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National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS
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John C. Stennis Space Center
OFFICE TRAILER TIE-DOWNS, BLOCKING AND ELECTRICAL CONNECTIONS

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Table of Contents

1.0 PURPOSE

This John C. Stennis Space Center (SSC) standard (SSTD) defines the Wind Zone II tie-down requirements and electric power connections for manufactured housing, trailers or other temporary enclosures at SSC.

2.0 APPLICIBILITY

This SSTD applies to all National Aeronautics and Space Administration (NASA) SSC contractors, subcontractors or other personnel involved in the set-up or use of manufactured housing, trailers or other temporary enclosures.

3.0 REFERENCES

All references are assumed to be the latest version unless otherwise indicated.

24 CFR Section 3280, *Federal Manufactured Home Construction and Safety Standards*
American Society of Civil Engineers (ASCE) 7, *Minimum Design Loads for Buildings and Other Structures*
International Residential Code (IRC) *for One and Two-Family Dwellings*
MH-2009-1, *Mississippi Department of Insurance Regulation, as amended*
Southern Building Code Congress International, *Southern Building Code*
SPR 1440.1, *SSC Records Management Program Requirements*
SCWI-8715-0003, *SSC Fall Protection Program*
SSTD-8070-0005-CONFIG, *SSC Preparation, Review, Approval, and Release of SSC Standards*
SSTD-8070-0119-MISC, *SSC Dig Permit Standard*

4.0 RESPONSIBILITIES

a. Users of this SSTD shall comply with its requirements, ensure use of the correct version of this Standard and the documents it references, and inform the appropriate organization of needed changes in accordance with SSC Standard SSTD-8070-0005-CONFIG.

b. Responsibilities for the use and control of this SSTD and for the review and approval of revisions or cancellation of this Standard shall be as specified in SSTD-8070-0005-CONFIG and the applicable documents referenced therein.

5.0 BLOCKING SUPPORTS

5.1 General

Trailers must be blocked adjacent to the "over-the-top" straps. Blocking shall be spaced a maximum of eight (8) feet intervals on all frame rails with end blocking a maximum of five (5) feet from trailer end.

5.2 Blocking Types

a. Adjustable Screw Column-type

The adjustable screw column-type is fastened to the trailer frame rail and has the base bolted into a 24" by 24" by 4" solid concrete pad (footer).

b. Concrete Blocks

This type consists of built up concrete blocks. First a 24" by 24" by 4" solid concrete footer is placed on the ground level. Next two 8" by 8" by 16" solid or celled concrete blocks are placed on top. Then a 24" by 24" by 2" solid concrete cap is put in place. Finally, if required, a 2" by 10" by 16" block of treated wood and/or treated wood shims will be put in place to complete the "block". Any wood used shall be treated for weather resistance. (See Appendix A for typical block support and tie-down detail.)

6.0 ANCHORS

6.1 Anchor Rods

There are several acceptable types of anchors used for tie-downs. Anchor rods for all types must be a minimum of 5/8 inch in diameter, galvanized steel, and have a single or two-head tension devices welded or bolted on top of the rod.

6.2 Acceptable Anchor Types

a. Auger

Screw type anchor of galvanized steel, 5' to 6' long, 8" diameter blade and a minimum depth of 4 feet.

b. Arrowhead

Collapsing leaves must have a minimum 8" span and a depth of 4 feet.

c. Deadman

Anchor rod 5/8 inch steel minimum. Rod must be hooked into concrete. Minimum depth of 5 feet.

d. Slab Anchor

A 5/8 inch rod must be embedded to meet minimum pull requirements.

6.3 Installation

a. All anchors shall be installed vertically. The tension device shall be near the ground level and directly below or just inside the edge of the enclosure.

b. Prior to installation of anchors, a Stennis Space Center Dig Permit (form SSC-618) shall be issued, per SSTD-8070-0119-MISC (Dig Permit Standard).

6.4 Standard Method

The "Standard Method of Test for Manufactured Home Anchors, Parts A and B" is described in the Federal Manufactured Home Construction and Safety Standards, 24 CFR Section 3280.401.

7.0 TIE-DOWNS

7.1 Site preparation

a. Mississippi Department of Insurance Regulation MH-2009-1 establishes the Mississippi Manufactured Home Installation Inspection Program "Installation Program" and shall be used for SSC trailer or temporary enclosures.

b. The site should be graded to provide a minimum of 12" clearance beneath the lowest member of the structure's main frame (I beam or channel beam) in the area of utility connections.

7.2 General

a. Manufactured or mobile structures shall require diagonal ties to restrict the unit from being pushed off its blocks/piers. These diagonal ties, plus additional over-the-top tie-downs will restrict overturning.

b. Blocks, piers or load-bearing supports or devices shall be designed and constructed to evenly distribute the loads.

c. Only strap tie-downs shall be used for the new installations of trailers and portable or temporary enclosures.

d. Galvanized steel straps 1¼" by .035" shall be used for any new or additional requirements. Use of built in weather resistant straps when furnished with new trailers are acceptable.

e. Strap type tension devices at anchor connections shall be used with all steel straps.

f. Trailer tie-downs shall utilize both frame ties and over-the-top ties.

g. Minimum tie-downs requirements shall be as follows:

Minimum Number of Tie-downs*			
Length of structure	*Number Vertical Ties*	*Number Diagonal Ties,* **each side**	*Total anchors per structure*
Up to 40 ft	2	4	8
41 ft to 60 ft	3	6	12
61 ft to 84 ft**	4	8	16
*The table is based on a minimum working load per tie of 3,150 lbs. with a 50% overload (4,725 lbs. total).			
**For a structure +85 ft, number of tie-downs will be subject to approval of MS Dept. of Ins. Reg. Commissioner.			

h. Over-the-top ties shall have roof brackets at each roof corner.

i. For double trailer enclosures, frame tie straps are required on the two outside trailer channels only.

j. Tie-downs shall not be located over windows or doors.

k. End of structure frame and over-the-top tie-downs shall be located not over five (5) ft from trailer ends. (See Appendix A for typical block support and tie-down detail.)

l. Any work required to set-up or maintain an Office Trailer subjecting workers to a fall hazard shall require compliance with the Stennis Space Center Fall Protection Program, SCWI-8715-0003.

8.0 ELECTRICAL CONNECTIONS

8.1 Power

a. Three phase 208/120v or single phase 240/120v service connection shall be provided.

b. The contractor shall provide hookups from the trailer or portable structure to the local power supply.

c. Once an SWR is approved, the FOSC Electrical Shop shall make the connection.

d. All wiring shall be in accordance with the latest edition of the National Electrical Code.

8.2 Feeder Capacity

a. Single trailer will be 80 amps.

b. Double trailer will be 120 amps.

c. Four trailers will be 300 amps.

8.3 Fused Disconnect Switch

Safety switch will be three (3) pole, two (2) fuse enclosed type or three (3) fuse enclosed type, 100 amp or 200 amp nameplate rating with fuses or breakers rated 80 amps or 150 amps respectively.

8.4 Breaker Panel

For a double trailer, two (2) breaker panels are required, each rated 100 amps, having a main two (2) pole breaker and feeder circuit breakers as required.
(See Appendix B and C)

8.5 Grounding

Each single trailer or each component of multi-trailers shall be a #6 bare cooper ground conductor from each service distribution panel, to a ¾" diameter, 10 foot long Copperweld ground rod. Rod shall be located under trailer edge or near a supporting pier to protect rod from physical damage.

8.6 Trailer Frame Grounding

All trailer frames shall be bonded to the grounding rod with a #6 copper conductor.

9.0 RECORDS AND FORMS

a. Records and forms required by the procedures of this standard shall be maintained in accordance with SPR 1440.1.

b. All records and forms are assumed to be the latest edition unless otherwise indicated.

c. Forms may be obtained from the SSC Electronic Forms repository or from the NASA SSC Forms Management Officer. Quality Records are identified in the SSC Master Records Index.

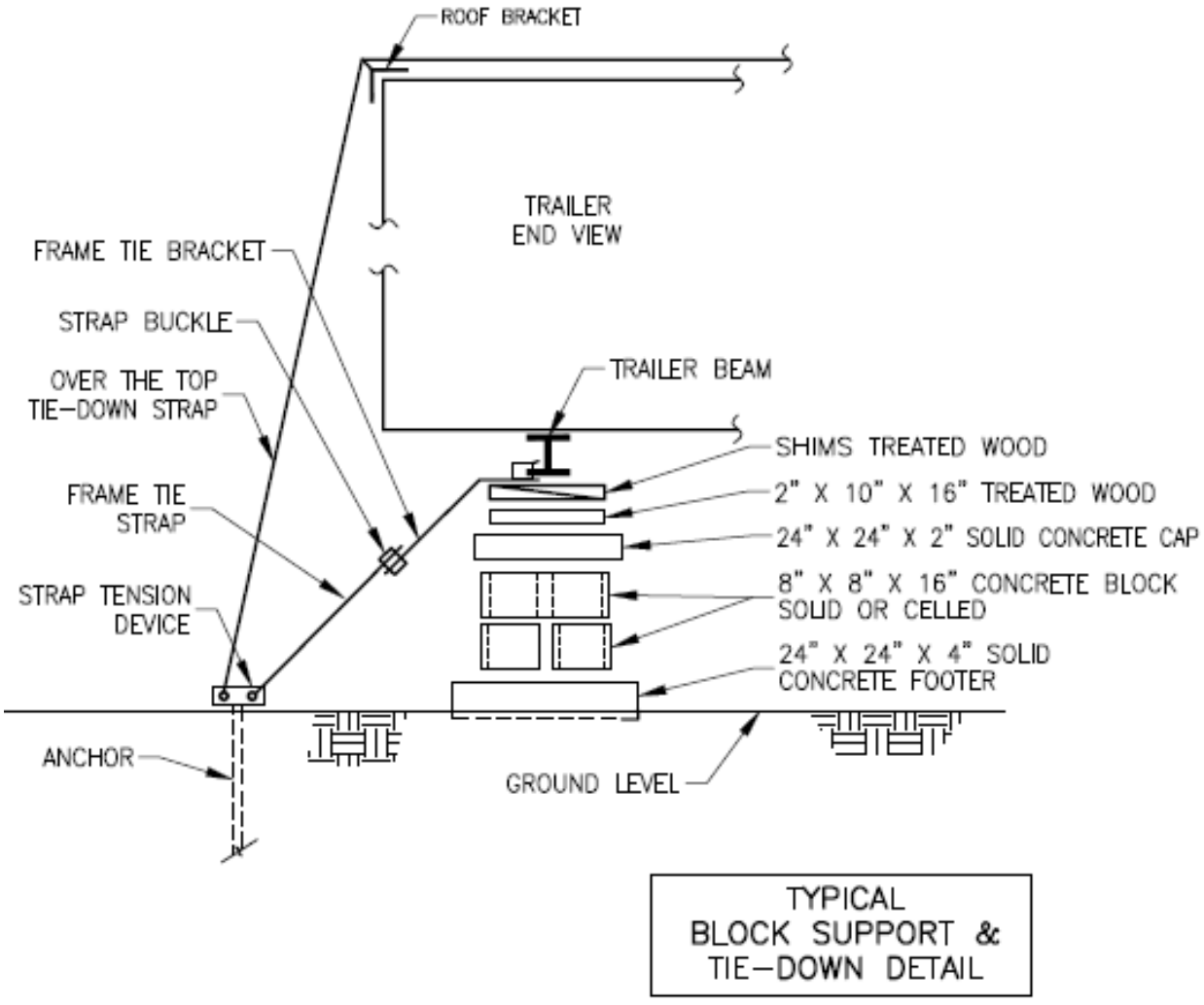
10.0 DEFINITIONS

Diagonal Tie	Any tie-down designed to resist horizontal or sheer forces and which deviate not less than 30° from a vertical direction.
Ground Anchor	Any device at the manufactured home stand designed for the purpose of securing a manufactured home to the ground.
Wind Zone II	Wind (Hurricane) Zone II includes Hancock county where SSC is located.
Tie-down	Any device designed for the purpose of anchoring a manufactured home or mobile home to the ground anchors.

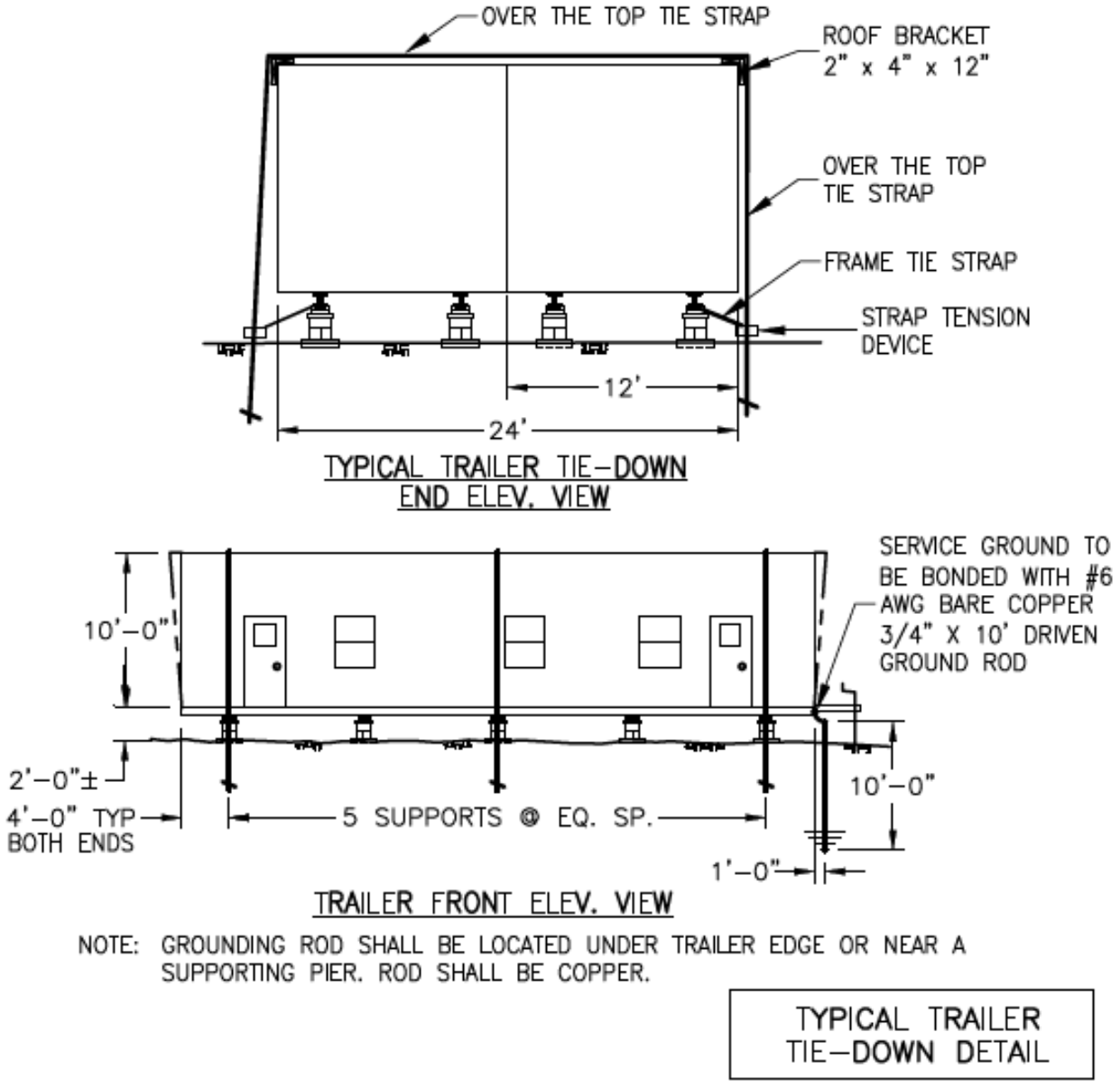
11.0 ACRONYMS AND ABBREVIATIONS

ASCE	American Society of Civil Engineers
CFR	Code of Federal Regulations
°	Degrees
Ft	Foot/feet
”	Inch
IRC	International Residential Code
NASA	National Aeronautics and Space Administration
#	Number
SCWI	Stennis Common Work Instruction
SSC	John C. Stennis Space Center
SSTD	John C. Stennis Space Center Standard
SPR	Stennis Procedural Requirements

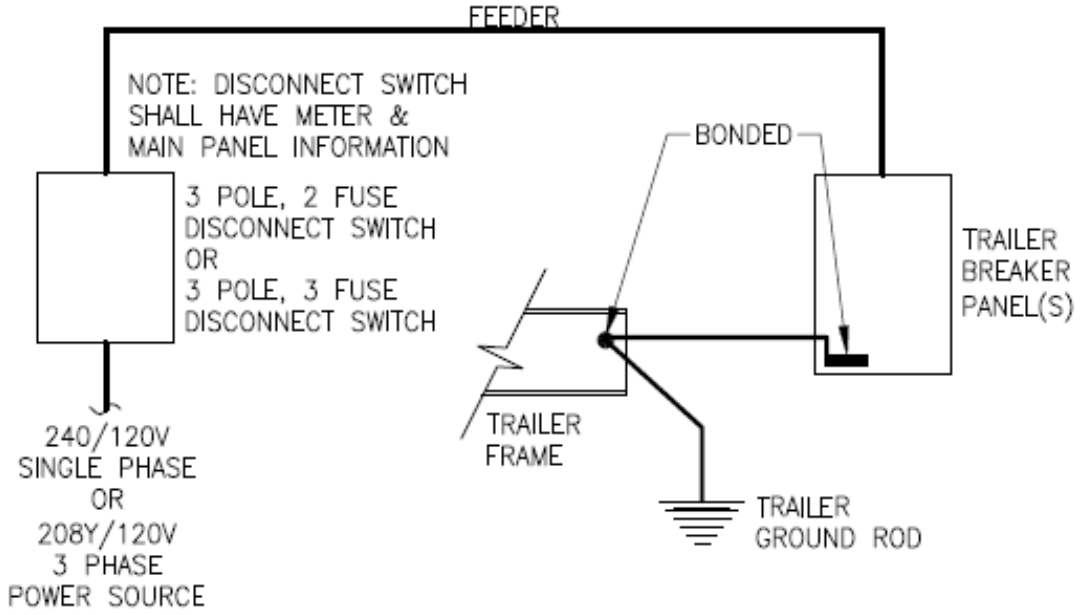
Appendix A: Typical Block Support And Tie-down Detail



Appendix B: Typical Trailer Tie-Down



Appendix C: Electric Power And Grounding Connection



SYSTEM	TRAILER TYPE	DISCONNECT SWITCH DISC SW AMPS	DISCONNECT SWITCH FUSE/BKR RATING	CONDUIT SIZE	FEEDER	BREAKER PANEL(S)
240/120V	SINGLE	100A	100A	1-1/4"C	2-1 AWG + 1 AWG N + 5 AWG GND	1 EA – 100 AMPS
	DOUBLE	200A	150A	2"C	2-1/0 AWG + 1/0 AWG N + 6 AWG GND	2 EA – 100 AMPS
	FOUR	400A	375A	4"C	2-500 KCM + 1-500 KCM N + 3 AWG GND	4 EA – 100 AMPS
208Y/120V	SINGLE	100A	100A	1-1/2"C	3-1 AWG + 1 AWG N + 6 AWG GND	1 EA – 100 AMPS
	DOUBLE	200A	150A	2"C	3-1/0 AWG + 1/0 AWG N + 6 AWG GND	2 EA – 100 AMPS
	FOUR	400A	375A	4"C	3-500 KCM + 1-500 KCM N + 3 AWG GND	4 EA – 100 AMPS
NOTE: TYPE OF CONDUCTOR THHN/THWN.						

ELECTRIC POWER AND GROUNDING CONNECTION