PRELIMINARY STUDY OF THE INSTALLATION OF MANUFACTURED HOMES AND INSTALLATION MONITORING BY STATES AND LOCAL GOVERNMENTS

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PREFACE

Purpose

This report is intended to assist HUD, states, and industry in finding ways to improve installation of homes which will achieve the following:

- Improve durability and quality of homes.
- Reduce property damage and number of personal injuries and deaths resulting from manufactured home accidents.
- Improve consumer satisfaction and confidence.

Scope

The study included on-site inspections of new manufactured homes[1]; review of state regulations and city or county inspection programs; and review of consumer complaint data, installation manuals, and installation hardware technical data. The study did not include homes on permanent foundations, such as homes on basement walls or perimeter foundation walls.

Intended Audience

This report is intended to be used by the following:

- Federal, state, and local governments
- Manufacturers, retailers, and installers of manufactured (mobile) homes
- Manufacturers of pier and anchor components
- Manufactured home associations

[1] The term "manufactured homes" or "manufactured housing" used in this study refers only to "mobile" homes, not modular homes.

Background

It should be noted that responsibility of regulating installation of manufactured (mobile) homes falls upon the state and local government. The Federal manufactured home program managed by HUD regulates only the design and production of homes at the factories. Once a HUD labeled home (i.e., a home produced under the Federal manufactured home program) leaves the factory it is sold by dealers. The home is then transported and installed either by the dealer or subcontractors hired by the home owners. All such activities (sale by dealer, transportation, zoning, site preparation, and installation) are regulated by the state and local government, and are not covered by the Federal Program.

NOTICE

The material contained in this report represents a preliminary study of various aspects affecting installation of manufactured homes with emphasis on homes installed in hurricane and highwind prone areas (for further explanation about this study's scope, see Chapter 4). Additional investigation, research, and study is recommended (see page 3.7).

***

HUD directed NCSBCS to prepare this report considering its responsibility to Congress under the public law 93-383, Title VI, Sections .608(a), .623(b), and .626(c).

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Other NCSBCS staff members have provided significant contribution in compiling and reviewing the information.

TABLE OF CONTENTS

1 INTRODUCTION 1.1

I. INSTALLATION OF MANUFACTURED HOMES BACKGROUND . . 1.1
A. Current Trends 1.1
B. Federal vs State and Local Responsibility . . 1.2

II. FACTORS STUDIED BY NCSBCS 1.3

2 OVERALL SCOPE AND METHOD OF DATA COLLECTION 2.1

3 SUMMARY CONCLUSIONS AND RECOMMENDATIONS 3.1

I. INTRODUCTION 3.1

II. MAIN ISSUES' QUESTIONS AND ANSWERS/RECOMMENDATIONS 3.2

A. Questions and Answers 3.2
B. Recommendations/Steps to Improve Installation 3.7

4 OBSERVATIONS FROM ON-SITE INSPECTION OF INSTALLATION OF HOMES 4.1

I. INTRODUCTION 4.1

A. Installation Inspection Process 4.1
B. Purpose and Scope of Installation 4.4
C. Analysis from Inspections 4.4

II. DEFICIENCIES DISCOVERED 4.4

A. List of Main Deficiencies 4.5
B. Technical Criteria to Determine Deficiencies . . 4.5

III. SUMMARY/CONCLUSIONS 4.6

A. Conclusions 4.6
B. Costs 4.9

IV. DRAFT OF MANUFACTURED HOME INSTALLATION INSPECTION GUIDEBOOK 4.10

TABLE OF CONTENTS (CONTINUED)

5 STATE REGULATIONS FOR INSTALLATION OF MANUFACTURED HOMES . . 5.1

I. INTRODUCTION 5.1

A. State Installation Regulation Evaluation Process 5.1
B. Purpose and Scope of Evaluating State Regulations 5.4
C. Analysis from State Regulations 5.4

II. FINDINGS 5.4

A. List of Main Aspects of the State Regulatory Programs Reviewed 5.4
B. Answers for the Three Questions 5.5

III. CONCLUSIONS 5.12

6 CITY AND COUNTY SURVEY 6.1

I. INTRODUCTION 6.1

A. City and County Survey Process 6.1
B. Purpose and Scope of the Survey 6.2
C. Analysis from the Surveys 6.2

II. CONCLUSIONS 6.2

A. Compilation of Answers to Survey 6.2
B. Overall Conclusions 6.6

7 REVIEW OF CONSUMER COMPLAINT DATA AVAILABLE WITH STATES (SAAs) 7.1

I. INTRODUCTION 7.1

A. Consumer Complaint Data Collection Process 7.1
B. Scope and Method of Analysis 7.2

II. CONCLUSIONS 7.3

TABLE OF CONTENTS (CONTINUED)

8 REVIEW OF INSTALLATION (SET-UP) MANUALS 8.1

I. INTRODUCTION 8.1

A. Installation Manual Review Process 8.1
B. Purpose of the Review 8.1

II. CONCLUSION 8.2

9 REVIEW OF COMPONENTS USED IN MANUFACTURED HOME INSTALLATION 9.1

I. INTRODUCTION 9.1

A. Component Review Process 9.1
B. Analysis from Review 9.2

II. CONCLUSIONS 9.3

LIST OF TABLES/SKETCHES

2 OVERALL SCOPE AND METHOD OF DATA COLLECTION 2.1

TABLE 2-1 Conducted Field (On-Site) Inspections 2.2
TABLE 2-2 Reviewed State Statutes and Regulations . . . 2.3
TABLE 2-3 Review of Local (County) Government Installation Inspection Procedures 2.4
TABLE 2-4 Review of Consumer Complaint Data Received From SAA 2.5
TABLE 2-5 Review of Installation (Set-Up) Manuals . . . 2.6
TABLE 2-6 Review of Components for Technical Information 2.7

3 SUMMARY CONCLUSIONS AND RECOMMENDATIONS 3.1

TABLE 3-1 Summary Questions about Main Issues and Brief Answers 3.2
TABLE 3-2 Suggested List to Follow to Help Improve Installation of Manufactured Homes 3.7

4 OBSERVATIONS FROM ON-SITE INSPECTION OF INSTALLATION OF HOMES 4.1

TABLE 4-1 Summary List of On-Site Inspections 4.2
TABLE 4-2 List of Main Deficiencies Observed by NCSBCS Inspectors during Site Inspection of Home Installation 4.16

SKETCH 4-1 Correct Method of Installation 4.25
SKETCH 4-1A Current Practice of Ground Anchor Installation 4.26
SKETCH 4-2 Incorrect Method of Installation 4.27
SKETCH 4-3 Wedging Between Steel Beam and Masonry Pier 4.28
SKETCH 4-4 Set-Up of Double Section of Homes 4.29
SKETCH 4-5 Connection of Floor Joist at Marriage Wall in Double Section Homes 4.30
SKETCH 4-6 Connection of Roof Ridge Beam at Marriage Wall in Double Section Homes . . 4.31

5 STATE REGULATIONS FOR INSTALLATION OF MANUFACTURED HOMES . . 5.1

TABLE 5-1 Major Aspects of State Regulations For Installation of Manufactured Homes 5.6
TABLE 5-2 National Profile of State Regulations Regarding Installation of Manufactured Homes 5.9
TABLE 5-3 National Profile 5.15

LIST OF APPENDICES

APPENDIX A	Selected Photographs from On-Site Inspections Indicating Main Deficiencies Observed
APPENDIX B	List of State Laws, Regulations, and Standards Information Collected by NCSBCS
APPENDIX C	Sample of Letters Sent to States, Requesting Information
APPENDIX D	List of Counties, Copy of Letter with Survey Questionnaire, and Summary Analysis of the Questionnaire
APPENDIX E	List of Component Manufacturers, Sample of Letter Sent, and Sample of Technical Information Obtained
APPENDIX F	Excerpts from Federal Standards Pertaining to Wind Storm Protection Requirements and Resolution Pertaining to Installation of Manufactured Homes
APPENDIX G	Correspondence
APPENDIX H	Excerpts from Reports Used for the Installation Study
APPENDIX I	NCSBCS A225.1

Chapter 1

CHAPTER 1

INTRODUCTION

I. INSTALLATION OF MANUFACTURED HOMES BACKGROUND

At present no compilation of data at the national level exists regarding the current industry practices for the installation of homes and how the installation affects durability, quality, and safety characteristics of the manufactured homes. There is a general perception among the State Administrative Agencies (SAAs) who handle consumer complaints that improper installation affects the durability and quality of manufactured homes. The above views are shared by a majority of the industry representatives. The adverse affects of improper installation of homes also include the following:

- Reduced consumer confidence
- Reduced public officials confidence (affecting zoning and housing policy)
- Reduced resale value of the home
- Increased life-cycle costs of the home

A. Current Trends

Current trends indicate that a larger percentage of homes produced are multi-section homes. The following is the ratio of single versus multi-section homes over the last three years.

	1986	1987	1988
Single-section	63%	60%	57%
Multi-section	37%	40%	43%

Multi-section homes require more attention to certain details during installation than single-section homes, such as the following: connection of two or more sections, and placement of support at the mating (marriage) line. There is a general concern among state officials that adequate attention is not being placed on such details.

Larger single-section homes are becoming more popular:

	Width	Length
Past demand	10 - 12 feet	40 - 60 feet
Current trend	14 - 18 feet	60 - 80 feet

The current trend is also toward heavier homes as more gypsum wall paneling and gypsum ceilings are being used instead of luan plywood paneling and ceiling board.

Installation practices have not improved in line with the production of multi-section homes, larger single-section homes, and heavier homes.

B. Federal vs State and Local Responsibility

The Federal Regulations, 24 CFR 3282, and 3283 require that the manufacturer and dealer must provide the homeowner with a "homeowner manual" which should include (per Sec. 3283.104) an explanation of the procedures recommended to be followed in setting up the manufactured home. The explanation should include the following:

1) Site preparation procedures
2) Types of foundations for which the home was designed
3) Procedure for leveling the home
4) Procedures for connecting utilities
5) Suggested anchoring procedures for wind uplift and overturning

If practical, the manual should include a list of sources the consumer may contact to obtain anchoring and set-up services. The manual should advise the consumer on differing requirements for manufactured homes located in "hurricane" and "non-hurricane" wind zones. The manual should also include a recommendation that the home be professionally inspected after it is set up to assure that it has not been damaged in transit or during set up, and that the set up is appropriate to the site.

The Federal Standards 3280.306 also have minimum requirements for the design and construction of homes to resist wind storms, including connections of the home with the support and anchoring system. The Federal Standards and Regulations do not have minimum requirements for the support and anchoring components or the systems.

Set-up manuals contain a recommended method of installation as required by Federal Regulations. The manufacturer's recommended method of installation is the "preferred" method; and, for warranty purposes, the manufacturer may require that method be followed. The manufacturer's set-up manual may not contain sufficient details for all site conditions and types of installations. Examples of such conditions could be the following: home installed on very high piers or on basement perimeter foundation. In such cases, the state or local government official must determine if additional details prepared by a registered engineer or architect are required.

It is the state and local government's responsibility to inspect the installation of homes to assure that the installation is done in accordance with the following:

1) Manufacturer's installation instructions (set-up manual).

2) Any additional installation details certified by professional engineers, and architects.

3) Local, municipal, or state building codes.

At this time, the Federal Government does not have any standards and regulations affecting support and anchoring components. Therefore, it is the state and local government's responsibility to develop and implement the standards.

II. FACTORS STUDIED BY NCSBCS

NCSBCS study included the following effort:

1. On-site inspection of installation with local and state inspectors located in ten states in hurricane zone (see Chapter 4).
2. Review of all available state statutes and regulations (see Chapter 5).
3. Review of local (county) government installation inspection procedures and practices (see Chapter 6).
4. Review of consumer complaint data received by HUD from SAAs (see Chapter 7).
5. Review of installation manuals (see Chapter 8).
6. Review of components used in manufactured home installation (see Chapter 9).

This study includes two chapters (chapters 2 and 3) that give a summary of the main areas that this installation study covers. Chapter 2 depicts the overall scope of data collection and evaluation in table/chart form. Chapter 3 lists the main questions brought up from this study and gives brief answers to these main installation issues. Chapter 3 also contains a section on recommended steps that can be taken to improve the overall quality of manufactured home installation.

Several Appendices have been included to give necessary background and backup information. Appendix A may be of particular interest to the readers of this study. It contains photographs taken during the on-site inspections showing main deficiencies observed.

Chapter 2

CHAPTER 2

OVERALL SCOPE AND METHOD OF DATA COLLECTION

Introduction

The tables on the following pages summarize NCSBCS' effort in collecting data relevant to installation of manufactured homes. The tables also identify how the data was analyzed or evaluated.

Further details for the installation study process can be located in the chapters referenced after each evaluation/analysis section.

The summary conclusions and recommendations given in Chapter 3 were arrived at based on the effort summarized in this chapter.

TABLE 2-1
1. Conducted Field (On-site) Inspections

STEP	ACTION
1	Inspected (accompanied by state and local officials) over 60 new homes in 10 high-wind prone states for installation procedures during or right after installation.
2	Took photographs and field notes.
3	Reviewed photographs and discussed observations with HUD and NCSBCS engineers.

<u>Evaluation/Analysis from Results of Inspection</u>

- Identified list of main deficiencies observed.
- Evaluated technical criteria for the deficiencies.
- Summarized general observations regarding the performances and knowledge of state/local inspectors and installers.
- Selected photographs showing examples of the deficiencies observed.

See Chapter 4 for further explanation of the on-site inspection.

TABLE 2-2
2. Reviewed State Statutes and Regulations

STEP	ACTION
1	Collected state statutes, regulations, and standards from all states.
2	Categorized the information received from the states.
3	Reviewed the information for installation related rules.

<u>Evaluation/Analysis from Results of Review</u>

- Prepared a list of state laws, regulations, and standards.
- Identified key characteristics of state and local monitoring.
- Prepared a chart summarizing the key characteristics of state regulations of all 50 states.
- Summarized analysis of national profile regarding state regulation of installations.
- Evaluated potential effectiveness of current state and local monitoring programs.

See Chapter 5 for further explanation of the state statutes and regulations.

TABLE 2-3
3. Review of Local (County) Government Installation Inspection Procedures

STEP	ACTION
1	Prepared survey questionnaires containing both procedural and technical information.
2	Selected counties in consultation with states.
3	Sent survey questionnaire to about 275 counties in 10 states receiving a substantial number of homes.
4	Reviewed the 126 responses.

Evaluation/Analysis from Results of Review

- Analyzed the responses of the county officials for general conclusions regarding both procedures and technical aspects.
- Compared the answers and general conclusions with field inspections and other data collected by limited telephone contacts with state officials.

See Chapter 6 for further explanation of the city and county survey results.

TABLE 2-4
4. Review of Consumer Complaint Data Received From SAA

STEP	ACTION
1	Reviewed the consumer complaint data sent by SAAs (data for 12 month period).
2	Reviewed the method of data collection and its impact on the analysis.

Evaluation/Analysis from Results of Review

- Drew general conclusions about relationship between consumer complaints and improper installation.
- Identified the main areas of concern from consumer complaints.

See Chapter 7 for further explanation of consumer complaint information.

TABLE 2-5
5. Review of Installation (Set-up) Manuals

STEP	ACTION
1	Reviewed nine set-up manuals from the NCSBCS library of all manufactured home designs.
2	Reviewed for 31 aspects (checklists) related with Federal Standards.

Evaluation/Analysis from Results of Review

- Identified potential nonconformances in the set-up manuals and contacted DAPIAs who approved the set-up manuals for their responses (all responses have not been received or reviewed at the time of writing this report).
- Analyzed the citations for patterns among all DAPIAs.

See Chapter 8 for further explanation of the installation manual review process.

TABLE 2-6
6. Review of Components for Technical Information

STEP	ACTION
1	Collected a list and the addresses of pier and anchor manufacturers.
2	Wrote letters to these manufacturers to obtain their installation instructions and test data.
3	Reviewed manufacturers' responses.
4	Reviewed other technical publications available.

<u>Evaluation/Analysis from Results of Review</u>

- Summarized key concerns.
- Summarized technical data related with the key concerns.

See Chapter 9 for further explanation of pier and anchor components review process.

Chapter 3

CHAPTER 3

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

I. INTRODUCTION

This chapter presents a chart which summarizes the main issues discovered during the installation study process. As stated in the preface, these conclusions are preliminary and require further investigation. (See pages 3.7 - 3.8 for suggested list of additional investigations.)

The chart lists 19 questions and answers. The answers have been made as brief as possible to make it presentable. The detailed explanations of the answers can be found in the various chapters referenced for each answer.

The conclusions (answers) are based on on-site inspections in ten eastern states and a review of all state programs (laws, regulations, installation standards).

This chapter also includes a suggested list of steps to follow (for HUD; states; manufacturers of manufactured housing and components; manufacturer associations; insurance companies; and state associations of manufactured home dealers and manufacturers) to help improve the installation of manufactured housing. These suggested steps are based on the information discovered during the installation study process.

II. MAIN ISSUES' QUESTIONS AND ANSWERS/RECOMMENDATIONS

A. Questions and Answers

The table below lists the main questions involved in the installation process, and answers to these questions. So that the reader will be able to quickly identify specific questions of interest certain key words have been capitalized, and related areas have been put together. The answers (comments) to these questions are preliminary and good for discussion purposes; additional study is recommended (see page 3.7).

TABLE 3-1
SUMMARY QUESTIONS ABOUT MAIN ISSUES AND BRIEF ANSWERS

NUMBER	QUESTIONS (ISSUE)	ANSWER (COMMENT)	REFERENCES TO CHAPTERS OR OTHER SOURCES
1)	Are HOMES currently being INSTALLED CORRECTLY?	Generally, no	#4 on-site inspections
	• Per homeowner SET-UP MANUAL?	Generally, no	
	• Per PIER/ANCHOR mfg's installation instructions	Generally, no	
2)	Are there significant PROBLEMS IN INSTALLATIONs?	Yes, several problems (i.e., anchors, piers straps and buckles, footings, connection of the two halves, etc.)	#4 on-site inspections
	• Do they affect DURABILITY, SAFETY and MAINTENANCE COST?	Yes	

SUMMARY QUESTIONS ABOUT MAIN ISSUES AND BRIEF ANSWERS

NUMBER	QUESTIONS (ISSUE)	ANSWER (COMMENT)	REFERENCES TO CHAPTERS OR OTHER SOURCES
3)	Will CORRECT INSTALLATION require substantial ADDITIONAL COST?	For most items, not much. A few items will require more labor cost.	Additional investigations are needed
4)	Are increased COSTS JUSTIFIED?	Yes, however, a cost/benefit analysis has not been made.	
	• Who BENEFITS?	Homeowner and home manufacturer.	
5)	Does the CONSUMER COMPLAINT DATA show installations to be a major problem?	Yes, over 50% of the complaints seem to come from installations (based on limited data).	#7 consumer complaint data
6)	Do the home MANUFACTURERS KNOW of these installation problems? If not, reasons?	Not to full extent, particularly they may lack knowledge of technical issues. Larger manufacturers may have much better technical knowledge. Service crew/managers are not always technically qualified.	Discussion with manufacturers
	• Why has no ACTION been taken SO FAR?	Lack of technical knowledge, dependence on retailers/dealers for business, competition among the manufacturers. Note: The manufacturers are now increasingly taking steps to work closely with retailers to assure that the set-up instructions are followed.	

SUMMARY QUESTIONS ABOUT MAIN ISSUES AND BRIEF ANSWERS

NUMBER	QUESTIONS (ISSUE)	ANSWER (COMMENT)	REFERENCES TO CHAPTERS OR OTHER SOURCES
7)	Do INSTALLERS/DEALERS know the CORRECT METHODS, set-up manual requirements, or pier-anchoring requirements?	Generally, no	On-site inspections
	• If not, why?	Installers: - Work based on their past experience. - Follow old industry-wide practice. - Do not read set-up manuals. - Find that manuals are complicated to interpret - Find that set-up manuals not available. - Are not generally regulated by government.	
8)	What PROGRAMS help REGULATE installers and improve their performance?	Installers are bonded, licensed with testing requirements. Installers receive training by manufacturers and state.	#5 State programs
9)	Does LICENSING and BONDING of installers help to regulate and improve installation?	Yes, licensing the installers helps to establish qualification criteria, and bonding helps to assure their performance.	
10)	Do STATE/LOCAL GOVERNMENT KNOW of the installation problems?	Not completely.	#4 on-site inspections
	• If not, reason?	- Lack of technical knowledge. - Not much emphasis from state or federal government in the past.	
	If so, why no resolution?	- Lack of statutory recourse. - Funding.	

SUMMARY QUESTIONS ABOUT MAIN ISSUES AND BRIEF ANSWERS

NUMBER	QUESTIONS (ISSUE)	ANSWER (COMMENT)	REFERENCES TO CHAPTERS OR OTHER SOURCES
11)	Do STATES have good installation related LAWS, REGULATIONS and STANDARDS?	No (except a few states)	#5 State programs
	What is the NATIONAL PROFILE?		

National Profile	# of States	% of homes affected
States with no laws, etc.	22	27%
States with some laws, etc.	11	16%
States with significant laws, etc. but very little enforcement	9	36%
States with significant laws, etc. and enforcement	8	18%

12)	Do LOCAL (CITY/COUNTY) INSPECTORS perform effective inspections?	Generally, no	#4 On-site
	If not, reason?	Lack of knowledge of correct installation procedures.	
13)	Is there a problem with the listing and quality of GROUND ANCHORS?	Yes	#4 On-site inspections
14)	Do the DEALERS/RETAILERS FAVOR increased regulations?	Generally not.	
	• If not, any reason?	Dealers are not technically knowledgeable, therefore, are not aware of the need for increased regulations. Besides increased regulations create more restriction and paperwork.	Discussion with SAAs

SUMMARY QUESTIONS ABOUT MAIN ISSUES AND BRIEF ANSWERS

NUMBER	QUESTIONS (ISSUE)	ANSWER (COMMENT)	REFERENCES TO CHAPTERS OR OTHER SOURCES
15)	Is Manufactured Housing Institute (MHI) in favor of increased installation regulation?	Yes	Discussion with MHI
	Do they favor increased training?	Yes	
16)	Is the National Manufactured Housing Federation of dealers in favor of increased installation regulation?	Federation is reviewing this aspect at present.	
17)	Is the National Federation of Homeowners Association in favor of increased installation regulations?	Yes	Letter See Appendix G
18)	Is the State Task Force in favor of increased installation regulation?	Yes	1987 State Task Force Report and resolution passed by states in Sept. 1988 See Appendix H
19)	What are the MAIN ISSUES where agreement is hard to reach IN STATES who are actively debating new installation laws and programs?	• What programs to select? • Should the installers be licensed, bonded? • What should the requirements be for licensing? What method of monitoring the installer's performance should be used? • What steps should be taken by state if county or city does not comply with state laws?	Letter See other discussions

B. Recommendations/Steps to Improve Installation of Manufactured Homes

The chart below lists recommended steps that HUD, the states, home manufacturers, manufacturer associations, ground anchor or other component manufacturers, insurance companies, and state associations of manufactured home dealers and manufacturers can or should take to improve installation of manufactured homes.

TABLE 3-2
SUGGESTED LIST TO FOLLOW TO HELP IMPROVE INSTALLATION OF MANUFACTURED HOMES

HUD

- Develop training manuals, video training modules for installation of homes.
- Collect existing technical data about components used in installation; provide a central source to all state and local offices.
- Hold series of workshops with SAA, manufacturer's associations, dealer's associations, local county officials, HUD area offices on installation.
- Place emphasis on the optional responsibilities of the SAAs, such as dealer lot and installation inspection by making them mandatory.
- Develop brochures and small handbook for homeowners which contain information about key installation issues and coordinate distribution of such material through manufacturers, dealers, and homeowner associations.
- Consider developing Federal standards on installation hardware, such as ground anchors, buckles, piers, etc.; or work with building codes or standards' organizations such as ANSI and ASTM to develop such standards.

TABLE 3-2 (Continued)
SUGGESTED LIST TO FOLLOW TO HELP IMPROVE INSTALLATION OF MANUFACTURED HOMES

HUD (continued)

- Notify lenders of problems (Title 1 program).
- Enhance review of DAPIA approved set-up manuals.
- Require additional data collection and evaluations on the following:
  - On-site investigations in the remaining 40 states not covered by the study.
  - On-site investigations in all 50 states of manufactured homes on permanent foundations.
  - State programs including detailed comparison of current state standards and regulations.
  - County and city programs.
  - Listing programs of installation hardware and verification of their performance by testing.
  - Homeowner manuals in compliance with CFR 3283.
  - Cost/benefit evaluation of improved installation procedures.
  - Cost/benefit evaluation of state/local regulation of installations.
  - Reduced durability and consumer satisfaction by improper installation (relationship of consumer complaints with improper installation).

TABLE 3-2 (Continued)

SUGGESTED LIST TO FOLLOW TO HELP IMPROVE INSTALLATION OF MANUFACTURED HOMES

STATES

- State task force should work in development of MODEL PROGRAM for states (including laws, regulations, and standards).
- Work toward developing uniform installation laws and effective inspection programs.
- Team up and develop training programs for state and county inspectors.
- Establish standards for components used in installation.
- If states do not have necessary laws, coordinate meeting with the state manufactured housing associations and HUD to develop support for laws.
- Place more emphasis on the "optional SAA responsibilities," such as dealer lot monitoring and installation inspections.

HOME MANUFACTURERS

- Improve the set-up manual and homeowner manual (the design and clarity of details).
- Provide technical training to the service personnel either independently or in coordination with other manufacturers.
- Coordinate the training of dealers and installers with other manufacturers.
- If HUD or states offer training programs, participate in those programs.
- Identify on each home by "flag" or other means where piers and anchors are required.
- Promote consumer awareness.

TABLE 3-2 (Continued)

SUGGESTED LIST TO FOLLOW TO HELP IMPROVE INSTALLATION OF MANUFACTURED HOMES

MANUFACTURER ASSOCIATIONS

- Coordinate the suggestions to HUD, the states, and home manufacturers.

GROUND ANCHOR or OTHER COMPONENT MANUFACTURERS

- Include installation instructions with their hardware.
- Provide training to installers.
- Conduct more testing and research.

INSURANCE COMPANIES

- Offer better rates for homes that are installed properly and are certified for proper installation by reputable inspection agencies.

STATE ASSOCIATIONS of MANUFACTURED HOMES

- Coordinate with states the bonding, licensing, and training programs for dealers and installers.

Chapter 4

CHAPTER 4

OBSERVATIONS FROM ON-SITE INSPECTION OF INSTALLATION OF HOMES

I. INTRODUCTION

This chapter discusses NCSBCS' observations and conclusions made from on-site inspection of the installations of manufactured homes. It includes a summary list of the number of parks and homes inspected and the inspection participants; a table detailing the main deficiencies observed by NCSBCS inspectors (engineers) during these site inspections of installation; and a draft (example outline) of a manufactured home installation inspection guidebook.

A. Installation Inspection Process

NCSBCS, accompanied by state and local inspectors, inspected over 60 homes in 10 states during April through June of 1988. HUD engineers also participated in many of these inspections. Since HUD allocated limited resources to this preliminary study, highwind and hurricane prone states were selected (per HUD's direction) because improperly installed homes located in these states pose higher risk to personal injury or death. (See Appendix F for excerpts from the Federal Standards pertaining to windstorm protection requirements.) The state and local (county) inspectors were asked to take NCSBCS inspectors to "better installed homes" to evaluate the practices that are considered to be sound by the installers and government inspectors. (For a list of the specific inspections performed in the ten states; NCSBCS and HUD staff inspectors for each inspection; and the state and local inspectors who participated see Table 4-1, "Summary List of On-Site Inspections".)

NCSBCS took photographs on site and these photographs were later reviewed by a NCSBCS panel of engineers and HUD staff. This panel discussed deficiencies observed during the inspections.

TABLE 4-1

SUMMARY LIST OF ON-SITE INSPECTIONS

STATES WHERE ON-SITE INSPECTIONS WERE PERFORMED	INSPECTIONS CONDUCTED BY NCSBCS ENGINEERS (AND HUD ENGINEERS)	PARTICIPATION BY STATE AND LOCAL INSPECTORS	# OF PARKS INSPECTED (# OF HOMES INSPECTED & DOCUMENTED)
1) Alabama	Pat Katon	State Officials Harold Hendricks Joe Teague Tom Berrey, Jr.	5 Parks 6 homes
2) Delaware	Pat Katon	Kent County Officials Mike Thompson Roger Williams	5 Parks 2 homes
3) Florida	Pat Katon	State Officials Orville Cummings Bill Brewer Melvin Hinsen Linda Hart County of Hillsborough Officials David H. Jones A. E. Tracy Floyd Keyes	3 Parks 4 homes
4) Georgia	Michael Werner Hyder Jinnah/HUD	State Official Lamar Dickerson	4 Parks 12 homes
5) Louisiana	Pat Katon	State Official Gene Admire Parrish of Baton Rouge Official O.M. Causey	3 Parks 2 homes
6) Maryland	Michael Werner	State Officials Richard Lynch Ocean City Inspector Mike Richardson	4 Parks 9 homes
7) North Carolina	Michael Werner Hyder Jinnah/HUD	State Officials Owen Tharrington Gil Jones	3 Parks 8 homes
8) New Jersey	Michael Werner Pat Katon	State Officials Bruce D'Admore Roy Beal	2 Parks 5 homes

SUMMARY LIST OF ON-SITE INSPECTIONS

STATES WHERE ON-SITE INSPECTIONS WERE PERFORMED	INSPECTIONS CONDUCTED BY NCSBCS ENGINEERS (AND HUD ENGINEERS)	PARTICIPATION BY STATE AND LOCAL INSPECTORS	# OF PARKS INSPECTED (# OF HOMES INSPECTED & DOCUMENTED)
9) Rhode Island	Michael Werner Dick St. Onge Hyder Jinnah/HUD	State Official Bob Hunt	2 Parks 8 homes
10) Texas	Pat Katon	State Officials Sergio Salinas Michael Hinckley City of Pasadena Official Jack Moore	8 Parks 10 homes

NOTE: NCSBCS has a summary of inspection reports for 66 homes.

B. Purpose and Scope of the Inspections

The purpose of these installation inspections was to learn not only the typical methods of installation of homes, but also to understand the interaction between homeowner, dealer, installer, home manufacturer, and local inspectors. The study includes inspections conducted in manufactured housing parks, planned subdivisional development of communities, and individual homeowner sites.

C. Analysis from Inspections

The NCSBCS inspectors identified specific deficiencies observed during on-site inspections, had discussions with the installers and local inspectors in the field, contacted SAA administrators, reviewed set-up manuals and ground anchor tests data, etc. Technical information obtained through these other sources were used to evaluate the conditions observed in the field and to determine their acceptability. A list of the main deficiencies that NCSBCS inspectors discovered is provided in the next section. This list of main deficiencies may be used for training purposes.

II. DEFICIENCIES DISCOVERED

NCSBCS discovered several deficiencies in the installation process (see Table 4-2). Photographs in Appendix A best demonstrate the observed deficiencies which were selected. Sketches are also included (at the end of this chapter) to further explain the installation process and deficiencies discovered.

A. List of Main Deficiencies

The following list contains main installation deficiencies summarized into seven categories (for details see Table 4-2).

1. Site preparation (drainage, spacing, or placement of footings, and vapor barrier).
2. Foundation (footings, piers and shims)
3. Tie-downs against sliding, uplift, and overturning moment caused by wind (ground anchors, straps and buckles).
4. Marriage wall connections (roof, floor, insulation, caulking and alignment between the two halves).
5. Mechanical work (ducts, repair of bottom board and insulation, venting, gas connection and plumbing).
6. Electrical work (field installation of fixtures and repairs).
7. Special site conditions (installation in flood areas, skirting and on-site additions).

B. Technical Criteria to Determine Deficiencies

The following list contains the criteria used in identifying the deficiencies:

- Manufacturers set-up manual.
- Current NCSBCS A225.1 Standards or other installation standards (see Appendix I for a brief description of the NCSBCS A225.1 Standards).
- Acceptable engineering practice.*

*NOTE: "Acceptable Engineering Practice" refers to engineering practices followed by professional engineers in all building construction trades that will assure durability and performance of homes under the typical conditions such as soil characteristics, gravity, wind, snow, moisture movement, etc. Durability means the capability of a building, one of its subassemblies, or other components to perform the functions for which it was designed and constructed (based on an assumed level of owner maintenance) over a specified time.

- Test data and installation instructions of the products (hardware) used in the installations.
- Durability, health, and safety requirements as identified in the Federal HUD Standards.

III. SUMMARY/CONCLUSIONS

This section lists the main conclusions NCSBCS made from the installation inspections and a summary relating to costs.

A. Conclusions

1. Deficiencies

None of the homes inspected were installed completely correctly. Each home inspected had many deficiencies related with the installation.

Major problem discovered in ground anchors

One of the significant and prevalent deficiencies discovered was incorrect installation of ground anchors. Examples follow:

- Angle of ground anchor is not according to the ground anchor manufacturer's instructions or test data
- Excessive projection of ground anchor above ground
- Predrilling the hole in the ground
- Absence of poured concrete collar

NCSBCS has identified the following reasons that may have caused this deficiency to be so prevalent:

- Installation instructions for the ground anchors are not available on site since the instructions are rarely provided with the hardware.

- Manufacturer's set-up or homeowner's manual does not provide installation instructions for the ground anchors, but references a requirement to install hardware in accordance with manufacturer's instructions.

- Installation procedures of various ground anchor brands available on the market vary widely. Each brand requires slightly different procedures and the procedures are also affected by the type of soil.

- Installers, dealers and local/state inspectors were not aware of the correct procedures of installing ground anchors. For instance, the installers, dealers and local/state inspectors did not know that the anchors need to be installed parallel to the strap rather than perpendicular or that a concrete collar is required by some anchor manufacturers, if predrilling for anchor placement is required.

2. Frequency of deficiencies

Since NCSBCS inspected a limited number of homes in only ten states, no statistical evaluation can be made about the frequency of occurrence of each deficiency listed in this chapter. However, the discussion with SAAs from the ten states and the remaining states indicated that the deficiencies discovered are commonly occurring in other states as well.

3. Effectiveness of state installation regulation

In nine out of the ten states where on-site inspections were conducted, the state programs to regulate the installations were not comprehensive. The following provides additional detail by cross-referencing Chapter 5, "State Regulation of Installation of Manufactured Homes."

1) Little or no laws related to installation of homes exist in three states and these states do not have an enforcement program.

2) Some laws related to installation of homes exist in three states but these states do not have an enforcement program.

3) Significant laws related to installation of homes exist in three states but these states do not have an effective enforcement program.

4) Significant laws exist in one state with reasonably effective enforcement program.

Note: As indicated in Chapter 5, only eight states out of the fifty states fall in Category 4. These eight states account for only 16 percent of all the homes installed.

4. State and local inspectors' awareness of installation deficiencies

The local inspectors and state inspectors participating were generally not aware of deficiencies observed. The inspectors did not appear to have technical knowledge regarding many of the deficiencies listed here. It appears that because of the lack of technical knowledge, the installation of homes is not significantly better, even in those local counties where installation inspections are being done today.

5. Set-up manuals

The set-up manuals were, in most cases, available but the installers were not using them. Some state or local inspectors referred to office or personal copies of instructions that may or may not incorporate individual model modifications. Generally, the homeowner or the park owner had to search for the set-up manual when NCSBCS inspectors asked for it. The park developers or homeowners were not fully aware of the importance of following instructions in the manufacturer's set-up manual.

B. Costs

The cost of installation of ground anchors is a substantial portion of the installation. NCSBCS was informed by the manufacturer's association that if the ground anchors were to be correctly installed, per tests and ground anchor manufacturer's instructions, it would substantially increase the cost of installation.

NCSBCS has not made an analysis to determine an increase in the cost of installation of the homes if correct installation procedures were to be followed. There are several items which are of workmanship type and the correct installation will not result in significantly increased labor or material cost. Some items, however, will result in significantly increased labor and material cost, such as foundations placed below frost depth, and correct ground anchor installation.

IV. DRAFT OF MANUFACTURED HOME INSTALLATION INSPECTION GUIDEBOOK

Reference Material Needed For Inspection

1. Home manufacturer's set-up manual, or set-up design that has been prepared by professional engineer.

2. Installation instructions of the ground anchor and strap and buckle manufacturer. (If they are not available, follow generic guidelines described.)

3. State or local installation standards.

If the above are not available, use NCSBCS A225.1 (see Appendix I for description of these standards).

When to Inspect

For most effectiveness, inspection during the installation is desirable. After the installation is complete, many structural connections and procedures followed by the installer can not be inspected.

If the inspection is done after the installation is complete, the inspector has to use "tell-tale" signs and some more imaginative methods to determine how the installation was done, particularly in multi-section homes.

If skirting has been installed, it may restrict the access to the foundations, unless one is willing to crawl through limited access doors or small vent openings.

Equipment Needed For Inspection

- Flash light
- Measuring tape
- Ladder
- Level (small and 4')
- Angle or protractor

CATEGORY 1 - SITE PREPARATION

1.1. Drainage of Site

- Crown in the middle under the house (drainage of water from center to outside).

- Trench or slope or other methods to drain the rain water away from the home and around the home.

- Placement of vapor barrier under the home (in humid locations).

1.2. Bearing on good soil and location (for location see next item) under Category 2

- Undisturbed soil (footings should not be placed on top soil containing organic material - undisturbed soil may be found 6" - 12" or more below existing grade).

- Compacted fill of the existing grades has been raised. Soil in footing area should be level.

1.3. Bearing Soil Below Frost Penetration

- Check footing depth for frost penetration, particularly if perimeter blocking is provided.

1.4. Utilities Installed at the Right Location

- Coordinate with the Utility Connection Location of the House.

1.5. Local Zoning Laws Regarding Front or Side Off-sets From Lot

- Check off-sets from street or lot boundary.

CATEGORY 2 - FOUNDATIONS (FOOTINGS, PIERS, CAPS AND SHIMS)

2.1. Footings

Determine size and location from set-up manual, locally adopted standards, or professional engineer's drawings.

- Under I-beams
- Under perimeter wall
- Under marriage wall ridgebeam post
- Under tip outs or extension
- Under fireplaces

Determine type of footing

Precast concrete pad - for proper mark and orientation (the surface with the manufacturer's identification mark should be visible and in contact with the metal stand).

- Treated plywood

  - Check manufacturer's mark for listing
  - Check listing for soil conditions
  - Check treatment of edges

- Solid 2" X 8" X 16" concrete masonry blocks

  - Orientation (parallel to I-beams)
  - Number of blocks (at least 2)

2.2. Piers

- Determine capacity of metal stand if applicable
- Check maximum height permitted by set-up manual adopted standards, or or engineered drawing.
- 8 X 8" X 16" masonry piers

  - Check orientation
  - Check direction of the cell (should be vertical)
  - Size of pier (depending on the height and set-up manual)
  - Cracked masonry

- For metal stand

  - Check the extension height needed
  - Check for listing
  - Check for installation instructions of metal stand, if there are any

2.3. Caps

- Size of cap (2" minimum thickness wood concrete or equivalent)
- Cracks and splits in lumber or in concrete cap.

2.4. Shims

- Type of material (wood without split and metal, plywood)
- Double shimming (flat bearing at I-beam and at pier)
- Minimum size (4" width - 6" length)
- Maximum height (1")
- Level of home

CATEGORY 3 -TIEDOWNS

3. Tiedowns

3.1. Ground Anchor (per ground anchor's installation instructions)

Listing of the ground anchor and its acceptance by the state.
Direction of ground anchor (should be parallel to diagonal strap, in case of a combination of vertical and diagonal ties, it should be parallel to the combined resultant.)

Location and spacing (per wind zone and set-up manual. The location should be as close to piers as possible.

Proper installation

- limited predrilling
- proper backfill with compacted soil

Listing of the ground anchor and its acceptance by state

Poured in place concrete collar (if required)
- thickness and size

Location with respect to I-beam

- for proper slope of strap, and

- for connection with vertical strap (if applicable)

3.2. Straps and Buckles

- Strap thickness and width
- Strap tension
- Straps proper laps through the buckle and ground anchor against slip.
- Buckle location (behind the I-beam and at the top of I-beam
- Proper tension of over the roof or hanging straps from sidewall (per set-up manual)
- Field installation of strap (fastened with the house with correct numbers, size of fasteners and location per set-up manual)

Note: For double wide homes, leveling and connection of the two halves should take place before putting tension in the straps. For single wide homes, leveling and placement of all footings should be completed before putting tensions in the straps. The level of the home should be again checked.

CATEGORY 4 - MARRIAGE WALL CONNECTION

4. Marriage Wall Connection (Per set-up Manual)

4.1. Connection at Floor

- Fastener size, spacing and angle of toe-nailing (or bolting of the clips)
- Damage to the bottom board
- For rigid connection without gap

4.2. Connection at Roof

Fastener size, spacing, location and angle of toe screwing
Damage to the roof sheeting
Placement of ridge shingles or metal plates
For rigid connection without gap

4.3. Connection at Sidewall

- Plates and fasteners
- Installation of siding, (removal of plastic paper or other temporary covering for ventilated wall cavities, if so required by set-up manual)

4.4. Insulation and Gasketing

- Insulation at floor, end walls, roof at all joints may be recommended or required per manufacturer's installation instructions. (Note: for homes having cathedral ceiling, the insulation should be at cathedral ceiling.
- Caulking as needed for stopping air infiltration
- Fire stopping as required between roof and wall cavities

4.5. Connection of all trims, etc. at doors, openings, and endwall

- Door operation
- Proper installation of trim, etc, so that it would not fall off.

CATEGORY 5 - MECHANICAL

5.1. Crossover Duct

- Listing
- Size
- Hanger
- Duct not touching the ground
- Check operation of heating system for proper air flow

5.2. Repair of Rips in Bottom Board and Insulation

- Proper tape
- Proper packing of insulation

5.3. Ventilation of Dryer Vent

- Outside rather than under the home
- Proper support

5.4. Drain Pipe Installation

- Proper connection of field installation: size, slope, direction of fittings
- Cleanouts not obstructed by structural elements such as piers, etc.
- Proper testing of drain pipes per set-up manual
- Proper testing of the water supply
- Testing of operation of all plumbing fixtures

5.5. Gas Connections

- Gas pipe size
- Retest the gas pipe if the inlet gas pipe is changed
- Grounding of gas pipe if changed
- Operation of all gas fired appliances

CATEGORY 6 - ELECTRICAL WORK

6. Electrical Work

6.1. Main Connection

- Proper feeder size
- Rating of feeder wire
- Connection to the main panel
- Maximum length

6.2. Field Installation of Fixtures

- Flash ring size and requirement (at exterior porch light for wood siding, flash ring is required).

- Installation of ceiling fan with proper structural connections.
- Operation and polarity

6.3. Operation of Appliances and Outlets

6.4. Repairs Loose Fixtures or Outlets

CATEGORY 7 - SPECIAL SITE CONDITIONS

7. Special Site Conditions

7.1. Operation of Exit Doors and Windows

7.2. Ventilation of Skirting

- Minimum 4 per home
- Minimum size for access
- Location

7.3. Special Foundation Design For Flood Plain or Raised Homes

- Per designs approved by professional engineer

TABLE 4-2
LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 1 - Site Preparation (drainage and placement of footings)

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
1.1	Poorly prepared site, improper drainage and inadequate preparation for footings.	Set-up Manual.	1, 2, 3, 6, 34
1.2	Organic material under footings (footings should be placed on undisturbed soil found 6" - 12" or more below grade or on compacted fill rather than on top soil having organic material).	Set-up Manual and acceptable engineering practice.	1, 2, 3, 6, 34 (Sketch 4-1)
1.3	Inadequate protection of bearing soil against erosion by rain or wind.	Acceptable engineering practice.	1, 2
1.4	Footings not placed below frost penetration (particularly the perimeter blocking).	Acceptable engineering practice.	10, 13
1.5	Not placing vapor barrier	Acceptable engineering practice.	All photographs

POTENTIAL IMPACT OF IMPROPER SITE PREPARATION

- Moisture problem leading to reduced durability of siding, bottom board, etc. Condensation in walls, ceilings, water damage in wall panelings and ceilings, wet insulation, etc.
- Foundation problems leading to differential settlements, affecting level of the home, reduced overall durability, buckling of walls, floors, etc., of operation of doors and windows, and loosening of tie-downs.

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 2 - Foundations, Footings, Piers and Shims

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
2.1	Footings placed above frost line	Acceptable engineering practice.	10, 13
2.2	Undersized footings.	Set-up manual.	6, 28
2.3	Orientation of seam of dual masonry block footings not parallel to the I-beam.	Acceptable engineering practice, NCSBCS-A225.1, etc.	5, 10
2.4	Untreated edges of treated plywood footing.	Acceptable engineering practice and tests.	4
2.5	Improper placement of precast concrete footing pad is a frequent error (the block face with manufacturer I.D. should be contacting the stand base--as shown--to assure proper performance).	Footing pad manufacturer instructions and tests for lateral loads.	3
2.6	Over-extended metal stand adjusting stud may not extend more than 2" per some test data).	Metal stand manufacturer instructions and tests to carry lateral load.	3, 9 (Sketch 4-2)
2.7	Masonry blocks (hollow masonry) on ends (the cells or cavities were horizontal instead of vertical).	Adopted state standard. Acceptable engineering practice, and NCSBCS A225.1, etc.	7, 8
2.8	Missing wood or solid masonry cap above hollow masonry block piers.	Set-up manuals, acceptable engineering practice, and NCSBCS A225.1.	1, 5, 7, 8, 11, 25

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 2 - Foundations, Footings, Piers and Shims

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
2.9	Improper shim between piers and I-beams: • Lack of double shimming to assure proper bearing. • Improper width (less than 4") of the wooden shim. • Overshimming (more than 1" thickness of shims). • Improper length (less than 6")	Set-up manuals, acceptable engineering practice (bearing stress of wood) and NCSBCS A225.1	1, 5, 8, 12, 20, 21, 23 (Sketch 4-3)
2.10	Absence of piers at marriage wall posts (supporting ridgebeams) in multiwide. (A similar problem would be not placing the piers at sliding glass door openings and for tip-out rooms.)	Set-up manual and acceptable engineering practice.	Sketch 4-4
2.11	Conflicting location of pier at marriage wall post with the uplift strap at that post.	Set-up manual and acceptable engineering practice.	28

<u>POTENTIAL IMPACT OF IMPROPER FOUNDATIONS</u>

- Foundation problems leading to improper leveling of homes, reduced overall durability, adversely affecting operation of doors and windows, buckling of sidewall panels, uneven roof line, and roof leaks.
- Lack of stability in wind and snowstorms.

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 3 - Tie-downs Against Wind (Ground Anchors, Straps and Buckles)

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
3.1	Concrete or ground anchors installed at a wrong angle (the ground anchor should be parallel to the tie-down strap).	Not per ground anchor manufacturers and tests against pullout.	2, 5, 14, 15, 16, 18, 23, 24, 25
3.2	Excessive projection of ground anchor above ground (it is more critical if the ground anchor is not parallel to the strap.)	Not per ground anchor manufacturers and tests against pullout.	16
3.3	Predrilling the hole to the full length of the ground anchor.	Not per ground anchor manufacturers and tests against pullout.	17
3.4	Absence of poured concrete collar around ground anchor at the ground level (this is required by some anchor manufacturers, particularly when the ground anchors are placed in holes predrilled to half of depth).	Not per ground anchor manufacturers and tests against pullout.	18
3.5	Excessive diagonal strap angle with the ground. (This occurs if the piers are too low or too high, the average being 36").	Set-up manual.	25
3.6	Not placing tie-downs close to the piers (if the tie-downs are close to the piers, they will be able to resist the tension much better without pulling the I-beam down).	Set-up manual.	24, 25

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 3 - Tie-downs Against Wind (Ground Anchors, Straps and Buckles)

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
3.7	Improper strap buckle installation. • The buckle not behind the I-beam and not at top of I-beam. • The strap not looped twice through the buckle to avoid slippage of strap in the buckle. • The strap not tightly wrapped around I-beam.	Strap and buckle manufacturers and tests	5, 6, 12, 20, 21 (Sketch 4-1 and sketch 4-2)
3.8	Improper modification to the location of the strap hanging from house (the added screws to the new location of the strap are not adequate).	Engineering acceptable practice.	22
3.9	Improper field installation of the strap at the ridgebeam post (the strap should have been tightly placed against the post. Some set-up manuals require field installation of straps).	Set-up manual and engineering acceptable practice.	27
POTENTIAL IMPACT OF IMPROPER TIE-DOWNS AGAINST WIND	• Lack of stability in wind storm leading to shaking at low wind speeds and sliding of the home from piers at high wind speeds. (This may lead to reduced overall durability of the home and increased risk of loss of property [home and its contents] and injury.)		

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 4 - Marriage Wall Connection (roof, floor, insulation caulking, and alignment between the two halves)

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
4.1	Improper connection of the two sections of the home: • at floor fasteners not placed between the two edge joists to close the gap. • at roof fasteners not placed between the two ridgebeams or trusses to close the gap. • Inadequate packing of insulation and caulking between the two sections to limit infiltration.	Set-up manual, Federal Standards, and acceptable engineering practices.	28, 29, 30, 31 (Sketch 4-4, sketch 4-5, and sketch 4-6)
POTENTIAL IMPACT OF IMPROPER MARRIAGEWALL CONNECTION	• Relative movement between the sections leading to reduced overall durability, roof leaks, air infiltration (loss of comfort and increased energy bills). • Sliding of the home from the piers leading to increased risk of property loss and injury.		

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 5 - Mechanical (repair of bottom board and insulation ducts, venting, gas connection, plumbing, etc.)

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
5.1	Cross-over duct between the two sections in contact with ground. (The duct should be installed on hangers so that the duct is not touching the ground).	Set-up manual and listing conditions of the cross-over duct.	33
5.2	Lack of repair of rips and cuts in bottom board, and damage to floor insulation.	Set-up manual	32
5.3	Improper ventilation of dryer duct under the house (this will cause condensation under the house).	Set-up manual	26, 34
5.4	Blocked clean-out of the drain pipe.	Acceptable engineering practice.	38
5.5	Changed gas pipes at the inlet (without gas pipe test).	Acceptable engineering practice.	39

POTENTIAL IMPACT OF IMPROPER MECHANICAL WORK

- Improper heating/cooling of the double section homes due to deterioration of cross-over duct.
- Improper heating and increased fuel cost due to rips in bottom board and insulation, entry of rodent and damage to floor decking due to exposure to moisture.

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 6 - Electrical Work (field installation of fixtures and repairs)

No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
6.1	Improper repair of popped out electrical outlet due to buckled wall paneling.	Acceptable engineering practice	36
6.2	Improper installation of ceiling fan (the fan is not properly hung or supported). (A similar situation will be improper connection of exterior porch lights.	Acceptable engineering practice	37
6.3	Under size pan for wiring load	Acceptable engineering practice	30

POTENTIAL IMPACT OF INCORRECT ELECTRICAL WORK
- Increased risk of injury and fire damage.
- Inoperable electrical outlets or fixtures.

LIST OF MAIN DEFICIENCIES OBSERVED BY NCSBCS INSPECTORS DURING SITE INSPECTION OF HOME INSTALLATION

Category 7 - Special Site Conditions

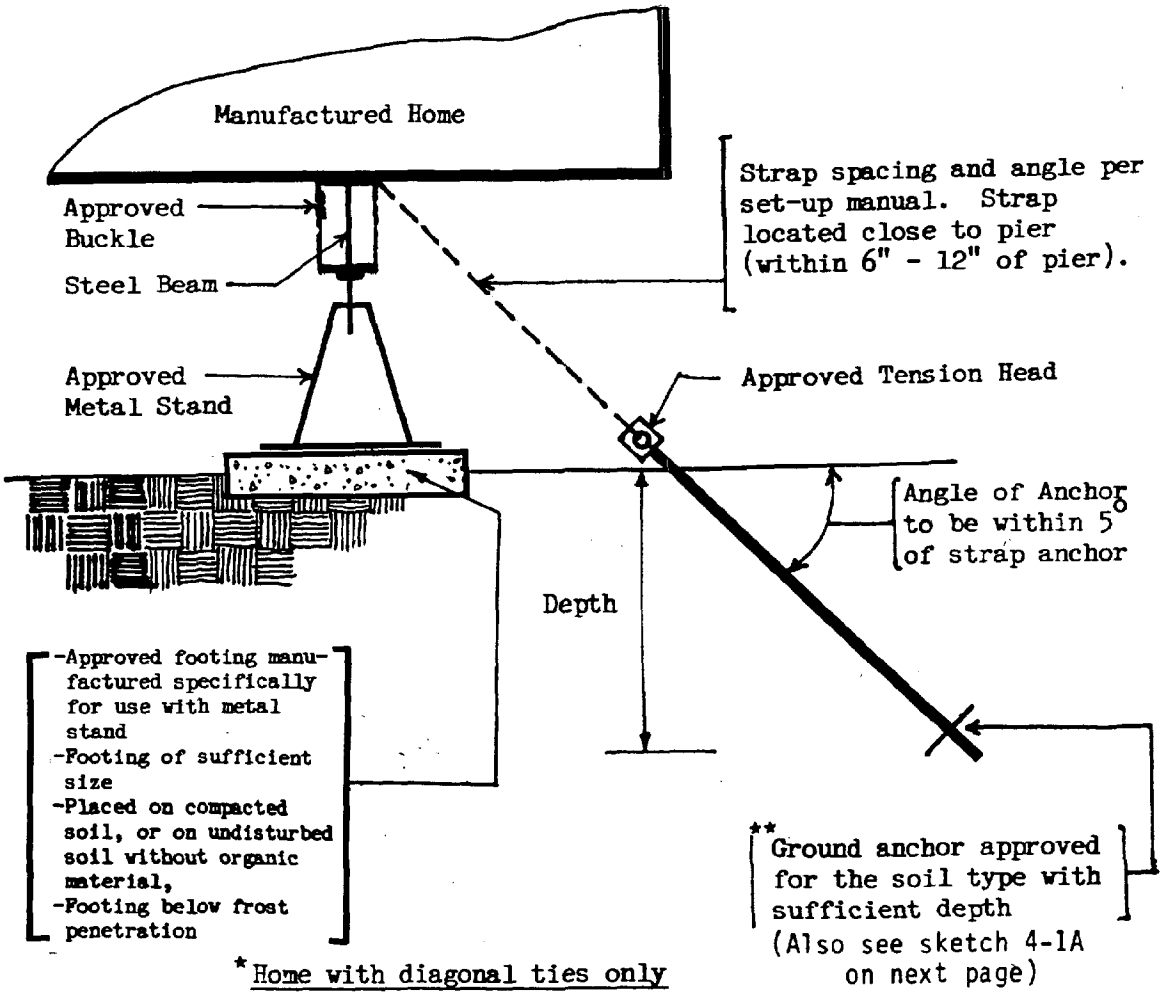
No.	Description of Deficiency	Criteria	Reference to Photographs and Sketches
7.1	Inadequate foundation design in flood areas to resist sliding in wind storms. (This results from lack of engineered design for special site conditions.)	Acceptable engineering practice	No Photo
7.2	Inadequate ventilation in the skirting. (This will not allow escape of ground moisture from under the house).	Set-up manual, acceptable engineering practice	35
7.3	Addition of porches, garages, awnings connected with home without engineered designs (a similar situation occurs when additional plumbing and electrical fixtures are connected in the basement or garage without properly engineered designs.	Set-up manual	No Photo
7.4	Inoperable exit windows and doors.	Acceptable engineering practice.	No Photo

POTENTIAL IMPACT OF IMPROPER DESIGN FOR SPECIAL SITE

- Increased risk of damage and injury in flood and wind storms.
- Reduced overall durability.

SKETCH 4-1

CORRECT METHOD OF INSTALLATION

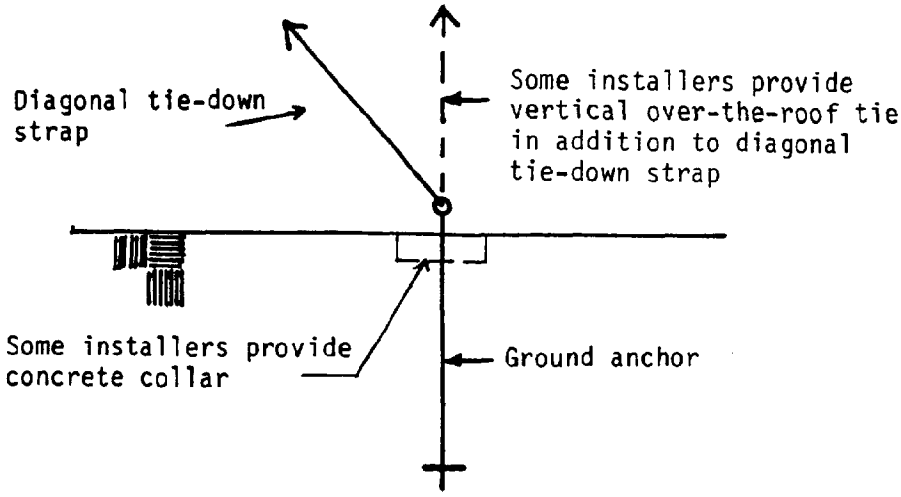


* Note: If over the roof straps are provided in addition to diagonal straps, the ground anchor should be parallel to combined forces of the two straps and should have twice as much capacity. Over the roof straps without the diagonal straps are not capable of resisting sliding of home. In most set-up manuals, over the roof straps are optional and only diagonal straps are required.

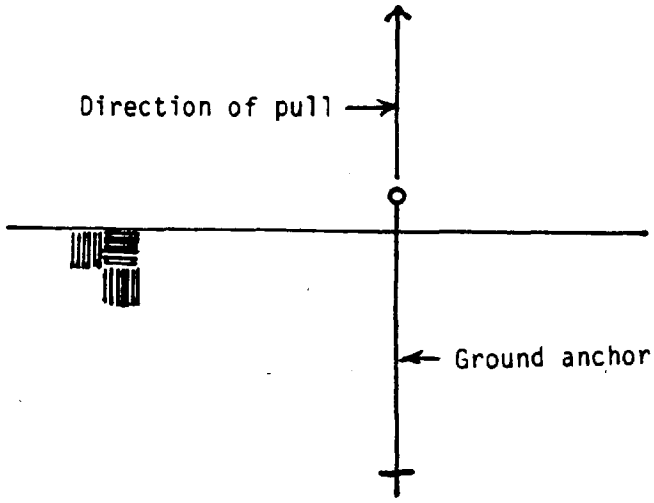
** Note: Some ground anchor manufacturers recommend that the anchors can be driven vertically for diagonal straps as long as poured-in concrete collar is provided around ground anchor. It is difficult to install anchors parallel to strap as shown above, as the anchors have to be installed before the home is put on site. Currently, the anchors are installed after the home is placed on piers on site.

SKETCH 4 - 1A

Current Practice of Ground Anchor Installation

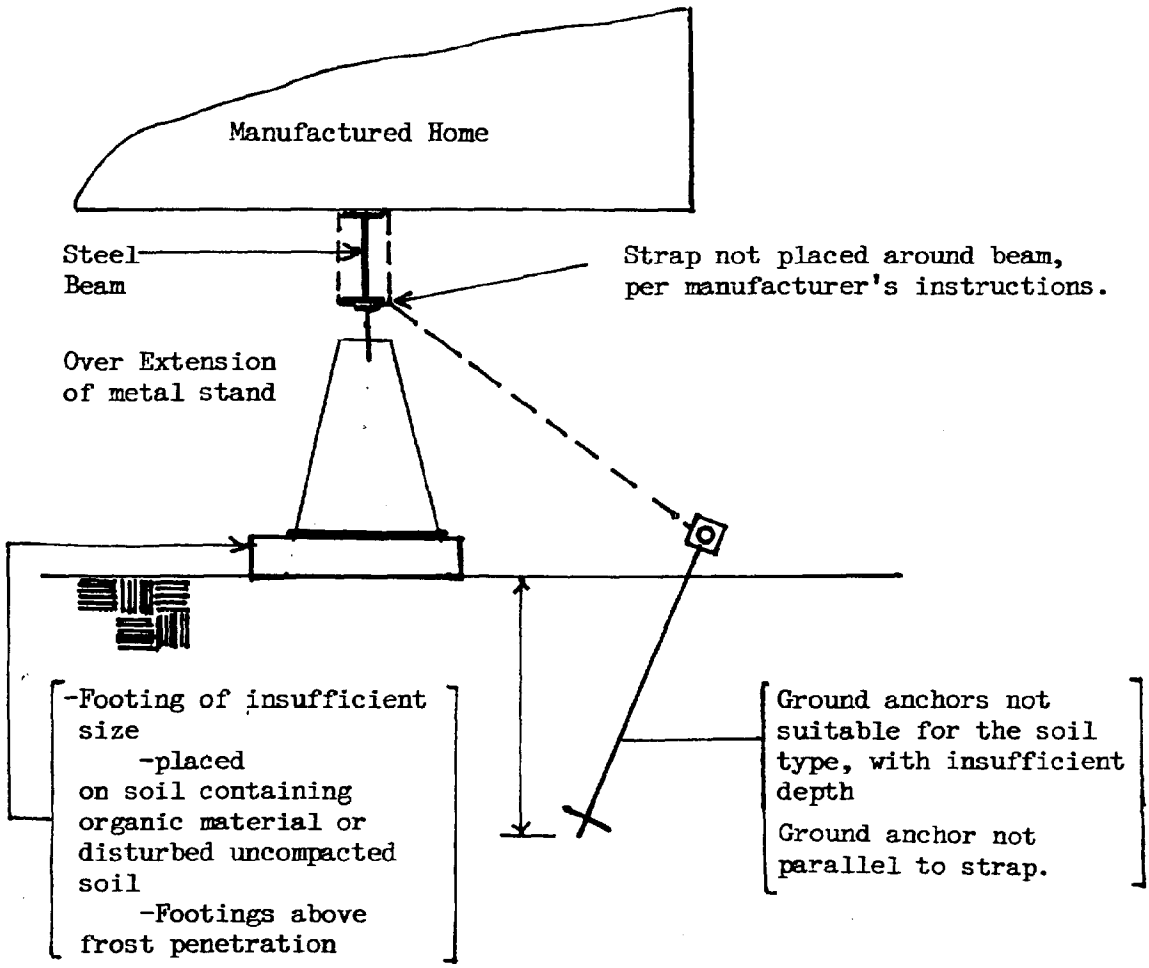


Tested Configuration of Ground Anchors



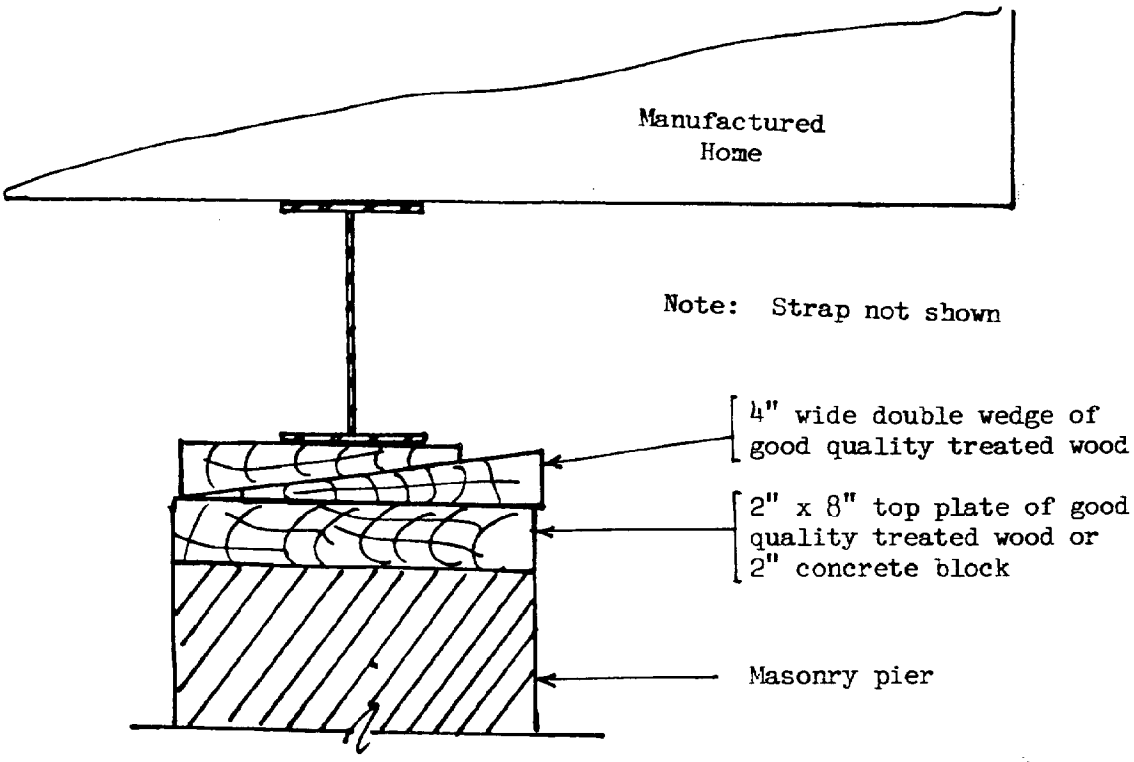
SKETCH 4-2

INCORRECT METHOD OF INSTALLATION

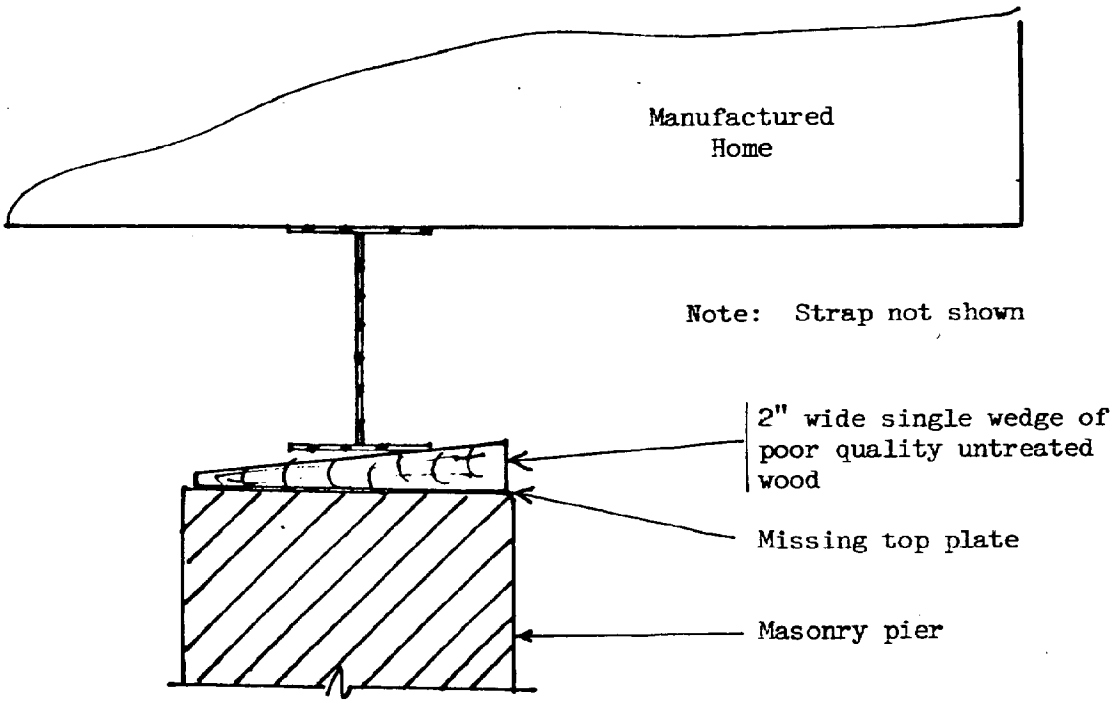


SKETCH 4-3

WEDGING BETWEEN STEEL BEAM AND MASONRY PIER



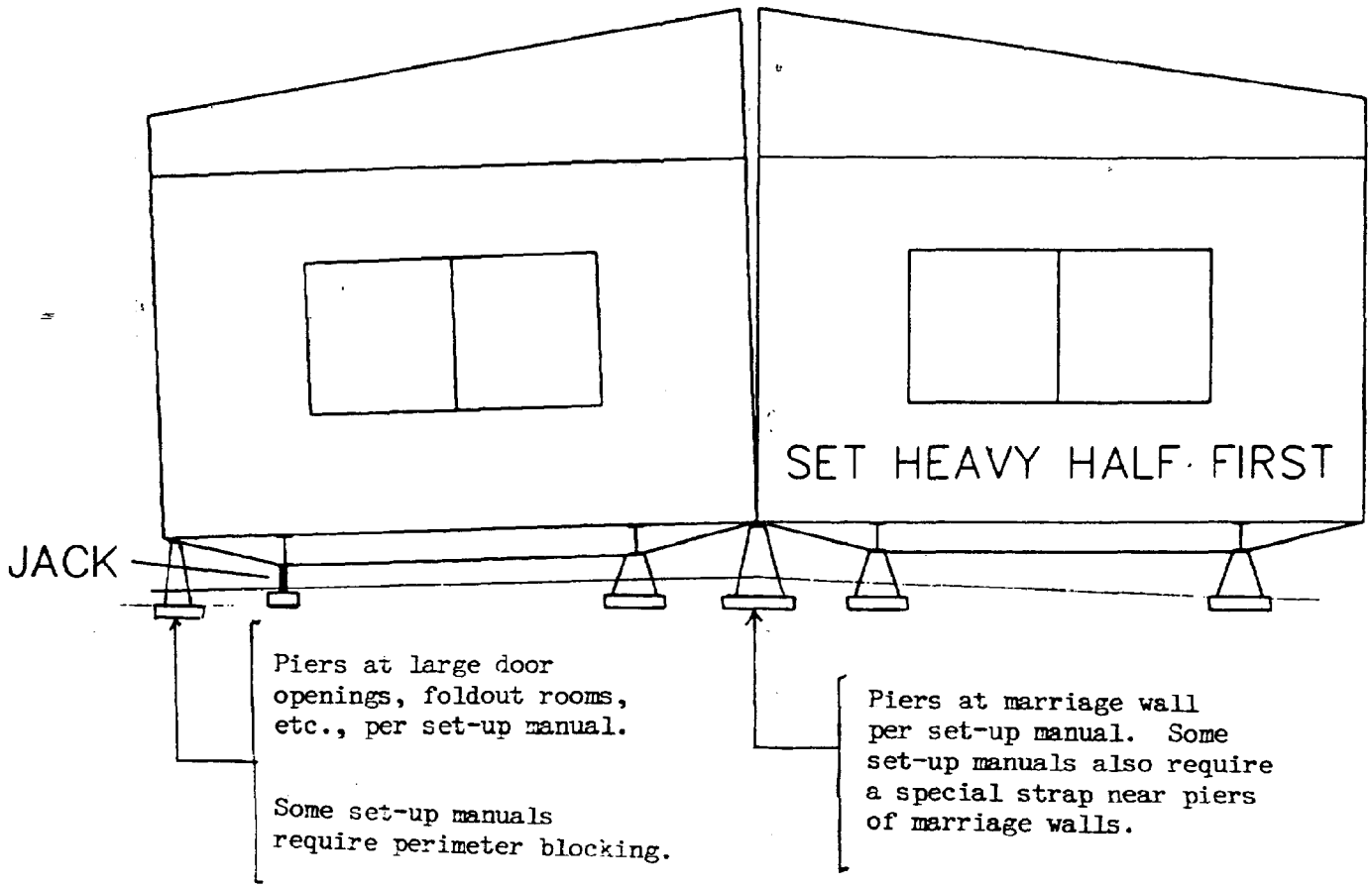
CORRECT METHOD



INCORRECT METHOD

SKETCH 4-4

SET-UP OF DOUBLE SECTION OF HOMES



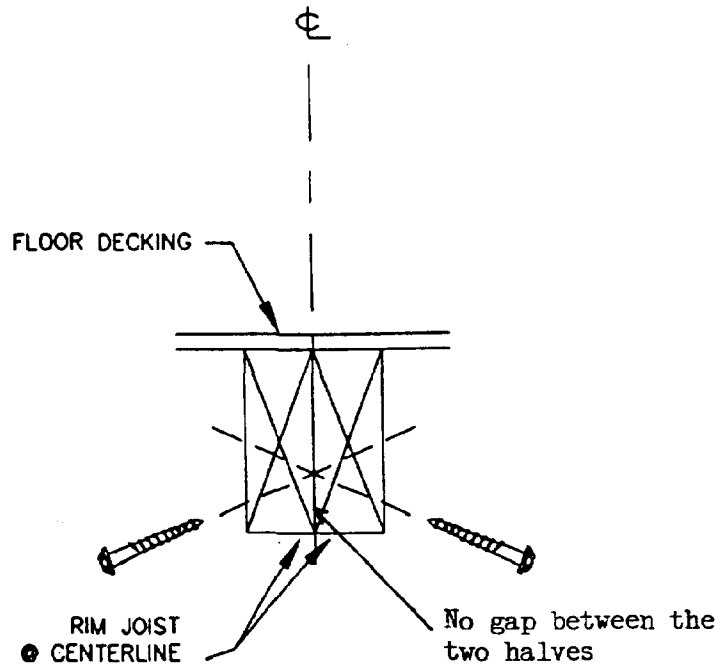
STEPS:

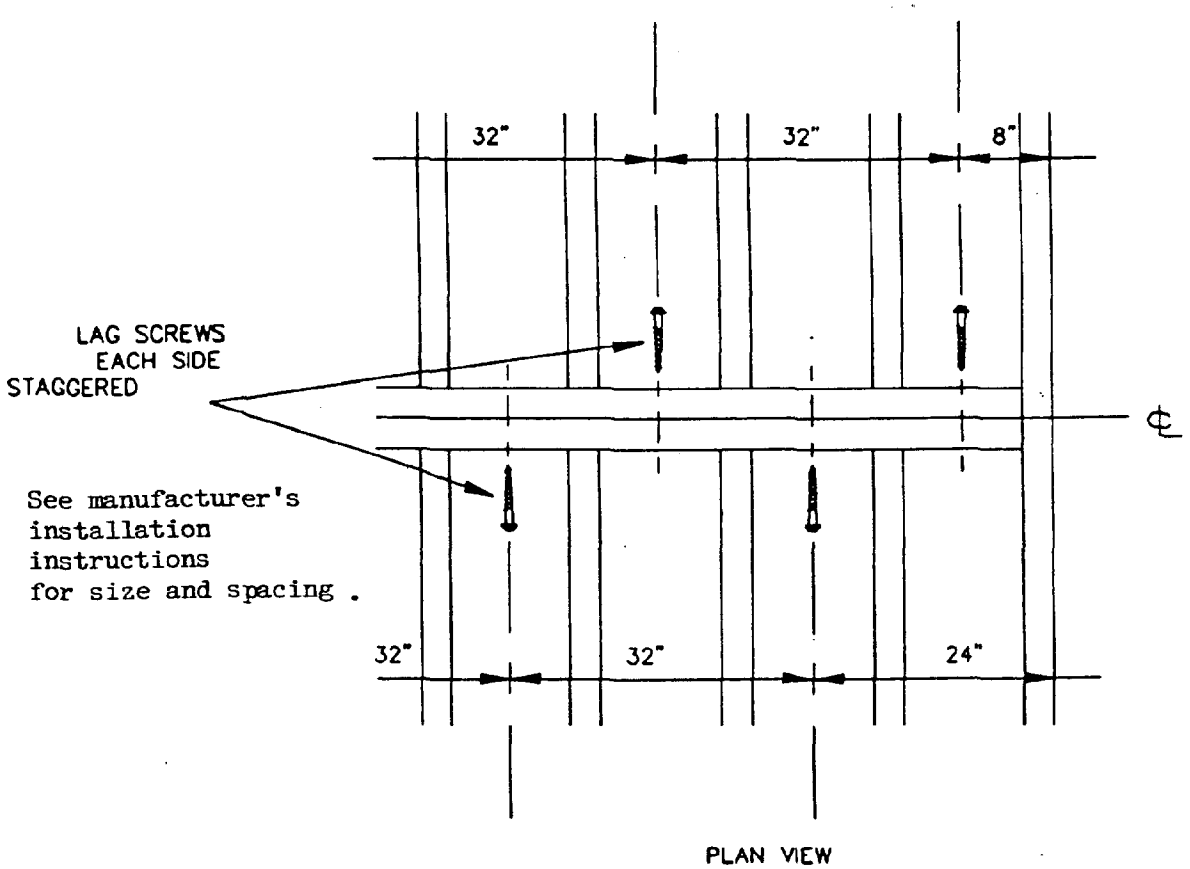
1. Alignment of Floor
2. Fasten at Floor
3. Fasten at Roof

SKETCH 4-5

CONNECTION OF FLOOR JOIST AT MARRIAGE WALL

IN DOUBLE SECTION HOMES

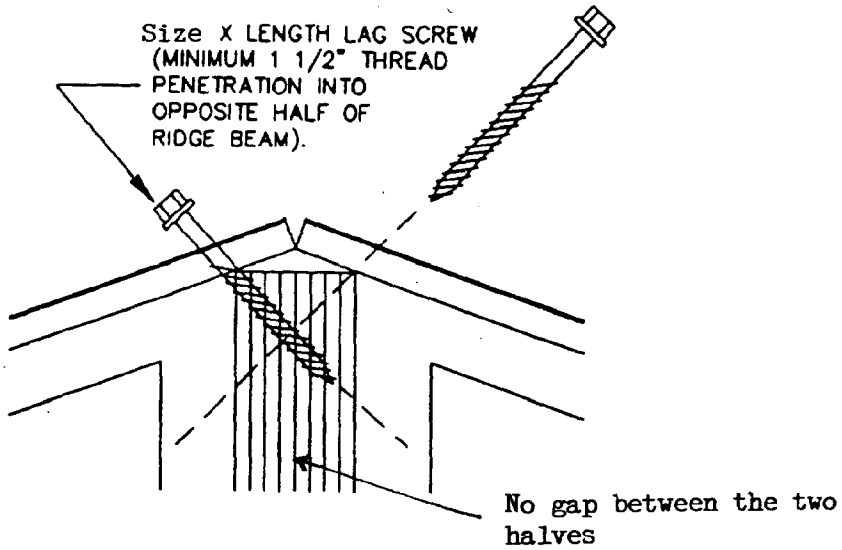


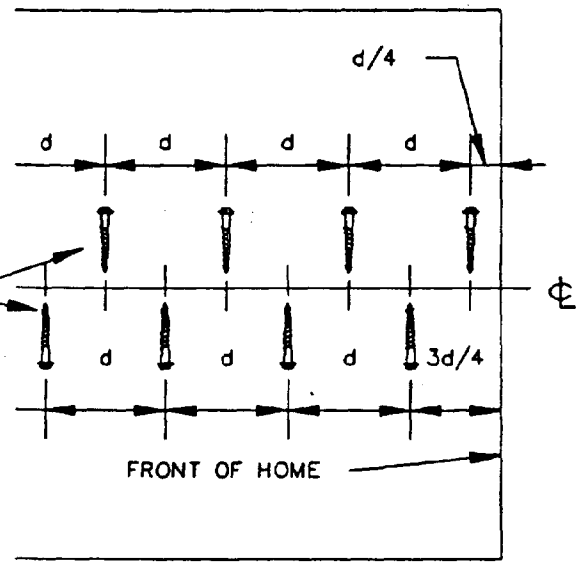


SKETCH 4-6

CONNECTION OF ROOF RIDGE BEAM AT MARRIAGE WALL

IN DOUBLE SECTION HOMES





TOP VIEW OF ROOF

DESIGN LIVE LOAD	d	
	28WIDE MAX	32WIDE MAX
20 PSF		
30 PSF		

See manufacturer's installation instructions for size and spacing.

Chapter 5

CHAPTER 5

STATE REGULATIONS FOR INSTALLATION OF MANUFACTURED HOMES

I. INTRODUCTION

This chapter discusses NCSBCS' process of reviewing the state regulations of installation for manufactured homes, and NCSBCS' findings from the review.

A. State Installation Regulation Evaluation Process

NCSBCS collected state statutes, regulations, and standards relating to the installation of homes from all 50 states. To collect the needed data, NCSBCS wrote to each state requesting details of such statutes and regulations. To assure that information is collected from each state, NCSBCS contacted those states by telephone if the states did not provide written information.

See Appendix C for samples of the letter written to various states for requesting the information. NCSBCS used the data contained in the 1987 "State Task Force Report" (see Appendix H). That report identified the 19 states that had installation regulatory programs. NCSBCS wrote and requested the 19 states to provide NCSBCS with the following information:

1. A copy of applicable statute and installation inspection procedures.

2. Inspection forms.

3. Alternate enforcement options, such as municipal or county inspection contracts.

4. Results of any studies made to evaluate the impact of the installation on consumer complaints.

5. A list of typical problems found by state inspectors in their area.

6. A list of concerns about installation manuals, manufacturer/dealer/installer relationships.

7. A copy of training aids developed by the state regarding installation of homes.

The remaining 31 states were divided into two categories.

1. SAA states, i.e., states that are currently acting as State Administrative Agencies authorized by HUD.

2. Non-SAA states, i.e., states that are not currently acting as State Administrative Agencies.

NOTE: SAAs assume responsibilities under Federal law to assure that the manufacturer provides consumer protection against manufacturing defects. SAAs also have optional responsibilities of dealer lot inspection, installation inspection, sale of used homes, etc.

SAA states were asked to provide the same information as described above. Non-SAA states were asked to provide NCSBCS with the following information:

1. Has the nature of state's participation in the Federal Manufactured Housing Program been altered within the last 18 months?

2. If so, how?

3. Does the state have proposed legislation regarding manufactured housing installation that will convey enforcement authority to state or local jurisdictions?

4. If so, please tell about it.

5. Many consumer complaints seem to have arisen from the apparent improper installation of manufactured homes. Does the state currently have a recourse process for consumers with manufactured housing problems?

6. If so, please describe.

7. As part of a consumer complaint inspection, is the installation inspected?

8. If so, what aspects are inspected?

9. What comments or recommendations would the state like to make regarding HUD's concerns about the installation aspect of manufactured housing?

A list of the collected information from various states has been provided in Appendix B. Because of the large volume, NCSBCS has not provided a complete copy of the state laws and regulations in this report; however, a complete file containing information from each state is available at NCSBCS.

B. Purpose and Scope of Evaluating State Installation Regulations

The purpose of studying the state regulations pertaining to installation of manufactured housing was not only to learn the specific regulations that each state has but to correlate between the state regulations and arrive at a decision on effectiveness of these regulations.

C. Analysis from State Regulations

The NCSBCS inspectors learned the major aspects of the regulatory program of each state involved and drew conclusions based on these different state regulations. The next section discusses the main information obtained from this review of state regulations.

II. FINDINGS

The collected information was reviewed to evaluate the state regulatory programs.

A. List of Main Aspects of the State Regulatory Programs Reviewed

The following three questions convey a synopsis of the review of the state regulations involving the installation of manufactured housing:

1. What are the major aspects of the regulatory program in each state?
2. Can the states be categorized based on the effectiveness of their regulatory programs for installation and what percentage of homes are located in such groups of states?
3. What kind of regulations are needed to make the state programs effective?

B. Answers for the Three Questions

NCSBCS' findings regarding the three main questions that evolved from the analysis of the state regulatory programs are discussed below. Findings for questions 1 and 2 are presented in a table after each question is broken down into subsidiary questions. The answer to question 3 is provided in the list.

1. **What are the major aspects of the regulatory program in each state?**

   - Who is regulated?
   - How are they regulated?
   - Who enforces the regulations?
   - Are there any installation standards?
   - How does the state come to know about installation?
   - What recourse or penalties can be applied if problems are discovered?
   - Does the state charge installation registration or inspection fees?

The above aspects are briefly discussed in Table 5-1. That table provides a general description about the various aspects of state regulation requirements for installation.

TABLE 5-1

Major Aspects of State Regulations For Installation of Manufactured Homes

Major Aspects of Regulations	State Laws May Include the Following
Who is regulated?	• Installers • Dealers (retailers) • Salespersons • Homeowners • Park owners
How are they regulated?	• Licensing of dealers, installers, salespersons • Bonding of dealers, installers • Payment to recovery fund by dealers or installers.
Who enforces the regulations?	• State government to conduct inspections and enforce the laws. • Local governments to conduct inspections and enforce the laws.
Are there any installation standards?	• A reference to compliance with manufacturers installation instructions. • Blocking (foundation) standards. • Tie-down (anchoring standards). • A requirement of installation designs certified by licensed engineers.
How does the state come to know about installation?	• State Registration and/or installation stickers. • State permit
What recourse or penalties can be applied if problems are discovered?	• Withholding of occupancy permit or utility connection. • Fines against dealer, installer, or against homeowner. • Cancellation of licenses of dealers, installers, and salespersons.
Does the state charge installation registration or inspection fees?	• Fees paid by installer or homeowner.

2. **Can the states be categorized based on the effectiveness of their regulatory programs for installation and what percentage of homes are located in such groups of states?**

Table 5-2 contains a list of the states whose state programs meet the following criteria.

1) Scope of regulation and effectiveness of enforcement programs. (The 50 states can be divided into four categories.)[1]

   a. States having little or no installation standards and laws and no enforcement programs.

   b. States having some installation standards and laws and no enforcement programs.

   c. States having significant installation standards and laws but without effective enforcement program.

   d. States having significant installation standards and laws and effective enforcement programs.

2) Dependence upon the local governments to conduct installation inspections. Fifteen states depend on local governments for enforcing state standards and laws. These 15 states can be divided into two categories.

   a. States that do not monitor performance of local governments.

   b. States that do monitor performance of local governments and provide training as required.

[1] These categories are defined at the end of Table 5-2.

3) Bonding of dealers and installers.

   a. States require bonding of dealers

   b. States require bonding of installers

4) States that require licensing of installers.

5) Installation Standards

   a. States that require compliance with home manufacturers installation instructions.

   b. States that have blocking and tie-down standards.

6) States that require systems component manufacturers to seek approval from the state.

7) States that have state inspection or permit fees.

TABLE 5-2

NATIONAL PROFILE OF STATE REGULATIONS
REGARDING INSTALLATION OF MANUFACTURED HOMES

State Program Criteria	States (percentage of homes potentially affected)
1. Scope of regulation and effectiveness of enforcement programs.[1]	
a. States having little or no installation regulations and no enforcement programs.	(21 States) AK, CO, DE, GA, ID, IL, LA, MT, NE, NH, ND, OH, OK, PA, SC, SD, UT, VT, WV, WI, WY (43%)
b. States having some installation regulations and no enforcement programs.	(11 States) CT, IN, KA, KY, MD, ME, MO, NJ, NY, RI, VA (22%)
c. States having significant installation regulations but ineffective enforcement programs.	(9 states) AL, AR, FL, MA, MI, MN, NC, OR, WA (18%)
d. States have significant installation regulations and also effective enforcement programs.	(8 states) AZ, CA, IA, MS, NV, NM, TN, TX (16%)
2. Monitoring by state of the local government for compliance with state laws.	
a. States that monitor performance of local inspection agencies and provide training to local inspectors.	(4 states) AZ, CA, IA, OR (8%)
b. States that do not monitor performance of local governments.	(11 states) AL, AR, FL, MA, MN, MO, NC, OR, RI, VA, WA (22%)
3. Bonding of dealers and installers.	
a. States that require bonding of dealers.	(7 states) FL, MS, NC, NM, TN, TX, WA (14%)
b. States that require bonding of installers separate from dealers.	(5 states) NM, NC, TN, TX, WA (10%)
4. States that require licensing of installers.	(13 states) AZ, CA, MS, MI, ME, MN, NV, NM, NC, RI, TN, TX, WA (27%)

NATIONAL PROFILE OF STATE REGULATIONS REGARDING INSTALLATION OF MANUFACTURED HOMES

State Program Criteria	States (percentage of homes potentially affected)
5. Installation Standards	
a. States that require compliance with home manufacturers installation instructions.	(24 states) AL, AZ, AR, CA, FL, IA, IN, KY, MD, MA, MI, MN, MO, NV, ME, MS, NC, NY, OR, TN, RI, TX, VA, WA (49%)
b. States having blocking and tie-down standards	(22 states) AL, *AZ, AR, CA, FL, IA, IN, KY, KS, MI, MN, NV, NJ, NM, NC, OR, MO, RI, TN, TX, VA, WA (* No tie-down standards) (45%)
6. States that require systems component manufacturers to seek approval from the state	(17 states) AL, AZ, AR, CA, FL, IA, KS, MI, MA, MN, MS, MO, NV, NM, OR, TN, TX (35%)
7. States that have state inspection or permit fees. (This does not include any requirement of additional fees established by the local government.)	(6 states) CA, IA, NM, OR, TN, TX (12%)

[1] DEFINITIONS OF SCOPE OF REGULATION AND EFFECTIVENESS OF ENFORCEMENT PROGRAM

a. The states may not have any state-wide laws or programs such as the following: state licensing or bonding of installers; blocking and tie-down standards; routine state inspection of installation of homes; reporting mechanism for installation; components listings. The local government in these states may or may not have related laws.

[1] DEFINITIONS OF SCOPE OF REGULATION AND EFFECTIVENESS OF ENFORCEMENT PROGRAM (cont.)

b. The states have some installation laws such as blocking or tie-down standards, but no programs to enforce the standards. These states do not generally have licensing or bonding of installers, routine state inspection of installation, reporting mechanisms about installation, component standards or listings.

c. The states have installation laws but limited enforcement programs. The state laws generally include blocking and/or tie-down standards, a requirement that local or county governments conduct inspections, and components standards and/or listings.

   However, the state may not have any enforcement programs to monitor performance of county or city inspection programs. Further, the state may not have any programs to take action against counties/cities that do not comply with state laws or against dealers and installers who do not comply with state laws.

d. The states generally have comprehensive installation laws and enforcement programs. The enforcement programs include state inspection of installation of homes; state monitoring of county and city installation inspection performance; training; licensing and bonding of installers; a reporting mechanism of installations; provisions for penalties; fees to cover the expenses; and/or standards and regulations for installation components.

3. **What kind of regulations are needed to make the state programs effective?**

- Licensing and bonding of dealers and installers.
- Installation standards, including reference to manufacturer's installation instructions.
- Inspection programs of the installation of homes. If the local governments are entirely or partially given this responsibility, then a properly funded state program should be there to monitor and coordinate their activities and to provide training to local inspectors as required.
- Provisions for penalties.
- Fees to cover the expenses.
- Standards and regulations for installation components.

NOTE: All of the above aspects need to be regulated to achieve comprehensive installation regulations. This conclusion has been arrived at through discussions with the states that have tried to develop comprehensive enforcement programs.

In addition to the above, the state should have a technical training program for the installers, dealers so that the regulations and Standards can be properly followed.

III. CONCLUSIONS

This section lists the major conclusions from NCSBCS' findings from the review of state regulatory programs. Table 5-3 at the end of this chapter shows a national profile on various regulatory issues.

1) Many states need to improve their current laws, regulations, and standards. Those that have the standards or laws but do not have

enforcement programs need to develop such programs. The enforcement programs must include the following:

- Inspection by state of the installations. (If the state wants to depend on local government for inspections, the state needs to monitor the performance of the local government.)

- Bonding of dealers and installers.

- Training programs for dealers, installers, and local government inspectors.

2) A large percentage of homes are being sited in states having inadequate laws and enforcement programs. Therefore, the laws need to be improved.

3) Adoption of a national installation standard (such as NCSBCS A225.1) by the states would benefit uniformity of enforcement, and compliance by the manufacturers. The states need to evaluate if the NCSBCS A225.1 Standard can serve this need in the current form or with certain modifications. The states should coordinate their concerns to identify what modifications, if any are required, to the NCSBCS A225.1 Standards to facilitate its adoption by various states. (See Appendix I for additional information on NCSBCS A225.1.)

4. Many state laws require compliance with the manufacturer's installation instructions; however, the state laws permit compliance with only state standards when manufacturer's installation instructions are not available. In NCSBCS' opinion, the state laws should require compliance with the following:

- Manufacturer's installation and state standards (whichever are more restrictive must be followed).

- If manufacturer's installations are not complete or are not applicable for a given site and foundation, installation drawings approved by the licensed engineer or architect must be required and followed.

The above recommendations are being made because some state standards are not comprehensive. Also, unless the manufacturer's installation instructions are followed, the home warranty may be voided.

TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Alabama 11249 5%	Homeowner is Responsible		Local Building Inspectors	Yes See note #3	Yes See note #1	Yes See note #2	Permit Application	• Misdemeanor • Court granted additional relief	Set by local government
Alaska 6 -1% or less	None	———	———	———	———	———	———	———	———
Arizona 5871 2.6%	• Retailer • Installer • Broker • Salesperson	• Examination • Registration Fees • Recovery Fund	• State Inspectors • Local Building Inspectors • County Collects Fees & Inspects up to 2 inspections per permit fee See notes 5 & 6	Yes	Yes	Locally Adopted Ordinance See notes #2, & #4.	• Permit Application	• Close permit issued • Administrative hearing • Revocation of license	$90.00
Arkansas 4363 1.9%	Dealers	License	Local Building inspectors	Yes See note #3	Yes	Yes	• Permit application • Consumer complaint	• Administrative hearing • Penalty assessment	Set by local government

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
4. The state requires that installation instructions for the installation hardware (components) must be provided with hardware.
5. The state monitors performance of local inspectors responsible for installation inspections.
6. The state has programs to provide training to local inspectors responsible for installation inspectors.

TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
California 9651 3%	• Dealers • Installers	• Examination • Licensing	• State 60% • Local Building inspector 40% See note #5	Yes	Yes	Yes See note #2	Permit application	• Revocation of license • Fines	$80.00 permit $60.00 reinspection fee
Colorado 918 -1% or less	None	—	—	—	—	—	—	—	—
Connecticut 293 -1% or less	Only Parks	—	—	—	—	—	—	—	—
Delaware 1930 -1% or less	None	—	—	—	—	—	—	—	—
Florida 25865 11%	Dealers	• Bond • License	Local building inspectors	Yes See note #3	Yes See note #1	Yes See notes #2, and #4	Permit application	• Civil penalty • License revocation • Bond attachment	Set by local government

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
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				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Georgia 14797 6.6%	Dealers Installers	• Licensed by local govt. • Local code enforcement	Local building inspectors inspectors	Yes	Yes	Yes	Permit application	• License revocation • Fine	Set by local government
Idaho 605 -1% or less	Dealers	License	No specific enforcement program	Yes	Yes	Yes	Permit application	License revocation	Not known
Illinois 3571 1.6%	None	———	———	———	———	———	———	———	———
Indiana 6425 2.9%	None	———	State inspects with consumer complaint	Yes	Yes See note #1	———	———	———	———

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
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				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Iowa 868 -1% or less	• Installer • Purchaser is responsible	Listed by commissioner with proof of competence	• Local building inspectors • Approved installers • Each complete installation certification and affix seal See note #5	Yes See note #3	Yes	Yes See note #2	• Certificate sent to state • Consumer request	Denial or repossession of installation seals	• Seal fee $12.50 • Verification inspection fee $30.00/hr.
Kansas 1463 -1% or less	None/Any home occupied shall be secured	———	———	———	Yes See note #1	Yes See note #2	———	Class C misdemeanor	———
Kentucky 5346 2.3%	"Installing dealers"	• License • Liability insurance	State inspectors perform random inspections	Yes See note #3	Yes	None	• Consumer complaint • Random selection by state based on sales report	None	No fees
Louisiana 2337 1%	None	———	———	———	———	Yes, if in flood plain by FEMA	———	———	———

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
4. The state requires that installation instructions for the installation hardware (components) must be provided with hardware.
5. The state monitors performance of local inspectors responsible for installation inspections.
6. The state has programs to provide training to local inspectors responsible for installation inspectors.

TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Maine 2738 1%	• Dealers • Installers	Registration	Local building inspector	Yes	———	———	Permit application	———	Set by local government
Maryland 1313 -1% or less	None	———	Local building inspectors	Yes	No	Yes	Permit application	Referral to state attorney	———
Massachusetts 826 -1% or less	• Dealer • Installer	• Examination • License	Local building inspector	Yes See note #3	No	No See note #2	Permit application	License revocation	$500 to $1,000 based on home evaluation
Michigan 9915 4.3%	• Dealer • Broker • Installer	• Filing fee	Local building inspectors	Yes	Yes	Yes, if flood plain by FEMA See notes #2, & #4	Permit application	Administrative hearing	Set by local government

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
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TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Minnesota 1685 -1% or less	• Dealer • Installer	Installer registrations record keeping function only	• Municipal building officials • State inspectors during consumer complaint inspection	Yes	Yes See note #1	No See note #2	• State seal affixed • Occupancy certificate given to owner and copied to state	• Civil penalty • Misdemeanor	• $25.00 for construction seal • Installation fee • Anchoring fee • Construction compliance certificate
Mississippi 5070 2.2%	• Dealer/ installer	License	• Local building official • State does spot check	Yes	Yes	Yes See note #2	Permit application	• License revocation • Dealer association	None
Missouri 4621 2%	Dealer	Dealer is licensed to do business	State does spot checks	Yes	Yes See note #1	Yes See note #2	Report of sales	No recourse	None
Montana 514 -1% or less	None	———	———	———	———	———	———	———	———

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
4. The state requires that installation instructions for the installation hardware (components) must be provided with hardware.
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TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Nebraska 477 -1% or less	Dealers	License	Local building inspectors	———	———	———	———	———	———
Nevada 2006 -1% or less	• Retailer • Installer • Sales person • Serviceman • Rebuilders	• Examination • Registration fees • Recovery fund	• State inspectors • Local inspectors contracted with state See note #6	Yes See note #3	Yes See note #1	Yes See note #2	• Installer via permit • 24 hour notice required	• Disciplinary hearing • Suspension or revocation of license	$65.00 permit fee $40.00/hr. reinspection fee
New Hampshire 1389 -1% or less	None	———	———	———	———	———	———	———	———
New Jersey 900 -1% or less	None	———	Local building inspectors	Yes	Yes	Yes	Permit application	Withhold certificate of occupancy	• Certificate $35.00 • Seal $35.00 • Plumbing permit $20 • Electrical permit $20 • Construction permit/ dollar value

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
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TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
New Mexico 3097 1.3%	• Dealers • Installers • Brokers • Salesperson • Repairman	• Bond • Examination • License	State	Yes "May be"	Yes	Optional "may be" See note #2	State permit	• License revocation • Suspension • Bond attachment	• $35.00 permit fee • $35.00 reinspection fee
New York 7930 3.5%	None	———	———	Yes	———	———	———	———	———
North Carolina 22699 10%	• Dealer • Installer • Salesperson	• Bond • License	Local building inspector See note #6	Yes	Yes See note #1	Yes	Permit application	• Administrative hearing • Suspension • Revocation • Denial • Civil Penalty • Bond attachment	Set by local government
North Dakota 231 -1% or less	None	———	———	———	———	———	———	———	———

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
4. The state requires that installation instructions for the installation hardware (components) must be provided with hardware.
5. The state monitors performance of local inspectors responsible for installation inspections.
6. The state has programs to provide training to local inspectors responsible for installation inspectors.

TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Ohio 6749 2.9%	None	—	—	—	—	—	—	—	—
Oklahoma 1105 -1% or less	None	—	—	—	—	—	—	—	—
Oregon 2910 1.3%	None	—	Local building inspectors See note #5	Yes See note #3	Yes	Yes, in specific counties See note #2	Permit application	Hearing	• $35.00 single wide • $15.00 each additional section • 4% of fees collected forwarded to state
Pennsylvania 7096 3.1%	None	—	—	—	—	—	—	—	—

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
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				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Rhode Island 179 -1% or less	• Dealer • Installer	License	Local building inspector	Yes	Yes	Yes	Permit application	Certificate of occupancy withheld	Set by local government
S. Carolina 11811 5.2%	None	———	———	———	———	———	———	———	———
S. Dakota 581 -1% or less	None	———	———	———	———	———	———	———	———
Tennessee 9342 4.1%	• Dealer • Installer	• Bond • Fee	State electrical inspector	Yes See note #3	Yes	Yes See notes #2 and #4	Permit application by installer	• Misdemeanor • Injunctive relief	• $12.00 installation • $8.00 Electrical
Texas 8507 3.7%	• Retailer • Installer • Broker • Salesperson • Rebuilder	• Bond • Registration fee	• State inspectors • Local contracted inspector See note #6	Yes See note #3	Yes	Yes See note #2	• Installer after set-up • Retailer after sale	• Revocation of license • Bond attachment • Civil penalties	$20.00

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
4. The state requires that installation instructions for the installation hardware (components) must be provided with hardware.
5. The state monitors performance of local inspectors responsible for installation inspections.
6. The state has programs to provide training to local inspectors responsible for installation inspectors.

TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
Utah 356 -1% or less	None	—	—	—	—	—	—	—	—
Vermont 852 -1% or less	None	—	—	—	—	—	—	—	—
Virginia 5861 2.6%	Dealers	• Business license	• Local building inspectors • State oversight • State may inspect at request of dealer, mfr., consumer	Yes	Yes	Yes	Permit application	• Misdemeanor • Referred to DMV	Set by local government
Washington 3873 1.7%	• Dealers • Installers	• Bond • License	Local building inspectors	Yes	Yes	Per local jurisdiction	Permit application	Violation of Consumer Protection Act	Permit fee set by local government

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
4. The state requires that installation instructions for the installation hardware (components) must be provided with hardware.
5. The state monitors performance of local inspectors responsible for installation inspections.
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TABLE 5-3

State Homes shipped to the state in 1987 Percentage of National Production	Who is Regulated By State?	How Are They Regulated?	Who Enforces or Inspects?	ARE THERE ANY STANDARDS?			How is the Installation Reported?	What Recourse or Penalties Available?	What Are Inspection or Permit Fees?
				Manufacturer's Installation Instructions	State Blocking Standards	State Tie-down Requirement			
West Virginia 3085 1.3%	None	____	____	____	____	____	____	____	____
Wisconsin 2198 -1% or less	None	____	____	____	____	____	____	____	____
Wyoming 125 -1% or less	None	____	____	____	____	____	____	____	____

1. The state laws refer to ANSI A-119 or NFPA 501 Installation Standards.
2. The state requires that only state approved installation hardware (components) must be used.
3. The state requires that set-up manual of each manufacturer of homes needs to provide a copy to the state for its files.
4. The state requires that installation instructions for the installation hardware (components) must be provided with hardware.
5. The state monitors performance of local inspectors responsible for installation inspections.
6. The state has programs to provide training to local inspectors responsible for installation inspectors.

Chapter 6

CHAPTER 6

CITY AND COUNTY SURVEY

I. INTRODUCTION

This chapter discusses NCSBCS' findings regarding city/county procedures of installation inspection and its effectiveness.

A. City and County Survey Process

NCSBCS sent approximately 275 survey questionnaires to various selected cities and counties in those 10 states that received home shipments of 8000 or more units in 1987. (See Appendix D for a list of states, cities, and counties.) The survey questionnaire was also sent to some of the cities/counties where NCSBCS conducted on-site investigations. NCSBCS received replies from approximately 50% of the cities and counties (126).

During the review of the state programs and on-site inspections by NCSBCS, it became apparent that regardless of what kind of state regulations exist, the city and county officials are generally responsible for installation inspections of the manufactured home. Therefore, information about city and county installation inspection programs was collected through a survey questionnaire.

The responses to the survey questionnaire were compared to observations made by NCSBCS engineers from the on-site inspections and general information provided by state and local inspectors, installers, and dealers. this revealed some contradictions between published and actual procedures of the cities and counties.

The responses to the survey questionnaire were tabulated and an analysis was made to reach general conclusions.

B. Purpose and Scope of the Survey

The purpose of the survey questionnaire was to collect information about administrative as well as technical aspects of the installation inspection programs. The questionnaire was divided into two sections. (See Appendix D for a sample questionnaire.) In Section A, questions 1-20 are related to the administration of local procedures. Section B, questions 1-10 are related to technical aspects of an installation inspection. For each question there were multiple answers.

The survey questionnaire was analyzed to help identify specific areas concerning the installation of manufactured housing, particularly the state and local process of installation. The survey included questions designed specifically for those states with regulations or those without regulations.

C. Analysis from the Surveys

The survey questionnaire was analyzed to get a general idea about the following:

- Relationship between state and local governments
- Local government ordinances and inspection procedures
- Inspection of various components during installation

II. CONCLUSIONS

A. Compilation of Answers to Survey

The list below provides a brief compilation of certain answers to the survey questionnaire. For a complete compilation, see Appendix D. The issues listed below have been rephrased from the questionnaire to focus

attention to the main answer, and a reference is given to the questionnaire's number. The percentage has been rounded to give a general conclusion.

1. Do the cities/counties have installation related ordinances of their own, over and above the state laws and regulations? (Question #3)

- 46% answered: YES.

2. Do these ordinances have specific requirements for piers and tie downs? (Question #4)

   - 47% answered: YES.

3. Does the city/county register or license manufactured home installers? (Question #5)

   - 71% answered: NO.

4. Who performs the installation inspection? (Question #6)

   - 85% answered: by county and city inspectors.

5. If city/county inspectors are performing the inspections, are such inspections being done under contract with states? (Question #7)

   - 84% answered: NO.

6. How many inspectors are involved in installation inspections in the city/county? (Question #8)

   - 71% answered: 5 or less inspectors
   - 56% answered: 3 or less inspectors
   - 19% answered: 1 inspector

7. How many manufactured home installation inspections are performed each month? (Question #9)

   - 78% answered: 50 or less homes per month
   - 63% answered: 25 or less homes per month
   - 33% answered: 10 or less homes per month

8. Does city/county feel there is a need to train inspectors for installation of homes? (Question #11)

   - 55% answered: NO.

9. How does city/county become aware of installation of manufactured homes? (Question #13)

   - 60% answered: by permit application or request by owner.

10. After the inspection is completed, what certification is provided to the homeowner? (Question #15)

    - 49% answered: Certificate of Occupancy
    - 25% answered: a label or decal

11. If the home installation is not acceptable, then what action can city/county take? (Question #18)

    - 98% answered, either the certificate of occupancy is withheld or utility services are stopped

Note: 47% give 30-60 days for repair and reinspection
37% give indefinite period for repair and reinspection

12. Does the city/county inspect the installation of homes against the manufacturer's set-up manual or other drawings approved by an engineer? (Question #20)

- 68% answered: YES

(Others use state standards or city or county ordinances for making inspections).

13. Does city/county inspect for the following technical categories? (Questions in Section B - 1 through 10)

• Piers	54% responded to all aspects
• Pier spacing	53% responded to all aspects
• Ground anchors	88% responded to all aspects
• Anchor spacing	79% responded to all aspects
• Multi-wide fastening	70% responded to all aspects
• Finishing at joints of multi-wide homes (roof and siding)	64% responded to all aspects
• Utility crossover in Multi-wide	79% responded to all aspects
• Site	86% responded to all aspects
• Construction zones of the house (wind zone, thermal zone and roof load zone from data plate)	60% responded to all aspects

Note: Many cities/counties did not complete the answers to all questions. It is assumed that cities/counties are not inspecting that aspect. Refer to Appendix D for complete compilation of responses.

B. Overall Conclusions

1. The city/county governments are generally not regulating (such as licensing and bonding) the dealers or installers. If an installation is found to be unacceptable, the homeowner is notified and an occupancy permit is withheld.

2. There are many cities/counties which do not have installation inspection programs. The percentage of such cities and counties could be 25% - 40%.

3. The city/county inspectors are not looking at all the key aspects of installation; therefore, the procedure (or checklist) needs to be improved.

4. The on-site inspections conducted by NCSBCS indicated that the city and county inspectors are often not able to recognize deficiencies even if they had procedures to follow (in those aspects where their procedures required inspection). Therefore, these inspectors need to be trained.

   There may be as many as 2,000 - 4,000 inspectors involved with installations in all the 50 states. Therefore, training all inspectors involved in installation would require substantial resources and coordination with local governments.

5. There is a great diversity in the local ordinances and regulations of installation of homes. The diversity may be one of the factors causing confusion and lack of compliance because installers generally work in more than one county or city.

6. There are some contradictions between the responses received through the survey questionnaire and the observations made by the NCSBCS engineers during the on-site inspection. The following are the main contradictions.

   a. Over 50 percent cities and counties responded that they inspect for ground anchors, tie-downs, piers, etc. However, the on-site inspections indicated that the city and county inspectors do not inspect many technical details. During each of the NCSBCS on-site inspections, the city/county inspectors failed to identify many obvious deficiencies in the installation of ground anchors and piers. This indicates that either the inspectors do not have adequate technical training or they are not putting adequate attention on inspection of ground anchors and piers during the inspections.

   b. Fifty-five percent of the cities or counties did not identify a need for additional training, however, NCSBCS observations during the on-site inspections indicated that a majority of the local inspectors would benefit from training programs.

   c. Sixty-eight percent of the cities and counties responded that the installation inspections are made using manufacturers installation instructions. However, none of the local inspectors used set-up manuals for making inspections in the NCSBCS on-site inspections.

The above contradictions were discussed with state agencies that monitor performance of local inspectors as part of their state programs. In their opinion, the local inspectors' work is not monitored and local inspectors are not provided with adequate training; therefore, local inspectors are not able to conduct effective inspections.

Chapter 7

CHAPTER 7

REVIEW OF CONSUMER COMPLAINT DATA AVAILABLE WITH STATES (SAAS)

I. INTRODUCTION

NCSBCS reviewed consumer complaint data available in its files sent by the 35 State Administrative Agencies (SAAs) to determine if consumer complaints are arising from improper installation of manufactured homes.

A. Consumer Complaint Data Collection Process

NCSBCS receives (through HUD) a list of consumer complaints received by the states. Currently only 24 states out of 35 are providing this information to HUD. For each home owner (consumer) complaining to the state about a HUD labelled manufactured home, the complaints are categorized in one or more of sixty categories listed in the complaint chart. For a sample of the chart, see page 7.5. The following 4 of the 60 categories contained in the complaint chart are directly related with installations:

- Set-up and leveling
- Connection to utilities
- Joining sections of multi-wide units
- Other installation

In addition to the four categories above, which are directly related to installation, there are many more which have an indirect relationship to installation. The indirect relationship between reported consumer complaints and installation is expressed in the chart on the following page.

CATEGORIES OF CONSUMER COMPLAINTS INDIRECTLY RELATED TO INSTALLATION

Categories of Consumer Complaint	Indirect Relationship to Installation
• Bottom board	Not repaired at the time of installation
• Defective doors	Home not level or door frame out of square, affecting the operation of the door
• Floor buckled or warped	Home not level or properly supported
• Floor (other - such as hump in floor)	Perimeter blocking not provided as required.
• Leaks - roof	Improper connection of the two halves in multi-section homes, absence of support at ridgebeam post in the marriage wall
• Window inoperative	Window frame out of square, home out of level
• Roof problems (such as hump in roof)	Absence of support at ridgebeam post on marriage wall in multi-section homes

NOTE: The above list is of only structural issues. Improper installation could affect plumbing, electrical, and heating and cooling of the house.

It should be further noted that the consumer complaint data sent by SAA represents only a fraction of all the consumer complaints (5-7% of complaints) received by dealers and manufacturers. This is because a majority of the complaints are either resolved by the dealer/manufacturer, or the unsatisfied consumer does not contact state agencies.

B. Scope and Method of Analysis

NCSBCS reviewed consumer complaint data of about 12 months submitted by 24 states (representing 72 percent of all homes in the country).

The consumer complaint categories were reviewed to determine what percentage of consumer complaints were directly related to the installation and those that were indirectly related to installation.

Since a statistically representative small sample of the consumer complaints were not inspected by NCSBCS or by SAA on site, an accurate and reliable analysis can not be made. However, the data and its general analysis is useful for arriving at general conclusions.

Thirty-five SAAs were contacted via telephone, and during field visits and asked if in their opinion a substantial number of consumer complaints arise from improper installations.

II. CONCLUSIONS

This section lists the correlation NCSBCS found between consumer complaints and installation of manufactured homes.

1. A review of the consumer complaint data (the four categories directly related to installation) indicates that about 25 to 30 percent of the complaints result from incorrect installation.

2. The review of the consumer complaint data of the remaining 56 categories and their indirect relationship to installation indicates that 50 to 60 percent of all consumer complaints result from incorrect installation.

3. Summary in various categories:

Category	Percent of all Consumer Complaints
Directly Related With Installation:	
Set-up and leveling (ISU)	18.5
Connection to utilities (IUC)	.5
Joining sections of multi-wides (IMP)	4.8
Indirectly Related With Installation: (some examples)	
Bottom board (SBB)	7.3
Floor buckled or warped (SFB)	15.0
Defective doors (SDD)	25.5
Inoperable windows (SWI)	12.5
Leaks - roof (SLR)	16.5
Drain and waste systems (PDW)	4.0

NOTE: It should be noted that one complaint generally has more than one category of complaint.

4. While the above conclusions indicate that a majority of the complaints may be directly and/or indirectly related with installation, this data does not show the impact of incorrect installation on overall durability and safety of the occupants. Additional study is required to make such an evaluation.

COMPLAINT CHART

U.S. Department of Housing and Urban Development
Office of Nuclear
Federal Housing Commissioner

Manufactured Housing Complaint Index

Item						
Structural						
Air Infiltration	SAI					
Bottom Board	SBB					
Ceiling Defective or Sagging	SCD					
Defective Doors	SDD					
Floors Buckled or Warped	SFB					
Floors - Other (specify)	SFO					
Leaks - Roof	SLR					
Leaks - Wall	SLW					
Leaks - Window	SLG					
Leaks - Other (specify)	SLO					
Roof Problems	SRP					
Running Gear Problems	SRG					
Siding - Warped/Defective	SSW					
Truss Failure	STF					
Wall Panel Buckled	SWB					
Wall Panels - Other Than Buckled (specify)	SWP					
Windows Inoperative	SWI					
Structural - Other (specify)	SOO					
Plumbing						
Drain and Waste System	PDW					
Freezing of Water Line	PFL					
Pipes	PPP					
Plumbing Leaks	PPL					
Sink Problems	PSP					
Toilet Problems	PTP					
Tub/Shower Problems	PTS					
Water Distribution System	PDS					
Water Heater	PWH					
Plumbing - Other (specify)	POO					
Electrical						
Dist. Panel/Circuit Breakers	EDP					
Light Fixtures	ELF					
Receptacles	ERP					
Switches	ESP					
Wiring	EWP					
Electrical - Other (specify)	EOO					
Heating/Cooling						
Air Conditioning Equipment	HAC					
Air Handling System (Supply & Return)	HDS					
Condensation in Ceiling	HCC					
Condensation in Walls	HCW					
Condensation in Windows	HCG					
Condensation - Other (specify)	HCO					
Furnace	HFP					
Gas Leaks	HGL					
High Heating Bills	HHB					
Inadequate Insulation	HI					
Miscellaneous Heating Appliances, e.g., Heat Pump, Solar Heating (specify)	HMA					
Thermostat	HTP					
Heating System - Other (specify)	HOO					
Fire Safety						
Fireplace	FFP					
Fires	FIR					
Smoke Detectors	FSD					
Fire Safety - Other (specify)	FOO					
Installation						
Set-Up and Levelling	IEU					
Connection to Utilities	IUC					
Joining Sections of Multiwide Units	IMP					
Other Installation (specify)	IOO					
Miscellaneous						
Defective Appliance	MDA					
Defective Appliance Hookup	MAH					
Formaldehyde Vapors	MFV					
Air Pollutants - Other (specify)	MAP					
Misc. - Other (specify)	MOO					

Chapter 8

CHAPTER 8

REVIEW OF INSTALLATION (SET-UP) MANUALS

I. INTRODUCTION

This chapter discusses NCSBCS' findings from the review of the set-up manuals.

The Federal Standards and Regulations (CFR 3280 and 3282) require that the home manufacturer must provide each home with a set-up manual which will have at least one method of installing the home.

A. Installation Manual Review Process

NCSBCS conducted a review of 9 out of approximately 130 set-up manuals for their compliance with the Federal Standards and Regulations. This selection was made to represent all the DAPIAs.

The 9 set-up manuals were reviewed against a checklist of 31 items to assure their compliance with the Federal Standard CFR 3280 and acceptable engineering practices. For a copy of the checklist see page 8.3.

The potential deficiencies were identified and such findings were sent to the DAPIA and manufacturers for their response and resolution. NCSBCS has not yet received all responses from the DAPIAs.

B. Purpose of the Review

The purpose of reviewing the set-up manuals was to determine the nature of potential errors and any lack of clarity which might lead toward improper installation if the set-up manual was to be used by the installers. To analyze a pattern in the citations, a matrix (chart) was prepared for all nine manuals reviewed, using the checklist of 31 items. See page 8.5.

II. CONCLUSION

A review of the 65 citations issued indicated the following main deficiencies:

1) Impracticable control of diagonal frame tie inclination
2) Incomplete multi-wide connection details
3) Incomplete bearing-shim/pier cap details
4) Inadequate notice of soil bearing requirements

The chart on the next page summarizes the potential errors/omissions discovered.

CHECKLIST FOR THE REVIEW OF MANUFACTURER'S INSTALLATION INSTRUCTIONS

ITEM NUMBER	ISSUE
_____	1. Blocking instructions for main rail I-beams.
_____	2. Blocking instructions for sidewall and marriage wall openings greater than 48" o.c.
_____	3. Perimeter blocking instructions, if required.
_____	4. Tie-down instructions and specifications.
_____	5. Supporting calculations of the tie-down system per the details in the manual.
_____	6. Details in the set-up manual regarding field installation of DWV pipes, particularly if the field installation includes several joints and directional fittings.
_____	7. Instructions for bottom board patching.
_____	8. Instructions that the mobile home has been designed for an inlet water pressure of 80 psi including a statement that when the mobile home is to be installed in an area where the water pressure exceeds 80 psi a pressure reducing valve should be installed.
_____	9. Installation instructions indicating that a cold water shut off valve is to be installed at the water supply inlet.
_____	10. Installation instructions indicating the pressure range for safe and effective operation of the gas piping system.
_____	11. Instructions as to the proper electric feeder conductor sizes for an approved masthead and/or raceway provided and the size of the junction box to used.
_____	12. Instructions for methods to be used to protect water pipes and fixtures from freezing.
_____	13. A statement that if heat tape is used to protect against pipes freezing it shall be listed for use with mobile homes.
_____	14. Instructions for connection and support of cross-over heating duct.
_____	15. Specification of ties: tie installed in accordance with certification. (Combined load?)
_____	16. Spacing of ties.

CHECKLIST FOR THE REVIEW OF MANUFACTURER'S INSTALLATION INSTRUCTIONS

ITEM NUMBER	ISSUE
_____	17. Control of incline of diagonal
_____	18. Footing specification
_____	19. Main footing and pier spacing
_____	20. Footing and pier spacing at the marriage line
_____	21. Details for securement to footings
_____	22. Details for installation of anchors
_____	23. Over-the-roof strap requirements
_____	24. Instructions for leveling/releveling and adjusting tension of the straps connecting ground anchors
_____	25. P.E. certification
_____	26. Reference to soil type for a given design of footings
_____	27. Placement of footings at a minimum depth below frost line
_____	28. Removal of organic soil below the footings
_____	29. Assembly of double-wide, (caulking, connections)
_____	30. Supporting calculations for connection of floor joist (double-wide) per approved detail
_____	31. Angular measurement of the strap

SUMMARY OF INSTALLATION INSTRUCTION NONCOMPLIANCES CITED PER CHECKLIST

[(X) Indicates that a Potential Deficiency was Discovered Under the Checklist Item #]

Checklist Item #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Design Package #1							X									X						X		X						X	X
Design Package #2					X																				X					X	X
Design Package #3																X					X	X		X		X				X	X
Design Package #4								X	X	X																X				X	X
Design Package #5					X			X																			X			X	X
Design Package #6																					X			X		X		X		X	
Design Package #7														X							X					X				X	X
Design Package #8																					X	X		X		X				X	X
Design Package #9					X				X			X									X				X					X	X

Chapter 9

Chapter 9

REVIEW OF COMPONENTS USED IN MANUFACTURED HOME INSTALLATIONS

(Emphasis on Ground Anchors)

I. INTRODUCTION

A number of components are used in the installation of manufactured homes. Some examples of these components follow: wood shims, metal stands, concrete masonry, blocks, straps and buckles, ground anchors, over the roof straps, etc.

For a proper installation, it is important that the following occurs:

- The components meet certain standards and are listed to assure durability and performance.

- The components are used according to the manufacturer's instructions and listing conditions.

A. Component Review Process

NCSBCS obtained from the various states the list of names and addresses of the manufacturers of ground anchors and straps and buckles. NCSBCS wrote letters to 21 manufacturers of components used in installation and requested that they provide NCSBCS with the following:

- Descriptive literature
- Installation instructions
- Test data

Appendix E contains the list of the manufacturers contacted by NCSBCS.

A majority of the manufacturers did not respond to the NCSBCS request. Those few who responded did not provide complete information. NCSBCS' engineers reviewed this data.

NCSBCS also reviewed a study by the National Bureau of Standards entitled, "Soil and Rock Anchors for Mobile Homes - A State-of-the-Art Report." That report contained some conclusions and recommendations about ground anchors. Excerpts from the study are provided in Appendix H.

NCSBCS also contacted states that regulate installation components to provide us with a list of the components acceptable to their states. A sample of the list from the State of Florida is provided in Appendix E.

B. Analysis from Review

To evaluate current practices, NCSBCS tried to collect technical information test data listing information from the manufacturers of the components. Discussions with SAAs and on-site inspections by NCSBCS indicated that emphasis needs to be placed on ground anchors and straps and buckles since a number of deficiencies were observed relating to these two components.

NCSBCS' concern was heightened as NCSBCS on-site inspections indicated that installation instructions for ground anchors and straps and buckles are not shipped with or provided at the point of sale of the hardware.

II. CONCLUSIONS

1. The following are the main conclusions about ground anchors.

   a. An examination of the test data provided by the few manufacturers and discussions with the states who regulate the components indicate that ground anchors are generally tested for pull-out using a force applied along the axis of the ground anchor.

      Therefore, applications of the ground anchors which allow diagonal straps to be aligned in directions other than along the axis of the ground anchors will not carry the load. Some ground anchor manufacturers recommend placing a poured in-place concrete collar around the anchor, if the anchor is not aligned with the axis of the strap. However, test data are not available to verify the performance of the anchors in such conditions. (No concrete collars were observed in the NCSBCS site inspections.)

   b. If a ground anchor is installed by drilling a hole in the ground and then backfilling the hole after installation of the ground anchor with compacted soil, this may provide significantly less capacity than desired. The tests have been generally done on ground anchors which were installed in soil by twisting rather than by excavating the soil.

   c. Since different types of ground anchors are required for different types of soil and their depth requirement may also depend upon the quality of the soil to develop the desired capacity, a uniform industry wide classification method to classify soils is needed. Along with this soil classification, charts need to be developed for the capacities for various depth and angle of the anchor in the ground. Using simple charts, the state or county/city inspector could assure conforming installation.

d. Test data are not available for studying the performance of ground anchors under cyclic load caused by wind gusts. Such testing should become a part of the ground anchor listing process.

e. If over the roof ties and diagonal frame ties share common ground anchor, the anchor capacity should be designed to resist the combined load. Generally, this aspect is not clearly identified in the home manufacturer's set-up manual and is overlooked by the installers.

2. The following are main conclusions about straps and buckles:

a. Different manufacturers recommend slightly different ways for the installation of straps. The variation generally relates to the placement of the buckle and its connections with the ground anchor. Unless these instructions are followed, the strap may not provide the desired capacity.

LIST OF APPENDICES

APPENDIX A	Selected Photographs from On-Site Inspections Indicating Main Deficiencies Observed
APPENDIX B	List of State Laws, Regulations, and Standards Information Collected by NCSBCS
APPENDIX C	Sample of Letters Sent to States, Requesting Information
APPENDIX D	List of Counties, Copy of Letter with Survey Questionnaire, and Summary Analysis of the Questionnaire
APPENDIX E	List of Component Manufacturers, Sample of Letter Sent, and Sample of Technical Information Obtained
APPENDIX F	Excerpts from Federal Standards Pertaining to Wind Storm Protection Requirements and Resolution Pertaining to Installation of Manufactured Homes
APPENDIX G	Correspondence
APPENDIX H	Excerpts from Reports Used for the Installation Study
APPENDIX I	NCSBCS A225.1

Appendix A

Appendix A

Selected Photographs

* Improper Drainage

* No Vapor Barrier

Photograph # 1

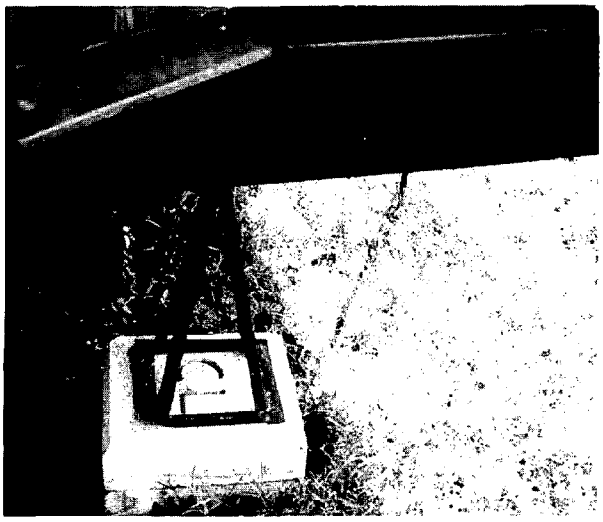
* Noncompacted Soil Underfooting

* Inadequate Protection Of Bearing Soil

Photograph # 2

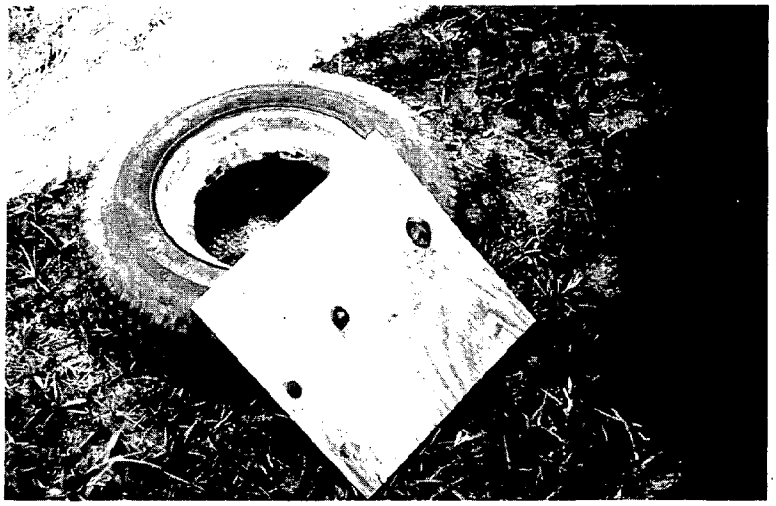
* Organic Material Under Footing

* Deteriorating Metal Stand



Photograph # 3

* Untreated Plywood Edges



Photograph # 4

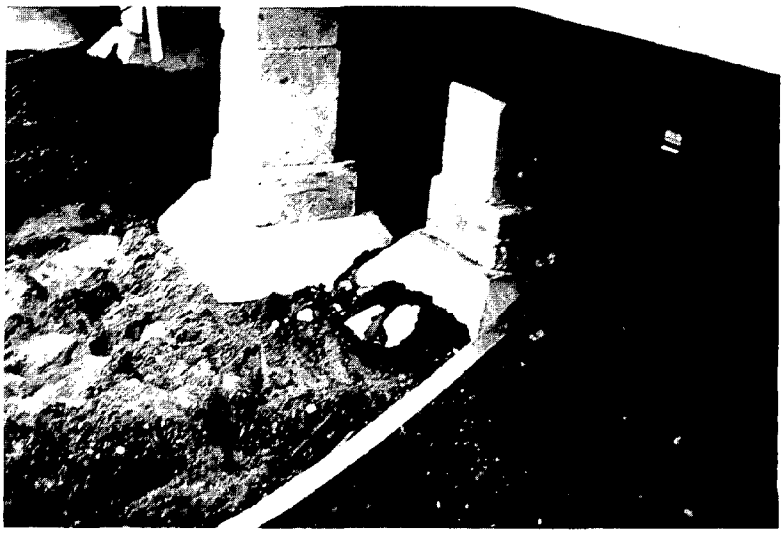
* 4" x 8" x 16" Footing Blocks Mis-Oriented To Frame

* Improper Cap

Photograph # 5

* Noncompacted Topsoil Underfooting

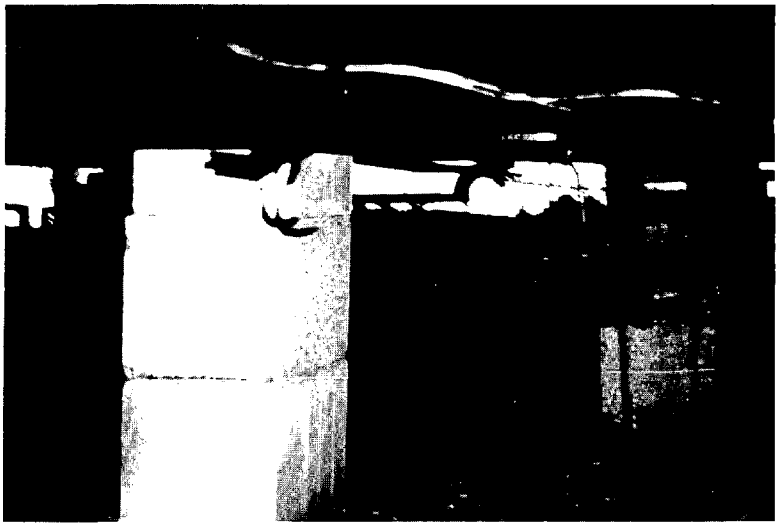
* Damaged & Undersized Footing



Photograph # 6

* Improper Cell Alignment

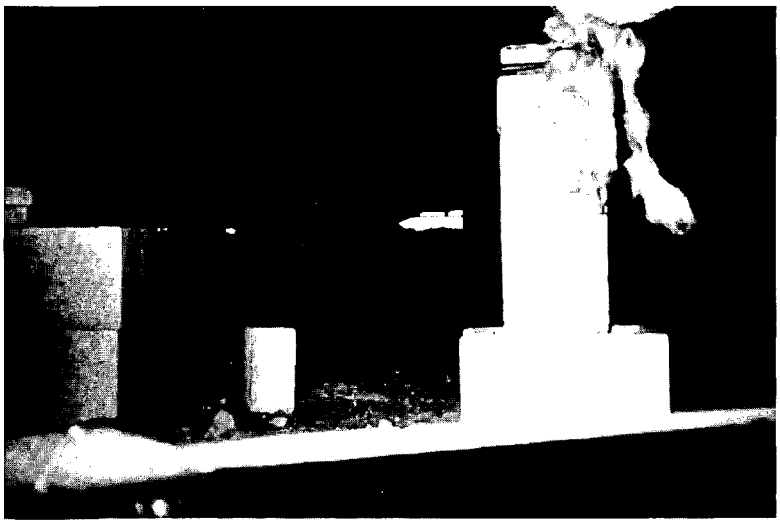
* No Footing Under Pier



Photograph # 7

* Improper Cell Alignment

* Absence Of Pier Cap



Photograph # 8

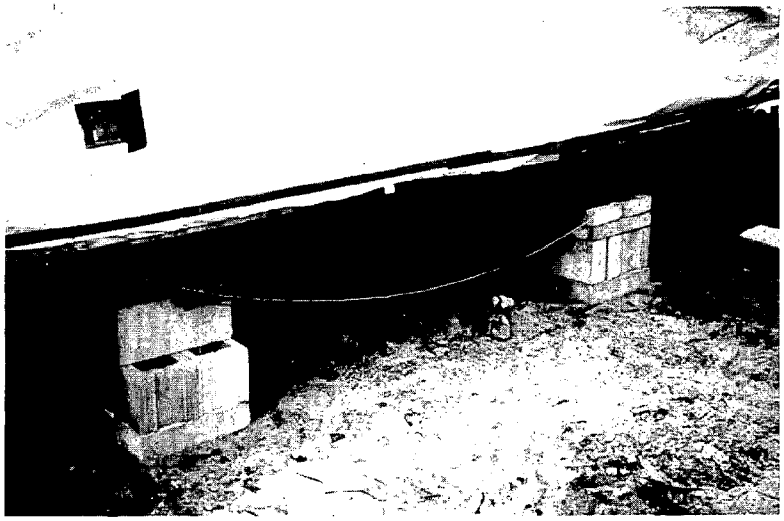
* Over Extended Adjusting Stud

* Flaking Protective Paint

Photograph # 9

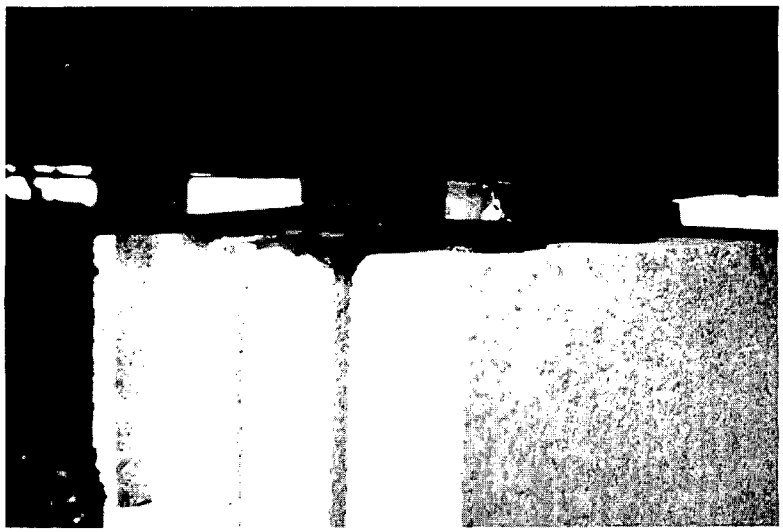
* Missing Solid Masonry Cap

* Mis-Oriented Footing Blocks



Photograph # 10

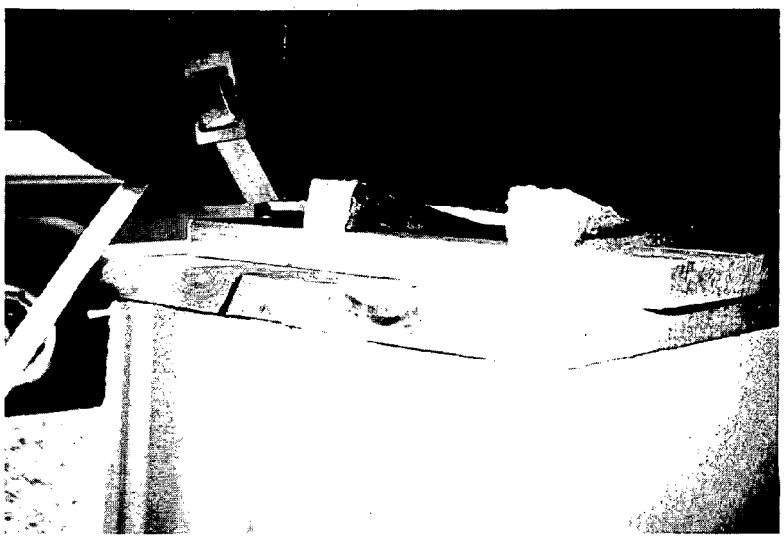
* Missing Pier Cap



Photograph # 11

* Improper Shimming (without a pair)

* Improper Frame Tie Buckle



Photograph # 12

* Perimeter Footings
  Not Below
  Frost Line

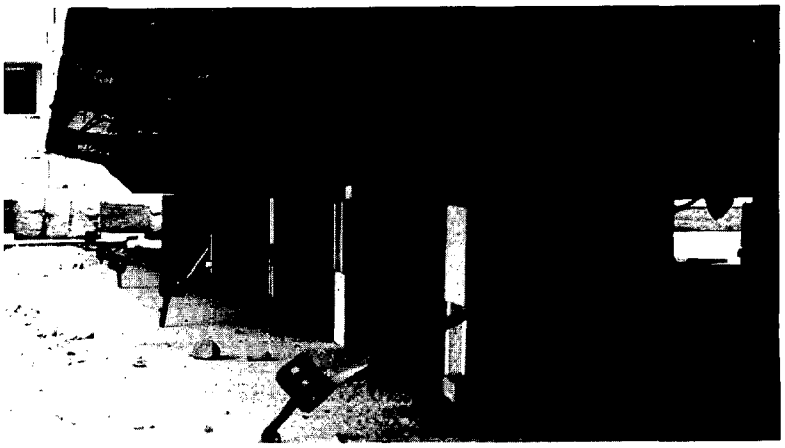
* Improper Location
  Of Piers

Photograph # 13

* Wrong Angle Of
  Anchor For Tie

Photograph # 14

* Wrong Angle Of
  Anchor For Tie



Photograph # 15

* Excessive Anchor Projection

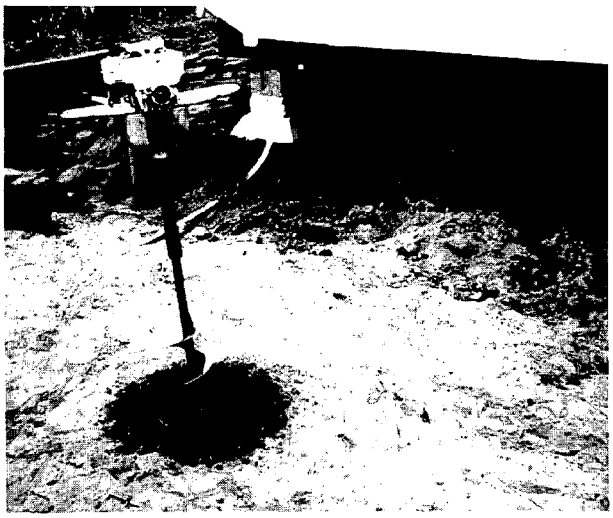
* No Vapor Barrier

Photograph # 16

* Predrilled Hole With Poor Soil Preparation

* Predrilled Hole Without Poured Concrete Collar

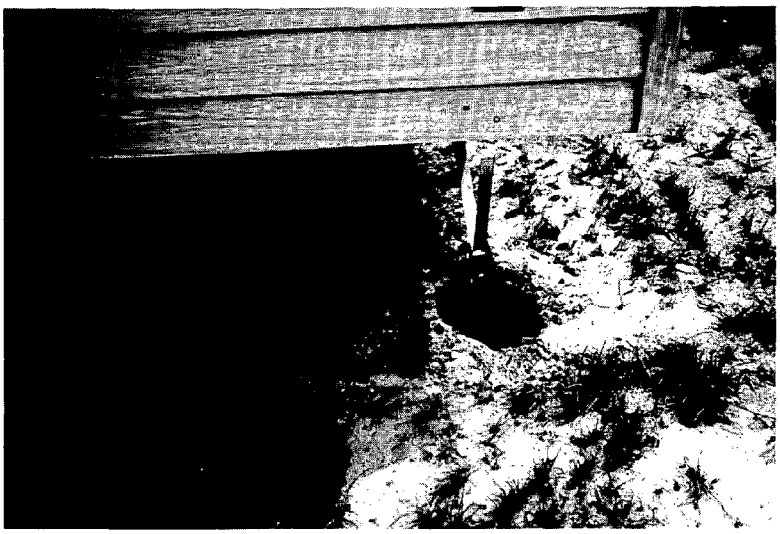
* No Vapor Barrier



Photograph # 17

* Predrilled Hole Without Poured Concrete Collar

* No Vapor Barrier



Photograph # 18

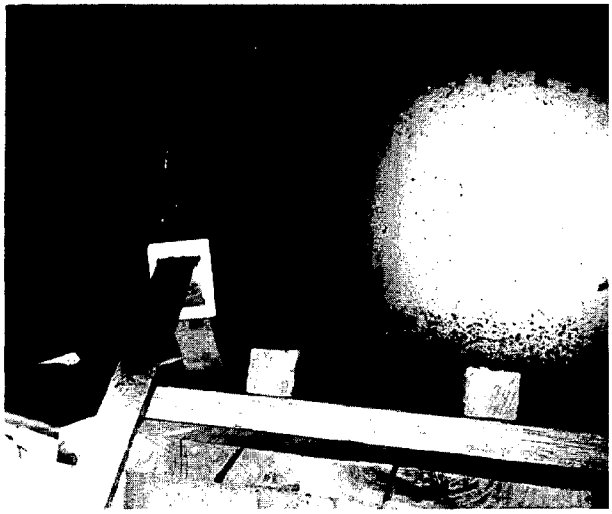
* Non-Compacted Backfill For Ground Anchor

* Buried Anchor Tie

Photograph # 19

* Improper Buckle Fastening

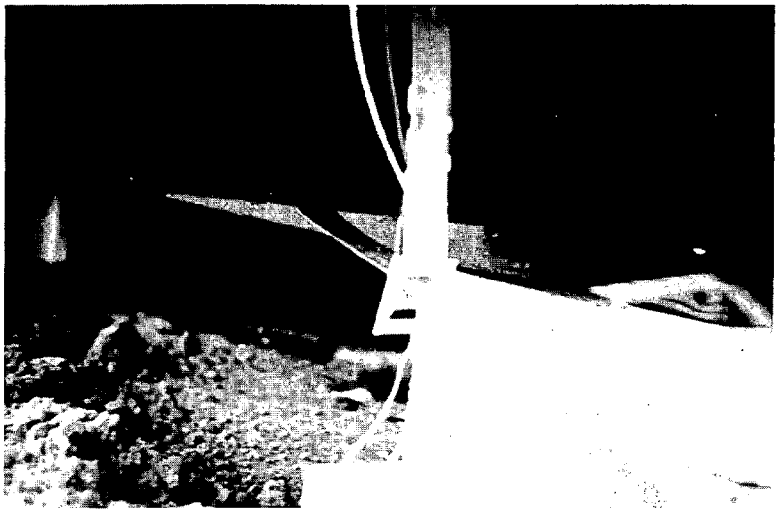
* Shimming Without A Pair



Photograph # 20

* Improper Buckle Fastening

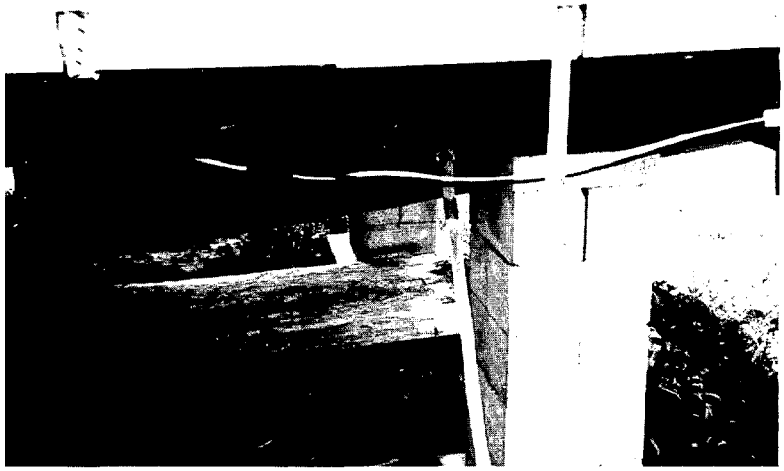
* I-Beam Not Bearing On Pier



Photograph # 21

* Improper Over-Top Tie

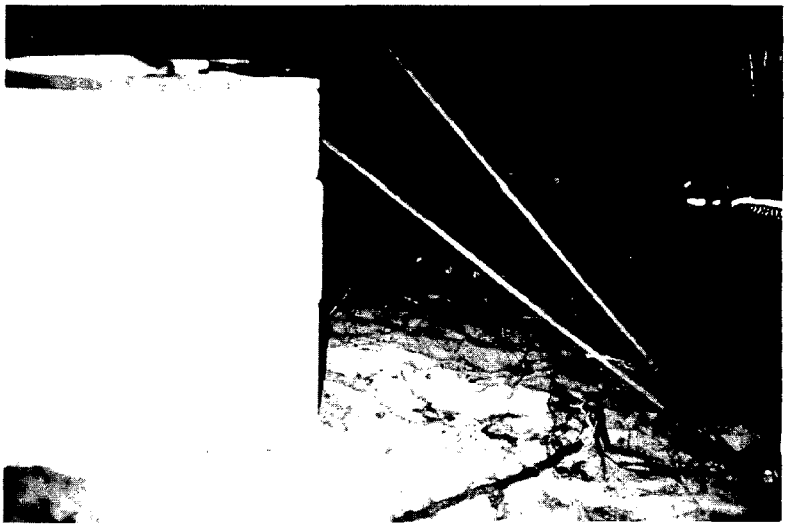
* Insufficient Number Of Screws



Photograph # 22

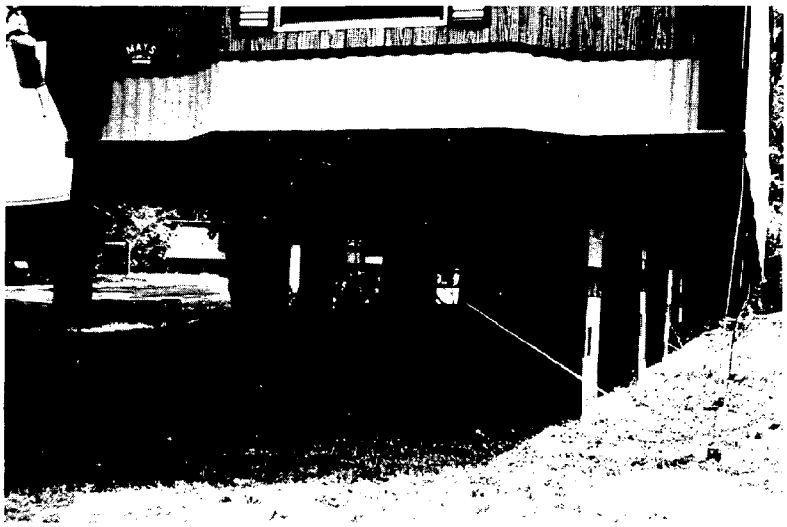
* Unacceptable Wrapping Of Frame Tie

* Poor Site Preparation



Photograph # 23

* Tie Downs Incorrectly Located Between Piers



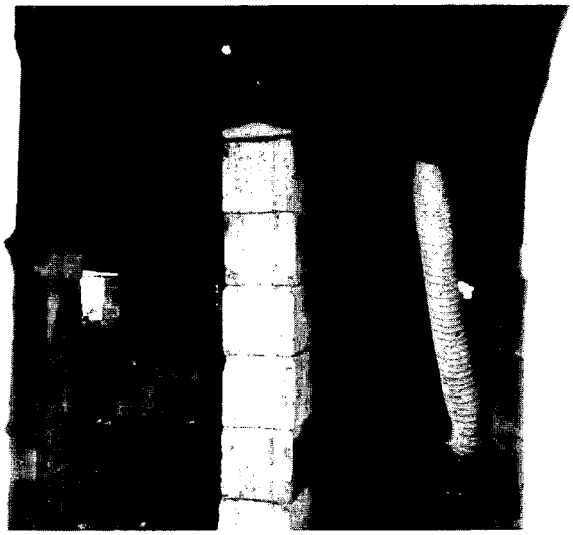
Photograph # 24

* Excessive Strap Angle

Photograph # 25

* Improper Pier Alignment To Marriage Wall

* Dryer Vented Beneath Home



Photograph # 26

Too Few Screws At Ridge Beam

Photograph # 27

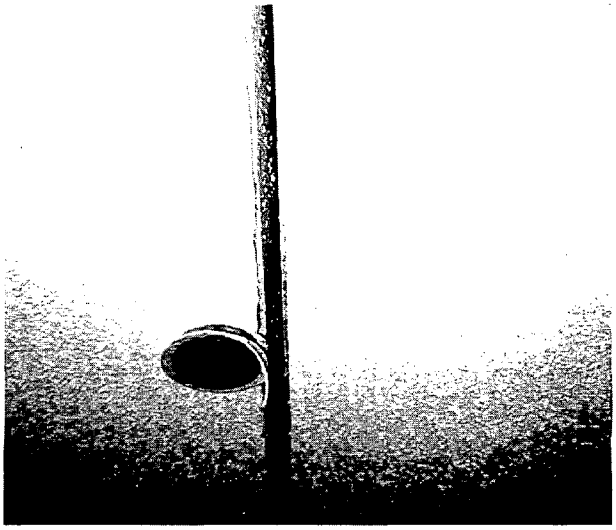
* Pier Not Under
  Column Support

Photograph # 28

* Halves Not Connected
  At Ridge Beam

Photograph # 29

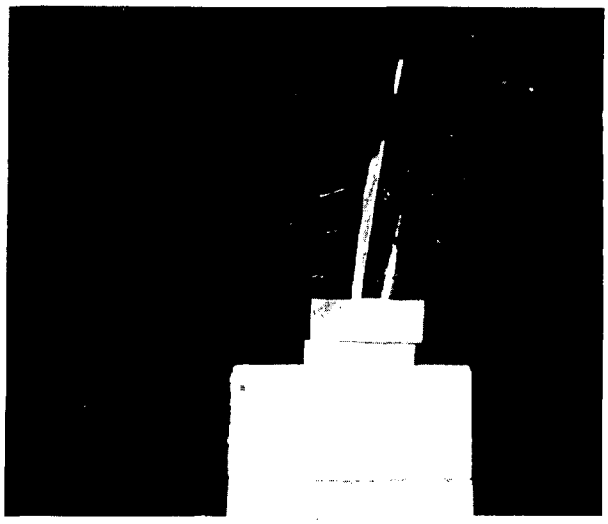
* Halves Not Connected
  At Ridge Beam



Photograph # 30

* Halves Not Connected At Floor

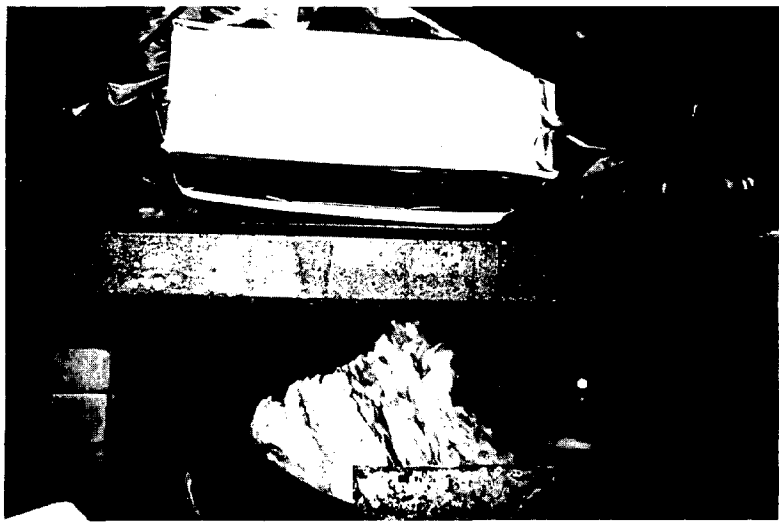
* Incorrect Wood Cap



Photograph # 31

* Uninsulated Floor Heat Duct

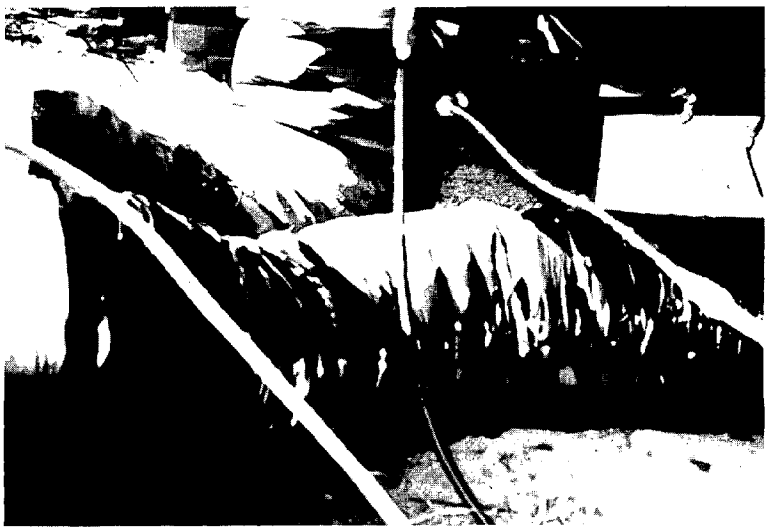
* Damaged Bottom Board



Photograph # 32

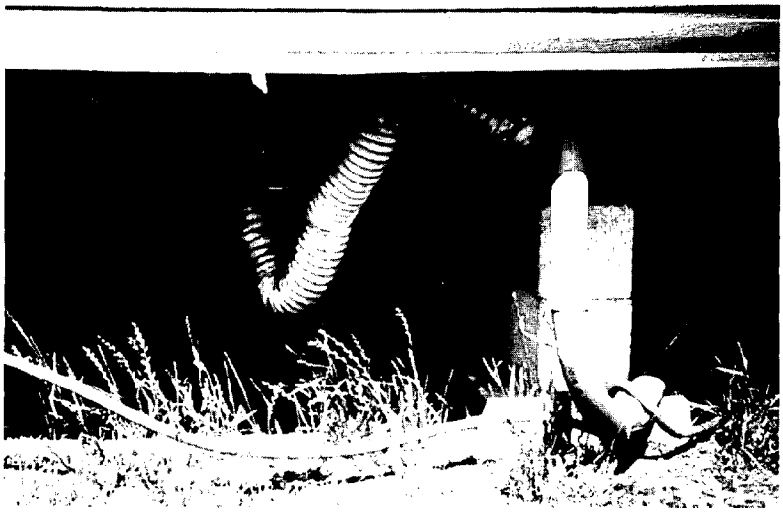
* Unsupported Duct

* Loose Gas Ground



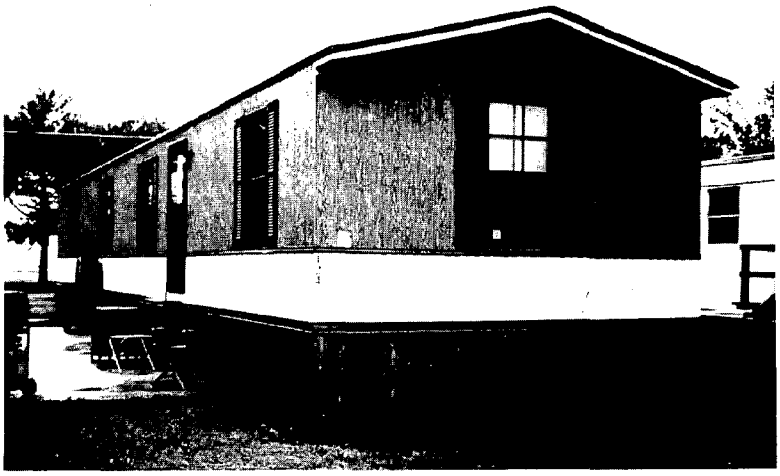
Photograph # 33

* Dryer Vented Under Home



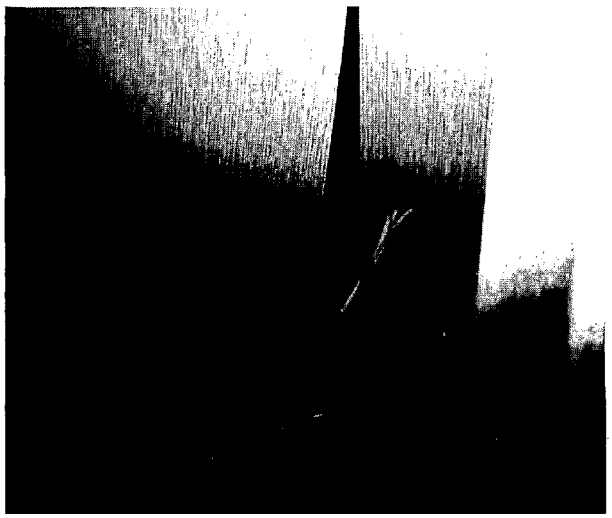
Photograph # 34

* No Ventilation In Skirting



Photograph # 35

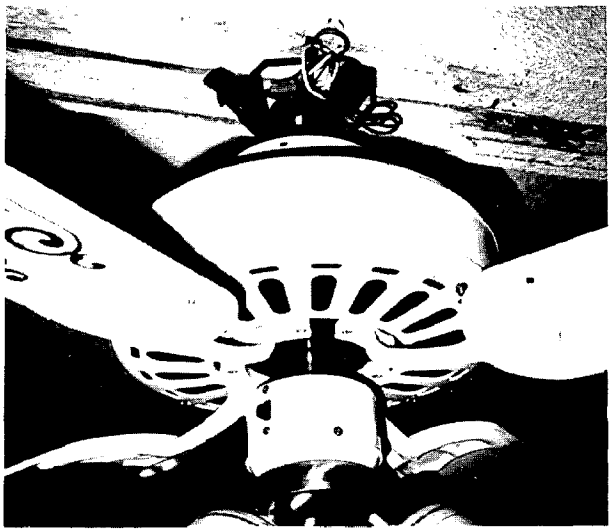
* Popped Interior Paneling



Photograph # 36

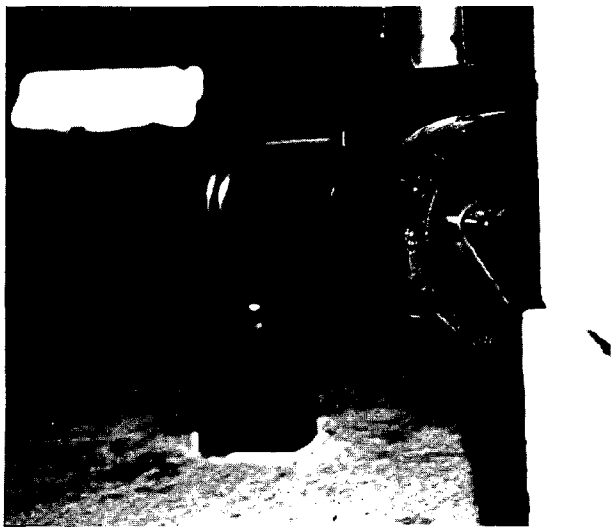
* Improper Installation

* Nonapproved Pan Cover



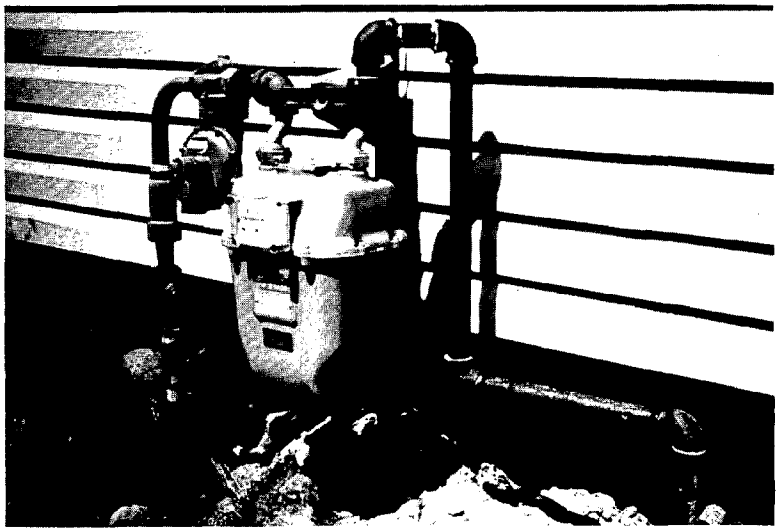
Photograph # 37

* Blocked Drain
  Clean Out



Photograph # 38

* Upsized Gas Line



Photograph # 39

Appendix B

APPENDIX B

LIST OF STATE LAWS, REGULATIONS, AND STANDARDS, ETC. COLLECTED BY NCSBCS REGARDING MANUFACTURED HOUSING

This list identifies what information was collected, the department having jurisdiction and the contact person.

Notes:

1. The actual information (copies of state statues and regulations) is being kept at NCSBCS headquarters because of the enormous volume of the information.

2. The information was sent by the states at NCSBCS' request in May 1988. It generally includes the legislation, regulations, and standards affecting all aspects of the manufactured housing industry in that state. Installation related information is part of the information collected.

3. Twenty-one states do not appear to have any regulations (based on the letters or phone conversations).

4. Seven states did not provide any written information. For these states some key information was collected by telephone contact.

5. The list also contains state's letters to NCSBCS regarding their main problems, general concerns regarding installation of homes. It also contains some other relevant data received from few counties within that state.

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
1. **Alabama** Department of Insurance Fire Marshall Div. Mr. Harold Hendricks	1. Statute (Act #1144 S.219 1975) "Uniform Code for the Anchoring of Mobile Homes Act." 2. Rules and Regulations 3. Consumer Complaint Form 4. 1988 Draft of Proposed Legislation
2. **Alaska** Office of the Attorney General Mr. Robert E. Mintz	1. Statute (Mobile Home Warranty Act, Chapter 30, Section 45.30.011) Mobile Homes and Mobile Home Parks
3. **Arizona** Dept. of Building and Fire Safety Mr. George Kiefer	1. Statute (Arizona Revised Statutes) Title 41 Chapter 16, Articles, 1,2,3,4) 2. Chapter 34 Board of Manufactured Housing 3. Suggested methods of complying with Mobile Manufactured Installation Standards 4. Inspection Time Sheet 5. Inspection Record 6. Installation Insignia Report 7. Form Letters 8. Installation Investigation Letter 9. Report of Installation Investigation 10. Installation Permit Application
4. **Arkansas** Arkansas Manufactured Home Commission Ms. Mary Beth Bowman	1. Arkansas Installation and Anchoring 2. 2-15-88 Letter to NCSBCS from Ms. Bowman
5. **California** Department of Housing and Community Development Division of Codes & Standards Mr. Jim McGowan	1. Statute (California Health and Safety Division 13, Part 2.1, Mobile Home Parks Act. 2. California Code of Regulations, Title 25 Chapter 2. 3. Mobile Home Installations Guide 4. Installation Acceptance Forms HCD 513A - issued by Dept. HCD 513B - issued by local jurisdiction HCD 513C - Foundation System Acceptance 5. Inspection Forms 6. 6-28-88 Letter From Jim McGowan

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
6. **Colorado** Division of Housing Les Tingle	1. Colorado does not appear to have state-wide regulations pertaining to installation of manufactured housing. 2. Information was gathered from telephone contact.
7. **Connecticut** Office of the Attorney General Professional Licensing Division Mr. Robert Hurley	1. Statute (Title 21, Ch. 412) Mobile Manufactured Homes and Mobile Manufactured Home Parks, Park Owners and Residents. 2. 8-8-88 letter from John Charters.
8. **Delaware** Office of the Attorney General Ms. Marjorie Homiller Kent County, Mr. Mike Thompson	1. Delaware does not appear to have state-wide regulations pertaining to installation of manufactured housing. 2. Information was gathered from telephone contact. 3. Kent County Delaware Housing Code 4. Anchoring & skirting requirements 5. Mobile Home Checklist 6. 1-7-87 letter from John Wilson to Robert O-Brien
9. **Florida** Department of Highway Safety and Motor Vehicles Mr. Buck Jones Mr. Orville Cummings Hillsborough County Mr. David H. Jones Taylor County Mr. Luther Gunter	1. Statute (F.S. 1985, Ch. 320, Ch. 205) 2. Rules of DHSMV, DMV, Chapter 15C-1.10 3. List of approved component manufacturers 4. Information booklet pertaining to mobile homes and recreation vehicles. 5. Hillsborough County Building Code ordinance No 86-6. 6. Hillsborough County Notice of Violation 7. 4-15-88 letter to NCSBCS from Orville H. Cummings, Deputy Chief 8. 4-12-88 letter to NCSBCS from Luther Gunter Jr., Building Official. 9. 4-12-88 letter to Buck Jones, Chief
10. **Georgia** Office of Comptroller General Tom Eberhart	1. Georgia does not appear to have state-wide legislation pertaining to the installation of manufactured housing. 2. Information was gathered by telephone contact. 3. 11-30-88 letter to NCSBCS from Earl A. Ferguson.

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
11. **Idaho** Tom Fica	1. Idaho does not appear to have state-wide regulation pertaining to the installation of manufactured housing. 2. Idaho does have legislation which will be implemented 1/1/89 (copy not available) 3. Information was gathered by telephone contact.
12. **Illinois**	1. Illinois does not appear to have state-wide regulation pertaining to the installation of manufactured housing. 2. Information was gathered by telephone contact.
13. **Indiana** Indiana Department of Fire and Building Services Al Haboush	1. Statute (675 IAC 14-3) 2. Findings of inspection investigation for consumer complaint 3. 7-13-88 letter to NCSBCS from Al Haboush
14. **Iowa** Iowa Department of Public Safety C.E. Peter Green	1. Statute (IA 103A-1, "State Building Code Act." 2. Rules & Regulations 680-16.621 3. Iowa Manufactured Home Installation Certificate. 4. 4-7-88 letter to NCSBCS from Mr. Green
15. **Kansas** Office of the Attorney General Teresa Nelson	1. Statute (Kansas Consumer Protection Act) 2. Rules and Regulations 75-1211 Mobile Home and Recreational Vehicle Code
16. **Kentucky** SAA Administrator Les Westerfield	1. Copies of regulations were provided. 2. Information was gathered by telephone contact.

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
17. **Louisiana** Department of Public Works State Statute Not Provided Parrish of East Baton Rouge James Kidd P.E. Building Official Gene Admire	1. Louisiana does not have state-wide regulation pertaining to the installation of manufactured housing. 2. City of Baton Rouge a. Elevation requirements for permits in flood prone area. b. Mobile home tie down requirements c. Relocation of m/h single family residence d. Plot plan form e. Anchoring to resist flotation collapse or lateral movement f. City inspection form g. Application for certificate of occupancy h. Application for building permit
18. **Maine** Manufactured Housing and Department of Professional and Financial Regulation Mr. David Preble	1. Copies of regulations pertaining to the installation of manufactured housing were not provided. 2. Information was gathered by telephone contact.
19. **Maryland** Department of Housing and Community Development Mr. Kanti Patel	1. Stability (Title 05 Dept. of Housing and Community Development Subtitle 02, Chapter 04 Industrialized Building and Mobile Homes) 2. 7-8-88 letter to NCSBCS from Kanti Patel
20. **Massachusetts** Charles Dinezio John McCarthy	1. Copies of regulations pertaining to the installation of manufactured housing were not provided. 2. Information was gathered by telephone contact.

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
21. **Michigan** Steve Zamiara	1. Statute (P.A. 96 of 1987, as amended) "Mobile Home Commission Act." 2. Michigan Mobile Home Commission Rules 3. "The Mobile Home Installer and Repairer in Michigan." 4. Instructions Installer/Repairer License 5. "The Mobile Home Installer and Repairer in Michigan." 6. "The Mobile Home Buyers & Residents Handbook." 7. Application for mobile home dealer-broker-installer 8. 7-25-88 letter to NCSBCS
22. **Minnesota** Department of Administration Richard I. Hauck	1. Statute (Minnesota Statutes 1982) "Manufactured Home Building Code" 2. Building Officials Manufactured Home Installation Information 3. Department of Administration State Building Code, Manufactured Homes, Chapter 1350 4. State of Minnesota Support System Seal 5. State of Minnesota Anchoring System Seal 6. Minnesota Mobile Home Installation Inspection and Correction Notice 7. Minnesota Repair Notice (Red Tag) 8. Minnesota Reinspection Notice 9. 4-6-88 letter to NCSBCS from Richard I. Hauck
23. **Mississippi** Office of Fire Marshall Mr. Jerry Black	1. Statute (17 Miss. Supp. Law, 1979, Ch. 3125, 75-49-7) 2. Rules and Regulations for the Mobile Home Division of the State Fire Marshal's Office for Factory
24. **Missouri** SAA Administrator Mr. Ed. Klein	1. Copies of the statute not provided. 2. "Mobile Homes Challenges for Today and Tomorrow." This contains references to the statutes.

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
25. **Montana** Montana Building Codes Advisory Council Mr. Delmont Thurber	1. Montana does not appear to have state-wide regulations pertaining to the installation of manufactured housing. 2. Information was gathered by personal contact.
26. **Nebraska** Office of Housing and Environmental Health Mr. Mark Luttich	1. Statute (Article 46 Manufactured Homes Recreational Vehicles, and Mobile Home Parks
27. **Nevada** Nevada Department of Commerce Manufactured Housing Division Ms. Joan Clements	1. Statute (Chapter 489, Mobile Homes and similar vehicles) 2. Statute (Chapter 461, Manufactured Buildings) 3. Statute (Chapter 461A, Mobile Homes and Parks) 4. Statute (Chapter 118B Landlord and Tenant Mobile Home Parks) 5. 8-3-88 letter to NCSBCS from Joan Clements
28. **New Hampshire** Office of the Attorney General Consumer Protection and Anti-trust Bureau Ms. Gyda DiCosola	1. Listed Statute (RSA No. 47:22-a) "Powers of City Councils" 2. Listed Statute (RSA No. 47:22-b) "Foundations." 3. 10-28-88 letter to NCSBCS from Gyda DiCosola.
29. **New Jersey** Department of Community Affairs Mr. Paul Sachdeva Mr. Butch D'Amore	1. Copies of statute were not Provided 2. Notice to general contractors, sub-contractors, homeowners regarding required inspections
30. **New Mexico** Manufactured Housing Division Mr. John Wilson	1. Statute (New Mexico Manufactured Housing Act & Regulations 2. "Homeowners Guide to Manufactured Housing in New Mexico 3. Installation Inspection Form 4. Correction Notice Form 5. Consumer Complaint Inspection Form 6. Closing File Statement 7. Inspection Permit 8. 4-22-88 letter to NCSBCS from John Wilson

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
31. **New York** Housing & Building Codes Bureau Div. of Housing & Community Renewal Mr. Fred Kissner	1. Copies of statute were not provided. 2. "Developer's Guide Economic Development City of Rochester
32. **North Carolina** Department of Insurance	1. Statute (General Statutes of North Carolina, Chapter 143, Articles 1 to 20) 2. State of North Carolina Regulations for Mobile Homes & Modular Housing 3. Bulletin No. 87-L-10 Changes in Manufactured Housing Set-up Regulations 4. 5-5-88 letter to NCSBCS from John McClancey
33. **North Dakota** Office of Attorney General Mr. Terry Adkins	1. North Dakota does not appear to have state-wide regulations pertaining to installation of manufactured housing. 2. 7-6-88 letter to NCSBCS from Terry Adkins
34. **Ohio** Office of Attorney General Ms. Vicki Lucas	1. Ohio does not appear to have state-wide regulations pertaining to installation of manufactured housing. 2. Information was gathered by telephone contact.
35. **Oklahoma** Office of Attorney General Mr. Jamie Davis	1. Oklahoma does not appear to have state-wide regulations pertaining to the installation of manufactured housing. 2. Information was provided by telephone contact.
36. **Oregon** Building Codes Agency Patrick Lewis	1. Statute (Chapter 814, Division 23, Section 900) 2. "State of Oregon Installation Requirements" 3. "Manufactured Home Hookups for Plumbing" 4. "Manufactured Home Hookups for Electrical

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
37. **Pennsylvania** Division of Manufactured Housing Mr. John Smoke	1. Statute Not Provided 2. "Inventory and Analysis of Selected State Guidelines for Manufactured Housing Installation, Dealer Licensing, and Enforcement" 3. "Planning for the Mobile Home & Advisory Document."
38. **Rhode Island** Office of State Building Commissioner Mr. Joe Marciano	1. Copies of statute were not provided. 2. Information was gathered by telephone contact.
39. **South Carolina** Building Codes and Regulatory Services Ms. A.R. Youmans	1. South Carolina does not appear to have state-wide regulations pertaining to the installation of manufactured housing. 2. Information was provided by telephone contact.
40. **South Dakota** Division of Commercial Inspection & Regulation Mr. Jim Melgaard	1. South Dakota does not appear to have state-wide regulations pertaining to the installation of manufactured housing. 2. Information was provided by telephone contact.
41. **Tennessee** Department of Commerce and Insurance Division of Fire Prevention Mr. David H. Borum	1. Statute (Tennessee Code Annotated Title Title 68, Chapter 45, Manufactured Home Anchoring) 2. Rules of Tennessee Department of Commerce and Insurance Chapter 0780-2-5 Stabilizing of Manufactured Homes 3. Blocking Standards 501-A "Part 4 Mobile Home Site Facilities 4. 4-21-88 letter to NCSBCS from David Borum
42. **Texas** Texas Department of Labor and Standards Mr. Harry Christensen City of Pasadena Mr. Jack Moore	1. Statute (Article 5221F) Texas Manufactured Housing Standards Act 2. Manufactured Housing Rules, Chapter 69 3. Installation Inspection Reporting Form 4. Monthly Installation Summary Report 5. Contract and Agreement for Local Inspection of Manufactured Housing 6. Pasadena Code of Ordinances, Chapter 21 7. 4-15-88 Memo to H. Christensen from B. Peterman

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
43. **Utah** Contractor's Division Mr. Ed. Short	1. Utah does not appear to have state-wide regulations pertaining to the installation of manufactured housing. 2. Information was provided by telephone contact.
44. **Vermont** Office of Attorney General Consumer Assistance Program Jay Ashman	1. Vermont does not appear to have state-wide regulations pertaining to the installation of manufactured housing. 2. Information was provided by telephone contact.
45. **Virginia** Department of Housing and Community Development Mr. Curtis McIver	1. Statute (1981 Virginia Uniform Building Code) 2. Virginia Industrialized Building Law Information Bulletin 10-74 3. 4-18-88 letter to NCSBCS from Curtis McIver
46. **Washington** Department of Labor and Industries Mr. James Arvan	1. Statute (Substitute House Bill No. 1690 2. RCW 43.22.340 through RCW 43.22.490 3. Chapter 296-150B WAC Standards for Mobile Homes, Commercial Coaches, and Recreational Vehicles 4. Application for requested inspection 5. "Typical manufactured housing set-up problems." 6. 5-3-88 letter to NCSBCS from James Arvan
47. **West Virginia** State Fire Marshall Walter Smittle, III	1. West Virginia does not appear to have state-wide regulations pertaining to the installation of manufactured housing. 2. Information was provided by telephone contact.
48. **Wisconsin** Department of Industry Labor and Human Relations Mr. Grant Turner	1. Statute Not Provided 2. Consumer Complaint Forms and Follow-up Form Letters

INFORMATION COLLECTED

State, Department Having Jurisdiction	List of Information
49. **Wyoming** Department of Fire Prevention and Electrical Safety Mr. Gary Bare	1. Statute (House Bill No. 0057, Enrolled Act No. 66) 2. 7-12-88 letter to NCSBCS from Gary Bare

Appendix C

APPENDIX C

Sample of Letters Sent to States for Getting Information

NCSBCS sent requests for information about administration, inspection and enforcement procedures to the nineteen states that responded with a positive answer to the 1987 Task Force questionnaire.

1. Arizona
2. Arkansas
3. California
4. Colorado
5. Florida
6. Iowa
7. Kentucky
8. Maine
9. Minnesota
10. Missouri
11. Nevada
12. New Jersey
13. New Mexico
14. North Carolina
15. Rhode Island
16. Tennessee
17. Texas
18. Virginia
19. Washington

NCSBCS also sent a request letter to the states that responded with a negative answer to the 1987 Task Force questionnaire and to the non-SAA states.

SAA STATES

1. Alabama
2. Georgia
3. Idaho
4. Indiana
5. Louisiana
6. Maryland
7. Michigan
8. Mississippi
9. Nebraska
10. New York
11. Oregon
12. Pennsylvania
13. South Carolina
14. South Dakota
15. Utah
16. Wisconsin

NON-SAA STATES

1. Alaska
2. Connecticut
3. Delaware
4. Hawaii
5. Illinois
6. Kansas
7. Massachusetts
8. Montana
9. New Hampshire
10. North Dakota
11. Ohio
12. Oklahoma
13. Vermont
14. West Virginia
15. Wyoming

NCS BCS

National Conference of States on Building Codes and Standards, Inc.
481 Carlisle Drive, Herndon, Virginia 22070 (703) 437-0100
Fax: (703) 481-3596

Letters Sent to SAA States That Indicated in the Task Force Questionnaire 1987 that they had an Installation Program (April 1, 1988) and Those that Did Not Respond to Task Force Questionnaire 1987 (May 20, 1988)

April 1, 1988

SAA Administrator
Address

Dear _____:

The Department of Housing and Urban Development (HUD) has requested that NCSBCS collect data with respect to regulation of manufactured housing installation. NCSBCS has been asked to study the current state programs, review the installation manuals and conduct limited site inspections to document the impact of the installation methods and procedures on the performance and durability of manufactured housing. The study, when completed, will be shared with the State Administrative Agencies (SAAs). Hopefully, this will be possible during the upcoming SAA seminars.

It is my understanding that your state has laws and regulations, along with inspection systems, affecting the installation of the manufactured homes within your state boundaries. For the study of the manufactured housing installation and regulation practices to be complete and meaningful, we need your assistance and help. I will appreciate if you can, at your earliest convenience, send us the following:

1. A copy of your applicable statute and installation inspection procedures.

2. Inspection forms.

3. Alternate enforcement options, such as municipal or county inspection contracts.

4. Results of any studies made to evaluate the impact of the installation on consumer complaints.

5. A list of typical problems found by your inspectors in your area.

6. A list of concerns about installation manuals, manufacturer/dealer/installer relationships.

7. A copy of training aids developed by your state regarding installation of homes.

If you do not have all of the above information readily available, please send us what you can.

I have assigned Pat Katon, who has extensive experience in this area, as Project Engineer to collect this data. She will be contacting you or your designee in the next few weeks to get additional information. She may also arrange for a few on-site inspections in your area. Please let us know if you have some good examples of typical problems. Mike Werner, Manager of Design Review Evaluation Services, at NCSBCS will be the Project Manager and will be reviewing the installation manuals.

If you have any questions, please contact Ms. Katon at (703) 437-0100. Thank you for your cooperation.

Sincerely,

Shyam Choudhary, P.E.
Assistant Director, Chief Engineer
Manufactured Homes/Codes and Standards

SC/PK/mb

cc: Bob Fuller
Sam Hacopian
Al Brantley
Rick Roberts
Mike Werner

NCS BCS

National Conference of States on Building Codes and Standards, Inc.
481 Carlisle Drive, Herndon, Virginia 22070 (703) 437-0100
Fax: (703) 481-3596

Letters Sent to SAA States With Negative
Response to 1987 Task Force Questionnaire

May 20, 1988

SAA Administrator
Address

Dear _____:

The Department of Housing and Urban Development (HUD) has requested that NCSBCS collect data with respect to regulation of manufactured housing installation. NCSBCS has been asked to study the current state programs, review the installation manuals and conduct limited site inspections to document the impact of the installation methods and procedures on the performance and durability of manufactured housing. The study, when completed, will be shared with the State Administrative Agencies (SAAs). Hopefully, this will be possible during the upcoming SAA seminars.

Based on your response to the March 1987 NCSBCS Task Force on Federal Manufactured Housing Program questionnaire, it is our understanding that your state does not have laws, regulations, or inspection systems addressing the installation of the manufactured homes within your state boundaries.

For the study of manufactured housing installation and regulation practices to be complete and meaningful, we need your assistance and help.

The information most helpful to this project is covered by the following questions:

1. Has the nature of your state's participation in the Federal Manufactured Housing Program been altered within the last 18 months?

2. If so, how?

3. Does your state have proposed legislation regarding manufactured housing installation that will convey enforcement authority to state or local jurisdiction?

4. If so, please tell us about it.

5. Many consumer complaints seem to have arisen from the apparent improper installation of manufactured homes. Does your state currently have a recourse process for consumers with manufactured housing problems?

6. If so, please describe.

7. As part of a consumer complaint inspection, what aspects of installation are inspected?

8. If so, what aspects are inspected?

9. What comments or recommendations would you like to make regarding HUD's concerns about the installation aspect of manufactured housing?

I would appreciate a brief narrative and a copy of any inspection and administrative control forms from you addressing the above.

I have assigned Pat Katon, who has extensive experience in this area, as Project Engineer to collect this data. She may be contacting you or your designee in the next few weeks to get additional information. She may also arrange for a few on-site inspections in your area. Please let us know if you have examples of typical problems. Michael Werner, Manager of Design Review Evaluation Services, at NCSBCS is the Project Manager.

If you have any questions, please contact Ms. Katon at (703) 437-0100. Thank you for your cooperation.

Sincerely,

Shyam Choudhary, P.E.
Assistant Director, Chief Engineer
Manufactured Homes/Codes and Standards

SC/PK/mb

cc: Bob Fuller
Sam Hacopian
Hyder Jinnah

NCS BCS

National Conference of States on Building Codes and Standards, Inc.
481 Carlisle Drive, Herndon, Virginia 22070 (703) 437-0100
Fax: (703) 481-3596

Letters Sent to SAA States That May Have Installation Standards

May 20, 1988

SAA Administrator
Address

Dear _____:

The Department of Housing and Urban Development (HUD) has requested that NCSBCS collect data with respect to regulation of manufactured housing (mobile homes) installation. NCSBCS has been asked to document the impact of the installation methods and procedures on the performance and durability of manufactured housing by doing the following:

- Studying the current state programs
- Reviewing the installation manuals
- Conducting limited site inspections

The completed study will be shared with the State Administrative Agencies (SAAs). Hopefully, this will be possible during the upcoming SAA seminars.

Your state may have laws and regulations, along with inspection systems, affecting the installation of the manufactured homes within your state boundaries. For the study of manufactured housing installation and regulation practices to be complete and meaningful, we need your assistance.

Please send us the following information:

1. A copy of your applicable statute and installation inspection procedures

2. Inspection forms

3. Alternate enforcement options, such as municipal or county inspection contracts

4. Results of any studies made to evaluate the impact of the installation on consumer complaints

5. A list of typical problems found by your inspectors in your area

6. A list of concerns about installation manuals, manufacturer/dealer/installer relationships

7. A copy of training aids developed by your state regarding installation of homes

If you do not have all of the information readily available, please send us what you can.

I have assigned Pat Katon, who has extensive experience in this area, as Project Engineer to collect this data. She may be contacting you or your designee in the next few weeks to get additional information. She may also arrange for a few on-site inspections in your area. Please let us know if you have examples of typical problems. Michael Werner, Manager of Design Review Evaluation Services, at NCSBCS is the Project Manager.

If you have any questions, please contact Ms. Katon at (703) 437-0100. Thank you for your cooperation.

Sincerely,

Shyam Choudhary, P.E.
Assistant Director, Chief Engineer
Manufactured Homes/Codes and Standards

SC/PK/mb

cc: Bob Fuller
Sam Hacopian
Hyder Jinnah

Appendix D

APPENDIX D

List of States, Counties, Cities, Copy of the Typical Letter With Survey Questionnaire and Analysis of Questionnaire Received

NCSBCS sent 275 letters with survey questions to selected cities and counties in ten states where shipments to the state were greater than 8000 homes in 1987.

1. Alabama
2. California
3. Florida
4. Georgia
5. Michigan
6. North Carolina
7. New York
8. South Carolina
9. Tennessee
10. Texas

State officials were queried to confirm the counties with a significant concentration of manufactured housing. NCSBCS also sent 18 letters to cities/counties in the State of Louisiana as a result of the on-site visit. These were also selected after consultation with the state administrator. NCSBCS received responses from about 50 percent of the counties.

132 cities/counties responded to the survey. However, only 126 were received in time to be tabulated.

List of Cities and Counties Surveyed

ALABAMA

CITY	COUNTY
BIRMINGHAM	JEFFERSON
DECATUR	
FLORENCE	FLORENCE
FOLEY	BALDWIN
MADISON	
MILLBROOK	MOBILE
MOBILE	
MOBILE	
MONTGOMERY	MONTGOMERY
PHOENIX CITY	RUSSELL
TUSCALOOSA	

CALIFORNIA

CITY	COUNTY
HAYWARD	ALAMEDA
MARKLEEVILLE	ALPINE
MARTINEZ	CONTRA COSTA
CRESCENT CITY	DEL NORTE
FRESNO	FRESNO
WILLOWS	GLENN
LOS ANGELES	LOS ANGELES
MADERA	MADERA
MARIPOSA	MARIPOSA
BRIDGEPORT	MONO
NAPA	NAPA
SANTA ANA	ORANGE
AUBURN	PLACER
HOLLISTER	SAN BENITO
SAN DIEGO	SAN DIEGO
STOCKTON	SAN JOAQUIN
REDWOOD CITY	SAN MATEO
SAN JOSE	SANTA CLARA
MODESTO	STANISLAUS
RED BLUFF	TEHAMA
WOODLAND	YOLO
KERN	BAKERSFIELD
DOWNIEVILLE	SIERRA
FAIRFIELD	SOLANO
NEVADA CITY	NEVADA
OROVILLE	BUTTE
SAN CARLOS	
WEAVERVILLE	TRINITY
YUBA CITY	SUTTER
YREKA	SISKIYOU
ALTURAS	MODOC

CALIFORNIA

CITY	COUNTY
SAN JOUQUIN	
SAN LUIS OBISPO	SAN LUIS OBISPO
SAN BERNARDINO	SAN BERNARDINO
HANFORD	KINGS
BAKERSFIELD	KERN
SUSANVILLE	LASSEN
VENTURA	VENTURA
LAKEPORT	LAKE
SAN ANDREAS	CALAVERAS
SONORA	TUOLUMNE
SANTA BARBARA	SANTA BARBARA
WEAVERVILLE	TRINITY
SANTA CRUZ	SANTA CRUZ
VISALIA	TULARE
QUINCY	PLUMAS
NEVADA CITY	NEVADA
SAN CARLOS/BELMONT	
COLUSA	COLUSA
EL CENTRO	IMPERIAL
SACRAMENTO	SACRAMENTO
SALINAS	MONTEREY
MARYSVILLE	YUBA
UKIAH	MENDOCINO
	SOLANO
JACKSON	AMADOR
YUBA CITY	SUTTER
PLACERVILLE	EL DORADO
SANTA ROSA	SONOMA
LOS ANGELES	
	INYO

FLORIDA

CITY	COUNTY
BRADENTON	MANATEE
BRISTON	LIBERTY
BROOKSVILLE	HERNANCO
BUNNELL	FLAGLER
BUSHNELL	SUMTER
CLEARWATER	PINELLAS
CRAWFORDVILLE	WAKULLA
CROSS CITY	DESOTO
DEFUNIAK SPRING	WALTON
DELAND	VOLUSIA
FERNANDIA BEACH	NASSAU
FT. LAUDERDALE	BROWARD

FLORIDA

CITY	COUNTY
FT. PIERCE	ST. LUCIE
FT. WALTON BEACH	
GAINESVILLE	ALACHUA
JASPER	HAMILTON
KEY WEST	MONROE
KISSIMMEE	OSCEOLA
LABELLE	HENDRY
LAKE BUENA VISTA	
LECANTO	CITRUS
LIVE OAK	SUWANEE
MADISON	MADISON
MARIANNA	JACKSON
MERRITT ISLAND	BREVARD
MIAMI	DADE
MILTON	SANTA ROSA
MONTICELLO	JEFFERSON
MOORE HAVEN	GLADES
NAPLES	COLLIER
NEW PORT RICHEY	PASCO
OCALA	MARION
ORLANDO	ORANGE
PALATKA	
PANAMA CITY	BAY
PENSACOLA	ESCAMBIA
PENSACOLA BEACH	
PORT CHARLOTTE	CHARLOTTE
PORT ST. JOE	GULF
QUINCY	GADSEN
SANFORD	SEMINOLE
SANIBEL	
SARASOTA	SARASOTA
SEBRING	HIGHLANDS
SHREVEPORT	
ST. AUGUSTINE	ST. JOHNS
ST. PETERSBURG	
STUART	MARTIN
TALLAHASSEE	LEON
TAMPA	HILLSBOROUGH
TAVARES	LAKE
VERO BEACH	INDIAN RIVER
WAUCHULA	HARDEE
WEST PALM BEACH	PALM BEACH

GEORGIA

CITY	COUNTY
ATHENS	ATHENS-CLARKE
AUGUSTA	RICHMOND
BRUNSWICK	GLYNN
BUCHANAN	HARALSON
CALHOUN	GORDON
CANTON	CHEROKEE
CARTERSVILLE	BARTOW
CONYERS	ROCKDALE
CORDELE	CRISP
COVINGTON	NEWTON
CUMMINGS	FORSYTHE
FATEYYEVILLE	FAYETTE
FOLKSTON	CHARLTON
FORT VALLEY	PEACH
GAINESVILLE	HALL
GRAYSON	GORDON
HAMILTON	HARRIS
HARTWELL	HART
HINESVILLE	LIBERTY
JACKSON	BUTTS
JEFFERSON	JACKSON
JONESBORO	CLAYTON
KINGSLAND	CAMDEN
LA FAYETTE	WALKER
LAGRANGE	TROUP
LAWRENCEVILLE	GWINNETT
LEESBURG	LEE
MARIETTA	COBB
MARTINEZ	COLUMBIA
MILLEDGEVILLE	BALDWIN
MONROE	WALTON
MCDONOUGH	HENRY
NEWNAN	COWETA
PEMBROKE	BRYAN
SAVANNAH	CHATHAM
SPRINGFIELD	EFFINGHAM
THOMASVILLE	THOMAS
THOMSON	MCDUFFIE
TIFTON	TIFT
VALDOSTA	VALDOSTA
WARNER ROBINS	HOUSTON
WATKINSVILLE	OCONEE

LOUISIANA

CITY	COUNTY
ABBEVILLE	
ALEXANDRIA	ALEXANDRIA
BATON ROUGE	
COVINGTON	
GONZALES	
HAHNVILLE	
HAMMOND	
HOUMA	
JENNINGS	
LAFAYETTE	
LAKE CHARLES	
LAPLACE	
MINDEN	
MONROE	
NEW ORLEANS	
SHREVEPORT	
SLIDELL	

NEW YORK

CITY	COUNTY
ALBANY	
BARRINGTON	
DELMAR	
LOCKPORT	
NEW YORK	
NORWICH	
POUGHKEEPSIE	
ROCHESTER	
WATERLOO	
WHITE PLAINS	
WILLIAMSVILLE	

MICHIGAN

CITY	COUNTY
BAD AXE	HURON
BIG RAPIDS	
COLDWATER	BRANCH
CORUNNA	
GAYLORD	
GENESEE	
GRAND RAPIDS	
GRAYLING	
HARRISVILLE	ALCONA
HILLSDALE	
HOWELL	
LAPEER	LAPEER
LELAND	LEELANAU
MILAN	
MT. CLEMENS	
ST. JOHNS	
SWARTZ CREEK	
TRAVERSE CITY	GRAND TRAVERSE

NORTH CAROLINA

CITY	COUNTY
ASHVILLE	BUNCOME
BAYBORO	PAMLICO
BEAUFORT	CARTERET
BOONE	WATAUGA
CHARLOTTE	
CURRITUCK	CURRITUCK
FAYETTEVILLE	CUMBERLAND
GREENSBORO	GUILFORD
JACKSONVILLE	
LENOIR	CALDWELL
LEXINGTON	DAVIDSON
LUMBERTON	ROBESON
MORGANTON	BURK
NEWLAND	AVERY
RALEIGH	WAKE
SANFORD	LEE
WILMINGTON	NEW HANOVER
WILSON	WILSON

SOUTH CAROLINA

CITY	COUNTY
ANDERSON	ANDERSON
ANDERSON	ANDERSON
BEAUFORT	BEAUFORT
CHARLESTON	CHARLESTON
COLUMBIA	RICHLAND
GEORGETOWN	GEORGETOWN
GREENVILLE	GREENVILLE
LEXINGTON	LEXINGTON
MONCKS CORNER	BERKELEY
MURRELLS INLET	MURRELLS INLET-GARDEN
RIDGELAND	JASPER
ROCKHILL	YORK
SALUDA	SALUDA
SPARTANBURG	SPARTANBURG
SUMMERVILLE	DORCHESTER
SUMTER	SUMTER
WALTERBORO	COLLETON

TENNESSEE

CITY	COUNTY
ALCOA	
CHATTANOOGA	
COLUMBIA	MAURY
COOKEVILLE	
DYERSBURG	DYER
ELIZABETHTON	
FRANKLINE	WILLIAMSON
KNOXVILLE	KNOX
KNOXVILLE	KNOX
KNOXVILLE	KNOX
MEMPHIS	
MEMPHIS	
MURFREESBORO	
NASHVILLE	NASHVILLE/DAVIDSON

TEXAS

CITY	COUNTY
ALNARVADO	
BOERNE	
BRYAN	
COLLEGE STATION	
COMBES	
CORINTH	
DEL RIO	
DONNA	
ELGIN	
FT. STOCKTON	
HARBER HEIGHTS	
KAUFMAN	
KINGSVILLE	
LA FERIA	
LA MARQUE	
LIBERTY	
LUFKIN	
MCALLEN	
NACOGDOCHES	
NEEDVILLE	
NEW BRAUNFELS	
NOVASOTA	
PALESTINE	
PASADENA	
PHARR	
PORT ARANSAS	
ROSENBERG	
SAN BINITO	
SAN JUAN	
SIMMINOLE	
STAFFORD	
SUGARLAND	
SULPHUR SPRINGS	
TERRELL	
TYLER	

Generic Request Letter

June 13, 1988

County Building Officials
Address

Dear _____:

Many consumer complaints about manufactured housing (mobile homes) seem to involve the improper installation of the home. This concerns all levels of government. The U.S. Department of Housing and Urban Development (HUD), in response to this concern, has retained NCSBCS to provide a study on manufactured housing installation.

The preliminary findings reflect that administrative, inspection and enforcement procedures of manufactured (mobile) home installation vary widely. Primary responsibility for assuring proper installation most often rests with municipal or county enforcement. The significant number of manufactured homes shipped into your jurisdiction in 1987 makes your assistance with the installation study invaluable.

Among other issues, we are evaluating whether there is a need to organize training programs for county inspectors and to develop guidebooks regarding installation of manufactured (mobile) homes.

Please complete the attached questionnaire and return it to the above address. We must have receipt no later than July 5, 1988 for your response to be included in the study.

If you have any questions, please contact Ms. Pat Katon, Project Engineer, or Michael Werner, Project Manager at (703) 437-0100. Thank you for your cooperation and guidance.

Sincerely,

Shyam Choudhary, P.E.
Assistant Director, Chief Engineer
Manufactured Homes/Codes and Standards

SC/PK/rs

cc: Robert Fuller
Sam Hacopian
Hyder Jinnah

Questionnaire
Parts A & B

SURVEY OF ADMINISTRATION, ENFORCEMENT AND INSPECTION
OF MANUFACTURED HOUSING INSTALLATIONS

STATE OF _____
COUNTY/CITY OF _____
BY _____
DATE _____

A. PLEASE CIRCLE THE APPLICABLE LETTER OR LETTERS WHICH WILL COMPLETE EACH OF THE FOLLOWING STATEMENTS. IF THE ANSWER TO #2 IS "a, an excluding," NO ADDITIONAL INFORMATION IS REQUESTED. THANK YOU FOR YOUR ASSISTANCE.

1. Our state _____ a manufactured housing installation law.

   a. has
   b. does not have

2. Our county/city has _____zoning ordinance concerning manufactured housing.

   a. an excluding
   b. a restricting
   c. no

3. Our county/city _____ a manufactured housing installation ordinance of its own.

   a. has
   b. does not have

4. Our county/city installation ordinance includes_____ requirements for each home.

   a. blocking
   b. tie down

5. Our county/city_____ register or license manufactured home installers.

   a. does
   b. does not

6. The inspection of the installation of manufactured housing is done by_____.

   a. state inspectors
   b. county inspectors
   c. city inspectors
   d. both state and local government
   e. neither state nor local government

7. Our county/city _____ a contract with the state to perform manufactured home installation inspections.

   a. has
   b. does not have

8. Our county/city has _____inspectors to inspect manufactured homes in our area.

   a. 1
   b. 2-3
   c. 4-5
   d. 5-10
   e. more than 10

9. Our county/city inspects an average of _____ manufactured homes installations per month.

   a. less than 10
   b. 11 to 25
   c. 26 to 50
   d. 51 to 100
   e. more than 100

10. Our county/city provides training sessions for our inspectors_____.

    a. as needed
    b. every six months
    c. every year
    d. every other year
    e. whenever funds are available
    f. only as on-the-job training (OJT)

11. Our county/city _____ identified a need for additional training resources.

    a. has
    b. has not

12. For taxation purposes manufactured homes are considered_____.

    a. real property
    b. personal property

13. Our county/city is notified that a manufactured home needs inspection by_____.

a. building-permit application
b. inspection request made by party
c. installer report after set up
d. seal or decal purchase
e. state agency forwarding reports to us
f. other (please describe)_____
_____

14. Total inspection fees for each home range between_____.

a. $ 0.00 and $10.00
b. $10.01 and $25.00
c. $25.01 and $50.00
d. $50.01 and $100.00
e. over $100.00

15. When the home passes inspection, _____.

a. a pressure sensitive acceptance label or decal is applied to the home
b. the homeowner is given a certificate of occupancy
c. the homeowner is given completed inspection report
d. no notice is provided
e. other(please describe)_____
_____

16. If there is a problem with the home's installation, our county/city_____.

a. notifies the state agency to effect enforcement
b. takes enforcement action ourselves
c. both state and local government take action

17. If a home's installation does not pass the first inspection, it must be corrected within _____.

a. 30 days
b. 30-60 days
c. 60-120 days
d. whenever

18. If a home does not pass a final inspection, _____.

    a. utility services are stopped
    b. a close permit is issued
    c. the certificate of occupancy is not issued
    d. the denial label or decal is applied to home
    e. the installer is charged with a misdemeanor and fined
    f. the installer is charged with civil penalty and fined
    g. the installers license is revoked
    h. the issue is referred to DMV
    i. the lien holder is notified
    j. other_____

19. In our area, fines or penalties for each home in violation range from _____.

    a. $ 0.00 to $50.00
    b. $50.01 to $100.00
    c. $100.01 to $500.00
    d. $500.01 to $1000.00
    e. over $1000.00

20. Our county/city _____inspect from the manufacturer's approved installation manual for the home or other engineer approved drawings.

    a. does
    b. does not

B. PLEASE CIRCLE THE APPLICABLE LETTER OR LETTERS TO SHOW WHICH OF THE FOLLOWING ITEMS ARE INCLUDED IN YOUR INSTALLATION INSPECTION PROCEDURES.

1. pier materials

    a. are approved
    b. height
    c. footing
    d. caps
    e. shims

2. pier spacing

    a. at steel I beam
    b. at marriage wall
    c. on perimeter
    d. at exterior doors
    e. under fire place
    f. at columns or at sides of wide opening

3. anchoring equipment

   a. anchor is approved for use in our area
   b. anchor is suitable for soil conditions
   c. installed in accordance with anchor manufacturers approved instructions
   d. ties (straps) are continuous

4. spacing of anchoring equipment

   a. over the top ties (vertical)
   b. frame ties (diagonal)

5. fastening of multi-wide halves

   a. at roof (ridge beam)
   b. between floors at mate line

6. finishing of exterior of multi-wide home

   a. peak of roof
   b. siding at ends of home

7. utility crossovers of multi-wide home

   a. electrical
   b. water supply
   c. plumbing (DWV)
   d. heating/cooling
   e. gas

8. site

   a. easement
   b. drainage
   c. footings below frostline
   d. pier height above flood level

9. construction zones

   a. wind load
   b. roof load
   c. thermal
   d. seismic load

10. other aspects

   a. heat tape listing
   b. crawl space access
   c. ventilation of skirted subfloor area
   d. driveways
   e. add on structures

NUMBER AND PERCENTAGE
TABULATION OF RESPONSES TO QUESTIONNAIRE
(NATIONAL PROFILE)

A. Administrative Questions

	Number of Responses (Circled)	Percent of Responses (Circled)
1. Our state _____ a manufactured housing installation.		
a. has	103	82%
b. does not have	20	16%
no response	3	2%
2. Our county/city has _____ ordinance concerning manufactured housing.		
a. an excluding	8	6%
b. a restricting	81	64%
c. no	36	29%
no response	1	0%
3. Our county/city _____ a manufactured housing installation ordinance of its own.		
a. has	58	46%
b. does not have	64	51%
no response	4	2%
4. Our county/city installation ordinance includes _____ requirements for each home.		
a. blocking	67	51%
b. tie down	85	65%
a. and b.	59	47%
no response	33	26%
5. Our county/city _____ register or license manufactured home installers.		
a. does	33	26%
b. does not	90	71%
no response	3	2%
6. The inspection of the installation of manufactured housing is done by _____.		
a. state inspectors	10	8%
b. county inspectors	91	72%
c. city inspectors	17	13%
d. both state and local government	15	14%
e. neither state nor local government	3	1%

A. Administrative Questions (continued)

	Number of Responses (Circled)	Percent of Responses (Circled)
7. We _____ a contract with the state to perform manufactured home installation inspections.		
a. have	13	10%
b. do not have	106	84%
no response	7	5%
8. We have _____ inspectors to inspect manufactured homes in our area.		
a. 1	24	19%
b. 2-3	46	37%
c. 4-5	19	15%
d. 5-10	13	10%
e. more than 10	16	11%
no response	8	6%
9. We inspect an average of _____ manufactured home installations per month.		
a. Less than 10	41	33%
b. 11 to 25	38	30%
c. 26 to 50	19	15%
d. 51 to 100	12	9%
e. more than 100	7	5%
no response	9	7%
10. We provide training sessions for our inspectors _____.		
a. as needed	52	40%
b. for everyone every six months	5	5%
c. for everyone every year	4	4%
d. for everyone every other year	1	-
e. whenever funds are available	8	8%
f. only as on-the-job training (OJT)	46	36%
no response	10	8%
11. We _____ identified a need for additional training resources.		
a. have	48	38%
b. have not	69	55%
no response	9	7%
12. For taxation purposes manufactured homes are considered _____.		
a. real property	80	63%
b. personal property	59	47%
no response	9	7%

Administrative Questions (continued)

	Number of Responses (Circled)	Percent of Responses (Circled)
13. We are notified that a manufactured home needs inspection by _____.		
a. building permit application	57	45%
b. inspection request made by party	19	15%
c. installer report after set up	0	0%
d. seal or decal purchase	2	2%
e. state agency forwards reports to us	2	2%
f. other (please describe) _____	4	3%
14. Total inspection fees for each home range between _____.		
a. $0.00 and $10.00	7	6%
b. $10.01 and $25.00	26	21%
c. $25.01 and $50.00	32	25%
d. $50.01 and $100.00	34	27%
e. over $100.00	22	17%
no response	11	9%
15. When the home passes inspection _____.		
a. a pressure sensitive acceptance label or decal is applied to the home	6	5%
b. the homeowner is given a certificate of occupancy	62	49%
c. the homeowner is given completed inspection report	21	17%
d. no notice is provided	6	5%
e. other (please describe) _____	30	24%
no response	12	10%
16. If there is a problem with the homes installation, we _____.		
a. notify the state agency to effect enforcement	4	3%
b. take enforcement action ourselves	99	76%
c. both take action	17	13%
no response	13	10%
17. If a home's installation does not pass the first inspection, it must be corrected within _____.		
a. 30 days	50	40%
b. 30-60 days	9	7%
c. 60-120 days	7	6%
d. whenever	46	37%
no response	14	11%

A. Administrative Questions (continued)

	Number of Responses (Circled)	Percent of Responses (Circled)
18. If a home does not pass a final inspection _____.		
a. Utility services are stopped	60	48%
b. close permit is issued	1	0%
c. the certificate of occupancy is not issued	63	50%
d. the denial label or decal is applied to home	8	6%
e. the installer is charged with a misdemeanor and fined	6	5%
f. the installer is charged with civil penalty and fined	0	7%
g. the installers license is revoked	1	0%
h. the issue is referred to DMV	0	0%
i. the lien holder is notified	0	0%
j. other _____	14	11%
no response	19	15%
19. In our area, fines or penalties for each home in violation range from _____.		
a. $0.00 to $50.00	46	37%
b. $50.01 to $100.00	12	10%
c. $100.01 to $500.00	26	21%
d. $500.01 to $1000.00	3	2%
e. over $1000.00	0	0%
no response	39	31%
20. We _____ inspect to the manufacturers approved installation manual for the home or other engineer approved drawings.		
a. do	86	68%
b. do not	34	26%
no response	6	5%

B. Technical Questions

	Number of Responses (Circled)	Percent of Responses (Circled)
The applicable letter or letters circled show which of the following items were included in inspection procedures		
1. pier materials		
a. are approved	92	73%
b. height	86	68%
c. footing	88	70%
d. caps	68	54%
e. shims	78	62%
a, b, c, d, e	68	54%
2. pier spacing		
a. at steel I beam	18	14%
b. at marriage wall	2	1%
c. on perimeter	2	1%
d. at exterior doors	36	29%
e. under fireplace	35	28%
f. at columns or at sides of wide opening	46	37%
no response	59	47%
3. anchoring equipment		
a. anchor is approved for use in our area	60	48%
b. anchor is suitable for soil conditions	40	32%
c. installed in accordance with anchor manufacturers approved instructions	55	44%
d. ties (straps) are continuous	58	46%
no response	28	22%
4. spacing of anchoring equipment		
a. over the top ties (vertical)	82	65%
b. frame ties (diagonal)	92	73%
no response	27	21%
5. fastening of multi-wide halves		
a. at roof (ridge beam)	72	57%
b. between floors at mate line	81	64%
no response	38	30%
6. finishing of exterior of multi-wide home		
a. peak of roof	75	60%
b. siding at ends of home	75	60%
no response	45	36%

B. Technical Questions (continued)

	Number of Responses (Circled)	Percent of Responses (Circled)
7. utility crossovers of multi-wide home		
a. electrical	95	61%
b. water supply	83	66%
c. plumbing (DWV)	91	72%
d. heating/cooling	81	64%
e. gas	77	61%
no response	27	21%
8. site		
a. easement	68	54%
b. drainage	66	52%
c. footings below frostline	45	36%
d. pier height above flood plain level	96	71%
no response	18	14%
9. construction zones		
a. wind load	67	53%
b. roof load	50	40%
c. thermal	18	14%
d. seismic load	30	24%
no response	50	40%
10. other aspects		
a. heat tape listing	13	10%
b. crawl space access	67	53%
c. ventilation of skirted subfloor area	71	56%
d. driveways	39	31%
e. add on structures	60	48%
no response	15	12%

		QUESTIONS FROM PART A																				QUESTIONS FROM PART B										
	CO	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
AL	MOBILE	B	C	B		B	B	B					A		A				A		B											
AL	JEFFERSON	A	B	B		B	A	B					AB				A															
AL	RUSSELL	A	C	B		B	A	B				B	AB	F	A	E				A	B												
CA	SISKIYOU	A	BC	B	AB	B	AB	B	D	A	A	B	AB	AB	D	B	BC	A	AC	AD	AB	ABCDE	ABCDEF	ABCD	AB	AB		ABCDE	BD	ABD	BCE	
CA	MODOC	A	C	A	AB	B	B	B	A	A	F	A	A	A	D	B	B	B	CI		A	ABCE	ABCE	A	B	AB	AB	ABCE	BCD	ABD	BE	
CA	SAN LUIS OBISA		B	B		B	B	B	D	B	A	A		A	E	E	B		J	A	A	ABCDE						ABCDE	ABCD		ABCDE	
CA	AMADOR	A	B	B		B	B	B	B	A	A	A	A	AB	E	CD	B		CJ		A	BCDE	ABCDF	BC		B		ABCE	ABD	ABD	BCE	
CA	SAN CARLOS	A	C	B	AB	A	B	B	B	A	A	B	A	A	E	E	B	B	C	C	A	ABCDE	ABCDEF	C	B	A	A	ABCDE	ABCD	AB	ABCDE	
CA	VENTURA	A	B	A	B	B	AB	B	E	A	F	A	A	B	E	E	B	D	A		A	A		C	B	A	AB	ABCDE	ABCD		BCD	
CA	SONOMA	A	B	B		B	B	A	E	B	F	A	AB	AB	C	B	B	D	AC		A	ABCDE	ABCDE	C	AB	A	AB	ABCDE	ABCD	ABCD	ABCDE	
CA	LAKE	A	B	A	B	B	D	B	C	B	F	B	A	A	E	B	B	D	AC	B	A	ABCDE	ABC	CD		AB	A	ABCDE	ABCD		DE	
CA	TULARE	A	B	B	AB	B	D	A	E	B	A	A	AB	A	E	B	B	C	ACE	A	A	ABC	ABCDE	ABCD	AB	AB	AB	ABCDE	BD	ABD	ABCE	
CA	LOS ANGELES	A	B	A	AB	B	B	B	E	B	A	A	A	A	D	C	BC	D	AC	A	A	ABCDE	ABCDEF	ABCD	AB		B	ABCDE	ABCD	ABCD	ABCDE	
CA	CALAVERAS	A	B	A	B	B	B	B	C	A	F	B	A	B	E	B	B	C	CJ	A	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABCD	ABCD	ABCDE	
CA	PLUMAS	A	B	B		B	D	B	C	A	F	A	A	ABC	D	B	B	D	C		A	ABCE	ABCDF	ABCD	AB	AB	AB	ABCDE	BCD	AB	BE	
CA	NEVADA	A	C	B		B	B	B	E	A	A	B	AB	B	D	B	B	D	AC	C	A	AC	ABF	C		A	A	ABCDE	B	A	BC	
CA	SAN JOUQUIN	A	C	B	AB	B	AB	A	D	C	A	A	AB	A	E	B	B	C	C	A	A	ABCDE	ABF	ABC	AB	AB	AB	ABCDE	ABCD	ABCD	BCE	
CA	SACRAMENTO	A	B	B	A	B	B	B	E	B	A	B	A	A	DE	C	B	A	C	C	A	ACDE	ABF	C	AB	AB	AB	ABCDE	ABCD	B	BCE	
CA	SANTA BARBARAA		B	B		B	B	B	C	A	F	B	A	A	D	B	B	A	C		A	ABC	ABF	AC	B	AB	AB	ABCDE	ABD	AD	BCE	TRAINING
CA	IMPERIAL	A	B	B	B	A	B	B	D	B	A	B	A	B	D	B	B	B	C	A	A	ABE	ABF	ACD	A	AB	AB	ABCDE	ABD	ABD	BCE	
CA	MENDOCINO	A	B	B	AB	B	D	D	C	A	F	B	A	A	D	C	B	A	C	B	A	ACDE	ABC	CD	AB	AB	AB	ABCDE	ACD	AD	BCE	
CA	MONTEREY	A	B	B	B	B	B	B	D	A	A	A	A	A	DE	C	B	D	J		A	ABCE	AB	C	AB	AB	AB	ABCDE	ABD	ABD	BCDE	
CA	INYO	A	B	A	B	B	B	A	B	A	F	B		B	D	B	C	A	C		A	ABCDE	ABCDEF	ABCD	B		AB	ABCDE	ABCD	ABCD	ABCDE	
CA	SAN BERNARDINA		B	B		B	B		E	C	A	A	AB	AB	E	BC	B	D	C		A	ABC	ABCEF	C		AB	AB	ABCDE	ABCD	ABCD	BCDE	
CA	KINGS	A	B	A	A	B	B	B	B	A	E	B	B	A	D	E	B	C	C	B	A	A	AB	AC	A	B	AB	ABCDE	A	AB	DE	
CA	YUBA	A	B	A	AB	B	ABD	B	C	B	A	B	AB	B	E	B	C	D	AC	A	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABCD	BD	BCDE	
CA	LASSEN	A	B	B	A	B	B	B	B	A	E	B	A	A	D	B	BC	A	A	A	A	ABCDE	ABCDF	CD	B	AB	AB	ABCDE	ABCD	ABCD	BCE	
CA	SOLANO	A	B	B	B	B	B	B	B	A	F	B	A	A	E	B	B	C	C	A	A	ABCDE	ABC	A	B	AB	AB	ABCDE	ABD	A	E	
CA	EL DORADO	A	B	B	B	B	D	B	E	B	F	A	A	B	E	BC	B	D	C		A	ABCDE	ABCDF			AB	AB	ABCDE		ABD	BCE	
CA	TRINITY	A	B	B		A	BD	B	B	A	A	B	B	A	D	B	B		AC		A	ABCE	ABCDEF	C		AB	AB	ABCDE	AB	AB	E	
CA	KERN	A	B	A	AB	B	B	B	E	C	A	A	AB	B	E	AC	B	D	AE	ABCD	B	ABCE	ABCDEF	ABCD	AB	AB		ABCDE	ABD	ABD	CDE	
CA	TUOLUMNE	A	B	B		A	B	B	C	B	A	B	B	AB	C	B	B	A	C		A	A	AB	C	AB	AB		ABCDE	B	ABD	CE	
CA	SUTTER	A	A	B		B	B	B	B	A	A	B	A	A	E	B	B	D	C	A	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABCD	ABCD	BC	
CA	SANTA CRUZ	B	B	B		B	B	B	A	A	F	B	A	A	D	E	B	C	A	C	A	ABCE	AB	ABC	AB	AB	AB	ABCDE	ABD	ABD	BCDE	
FL	OSCEOLA	A		A	AB	A	B	B	A	D	F	A		AB	C	B	B	A	C	A	A	ABCDE		CD	AB	AB	AB		D		BC	STATE TRA
FL	SEMINOLE	A	B	A	B	B	B	B	C	A	A	B	AB	A	E	B	B	D	C		A	ABCDE	ACF	ACD	A	AB	AB	ABCD	AB	D	BCE	
FL	ST. JOHNS	A	B	A	AB	B	B	B	D	D	F	B	B	B	B	B	B	A	C	B	A	ABCDE	ABCDEF	AC	AB	AB		ABCDE	D	A	BCE	
FL	PASCO	A	B	B	AB	A	B	B	D	E	A	A	B	A	E	C	B	D	A	A	A	ABCDE	A	ABCD	AB			A	AD	A	E	
FL	PUTNAM	A	A	A	AB	B	B																									
FL	INDIAN RIVER	A	B	A	AB	A	B	B	C	B	F	B	B	A	C	B	B	D	C	A	A	ABCDE	C	AC	AB				B	A	ABCDE	
FL	CHARLOTTE	A	B	A	AB	A	B	B	E	B	F	B	B	B	D	B	B	D	AC	A	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCD	ABD	AC	BCDE	
FL	HIGHLANDS	B	B	B		B	B	B	C	A	F	A	A	B	E	B	C	A	AC	A	A	ABCDE	ABCDEF	ABCD	AB		AB	ABCD	D	AB	ABCDE	
FL	GULF	B	C	A	AB	B	B	B	A	B	AF	B	AB	A	B	E	B	D	A		A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	BD	A	ABCE	
FL	COLUMBIA	A	B	B		B	B	B	B	D	F	B		B	C	C	B	D	A		A	ABCDE	A		AB							
FL	PALM BEACH	A	B	A	AB	B	B	B	E	B	F	B	A	A	D	E	C	D	AD		A	ABCF	A	AB	AB	AB	AB	ABCDE	ABD	A	BDE	
FL	LEON	A	B	A	AB	A	B		B	D	AE	A	B	A	C	E	B	D	A	A	B	ABE	ADF	AC	AB			ABC	AD			
FL	WALTON	A	C	B	B	B	B	B	C	C	F	B	A	B	B	C	B	D	A	A	B			D	AB					A	E	
FL	JACKSON	A	C	A	AB	B	B	B	B	D	F	A	A	A	B	A	B	A	A	C	B	ABCDE	AB	B	AB	AB						
FL	ESCAMBIA	A	B	A	AB	A	B	B	C	D	F	B	AB	A	D	E	B	D	A	A	B	AE	AC	C	AB	AB		A	D	A	E	
FL	MADISON	A	C	B	AB	B	B	B	A	B	C	B		B	B		BC	D	A		A	ABCDE	ABCDEF	ABC	AB	AB		ABC	D	AB	E	
FL	SUWANNEE	A	C	B	AB	B	B	B	B	C	F	A	A	A	D	B	B	D	AC	C	B	ABCDE	ACDF	ABC	AB	AB	AB	ABCDE	D	A	CDE	
FL	VOLUSIA	A	B	B	AB	A	B	B	E	C	A	A	B	ABC	D	BE	B	C	AC		A	ABCDE	ABC	ACD	AB		AB		BD		BCDE	
FL	PINELLAS	A	C	B	B	A	B	B	E	C	A	A	A	AB	E	B	B	D	C	A	A	ABCDE	G	C	AB		AB	ABCDE	ABCD	A	DE	
FL	BROWARD	A	B	A	AB	A	B	B	E	C	B	A	AB	A	D	B	B	C	C	A	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABD	A	DE	

FL	WAKULLA	A	B	A	AB	B	B	B	A	C	F	B	AB	A	E	E	C	D	AC	C	A	ABCDE	ABCDEF	ABD	AB		ABCDE	ABCD		DE
FL	GADSEN	A	C	A	AB	B	B	B	B	C	AB	B	A	A	D	E	D	E	D	A	A	ABCDE	ABCDEF	ABCD	AB	B	B	ABCD	ABCD	A	E
FL	BAY	A	C	B	AB	B	D	B	D	C	A	B	AB	A	B	B	B	D	C	A	B	ABCDE		BC	AB		AB		AD		
FL	HILLSBOROUGH	A	B	A	AB	A	B	B	E	E	A	B	B	A	A	A	B	A	AG		A	ABCDE	ABC	CD	AB		AB		ABD	AB	DE
FL	FLAGLER	A	B	A	AB	A	B	B	B	A	A	B	AB	A	D	B	B	A	C	A	A	ABCDE	ABCDEF	ACD	AB	B	AB	CDE	BD	AB	BCE
GA	HOUSTON	B	B	A	A	A	B	B	B	C	F	A	B	A	D	D	B	A	A	A	B	ABCDE	A								
GA	BRYAN	A	B	A	AB	A	B	B	B	B	E	A	A	AB	BCD	E	B	A	D	A	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABCD	ABCD	ABCE
GA	HARRIS	A	B	A	AB	A	B		B	B	C	A	B	AB	C	C	B	A	AE	C	B	ABCDE	ABDEF	ABCD	AB	AB	AB	ABCDE	ABCD	B	BCE
GA	GLYNN	B	B	B	AB	B	B	B	B	B	CE	A	A	ABD	A	C	B	A	AC	B	B	ABC	ABC	A	AB	A	Z	ABCDE	ABD	A	BCE
GA	EFFINGHAM	A	B	A	AB	A	B	B	B	C	F	B	B	A	B	B	B	A	AC	A	A	ABCDE	AEF	AC	AB	AB	AB	ABCDE	ABD	AB	CE
GA	BALDWIN	A	C	A	AB	B	B	B	A	B	B	A	A	A	C	E	B	A	ABCDE	B	A	ABCDE	AE	D	A	AB	AB	ABCDE	ACD	A	BCE
GA	LIBERTY	A	B	B	AB	A	B	B	C	C	A	B	AB	ABD	C	E	B	D	J		B	ABCDE	A	A	AB				AD	E	E
GA	BARTOW	B	B	A	AB	B	B	B	B	D	F	B	AB	A	D	E	B	D	A	A	B	ABC	A	D	AB			AD	AD		BE
GA	COLUMBIA	B	B	A	A	A	B	B	A	B	F	B	B	B	C	A	B	D	A	C	B							AC			D
GA	PEACH	A	B	B	A	B	B	B	B	A	A	A	B	B	AD	BCE	B	B	A	AC	A	B	ABCDE	ABCDEF	C	AB	AB	ABCDE	AD		BE
GA	ROCKDALE	A	C	A	B	B	B	B	B	A	A	B	A	A	C	B	B	A	C	B	A	C	A	B	B	AB	AB	ABCDE	BC	AB	BCE
GA	RICHMOND	A	B	A	B	A	B	B	B	B	A	A	B	A	B	E	B	A	A	A	A	ABCDE	AB	C	AB	B	B	ABCDE	ABCD		BC
GA	THOMAS	B	C	B		B	E	B	B	C	F	B	A	A	B			D	A		B							ABCD	D		E
GA	BUTTS	A	B	B	B	B	B	B	A	A	A	B	AB	A	C	E	B	A	AC	C	B	ABCDE	ABEF	ABD	AB	AB	AB	AD	ACD	A	E
GA	TIFT	B	C	A	B	B	B	B	A	B	B	B	A	A	B	E	B	A	A	C	B	ACD	ABCDEF	AC	B	AB	A	ABCDE	ABCD	AB	BCE
GA	WALKER	B	C	B		B	E	B					B																AD		
GA	WALTON	B	B	B	B	B	B	B	A	F	B	AB	A	D	C	B	D	A	A	A	A		A	A	B	AB	AB		CD	AB	BC
GA	HENRY	B	B	A	B	A	B	B	C	B	E	A	B	B	C	B	B	D	C	C	B	ABCD	AB	A	B	AB	AB	ABCDE	B		
GA	CHARLTON		C																												
LA	ABBEVILLE	B		B		B		B					A								B								D		
LA	MINDEN	A	B	A	AB	B	C	B	A	A	F	B	B	A	C	E	B	D	A	A	A	ACDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABCD	ABCD	BCDE
LA	LAKE CHARLES	B	A																												
LA	LAFAYETTE	B	B	A	B	B	BC	B	B	D	A	B	A	B	C	C	B	D	A		B	A	AB	C	A	AB	AB	ABCE	D	A	DE
LA	NEW ORLEANS	A			B	B	D	B	E	A	E	A		A		B	B	A	AC		A										
LA	HOUMA		B	A	B	B	BC	B	B	B	F	B	A	AB	B	B	B	A	C		A	B		A	AB			ACE	D		
LA	HAMMOND	A	B	A	AB	A	C	B	B	A	A	A	B	A	C	B	B	A	A	B	A	B	C	C	A	A	A	AB	D	A	C
LA	ALEXANDRIA	B	B	A	B	B	C	B	A	A	F	B	B	F	A	D	B	A	AE	C	B				B			ABCDE	ABD		D
MI	ALCOMA	A	C	B	B	B	B	B	A	A	F	B	A	A	C	B	B	A	CD	C	B	BC	A	A	B	B	AB	ABC	CD	AB	BCE
MI	LIVINGSTON	A	C	B		B	B	B	B	B	A	A		A	D	B	AB	A	C	A	A	ACDE	ACF	A	AB	AB	AB	AC	CD	AB	ABCE
MI	GRAND TRAVERSA		B	B	AB	B	ABD	B	B	A	A	A	A	ABC	C	B	B	E	C	C	A	AE	AB	ABCD	AB	B	B	ABCDE	CD	ABCD	BCE
MI	MECOSTA	A	A	A		B	B	B	B	B	F	A		A	E	B	B	D	DJ	C	A	ABCDE		C	AB	AB	AB	ABCDE	D	ABCD	ABCDE
MI	YORK	A	B	A	AB	A	C	B	A	A		B	A	BA	C	B	BC	A	C	B	A	ABCDE	ABCEF	CD	AB	AB	AB	ABCDE	ABCD	ABC	BCDE
MI	BRANCH	A	A	B	B	B	B	B	A	B	F	B	A	A	C	B	B	A	C		B	ACE	AF	B	B	B	B	ADE	BD		BCE
MI	OTSEGO	A	B	A	B	A	B	A	B	A	A	B	A	AB	E	E	B	A	J	A	AB	AC	ABF	BCD	B	B	AB	ABCDE	C	AB	BCE
NC	WILSON	A	B	B	AB	B	B	B	B	D	E	A	AB	F	B	B	B	D	C		A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABCD		BCE
NC	BURKE	A	C	B		A	B	B	B	D	F	A	B	A	B	BC	BC	D	C	A	A	BD	B	AB	AB			AC	B		BC
NC	CARTERET	A	C	B	B	B	B	B	C	B	A	A	A	A	D	B	A	A	C	A	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABCD	ABC	BCE
NC	CALDWELL	A	B	B		B	B	B	B	C	F	A	B	AB	D	BCE	B	D	AC		A	ABCDE	ABCDF	ACD	AB	AB	AB	ABCDE	CD	B	E
NC	ROBESON	A	C	B	AB	A	B	B	C	E	A	B	A	ABC	D	B	BC	D	C	A	A	ABCDE	A	CD	AB	AB	AB	ABCDE	D		BCE
NC	WATAUGA	A	C	A	AB	B	B	B	B	B	F	B	B	B	C	B	B	D	C	A	B	ABCDE	ABCDEF	ACD	AB	AB	AB	A	D		BCE
NC	BUNCOMBE	A	BC	A	AB	A	B	B	C	E	A	B	B	A	C	E	B	D	J	A	A	ABCDE	ABCDEF	ABCD	AB	B		ABC			
NC	CUMBERLAND	A	B	B	AB	A	C	B	B	B	A	B	B	AC	B	A	B	A	A		A	ABCDE	A	ABCD	AB			ABCD			
NC	AVERY	A	C	B	AB	B	BC	B	B	B	F	B	B	B	B	E	B	D	J	A	A	ABCDE	ABCDEF	CD	AB	B		ACE	C		
NC	DAVIDSON	A	C	B	AB	B	B	B	B	B	E	B	A	A	B	B	B	A	C	C	A	ABCDE	A	ABCD	AB	B	AB	ABCDE	ABCD	A	BC
NC	NEW HANOVER	A	B	B		B	B	B	D	D	F	B	A	A	C	B	B	D	AC	A	A	ABCDE	ABCE	AD	AB			AC	CD	AB	E
NY	CHENANGO	A	C	B		B	B	B	B	B	C	A	A	A	D	B	B	B	A	C	A	ABC	ABCF	C		AB	AB	BCDE	ABCD	C	ABE
NY	ROCHESTER	A	A																												
NY	ALBANY	A	C	B		B	C	B	C	A	A	B	A	A		B	C	A	CJ	C	A	C		ABC					ABCD		
SC	ANDERSON	B	B	A	AB	B	BC	B	A	E	F	A	A	D	B	C	B	A	CJ	C	B	ABCD	ABCD	A	AB				AD		E
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SC	GREENVILLE	A	B	A	A	B	B	B	D	E	A	B	B	AD	C	C	B	A	A	A	B	ABCDE	A	BD	A	AB	AB	ABCDE	D	D	BCD
SC	BEAUFORT	B	C	A	AB	B	AB	B	B	B	A	A	B	BC	B	C	B	A	A		A	ABCDE	A	AD	AB	B	AD	AD	A	E	
SC	DORCHESTER	A	B	A	AB	B	B	B	B	D	E	B	B	AB	C	B	B	A	AC	B	A	ABCDE	ABD	AD	AB	AB		ABCDE	AD	AD	E
SC	RICHLAND		B	B	A	B	B	B	D	C	A	B	B	BCD	B	E	B	A	C		B										
TN	MAURY	A	B	B	B	B	D	B	A	B	F		A	A	CD	B		D	C	A	B	AB						C	D		
TX	FORT BEND	A	C	A	AB	B	CD	B	B	B	F	A	B	AB	D	E	B	A	AJ	B	A	ABC	AF	AC	AB	AB	A	ABCDE	ABD	AB	BCDE
TX	KINGSVILLE	A	B	B		B	D	A	B	A	A	B	AB	ABEF	B	CE	C	B	ADE	ABCD	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABD		DE
TX	BRAZOS	A	C	B		B	C	A	B	B	C	B	B	E	D	B	B	D	C	A	A	ABCDE	ABD	BCD	AB				AD		E
TX	DONNA	A	B	A	AB	A	C	A	A	B	A	A	A	E	B	A	A	B	E		A	AC	ACF	ABCD	B	B	B	ABCDE	ABCD	ABCD	ABCDE
TX	HARRIS	A	C	A	AB	B	C	A	B	A	A	B	A	AE	C	BE	C	D	ADJ	A	A	ABCDE	A	CD	AB	AB	AB	CE	ABD	A	CD
TX	BASTROP	A	B	A	AB	B	D	A	A	A	A	B	A	AE	D	D	C	A	D	C	A	ABCE	ABCDEF	ACD	B	AB	AB	ABCDE	ABCD	ABCD	BCDE
TX	NAVASOTA	A	B	A	AB	B	D	A	A	A	F	B	A	AE	B	C	B	A	A	C	K	ABCDE	A	C	AB			ABCDE	AD	A	BCDE
TX	PECOS	A	B	A	AB	B	D	A	B	A	A	A	A	AE	B	D	C	A	AE	B	A	ABCDE	A	ABCD	AB	AB	AB	ABCDE	ABD	AB	BDE
TX	TYLER	A	B	B	B	B	A	B	A	A	F	A	A	AB	C	B	B	A	AD	A	A					B	B	ABCDE	ABD		BCDE
TX	SAN BENITO	A	B	B	AB	B	C	A	A	A	A	B	A	A	B	B	B	A	AC	A	A	ABCE	A	C	AB	AB	AB	ABCDE	ABD	AB	BCDE
TX	KAUFMAN	B	A	B		B	E	B	A	A	A	A	A	F		E					B										
TX	COMAL	A	B	A	AB	B	D	A	B	B	A	B	A	AE	B	B	C	A	J	CDE	A	ABCDE	ABCDEF	ABCD	AB	AB	AB	ABCDE	ABD	AB	BCDE
TX	NACOGDOCHES	A	A	A		B	AD	B	C	A	B	A	B	A	C	D	C	A	A	C	B			ABCD	B	AB	AB		ABCD		DE

Appendix E

APPENDIX E

LIST OF COMPONENT MANUFACTURERS WHO WERE CONTACTED BY NCSBCS FOR THEIR PRODUCT INFORMATION

AB Chance Company
210 North Allen St.
Centralia, MO 55240

Anchor-Sur
Route 29
North Pekin, IL 61554

Barker Mfg. Co., Inc.
730 E. Michigan Ave.
Battle Creek, MI 49016

Big Valley Ind.
310 Messenger Road
Keokuk, IA 52632

Bold City
911 Granville Road
Jacksonville, FL 32205

Carefree of Colorado
2760 Industrial Lane
Bloomfield, CO 80020

Double H Anchoring System
102 Lane Avenue, South
Jacksonville, FL 32205

E.F. Domine Co.
P. O. Box 238
Tracy, MN 56175

M & H Mfg. Corp.
819 Logan St.
Goshen, IN 46526

MHA Corporation
12662 U. S. Hwy. 20
Middlebury, IN 46540

Minute Man Anchors
305 W. Walker Street
East Flat Rock, NC 28726

Mobile Homes Anchorage
and Services
3214 - 89th Lane
Blaine, MN 55434

National Anchor Corp.
5690 Powerline Rd.
P. O. Box 976
Deerfield Beach, FL 33441

PERMA-JACK, Inc.
Route 6, Box 967
Pensacola, FL 32507

Richey Machine
8516 U.S. Highway 19 North
Port Richey, FL 33568

Sharon Aero Machine Co.
1825 12th St., S.E.
Largo, FL 33541

Steward Mfg. Co.
325 South Shiloh Rd.
Garland, TX 75042

Sturdy Truck Equipment, Inc.
1839 Carolina Beach Road
Wilmington, NC 28401

Tanky Disk Products
111 Old Bee Tree Road
Swannanaa, NC 28778

Tie Down Engineering
5901 Wheaton Drive
Atlanta, GA 30336

Tri-City Aluminum Products,
Inc.
Route 10, Box 387
Ocala, FL 32670

Turnset Ind., Inc.
2602 Corporate Ave. East
Memphis, TN 38132

June 3, 1988

General Manager

Dear Sir:

The Department of Housing and Urban Development (HUD) has requested that NCSBCS collect data regarding manufactured housing installation. For the study of manufactured housing installation to be complete and meaningful, we need your assistance.

It is my understanding that your company manufacturers and/or distributes installation components such as tiedown hardware and fabricated piers for manufactured housing. Copies of descriptive literature, installation instructions, and certification test reports for all your manufactured housing equipment will be most helpful and appreciated.

If you do not have all of the above information readily available, please send us what you can.

If you have any questions, please contact Michael Werner, NCSBCS Project Manager at (703) 437-0100. Thank you for your cooperation.

Sincerely,

Shyam Choudhary, P.E.
Assistant Director, Chief Engineer
Manufactured Homes/Codes and Standards

SC/rs

technical note AMERICAN PLYWOOD ASSOCIATION

P.O. Box 11700, Tacoma, Washington 98411 / Area Code 206-565-6600 / TLX 32-7430

NUMBER E450 September 1980

PLYWOOD PIER PADS FOR MOBILE HOMES

Preservative-treated plywood is a strong and efficient material for mobile home pier pads. It is light weight, durable, and easy to handle. Preservative-treated plywood is readily available and can be cut to size on site with minimal effort.

Recommendations:

Table 1 presents recommended pad sizes and thicknesses for use under mobile home support piers. The recommendations are based on an 11-1/2-in.-square metal support pier, or an 8-in. x 16-in. concrete block pier. All recommendations are for soils with a bearing capacity of 1,000 psf, upon which the maximum pier load is based.

The plywood grade recommended for all pads is APA RATED SHEATHING Exposure 1, marked PS 1. Plywood beneath mobile home piers must be preservative treated. Pressure-preservative treatment provides protection against decay, development of mold growth, and common insect infestation. Plywood shall be certified by the treater as complying with the treating, drying, retention and penetration requirements of American Wood Preservers Bureau's AWPB-FDN Standard. Alternatively, plywood may be pressure-treated in accordance with AWPA C-9 with salt preservatives as required for soil contact exposure.

Regulatory Requirements:

Responsibilities of the mobile home manufacturer with regard to support systems are defined in the Federal Mobile Home Construction and Safety Standard. The manufacturer is required to provide instructions with each mobile home, specifying the location and required capacity of stabilizing devices for its support and anchoring system.

In addition, the maximum allowable load per pier may be dictated by the provisions of the individual state regulatory agency or the pier manufacturer. This design load is generally associated with a soil bearing capacity of 1,000 psf. Increased design loads for allowable soil bearing pressures in excess of 1,000 psf are generally granted only if a soils investigation of the site is conducted by a registered civil engineer.

TABLE 1. Plywood Pier Pad Recommendations for Mobile Homes
(APA RATED SHEATHING Exposure 1, marked PS 1, treated in accordance with American Wood Preservers Bureau's AWPB-FDN Standard or AWPA C-9 for soil contact)

Plywood Pad Size (in.)[a]	Minimum Plywood Thickness (in.)[b] for		Maximum Pier Load (lb) for 1000-psf Soil
	Metal Stands	Concrete Blocks	
18 x 18	15/32, 1/2	1	1780
18 x 19.2	19/32, 5/8	1-1/8	2130
24 x 24	1-1/8	1-1/4	4000

(a) Face grain may be either direction relative to pad or pier dimension.

(b) Plywood thickness is for metal stand with 11-1/2"-square base, or concrete block with an 8" x 16" base. Thicknesses of 1" or more may be fabricated from two layers of plywood, stacked with or without fastening.

Plywood Performance:

A test program was conducted to clearly establish plywood as an adequate pier pad material. Recommendations were developed for plywood pads of varying size under pier loads which resulted in 1,000-psf soil pressure.

Plywood panels used in this test series were APA trademarked C-D Interior with exterior glue (now termed APA RATED SHEATHING Exposure 1, marked PS 1), preservative treated in accordance with the AWPB-FDN Standard. All plywood pads were tested in a wet condition which reduced panel strength and stiffness, but which is consistent with expected conditions. Plywood face grain was placed in the weakest direction relative to pad or pier dimension. The base of the metal pier stand measured 11-1/2 in. x 11-1/2 in. and consisted of 1-1/2-in.-wide steel, as shown in Figure 1. The base of the two-core concrete block measured 8 in. x 16 in., as shown in Figure 2.

To simulate a pad bearing on earth while supporting a mobile home, 16 cubic feet of soil was placed in a wooden container. For test purposes, a soil pressure of 1,000 psf was ascertained by procedures set forth in ASTM D1883, Standard Methods for Establishing Bearing Ratio of Laboratory Compacted Soils. The pier system was then loaded on the soil, as shown in the figures, with a 60,000-lb-capacity Tinius Olson test machine. At specified load levels and/or time intervals, plywood deflection was measured relative to the base of the metal pier stand or concrete block, also as shown in the figures.

All plywood pads at the recommended thicknesses, whether fabricated with one or two layers, were tested for 12 hours at 1.75 times maximum design load, followed by 3 hours at 2.5 times maximum load without a failure which would impair its function. In all cases, settlement into the 1,000-psf soil of the test setup was well under 1/2 in. at design load. Increased loading simply increased settlement.

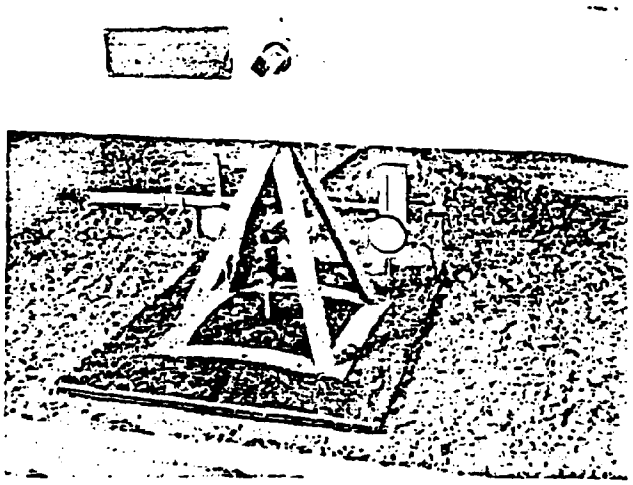


FIGURE 1. Test Setup Using Metal Pier Stand

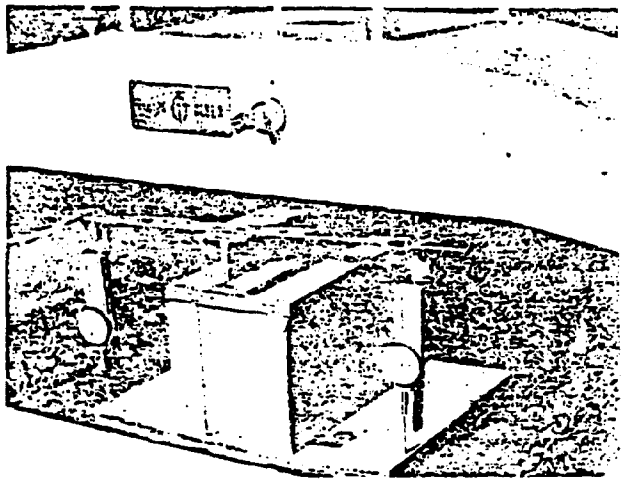


FIGURE 2. Test Setup Using Concrete Block Pier

GEORGE FIRESTONE
Secretary of State
JIM SMITH
Attorney General
GERALD LEWIS
Comptroller

State of Florida

BOB GRAHAM
Governor

BILL GUNTER
Treasurer
DOYLE CONNER
Commissioner of Agriculture
RALPH D. TURLINGTON
Commissioner of Education

Department of Highway Safety and Motor Vehicles

Neil Kirkman Building

ROBERT A. BUTTERWORTH
Executive Director

Tallahassee, 32301

DIVISIONS

• FLORIDA HIGHWAY PATROL • DRIVER LICENSES • MOTOR VEHICLES • ADMINISTRATIVE SERVICES

April 1, 1983

TO: ALL BUILDING ENFORCEMENT OFFICIALS
AND OTHER INTERESTED PERSONS

FROM: ROBERT A. BUTTERWORTH, EXECUTIVE DIRECTOR RAB

SUBJECT: UPDATED ANCHOR MANUFACTURER'S LISTING OF
APPROVED ANCHOR PRODUCTS

Attached herewith is an updated listing of the approved anchor manufacturer's products that are listed for use in Florida. Previous anchor and component listings are obsolete and should be discarded and replaced with this listing immediately. Additions will be made when necessary on the attached anchor listing.

It is again requested by this Division that the names and addresses of the proper authorities involved in the on-site inspection program for each individual county, city, town, etc., be supplied to us so that we may have a precise record of areas that definitely have an on-site inspection program in operation. Also, please keep us abreast of any personnel changes within the program for your specific region.

Names and addresses of authorities involved in the on-site inspection program should be forwarded to this Division to the attention of Buck Jones, Chief of the Bureau of Mobile Home/Recreational Vehicle Construction, or his assistant, Orville H. Cummings. Federal and State laws require that all new mobile homes are to be set up according to the instructions and certifications furnished by the mobile home manufacturer.

Your cooperation and response in complying with our request will be appreciated. If you should have any questions regarding the attached listing of the approved anchor models, please feel free to contact either Buck Jones or Orville Cummings by telephone 904/488-7657 or 488-8600.

RAB:CJB/bv

Attachments

ANCHOR MANUFACTURER'S LISTING

OF

APPROVED AND UNAPPROVED ANCHOR PRODUCTS

PREPARED BY: DEPARTMENT OF HIGHWAY SAFETY & MOTOR VEHICLES
DIVISION OF MOTOR VEHICLES
BUREAU OF MOBILE HOME &
RECREATIONAL VEHICLE CONSTRUCTION

10/11/88

APPROVED

ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)

A. B. CHANCE COMPANY
210 North Allen Street
Centralia, Missouri 65240

MODEL #	IDENTIFICATION	DESCRIPTION
T430	Auger Anchor	11/16" x 30" rod with 2 - 4" disc
648	Auger Anchor	11/16" x 48" rod single 6" disc
648L	Auger Anchor	5/8" x 48" rod single 6" disc
848	Auger Anchor	11/16" x 48" rod single 8" disc
PA	Patio Anchor	Concrete Slab
RB-2	Roof Bracket	
SD	Strap Buckle	Splice for 1¼" x .035" strap
SS	Strap Seal	Seal for 1¼" x .035" strap
ST	Tensioner	Strap tensioner for all CHANCE MOBILE HOME anchor models
	Strapping	1¼" x .035" Hurricane Strapping, INTERLAKE INC. ONLY
	IMPORTANT:	A. B. CHANCE MOBILE HOME ANCHORS ARE APPROVED PROVIDED THEY ARE FITTED WITH A CLIP (Per anchor manufacturer's installation instructions)

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ANCHOR-SUR PRODUCTS
Division of Poly Foam International, Inc.
P.O. Box 684
Fremont, Ohio 43420

MODEL #	IDENTIFICATION	DESCRIPTION
1-A-2	Drive Anchor	6" triangle with 48" cable
48SH	Turnset Auger Anchor	5/8" x 48" rod single 6" disc
22RA	Earth Anchor	24" tube shaft / 2-6" plates expanding to 9½"

****

BOLD CITY
911 Granville Road
Jacksonville, Florida 32205

MODEL #	IDENTIFICATION	DESCRIPTION
BC-2	Frame Tie	with aluminum buckle
BC-7	Auger Anchor	5/8" x 48" single 6" disc

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APPROVED

ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 2

DOUBLE H ANCHORING SYSTEM, INC.
102 Lane Ave., South
Jacksonville, Florida 32205

MODEL #	IDENTIFICATION	DESCRIPTION
A-10	Auger Anchor	5/8" x 48" rod with single 6" disc
A-30	Patio Anchor	4" bolt with expandable shield
A-90	Single Head Adapter	Tensioning device to convert single head anchors into double heads
A-4	Frame Tie	1½" x .035" x 6½' strap with buckle using Signode, Riblet, or Tie Down Engineering strap only
A-6	Roof Bracket	Aluminum roof bracket for over-roof expose strapping
A-7	Earth Anchor	5/8" x 48" rod with single 6" disc anchor with eye to be used with steel cable
A-5	Buckle	Double Eye Aluminum Buckle

****

MHA CORPORATION
12662 U.S. Hwy. 20
Middlebury, IN 46540

MODEL #	IDENTIFICATION	DESCRIPTION
MHA-2	Auger Anchor	5/8" x 48" rod with single 6" disc
MHA-4	Auger Anchor	5/8" x 48" rod with 2 - 4" disc
MHA-6	Auger Anchor	5/8" x 30" rod with 2 - 4" disc
MHA-8	Auger Anchor	3/4" x 48" rod with single 6" disc
MHA-10	Auger Anchor	3/4" x 48" rod with 2 - 4" disc
MHA-12	Auger Anchor	3/4" x 30" rod with 2 - 4" disc
MHA-14	Auger Anchor	5/8" x 48" rod with single 6" disc
MHA-20	Concrete Anchor	5/8" x 8" rod, "J" bolt
MHA-22	Patio Anchor	5/8" bolt with concrete expansion shield
MHA-24	Slab Anchor	5/8" x 8" threaded rod with 5/8" hex head nut
MHA-33	Buckle	Aluminum buckle
MHA-39	Frame Tie	1½" x .035" x 6' strap with buckle
MHA-46	Double Head Adapter	Tensioning device to convert single head anchors into double heads

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APPROVED

ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 3

MINUTE MAN ANCHORS
305 West Walker Street
East Flat Rock, N. C. 28726

MODEL NEW #	MODEL OLD #	IDENTIFICATION	DESCRIPTION
MMA8P	MMA8P	Pier	8" steel pier
MMA10P	MMA10P	Pier	10" steel pier
MMA12P	MMA12P	Pier	12" steel pier
MMA14P	MMA14P	Pier	14" steel pier
MMA16P	MMA16P	Pier	16" steel pier
MMA18P	MMA18P	Pier	18" steel pier
MMA20P	MMA20P	Pier	20" steel pier
MMA22P	MMA22P	Pier	22" steel pier
MMA2	650DHS	Auger Anchor	19/32" or 5/8" x 48" rod single 6" disc
MMA4	650HDHS	Auger Anchor	3/4" x 48" rod single 6" disc
MMA8	48XDHS	Drive Anchor	2-3/4" x 48" rod with 1" x 14" gage tubes
MMA10	36DHS	Coral Drive Anchor	3/4" x 34" rod double head
MMA12	210DHS	Slab Anchor	5/8" X 10" threaded rod 5/8" nut
MMA14	210PDHS	Concrete Anchor	5/8" x 10" rod w/3" turn on end
MMA18	THDH	Tension Device	Double head tension device with bolt hole in bottom of yoke for use with expansion bolt, etc.
MMA22	100DHS	Tension Device	Double head tension device adapter
MMA Inc. Certified to ANSI A119.1		Strapping	1¼" x .035" galvanized steel strapping
MMA Inc. Certified to ANSI A119.1		Strapping	Unitex tie-down strapping, 3 3/8" wide Minute Man anchor's tension device, 3/4" diameter bolt
MMA29	FC II w/s	Frame Hook	7 feet of Minute Man strapping with frame hook
MMA32	BUC w/s	Strap/buckle	7 feet of Minute Man strapping with buckle

ITEMS APPROVED BUT PRESENTLY OUT OF PRODUCTION

MODEL NEW #	MODEL OLD #	IDENTIFICATION	DESCRIPTION
MMA1	650S	Auger Anchor	5/8" x 48" rod single 6" disc
MMA1	650ETS	Auger Anchor	5/8" x 48" rod single 6" disc with removable single head
MMA2	650DHETS	Auger Anchor	5/8" x 48" rod single 6" disc with removable double head
MMA3	650HS	Auger Anchor	3/4" x 48" rod single disc & head
MMA7	48XS	Drive Anchor	2 - 3/4" x 48" rods with 1" x 14" gage tub
MMA11	210S	Slab Anchor	5/8" x 10" threaded rod w/nut-single head
MMA13	210PS	Concrete Anchor	5/8" x 10" rod w/3" turn on end
MMA15	30ERS	Expanding Bedrock Anchor	5/8" x 30" threaded rod w/expanding nut w/single head
MMA16	30ER DH	Expanding Bedrock Anchor	5/8" x 30" threaded rod w/expanding nut w/double head

****

APPROVED

ADDITION TO APPROVED ANCHOR LISTING
October 12, 1984

ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 4

PERMA-JACK, INC.
Rt. 6 Box 967
Pensacola, Fla. 32507

MODEL #	IDENTIFICATION	DESCRIPTION
I	Concrete Pier	8" with 2" height adjustment
II	Concrete Pier	10" with 2" height adjustment
III	Concrete Pier	12" with 2" height adjustment
IV	Concrete Pier	14" with 2" height adjustment
V	Concrete Pier	16" with 2" height adjustment
VI	Concrete Pier	18" with 2" height adjustment
VII	Concrete Pier	20" with 2" height adjustment
VIII	Concrete Pier	22" with 2" height adjustment

All jacks are to be installed on base pads as required by the mobile home manufacturer's set-up instructions.

****

HUGHES MANUFACTURING, INC.
11910 62nd Street North
Largo, Florida 33543

MODEL #	IDENTIFICATION	DESCRIPTION
S-6	Auger Anchor	5/8" x 48" rod/single 6" disc/double head bolt over bolt
SH-6	Auger Anchor	19/32" or 5/8" x 48" rod single disc side by side bolts double head
SAM-5	Auger Anchor	5/8" x 48" rod single 6" disc single head
SC 6	Slab Anchor	5/8" x 4" threaded rod w/expansion lead ancho double head bolt over bolt
SHC 6	Slab Anchor	5/8" x 4" threaded rod w/expansion lead anchor double head side by side bolts
SA 3	Frame Hook	Frame tie - Strap required to encircle the I-Beam

****

STURDY TRUCK EQUIPMENT, INC.
1839 Carolina Beach Road
Wilmington, N. C. 28401

MODEL #	IDENTIFICATION	DESCRIPTION
H-1A	Auger Anchor	5/8" x 48" rod single 6" disc single head
H-3A	Auger Anchor	5/8" x 36" rod 2-4" disc single head
H-5A	Auger Anchor	3/4" x 48" rod single 6" disc single head
H-7A	Auger Anchor	3/4" x 36" rod 2-4" disc single head
ML-1	Auger Anchor	3/4" x .083" x 48" tubular shaft 6" disc

****

APPROVED

ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 5

TIE DOWN ENGINEERING
5901 Wheaton Drive
Atlanta, Georgia 30336

MODEL NEW #	MODEL OLD #	IDENTIFICATION	DESCRIPTION
MPP10	PP10	Pier	10" steel power pier
MPP12	PP12	Pier	12" steel power pier
MPP14	PP14	Pier	14" steel power pier
MPP16	PP16	Pier	16" steel power pier
MPP18	PP18	Pier	18" steel power pier
MPP20	PP20	Pier	20" steel power pier
MPP22	PP22	Pier	22" steel power pier
M12H - 5/8	A2H	Auger Anchor	5/8" x 48" rod single 6" disc w/double head
M12H - 11/16	A2H	Auger Anchor	11/16" x 48" rod single 6" disc w/double head
M122 - 5/8	A22	Auger Anchor	5/8" x 33" 2-4" disc w/double head
M122 - 11/16	A22	Auger Anchor	11/16" x 33" 2-4" disc w/double head
ME48	E1	Auger Anchor	5/8" x 48" single 6" disc w/eye on top
M1T2	T2	Patio Slab Anchor	3/4" x 10" threaded rod w/flat washer and nut double head
M1J2	J2	Patio Concrete Anchor	5/8" x 10" rod concrete anchor w/double head
M1CS2	CS2	Patio Anchor w/bolt	½" x 3" steel expansion bolt with "Redhead Sleve Anchor" Double head
M1AR2	AR2	Double head device (only)	Double head tension device w/bolt hole in bottom of yoke
M1S2	S2	Double head Swivel Adapter	Double head tension device with swivel adapter
Tie Down Engineering Certified to ANSI A119.1 Fed. Spec. QQS781-H		Strapping	1¼" x .035" galvanized steel strapping
MHT6	HT6	Frame hook w/ strap	6' x 1¼" x .035" strap with hook
MBU7	BU7	Strap w/buckle	7' x 1¼" x .035" strap with buckle
MGRB	GRB	Roof bracket	Galvanized Roof Bracket
MBU	BU	Strap Buckle	Galvanized Strap Buckle

****

APPROVED

ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 6

TRI-CITY ALUMINUM PRODUCTS, INC.
Rt. 10, Box 387
Ocala, Florida 32670

MODEL #	IDENTIFICATION	DESCRIPTION
S-1	Frame Tie	6½' x 1¼" x .037" SEMCO Strapping with S-Buckle

****

APPROVED

ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 7

TO APPROVED ANCHOR LISTING
July 27, 1983

STURDY TRUCK EQUIPMENT, INC.
1839 Carolina Beach Road
Wilmington, NC 28401

MODEL #	IDENTIFICATION	DESCRIPTION
S-6	6" Pier	Steel Pier
S-8	8" Pier	Steel Pier
S-10	10" Pier	Steel Pier
S-12	12" Pier	Steel Pier
S-14	14" Pier	Steel Pier
S-16	16" Pier	Steel Pier
S-18	18" Pier	Steel Pier
S-20	20" Pier	Steel Pier
S-22	22" Pier	Steel Pier
S-24	24" Pier	Steel Pier

****

MHA CORPORATION
12662 U.S. Hwy. 20
Middlebury, Indiana 46540

August 30, 1983

MODEL #	IDENTIFICATION	DESCRIPTION
MHA SB 57	Auger Anchor	11/16" x 36" rod w/6" disc Double Head
MHA SB 8	Auger Anchor	3/4" x 48" rod w/6" disc Double Head
MHA SB 10	Auger Anchor	3/4" x 48" rod with double 4" disc Double Head
MHA SB 22	Patio Anchor	½" x 1½" bolt w/lead concrete expansion anchor
MHA SB 26	Concrete Anchor	5/8" x 8" rod w/3" bend on bottom

****

CAREFREE OF COLORADO
2760 Industrial Lane
Bloomfield, CO 80020

November 3, 1983

MODEL #	IDENTIFICATION	DESCRIPTION
MHA	Hex Head Split Bolt	3.130" x .627" cold headed steel

Tested and listed for use with Minute Man Anchors.

TO APPROVED ANCHOR LIST
August 30, 1984

APPROVED
ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 8

RICHEY MACHINE
8516 U.S. HIGHWAY 19 NORTH
PORT RICHEY, FLORIDA 34668

MODEL NUMBER	IDENTIFICATION	DESCRIPTION	SOIL CLASS
Richey M-4	Auger Anchor	5/8" x 48" rod/single 6" disc	D
Richey BU	Buckle	1/8" x 2" x 2 3/8" (steel)	
Richey Machine	Tie-Down Strap	1¼" x .035" QQS781H	
	Bolt	Slotted/Knurled/ Zinc plated	

****

February 20, 1985

STURDY TRUCK EQUIPMENT, INC.
1839 CAROLINA BEACH ROAD
WILMINGTON, NORTH CAROLINA 28401

MODEL NUMBER	IDENTIFICATION	DESCRIPTION	SOIL CLASS
SB-1	Strap/Buckle	One buckle attached to 7½' of 1.25' x .035" strap with one Stanley clip with two crimps. Sturdy Equipment strap	

****

ADDITION TO APPROVED ANCHOR LISTING
July 19, 1985

APPROVED
ANCHOR MANUFACTURER'S LISTING
(Anchors and Components)
Page 9

ANCHOR--SUR
P. O. BOX 684
FREMONT, OHIO 43420

MODEL NUMBER	IDENTIFICATION	DESCRIPTION	SOIL CLASS
48DH	Auger Anchor	3/4" x 48" double 4" disc	D
DTH & HN5830	Head & Anchor Bolt	Head w/5/8"x3½" Phillips anchor bolt	
CDE8	Concrete Anchor with swivel head	10½" x 3/4" rod/hook on end	E
FH-6	Short Frame Hook	2 3/16"x2"x 1/8" steel hook w/6'x1¼" x .035 Anchor Sur Strap (seal w/2 crimps)	
FB-6	Long Frame Hook	4 3/4"x2"x 1/8" steel hook with 6'x1¼ x .035 anchor strap (clip w/2 crimps)	
SB-6	Frame Tie/Strap w/Buckle	2"x2"x 1/8" buckle w/6'x 1¼" x .035 Anchor Sur Strap (clip w/2 crimps)	
Strap	Anchor Sur Strap	1¼' x .035 galv. strap	
SB	Hex Shoulder Bolt	2 3/4" x 5/8" slotted knurled bolt	
SB-1	Buckle (Only)	2"x2" x 1/8" buckle	

****

UNAPPROVED FOR USE ON
MOBILE HOMES IN THE STATE OF FLORIDA

SEPTEMBER 27, 1988

RICHEY MACHINE
8516 U. S. HIGHWAY 19 NORTH
PORT RICHEY, FLORIDA 34668

MODEL NUMBER	IDENTIFICATION	DESCRIPTION
DR-30	Auger Anchor	30" rod with 2 - 4" disc double head

HUGHES MANUFACTURING, INC.
11910 62nd STREET NORTH
LARGO, FLORIDA 33543

MODEL NUMBER	IDENTIFICATION	DESCRIPTION
SH-24	Auger Anchor	24" rod with 2 - 4" disc
SH-36	Auger Anchor	36" rod with 2 - 4" disc
I-15	Auger Anchor	15" rod eye anchor
I-30	Auger Anchor	30" rod eye anchor
I-48	Auger Anchor	48" rod eye anchor

Appendix F

APPENDIX F

EXCERPTS FROM FEDERAL STANDARDS PERTAINING TO WIND STORM PROTECTION REQUIREMENTS

AND

RESOLUTION 09/21/88-2 PERTAINING TO INSTALLATION OF MANUFACTURED HOMES

(a) *Provisions for support and anchoring systems.* Each manufactured home shall have provisions for support and anchoring systems, which, when properly designed and installed, will resist overturning and lateral movement (sliding) of the manufactured home as imposed by the respective design loads. The design wind loads to be utilized for calculating resistance to overturning and lateral movement shall be the wind loads indicated in § 3280.305(c)(1) and (2) increased by a factor of safety of 1.5. The basic allowable stresses of materials required to resist overturning and lateral movement shall not be increased in the design and proportioning of these members.

(1) The provisions of this section shall be followed and the support and anchoring systems shall be designed by a Registered Professional Engineer or Architect.

(2) The manufacturer of each manufactured home is required to make provision for the support and anchoring systems but is not required to provide the anchoring equipment or stabilizing devices. When the manufacturer's installation instructions provide for the main frame structure to be used as the points for connection of diagonal ties, no specific connecting devices need be provided on the main frame structure.

(b) The manufacturer shall provide printed instructions with each manufactured home specifying the location and required capacity of stabilizing devices on which the design is based. The manufacturer shall provide drawings and specifications certified by a registered professional engineer indicating at least one acceptable system of anchorage including the details of required straps or cables, their end connections and all other devices needed to transfer the wind loads from the manufactured home to the ground anchors.

(c) The provisions made for anchoring systems shall be based on the following design criteria for manufactured homes.

(1) The minimum number of ties required per side shall be as required to resist the design loads stated in § 3280.305(c) (1) and (2).

(2) Ties shall be as evenly spaced as practicable along the length of the manufactured home with not more than 8 feet open-end spacing on each end.

(3) When continuous straps are provided as vertical ties, such ties shall be positioned at rafters and studs. Where a vertical tie and diagonal ties are located at the same place, both ties may be connected to a single ground anchor, provided that the anchor used is capable of carrying both loadings.

(4) Add-on sections of expandable manufactured homes shall have provisions for vertical ties at the exposed ends.

(d) Double-wide manufactured homes require only diagonal ties. These shall be placed along the main frame and below the outer side walls.

(e) Protection shall be provided at sharp corners where the anchoring system requires the use of external cables or straps. Protection shall also be provided to minimize damage to roofing or sliding by the cable or strap.

(f) Anchoring equipment shall be capable of resisting an allowable working load equal to or exceeding 3,150 pounds and shall be capable of withstanding a 50 percent overload (4,725 pounds total) without failure of either the anchoring equipment or the attachment point on the manufactured home.

(g) Anchoring equipment exposed to weathering shall have a resistance to weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 ounces per square foot of surface coated.

(1) Slit or cut edges of zinc-coated steel strapping do not need to be zinc coated.

(2) Type 1, Finish B, Grade 1 steel strapping, 1¼ inches wide and 0.035 inch thick, conforming with Federal Specification QQ-S-781H-1974, with 1977 Amendment 2 and Notice I, Strapping, Steel, and Seals, is judged to conform with the provisions of this section and paragraph (f) of this section.

(Sec. 625 of the National Manufactured Housing Construction and Safety Standards Act of 1974, 42 U.S.C. 5424)

NCS BCS

National Conference of States on Building Codes and Standards, Inc.
481 Carlisle Drive, Herndon, Virginia 22070 (703) 437-0100

OFFICERS

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DIRECTOR
ARKANSAS MANUFACTURED HOME COMMISSION
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DIRECTOR OF CODES ADMINISTRATION
DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT
ANNAPOLIS, MARYLAND

EXECUTIVE DIRECTOR
ROBERT C. WIBLE

RESOLUTION 09/21/88-2

WHEREAS, as it is the intent of the U.S. Congress that the consumers of manufactured homes live in homes that are safe and durable; and

WHEREAS, since June 1976 in their effort to carry out their duties under the Federal Manufactured Housing Construction and Safety Standards Program, the states have continued to receive complaints from unsatisfied consumers of manufactured homes; and

WHEREAS, in performing SAA complaint activities, the states observe that the proper set up of a manufactured home is a significant factor in determining the overall performance of the home; and

WHEREAS, the improper set up of a manufactured home greatly decreases the life expectancy and performance of the home and often results in the introduction of serious defects and safety hazards; and

WHEREAS, many states have not been able to effectively pass and implement legislation and regulations to regulate the set up of manufactured homes.

NOW, THEREFORE, BE IT RESOLVED, that the U.S. Congress and the U.S. Department of Housing and Urban Development urge the states to pass and effectively implement manufactured home set up laws as a condition of receiving and maintaining SAA approval within three years.

BE IT FURTHER RESOLVED, that only manufactured homes installed under the HUD-approved SAA programs, or in its absence a HUD-approved organization enforcing DAPIA-approved installation instructions, be eligible for federal mortgage insurance.

RESOLVED this 21st day of September, 1988.

Appendix G

APPENDIX G

CORRESPONDENCE

Indiana Manufactured Housing Association, Inc.

EXECUTIVE OFFICES: 3210 RAND ROAD • INDIANAPOLIS, INDIANA 46241-5499 • (317) 247-6258

Ronald L. Breymier
Executive Vice President

Bud Lachmann
Director of RV Operations

Connie Moore
Director of MH Operations

Sue Bartee
Midwest Show & Events Manager

Rhonda Wilson
Director of Public Relations

Jenny Knoebel
Office Manager

Pat Smilley
Secretary-RV Division

Cathy Pang
Secretary

1988 Board of Governors

Jerry Pickrell
President

Jim Boyts
Vice President
RV Manufacturers Division

Dan Keaffaber
2nd Vice President
MH Dealers Division

Bill Graham
Secretary
MH Communities Division

Martin Hey
Treasurer
South Central Chapter

Art Knochel
Assistant Treasurer
Tippecanoe Chapter

Vernon Sailor
Past President

Dave Cagley
Campground Division

Bob Coplen
RV Dealers Division

Rex Durrett
Central Indiana RV Chapter

Charlie Garrison
Northwestern Chapter

Kay Gedert
West Central Chapter

Wayne Graves
Finance/Insurance Div.

Sharon Hope
Capitol City MH Chapter

Jamie Lanter
Suppliers Division

Dale Ludwig
Service Firm Division

Jameson McGraw
East Central Chapter

Farrel Miller
Northeastern MH Chapter

Skip Miller
MH Manufacturers Division

Harold Platt
Valley Chapter

Ed Seizer
Southwestern Chapter

Chip Story
Southeastern Chapter

August 29, 1988

RECEIVED
AUG 31 1988
NCSBCS

Mr. Shyam Choudhary
National Conference of States on
Building Codes and Standards, Inc.
481 Carlisle Drive
Herndon, VA 22070

Dear Shyam:

I am sorry I missed you in South Bend. My responsibilities during show hours required more attention than I expected.

I was able to attend the joint task force meeting Wednesday afternoon, but had to return to the show prior to Ashok's presentation. I particularly wanted to hear his comments on installation and the states' involvement in enforcement.

At this point, our task force is divided not as to the need for installation standards, but the method of inspection, enforcement, education, licensing, etc.

We have a board meeting in a few weeks, at which time the task force would like to give a progress report. Several of the task force members support taking a "wait and see" attitude. I, on the other hand, would like to be prepared for any state or federal mandates the industry is facing.

It will help me to know exactly what NCSBCS has in mind. Do you foresee HUD enforcement of a standard? Do you anticipate the SAA's acting as the educator and enforcer of an installation standard? Do you see the proposed standard as federally pre-emptive? I am sure my concerns could have been addressed by Ashok. I regret my absence a great deal.

I will phone you after Labor Day to discuss these issues. Enjoy the holiday and the remaining days of summer.

Sincerely,

Connie Moore

Connie Moore
Director, MH Operations

- ☐ DIR., MFG. HSG./CODES & STDS.
- ☑ ASST. DIR./CHIEF ENG.
- ☐ [illegible] & [illegible] SER.
- ☐ FIELD ENGINEERS
- ☐ EXECUTIVE DIRECTOR
- ☐ OTHERS

National Foundation
Manufactured Home Owners

161 FRANCISCAN DRIVE * DALY CITY, CALIFORNIA * (415) 992-7470

August 22, 1988

RECEIVED
AUG 26 1988
NCSBCS

James C. Nistler
Deputy Assistant Secretary
for Single Family Housing
Department of H. U. D.
451 Seventh Street, S. W.
Washington, D. C. 20410

Re: Invitation of Mr. Ashok Goswami to Our National Foundation Meeting in Las Vegas

Dear Jim:

This letter is to respectfully request that you authorize Mr. Ashok Goswami to attend and to participate in our Annual National Foundation Meeting in Las Vegas on September 29-30 per the attached announcement.

We would ask Mr. Goswami to review the function of the HUD Contract Agent for the National Manufactured Housing Program, the consumer and remedial complaint programs - subpart I, the relationship between the manufacturer/dealer and consumer thru the SAA Program, and other equal interests to the purchaser/homeowner.

In addition, we would allot the time for showing the slides on the installation of manufactured housing, to present the newly released 1987 Edition of the Manufactured Housing Installation Standards, ANSI A-225.1, and to encourage each state to adopt comparable and suitable standards.

Thank You, Jim. We kindly ask for your approval.

Sincerely

Len

Len Wehrman
Vice President for Gov't
and Industry Relation

Copy to:

Bob Wible, NCSBCS

- [x] DIR., MFG. [illegible] & STDS.
- [ ] [illegible]
- [ ] MGR., DESIGNS & EVAL. SER.
- [ ] FIELD ENGINEERS
- [ ] EXECUTIVE DIRECTOR
- [ ] OTHERS

REMARKS

National Foundation
Manufactured Home Owners

161 FRANCISCAN DRIVE * DALY CITY, CALIFORNIA * (415) 992-7470

ANNOUNCEMENT OF June 28, 1988

SPECIAL INVITATION

TO MANUFACTURED HOUSING

HOMEOWNER-INDUSTRY-GOVERNMENT FORUM

BY THE NATIONAL FOUNDATION OF MANUFACTURED HOME OWNERS

To:
(a) U. S. Department of Housing and Urban Development
(b) National Conference of States on Building Codes and Standards
(c) Manufactured Housing Institute
(d) Association for Regulatory Reform
(e) National Manufactured Housing Federation
(f) Major Manufactured Housing Community Owners-Syndicators and other Financial Investment Corporations

Forum: Analyze What Is Happening To Manufactured Housing Within The Industry And Government Segments And How It Is Affecting Both Current And Future Homeownership! "Twelve Years and Counting",

Where/When: Las Vegas, Nevada. Landmark Hotel. Reser. 1-800-634-6777

September 29, 1988 - Thursday - 1:00 PM to 5:30 PM
September 30, 1988 - Friday - 8:00 AM to 5:00 PM

Please ask for "Len Wehrman" or "John Jensen" upon arrival.

Topics:
1. Have the Gov't and Industry served the public/homeowners?
2. Are rental/lease type communities creating today's problems?
3. Does the free market of supply and demand work for MH?
4. Have the marketing and sitings kept pace with technology?
5. Is the sustained turn-down in production predictable?
6. After 12 years, are the Federal MHCSS Regulations a success?
   Are they a form of "protectionism" with serious results?
   Should they be de-regulated and removed from HUD?
   Do the DAPIA-IPIA-SAA Programs need total revisions?
   Is the industry (and gov't) providing "affordable" housing?
7. Legislation at state level - why the confrontation?
8. Should this type of forum be an annual event?

Len

Len Wehrman
Vice President for Gov't
and Industry Relation

PLEASE ACKNOWLEDGE AT EARLIEST DATE!

Appendix H

APPENDIX H

EXCERPTS FROM REPORTS USED FOR THE INSTALLATION STUDY

This Appendix includes an excerpt from the NBS publication, "Soil and Rock Anchors for Mobile Homes - A State-of-the-Art Report." The excerpts from this include the following:

- Summary and Recommendations
- Information about Helix and Multi-Helix Anchors

For additional information, refer to the above publication.

This Appendix also includes an NCSBCS State Task Force Report on the Federal Manufactured Housing Program, "Final Report - Fulfilling the Public's Trust."

Specific excerpts from this report include a recommendation for "uniform national state-based system" for the installation of manufactured housing.

For additional information see this report.

NBS BUILDING SCIENCE SERIES 107

Soil and Rock Anchors for Mobile Homes - A State-of-the-Art Report

William D. Kovacs

Purdue University
Lafayette, Indiana 47907

and

Felix Y. Yokel

Center for Building Technology
National Engineering Laboratory
National Bureau of Standards
Washington, D.C. 20234

Prepared for

Division of Engineering, Building Technology and Standards
Office of Policy Development and Research
Department of Housing and Urban Development
Washington, D.C. 20410

U.S. DEPARTMENT OF COMMERCE, Juanita M. Kreps, Secretary

Luther J. Hodges, Jr., Under Secretary

Jordan J. Baruch, Assistant Secretary for Science and Technology

NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director

Issued October 1979

SUMMARY AND RECOMMENDATIONS

1. AVAILABLE ANCHORING SYSTEMS

A wide variety of soil and rock anchors, and some other methods to tie down a mobile home are commercially available. The anchoring may be made directly in natural or compacted soil, rock, coral, or directly to concrete slabs or other foundation elements. Based on the limited pull-out test data available, it appears that most of the anchor types discussed in this report can be installed to adequately meet the loading requirements in present standards.

2. SOIL CLASSIFICATION

An industry-wide nomenclature describing soils and rock is nonexistent. Different organizations call the same soil type by different names and assign to it different anchor pull-out capacities. As a result, it is difficult to interpret and correlate available test data and develop sound empirical design procedures. However, in areas where local field experience has been accumulated, satisfactory anchoring of mobile homes is accomplished by adequate characterization of regional soil conditions.

The present practice of assigning pull-out capacities to various anchor types on the basis of visual descriptions of soil types is potentially misleading and unsafe. Such "soil descriptions" seldom take into account the actual soil properties and conditions that govern the pull-out capacity. It is concluded that there is a need for an industry-wide consensus on terminology for describing, and methods of characterizing soils and rocks.

3. ENGINEERING CORRELATIONS BETWEEN SOIL PROPERTIES AND ANCHOR PULL-OUT CAPACITY

Hypotheses and equations for predicting anchor pull-out capacity have been developed and are presented in this report. Correlation between measured

and calculated anchor capacity is poor, particularly for granular soil. The mobile home industry uses the Standard Penetration Test (SPT), Soil Test Probe (STP) or visual soil descriptions to select anchors for given site conditions. The SPT provides a fairly reliable indication of soil properties for granular soils but only a very crude approximation when cohesive soils are investigated. It is questioned if those who use the SPT for anchor design are aware of these facts. The Soil Test Probe may provide an indirect measurement of soil shear strength which governs the pull-out capacity of anchors. However, based on the available data (or perhaps because of the absence of adequate data), the correlation between the STP readings and pull-out capacity is not obvious and further experimental (field) study is required.

Since some soils change strength and therefore anchor holding capacity seasonally, some method of taking this strength change into account for design purposes is required. Available information and present design procedures do not account for this problem. Similarly, little information is available on adequate design of mobile home anchors in expansive soils and soils that undergo seasonal frost heave.

There is an almost complete lack of information on the effects of cyclic (Dynamic) loading on anchor capacity. Since wind loads are cyclic and soil strength generally deteriorates with increasing numbers of loading cycles, dynamic loading effects should be further investigated.

4. TEST STANDARDIZATION

One of the main reasons for our inability to correlate soil and rock properties with pull-out capacity is the overall lack of adequate data in the mobile home anchor literature. In order to determine this correlation, test data should convey the following information:

A. Complete load versus uplift displacement data in order to establish the ultimate loads as well as displacement characteristics

for a given anchor and depth of embedment in a specific soil condition.

B. Complete description of the anchors used, their depth of embedment, method of installation, and installation torque (if applicable).

C. An evaluation of the soil properties and the location of the ground water table at the site. The soil properties determined should include the shear strength parameters and the soil weight per unit volume (density). These properties should be determined by field and/or laboratory tests other than the SPT or STP.

D. The results of Standard Penetration Tests, Soil Test Probe tests, and other in-situ tests that could later be used to predict anchor capacity.

All four items should be provided together to develop correlations. Typically only 2 or at best 3 of the 4 items are available in existing data.

In Item A above, the need for pull-out load-displacement data is mentioned. Presently, there is no standard method for performing pull-out tests in the mobile home anchoring industry. As a result, the precision, accuracy, and amount of information typically provided in a pull-out test report is deficient when compared with a typical ASTM standard test. Most available load test reports list the soil class as determined visually without any shear strength indicator.

5. RECOMMENDATIONS

The following is recommended on the basis of this study:

- To adopt an industry-wide soil classification system including a standard nomenclature to define soils and rock;

- to prepare a standard method of performing anchor pull-out tests in the field, including minimum requirements for the characterization of soils;

- to conduct a test program in order to establish correlations between anchor pull-out capacity and several in-situ tests, and to determine effects of dynamic, cyclic, and sustained loading, loading which is not in the direction of the anchor shaft, and anticipated seasonal changes in the moisture content of the soil;

- to develop a standard performance test by which the adequacy of anchors can be determined.

4.3.2 Helix and Multi-Helix Anchors

One of the more common (mobile home) anchors is the helix or multi-helix anchor (see figure 4.2). Anchor sizes range from 3-in (0.08-m) diameter to 15-inch (0.38-m) diameter (for very high capacity anchors not used for mobile homes). Anchors are also available in twin 4-in or twin 6-in helix arrangement. Typical installation is performed by applying a vertical load to the anchor while it is "turned" into the ground to the desired depth. This turning or torquing can be done either by hand or by a power tool. Under these latter conditions it is appropriate to measure the installation torque in units of ft-lb or in-lb. In accordance with information obtained from anchor manufacturers, the pull-out capacity in lb is approximately 10 times the installation torque in ft-lb. This number should be field verified in each location. Minimum recommendations for anchor rod diameter and depth of embedment for both 6- and 8-inch diameter helix anchors suggested by Harris [46] are shown in figure 4.3. Klym's [60a] experiences at Ontario Hydro indicate that, to be fully effective, the helix anchor should have a minimum embedment of 5 helix diameters and that the top helix should be below the anticipated frost line. For multi-helix anchors, the pitch [and spacing] of the helix are designed to make the top helix follow the same helical path as the bottom helix to ensure minimum soil disturbance. In some soils, disturbance will cause a significant reduction in the holding capacity of the anchor. These considerations are discussed in the following sections of this report. Multi-helix anchors were found to be more suitable when installed in medium to stiff clays and medium

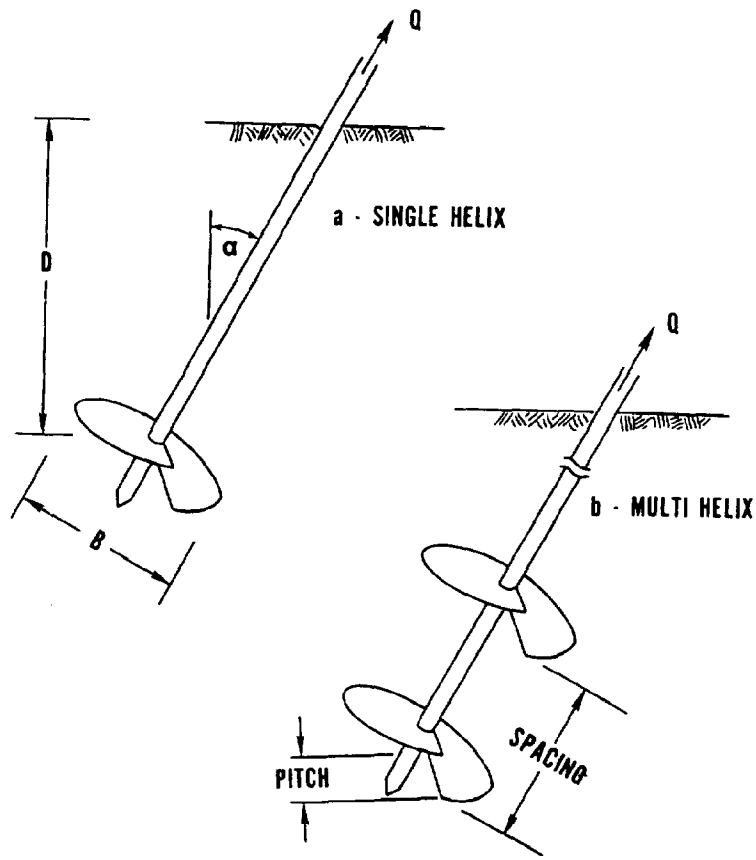
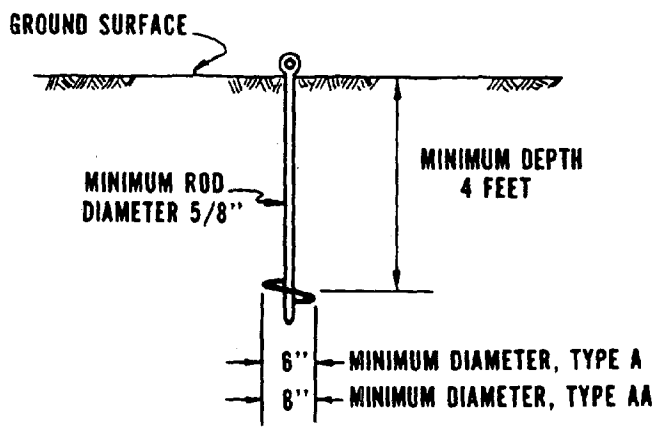


Figure 4.2 Helix and Multi-helix Anchors

Type A - A screw auger of minimum auger diameter of 6 inches with a minimum 5/8 inch diameter rod installed with a minimum depth of 4 feet. Also 8 inch size Arrowhead anchor.

Type AA - Same as Type A except minimum auger diameter is 8 inches. Also 10 inch size Arrowhead anchor.



NOTE: 1 in = 25.4 mm
1 ft = 0.30 m

Figure 4.3 Minimum Dimensions Recommended by Harris for Helix Anchors [46]

density sands. According to Robinson [87], their use in very hard and dense materials or soils containing gravel and cobbles is very limited.

An alternative method for the installation of helix anchors is to partially excavate a hole to some depth, say for example 2 feet (0.6 m). Next, the helix anchor is installed and turned into the soil from the depth of 2 feet to the designed depth, typically 4 feet (1.2 m). Finally, the hole may be backfilled by tamping or compacting the soil, or perhaps better yet, filled with lean concrete. Filling the hole with concrete serves several useful functions. These are: added weight that the anchor must pull against; an increase in side resistance to a vertical pull-out; and an increased resistance to horizontal loads because of the increased bearing area of the concrete surrounding the shaft. The comments about horizontal anchor capacity apply to all of the types of anchors mentioned, since typically the diameter of the anchor shaft at the ground surface is very small (in the order of an inch (25 mm) or less) and, therefore, has a very small bearing area to transmit horizontal load to the soil. Proponents of the Helix Anchor will argue, and perhaps rightly so, if only vertical pull-out is considered, that [to achieve maximum pull-out capacity] the anchor should be torqued or twisted into place, never installed in a partially excavated hole and then backfilled. Further field tests are necessary to establish behavior under various installation conditions.

NCS BCS

NCSBCS State Task Force
on the
Federal Manufactured Housing Program

FINAL REPORT

"FULFILLING THE PUBLIC'S TRUST"

March 12, 1987

Recommendation #2:

A uniform national state-based system must be established that promotes the adoption and enforcement of manufactured housing installation standards by state and local units of government. Such a system must also promote bonding and licensing of dealers and installers.

Basis of Recommendation:

A major source of frustration to manufacturers is the lack of state or local regulations and enforcement for proper installations of homes. No matter how well a home is built, there will be problems if it is improperly installed. Improper installation can lead to structural failures to the home, condensation problems, or damage during storms or high winds. Similarly, problems with homes can occur due to inadequate blocking of the home while on display or in storage at the dealer's lot, improper dealer alterations, or damage incurred during transportation.

While the federal program requires that the manufacturers provide limited installation instructions for each home, the federal law does not provide for the enforcement of these or any other standard for the home's installation.

Installation and proper treatment of the units by the dealers are solely within the jurisdiction of the states or local units of government. Presently, only about half of the states have an installation standard as law. Many of these states require that the manufacturers' instructions be used. Many also require that a more comprehensive standard, such as ANSI A225.1/NFPA 501A Manufactured Home Installation Standard be used. The task force regretably notes, however, that even where the states mandate proper installation of homes, there is frequently inadequate enforcement of the state requirements by state and local government.

The states' monitoring and enforcement of public safety regulations on dealers and installers also varies. Of 44 respondents to the task force's surveys of the states: 29 states reported that they inspect dealer lots; 29 license dealers; 21 inspect installations; and 17 license installers.*

The task force strongly recommends that uniform installation standards be adopted and enforced by the states and local units of government. The ANSI A225.1 Standard is being updated and should be available later this year. The task force recommends that the states adopt and work with the local units of government to enforce the updated A225.1 Standard.

The task force recognizes that in some states there is political resistance to these types of the statewide programs. Such resistance may not only be the unwillingness of local units of government to be preempted by the state government, but may also be resistance of some dealers and installers. The difficulty in enacting such measures is exemplified by the State of Wisconsin, which reports that installation is a big problem, but thus far has been unable to get an installation bill through the state legislature.

Governors, state legislators, and other elected officials must be made aware of the durability, health, and life safety problems faced by their constituents because of inadequate statewide or local installation requirements and enforcement. To support this effort, the task force recommends that HUD share appropriate SAA data with the state governors and legislators to promote their understanding of the need for properly enforced installation standards.

* See Appendix B1

Furthermore, the task force proposes that HUD encourage the adoption of installation standards and licensing, bonding, and enforcement programs through the requirements of FHA and VA financing. HUD can require that a locality or state have such a program in effect in order for a home to qualify for FHA or VA financing.

States that have adopted and enforced installation standards have experienced significant decreases in the number of consumer complaints. The State of Arizona, for example, experienced a 40% drop in consumer complaints within six months of enacting a statewide installation program. The task force calls upon NCSBCS, MHI, and NMHF to jointly fund and develop model state and local legislation for adopting and enforcing installation standards.

"The States' Activities in the Regulation of Manufactured Homes"

	Performs Dealer Lot Inspections	Licenses Dealers	Installation Standard	Inspects Installations	Licenses Installers	SAA	IPIA	DAPIA	Units Shipped to State 1976-86
Alabama	Yes	Yes	No	Yes	No	Yes	No	No	84,189
Alaska	No	Yes	No	No	No	No	No	No	3,225
Arizona	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	66,864
Arkansas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	39,649
California	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	143,074
Colorado	Yes	Yes	No	Yes	No	Yes	Yes	No	27,713
Connecticut	No	No	Yes	No	Yes	No	No	No	3,417
Delaware	No	No	No	No	No	No	No	No	16,738
Florida	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	271,277
Georgia	Yes	Yes	No	No	No	Yes	Yes	No	131,904
Hawaii	No	No	No	No	No	No	No	No	0
Idaho	Yes	Yes	No	No	No	Yes	Yes	No	19,737
Illinois	No	No	No	Yes	No	No	No	No	38,655
Indiana	Yes	No	No	No	No	Yes	Yes	No	52,598
Iowa	No	No	Yes	Yes	Yes	Yes	No	No	14,475
Kansas	Yes	Yes	Yes	No	No	No	No	No	26,663
Kentucky	Yes	Yes	Yes	Yes	No	Yes	No	No	54,750
Louisiana	Yes	Yes	No	No	No	Yes	Yes	No	117,395
Maine	Yes	Yes	No	No	Yes	Yes	No	No	13,503
Maryland	No	No	No	No	No	Yes	No	No	12,251
Massachusetts	No	No	Yes	Yes	No	No	No	No	6,775
Michigan	Yes	No	Yes	Yes	No	Yes	No	No	67,457
Minnesota	Yes	Yes	Yes	Yes	Yes	Yes	No	No	23,928
Mississippi	No	No	No	No	No	Yes	No	No	51,470
Missouri	Yes	Yes	No	No	No	Yes	No	No	45,495
Montana						No	No	No	16,823

"The States' Activities in the Regulation of Manufactured Homes"

	Performs Dealer Lot Inspections	Licenses Dealers	Installation Standard	Inspects Installations	Licenses Installers	SAA	IPIA	DAPIA	Units Shipped to State 1976-86
Nebraska	No	Yes	No	No	No	Yes	Yes	Yes	10,594
Nevada	Yes	Yes	Yes	Yes	Yes	Yes	No	No	20,734
New Hampshire						No	No	No	10,756
New Jersey	No	No	No	Yes	No	Yes	No	No	7,706
New Mexico	Yes	Yes	Yes	Yes	Yes	Yes	No	No	41,494
New York	No	No	Yes (responded No)	No	No	Yes	No	No	50,275
North Carolina	Yes	Yes	Yes	Yes	Yes	Yes	No	No	176,259
North Dakota	Yes	Yes	No	No	No	No	No	No	10,181
Ohio	Yes	No	Yes (responded No)	Yes	No	No	No	No	62,002
Oklahoma	No	No	No	No	No	No	No	No	68,845
Oregon	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	42,842
Pennsylvania	No	Yes	No	No	No	Yes	No	No	68,930
Rhode Island	No	No	Yes	No	No	Yes	No	No	1,197
South Carolina	Yes	Yes	No	No	Yes	Yes	No	No	98,869
South Dakota						Yes	No	No	8,290
Tennessee	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	60,179
Texas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	307,523
Utah						Yes	Yes	No	13,026
Vermont						No	No	No	5,210
Virginia	Yes	Yes	Yes	Yes	No	Yes	No	No	55,938
Washington	Yes	Yes	No (Yes)	No	Yes	Yes	Yes	No	76,363
West Virginia	Yes	Yes	Yes (responded No)	No	Yes	No	No	No	36,429
Wisconsin	Yes	Yes	No	No	No	Yes	Yes	No	25,974
Wyoming						No	No	No	13,555
Total	29/15	29/15	22/22	21/22	17/27				2,623,196

NOTE: This information was collected from the task force's surveys of the states and follow-up phone calls. Although the state may not perform the above activities, they may be performed by local jurisdictions. Also, for some of these states, the above activities are performed by different agencies.

Appendix I

APPENDIX I

NCSBCS A225.1 -1987

This Appendix contains information on an edition of NCSBCS' standards for manufactured home installation. It contains copies of pages that may be of interest, and information on how to obtain this installation standard.

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NCSBCS Standard for

Manufactured Home Installations

(Manufactured Home Sites, Communities, and Set-ups)

NCSBCS A225.1-1987

1987 Edition of NCSBCS A225.1

This edition of *NCSBCS Standard for Manufactured Home Installations (Manufactured Home Sites, Communities, and Set-ups)* was prepared by the National Conference of States on Building Codes and Standards, Inc. (NCSBCS) Committee on Manufactured Home Installations (Manufactured Home Sites, Communities, and Set-ups). It was approved by the NCSBCS Standards and Evaluation Committee at the September 14, 1987 Annual Meeting of the Conference. Prior to approval, the document had been submitted to public review and comment within NCSBCS. All public comments were resolved and this document has been submitted to ANSI for its separate approval. However, under the NCSBCS procedures, the NCSBCS Standards and Evaluation Committee approval of September 14, 1987 is the effective date for this standard as an NCSBCS standard. This edition supersedes all previous editions.

Contents

Chapter 1 Scope and Intent of Standard, Organization of Standard, and Definitions

1-1 Scope 1
1-2 Intended Usage of Manufactured Homes Covered Under This Standard 1
1-3 Definitions and Units 1
1-4 Single and Multiple Manufactured Home Sites - General 4
1-5 Manufactured Home Installation Instructions 4

Chapter 2 Siting and Foundation Systems

2-1 Siting and Foundation Systems 5
2-2 Acceptable Foundation Systems Information 5
2-3 Site Considerations 5
2-4 Manufactured Home Installation 7
2-5 Foundation Standards 9
2-6 Placement 11

Chapter 3 Plumbing

3-1 General Requirements 15
3-2 Water Supply 15
3-3 Wells as the Source of Supply 15
3-4 Sewage Systems - General 16
3-5 Sewage Piping Installations 16
3-6 Sewage System and Treatment Facilities 17
3-7 Septic Tanks 17

Chapter 4 Mechanical Equipment (Heating and Cooling)

4-1 Exterior Mechanical Equipment 19

Chapter 5 Fuel Supply 19

Chapter 6 Electrical 19

Chapter 7 Life and Firesafety 19

Chapter 8 Manufactured Home Accessory Buildings and Structures

8-1 General 21
8-2 Cabana 21
8-3 Awnings and Carports 21
8-4 Ramadas 22
8-5 Porches, Stairways, and Landings 22
8-6 Storage Structures 23
8-7 Fences and Windbreaks 23

Appendix A Barrier-Free Design Aspects for the Physically Handicapped (Exterior Only) 24

Appendix B Wind Zone and Roof Load Zone Maps 26

Appendix C Typical Designs of Piers for Load-Bearing Supports for Manufactured Homes 27

Appendix D Suggested Manufactured Home Community Environment and Health Guidance 45

Appendix E Use and Preventive Maintenance of Manufactured Home Installations 46

Appendix F Availability of Utilities 47

Appendix G National Flood Insurance Program 47

Appendix H Ground Level Installation of Manufactured Homes (Floor at Grade) 47

Appendix I Referenced Publications 48

Chapter 1
Scope and Intent of Standard, Organization of Standard, and Definitions

1-1 Scope. This standard covers the installation of manufactured homes, wherever located, and minimum construction standards for manufactured home communities. Included are requirements for manufactured home sites (whether a single site or sites located in communities), utility facilities, manufactured home set-ups, and manufactured home on-site accessory buildings or structures. This standard references fire safety requirements for the installation of manufactured home sites, including accessory buildings, structures, and communities.

Note: Wherever the phrase manufactured homes is used it is intended to include mobile homes. See Section 1-2.1 and the definitions in Section 1-3.

1-2 Intended Usage of Manufactured Homes Covered Under this Standard. The provisions of this standard are intended to apply to manufactured homes (single section, multiple section, or expandable types) for use as single-family dwellings.

Note 1: The Federal Manufactured Home Construction and Safety Standards (MHCSS) cover single family occupancies only. This standard makes no provisions for other residential occupancies.

Note 2: This standard does not apply to manufactured homes used for other than dwelling purposes.

Note 3: The provisions of this standard shall not apply to recreational vehicles as defined in the *NFPA 501C, Standard for Recreational Vehicles*, or to Park Trailers as defined in the *ANSI A119.5, Standards for Park Trailers*.

1-2.1 Types of Structure Covered.

(a) **Manufactured Homes.** The manufactured homes covered under this standard are manufactured homes complying with the U.S. Department of Housing and Urban Development Manufactured Home Construction and Safety Standards Program as set forth in 24 C.F.R., Parts 3280, 3282, and 3283 as mandated in the United States of America and manufactured homes built prior to June 15, 1976 to those complying with the *Standard for Mobile Homes, NFPA 501B/ANSI A119.1* edition in effect at the time of manufacture.

Note: The HUD MHCSS Program is composed of three parts, as authorized by 42 U.S.C. 5401 et. seq.:
*Part 3280 - MHCSS
*Part 3282 - MH Procedural and Enforcement Regulations
*Part 3283 - MH Consumer Manual Requirements

(b) **Accessory Buildings and Structures.** See Section 1-3 for definitions. See also Chapter 8 for design considerations for accessory buildings and structures.

(c) **Community Buildings.** Every community building shall be designed and constructed in accordance with the applicable provisions of state and local regulations.

1-2.2 Applicability. This standard is designed to be adopted by authorities having jurisdiction responsible for the safety and health of manufactured home users and for establishing regulations applicable to manufactured home communities. It is intended to apply to all manufactured home set-ups and to new rather than existing manufactured home sites and communities. While this standard provides useful technical data for improvements to existing sites and communities falling within its scope and such use is encouraged, it is not intended to be applied retroactively to existing sites and communities except where the authority having jurisdiction considers such application essential for the safety and health of the occupants or users of the sites and communities. This standard shall not be construed as relieving the installer of a manufactured home of responsibility for compliance with the manufacturer's installation instructions, state and local ordinances, codes, and regulations established by the authorities having jurisdiction. This standard does not relieve owners or operators of manufactured home communities from complying with any other legally enforceable regulations of any responsible authority having jurisdiction, or relieve the manufactured home owner or occupant from responsibilities for the proper use and maintenance of a manufactured home.

1-2.3 Organization of Standard. This standard is divided into eight chapters with appendix material. The chapters are divided generally by the kinds of work involved to facilitate adaptation by local jurisdictions. Chapter 1 provides general information; Chapter 2 gives information on the site design set-up and stabilization of the manufactured home; Chapter 3 is on plumbing; Chapter 4, on heating and cooling; Chapter 5, on fuel and supply systems; Chapter 6 contains standards for electrical work; Chapter 7 references NFPA 501A on life and fire safety; and Chapter 8 treats the subjects of manufactured home accessory buildings and structures. Appendix material gives additional guidance as shown in the contents, and the provisions in the appendix shall not apply unless specifically adopted.

1-3 Definitions and Units.

Accessory Building or Structure, Manufactured Home. A building or structure which is an addition to or supplements the facilities provided by a manufactured home. Examples are: awnings, cabanas, garages, ramadas, storage structures, carports, fences, windbreaks, or porches.

Anchoring Equipment (Ties). Straps, cables, turnbuckles. and chains, including tensioning devices, which are used to secure a manufactured home.

Anchoring System. A method of construction which when properly designed and installed will resist overturning and lateral movement of the manufactured home.

Approved. Acceptable to the authority having jurisdiction.

Note: The National Conference of States on Building Codes and Standards, Inc. (NCSBCS) and the American National Standards Institute (ANSI) do not approve, inspect, or certify any installations, procedures, equipment, or material, nor do they approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NCSBCS or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listing or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure.

Awning. A shade structure supported by posts or columns or entirely or partially supported by a manufactured home installed, erected, or used on a manufactured home site.

Baling. A method of "wrapping" a cross section (roof, walls, and floor) and the main frame (chassis) of a manufactured home with straps.

Cabana. A room enclosure erected or constructed adjacent to a manufactured home for residential use by the occupant of the manufactured home.

Carport. An awning or shade structure for a vehicle or vehicles which may be freestanding or attached to a manufactured home.

Community Building. Any nonresidential building used for manufactured home community purposes.

Community Management. The person or entity who owns a manufactured home development or has charge, care, or control of a manufactured home community (park, estate, subdivision, etc.).

Community, Manufactured Home. A parcel (or contiguous parcels) of land which has been so designated and improved that it contains two or more manufactured home sites available to the general public for the placement of manufactured homes for occupancy.

Note: The manufactured home sites may be for rent or lease, or sites may be sold for residential occupancy (as in a subdivision).

Community Street. A public or p[illegible]ay which affords principal means of access to abutting individual manufactured home sites and community buildings.

Diagonal Tie. A tie intended to primarily resist horizontal or shear forces and which may secondarily resist vertical, uplift, and overturning forces.

Dwelling Unit. One or more habitable rooms which are designed to be occupied by one family with facilities for living, sleeping, cooking, eating, and sanitation.

Frame, Main. That part of the structural system which is normally used to transmit accumulative design loads to the support system.

Foundation, Manufactured Home. A site-built or site-assembled system of stabilizing devices which is:

(a) Capable of transferring design dead loads and live loads required by Federal Regulations *(see 1-2)* and other design loads unique to local home sites due to wind, seismic, and water conditions, that are imposed by or upon the structure into the underlying soil bedrock without failure, and

(b) In frost susceptible areas, placed at an adequate depth, or otherwise adequately protected, to prevent frost damage.

(c) Constructed of materials acceptable to the authority having jurisdiction *(see Appendix C for examples).*

Garage. A structure located on a manufactured home site designed for the storage of motor vehicles.

Gas Supply Connector, Manufactured Home. A listed connector designed for connecting the manufactured home to the gas supply source.

Ground Anchor. A device at the manufactured home stand designed to transfer manufactured home anchoring loads to the ground.

Habitable Room. A room or enclosed floor space arranged for living, eating, food preparation, or sleeping purposes not including bathrooms, toilet compartments, laundries, pantries, foyers, hallways, and other accessory spaces.

Hurricane-Resistive Manufactured Home. A manufactured home which meets the wind design load requirements for Zone II in Subpart D, Section 3280.305(c)(2) of the Federal Standard or the applicable hurricane-resistive design requirements of the *Standard for Mobile Homes, NFPA 501B/ANSI A119.1* edition in effect at the time of manufacture.

Labeled. Equipment or materials to which has been attached

a label, symbol, or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or materials meets appropriate standards or has been tested and found suitable for use in a specified manner.

Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should use the system employed by the listing organization to identify a listed product.

Manufactured Home. A structure, transportable in one or more sections, which, in the traveling mode, is 8 body ft. (2.4 m) or more in width or 40 body ft. (12 m) or more in length, or, when erected on site, is 320 or more sq. ft. (28.8 m2), and which is built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air conditioning and electrical systems contained therein; except that such term shall include any structure which meets the size requirements and with respect to which the manufacturer voluntarily files a certification required by the Secretary of the U.S. Department of Housing and Urban Development and complies with the Federal Manufactured Home Construction and Safety Standards.

Note: This definition should not be interpreted to include any types of recreational vehicles (including so-called "park models" or travel trailers) which may equal or exceed the body length specified herein.

Mobile Home. A factory-assembled structure or structures equipped with the necessary service connections and made to be readily movable as a unit or units on its (their) own running gear and designed to be used as a dwelling unit(s) without a permanent foundation.

The phrase "without a permanent foundation" indicates that the support system is constructed with the intent that the manufactured home placed thereon will be moved from time to time at the convenience of the owner.

Note: Manufactured homes were formerly referred to as mobile homes or trailer coaches.

Pier. That portion of the support system between the footing and the manufactured home, exclusive of caps and shims.

Porch. An outside walking area having the floor elevated more than 8 in. (203 mm) above grade.

Ramada. Any freestanding roof or shade structure installed or erected above a manufactured home or any portion thereof.

Set-up. The work performed and operations involved in the placement and securing of a manufactured home on a foundation system.

Shall. Indicates a mandatory requirement

Should. Indicates a recommendation or that which is advised but not required.

Site, Manufactured Home. A designated parcel of land designed for the accommodation of one manufactured home, its accessory buildings or structures, and accessory equipment for the exclusive use of the occupants.

Skirting. A weather-resistant material used to enclose the space from the bottom of the manufactured home to grade.

Stabilizing Devices. All components of the anchoring and support systems such as piers, footings, ties, anchoring equipment, ground anchors, or any other materials and methods of construction which supports and secures the manufactured home to the ground.

Stand, Manufactured Home. That area of a manufactured home site which has been reserved for the placement of a manufactured home.

Structure. That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

Support System. A combination of footings, piers, caps, and shims that will, when properly installed, support the manufactured home.

Tie. See anchoring equipment.

Vertical Tie. A tie intended to resist the uplifting and overturning forces.

1-3.1 Units. Metric units of measurement in this standard are in accordance with the metric system known as the International System of Units (SI). Two units (liter and bar), outside of but recognized by SI, are commonly used. These units are listed in Table 1-3.1 with conversion factors.

Table 1-3.1

Unit Name	Unit Symbol	Conversion Factor
liter	L	1 gal = 3.785L
cubic decimeter	dm^3	1 gal = 3.785 dm^3
pascal	Pa	1 psi = 6894.757 Pa
bar	bar	1 psi = 0.0689 bar
bar	bar	1 bar = 10^4 Pa
meter	m	1 ft = .3048m

For additional conversions and information see *ASTM E380 Standard for Metric Practice*, Appendix 1.

1-3.2. If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated is to be regarded as the requirement. A given equivalent value may be approximate.

1-3.3. The conversion procedure for the SI units is to multiply the quantity by the conversion factor and then round the result to the approximate number of significant digits.

1-4 Single and Multiple Manufactured Home Sites - General.

1-4.1 Location of Utility Lines, Connections. Utility lines and connections shall be located as specified in 3-1.2 for plumbing, 6-1 for electrical, and NFPA 501A for gas to serve the manufactured home stand.

Note: For manufactured home communities, see also Sections 3-2.2.1, and 6-1, and NFPA 501A.

1-4.2 Marking of Underground Utility Lines. The location of electrical cables, gas piping, water piping, and sewer lines buried underground along the periphery or within 4 ft. (1.2 m) of the perimeter of the site's largest planned manufactured home shall be indicated by an above ground sign(s), or by underground marker tapes, identifying the proximity of the lines. A plot plan showing the "as built" location of underground utility lines shall be available for installations in multiple-site facilities.

Note: This requirement is to preclude possible damages to such underground services by the use of ground anchors, installations of skirting (underfloor enclosures), plantings, foundations for steps at access floors, etc.

1-5 Manufactured Home Installation Instructions.

1-5.1. The Federal Manufactured Home Construction and Safety Standards Program (24CFR 3280, 3282, and 3283) requires that all manufactured homes be provided with installation instructions covering foundation, anchoring, utility connections, and other items. Where such installation instructions are provided, they shall be followed to the extent they do not conflict with the state or local requirements.

1-5.2 Installer Qualifications. Manufactured home installers shall be qualified by training, education, and experience to set up homes in accordance with the provisions of the manufacturer's installation instructions, the provisions of this standard, the standards referenced in 1-2.1, and in accordance with any state or local regulations.

1-5.2.1. The authority having jurisdiction is responsible for establishing reasonable qualifications for installers which assure that manufactured home installations comply with 1-2.1 and 1-5.1.

1-5.3 Manufactured Home Utility Connections. When a manufactured home consists of two or more sections, all utility connections from one section to another shall be installed in accordance with the manufacturer's instructions.

1-5.4 Rigid Utility Connections. No rigid utility connections shall be made unless the home is installed on a foundation constructed in accordance either with the state or local regulations or, in the absence of such regulations, with a recognized model building code.

1-5.5 Approved Materials Required. All manufactured home utility services shall be connected to the supply sources only with approved materials.

Chapter 2
Siting and Foundation Systems

2-1 Siting and Foundation Systems.

2-1.1 General. This chapter prescribes standards for the siting, design and installation of manufactured home foundation systems. It identifies acceptable foundation systems. This chapter is applicable to all new and relocated manufactured homes, when and wherever newly installed at a home site.

2-1.2 A Manufactured Home Foundation System is one constructed in accordance with the foundation system included in the manufacturer's installation instructions, supplemented by the requirements of this chapter, or the local building code having jurisdiction or, in the absence of a local code, with a recognized model building code.

2-1.3. The manufacturer or homeowner shall be permitted to design for unusual installation not provided for in the manufacturer's standard installation instructions.

2-2 Acceptable Foundation Systems Information. Table 2-2 indexes information for the design of manufactured home foundation systems which meet the minimum criteria established in this standard.

2-3 Site Considerations.

2-3.1 General.

2-3.1.1 Access. Each home shall be located so that access and use can be assured without trespass upon adjoining properties. Each site shall be accessible from abutting streets for all essential and emergency uses by vehicular equipment, including equipment used by public protective agencies (fire, police, ambulance services) during all anticipated weather conditions. Access streets shall either be dedicated for public use or, when authorized by the authority having jurisdiction, shall be private ways protected by permanent easements.

2-3.1.2 Evaluation. Each site shall be evaluated by the authority having jurisdiction to determine: (a) if it is suitable for its intended use; (b) that such use complies with any applicable federal, state, and local laws; (c) if such hazards as flood erosion, sediment deposition, noise, or air pollution from nearby traffic or industrial activities, vibration from vehicular traffic or construction or industrial production operations, or unstable landfill conditions exist which might impair the use or utility of the property. When, during preparation of the site, such unforeseen factors as rock formation, high groundwater levels, springs, biologically generated gases, etc., are encountered, corrective work shall be taken prior to siting the manufactured home.

Note: See Appendix H.

2-3.1.3 Protective Slopes of Unpaved Areas Around Manufactured Home Stands and Accessory Buildings. Grades shall slope downward from patios and stands, from all walls, skirting, and foundations, and from water supply wells to adequate outfalls or to drainage swales discharging to adequate outfalls.

2-3.2 Home Site Development.

2-3.2.1 Site Grading and Drainage. The objectives are: (1) to preserve as many desirable site features as practicable; (2) to provide diversion of surface water away from the manufactured home, accessory structures, and stands; (3) to prevent standing water and soil saturation detrimental to structures and site use; (4) to provide for disposal of surface water except as desired for controlled irrigation; (5) to provide finished grades for the safe and convenient access and use of sites; and (6) to provide protection from erosion.

2-3.2.2 Drainage Provisions. Manufactured home stands, unless subsurface drainage structures are provided, shall have a crown or gradient for surface drainage acceptable to the authority having jurisdiction.

Drainage designs should accommodate storm runoff calculated on the basis of foreseeable conditions of contributory site and off-site drainage areas.

2-3.2.3 Required Drainage Structures. Where erosion due to high runoff velocity is not prevented by grading or by plantings, drainage structures shall be constructed.

2-3.2.4 Dry Wells. Where their installation is authorized, dry wells shall be located not less than 10 ft. (3.5 m) from a manufactured home stand, at least 20 ft. (6.10 m) from sewage disposal fields, and not less than 50 ft. (15.24 m) from water supply wells.

Note: For effectiveness, dry wells should be relied upon only in areas of well-drained soils with high sand and gravel content.

2-3.2.5 Driveways. Driveways shall extend from such access streets to a garage, carport, or parking space with the location, alignment, and grades designed to provide for safe and convenient use. Driveways shall have a minimum width of 10 ft. (3.05 m) and shall have a 5-ft. (1.52 m) radius or shall flare to a 14-ft. (4.27 m) width at street entrance.

2-3.3 Multiple Site Development.

2-3.3.1 General. In addition to the provisions for single and multiple site development, the following provisions relate to sites located in manufactured home communities (see Section 7-2).

2-3.3.2 Land Use Requirements-Space Utilization. Site coverage and building separation in a manufactured home community for each manufactured home and its accessory structure(s) shall be in accordance with this section.

2-3.3.3 Setbacks. Each manufactured home stand shall be set back at least 5 ft. (1.52 m) from the lot line at any abutting street within a manufactured home community.

2-3.3.4 Access to Community Streets. Each manufactured home site within a manufactured home community shall have direct access to a community street. The access shall be an unobstructed area, not less than 14 ft. (4.27 m) in width for the movement of a manufactured home on or off the site *(see 2-3.2.5 for driveways).*

2-3.3.5 Community Streets and Common Walk Systems.

(a) Minimum pavement widths, excluding widths, shall be 24 ft. (7.32 m) for two-way traffic; 14 ft. (4.27 m) for one-way traffic; and at least 7 ft. (2.13 m) shall be added for each parking lane if provided.

(b) The street system shall have direct connection to a public way.

(c) Street grades should generally be not more than 8 percent. Short runs with a maximum grade of 12 percent may be permitted, provided traffic safety is assured.

(d) A common walk system should be provided and maintained between locations where pedestrian traffic is concentrated and is not separated from automobile traffic. Such common walks should have a minimum width of 3 1/2 ft. (1.07 m). See also Appendix A, Section A-2.

(e)When designing manufactured home communities, care must be taken to provide for maneuvering room for placing manufactured homes on stands, considering the home sizes allowed in the community.

2-3.3.6 Street Lighting. Streets and walkways designed for the general use of the manufactured home community residents shall be lighted during the hours of darkness in a manner acceptable to the authority having jurisdiction.

2-3.3.7 Gutters or Swales. Gutters or swales if provided shall be connected to adequate outfall with off-site drainage ways protected for permanence.

2-3.3.8 Drain Lines. Drain lines shall be of durable materials, sized and installed to assure positive runoff. Drain lines for surface drainage shall have sealed joints. Drain lines for subsurface drainage shall be permitted to be perforated, porous, or open joint pipe with not less than 9 in. (229 mm) pervious backfill over pipe. Drain lines shall be connected to an adequate outfall.

2-3.3.9 Drain Inlets. Drain inlets shall be sized, designed, and constructed for their intended use.

2-3.3.10. Emergency surface drainage overflows for drain inlets or catch basins shall be provided where necessary to prevent flooding of manufactured home stands, damage to accessory structures, and any wells, in the event of failure of any underground drainage structures.

2-4 Manufactured Home Installation.

2-4.1 General.

2.4.1.1 Manufactured Homes With Manufacturer's Instructions. The manufacturer's instructions shall include a typical foundation system designed by a registered professional engineer or architect to support the anticipated loads specified in the manufacturer's installation instructions for the design zone (including climate) of installation, and shall meet the requirements of this standard. These instructions shall be provided with the home following installation as required by 24 C.F.R., Parts 3280, 3282, and 3283 (42 U.S.C. 5401 et seq.).

2-4.1.2 Manufactured Homes Without Manufacturer's Installation Instructions. Homes not provided with manufacturer's instructions shall have a foundation system which meets the requirements of this standard and is installed in a manner acceptable to the authority having jurisdiction.

2-4.1.3 Manufactured Home Stabilizing Devices. Each manufactured home, upon being installed on a manufactured home stand, shall have stabilizing devices, or shall be installed on a foundation constructed in accordance with the local building code having jurisdiction or, in the absence of a local code, with a recognized model building code, except that the authority having jurisdiction shall be permitted to waive compliance with the provisions for anchoring systems where low design wind velocities do not justify such systems. Requirements for stabilizing devices are included in this chapter.

2-4.1.4. Stabilizing devices not provided with the manufactured home shall be listed or labeled to meet or exceed the design and capacity requirements of the manufactured home manufacturer and this standard.

2-4.2 Soil Considerations.

2-4.2.1 Design of Manufactured Home Stand.

Footing. Where natural soils or controlled-fill (free of grass and organic material) are used, it shall support the loads imposed by the support system of the manufactured home placed thereon. The required load-bearing capacity shall be calculated based on the design loads shown in Table 2-4.2.1.

Table 2-4.2.1
Manufactured Home Stand Load-Bearing Calculations#

Design Zone	South Zone psf	South Zone kg/m²	Middle Zone psf	Middle Zone kg/m²	North Zone psf	North Zone kg/m²
Roof Live Load	20*	98.	30*	146.	40*	195.
Roof Dead Load	5	24.	5	24.	5	24.
Floor Live Load	40	195.	40	195.	40	195.
Floor Dead Load	10	49.	10	49.	10	49.
Design Distributed load	75	366.	85	414.	95	463.

#For manufactured homes labeled as complying with the Federal Manufactured Home Construction and Safety Standards, refer to the Manufacturer's Installation Instructions.

*Where greater vertical (snow) loads have been determined to exist in localized areas by the authority having jurisdiction through surveys or experience, such roof live loads shall apply.

2-4.3 Loadings. Unless specified by the authority having jurisdiction, manufactured homes shall be installed on a stand with stabilizing devices or other foundation system which is designed and constructed to sustain, within allowable stress and settlement limitations, all applicable loads specified in Appendix B increased by a factor of safety of 1.5.

Note: In areas where snow and wind loads are anticipated to exceed Appendix B, design loads shall be based on ANSI A58.1-1982 or as directed by the authority having jurisdiction.

2-4.4 Anchoring.

2-4.4.1 Anchor Design and Installation. Each manufactured ground anchor shall be listed and installed in accordance with the terms of its listing and the anchor manufacturer's instructions and shall include means of attachment of ties meeting the requirements of 2-5.4.8 Ground anchor manufacturer's installation instructions shall include the amount of preload required, the methods of adjustment after installation, and the load capacity in various types of soil. These instructions shall include tensioning adjustments which may be needed to prevent damage to the manufactured home, particularly damage that can be caused by frost heave.

(a) Each ground anchor shall have the manufacturer's identification and listed model identification number marked thereon so that the number is visible after installation. Instructions shall accompany each listed ground anchor specifying the types of soil for which the anchor is suitable under the requirements of 2-5.4.1.

Note: The following data gives information relative to soil types with blow counts and torque values:

Table 2-4.4.1

Types of Soils	Blow Count (ASTM D1586)	Test Probe[1] Torque Value[2]
Sound hard rock.....	NA	NA
Very dense and/ or cemented sands, coarse gravel and cobbles, preloaded silts, clays, and corals.....	40-up	More Than 550 lbs. in. (62 N.m)
Medium-dense coarse sands, sandy gravels, very stiff silts and clays.....	24-39	350-549 lbs. in. (40-62 N.m)
Loose to medium dense sands, firm to stiff clays and silts, aluvian fill.....	14-23[3]	200-349 lbs. in. (23-40 N.m)[3]

[1]The test probe is a device for measuring the torque of soils to assist in evaluating the holding capability of the soils in which the anchor is placed. The test probe has a helix on it. The overall length of the helical section is 10.75 in. (273 mm); the major diameter is 1.25 in. (32 mm); the minor diameter is 0.81 in. (21 mm); the pitch is 1.75 in. (45 mm). The shaft must be of suitable length for anchor depth.
[2]A measure synonymous with moment of a force when distributed around the shaft of the test probe.
[3]Below these values, a registered professional engineer should be consulted.

2-4.4.2 Ground Anchors, Concrete Slabs, or Continuous Footings. Ground anchors, including means for attaching ties, shall be located to effectively match the anchoring system instructions provided by the manufactured home manufacturer, or, if there are no instructions, in accordance with the requirements of 2-4.1.2 herein, and shall be designed and installed to transfer the anchoring loads to the ground.

2-4.4.3 Use of Concrete Slabs or Continuous Footings. If concrete slabs or continuous footings are used to transfer the anchoring loads to the ground, the following shall be required:

(a) Steel rods cast in concrete shall be capable of resisting loads as specified in 2-5.4.1.

(b) Deadman concrete anchors may be used in place of listed anchors if they meet the requirements of 2-5.4.1.

(c) Concrete slabs may be used in place of ground anchors, provided the slab is constructed so that it provides holding strength equal to the requirements of 2-5.4.1.

2-5 Foundation Standards.

2-5.1 Footing.

2-5.1.1. Footings shall be sized to support the loads shown in the manufacturer's instructions and as specified below.

2-5.1.2 Support System Spacing. Unless the entire support system is designed by a professional engineer or architect, the support system shall be designed in accordance with this standard.

2-5.1.3 Footings. Where no manufacturer's instructions are available, the required load-bearing capacity of individual load-bearing supports and their footings shall be calculated using the values in Table 2-4.2.1. Footings shall be adequate in size to withstand the uniform live and dead loads of the manufactured home and any concentrated loads.

(a) Footings shall be at least 144 sq. in. (0.09 m2) of solid concrete, block, or other materials approved for the intended use by the authority having jurisdiction. See Appendix C for minimum thickness.

(b) Footings or pier foundations (unless approved by a registered professional engineer), when required, shall be placed level on firm undisturbed soil or on controlled fill which is free of grass and olrganic materials to minimum load-bearing capacity of 1000 psf (4882 kg/m2). Where unusual conditions exist, the spacing of piers and the load-bearing capacity of the soil shall be determined specifically for such conditions (see 2-6.3.2).

Note: In those areas subject to ground frost heave see 2-6.3.2.

2-5.1.4. The supports shall begin not more than 2 ft. (0.61 m) from the exterior of each end wall. Supports shall be installed directly under the main frame (chassis) of the manufactured home.

Note: Methods other than those specified herein may be approved by the authority having jurisdiction

2-5.1.5. Table 2-5.1.5 shall be applicable unless the entire support system is designed and calculated by a registered professional engineer or architect.

2-5.2 Piers.

2-5.2.1 Piers. Piers or load-bearing supports or devices shall be designed and constructed to evenly distribute the loads. Load-bearing supports or devices shall be listed and labeled, shall be designed by a registered professional engineer or architect, shall be approved for the use intended, or piers shall be constructed as in table 2-5.2.1.

2-5.2.2. Piers less than 36 in. (914 mm) in height shall be constructed of open or closed cell, 8-in. by 8-in. by 16-in. (203-mm x 203-mm x 406-mm) concrete blocks (with open cells vertically placed upon the footing). Single-stacked block piers shall be installed with the 16-in. (406-mm) dimension perpendicular to the main (I-beam) frame. The piers shall be covered with a 2-in. by 8-in. by 16-in. (51-mm x 203-mm x 406-mm) wood or concrete cap *(see Figure C-10, Appendix C).*

2-5.2.3. Subject to the limitations of 2-6.1.2, piers between 36 in. and 80 in. (914 mm and 2032 mm) in height and all corner piers over three blocks high shall be double blocked with blocks interlocked and capped with a 4-in. by 16-in. by 16-in. (102-mm x 406-mm x 406-mm) solid concrete block, or equivalent *(see Figure C-11, Appendix C).*

2-5.2.4. Subject to the limitations of 2-6.1.2, piers over 80 in. (2032 mm) in height shall be constructed as per 2-5.2.1 and they shall be laid in concrete mortar and steel reinforcing bars inserted in block cells with the block cells filled with concrete *[see Figures C-12(a) and C-12(b) in Appendix C].*

2-5.2.5 Steel Piers. Steel piers, when used, shall be in compliance with 2-5.4.16 after fabrication to provide corrosion protection *(see C-8 in Appendix C).*

2-5.3 Walls. Load bearing and nonloadbearing walls constructed on site shall be constructed of concrete, masonry, or any other material or system that is recognized by the authority having Jurisdiction.

Minimum thickness shall be that required to resist lateral pressure from adjacent earth and support design loads as determined by acceptable engineering practice.

2-5.4 Anchors and Ties.

2-5.4.1 Capacity of Anchors. Each approved ground anchor, when installed, shall be capable of resisting an allowable working load at least equal to 3,150 lbs. (1429 kg) in the direction of the tie plus a 50 percent overload (4,725 lbs. or 2143 kg total) without failure.

2-5.4.2 Anchoring Equipment. Anchoring equipment, when installed, shall be capable of resisting an allowable working load equal to or exceeding 3,150 lbs. (1429 kg) and shall be capable of withstanding a 50 percent overload (4,725 lbs. or 2143 kg total) without failure of either the anchoring equipment or the attachment point on the manufactured home. When the stabilizing system is designed by a qualified registered professional engineer or architect, alternative working loads may be used provided the anchoring equipment is capable of withstanding a 50 percent overload. All anchoring equipment shall be listed or labelled as being capable of meeting all

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