the CCS accurately represented the true Conner materials costs and thus could be used as a basis for this report.

Secondly, Steven Winter Associates, Inc., would document and record all materials incorporated into the homes that were related to the design changes caused by the proposed standards. This was accomplished and the results have been incorporated into the following Tables 2, 3, 4, and 5. Each of these tables is reviewed in the following pages and the conclusions based on the on-site data collection are contained in Section VII.

INCLUSION OF EDITED VERSIONS OF CONNER COST SHEETS

Appendices V and VI are edited versions of the CCS, with Appendix V being a material description and quantity list for all items utilized in the 6814 Standard Home, and Appendix VI being a material description and quantity list for all items utilized in the 5224 Standard Home.

It should be noted that the material price information for each of the items in both these appendices has been deleted from this report to protect, to the extent possible, the confidentiality of information not absolutely relevant to the proposed standards and the related cost items.

RELATIONSHIP OF CONNER COST SHEETS TO REPORTED COSTS

The material quantity information contained in Appendices V and VI is based on previous take-off and factory material counts made by Conner personnel for their normal business operations. While such material

quantity information is useful as a guide in this Demonstration Project, the actual quantitites for the affected items on both the standard and the demonstration homes are based on material counts, completed in the factory, by the cost contractor.

SECTION V

SUMMARY OF EXTRA COSTS REQUIRED
TO CONSTRUCT DEMONSTRATION HOMES

The material cost impacts of the proposed standards are detailed, on an item by item basis, in Tables 2 and 3. For the single wide unit in Table 2 and the double wide unit in Table 3, there is a listing of all "Design Change" items and the "Present Construction" items. For each item number, (D-6, I-24, etc.), the following information is provided:

Item Description: A brief description is provided here with more detail included in Appendix I, II or III.

Material Cost, Demo Unit: The observed and recorded material cost differential between the Conner's Standard Design and the special Demo unit for this item are included here. In some cases, new materials were added. In other cases, the recorded cost difference reflects the substitution of one material for another. Both extra costs and cost savings are shown here. Back up calculations may be found in Appendix VII and VIII.

Projected Material Cost, Production Unit: Again, this is the material cost differential. However, this column shows the difference between the Conner's Standard design and the special demo unit constructed under production conditions when change-over problems have been worked out by the manufacturer, and the special demo unit is being manufactured repetitively. Differences between the Demo unit and the Demo Production unit costs are explained in the "Remarks" column of Tables 2 and 3, as well as in Appendix VII and VIII.

1982 T&E/SWA Material Cost: A review of the items in the 1982 Cost/Benefit report was undertaken to match up the items included therein with the items included in the currently proposed standard. Where similar items could be identified the costs from Table 2-1 of the 1982 report are listed beside the comparable item from the 1983 Demonstration Project.

1982 T&E/SWA Item No.: For those 1982 costs listed in the previous column, this column merely identifies the 1982 T&E/SWA item number.

As can be seen, Tables 2 and 3 include both "Design Change" and "Present Construction" items. Clearly, in the Demonstration Project, the cost difference between Conner's normally incurred costs for an item, and the same item in the Demo unit, is zero as long as HUD's present minimum requirements and HUD's proposed minimum requirements do not impact what Conner's actually does in the factory.

For example, HUD has proposed an increase in the minimum type of carpeting permitted in any manufactured home. Conner, as a standard practice, provides carpeting that is better than the currently required

minimum, and even better than the up-graded minimum proposed by HUD. In this case, the cost for Conner to comply with HUD's proposed carpet up-grade is zero, since Conner's present construction meets the proposed standards.

The details of each of these "Present Construction" items may be found in Appendix III. As noted before, where comparable items could be identified in the 1982 T&E/SWA report, the associated costs are included in Tables 2 and 3, in the appropriate column.

Table 2

MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
DESIGN CHANGE ITEMS						
B-2	Delete storms	($6.72)	($6.72)	$ 2.26	7	
D-6	Add corner straps	1.36	1.36	3.43	45	
D-12	Vinyl flooring in bath	34.51	14.00	0.15	48	For production unit, use more economical grade of flooring
D-13	w/o area carpet deletion	3.00	1.50	NA	48	For production condition, assume 50% salvage of carpet material.
D-18	Material mods. for formaldehyde certification			38.80	40,40-1	
	Substitute certified paneling for uncertified V.C.P.	(21.26)	-0-			Temporary action for demo. program
	Delete "Feature Wall"	(22.61)	-0-			d.o.
	Add "tub surround	80.00	-0-			Delete tub surround in production units using certified v.c.p.
	Premium Costs for certified:					Production case assumes certification program cost of $1.00/MSF for paneling and $0.50/MSF for particle board.
	Paneling	-0-	2.09			
	Particleboard	-0-	0.50			
	Vinyl covered plywood (VCP)	-0-	0.30			No costs are included for any product improvement, per mfgr. estimate
	Cabinet mat'l.	-0-	-0-			included w/particleboard

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
E-1	New test requirements for bow trusses	-0-	-0-	NA	55	Some future re-certification costs are possible
E-5	Formaldehyde test methods	-0-	-0-	NA	40	Costs are included in D-18
F-4	Provide kraft-faced batts for wall vapor barrier	10.92	10.92	-0-	64	
F-9	Storm windows not req'd on small windows	-0-	-0-	NA	68	Cost saving is included in B-2
G-1	Main water shut-off valve	6.50	4.58	3.34	85	Quantity purchase discounts considered in production case.
G-2	Provide heat tape	9.25	8.79	4.68	77	d.o.
G-17	Substitute long turn ells for short turn ells	0.38	-0-			see remark for G-1. Savings can be expected in prod.case
I-11	Delete wall receptacle as shown	(1.72)	(1.72)	(3.70)	132	
I-17	Modify attachment method of cable	-0-	-0-	NA	NA	Small labor savings are included in labor multiplier
I-19	Tolerance limits at receptacles	-0-	-0-	NA	140	Existing snap-in boxes comply w/change
I-24	Exterior light cover (tempo.)	-0-	-0-	NA	NA	

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
J-4.1	Eliminate wall paneling joints at door and window jambs	1.63*	-0-	7.50	144	All J-4 costs indicated by an asterisk (*) are the result of a decision to meet the proposed transportation requirement of the standards by calculation, in lieu of qualification by previous experience. Production situation assumes qualification by previous experience.
J-4.2	Rim joist reinforcement	12.60*	-0-		144	
J-4.3	Top plate reinforcement at doors and windows	5.74*	-0-		144	
J-4.4	Change wall"C" to shear wall, double floor joists	2.55	2.55		144	Shear wall is required by current wind requirements and is not related to transportation
J-4.5	Add paneling under gypsum as shown	30.41*			144	
J-4.6	Upgrade 12 floor joists in axle area from #3 to #2	-0-*			144	Both std. and demo. units used all #2 mat'l.

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
J-4.7	Delete 2x2 tube and angle brachets	(25.82)*			144	
J-4.8	Relocate out-riggers and spring hangers	-0-*	-0-		144	
J-4.9	Modify various interior shearwall fastener require-ments	-0-*	-0-		144	For manufacturers not utilizing a fastener and staple allowance this may have a cost impact
J-4.10	Modify various end wall fastener requirements	-0-*	-0-		144	d.o.
J-4.11	Upgrade fastener schedule, rim to floor	-0-*	-0-		144	d.o.
J-4.12	Upgrade fastener schedule, rim to sidewall	-0-*	-0-		144	d.o.
J-4.13	Modify floor framing at Wall "C"	-0-	-0-		144	Costs included in J-4.4
J-4.14	Upgrade floor joist as shown	-0-	0.11		144	See remark for J-4.6
Sub-total	Extra material costs for all design changes on demo unit	$120.72	$38.26			

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
Sub-total	Extra material costs for comparable items from T&E report			$56.46		
PRESENT CONSTRUCTION MEETING PROPOSED STANDARDS						
B-6	Revise minimum egress dimensions	-0-	-0-	NA	11	
B-7	Lower maximum egress latch height	-0-	-0-	-0-	13	
B-11	Kitchen and bath req'd in all units	-0-	-0-	NA	17	
B-17	Updated reference for glazing std.	-0-	-0-	NA	21	
C-4	Lowered interior flame spread requirements	-0-	-0-	0.21	24	Some future impact for re-certification. Most alternative mat'ls comply w/ 75 or less requirements
C-7	Required carpet certification	-0-	-0-	NA	29	If a future independent certification program is initiated, minor costs may be incurred
C-11	Revised Reference Standards	-0-	-0-	-0-	NA	

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
C-12	Qualifications of fire test agencies	-0-	-0-	0.28	34	
D-3	Minimum adhesive std.	-0-	-0-	1.46	47	Some future cost, per gallon, may be incurred with anticipated certification
D-4	Clarification on support of load bearing mat'ls	-0-	-0-	-0-	NA	
D-5	Clarify procedure for determination of lumber moisture content	-0-	-0-	NA	41	
D-10	Provision of ASTM adhesive std.	-0-	-0-	-0-	47	See remark for D-3
D-14	Requirement to roofing in accordance with mfgrs. instruction	-0-	-0-	-0-	NA	
E-2	Revision of Window Standards Reference	-0-	-0-	-0-	60	Future one-time costs expected to re-certify to AAMA stds.

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
E-3	Requirement for operation check of egress windows	-0-	-0-	NA	62	
E-4	Egress device certification	-0-	-0-	NA	62	Future costs to comply with passage door cert. program anticipated
F-8	Infiltration resistant joints	-0-	-0-	NA	NA	Overhead costs for engineering calcs.
F-10	Revised infiltration heat loss equation	-0-	-0-	-0-	73	
F-12	Alternate heat loss calculations	-0-	-0-	NA	NA	
G-3	Insulated water pipe requirements	-0-	-0-	2.07	79	
G-4	Plumbing stds. reference	-0-	-0-	NA	NA	
G-9	Access to diverter valves	-0-	-0-	NA	83	
G-11	Revised plumbing supports	-0-	-0-	(6.01)	84	
G-12	Water heater relief drain	-0-	-0-	NA	86	
G-13	Nominal pipe sizing	-0-	-0-	NA	88	
G-16	Equivalent sweep for fittings	-0-	-0-	NA	NA	

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
G-18	Water heater pressure test exemption	-0-	-0-	NA	92	
G-19	Plumbing fixture tests	-0-	-0-	NA	93	
H-25	Door opening measurement clarification	-0-	-0-	NA	118	
H-26	Adjustable registers requried	-0-	-0-	0.91	120	
I-7	Separate laundry receptacles	-0-	-0-	NA	127	
I-10	Required laundry receptacles	-0-	-0-	NA	NA	
I-18	Outlet box brace requirements	-0-	-0-	NA	136	
I-21	Electrical test requirements	-0-	-0-	NA	NA	
I-22	Visual polarity checks permitted	-0-	-0-	NA	139	
I-23	Exterior outlet requirements	-0-	-0-	NA	134	
J-5	Drawbar strength requirements	-0-	-0-	1.99	148	
J-6	Running gear design	-0-	-0-	NA	145	

Table 2
MATERIAL COST IMPACT
ON
SINGLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
J-7	Welding of Spring hangers	-0-	-0-	-0-	151	
J-8	Tire capacity	-0-	-0-	NA	154	
J-11	Axle requirements	-0-	-0-	NA	152	
J-13	Lug bolt torque	-0-	-0-	NA	NA	
J-14	Brake axle requirements	-0-	-0-	NA	156	
J-15	Parallel brake wiring requirements	-0-	-0-	NA	NA	
Subtotal	Mat'l costs for present const. Items	-0-	-0-			
Subtotal	Extra material costs for comparable items from T&E report			$ 0.91		
Total	All extra mat'l costs for demo unit	$120.72	$38.26			
Total	Extra mat'l costs for all comparable items from T&E report			$57.37		

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
D-12	Vinyl flooring in bath	-0-	20.22	0.15	48	Both std. and demo units had sheetgoods under carpeting. In production unit, lower grade of sheetgoods is assumed.
D-18	Material mods. due to formaldehyde certification			46.98	40,40-1	
	Substitute certified paneling for uncertified V.C.P.	(31.16)	-0-			Temporary action for demo. program
	Add tub surround in bath	144.32	-0-			Delete tub surround in production units using certified V.C.P.
	Premium cost For certified:					Production case assumes certification program cost of $1.00/MSF for paneling and $0.50/MSF for particleboard
	paneling		2.89			
	particleboard		0.61			
	vinyl covered paneling (VCP)		0.36			
	Cabinet mat'l		-0-			included in particleboard
E-1	New testing reqm'n'ts for mono-pitch trusses	-0-	-0-	NA	55	Some future re-certification costs are possible
E-5	Formaldehyde test methods	-0-	-0	NA	40	See costs in D-18
G-1	Master cold water shut-off valve	6.50	4.58	3.34	85	Reduced for quantity purchases

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
G-2	Provide heat tape	9.85	8.79	6.47	77	d.o.
G-10	Delete air gap	(0.15)	(0.15)	(2.28)	82	
G-17	Substitute long turn ells for short turn ells	0.46	-0-	NA	91	Quantity purchase eliminates extra cost in production case. Savings can be expected under production conditions.
I-17	Modify elec. wire support requirements	-0-	-0-	NA	NA	
I-19	Elec.Receptacles tolerance limits	-0-	-0-	NA	140	Existing snap-in boxes comply w/change
J-4.1	Eliminate wall paneling joints at door and window jambs	54.00*	-0-	13.19	144	All J-4 items indicated by an asterisk (*) are the result of a decision to meet the proposed transportation requirements by calculation, in lieu of qualification by previous experience.
J-4.2	Reinforcement of Rim Joist/Wall Connection	16.88*	-0-	-	144	
J-4.3	Provide paneling under gypsum as shown	28.46*	-0-	-	144	
J-4.4	Delete 2x2 tube and frame angles	(56.31)*	-0-	-	144	

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
J-4.5	Upgrade floor joists as shown on plans	-0-*	-0-		144	Both std. and demo units used all #2 joists
J-4.6	Change "F" wall to shear wall	(0.22)*	-0-		144	Shear wall required to meet transportation calcs.
J-4.7	Add floor joists	8.61*	-0-		144	Transportation calcs. req'd. extra joists in demo. unit
J-4.8	Relocate floor joist	-0-*	-0-		144	
J-4.9	Delete floor joist	-0-*	-0-		144	
J-4.10	Modify fastening schedule for interior shear-wall	-0-*	-0-		144	See remarks for J-4.9 Table 2
J-4.11	Modify fastening schedule for endwall	-0-*	-0-		144	d.o.
J-4.12	Modify fastening schedule for rim joist/floor connection	-0-*	-0-		144	d.o.
J-4.13	Modify fastening schedule for rim/ sidewall connec-tion	-0-*	-0-		144	d.o.
J-4.14	Marriage wall cross bracing	8.93*	-0-		144	

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
J-4.5	Modify drawbar	-0-	-0-		147	Savings are included in multiplier for waste materials
Sub-total	Extra mat'l cost for all design changes on demo unit	$190.17	$37.30			
Sub-total	Extra mat'l costs for comparable items from T&E report			$67.85		
PRESENT CONSTRUCTION MEETING PROPOSED STANDARDS ----------						
B-2	Provide openable bath windows w/o storm removal	-0-	-0-	4.53	7	
B-6	Revise minimum egress dimension	-0-	-0-	NA	11	
B-7	Lower maximum egress latch height	-0-	-0-	-0-	13	
B-11	New requirement for kitchen and bath	-0-	-0-	NA	17	
B-17	Updated reference for glazing std.	-0-	-0-	NA	21	

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
C-4	Lowered interior flame spread requirements	-0-	-0-	0.21	24	
C-7	Required carpet certification	-0-	-0-	NA	29	
C-11	Revised reference standard	-0-	-0-	-0-	NA	
C-12	Qualifications of fire test agencies	-0-	-0-	0.28	34	
D-3	Minimum adhesive std.	-0-	-0-	1.46	47	
D-4	Clarification on support of load bearing mat'ls.	-0-	-0-	NA	NA	
D-5	Clarify procedure for determination of lumber moisture content	-0-	-0-	NA	41	
D-6	Add req'd. corner strapping at sidewall	-0-	-0-	8.59	45	
D-10	Provision of ASTM adhesive std.	-0-	-0-	NA	47	See comments in Table 2
D-13	Delete carpet under future w/d locations	-0-	-0-	NA	48	

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
D-14	Requirements to install roofing in accordance with manufacturers instructions	-0-	-0-	NA	NA	
E-2	Revision of Window Reference Stds.	-0-	-0-	-0-	60	d.o.
E-3	Revision for operational check of egress windows	-0-	-0-	NA	62	d.o.
F-4	Egress device certification	-0-	-0-	NA	62	d.o.
F-4	Provide Wall Vapor retarder with Kraft faced batts	-0-	-0-	NA	64	
F-8	Infiltration resistant joints	-0-	-0-	NA	NA	
F-9	Delete storm units or small windows	-0-	-0-	NA	68	
F-10	Revised infil-tration heat loss equation	-0-	-0-	2.34	73	
F-12	Alternate Heat Loss Calculations	-0-	-0-	NA	NA	See remarks in Table 2

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
G-3	Insulated Water Pipe requirements	-0-	-0-	2.07	79	
G-4	Plumbing standards references	-0-	-0-	NA	NA	
G-9	Access to diverter values	-0-	-0-	NA	83	
G-11	Revised plumbing supports	-0-	-0-	(6.01)	84	
G-12	Water heater relief drain	-0-	-0-	NA	86	
G-13	Nominal pipe sizing	-0-	-0-	NA	88	
G-16	Equivalent sweep for fittings	-0-	-0-	NA	NA	
G-18	Water heater pressure test exemption	-0-	-0-	NA	92	
G-19	Plumbing fixture tests	-0-	-0-	NA	93	
H-12	Thermostat Location	-0-	-0-	NA	104	
H-25	Door opening measurement	-0-	-0-	NA	118	
H-26	Adjustable registers required	-0-	-0-	0.91	120	

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
I-7	Separate laundry circuit	-0-	-0-	NA	127	
I-10	Required laundry	-0-	-0-	NA	NA	
I-18	Outlet box brace requirements	-0-	-0-	NA	136	
I-21	Electrical test requirements	-0-	-0-	NA	NA	
I-22	Visual polarity checks permitted	-0-	-0-	NA	139	
I-23	Exterior outlet requirements	-0-	-0-	NA	134	
I-24	Exterior lights and required interior switches	-0-	-0-	NA	NA	
J-5	Drawbar strength requirements	-0-	-0-	NA	144	
J-6	Running gear design	-0-	-0-	NA	145	
J-7	Welding of spring hangers	-0-	-0-	-0-	151	
J-8	Tire capacity	-0-	-0-	NA	154	
J-11	Axle requirements	-0-	-0-	NA	152	
J-13	Lug bolt torque	-0-	-0-	NA	NA	
J-14	Brake axle requirements	-0-	-0-	NA	156	

Table 3
MATERIAL COST IMPACT
ON
DOUBLE WIDE DEMO UNIT

Item No.	Item Description	Mat'l Cost DEMO. UNIT	Projected Mat'l Cost PRODUCTION UNIT	1982 T&E Mat'l Cost Table 2-1 /1.68	1982 T&E Item No.	REMARKS
J-15	Parallel brake wiring requirements	-0-	-0-	NA	NA	
Sub-total	Material Costs for Pres. Const Items	-0-	-0-			
Sub-total	Extra Material Costs for Comparable Items from T&E Report			$14.38		
Total	All extra Material Costs for Demo Unit	$190.17	$37.30			
Total	Extra Material Costs for all Comparable T&E Report Items			$82.23		

SECTION VI

DEVELOPMENT OF CONSUMER COST IMPACTS

A crucial issue in the standards revisions proposed by HUD, is the cost impact on the ultimate consumer, the purchaser of the manufactured home. Tables 2 and 3 provide detail on extra material costs for two different conditions:

1) The single or double wide demonstration home;
2) A projected production version of the same single or double wide demonstration unit; and

Tables 2 and 3, however, do not address this crucial issue of consumer cost. Table 4 does this, and as such, is the key table of this report.

Two sets of numbers are presented in Table 4. First, the total material costs for the above described two different conditions are merely reproduced from Tables 2 and 3. These material costs are then projected to the consumer cost level and included in Table 4, using three approaches:

1) The 1982 T&E method of converting direct material costs to consumer retail costs as modified by the inclusion of a material waste factor. This results in the material costs being multiplied by 1.83 (i.e., material cost x 1.09 x 1.68 = material costs x 1.83). The consumer cost estimate developed in this fashion is presented in Table 5.

2) The Conner Homes Corporation method of converting direct material costs to consumer costs, or retail costs, involves multiplication by a factor of 2.42. The derivation of this factor is described below.

$$\text{Wholesale Cost} = \frac{\text{material cost} \times 1.09}{0.6}$$

$$\text{Retail Cost} = \frac{\text{wholesale cost}}{0.75}$$

3) The MHI method of converting direct material costs to consumer or retail costs, as conveyed to HUD, is through the use of a multiplier of 2.22. The derivation of this factor is described below.

$$\text{Wholesale Cost} = \frac{\text{material cost}}{0.6}$$

$$\text{Retail Cost} = \frac{\text{wholesale cost}}{0.75}$$

Widespread agreement has not been reached on the use of any of these three methods and all three are included in Table 4 for comparison purposes. It can be seen from Table 4 that the consumer cost estimates of the impact of these proposed changes, on the single wide unit range from $70.02 to $292.14. For the double wide unit, these consumer cost impacts range from $68.26 to $460.21.

The Conner Homes approach (i.e., 2.42) when applied to the Demo unit results in the highest consumer cost impact estimate, and the T&E method (i.e., 1.83) when applied to the production version of the Demo unit results in the lowest consumer cost impact estimate.

OVERALL COMPARISON WITH PREVIOUS REPORT

As noted in Section II, above, and as described in detail in Appendix IV, this demonstration project did not include a number of the proposed changes to the standards. In 1982, the T&E/SWA report addressed all changes proposed by HUD at that time, and estimated the impact on a typical industry unit, both single and double wide. Table 5 shows the portions of costs identified in the 1982 T&E/SWA report that also were included in the 1983 Demonstration Project, and the total extra material costs for comparable items on both the single wide and the double wide homes, from Table 2 and 3.

Table 4
Retail Cost Comparisons
for
Single and Double Wide
Manufactured Homes

(Material Cost (from Table 2&3)			CONSUMER COSTS					
			T&E Method (1.83)		Conner Homes Corporation Method (2.42)		MHI Method (2.22)	
Unit Type	Demo Unit	Projected Production Demo Unit	Demo	Projected Production	Demo	Projected Production	Demo	Projected Production
Single Wide	$120.72	$38.26	(120.72x1.83) $220.92	(38.26x1.83) $70.02	(120.72x2.42) $292.14	(38.26x2.42) $92.59	(120.72x2.22) $268.00)	(38.26x2.22) $84.94
Double Wide	$190.17	$37.30	(190.17x1.83) $348.01	(37.30x1.83) $68.26	(190.17x2.42) $460.21	(37.30x2.42) $90.27	(190.17x2.22) $422.18	(37.30x2.22) $82.81

Table 5

Comparison of Items
included in
1982 T&E/SWA Report
and
1983 Demonstration Project

	Material Costs, Comparable Items	Consumer Costs, Comparable Items	Total Consumer Costs included in 1982 Report	% of 1982 Report Costs Addressed
Single Wide	$57.37	$ 96.38	$205.98	47%
Double Wide	$82.23	$ 138.15	$286.19	48%

SECTION VII

CONCLUSIONS

The Demonstration Project did not answer all of the cost and implementation questions related to the proposed MHCSS. However, it is possible to derive a series of conclusions, based on the data collected and the various field observations, related to the impact of the proposed standards changes on one particular manufacturer.

The long term production impact of the proposed Federal Standards changes on the Conner demonstration homes is less than $100.00. More detailed conclusions, separated into categories of Demonstration Home, Production Demonstration Home, Transportation Requirements, and Formaldehyde Emission Limits, are as follows:

DEMONSTRATION HOMES

1) The material cost difference between the standard and the demonstration single wide homes was $120.72. The material cost difference between the double wide homes was $190.17. Of this total, the largest contributing costs were related to transportation and formaldehyde emission controls. The transportation costs were due to HUD's decision to calculate the required changes rather than utilize previous experience (see Transportation Requirements on following page). The major costs associated with formaldehyde emissions controls were due to the manufacturer's selection of materials, and not directly due to the proposed Federal Standards Changes (see Formaldehyde Emission Limits on following page).

2) In 1982, the T&E/SWA report estimated material costs of $57.37 for a typical single wide home, and $82.23 for a typical double wide home, both cost figures being for incremental costs due to changes in the Standards, and both being for comparable portions of the revised standard.

3) From the measured material costs for the single wide home of the Conner demonstration model, the range of consumer cost estimates (i.e. impacts on consumer costs of the differences between standard and demonstration homes) was from a low of $220.92 to a high of $292.14. For the double wide home, the range was $348.01 to $460.21.

PRODUCTION DEMONSTRATION HOMES

1) The material cost difference between the projected standard and demonstration production version of the Conner single wide home was $38.26. Major reasons for the difference between the demonstration unit and the production unit costs are the assumed availability of materials necessary to comply with the proposed formaldehyde emission limits, and a projected use by industry of the "previous-experience" method of transportation compliance.

2) The material cost difference between projected double wide homes was $37.30. Major reasons for the difference between unit costs are, as with single wides, the assumed availability of materials necessary to comply with the proposed formaldehyde emission limits, and a projected use by industy of the "previous-experience" method of transportation compliance.

3) From the measured material costs for the single wide home, the range of consumer cost estimates was from a low of $70.02 to a high of $92.59. For the double wide home, the range was $68.26 to $90.27.

TRANSPORTATION REQUIREMENTS

The decision by HUD and Conner Homes Corporation to comply with the transportation requirements by engineering calculations, rather than by "previous experience" added material costs of $24.56 to the single wide demonstration home, and material costs of $60.35 to the double wide demonstration home. These material costs are the sum of all the asterisk items in Tables 2 and 3 for Item J-4. These material cost savings would result in a range of retail cost savings from $44.94 to $59.43 on the single wide, and $110.44 to $146.05 on the double wide. These extra costs will be substantially reduced, and in many cases eliminated, under anticipated production conditions.

FORMALDEHYDE EMISSION LIMITS

The unavailability of vinyl covered plywood that could be certified to meet the formaldehyde emission requirements significantly added material costs of $36.13 to the single wide demonstration home and $113.16 to the double wide demonstration home. These material costs are the sum of the D-18 costs for the demonstration unit in Tables 2 and 3. The added retail costs ranged from $66.12 to $87.43 for the single wide, and $207.08 to $273.84 for the double wide. The changes necessary for demonstration home compliance included substitution of regular paneling for all V.C.P., and addition of fiberglass tub enclosures in all bathrooms.

It should be noted that under anticipated production conditions, a net substantial reduction in material costs of $33.24 and $109.30 is projected for the single wide production demonstration home and the double wide production demonstration home respectively. These material cost reductions can be calculated by adding the demonstration home costs in Item D-18 and subtracting from this total Item D-18 costs for the Production Demonstration Unit in both Tables 2 and 3. The retail cost saving ranged from $60.83 to $80.44 for the single wide, and $200.02 to $264.51 for the double wide. The cost reduction is primarily due to the use of certified V.C.P. and the elimination of the need for the tub enclosures.

Appendix I

DESIGN CHANGES TO MEET PROPOSED STANDARDS MODEL 6814 135, SINGLE WIDE

ITEM NO.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
			SUBPART B
B-2	Floor plan 6814 135, 078.00	Delete (2)-14"X27" Bathroom Storm Windows. (3280.103(c))	Windows used to provide ventilation shall be openable without the removal of storm windows to provide a path for humidity and odor removal. [3280.103(c)]
			SUBPART D
D-6	034.00	Add Roof to Sidewall Strap at 24"o.c. from each Corner. (4 Total) Add 2"x4"x14 1/2" - #3SPF Blocking (4 Total) (3280.306(c))	Wind design criteria for resistance to uplift are increased based on research findings and experience for roof membranes and trusses which are connected to the membrane. Provision increases fastening requirements roof membranes and/or trusses to sidewall and roof trusses connected to the membrane to be designed for greater uplift resistance but permits use of roof dead weight to resist uplift force. [3280.306(c)]
D-12	082.00 (Note 26)	Provide vinyl floor covering under carpet in bathrooms (3280.305)	The requirement permitting only sealing of the wood floor without application of a non-aborbent floor covering has been removed, per I.B. D-8-76 and research findings. (3280.305)
D-13	082.00	Cut out carpeting installed over vinyl flooring in future W/D location. (3280.305(J)(3))	Carpeting may no longer be installed in areas designat for future installation of laundry equipment. [3280.305(j)(3)]
D-18	General	Plywood Wall Paneling to be Certified for 0.20ppm (Max) Formaldehyde Emission by Large Air Chamber Test Method. Particleboard Floor Decking to be Certified for 0.30ppm (Max) Formaldehyde Emission by Large Air Chamber Test Method. (3280.309)	Formaldehyde emission standards and certification requirements for particleboard and plywood are establis [3280.309]
E-1		Bow Truss to be Retested at 2.50 Factor of Safety for 5 minute load duration (3280.402(b))	Ultimate load test procedure is clarified by defining factyor of safety to be at least 2.50 (a higher load factor is required when specified by appropriate refe standards) and by establishing a minimum test duratio five minutes for that load. [3280.402(b)]

EM.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
			SUBPART F
5		Refer to D-18 (3280.411,3280.412)	Testing methods for formaldehyde measurements including loading ratios are established for initial certification and production testing. [3280.411 3280.412]
4	026.00	Provide Kraft Backed R-11 Insulation in all exterior walls. (3280.504(b))	A vapor retarder is required for exterior walls in colder climactic zones [3280.504(b)]
9		Delete (2)-14"x27" Bathroom Storm Windows (3280.506(c))	Thermal protection provisions would be modified as follows: (a) Storm or double glazing no longer required for windov of 3 square feet or less in colder climatic areas. [32809.506(c)]
			SUBPART G
1		Install a master cold water shut-off valve recognized by model code authorites on main feeder water supply line. (A certified valve to WWV-54D-73 standard could not be obtained commercially.) Mfgr. is currently installing at least one non-certified valve on all homes. (3280.609)	All plumbing materials and components are to listed (3280.603) A master cold water shut-off valve is required to be installed. (3280.609) Shut off valves are required to comply with WWV-54D-73 (3280.604)
-2		Provide a Heat Tape Listed to UL 499-1973 (3280.603(b)(4))	(a) Listed heat tapes to be provided by manufacturers for homes certified for use in colder climates and by specifying information to be included for proper connection of heat tapes by installers. [3280.603(b)(4)(1)-(111)]
-17	Drain Line 6814135	Change Vertical to Horizontal Sinle fixture Drain Connections to Short Turn Fittings. (3280.610(g)(3))	The use of a short turn fitting (quarter bend) would be permitted for connection of certain drainage fittings. [3280.610(g)(3)]

ITEM NO.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
			SUBPART I
I-11	Electrical 6814 135	Delete Wall Receptacle Behind Door in Rear Bedroom (3280.807(f)(2))	Wall spaces behind any door which fully opens against wall are excluded from the wall space measurement for a receptacle. [3280.807(f)(2)]
I-17	087.00 (item 11)	Delete Intermediate Securement to Structural Members In Ceiling For Non,Metallic Sheathed Cable. Securements to be withing 12" of the Point of Entry and the Box. (3280.809(b))	Support and securement provisions for non-metallic cal are amended to reflect acceptable industry practices. [3280.809(b)]
I-19	088.01 (item 22)	Revise Detail From 1/8" to 1/16" (3280.809(d))	A tolerance of 1/16 inch maximum is provided for mounting of outlet box into openings in combustible walls ceilings. [3280.809(d)]
I-24	088.00 (Item 20)	Install Allied Products Temporary Cover #9315 and seal all edges with Par Caulking Tape (certified Temporary cover presently not commercially available) (3280.809(b))	An exterior lighting outlet which is controlled by a switch is required at each exterior door entrance. A temporary covering for the outlet is to conform to th NEC. [3280.809(b)]
			SUBPART J
J-4	Floor Plan 14135	Vertical Loads .1 Interior Wall Paneling Splices to Overlap Door and Window Opening .2 Add Plywood Reinforcement at Locations Specified -- Side Wall to Rim Joist. .3 Add 2"x4"x5'4" Under top Plate at door and Window Openings as Shown. .4 Change 4" Plumbing wall to shear wall and add stub wall for plumbing	Transportation design loading for the structure is increased in the vertical direction and longitudinal static lateral design load criteria is provided for dynamic forces imposed in those directions in accorda with research testing results. [3280.903(c)]

ITEM NO.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
		.5 Add 5/32" Luan Plywood Wall Panal Reinforcement under 5/16" Gypsum wall paneling at locations specified.	
	Floor Frame 14135	.6 Add 2"x6" #2 SPF Floor Joist (12 Total) at Axle Area.	
	Steel Frame 14135	.7 Delete 2"x2"x10'0" Tube and 1"x1" Angle Brace reinforcements.	
		.8 Relocate Outriggers, Crossmembers and Springhangers as Shown.	
024.00	Interior Shear-wall to Roof System Fastener Schedule	Lateral Loads .9 Increase and revise fastening schedule of interior shearwall to sidewall, roof, and floor connections. Note: Existing design does not provide adequate connections for existing wind load requirements	
025.00		.10 Increase and revise fastening schedule of end wall to sidewall, roof, and floor connections. Note: Existing design does not provide adequate connections for existing wind load requirements	
074.00		.11 Increase rim joist to floor joist fastening schedule.	

ITEM NO.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
		.12 Increase sidewall to rim joist fastening schedule. NOTE: Existing design does not provide adequate connections for existing wind load requirements	
	Floor Frame 141 35	.13 At "added" shearwall, provide 2 - 2"x6" #2 SPF and change and relocate 1 - 2"x6" # 3 SPF to #2 SPF.	
		.14 Change 1st floor joist forward of shear wall from 2x6,#3,S.P.F. to 2x6,#2,S.P.F. NOTE: Existing design does not provide adequate resistance for existing wind load requirements (3280.903(c))	

Appendix II

DESIGN CHANGES TO MEET PROPOSED STANDARDS MODEL 5224 116, DOUBLE WIDE

ITEM NO.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
		SUBPART D	
D-12	082.00 (Nt.26)	Provide vinyl floor covering under both carpet (3280.305)	The requirement permitting only sealing of the wood floor without application of a non-absorbant floor covering has been removed per I.B. D-8-76 and research findings (3280.305).
D-18 (also refer to E-5)	General Specification	Plywood Wall Paneling to be certified for 0.20 ppm (Max) Formaldehyde Emmission by Large Air Chamber Test Method, Particleboard. Floor decking to be certified for 0.30 ppm (Max) Formaldehyde Emission by Large Air Chamber. (3280.309)	Formaldehyde emission standards and certification re requirements for particleboard and plywood are established. [3280.309]
		SUBPART E	
E-1		Monopitch truss to be Retested at 2.50 Factor of Safety for 5 Minute Load Duration. (3280.402(b))	Ultimate load test procedure is clarified by defining factor of safety to be at least 2.50 (a higher load fa is required when specified by appropriate reference st dards)and by establishing a minimum test duration of f minutes for that load. [3280.402(b)]
E-5		Refer to D-18 (3280.411,412)	Testing methods for formaldehyde measurements includin loading ratios are established for initial certificati and production testing. [3280.411 3280.412]
		SUBPART G	
G-1		Install a master cold water shut off valve recognized by Model Code Authorities on main feeder water supply line. (A certified value to WWV-54D-73 could not be commercially obtained.) Mfgr. is currently installilng at least one non-certified valve on all homes. [3280.604]	All plumbing materials and components are to be listed (3280.603) A master cold water shut off value is required to be i stalled. (3280.609) Shut off value to to comply with WWV-54D-73. (3280.604

ITEM NO.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
G-2		Provide a Heat Tape listed to UL 499-1973 (3280.603(b))	(a) Listed heat tapes to be provided by manufacturers homes certified for use in colder climates and by specifying information to be included for proper connection of heat tapes by installers. [3280.603(b)(4)(1 (111)]
G-10		Install a High Loop for Dishwasher in Lieu of Fixed Air Gap Per Manufacturer's Instructions (3280.607(b))	High loop drains are permitted in lieu of fixed air ga for dishwashers. [3280.607(b)(4)] Manufacturer's instructions currently recommend the use of the high loo method of protection as an alternative to the fixed ai gap.
G-17	Drain Lines 5224 116	Change Vertical to Horizontal sngle fixture Drain Connection to Short Turn Fittings. (3280.610(g))	The use of a short turn fitting (quarter bend) would b permitted for connection of certain drainage fittings. [3280.610(g)(3)]
			SUBPART I
I-17	087.00 (item 11)	Delete Intermediate Securement to Structural Members in Ceiling for Non,Metallic Sheathed Cable. Securements to be withing 12" of the Point of Entry and the Box. (3280.809(b))	Support and securement provisions for non-metallic cab are amended to reflect acceptable industry practices. [3280.610(g)(3)]
I-19	088.01 (item 22)	Revise Detail from 1/8" to 1/16" (3280.809(d))	A tolerance of 1/16 inch maximum is provided for mount of outlet box into openings in combustible walls and ceilings. (3280.809(d)]
			SUBPART J
J-4	SIDE PANELS 230.02	Vertical .1 Interior wall Paneling splices to overlap door and window openings	Transportation design loading for the structure is increased in the vertical direction and longitudinal and static lateral design load criteria is provided for dy namic forces imposed in these direction in accordance with research testing results. [3280.903(c)]

TEM O.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
		.2 Add 8" Plywood Reinforcement at Locations specified-side wall to Rim joist	
		.3 Add 5/32" Lauan Plywood Wall Panel Reinforcement under 5/16" Gypsum wall Paneling at Locations Specified	
	STEEL FRAME 24116	.4 Delete 2"x2"x10'-0" Tube and 1"x1" Angle Brace Reinforcement	
	FLOOR FRAME 24116	.5 Change 2"x6"-#3 SPF Floor Joists to #2 SPF at Axle Area in A and B Sections (12 TOTAL in each section)	
		LATERAL	
230.00		.6 Add shear wall at 'A' section	
	STEEL FRAME 24116 FLOOR FRAME 24116	.7 Provide 2-2"x6"-#2 SPF under added shear wall on A-section (change and relocate 2"x6"-#3SPF floor joist on A section)	
		.8 Relocate 2"x6-#3 SPF floor joist on B-section	
		.9 Delete Joists as indicated - 'A' and 'B' section	

ITEM NO.	CONNER DETAIL	REQUIRED CHANGES	REVISION TO STANDARDS
J-4	024.00 Interior Shearwall to Roof System Fastening Schedule	.10 Increase and revise fastening schedule of interior shearwall to sidewall, roof, and floor connections. Note: Existing design does not provide adequate connections for existing wind load requirements	
	025.00	.11 Increase and revise fastening schedule of endwall to sidewall, roof, and floor connections. Note: Existing design fastening schedule is adequate for wind loads. Revision required for direction of fastener installation.	
	074.00	.12 Increase rim joist to floor joist fastening schedule. .13 Increase sidewall to rim joist fastening schedule. Note: Existing design does not provide adequate connections for wind load. (3280.903(c)) .14 Add Cross bracing at marriage wall.	
J-5	007.00	Relocate Drawbar Stiffener to Midpoint Between Coupler and Front Crossmember. (3280.904(a))	The drawbar is required to be capable of resisting design loads based on research test results or mos certain sizing and reinforcement provisions. [3280.904(a)(1)]

Appendix III
Present Construction Meeting Proposed Standards
Single Wide and Double Wide
Except as Noted

Item No.	Standards Reference	Determination by HUD of Compliance with Proposed Standards
B-2	Windows used to provide ventilation shall be openable without the removal of storm windows to provide a path for humidity and odor removal. [.103(c)]	All bath room storm windows are removabl on the double wide unit.
B-6	Minimum egress window dimensions are revised to 20" horizontal and 24" vertical in accordance with research recommendations. [.106(a)]	All egress window dimensions are 30" x 5
B-7	Locks and operating handles for egress windows are reduced from 60" to 54" above the floor to facilitate the opening of the window by children who are capable of operating the latch and lifting or sliding the window. (Based on research study conducted by NBS.) [.106(d)]	Latch Location is Below 54".
B-11	Each home is required to be provided with sanitary facilities and kitchen area for healthful habitation. [.108]	Home is Provided with kitchen and sanita facilities.
B-17	Updates reference standard for safety glazing materials, where required, to 1975 edition of the ANSI Z97.1 standard. [.112(b)]	All safety glazing materials conform to ANSI Z97.1-1975 standard.
C-4	Flame spread (F.S.) requirements are tightened by lowering the maximum ceiling interior finish from F.S. '200' to F.S.'75'. [.203B(b)]	See test data - letters from UL 6-2-80 a U.S. Gypsum 6-27-83 on Flame Spread Classification and Modulux Ceiling Syste
C-7	Carpeting is required to be certified to meet surface flammability requirements of 16 CFR 1630. [.205(a)] CPSC is currently not maintaining on-going certification program for carpets.	See test data provided. by Carriage Carpets.
C-11	Reference standard is changes to UL-217 in accordance with Interpretative Bulletin C-1-77 [.208(c)]	See Listing.

Item No.	Standards Reference	Determination by HUD of Compliance with Proposed Standards
C-12	Fire testing is required to be conducted by testing agencies having expertise in fire technology. [3280.209]	All required certifications are are accomplished by testing agencies having expertise in fire technology, except, carpeting test data supplied by carpet manufacuturer.
D-3 (Also refer D-10)	A reference to the ASTM standard for structural adhesives is added to the table. The particleboard commercial standard has been replaced with a newer ANSI standard for mat formed particleboard.	CP 575 Adhesive (Chemical Products) Conforms to ASTM D-3930-1982 (See Test Data To Be Supplied by Chemical Products)
D-4	Clarifies that load bearing materials must be supported as recommended by product manufacturers of that engineering analysis or testing by provided to verify different support spacing for materials. [.304(c)]	Materials are Supported at dimensions recommended by product supplier.
D-5	Provisions of Interpretative Bulletin D-1-77 are incorporated to clarify the procedure for determining moisture content of lumber and to provide a surface dry requirement governing lumber installation at the factory. (.304(b)(1)]	See 001.18 of Conner Q.C. Manual.
D-6	Wind design criteria for resistance to uplift are increased based on research findings and experience for roof membranes and trusses which are connected to the membrane. Provision increases fastening requirements for roof membranes and/or trusses to sidewall and requires roof trusses connected to the membrane to be designed for greater uplift resistance but permits use of roof dead weight to resist uplift forces. [3280.306(c)]	On Doublewide only, sufficient straps are provided as a part of the standard practice.
D-10 (Also refer D-3)	Consensus ASTM standard for adhesives used in structural applications is provided. [.305(h)(1)]	See D-3
D-14	Roofing is to be weather resistant and installed in accordance with roof covering manufacturer's instructions. [.305(h)(5)] Presently there are no guidelines in the standard for installation of roofing.	Fiberglass shingles are installed accordi to shingle manufacturer's instructions.

Item No.	Standards Reference	Determination by HUD of Compliance with Proposed Standards
E-2	Standards for windows (including egress window), sliding glass doors, and exterior passage doors would be replaced by consensus standards.	See letter from KINRO 6-6-83 for certification to AAMA 1703,1-1982.
E-3	Operational check of each installed egress window is required. [.409(c)]	See Conner Q.C. Manual.
E-4	Certification of egress devices and exterior passage door is required. [3280.408(e),.409(e)]	
F-4	A Vapor Retarder is required for exterior walls in colder climatic Zones [.504(b)]	Insulation with integral vapor retarder (Kraft Backed) is installed in exterior walls, on Double Wide, only, as a part of the standard practice
F-8	Joints between wall to wall, wall to floor, and wall to ceiling must be designed to resist air infiltration or be caulked or sealed. Present standards require that joint to be caulked or sealed. [.505]	Conners standard practice has been determined to be acceptable.
F-10	Infiltration heat loss formula has been revised to ASHRAE method to predict losses due to infiltration. [.508(a)]	See Heat Loss Calculations
F-12	Heat loss calculations would also be acceptable in accordance with "NFPA 501BM, - Mobile Home Heating and Cooling Load Calculations Manual" as well as the ASHRAE standard. [.507(a)]	See Heat Loss Calculations.
G-1 (Also refer G-4)	The provision for specific approval by the Department for plumbing components and accessories when listing by an approved listing agency is not available. All plumbing materials and components must be required to be listed or certified. [603(a)(4)]	All Plumbing Components are listed (Note exception - Master Cold Water Shut-off valve see Design change G-1)
G-3	Any water piping which is located in unheated or exposed areas is to be insulated. [603(b)(4)(iv)]	Water Heater Access is From Inside of Home. All Piping is located in a heated space.

tem lo.	Standards Reference	Determination by HUD of Compliance with Proposed Standards
;-4 Also efer ;-1)	All plumbing materials, devices, fixtures, fitting equipment, appliances and accessories are to conform to standards incorporated by reference except that, when more than one standard is listed, compliance is required to only one of the standards. [604(a)]	(See G-1)
;-9	Access provisions for diverter valves are not required. This incorporates Interpretative Bulletin 0-2-77(a). [607(c)]	Design incorporates the accessibility Provision.
;-11	Requirements for piping supports have been revised in recognition of acceptable industry practices. [608]	see 081.00 (Item 15)
;-12	Use of nominal size drain for water heater relief valve is permitted. [609(c)(1)(iii)]	Nominal size drain pipe is used for water heater relief valve
;-13	The use of nominal rather than actual dimensions in sizing piping and fittings is permitted [609(f)(1)]	Nominal Size Pipe and Fittings are used ir water and drain lines
;-16	Equivalent sweep for all fittings is to be determined utilizing referenced standards. [610(g)(1)]	See DRAIN LINES 6814135, 5224116 Specifie Components Comply.
;-18	The water heater is exempted from the air pressure test of water supply piping [612(a)] to avoid accidents resulting from including the heater in the test. (Interpretative Bulletin G-2-78)	See Conner Q.C. Manual 001.72 (Test 6)
G-19	Plumbing fixture test may be performed without filling fixtures through water distribution system. [612(c)]	See Conner Q.C. Manual 001.72 (Test 7)
H-12	Thermostat location, control setting circuit, and wiring provisions would be ammended to improve appliance efficiency and consumer comfort. [707(d)]	See page 7 of Coleman's Installation Instructions for Downflow Electric Furnace
H-25	Clarification is provided for measuring openings, when return air is provided, by undercutting doors. [715(b)(4)] Bathrooms are excluded in accordance with Interpretative Bulletin H-2-77.	See Conner Detail 084.00 (Item 15)
H-26	All registers would be required to be of the adjustable type.	See Conner Detail 085.00 (Item 18)

Standards Reference	Determination by HUD of Compliance with Proposed Standards
A separate 20 ampere circuit would be required for the clothes washer because of surge loads encountered during its operation which are higher than the rated connected load for the equipment. [806 (c)]	Electrical Detail 6814135, 5224116 (see - 091.02)
Receptacle outlets are to be provided for laundry appliance spaces even if the appliance is not installed. [807 (e)]	Receptacle outlet is provided see - Electrical Detail 6814135 & 5229116
A substantial brace for an outlet box shall withstand a 50 lb. force. [.809(c)]	
A range of voltages are provided for the dielectric strength test, and clarification is provided that the test need only be accomplished between the ground and the live parts. [.811(a)]	Conner detail 001.70 (Test 3) Q.C. Manual
Clarification is provided that polarity checks may be visual rather than actual tests for polarity. [.811(b)(3)]	Conner Detail 001.70 (Test 5) Q.C. Manual
Wet location protection would be required for outdoor equipment except that equipment located on the underside of the floor may be protected as required for a damp rather than wet loaction. [.814(a)]	Conner Detail 088.00 (Item 26)
1. A wall switch controlled exterior lighting outlet would be required at each exterior door entrances. 2. Any temporary covering for the outlet would have to conform to the National Electrical Code. The present Standard contains no requirements for temporary covers for outdoor outlets. [3280.814(b)]	Double wide 1. Switched outlets are provided 2. Install a box cover - ALLIED PRODUCTS 9315 - with par caulking tape. (Certified temporary cover presently not commercially available.d Single Wide Switch outlets with light fixtures installed are provided.
Clarifies in accordance with present industry practice that the running gear need only be designed to resist the gross static load supported. [3280.904(d)(2)]	Conner Detail 002.25-1, and-2
Spring assemblies are required to be attached to the main member of the frame with a 1/8 inch fillet weld or be designed to resist the imposed loads. [3280.904(e)]	Conner Detail 008.00

Standards Reference	Determination by HUD of Compliance with Proposed Standards
Tire capacity established at 1.50 times the load limit specified in the Tire and Rim Association Yearbook. [.904(g)(1)(i)]	Conner Detail 00.24
A table for determining the required number of 6000 pound rated axles is added and expanded to include larger ratio axles. (The table was previously issued as part of Interpretative Bulletin J-1-76.) [3280.904(f)(1)]	Conner Detail 002.25-1, and -2
Wheels and lug bolts shall be tightened to a specified torque load or as recommended by the equipment manufacturer. [.904(h)(2)]	See Instructions for Mounting Tire and Rim Assemblies - Kelsay Hayes (Item 4)
A minimum of two brake exles are required for each transportable unit unless otherwise substantiated by test. Conditions for testing that permit the combined braking performance of the towing vehicle and the home are also provided. [.904(g)(2)(ii)(A)]	Two brake axles meeting the minimum criteria are provided.
Brakes are wired in parallel (not series) to obtain a more balanced voltage distribution at each brake. Aluminum wiring may only be used when terminations are protected against corrosion. [.904(i)(3)]	See Conner Detail - Typical Electric Brake Circuit
The drawbar is required to be capable of resisting design loads or meet certain sizing and reinforcement provisions. [.904(a)(1)]	Drawbar is reinforced at two locations between coupler and front Cross member, on Single Wide Unit.

Appendix IV
Proposed Changes Not Included

The following items applicable to both the single wide and double wide homes have been identified by HUD as requirements included in the proposed rules but which are not included in the demonstration program undertaken in late 1983. Reasons for HUD's actions are provided in the HUD approved design package. For these reasons they are not included in this cost analysis.

Item	Description	Reference (all references refer to 3280)
A-1	Home Definition	.2(a)
A-2	Reference Standards	.3(c)
A-3	Reference Standards	-
A-4	Data Plate revision	.4(a)(6)
A-5	Waiver provisions	.8
A-6	Quality of workmanship	.303(b) and .10
A-7	Periodic updates	.11
B-1	Gross floor Area	.102
B-3	Exit door requirements	.105(a)(2)
B-4	Door opening widths	.105(b)(2),I.B. B-1-76
B-5	Exterior Key Locks	.105(b)(3)
B-8	Egress Window barriers	.106(d)
B-9	Integral rolled screens	.106(f) and I.B. E-3-76
B-10	Bathroom locks	.107
B-12	Bedroom size limits	-
B-13	Closet provisions	-
B-14	Toilet provisions	-
B-15	Door provisions	I.B. B-1-76
B-16	New stair provisions	.111
B-18	Safely glass changes	.112(b)
C-1	Fire code definitions	.202(a)(1),(4),(5)
C-2	Flame spread exceptions	.202
C-3	Flame testing	.203(a)(1),I.B C-1-76
C-5	Counter extensions	.203(c)(4)
C-6	Cabinet fire protection	-
C-8	Fire stopping	.206(a)
C-9	Fire tests	.207(a)(1)
C-10	Fire testing	.207(a)(3)
D-1	Seismic criteria	.301,.305(a),.306(c)
D-2	Design Requirements	.303(f)

D-7	Snow loads	.305(d)(1)
D-8	Snow loads	.305(d)(2)
D-9	Deflection criteria	.305(g)
D-11	Fastener criteria	-
D-14	Roofing	.305(h)(5)
D-15	Anchoring provisions	.306(b)
D-16	Zinc coating	.306(h)
D-17	Manufacturer's instructions	.308
E-1	Truss and floor tests	.403(f), .404, .405(b)
F-1	Vapor retarder definition	.502
F-2	Installation criteria	.502
F-3	Roof venting	.504(a)
F-5	A/C duct insulation	.504(c)
F-6	Multi-wide gaskets	.505
F-7	No envelope penetrations	.505
F-9	Delete small storms	.506(c) double wide only
F-11	Insulation compression	.508(c)
F-13	Comfort certificates	.509
F-14	Thermal options	.510
G-5	Drain access	.609(b)(2), .606(b)(3)
G-6	Fixture labels	.607(a)
G-7	Conserving toilets	-
G-8	Water proofing	.607(b)(3)
G-14	Utility entrances	-
G-15	Gray water	.610(c)(i)
H-1	Equipment definitions	.702
H-2	Appliance efficiencies	-
H-3	Reference Standards	.703
H-4	References Standards	.703
H-5	Fuel oil supply	.704,.706
H-6	Quick disconnects	-
H-7	Gas supply sizing	.705(d)
H-8	Gas Supply locations	-
H-9	Gas outlet projection	
H-10	Appliance shut-off valves	.705(1)(3)
H-11	Leakage test	.705(1)(7)
H-13	Oil shut off	.707(a)
H-14	Clothes dryer	.708(a)(c), I.B. H-1-77
H-15	Door interlock switch	.709(e)(1)
H-16	Vertical gas risers	.709(e)(3), .713
H-17	External heating connections	.708(c)(6),I,B,H-2-77
H-18	Air distribution design	.709(a)(7)(iv)
H-19	Evaporature coolers	.709(e)(8)
H-20	Fresh air inlet	.709(f)
H-21	Fireplace hearth	.709(g)

H-22	Appliance vents	.710(b)
H-23	Listed cooling coils	.714
H-24	Cooling duct wrap	.715(a)(6)
I-1	Delete various sections	.801(b)
I-2	Aluminum wiring	.803(b)
I-3	Power supply entrances	-
I-4	Exterior electrical service	.804(c), .805(a)
I-5	Panelboard labels	-
I-6	Appliance circuit	.806(b)
I-8	Laundry outlets	-
I-9	Compartment receptacles	.807(d),I.B I-1-77
I-12	Lattice room dividers	.807(f)(3)
I-13	Traffic area spaces	.807(F)(5)
I-14	Bath light fixtures	.808(b)
I-15	Bath switches	.808(c)
I-16	Combustible surfaces	.808(d)
I-20	Repairing electrical cable	.809(e)
J-1	Revised scope	.901
J-2	Running gear removal	.903(a)(3)
J-3	Design verification	.903(b)
J-9	Recycled axles	.904(f)(2)
J-12	Used tires	.904(h)(1)(ii), I.B., J-1-76

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MOD

MODEL NO. 6814-13-5 - NEWPORT PLANT NUMBER OF UNIT

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	100101	1,422.00	CLB	I BEAM 10X40 9# FT
901	100104	20.00	LF	2 IN. SQ.TUBE 11 GA.10 FOOT
901	100202	18.00	EA	CXM 3X75.5X1.5 FLANGES
901	100304	1.00	EA	REAR PLATE 9.5X75.5 13 GA
901	100402	20.00	EA	OUTRG 7.5X44X2T&1.75B FL 13G R
901	100502	4.00	EA	PAT PLA 1/4X7 1/4X9 1/4 10 G
901	100504	8.00	EA	HITCH PL 3/16X 8 X 8
901	100505	34.00	EA	ANGLE 1 X 1 X8 13 GUAGE
901	100611	1.00	EA	ANGLE-HITCH-2X2X36 10GA.
901	100704	1.00	EA	BRAKE AXLE W/MONOLEAFSPRING
901	100705	2.00	EA	IDLER AXLE W/MONOLEAFSPRING
901	100801	6.00	EA	TIRES 8.14X5-8 PLY
901	100802	6.00	EA	RIMS TL-600
901	100901	6.00	EA	VALVE STEM #415 RUBBER
901	101001	1.00	EA	JACK #2312-10 STEM FULL SKIRT
901	101002	1.00	EA	COUPLER 2312 FULL SKIRT
901	101201	26.00	LB	ELECT 5/32 WELD RODS #14A
901	101202	20.00	LB	ELECT 5/32 WELD.RODS #24
901	150101	135.00	MBF	RANDOM 1X2SPF NO.3 1BD.FT.-6
901	150103	52.00	MBF	RANDOM SPF 1X4 #3 1BD.FT.-3
901	150109	289.00	MBF	RANDOM SPF 2X4X NO.3 BRT SLF
901	150110	224.00	MBF	PET SPF 2X4X81.75
901	150115	24.00	MBF	RANDOM SPF 2 X 6
901	150119	29.00	MBF	RANDOM SPF 2X8
901	150121	101.00	MBF	RANDOM 1X3 #2 1-BD.FT.-4
901	150122	143.00	MBF	PET 1X3X82.5
901	150123	898.00	MBF	SPF 2X6X161 # 2 & BTR
901	150124	28.00	MBF	T-JOIST 2X4 7/8 X161
901	150130	242.00	MBF	SPF 2X3X81.75
901	150131	103.00	MBF	SPF 2X3X82.5
901	150132	165.00	MBF	FULL 1 X 2 (12 FT = 3 BDFT)
901	150302	94.00	MSF	PART BRD 5/8X4X140 1D2
901	150303	896.00	MSF	PART.BOARD 5/8X4X164
901	150513	56.00	MSF	REJECT PANEL
901	150524	56.00	MSF	JAMAICA PANEL
901	150525	1,980.00	MSF	KILLINGTON PANEL
901	150701	302.00	MSF	VL COV PANEL 3/16X4X7 FOR BATH
901	150815	172.00	MSF	5/16X48X90 GYPSUM FOR KITCHENS
901	151015	56.00	SF	NATURAL BUTCHER
901	151101	1,050.00	CLF	BATTEN # 900
901	151203	250.00	CLF	BATTEN 1X7 REG.VINYL COVER
901	151901	100.00	CLF	O.S. CORNER 165-2
901	151903	140.00	CLF	I.S.CORNER #104-2
901	152002	3.00	CLF	RAIL # 207-2
901	152003	150.00	CLF	SHOE #909
901	152006	42.00	CLF	CASING # 913
901	152401	140.00	CLF	CEILING BEAM #115
901	152404	98.00	LF	HEWED BEAM 1X3X8' OR 14'

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MOD

MODEL NO. 6814-13-5 - NEWPORT PLANT NUMBER OF UNIT

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	152505	39.00	EA	RAFTER 162.5 BOW 24IN.OC
901	152803	100.00	MSF	FURN ROOM WALL BD. 5/16X48X84
901	152806	896.00	MSF	CEILING PANEL 5/16X48X164
901	152903	896.00	MSF	BOTTOM BOARD 14 FOOT
901	152905	1.00	ROL	#620 TAPE -BOTTOM BOARD
901	153106	1,092.00	MSF	INSULATION R-11
901	153107	896.00	MSF	INSULATION R-11
901	153109	896.00	MSF	INSULATION R-14 PLAIN
901	153202	1,792.00	MSF	POLYETHYLENE 2MILX14X1000
901	200104	18.00	SYD	RHINO ROLL GOODS 14'
901	200225	85.00	SY	CARPET JAMBOREE
901	200301	85.00	SY	CARPET PAD 3/8X12
901	250103	65.00	MF	COP WIRE ROMEX 8/3 W/GRD RANGE
901	250105	19.00	MF	COP WIRE ROMEX 10/3 W/GRD DRYR
901	250106	270.00	MF	COP WIRE ROMEX 12/2 W/GRD
901	250109	750.00	MF	COP WIRE 14/2 W/GRD ROMEX
901	250112	60.00	MFT	18/8 THERMOSTAT WIRE
901	250204	22.00	MF	COPPER WIRE 4-4-6 SEU
901	250302	1.00	EA	POWER CORD #65 4 WIRE RANGE
901	250501	245.00	MF	TAIL LIGHT WIRE 18/1
901	250606	1.00	EA	BREAKER PAN 200 AMP W/MAIN BR.
901	250902	1.00	EA	BREAKER 2-90 AMP BR-290
901	250906	1.00	EA	BREAKER 2-40 AMP BR-240
901	250907	1.00	EA	BREAKER 2-30 AMP BR-230
901	250908	1.00	EA	BREAKER 2-20 AMP BR-220
901	250909	2.00	EA	BREAKER 1P 20 AMP BR-120
901	250910	1.00	EA	BREAKER 1P 15 AMP BR-115
901	250915	2.00	EA	BREAKER TW 15 15 AMP BR-15-15
901	250916	1.00	EA	BREAKER TWIN 15-20 AMP
901	251107	1.00	EA	BREAKER GFCI 115V SP 15AMP
901	251402	3.00	C	METAL PLATE 31/2 R.D.
901	251406	26.00	EA	T & B RECEP WDR-15BR
901	251407	12.00	EA	T & B SWITCH WD5-151BR
901	251705	1.00	EA	RECEPTS RANGE #1212 4 WIRE SUR
901	251707	1.00	EA	RECEPTS DRYER # 1225 4-WIRE
901	251716	2.00	EA	WATER-PROOF RECP. WR-100-C
901	251804	6.00	C	ELEC BOXES #3030-02-40 CEILING
901	251808	1.00	C	ELEC BOXES 6060-02 RECPT. WALL
901	251816	4.00	C	ELEC BOXES #3050-902-40 CEILIN
901	251903	5.00	LF	CONDUIT 2STUB OUTS/C
901	251906	1.00	EA	CONDUIT 2 EMT CONN #706-2
901	251907	1.00	C	CONDUIT 2 PLAST BUSH 936-24-2
901	251908	1.00	EA	CONDUIT 2 LOCK NUT
901	252001	10.00	C	CONNECTORS 3/8 NWT #3300 TGS
901	252002	2.00	C	CONNECT 3/4 NWT 6624 MET DRY

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MOD

MODEL NO. 6814-13-5 - NEWPORT PLANT NUMBER OF UNIT

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	252004	4.00	C	CONNECTORS 11/4 #5626 NCD 41
901	252011	3.00	C	CONNECTORS LUGS SOLD S L-70
901	252013	26.00	M	B-28 RED WIRE NUTS
901	252014	12.00	M	CONNECTORS WIRE NUTS
901	252015	5.00	M	B-18 YELLOW WIRE NUTS
901	252024	24.00	M	BURNDY #TF-8 CABLE TIE
901	252101	5.00	M	STAR WASHER 3/8 INT TOOTH
901	252102	10.00	M	STAR WASHER 1/4
901	252201	2.00	C	SERVICE LUG SX TA 6S
901	252301	2.00	EA	GROUND BAR 11 LUG
901	252302	4.00	C	GROUND BAR 2 SCREW BRASS
901	252402	30.00	C	SPLICE CAPS 2006 S #12 & 14
901	252502	24.00	M	WIRE PROCTECTORS T-1 TUBE
901	252701	.50	ROL	TAPE ELEC PLACTIC 66 PER ROLL
901	252801	3.00	EA	B/ROOM LITE 2027-IC-900
901	252802	6.00	EA	HALL 1303-81472-500
901	252819	2.00	EA	PORCH LIGHT UL 180 UNION
901	252828	1.00	EA	DININGLITE 1329/85476-505
901	252902	1.00	EA	LAMP #100
901	253003	2.00	EA	TAIL LIGHT
901	253204	15.00	EA	BULBS 60 WATTS 120 VAC.
901	254001	1.00	EA	SMOKE DETECTOR
901	300207	1.00	C	NIPPLES 3/4X4 THRESHOLD GALV.
901	300208	1.00	C	NIPPLES 3/4X2 GALV.
901	300610	4.00	LF	POLY PIPE 3/8
901	300611	151.00	LF	POLY PIPE 1/2
901	300612	45.00	LF	POLY PIPE 3/4
901	300637	2.00	EA	ELL 3/4FIP SWIVELX3/4POLYPB884
901	300642	1.00	EA	ADAPT 3/4 FIP X 3/4 POLY PB896
901	300644	2.00	EA	ADAPT 1/2 MIP X 1/2 POLY PB831
901	300665	2.00	EA	COUPLING 1/2X1/2 #C33B
901	300666	10.00	EA	COUPLING 1/2X3/8 #C32B
901	300668	13.00	EA	ELBOW 1/2X1/2 #E33B
901	300669	3.00	EA	TEE 1/2X1/2X1/2 #T333B
901	300674	1.00	EA	TEE 3/4X1/2X3/4 #T434B
901	300675	1.00	EA	ELBOW 3/4X3/4 #E44B
901	300676	1.00	EA	TEE 3/4X3/4X3/4 #T444B
901	300679	2.00	EA	TEE 3/4X1/2X1/2 #T433B
901	300680	1.00	EA	COUPLING 3/4X3/4 #C44B
901	301302	1.00	C	CAP 3/4 W/CHAIN FOR WATER
901	302002	2.00	EA	CUT OFF VALVE V-476
901	302003	2.00	EA	SEAL COCK 1/2 IPS #717-22F
901	302101	3.00	EA	GATE VALUE 3/4 #79-425
901	302401	81.00	CF	PIPE 1.5 PLASTIC
901	302402	17.00	CF	PIPE 2 PLASTIC
901	302403	30.00	CF	PIPE 3 PLASTIC
901	302501	3.00	C	COUPLING 1.5 #3001
901	302502	2.00	C	COUPLING 2 #3002

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MOD

MODEL NO. 6814-13-5 - NEWPORT PLANT NUMBER OF UNIT

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	302503	3.00	C	COUPLING 3 #3003
901	302603	2.00	C	NIPPLE 3X6 #3506
901	302604	2.00	C	NIPPLE 3X10 TXS #35105
901	302701	3.00	C	BUSHINGS 2X1.5 #2752
901	302801	3.00	C	ELL 90DEG.1.5 LONG TURM #2251
901	302802	1.00	C	ELL 90DEG.2 LONG TURN #2252
901	302807	2.00	C	ELL 45DEG.1.5 LONG TURN #2401
901	302810	2.00	C	ELL 3SX3T # 2253-1
901	302902	2.00	C	ELL 45DEG.2 #2502
901	303002	4.00	C	TEES 1.5SX1.5X1.5S #2114
901	303003	2.00	C	TEES 2SX1.5SX1.5S #2128
901	303005	1.00	C	TEES 2SX1.5SX2S #2127
901	303010	2.00	C	TEES 3SX3TX3S #2153-1
901	303106	2.00	C	SIDE INLET 3SX3SX2SX2S#2146L-1
901	303303	1.00	C	1.5 IN COMB. WYE #4301
901	303603	5.00	EA	P-TRAP 1.5X16 PLASTIC CONT
901	303605	3.00	EA	ANTI-SIPHON VENT BPC-78.
901	303606	3.00	EA	ANTI-SIPHON VENT ADPT. A-201
901	303701	4.00	C	ADAPTER 1.5X1-1/4 #3211Y
901	303704	1.00	EA	SWIVEL ADAPTER 3/4X1/2 BRASS
901	303714	10.00	EA	# 248 QEST 48IN RISER
901	303717	2.00	EA	1/2 FLANGE W/SCREW-R-1396
901	304101	1.00	C	PLASTIC CAPS 1.5 #3081
901	304102	2.00	C	PLAST CAPS 3 W/CHAIN 300-WS
901	304203	1.00	EA	SINK 18 X 32
901	304402	1.00	EA	SINK RIM 18 X 32
901	304501	1.00	EA	SWING SPOUT # T-800-T
901	304602	2.00	EA	BASKET STRAINER METAL
901	304607	1.00	EA	CONT WASTE #2008-P
901	304703	2.00	EA	LAVATORY-OVAL 17" X 20" P-1
901	304801	2.00	EA	FAUCET 4IN LAV T-77
901	305003	1.00	EA	BATHTUB 54 IN OWENS-CORNING
901	305301	1.00	EA	SHOWER DIVERTER T-2700-R
901	305401	1.00	EA	STRAINER W/STOPPER CAR-461
901	305501	2.00	EA	COMMODE BOWL
901	305502	2.00	EA	COMMODE TANK & TOP
901	305503	2.00	EA	COMMODE SEAT
901	305701	2.00	EA	FLOOR FLANGE FEM #3634-6 4X3
901	305801	2.00	EA	SEAL WAX #H2-11-1
901	306405	2.00	EA	COSMETIC CASE 24 INCH
901	306502	1.00	EA	WATER HEATER 30GAL.ELEC.
901	306602	2.00	EA	SH CURTAIN 72X72 W/VAL 581MOD2
901	350120	1.00	EA	PRE-CUT ROOF 65-6 X 170
901	350301	54.00	LF	HEAT DUCT 016X20.52PC/L DUCT
901	350802	448.00	LB	ALUMINUM .019 GA. SOLID COLORS
901	351208	160.00	M	STRAP GALV.1.5X15IN. 30GA
901	352001	2.00	EA	VENT CAP 2 PLUMB PLASTIC

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MOD

MODEL NO. 6814-13-5 - NEWPORT PLANT NUMBER OF UNIT

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	400101	6.00	EA	INT DOOR PRE-FIN.2-0X 6-8BORED
901	400102	1.00	EA	INT DOORPRE-FIN 2-6X6-8N/BORED
901	400116	1.00	EA	INT DOOR 1-8X6-8 WOOD 3ORED
901	400200	1.00	EA	EXTER DOOR 32X76 10X10 DIAMOND
901	400203	1.00	EA	EX.DOOR 34X80 CROSSBUCK
901	400434	4.00	EA	WINDOW-30X53 1/1 BROWN
901	400435	3.00	EA	WINDOW-30X53 1/1 BROWN EGRESS
901	400436	2.00	EA	WINDOW-30X27 1/1 BROWN
901	400437	2.00	EA	WINDOW BROWN 14X 27
901	400440	1.00	EA	WINDOW 30 X 40 1/1 BROWN
901	400550	2.00	EA	TRIM 30X27 REG WINDOW
901	400551	1.00	EA	TRIM 30X39 REG WINDOW
901	400552	7.00	EA	TRIM - 30X53
901	400801	5.00	EA	DOOR LOCK 7/8 BEDROOM PASSAGE
901	400802	3.00	EA	DOOR LOCK 7/8 BATHROOM PRIVACY
901	401401	1.00	EA	SLIDING DOOR KIT 47X83 2 DR.
901	401402	1.00	EA	SLIDING DOOR KIT 24X83 1 DR.
901	450114	18.00	SF	1/2"X4'X8'WHITE SHEET STOCK
901	450115	32.00	SF	1/2"X4'X8' BROWN STOCK
901	450117	5.00	SF	#1396 DOOR SLAB 1/2 X 13.5 X96
901	450118	58.00	SF	#1696 DOOR SLAB 1/2 X 16.5 X96
901	450607	8.00	EA	DRAWER SIDES 9 1/2 X 21
901	450701	4.00	EA	DRAWER SLIDE DS-22-SGT
901	450801	28.00	PR	HINGS SELFCLOSING A-COP#H_19E
901	450807	2.00	EA	DOOR BUMPER FLEX.SPRING#1003
901	450901	10.00	M	PULL #P22E
901	450903	10.00	EA	KNOB CM 855 ANTIQUE ENGLISH
901	500115	1.00	EA	3400-815 ELECTRIC FURNACE
901	500602	7.00	EA	FLOOR REGS W/DAMPER #F-511D
901	500603	7.00	EA	FLOOR REGS CONN 4X10X4-1/2 HIP
901	500701	.50	ROL	HEAT DUCT TAPE
901	500802	1.00	EA	REFER SINGLE DOOR LH 14CUFT
901	501400	8.00	FT	4" X 8' ALUM DRYER HOSE
901	501403	1.00	EA	OUA-64 4IN. VENT HOOD
901	501404	4.00	EA	1641-8 4"
901	501405	1.00	EA	W-49 DRYER VENT
901	501803	1.00	EA	ELEC.RANGE STAN. JBS03
901	501905	1.00	EA	HOOD 42 KROMTONE HOR W/PLAS CV
901	550201	1.00	EA	STEP TABLE #11
901	550424	1.00	EA	COCKTAIL TABLE # 10
901	550502	1.00	EA	DINETTE TABLE P-936 D.ELM
901	550602	4.00	EA	CHAIRS #99 BROWN RAWHIDE

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MODEL

MODEL NO. 6814-13-5 - NEWPORT PLANT NUMBER OF UNITS

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	551101	1.00	EA	BEDS 39 POLY STAND LESS LEGS
901	551103	2.00	EA	BEDS 54 POLY STAND LESS LEGS
901	551401	3.00	EA	BED FRAMES 39-54 METAL
901	551516	1.00	EA	CONNER DECOR KITS 10183
901	552046	1.00	EA	#9000 SOFA CRENSHAW PEWTER
901	552164	1.00	EA	#9000 CHAIR CRENSHAW PEWTER
901	552281	1.00	EA	6814135 MAYFAIR DLX
901	600917	1.00	EA	DRAPE HARDWARE 6814100
901	601900	.90	EA	FASTNERS/NAILS/STAPLES/SCREWS
901	650100	.75	EA	MISC/GLUE/CAULKING/PAINT/STAIN
901	651609	2.00	GAL	TPA ANTIFREEZE
901	651901	1.00	GAL	LINOLEUM ADHESIVE # 924
901	652001	2.00	EA	TAGS ALUMINUN DECAL CONNER
901	652005	1.00	EA	TAGS BRASS GAS CODE
901	652006	1.00	EA	TAGS BRASS ELECTRIC CODE
901	652007	1.00	EA	TAGS WATER TAG W-2
901	652008	1.00	EA	TAGS DRAIN OUTLET W-4
901	652009	1.00	EA	TAGS HEAT LOSS CERTIFICATE
901	652010	1.00	EA	TAGS M/HOME TAG F-2
901	652014	1.00	EA	TAGS DATA PLATE
901	652021	1.00	EA	TAGS HUD
901	652022	1.00	EA	RADCO CERTIFICATION TAG
901	652023	1.00	EA	COMFORT COOLING CERTIFICATE
901	652024	1.00	EA	LAUNDRY AREA TAG
901	652025	1.00	EA	OWNERS MANUAL
901	652026	1.00	EA	INSTALLATION INSTRUCTIONS
901	652101	38.00	CLB	STEEL STRAP 1 1/4X035 6.7 HURR

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MODE

MODEL NO. 5224-11-6 - NEWPORT PLANT NUMBER OF UNITS

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	100102	1,792.00	CLB	1 BEAM 10X40-8.0 #FT
901	100104	40.00	LF	2 IN. SQ.TUBE 11 GA.10 FOOT
901	100201	24.00	EA	CXM2X75.5X1.25FLANG C-BK 13GA
901	100307	4.00	EA	FRONT PLATE 10X163 10GA
901	100401	24.00	EA	OUTRG 7.5X32X1 T&B FLNG 13GA R
901	100502	16.00	EA	PAT PLA 1/4X7 1/4X9 1/4 10 G
901	100504	8.00	EA	HITCH PL 3/16X 8 X 8
901	100505	96.00	EA	ANGLE 1 X 1 X8 13 GUAGE
901	100611	2.00	EA	ANGLE-HITCH-2X2X36 10GA.
901	100704	2.00	EA	BRAKE AXLE W/MONOLEAFSPRING
901	100705	2.00	EA	IDLER AXLE W/MONOLEAFSPRING
901	100801	8.00	EA	TIRES 8.14X5-8 PLY
901	100802	8.00	EA	RIMS TL-600
901	100901	8.00	EA	VALVE STEM #415 RUBBER
901	101001	2.00	EA	JACK #2312-10 STEM FULL SKIRT
901	101002	2.00	EA	COUPLER 2312 FULL SKIRT
901	101201	24.00	LB	ELECT 5/32 WELD RODS #14A
901	101202	15.00	LB	ELECT 5/32 WELD.RODS #24
901	150101	91.00	MBF	RANDOM 1X2SPF NO.3 1BD.FT.-6
901	150103	176.00	MBF	RANDOM SPF 1X4 #3 1BD.FT.-3
901	150108	1.00	MBF	FIR UTIL. 2X2 1BD. FT.-3
901	150109	494.00	MBF	RANDOM SPF 2X4X NO.3 BRT SLF
901	150111	1,008.00	MBF	PET SPF 2X4X87 3/4 #3 SLF
901	150116	1,181.00	MBF	SPF 2X6X137#3
901	150121	63.00	MBF	RANDOM 1X3 #2 1-BD.FT.-4
901	150122	52.00	MBF	PET 1X3X82.5
901	150124	60.00	MBF	T-JOIST 2X4 7/8 X161
901	150126	20.00	MBF	SPF 2X3 RANDOM #2 &BETTER
901	150128	97.00	MBF	SPF 1X3X88.5 #2SRB
901	150131	67.00	MBF	SPF 2X3X82.5
901	150132	216.00	MBF	FULL 1 X 2 (12 FT = 3 BDFT)
901	150201	50.00	MSF	EXT. GLUE 3/8X4X8 INDEX 24/0
901	150302	1,226.00	MSF	PART BRD 5/8X4X140 1D2
901	150513	60.00	MSF	REJECT PANEL
901	150525	2,632.00	MSF	KILLINGTON PANEL
901	150702	355.00	MSF	VL. COV. PANEL 3/16X4X90
901	150815	278.00	MSF	5/16X48X90 GYPSUM FOR KITCHENS
901	151015	38.00	SF	NATURAL BUTCHER
901	151101	892.00	CLF	BATTEN # 900
901	151204	100.00	CLF	BATTEN 1X7 3-WAY VINYL COVER
901	151801	209.00	CLF	BASE COVE 110/CIN 01-161
901	151901	75.00	CLF	O.S. CORNER 165-2
901	152001	31.00	CLF	CASING # 337-2
901	152003	222.00	CLF	SHOE #909
901	152401	287.00	CLF	CEILING BEAM #115
901	152502	80.00	EA	RAFTER MONO 30 IN X 12 FOOT
901	152803	113.00	MSF	FURN ROOM WALL P.D. 5/16X48X84
901	152804	1,152.00	MSF	CEILING PANEL 5/16X48X140

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MO

MODEL NO. 5224-11-6 - NEWPORT PLANT NUMBER OF UNI

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	152903	1,152.00	MSF	BOTTOM BOARD 14 FOOT
901	152904	1,104.00	MSF	TU-TUF 12X500 W/CONNER DECAL
901	153106	1,152.00	MSF	INSULATION R-11
901	153108	1,235.00	MSF	INSULATION R-11
901	153110	1,235.00	MSF	INSULATION R-5
901	153111	1,152.00	MSF	INSL R-11 KRAFT-BACK
901	153202	1,235.00	MSF	POLYETHYLENE 2MILX14X1000
901	153203	2,470.00	MSF	POLYETHYLENE 4 MIL X 14 X 500
901	200103	27.00	SYD	RHINO ROLL GOODS 12'
901	200225	104.00	SY	CARPET JAMBOREE
901	200302	104.00	SY	CARPET PAD 3/4X12
901	250103	17.00	MF	COP WIRE ROMEX 8/3 W/GRD RANGE
901	250105	16.00	MF	COP WIRE ROMEX 10/3 W/GRD DRYR
901	250106	177.00	MF	COP WIRE ROMEX 12/2 W/GRD
901	250109	1,074.00	MF	COP WIRE 14/2 W/GRD ROMEX
901	250111	20.00	MF	COP WIRE #8 BARE GROUND
901	250112	25.00	MFT	18/8 THERMOSTAT WIRE
901	250113	40.00	MF	COPPER WIRE 6-6-8
901	250203	50.00	MF	COPPER WIRE 8-8-8 SEU 75C
901	250302	1.00	EA	POWER CORD #65 4 WIRE RANGE
901	250303	1.00	EA	POWER CORD #4 WIRE DYR PIGTAIL
901	250501	220.00	MF	TAIL LIGHT WIRE 18/1
901	250606	1.00	EA	BREAKER PAN 200 AMP W/MAIN BR.
901	250906	2.00	EA	BREAKER 2-40 AMP BR-240
901	250907	1.00	EA	BREAKER 2-30 AMP BR-230
901	250908	1.00	EA	BREAKER 2-20 AMP BR-220
901	250909	1.00	EA	BREAKER 1P 20 AMP BR-120
901	250913	1.00	EA	BREAKER 2 POLE 60 AMP BR-260
901	250915	2.00	EA	BREAKER TW 15 15 AMP BR-15-15
901	250916	1.00	EA	BREAKER TWIN 15-20 AMP
901	251107	1.00	EA	BREAKER GFCI 115V SP 15AMP
901	251406	32.00	EA	T & B RECEP WDR-15BR
901	251407	14.00	EA	T & B SWITCH WD5-151BR
901	251408	2.00	EA	AMP CROSSOVER PLUG #605152-1
901	251705	1.00	EA	RECEPTS RANGE #1212 4 WIRE SUR
901	251707	1.00	EA	RECEPTS DRYER # 1225 4-WIRE
901	251716	2.00	EA	WATER-PROOF RECP. WR-100-C
901	251804	5.00	C	ELEC BOXES #3030-02-40 CEILING
901	251816	9.00	C	ELEC BOXES #3050-902-40 CEILIN
901	251817	2.00	C	ELEC BOXES #6060-402 WALL
901	251903	5.00	LF	CONDUIT 2STUB OUTS/C
901	251906	1.00	EA	CONDUIT 2 EMT CONN #706-2
901	251907	1.00	C	CONDUIT 2 PLAST BUSH 936-24-2
901	251908	1.00	EA	CONDUIT 2 LOCK NUT
901	252000	10.00	C	CONNECT 3/8 NWT #6623 RAN. HD.

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MO

MODEL NO. 5224-11-6 - NEWPORT PLANT NUMBER OF UNI

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	252001	2.00	C	CONNECTORS 3/8 NWT #3300 T&B
901	252002	2.00	C	CONNECT 3/4 NWT 6624 MET DRY
901	252013	70.00	M	B-2B RED WIRE NUTS
901	252014	12.00	M	CONNECTORS WIRE NUTS
901	252015	7.00	M	B-1B YELLOW WIRE NUTS
901	252024	20.00	M	BURNDY #TF-8 CABLE TIE
901	252101	10.00	M	STAR WASHER 3/8 INT TOOTH
901	252102	320.00	M	STAR WASHER 1/4
901	252203	3.00	C	SERV. LUG KP 4C SPLIT BOLT CON
901	252301	1.00	EA	GROUND BAR 11 LUG
901	252302	2.00	C	GROUND BAR 2 SCREW BRASS
901	252401	30.00	C	SPLICE CAPS 2011 S LG WIRE
901	252502	28.00	M	WIRE PROCTECTORS T-1 TUBE
901	252701	.50	ROL	TAPE ELEC PLACTIC 66 PER ROLL
901	252801	12.00	EA	B/ROOM LITE 2027-IC-900
901	252819	2.00	EA	PORCH LIGHT UL 180 UNION
901	252828	1.00	EA	DININGLITE 1329/85476-505
901	253003	4.00	EA	TAIL LIGHT
901	253102	1.00	EA	FAN 8 CEILING EXHAUST COMPLETE
901	253204	17.00	EA	BULBS 60 WATTS 120 VAC.
901	254001	2.00	EA	SMOKE DETECTOR
901	300207	1.00	C	NIPPLES 3/4X4 THRESHOLD GALV.
901	300208	1.00	C	NIPPLES 3/4X2 GALV.
901	300610	4.00	LF	POLY PIPE 3/8
901	300611	95.00	LF	POLY PIPE 1/2
901	300612	34.00	LF	POLY PIPE 3/4
901	300637	2.00	EA	ELL 3/4FIP SWIVELX3/4POLYPB864
901	300642	1.00	EA	ADAPT 3/4 FIP X 3/4 POLY PB896
901	300644	2.00	EA	ADAPT 1/2 MIP X 1/2 POLY PB831
901	300665	2.00	EA	COUPLING 1/2X1/2 #C33B
901	300666	10.00	EA	COUPLING 1/2X3/8 #C32B
901	300668	11.00	EA	ELBOW 1/2X1/2 #E33B
901	300669	4.00	EA	TEE 1/2X1/2X1/2 #T333B
901	300671	1.00	EA	TEE 3/4X3/4X1/2 #443B
901	300674	4.00	EA	TEE 3/4X1/2X3/4 #T434B
901	300675	3.00	EA	ELBOW 3/4X3/4 #E44B
901	300676	2.00	EA	TEE 3/4X3/4X3/4 #T444B
901	300679	2.00	EA	TEE 3/4X1/2X1/2 #T433B
901	300680	1.00	EA	COUPLING 3/4X3/4 #C44B
901	301302	1.00	C	CAP 3/4 W/CHAIN FOR WATER
901	302002	2.00	EA	CUT OFF VALVE V-476
901	302003	2.00	EA	SEAL COCK 1/2 IPS #717-22F
901	302101	3.00	EA	GATE VALUE 3/4 #79-425
901	302401	65.00	CF	PIPE 1.5 PLASTIC
901	302402	15.00	CF	PIPE 2 PLASTIC
901	302403	30.00	CF	PIPE 3 PLASTIC
901	302501	2.00	C	COUPLING 1.5 #3001
901	302602	2.00	C	NIPPLE 3X4 #3504

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MC

MODEL NO. 5224-11-6 - NEWPORT PLANT NUMBER OF UNI

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	302603	2.00	C	NIPPLE 3X6 #3506
901	302604	2.00	C	NIPPLE 3X10 TXS #35105
901	302801	3.00	C	ELL 90DEG.1.5 LONG TURN #2251
901	302802	3.00	C	ELL 90DEG.2 LONG TURN #2252
901	302902	1.00	C	ELL 45DEG.2 #2502
901	303001	2.00	C	TEES 1.5SX1.5SX1.5S #2151
901	303004	4.00	C	TEES 2SX2SX1.5S #2126
901	303005	3.00	C	TEES 2SX1.5SX2S #2127
901	303006	3.00	C	TEES 2SX2SX2S #2132
901	303106	2.00	C	SIDE INLET 3SX3SX2SX2S#2146L-1
901	303602	6.00	C	P-TRAP 1.5 #3211-N
901	303603	1.00	EA	P-TRAP 1.5X16 PLASTIC CONT
901	303605	1.00	EA	ANTI-SIPHON VENT BPC-78
901	303606	1.00	EA	ANTI-SIPHON VENT ADPT. A-201
901	303702	2.00	C	STRAINER ADPT. 1.5 # 3216
901	303704	1.00	EA	SWIVEL ADAPTER 3/4X1/2 BRASS
901	303714	10.00	EA	# 248 QEST 48IN RISER
901	303717	2.00	EA	1/2 FLANGE W/SCREW-R-1396
901	304101	1.00	C	PLASTIC CAPS 1.5 #3081
901	304102	2.00	C	PLAST CAPS 3 W/CHAIN 300-WS
901	304203	1.00	EA	SINK 18 X 32
901	304402	1.00	EA	SINK RIM 18 X 32
901	304501	1.00	EA	SWING SPOUT # T-800-T
901	304601	2.00	EA	BASKET STRAINER #6103-4 4IN
901	304703	2.00	EA	LAVATORY-OVAL 17" X 20" P-1
901	304801	2.00	EA	FAUCET 4IN LAV T-77
901	305003	1.00	EA	BATHTUB 54 IN OWENS-CORNING
901	305012	1.00	EA	BATH TUB/GARDEN 60X49X24 #301
901	305301	2.00	EA	SHOWER DIVERTER T-2700-R
901	305302	2.00	EA	FAUCET # T-174-F
901	305401	2.00	EA	STRAINER W/STOPPER CAR-461
901	305501	2.00	EA	COMMODE BOWL
901	305502	2.00	EA	COMMODE TANK & TOP
901	305503	2.00	EA	COMMODE SEAT
901	305701	2.00	EA	FLOOR FLANGE FEM #3634-6 4X3
901	305801	2.00	EA	SEAL WAX #H2-11-1
901	306001	2.00	EA	PAPER HOLDER T-5158
901	306404	2.00	EA	MEDICINE CABINET # 54405-0036
901	306502	1.00	EA	WATER HEATER 30GAL.ELEC.
901	306601	2.00	EA	SHOWER CURTAIN 72X72 PLAIN
901	306701	24.00	EA	RINGS FOR SHOWER CURTAINS
901	350106	2.00	EA	PRE-CUT ROOF 49-6 X 148
901	350301	66.00	LF	HEAT DUCT 016X20.52PC/L DUCT
901	350703	1.00	EA	V-BONNET 7681-6421
901	350704	2.00	EA	DROP OUT KIT 7680-6411
901	350705	3.00	EA	12IN. BY 14FT DUCT 7680-4931
901	350802	410.00	LB	ALUMINUM .019 GA. SOLID COLORS
901	351208	200.00	M	STRAP GALV.1.5X15IN. 30GA

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MOD

MODEL NO. 5224-11-6 - NEWPORT PLANT NUMBER OF UNIT

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	352001	1.00	EA	VENT CAP 2 PLUMB PLASTIC
901	352002	4.00	EA	EAVE VENT 4" X 16"
901	400101	5.00	EA	INT DOOR PRE-FIN.2-0X 6-8BORED
901	400102	3.00	EA	INT DOORPRE-FIN 2-6X6-8N/BORED
901	400116	1.00	EA	INT DOOR 1-8X6-8 WOOD BORED
901	400201	1.00	EA	EX.DOOR-THRES 32X76 10X10 DIAM
901	400203	1.00	EA	EX.DOOR 34X80 CROSSBUCK
901	400434	5.00	EA	WINDOW-30X53 1/1 BROWN
901	400435	3.00	EA	WINDOW-30X53 1/1 BROWN EGRESS
901	400436	1.00	EA	WINDOW-30X27 1/1 BROWN
901	400438	1.00	EA	WINDOW 46 X 8 BROWN
901	400550	1.00	EA	TRIM 30X27 REG WINDOW
901	400552	8.00	EA	TRIM - 30X53
901	400555	1.00	EA	TRIM W/STORM 46X08
901	400801	7.00	EA	DOOR LOCK 7/8 BEDROOM PASSAGE
901	400802	2.00	EA	DOOR LOCK 7/8 BATHROOM PRIVACY
901	450115	79.00	SF	1/2"X4'X8' BROWN STOCK
901	450117	12.00	SF	#1396 DOOR SLAB 1/2 X 13.5 X96
901	450118	49.00	SF	#1696 DOOR SLAB 1/2 X 16.5 X96
901	450605	8.00	EA	DRAWER SIDES 5X18 5/8X1/4
901	450701	4.00	EA	DRAWER SLIDE DS-22-SGT
901	450801	22.00	PR	HINGS SELFCLOSING A-COP#H 19E
901	450807	2.00	EA	DOOR BUMPER FLEX.SPRING#1003
901	450900	24.00	M	STRAP #ST 23E
901	450901	10.00	M	PULL #P22E
901	450903	12.00	EA	KNOB CM 855 ANTIQUE ENGLISH
901	500115	1.00	EA	3400-815 ELECTRIC FURNACE
901	500602	10.00	EA	FLOOR REGS W/DAMPER #F-511D
901	500604	10.00	EA	FLOOR REG. CONN.4X10X6
901	501001	1.00	EA	REFRIG 2 DOOR RH 14 CU FT
901	501400	8.00	FT	4" X 8' ALUM DRYER HOSE
901	501402	1.00	EA	DRYER VENT KIT COMPLETE
901	501403	1.00	EA	DUA-64 4IN. VENT HOOD
901	501404	4.00	EA	1641-8 4"
901	501803	1.00	EA	ELEC.RANGE STAN. J8S03
901	501905	1.00	EA	HOOD 42 KROMTONE HOD W/PLAS CV
901	551516	1.00	EA	CONNER DECOR KITS 10183
901	552250	1.00	EA	DRAPES 5224116 MAT ONLY

CONNER HOMES CORP.

DATE 12/01/83 BASE STD. COST BY MOD

MODEL NO. 5224-11-6 - NEWPORT PLANT NUMBER OF UNIT

LOC.	B/M	QTY. REQ	U/M	DESCRIPTION
901	600922	1.00	EA	DRAPE HARDWARE 6414112
901	601900	1.00	EA	FASTNERS/NAILS/STAPLES/SCREWS
901	650100	1.15	EA	MISC/GLUE/CAULKING/PAINT/STAIN
901	651608	2.00	GAL	PLASTIC ROOF CEMENT
901	651609	1.00	GAL	TPA ANTIFREEZE
901	651901	2.00	GAL	LINOLEUM ADHESIVE # 924
901	652001	2.00	EA	TAGS ALUMINUN DECAL CONNER
901	652005	1.00	EA	TAGS BRASS GAS CODE
901	652006	1.00	EA	TAGS BRASS ELECTRIC CODE
901	652007	1.00	EA	TAGS WATER TAG W-2
901	652008	1.00	EA	TAGS DRAIN OUTLET W-4
901	652009	1.00	EA	TAGS HEAT LOSS CERTIFICATE
901	652010	1.00	EA	TAGS M/HOME TAG F-2
901	652014	1.00	EA	TAGS DATA PLATE
901	652019	1.00	EA	TAGS DISCONNECT SERV TAG DW
901	652021	1.00	EA	TAGS HUD
901	652022	1.00	EA	RADCO CERTIFICATION TAG
901	652023	1.00	EA	COMFORT COOLING CERTIFICATE
901	652024	1.00	EA	LAUNDRY AREA TAG
901	652025	1.00	EA	OWNERS MANUAL
901	652026	1.00	EA	INSTALLATION INSTRUCTIONS
901	652027	1.00	EA	SMOKE DETECTOR LABELS
901	652028	1.00	EA	200 AMP PANELBOARD LABELS
901	652029	1.00	EA	LIMITED WARRANTY SHEET
901	652030	1.00	EA	WATER HEATER WARNING LABEL
901	652031	2.00	EA	NO STORAGE LABEL

Appendix VII
Cost Calculation Back-Up, Single Wide Demo

Detailed back-up calculation for identified sigle wide material cost increases and decreases. All unit costs used are verified costs taken from Conners Cost Sheets dated December 1, 1983, or supplied individually by Conners personnel.

Item	Comments
B-2	Delete one storm window unit in each of two bathrooms. Cost reduction of: 2x3.36 = ($6.72)
D-6	Add four sidewall straps at 24" from each corner plus necessary blocking. Cost increase of: 4 straps @ .05 = $0.20 4 - 2x4 blocks @ $359 MBF = 4 x .29 = 1.16 Total Cost = 1.36
D-12	High grade vinyl flooring added under Standard bath capacity 2.5x6.25 + 4.32x8.0 + 2.5x5.0 = 62.75/9 = 7.0 sq.yds. 7.0 sq. yds. at 4.93 psy = $34.51 Projected Production units will utilize less expensive flooring or similar treatment 7.0 sq. yds. @ 2.00 psy = $14.00
D-13	Cut out and waste 30"x5' piece of carpet. Add 7.5 feet of carpet edge strip. Delete carpet and pad 12.5/9 x 4.03/SY = $5.60 Add 7.5 if strip @ 0.403/SY = $3.00 Note: Carpet and pad are included in waste factor, so net cost of change is $3.00.
D-18	Revisions on this demonstration project caused by formaldehyde certification include the following. Delete all vinyl covered plywood (V.C.P.) and substitute certified interior plywood paneling Wall B: Delete Tub-Tile Bd 31 3/4 x 84 @ 299/M (5.54) Add Paneling 31 3/4 x 84 @ 225/M 4.17

Wall C:	Delete	42 1/2 x 84	V.C.P.	(15.78)
	Delete	48 x 84	V.C.P.	incl.
	Add	42 1/2 x 84	Paneling	11.88
	Add	48 x 84	Paneling	incl.
Wall D:	Delete	26 x 84	V.C.P.	(10.42)
		24 1/2 x 3/4	V.C.P.	incl.
		33 1/2 x 84	V.C.P.	incl.
	Add	26 x 84	Paneling	7.84
		24 1/2 x 3/4	Paneling	incl.
		33 1/2 x 84	Paneling	incl.

Wall E:	Delete	48 x 84	V.C.P.	(12.30)
	Add	48 x 84	Paneling	incl.
	Delete	22 1/2 x 84	V.C.P.	9.25
	Add	22 1/2 x 84	Paneling	incl.
Wall K:	Delete	24 3/4 x 84	V.C.P.	(9.06)
		3/4 x 24 3/4	V.C.P.	incl.
		27 1/4 x 84	V.C.P.	incl.
	Add	24 3/4 x 84	Paneling	6.82
		3/4 x 24 3/4	Paneling	incl.
		27 1/4 x 84	Paneling	incl.
Sidewalls	Delete	83 x 84	V.C.P.	(15.35)
	Add	83 x 84	Paneling	11.55
Wall O:	Delete	24 3/4 x 84	V.C.P.	(9.10)
		1 1/2x24 1/2	V.C.P.	incl.
		27 1/4 x 84	V.C.P.	incl.
	Add	24 3/4 x 84	Paneling	7.60
		1 1/2x24 1/2	Paneling	incl.
		27 1/2 x 84	Paneling	incl.
Wall R:	Delete	30 x 84	V.C.P.	(5.23)
	Add	30 x 84	Paneling	3.94
Wall W:	Delete	35 1/2 x 84	V.C.P.	(6.19)
	Add	35 1/2 x 84	Paneling	4.66
			Net Cost Reduction	$21.26

Note: Batten strip savings are not included.
"Feature wall" on S.W. Demo was deleted with cost impact as follow:

Substitute regular certified paneling for VCP High Striped Melon (Note VCP used in lieu of Jamaica on std. unit)
71.2 sq. ft. x (299/msf - 225/msf) = (5.26)
delete mirror (11.11)
delete false beams (6.24)

Total Savings, Feature Wall ($22.61)

Add tub surround at 54" tub $80.00

Projected

Add 1.00/msf for all plywood and 0.50/msf for all particleboard to cover certification program cost, per HUD and HPMA.

VCP: .302 MSF x 1.00 = 0.30
P-P: 2.092 MSF x 1.00 = 2.09
PB: .990 MSF x 0.50 = 0.50

G-1 Standard gate valve provided at main cold water shut off was upgraded to a proposed code complying valve.

7.71 - 2.74 = $4.97

Projected

In production, quantity discounts of 5% would be available.

7.71(.95) - 2.74 = $4.58

G-2 One 6' listed heat tape was provided loose in the house package at a cost of $9.25.

Projected

In production, quantity discounts of 5% would be available.

9.25 x 0.95 = 8.79

G-17 Short turn 90 Ells were substituted for standard long turn Ells with impacts as follows

Delete	2 - 2" Ells @ $.25 ea	(0.50)
Add	2 - 2" Short turn Ells @ $0.360 ea	0.72
Delete	2 - 1 1/2 Ells @ $0.17ea	(.34)
Add	2 - 1 1/2 Short turn Ells @ $0.250	0.50
	Net Added Cost	$0.38

I-11 Delete outlet box, and cover plate ($1.24)
Delete 8'0" of 14 1/2 Romex @ $59.95/MSF (0.48)
Net Savings ($1.72)

J-4.1 Added wall paneling of 7.26 sq. ft. @ 0.225 psf (See attached take off)
Net Added Cost $1.63

Back-up for J 4.1 S.W.
Revised P-P layout for sidewalls

Sidewalls

Std	Demo	Std	Demo
48 x 84	16 x 84	48 x 84	16 x 84
48 x 84	48 x 84	do	48 x 84
48 x 84	do	28 1/2 x 84	do
46 1/2 x 84	do	35 1/2 x 84	do
33 1/2 x 84	do	19 1/2 x 84	do
16 x 84	do	44 1/2 x 84	do
8 x 32	16 x 84	48 x 84	do
48 x 84	48 x 84	40 1/2 x 84	do
do	do	33 x 84	16 x 84
do	do	38 x 84	48 x 84
do	do	48 x 84	do
do	do	do	16 x 84
do	do	do	48 x 84
do	do	do	do
34 x 84	do	16 x 84	32 x 84
30 x 84	do	7 x 34	48 x 84
48 x 84	16 x 84	46 x 84	do
48 x 84		48 x 84	do
		48 x 84	16 x 84
6 cuts	3 cuts	10 cuts	5 cuts
12 full pieces	14 full pieces	9 full pieces	14 full pieces
15.4 pieces	15 total pieces	15.34 total pieces	16 total pieces

30.74 pieces for std. unit
31 pieces for Demo unit

Net added mat'l of 7.26 sq. ft.

J-4.2 Added 2 pieces of paneling for band joist reinforcement

2 x 4 x 7 x .225 psf = $12.60

J-4.3 15 lf x 2/3 x .359 = $3.83

Add 15 lf of 2x4 R/L @ .359 /BF = $5.74

J-4.4

Delete	26.08 lf 1x4 R/L @ .319/lf	(8.32)
Add	26.08 lf 2x3 R/L @ .245/lf	6.39
Delete	14 pcs 1x4x82 1/2 @ .319/lf	(30.70)*
	* (check unit price)	
Add	13 pcs 2x3x82 1/2 @ .245/lf	21.90
Add	2.3 Shear block 1.27 lf @ .245/lf	.31

Relocate floor joist under new shear wall:
No Cost Impact
Change 2 - 2x6 floor joists from #3 to #2, #2 used throughout, No Cost Impact

4.5 lf 1x4 R/L @ .319/lf	= 1.44
3 pcs. 1x4x82 1.2 @ .319/lf	= 6.58
1 - P-P @ 27 x 84 @ .225 psf	= 3.54
1x53.125x1x4 R/t @ .319/lf	= 1.41
Net added cost	$2.55

J-4.5 Add certified low formaldehyde paneling under gypsum in kitchen
Substitute certified low formaldehyde paneling and gypsum for VCP in kitchen or end wall

Add P-P	(7 x 13.67) x .225	= 21.53
Add Gyp.	(7 x 13.67) x .219	= 20.95
Delete VCP	7 x 13.67 x .299	= (28.61)
		13.87

Add Paneling under existing gyp. on sidewall

.225 x 10.5 x 7 = 16.54

Net added cost in kitchen $30.41

J-4.6 No extra costs were incurred since #2 floor joists were used throughout for both standard and demo units

Projected

168 bf x .008/bF = 1.34
for #2 at 317/m and #3 at 309/mbf

J-4.7	Delete 2x2x16 ga. x 10' tubes @ .974 psf	(19.48)
	Delete 34 pcs. 1.5x1.5 angle @ 0.17 ea.	(5.78)
	Delete welding rods 1.11 lbs. @ 0.50/lb	(0.56)
	Net Savilngs	25.82

J-4.14 - Projected

In the production case, #3 material would be utilized wherever possibled. This would result in an increased cost for an upgraded floor joist, where specificed.

1 - 2x6x14 ft. long = 14 b.f.
14 b.f. @ ($317 - $309)/mbf = 0.11

Appendix VIII
Cost Calculation Back-Up, Double Wide Demo.

Detailed back-up calculations for identified double-wide material cost increases and decreases. All unit costs used are verified costs taken from Conners Cost Sheets dated Dec. 1, 1983, or supplied individually by Conners personnel.

Item Comments

B-2 Bath No. 1 in both standard and demonstration units was to be modified to delete window, thus the Demo unit is unaffected by this item. Bath No. 2 in both units has a storm unit that is openable without removal, thus this item is covered under "Pres. Const. Meeting Prop. Stds."

D-12 Projected

Calculate cost of lower grade sheetgoods on floor under standard carpet, in both baths.

((5x11) + (4.5 x 8) X 2.00 psy = $20.22

This is an added cost over Conner's standard practice of one material only, in bathrooms.

D-18 Revisions on this demonstration project caused by required formaldehyde certification include the following:

Delete all vinyl covered plywood (VCP) at $299/M and substitute certified interior paneling at $225/M, on:

Wall D	Delete	2 pcs VCP 48x90	(17.94)
	Add	2 pcs. P-P 48x90	13.50
Wall E	Delete	3 pcs VCP, 32x90	(17.94)
	Delete	1 pc VCP, 36 1/2x90	(6.82
	Add	3 pcs P-P, 32x90	13.50
	Add	1 pc P-P, 36 1/2x90	5.13
Wall F	Delete	VCP as follows:	
		1 pc 32x90	(5.98)
		1 pc 18 1/4x90	(3.41)
		1 pc 48x90	(8.97)
	Add	1 pc P-P 32x90	4.50
		1 pc P-P 18 1/4x90	2.57
		1 pc P-P 48x90	6.75

Wall H	Delete	1 pc 1 1/2x90	VCP	(0.28)
	Delete	1 pc 24 1/2x7	VCP	(0.36)
	Delete	1 pc 28x90	VCP	(5.23)
	Add	1 pc 1 1/2x90	P-P	0.21
	Add	1 pc 24 1/2x7	P-P	0.27
	Add	1 pc 28x90	P-P	3.94
"A" Sidewall	Delete	55x90	VCP	(10.98)
	Add	55x90	P-P	7.73
"A" Sidewall	Delete	64x90	VCP	(11.96)
	Add	64x90	P-P	9.00
END Sidewall	Delete	132.5x90	VCP	(24.76)
	Add	132.5x90	P-P	18.63
Marriage Wall	Delete	64x90	VCP	(11.96)
	Add	64x90	P-P	9.00
	Net Savings			($31.16)

Add 1 - 3 pc tub wall at Regular 54" Tub $80.00
Add 1 - tub surround at 60" garden tub 64.32
$144.32

Projected

Premium costs for certified board materials
P-P 2,892 sf x 1.00/MSF = 2.89
P.B. 1,226 sf x 0.50/MSF = 0.61
V.C.P. 1,226 sf x 1.00/MSF = 0.36

G-1 Standard Gate valve provided at main cold water supply was upgraded to a proposed code complying valve

7.71 - 2.74 = $4.97

Projected

Quantity discounts of 5% would be available.

7.71(0.95) - 2.74 = 4.58

G-10

Delete air gap @ 1.94 ea	=	(1.94)
Add 24", 7/8" d.w. hose @ .622/pf	=	1.24
Add 2 hose clamps @ 0.274 ea	=	0.55
Net Savings		(0.15)

G-17

Delete 2-2" 90 Ells @ 0.25	=	(0.50)
Delete 3 - 1 1/2 90 Ells @ 0.17	=	(0.51)
Add 2-2" Ells @ 0.36	=	0.72
Add 3-1 1/2" Ells @ 0.25	=	0.75
No change in pipe length		
Net Added Cost		$0.46

I-24 Both the standard unit and the demonstration unit were shipped with the same temporary cover, so no extra cost was incurred.

I-4.1 Per attached analysis, 8 extra pieces of paneling are required at an added cost of:
8x4x7 1/2x.225/sf = $54.00

Attachment for J.4.1. DW
ORIG. PANEL LAYOUT

A	B	C	D	A + B
				RE
48	12	12	48	48
16	24 1/2	24 1/2	48	36 1/2
39	27 1/2	27 1/2	48	48
14X32	28 1/4	28 1/4	48	1 CUT
25	7 1/2	7 1/2	48	
29 1/2	32	32	48	
48	27 1/4	27 1/4	48	A + B
16	9X48"	9X48	14	FE
48	29 3/4	29 3/4	12X34	48
48	36	36	48	36 1/2
8	9X94"	9X94	48	48
9"	17 3/4	17 3/4	48	1 CUT
7	7 1/2X30 1/2	7 1/2X30 1/2	48	
48	48	48	2 CUTS	
32	44 1/2	44 1/2		
48	7 1/2X 24 1/2	7 1/2X24 1/2		
48	27 1/4	27 1/4		
9 CUTS	16 CUTS	16 CUTS		
45 CUTS				

No Material waste due to routing of door openings - all header pieces pre-cut

Demo. Panel Layout

AB	A	B	C	D
RE				
32	48	48	48	32
48	48	32	32	48
48	48	48	48	48
4 1/2	48	32	32	16
2 CUTS	48	48	48	48
	48	48	48	48
A + B	48	48	48	32
FE	48	48X9"	48X9"	48
16	48	17X9	17X9	48
48	48	48	48	48
48	32	48	48	48
20 1/2	48	48	48	48
2CUTS	16	48	48	48
	2 CUTS	16	16	16
		5 CUTS	5 CUTS	4 CUTS

20 CUTS

oors
- 32x76
- 24 1/2x82 1/2
- 48x81
- 94x81 (less 48 + 17 x 9" = 29x81 effectively)
- 30 1/2 x 82 1/2
- 34x78

:4718 = 241.09722222
ıpprox. 8 panels, 48x90, with all
ıaterial waste resulting from routed door openings

J-4.2 Add 7 7/8"x90" pieces of paneling as shown

8"x90"x15pcs = 75 sf @ .225/sf = $16.88

J-4.3 Add extra paneling under gypsum
(140.25x90) + (57x90) + (51x90) = 126.5 sf @ .225/sf
Net Added Cost #28.46

J-4.4 Delete 40 lf of 2x2 tube @ .974/lf = 38.96
Delete 96 - 1x1x13gauge angles @ 0.17 = 6.32
Net Savings ($55.28)

Delete Weld Rods
2.05 lb. @ 0.50/lb. = (1.03)
Net Savings ($56.31)

J-4.5 No cost impact as all floor joist material used in both std and demo units was #2

Projected

288 bf x .008/bf = 2.30
for #2 at 317/m and #3 at 309/m

J-4.6 All Finish Costs are included in D-18
All fastening costs are included in J-4.10

Delete 8 - 1x3 @ 0.815 ea = 6.54
Add 8 - 2x3 @ 0.776 = 6.21
Add 2x3 block @ 0.1.7 = 0.11
Net Savings 0.22

J-4.7 "A" side - no difference in No. of floor joists used
Side "B" - Demo unit has 2 extra floor joists, located at new shear wall

2 - 2x6x13 - 7, #2 @ 317/MBF = $8.61

Projected
Modified spacing will eliminate the need for one joist.
Modified cost extra is as follows:

1 - 2 x 6 x 13 - 7, #2 at 317/MBF = $4.30

-4.8 No cost impact as same floor joist was utilized

-4.9 No cost impact as manufacturer decided not to delete floor joist

-4.14 Add 1 x 4 cross bracing to marriage wall, per standard detail

4 pcs, 1 x 4 x 12 = 16 bf
4 pcs, 1 x 4 x 9 = 12 bf
28 bf x 319/MBF = $8.93

-5 Shorter Drawbar Stiffener