Final Report

BEHAVIOR OF STEEL JOISTS SUPPORTING STANDING SEAM ROOF SYSTEMS

VOLUME I

by

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CHAPTER I

INTRODUCTION

1.1 Scope of Research

A research program to study the behavior of steel joist supported standing seam roof systems is reported herein. The study was conducted at the Fears Structural Engineering Laboratory, University of Oklahoma, under the sponsorship of VULCRAFT, a Division of NUCOR Corporation. For the purposes of this report, a standing seam roof system is defined as a roof cladding composed of steel cold-formed sheets attached to supporting members with steel clips which permit longitudinal movement of the sheets. Figure 1.1 shows details of standing seam roof systems with and without insulation systems. The principal advantage of a standing seam roof system is the elimination of penetrations through the panels. Typically, the only penetrations are near the eave where self-drilling or self-tapping fasteners are used to prevent the panels from sliding off of the roof or at sheet-to-sheet splice locations. The particular system used in this test program incorporates a "snap" together feature between adjacent panels.

The primary purpose of the research was to determine bridging spacing requirements for standard steel joists supporting the VULCRAFT standing seam roof panel. A secondary consideration was to determine the adequacy of the Steel Joist Institute (SJI) and the American Institute of Steel Construction (AISC) design procedures for predicting out-of-plane,

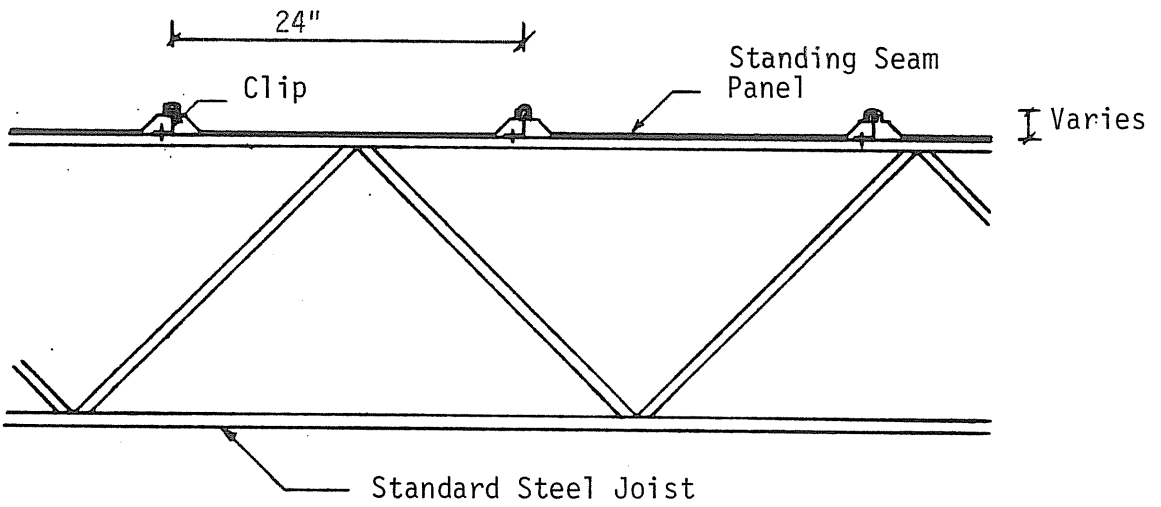
lateral torsional instability of the top chord of steel joists when used in conjunction with standing seam roof panels.

To encompass as wide a variety of roof configurations as possible, three span lengths at two load levels with several bridging spacings for each span and load level were tested. Two clip heights, with and without conventional insulation systems, were used, Figures 1.1(b) and (c). Further, a proprietary insulation system requiring a separate structural member to support the standing seam roof panel (Figure 1.1(d)) was also constructed for some of the tests. This system is designated by VULCRAFT as the Roof Insulation System and hereafter will be referred to as the RIS system. Span lengths tested were nominally 40 ft., 50 ft. and 60 ft. with design live load levels of 20 psf and 40 psf. Clip heights of both 3 in. and 4 in. were used in the program. Systems using the 3 in. clip were tested without standard "metal building" insulation, and with the RIS system. The 4 in. clip was used only with insulation and a thermal block as shown in Figure 1.1(c).

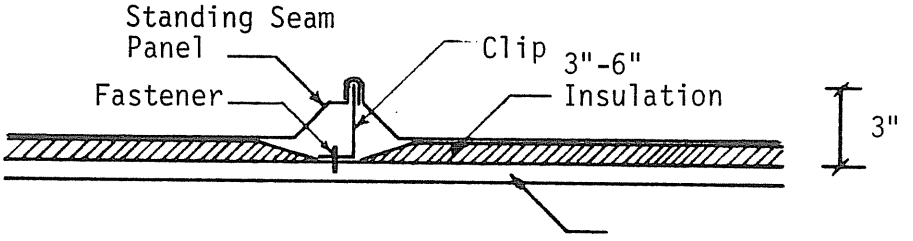
Standard light angle bridging was used in all tests. Tests were conducted using from 1 to 11 rows of top chord bridging and from 3 to 12 rows of bottom chord bridging.

1.2 Overview of the Testing Procedures

Details of the test set-up are shown in Figure 1.2. Complete roof assemblies were constructed in a 15 ft. 3 in. wide by 60 ft. 6 in. long vacuum chamber built specifically for roof system testing. Each test set-up involved four joists, two outside joists and two test (inside) joists, spaced 4 ft. 9 in. apart. The joists were supported by short sections of rafters typically used in buildings. See Figure 1.3 for photographs of partially constructed test set-ups.

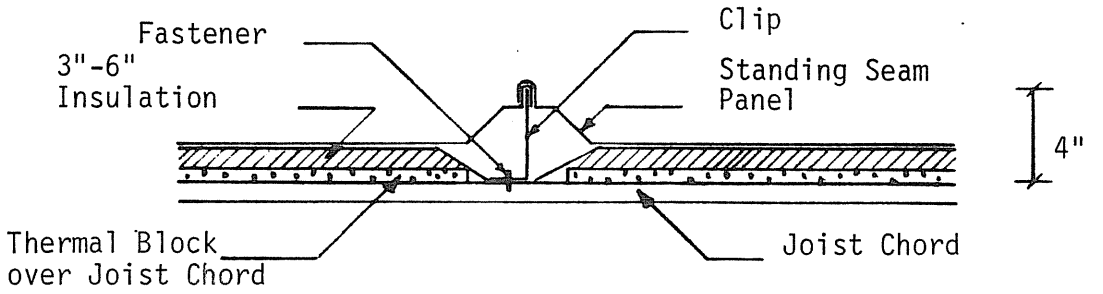


(a) Elevation

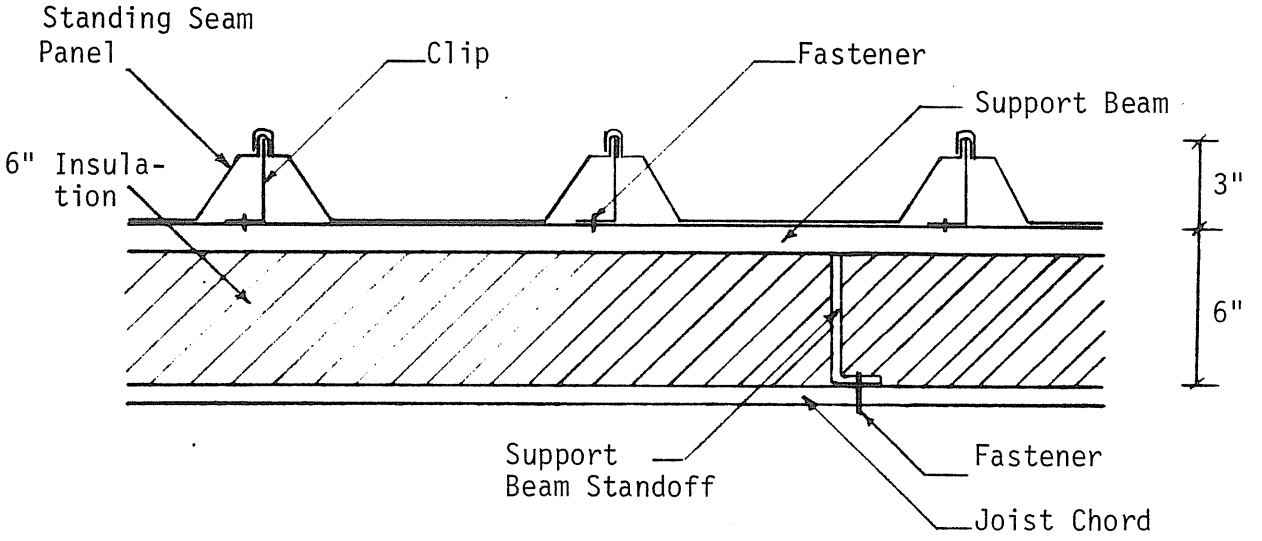


(b) 3 in. Clip with Standard Insulation

Figure 1.1 Standing Seam Roof Systems



(c) 4 in. Clip with Thermal Block and Insulation



(d) Proprietary Insulation System (RIS System)

Figure 1.1 Standing Seam Roof Systems, Cont.

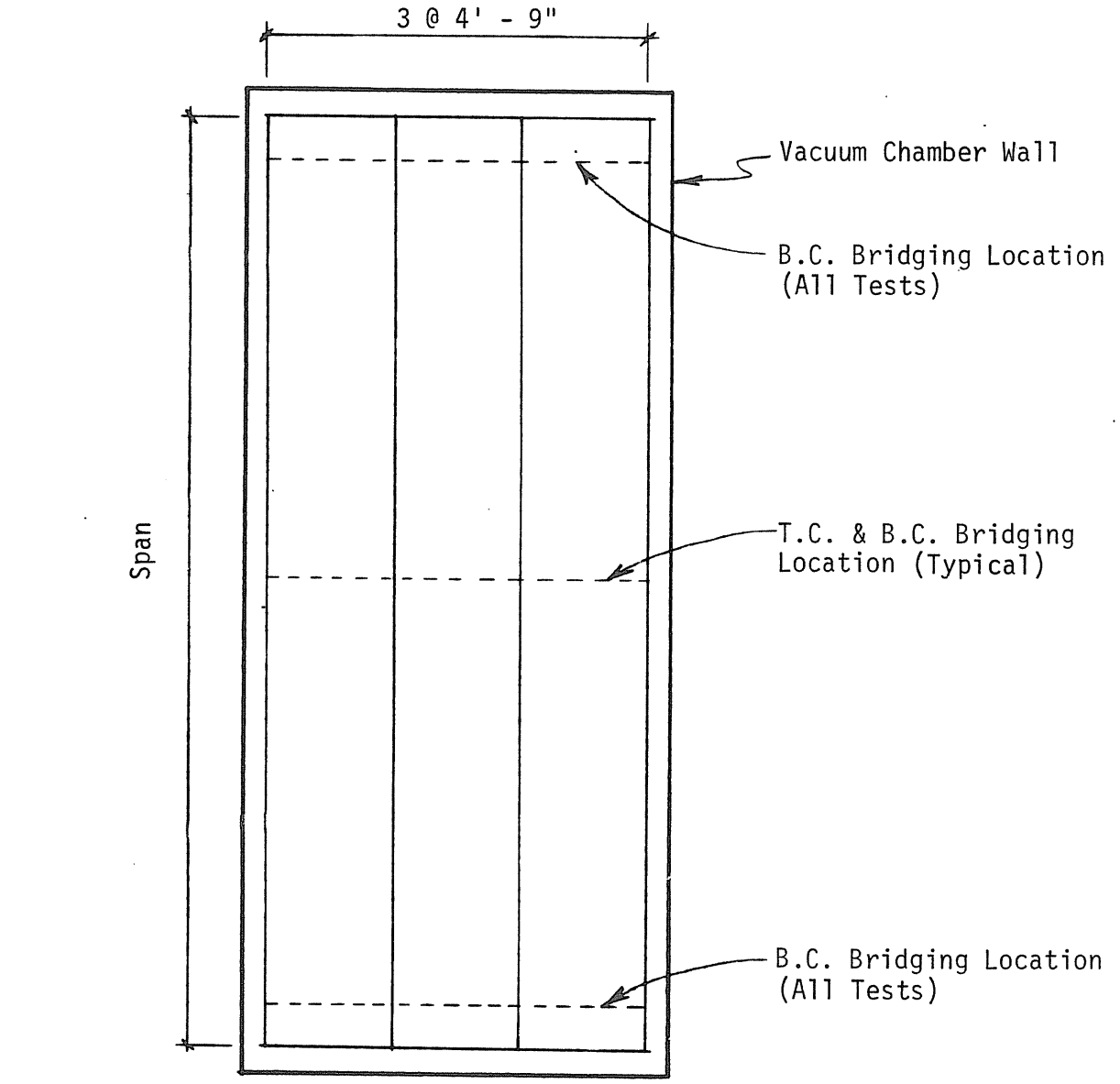
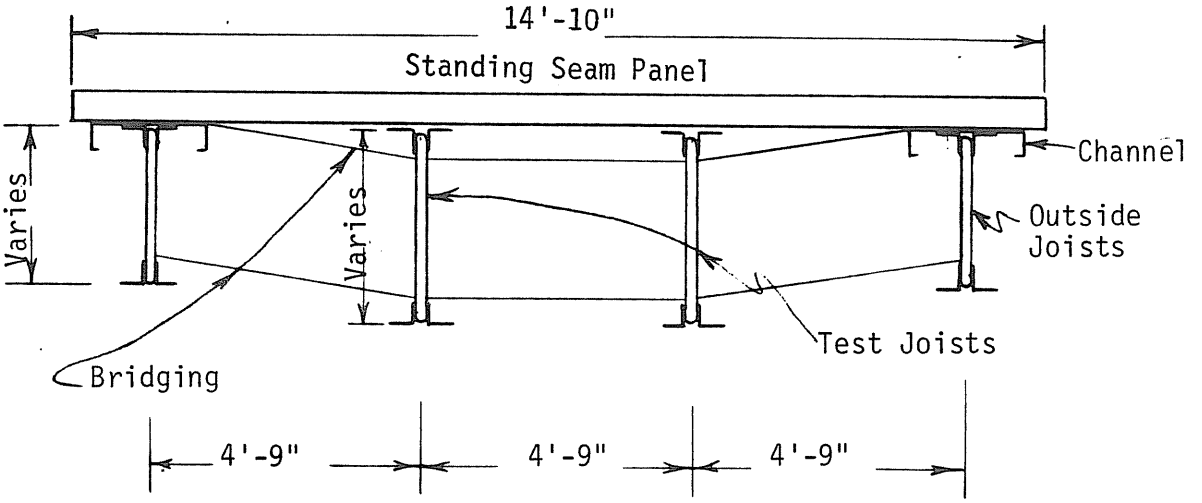
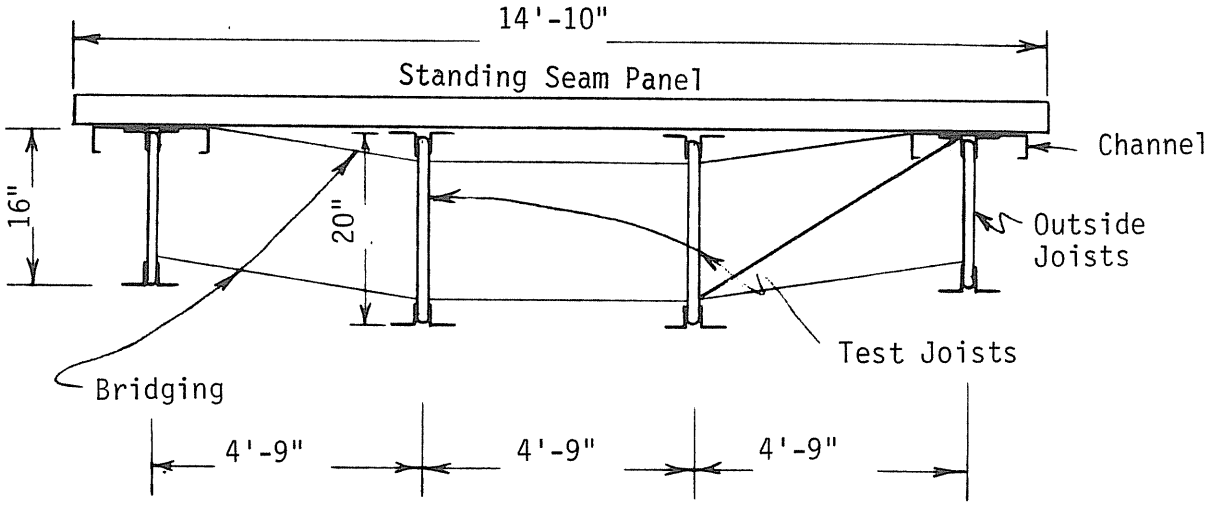


Figure 1.2 Test Set-up

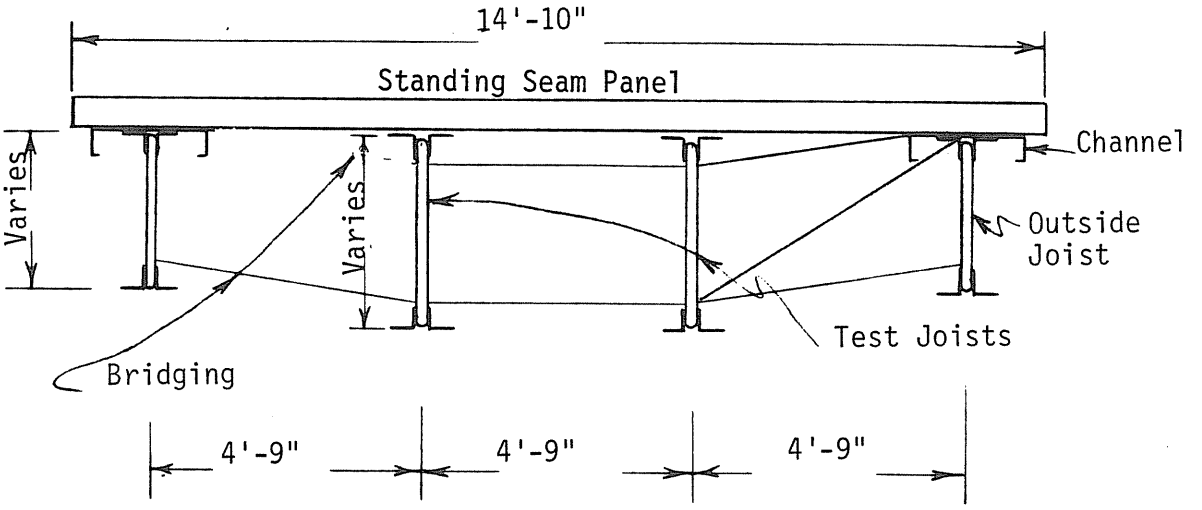


(c) Bridging Configuration, Tests 1 to 13

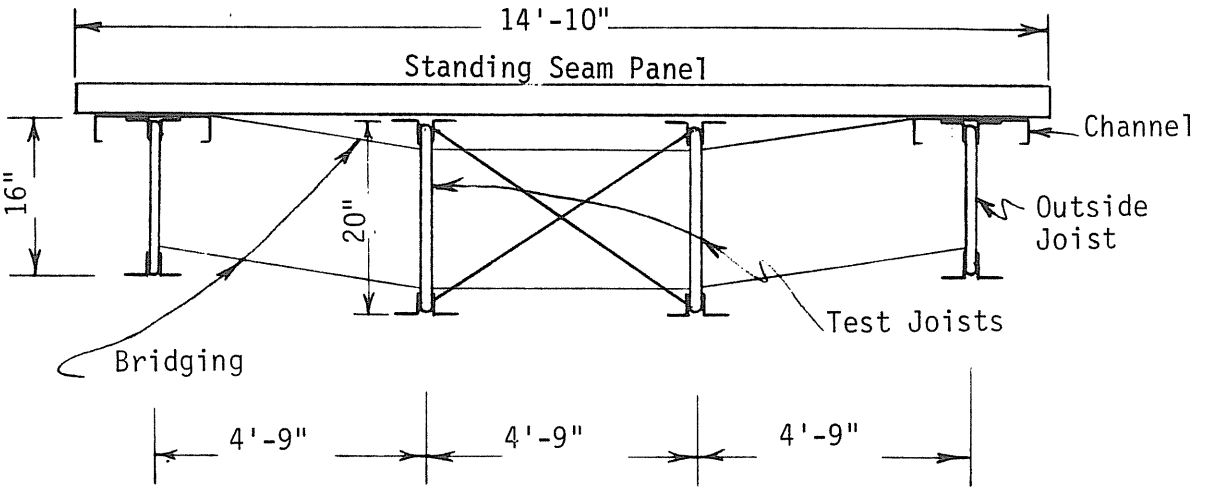


(d) Bridging Configuration, Test 14

Figure 1.2 Test Set-up, Cont.

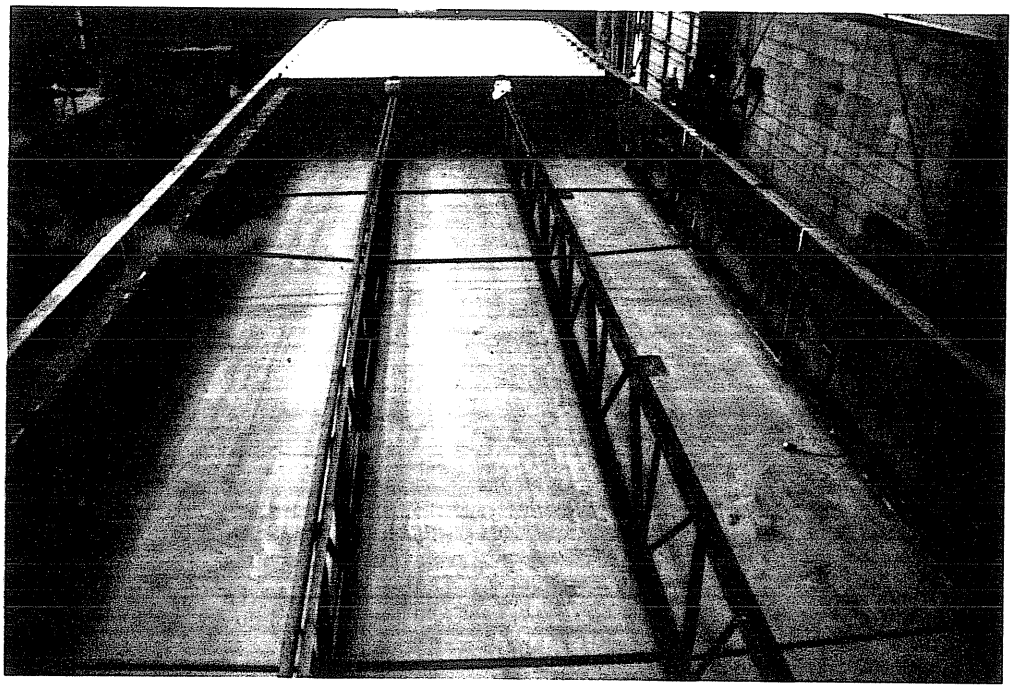


(e) Bridging Configuration, Tests 15 to 41

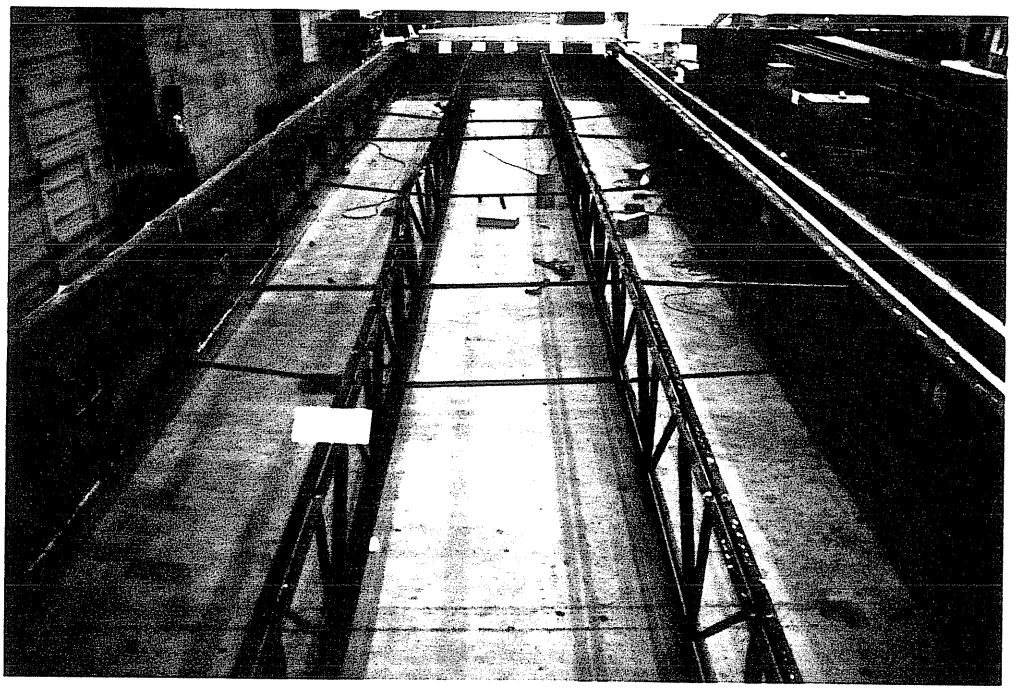


(f) Bridging Configuration, Tests 42 to 46

Figure 1.2 Test Set-up, Cont.



a) Prior to Testing



b) After Test

Figure 1.3 Photographs of Setup

To eliminate possible flexural "bridging" of the standing seam panels, the outside joists were designed to have approximately 60% of the test joist's flexural stiffness (moment of inertia) and flexural strength. To simulate lateral restraint provided by an eave strut in a building installation, channel sections were welded to the top chord of the outside joists, Figure 1.2. Top chord bridging was attached to one channel in all tests and to both channels in some tests.

Bottom chord bridging was installed near the outside bottom chord joist panel points in all tests with additional intermediate rows used in most tests. In some tests, the bottom chord bridging was also anchored to one outside joist channel as shown in Figures 1.2(d), (e) and (f).

Simulated live load was applied using suction once the roof system was constructed and the vacuum chamber sealed using polyethylene and vinyl tape. Suction was provided using three vacuum pumps and was monitored using a standard U-tube monometer and an electronic pressure transducer. Vertical and lateral displacements were measured using displacement transducers. All data was taken and recorded using a microcomputer based data acquisition system with selected data being plotted at the time of testing.

Several supplementary tests were conducted as part of the research program. A test set-up was constructed to measure lateral restraint provided by the various clip/insulation combinations under simulated live load. This set-up is described in Section 2.5. Tension tests of chord angles from at least one failed test joist of each test were conducted to determine yield stress, tensile strength and percent elongation of the compression chord material.

A complete description of the various testing procedures is found in Chapter II. Test results are described in Chapter III and comparisons to SJI and AISC specification provisions are found in Chapter IV. Conclusions and recommendations for design use and further study are found in Chapter V.

CHAPTER II

TEST DETAILS

2.1 Description of Test Components

Joists. The joists used in the testing were supplied by VULCRAFT and were manufactured at the Grapeland, Texas plant. Test joist lengths were 40 ft., 50 ft., and 60 ft. with corresponding depths of 20 in., 26 in. and 30 in., or a nominal depth to span ratio of 1:24. The VULCRAFT supplied design data for each test joist type is shown in Appendix B, along with the nominal joist profiles. All test joists were measured prior to testing and the dimensions are found in Appendices C through I.

The outside joists were standard joists with either a cold-formed or hot-rolled channel welded to the top chord as shown in Figure 1.2 These joists were designed to have approximately 60% of the flexural strength and stiffness of the corresponding test joists. Depths were 16 in., 22 in., and 24 in. for the 40 ft., 50 ft. and 60 ft. tests, respectively. Design data for these joists is given in Appendix B.

Panels, Clips and Fasteners. The standing seam panel used in the testing program was manufactured by VULCRAFT at the Grapeland, Texas plant and is designated as VULCRAFT Standing Seam Roof Panel. The panels were cold-formed from 24 gage Galvalume steel strip having a minimum yield strength of 50,000 psi and had a factory applied gasket in the female seam. The nominal panel cross-section is shown in Figure 2.1.

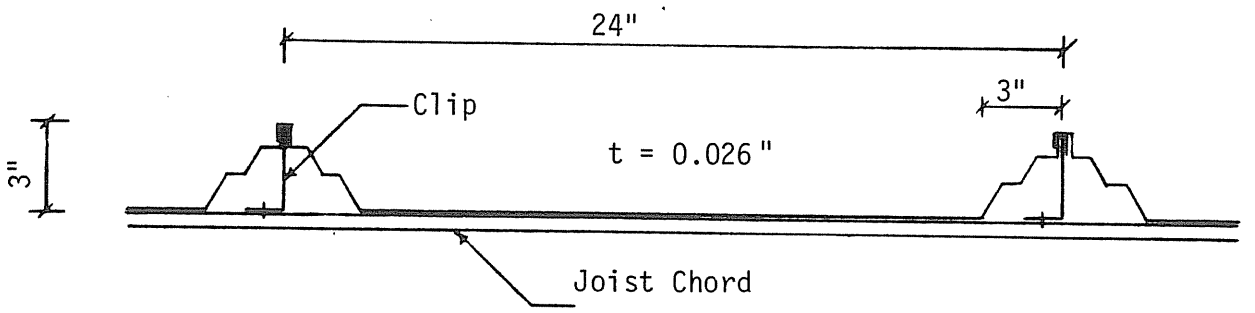


Figure 2.1 Nominal Standing Seam Panel Configuration

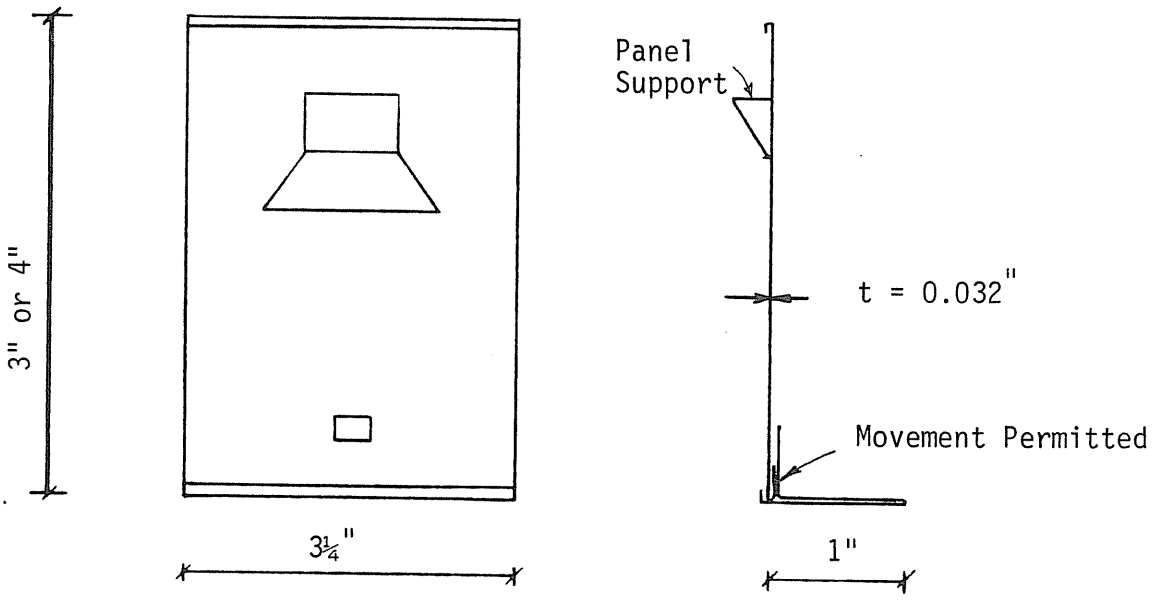


Figure 2.2 Panel Clip Details

The floating panel clips were supplied by VULCRAFT in two heights: 3 in. and 4 in. The general configuration is shown in Figure 2.2. The clip design allows for a minimum of 1 1/16 in. expansion and/or contraction from a center point. A small indentation centers the clip at the time of installation.

Each clip was attached to the supporting joist with two fasteners, either standard 5/16 in. diameter machine bolts or No. 12 x 1 in. self-drilling fasteners.

Eave Closure Plate. In all tests using a 3 in. clip except the RIS tests, an eave closure plate was first screwed to the channel of one outside joist and then the panel connected directly to this plate. Both connections were made using No. 12 x 1 in. self-drilling fasteners. For tests using the 4 in. clip, the panel was attached directly to a 4 in. x 4 in. timber which was fastened to the channel. For the RIS tests, the panel was attached directly to the RIS beam units on one outside joist. The nominal shape of the eave-closure plate is shown in Figure 2.3.

RIS Beam. The RIS segmented beams were supplied by VULCRAFT. Dimensional details are shown in Figure 2.4. No. 12 x 1 in. self-drilling fasteners were used to attach the beam units to the joist chords and to connect adjacent units.

Insulation. The insulation used in several of the tests was 3 in. 0.6 pcf metal building insulation with vinyl reinforced kraft facing. Thermal blocks were used with the 4 in. high clips and were 1 in. thick by 4 in. wide rigid urethene.

Bridging. Standard VULCRAFT supplied 1 in. bolted angle bridging was used in all tests. The specified minimum yield stress of the material was 50,000 psi.

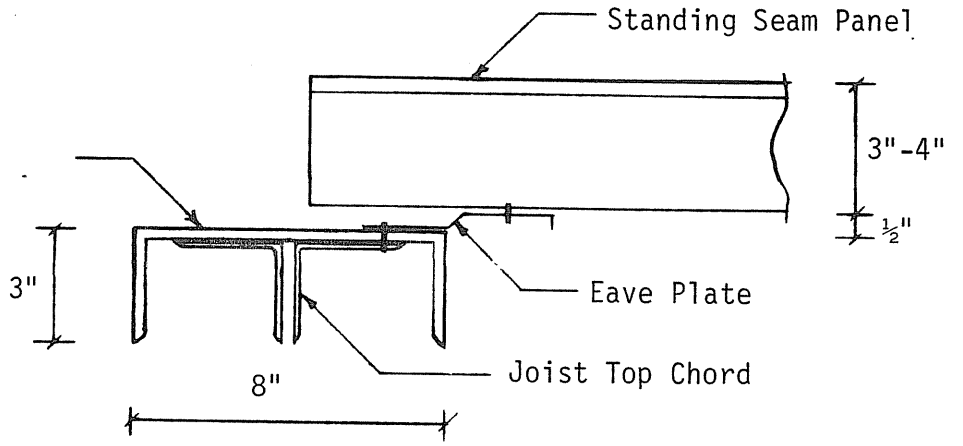
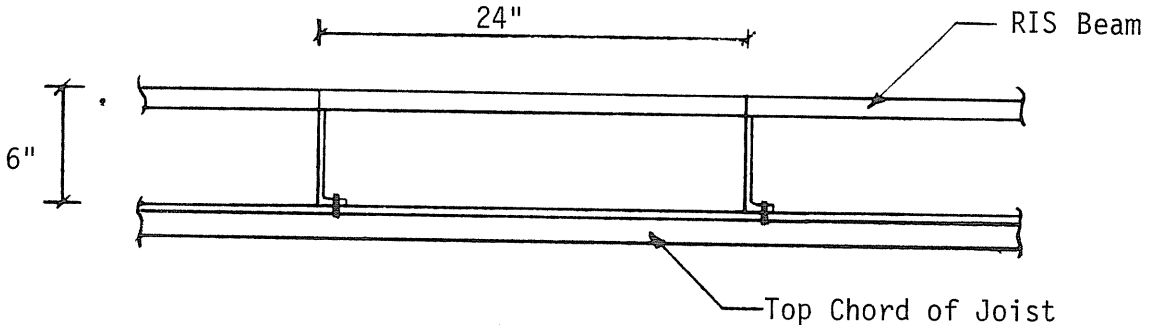
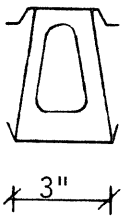


Figure 2.3 Eave-Closure Plate Details



(a) Elevation



(b) Section

Figure 2.4 RIS Beam Details

2.2 General Construction of the Test Set-ups

General details of the test set-up are shown in Figures 1.2 and 1.3. The joists were connected to rafter sections using 1½ in. to 2 in. long tack welds as specified by VULCRAFT standard details[1]. The rafter sections were supported on short column sections resting on the laboratory floor. Two 1/2 in. diameter rollers were inserted between the rafter sections and columns at one end to allow the rafter sections to rotate. In cases where the span was long (60 ft. tests), it was necessary to remove these rollers for stability reasons.

To start construction, the joists were placed on the rafters and spaced at 4 ft. 9 in. and the designated bridging configuration installed. The bridging was bolted together and to the joist with 3/8 in. diameter, 3 in. long bolts supplied by VULCRAFT and were tightened with an impact wrench. The floating panel clips were then installed at 2 ft. 0 in. spacing. The standing seam panels were then placed using the manufacturers recommended procedure. If required, insulation was installed along with the panel. In the case of RIS construction, the segmented beams were first installed on all four joists followed by the clips and panels. The east end of the roof panels were fastened either directly to the channel on the east joist or to eave closure plates previously installed on the channels or to RIS segmented beams as previously explained.

The test setup was constructed in a specially designed vacuum chamber. The outside walls of the chamber are metal panels bolted together and attached to the laboratory floor. Lateral support for the walls is provided at the top by angle braces. Once the roof system was completely in place, the entire assembly was covered with 6 mil polyethelene and sealed using vinyl tape. Suction was applied using a vacuum pump

and two auxiliary 55 gallon drum type industrial vacuum cleaners.

2.3 Instrumentation

The test setup was monitored using seven to fifteen displacement transducers, an electronic pressure transducer, and a U-tube oil monometer. Measurements, except for the U-tube monometer, were taken with a computer controlled data acquisition system which was able to read, process and plot data in real time.

The linear displacement transducers were placed at various locations on the test setup to best observe the movement of the test and outside joists. In all tests, the midspan vertical deflection of at least one test and one outside joist was monitored. In addition, displacement transducers were used to measure the vertical deflection of the rafters directly below the joist-to-rafter connection. These vertical measurements were used to correct the midspan vertical displacement of the test joist to account for support settlement (rafter deflection). Similar measurements were not needed at the outside joist supports because short columns were located directly under these points. Lateral displacements at or near the midspan of at least one test joist and one outside joist top chord were also measured during each test. Figure 2.5 shows typical displacement transducer locations.

The suction was measured with the electronic pressure transducer and checked with the U-tube monometer. The pressure transducer was calibrated in psf with an estimated accuracy of ±0.05 psf. The U-tube monometer was calibrated in 0.2 in. of water and has an estimated accuracy of ±0.1 in. of water.

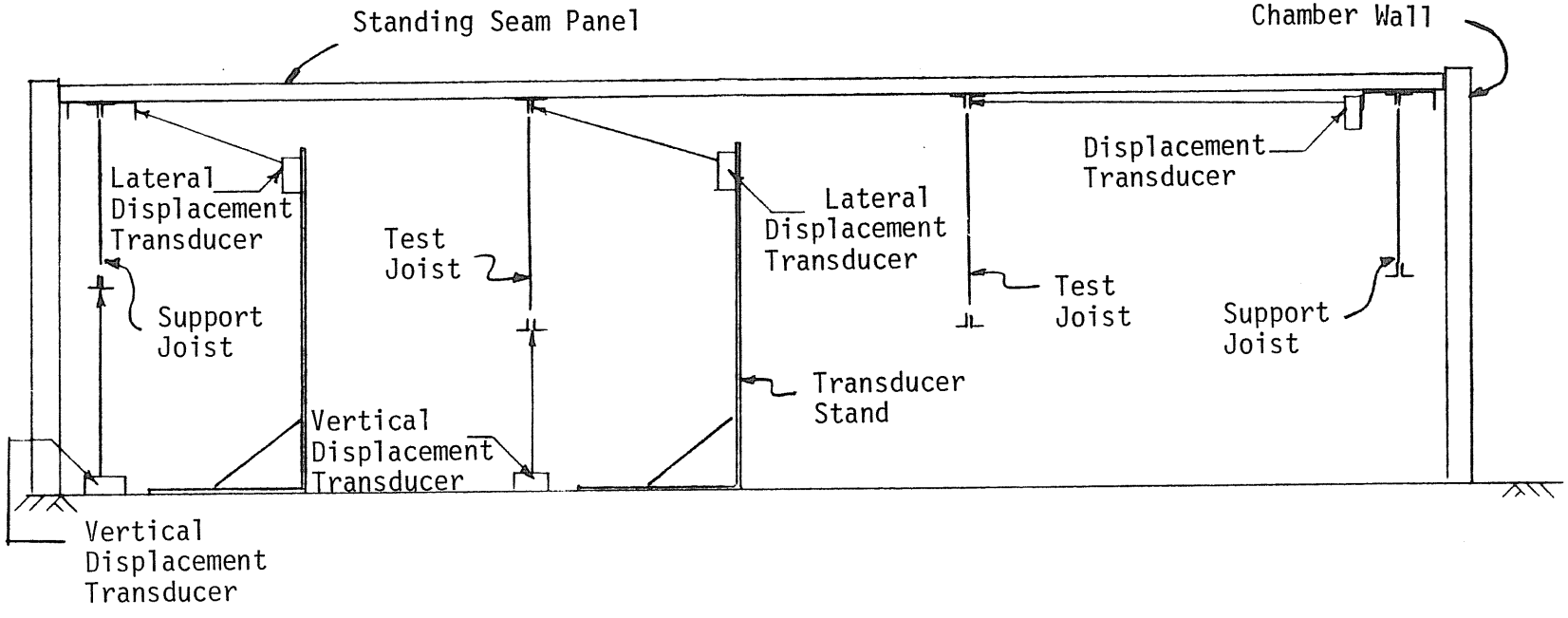


Figure 2.5 Typical Displacement Transducer Locations

All data for each test was read, processed, printed and plotted using the computer based data acquisition system which consisted of an analog-to-digital 5½ digit voltmeter, a 64k desk top microcomputer, and a two pen graphic plotter. The system was self contained in that the operator was free from having to take or plot any data during the test.

2.4 Testing Procedure

At the beginning of each test, a suction load of approximately 30% of the estimated failure load was first applied to the roof system. Readings were taken and plotted to check the behavior of the roof system and the operation of the data acquisition system. If any unreasonable results were observed at this time, the test was stopped until the problem was found and corrected. If no indiscrepencies were found, the system was unloaded and "zero" readings were taken. The load was then increased in approximate increments of either 25 plf or 50 plf per joist depending on the design live load of the roof system (25 plf for a 20 psf roof system and 50 plf for a 40 psf roof system). This process was continued until approximately 1.5 times the service load was reached when the load increments were decreased to 5 plf until failure or completion of the test. Readings of all displacement transducers and the electronic monometer were taken at each load increment. Generally, two plots of load versus deflection were made as the test progressed: one of vertical test joist deflections and the second of lateral top chord deflections. Notes were taken concerning deformation of the roof system and the failure mode. A complete description of all test results is found in Chapter III of this report.

2.5 Supplementary Tests

Coupon Tests. A 24 in. long section of undamaged chord of each failed joist was removed upon completion of the test and sent to the VULCRAFT Norfolk, Nebraska facility. There, at least one angle from each chord, was tested using a specially designed angle test device mounted in a universal testing machine. The reported yield stress and tensile strengths from these tests are found in Section 3.4.

Connection Restraint Tests. To determine the capability of the various panel-to-joist connections and of panel "hugging" or "drape" to provide lateral restraint to a joist top chord, a special test fixture and procedure was devised as part of this research program. The fixture consisted of two short sections of 8 in. deep joists connected to a support frame, four connection clips, three panels 13 ft. 2 in. long, an air bag, a containment box, an air compressor, a load cell, a double action hydraulic cylinder, an electric hydraulic pump, two displacement transducers and a high-speed computer based data acquisition system. The setup details are shown in Figure 2.6. Figure 2.7 is a photograph of the setup.

To assemble a test setup, floating panel clips were first bolted, (to permit reuse) to the joists and the insulation (if used) and panels installed using the usual procedure. The assembly was then turned over and placed on the air bag in the containment box. The hydraulic ram was then connected to the support frame using a linkage containing a calibrated load cell.

To perform a test, concrete blocks were first placed on the support frame. Air was then pumped into the air bag until the support frame was free of the containment box and the weight of the blocks was balanced

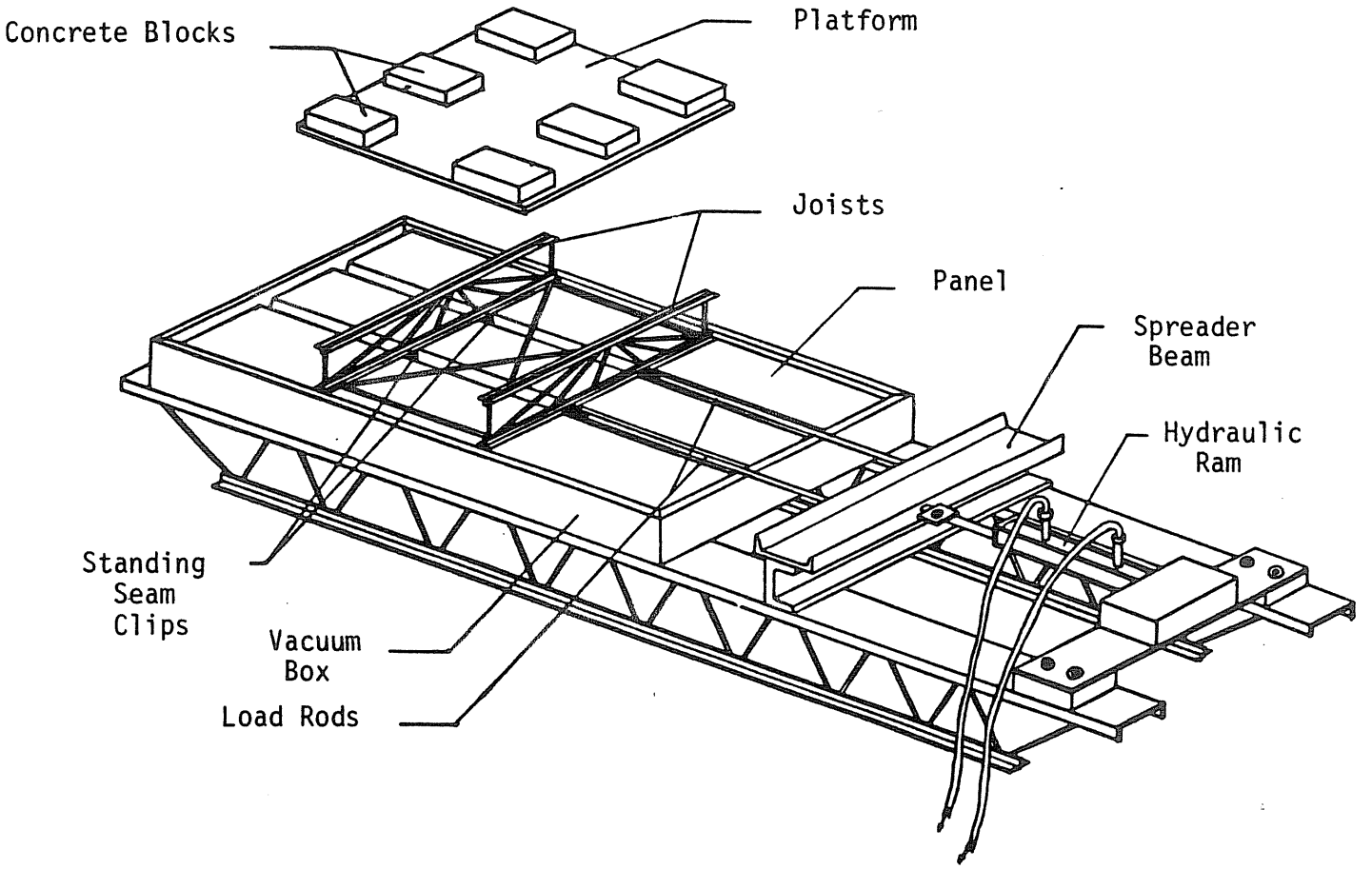


Figure 2.6 Connection Restraint Test Setup



Figure 2.7 Photograph of Connection Restraint Test Setup

by the pressure in the air bag. Using the hydraulic ram, force was applied transverse to the panel until the support frame moved relative to the panel. The displacement transducers were used to measure the motion of the support frame relative to the panel. The load cell was used to measure the applied force. The force and displacements were measured and plotted in real time using the data acquisition system. The data acquisition system for this series of tests consisted of a 16 channel high-speed A/D converter, a 64 bit micro-processor and a high-speed plotter.

Results from these tests are discussed in Section 3.4.

CHAPTER III

TEST RESULTS

3.1 General Roof System Test Results

A total of 46 vacuum chamber tests were performed as part of the research program. A flowchart showing the variation of test parameters and a complete test matrix are found in Appendix A. Figure A.1 is a flowchart showing the individual test configurations and the corresponding test numbers. Table A.1 lists for each test the designation number, joist type, span length, number of rows of bridging, bridging locations at top and bottom chords, failure load and remarks concerning the test set-up, failure mode and location. The tests are listed in chronological order in Table A.1. The following test designation scheme is used:

xx/y/zz-nn

where xx = nominal span in ft., y = clip height in in., zz = nominal live load in psf, and nn = test number in the order conducted. For example, Test 40/3/20-36 is a 40 ft. span test with 3 in. high clips and with joists designed for a nominal 20 psf live load. The test was the 36th in the series.

For each test a complete data pack was made which includes a test summary sheet, measured section properties, computed loads, plane view of test set-up, and vertical load versus vertical and horizontal displacement plots. What follows is a description of the components in a complete data pack for a typical test.

Specific information about each test is given on the test summary sheet. Each summary gives the test number, joist type, approximate design load, joist moment of inertia, predicted vertical deflection at 100 plf, dead load of the joist and panel, and the parameters of the test. These consist of span length, joist spacing, clip height, whether insulation was used, number of rows of bridging (at both top and bottom chords), bridging spacing along both the top and bottom chords, and any other parameters unique to the test. Calculated service loads, using the three methods presented in the following section, are also presented along with the test results such as failure mode and location, and load factors for the calculated service loads. A discussion of any important observations is also given. A typical test summary sheet is shown in Figure 3.1.

Figure 3.2 is a typical data pack sheet showing the measured cross-section. Computed section properties and service loads from the various methods (see following section) are typically presented as shown in Figure 3.3. Figure 3.4 shows a typical plan view as found in the data packs. Shown in this figure are the location of all instrumentation, spacing and configuration of bridging, and pertinent dimensions. Figure 3.5 shows typical vertical load versus vertical test joist and outside joist vertical deflections and vertical load versus selected lateral deflections.

Vertical and lateral displacements at 5 to 10 locations of interest on the test set-up were measured and recorded for all tests. Vertical deflections for the test joist and the outside joist nearest to the test joist were plotted against load along with a predicted vertical deflection. The vertical deflection was predicted using

$$\Delta = 5w\ell^4/384EI \qquad (3.1)$$

Test No. 50/3/40-29

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.6"^{4} Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-6'3"-7'2"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel was attached to channel. Large channel used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 197.3
2. Method: SJI Load: 288.1
3. Method: CONV. Load: 231.0

TEST RESULTS:

Failure Mode: Top chord lateral buckling both joists. Centerline of east joist and 3 ft. north of centerline west joist.

Applied Failure Load: 405.1 plf Total Failure Load: 422.2 plf

Load Factor (Failure Load/Service Load) 1. 2.14

2. 1.47

3. 1.83

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-Bottom chord yielding was shown at approximately 350 plf.

Figure 3.1 Typical Test Summary Sheet

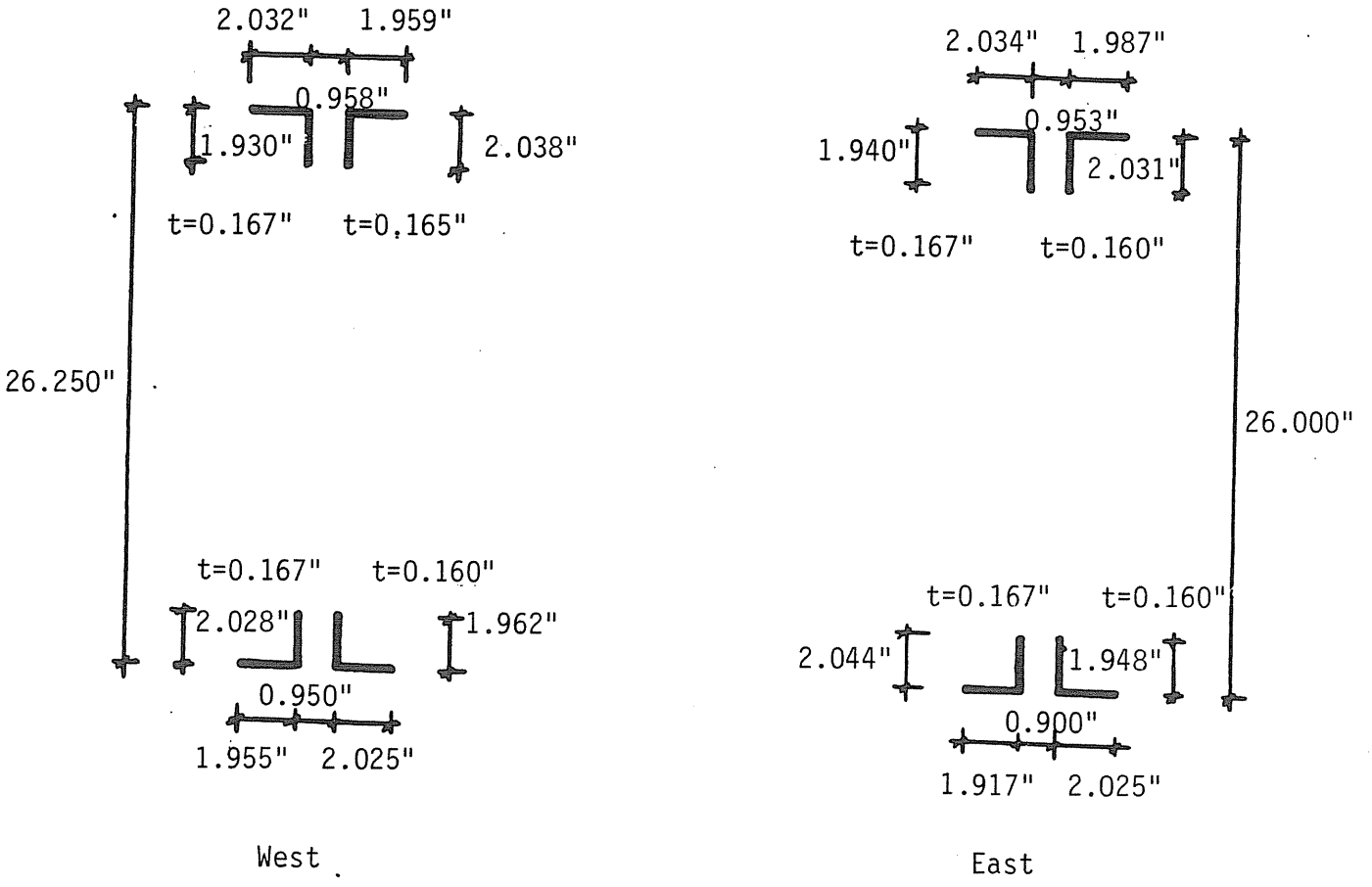


Figure 3.2 Typical Measured Cross-Section Properties Data

TEST # 50/3/40-29W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.032	RIGHT HORZ LEG (in) =	1.959
LEFT VER LEG (in) =	1.930	RIGHT VER LEG (in) =	2.038
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.165
GAP BETWEEN THE LEGS (in) =	0.958		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.955	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	2.028	RIGHT VER LEG (in) =	1.962
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160
GAP BETWEEN THE LEGS (in) =	0.950		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.483	in^4	Iy =	1.858	in^4
rx =	0.618	in	ry =	1.211	in
A =	1.266	in^2	J =	0.012	in^2
x =	2.489	in	y =	0.502	in

BOTTOM CHORD

Ix =	0.481	in^4	Iy =	1.807	in^4
rx =	0.621	in	ry =	1.203	in
A =	1.250	in^2	J =	0.011	in^2
x =	2.425	in	y =	0.593	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 398.98 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 26.25 (in)	EFF. DEPTH	= 25.16	(in.)	
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	= 1.18	(in)	
BRIDGING SPACING	= 6.30 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 105.31		
KL/ry	= 62.41	KL/rx	= 38.84		
b/t RATIO	= 12.35	Q	= 0.93		
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	= 422.20	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	22.8	28.9	60.6	197.3	2.14
SJI	33.4	42.2	88.5	288.1	1.47
CONV	26.7	33.9	71.0	231.0	1.83

Figure 3.3 Typical Computed Allowable Loads and Load Factors Printout

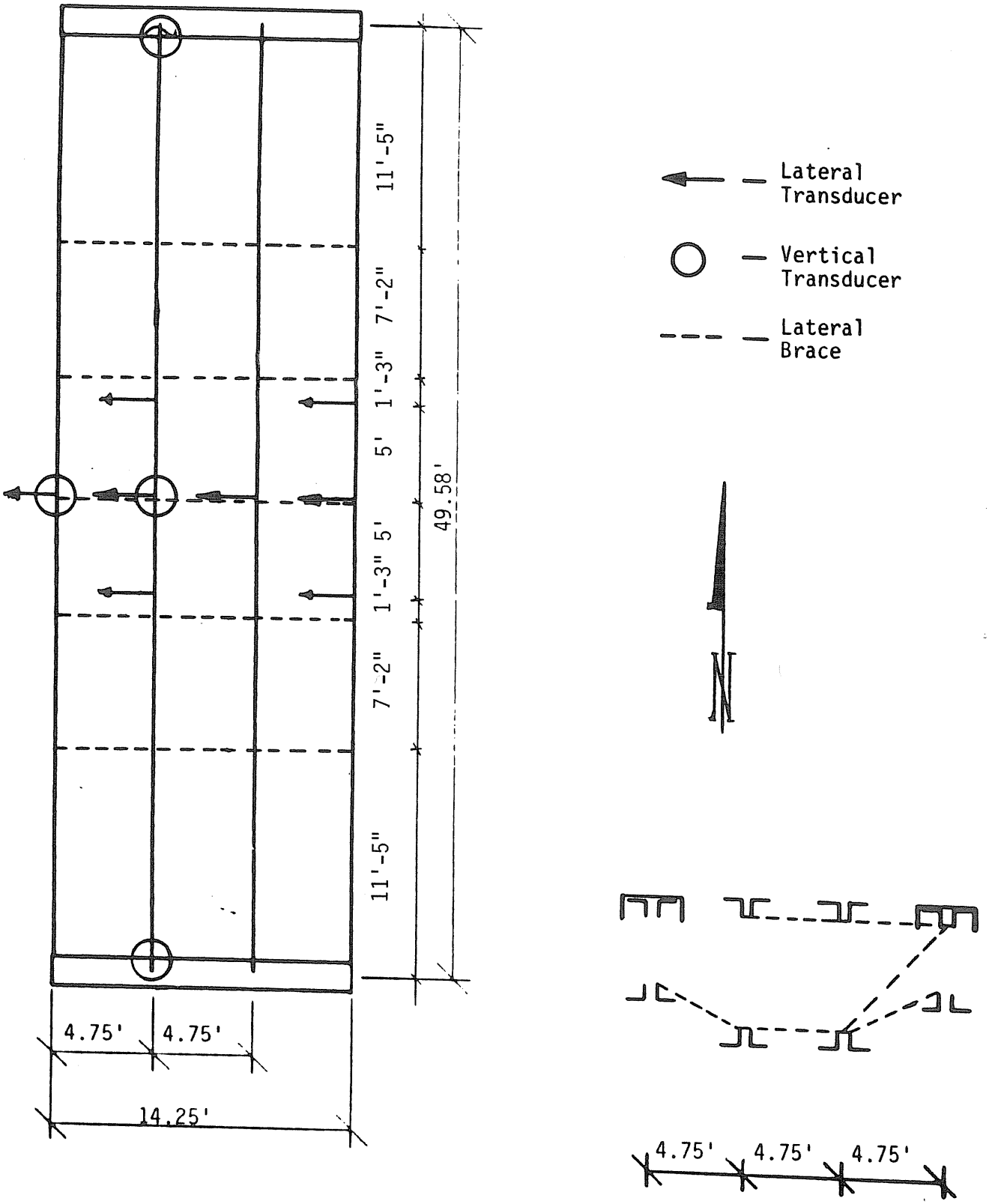
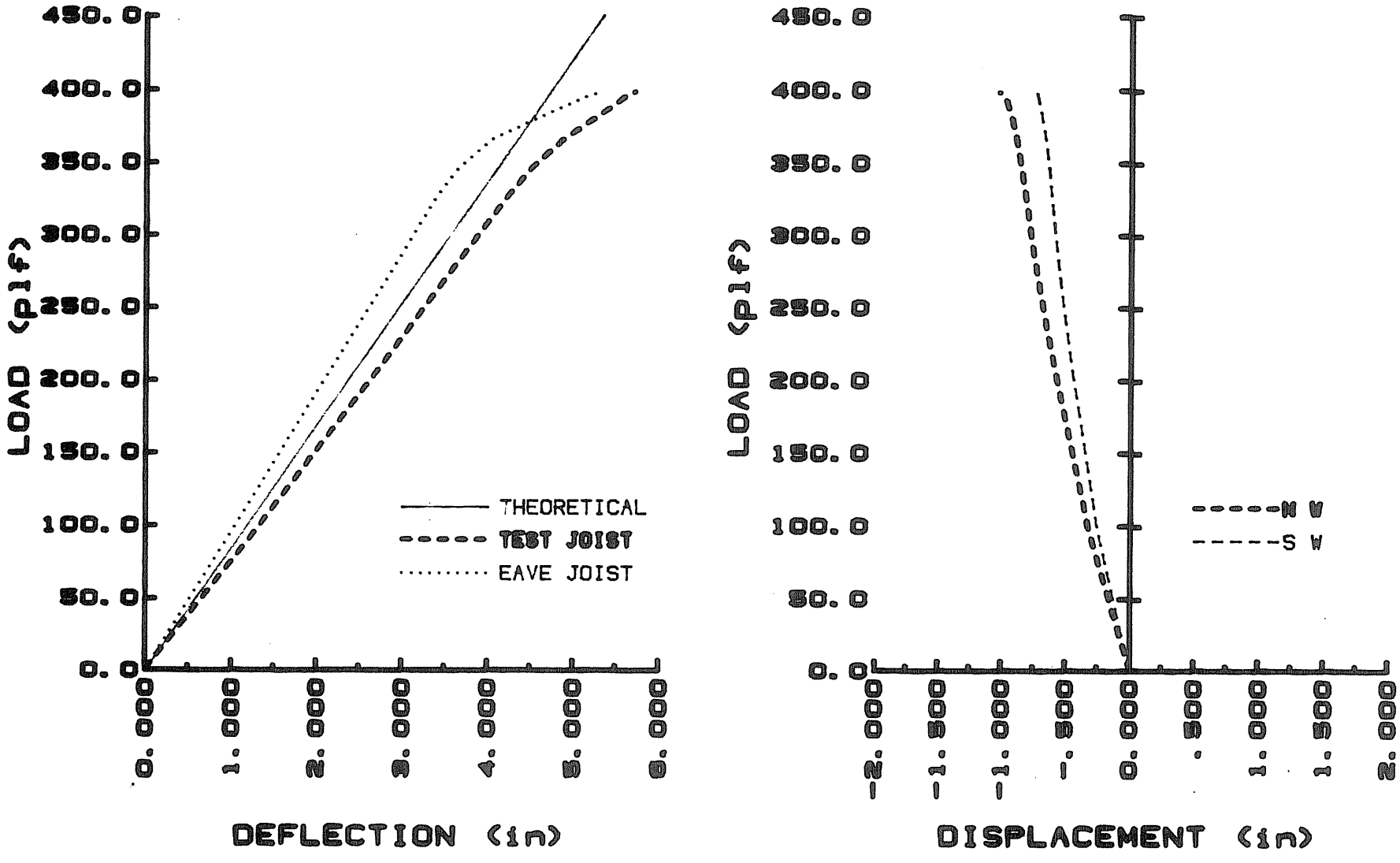


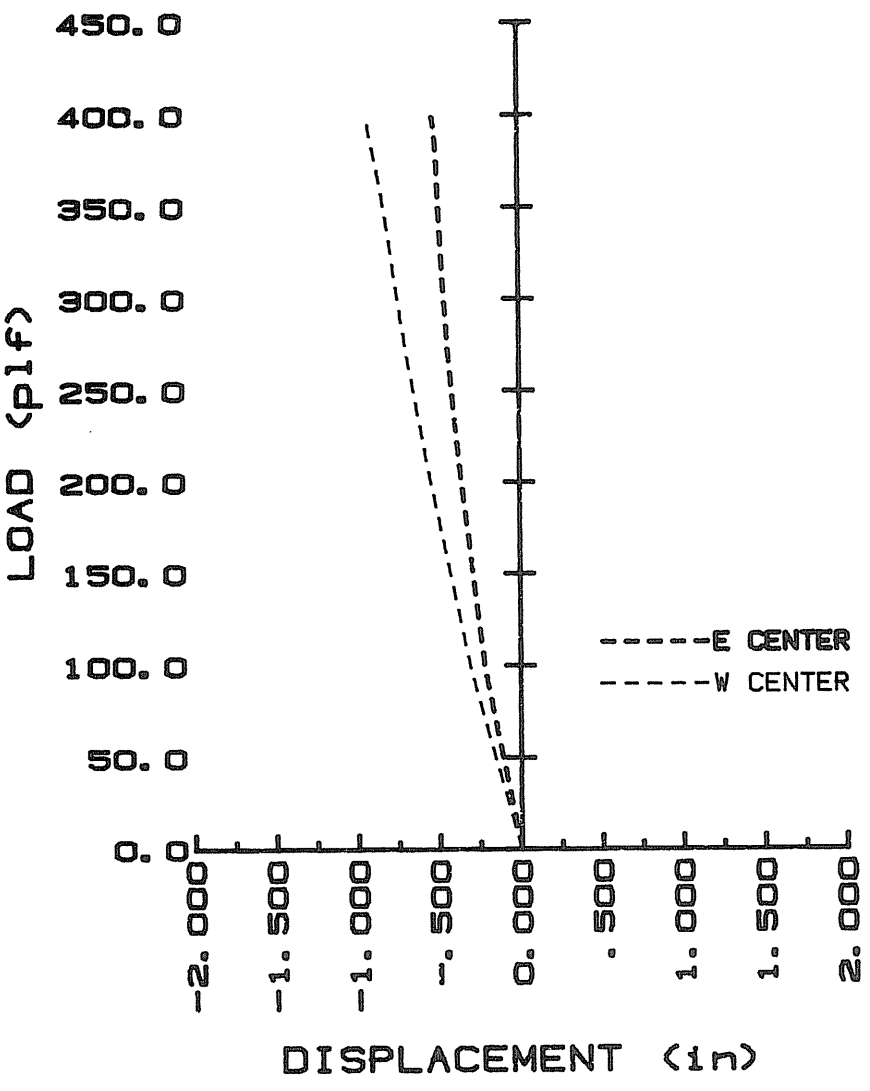
Figure 3.4 Typical Plan View of Specific Test Setup



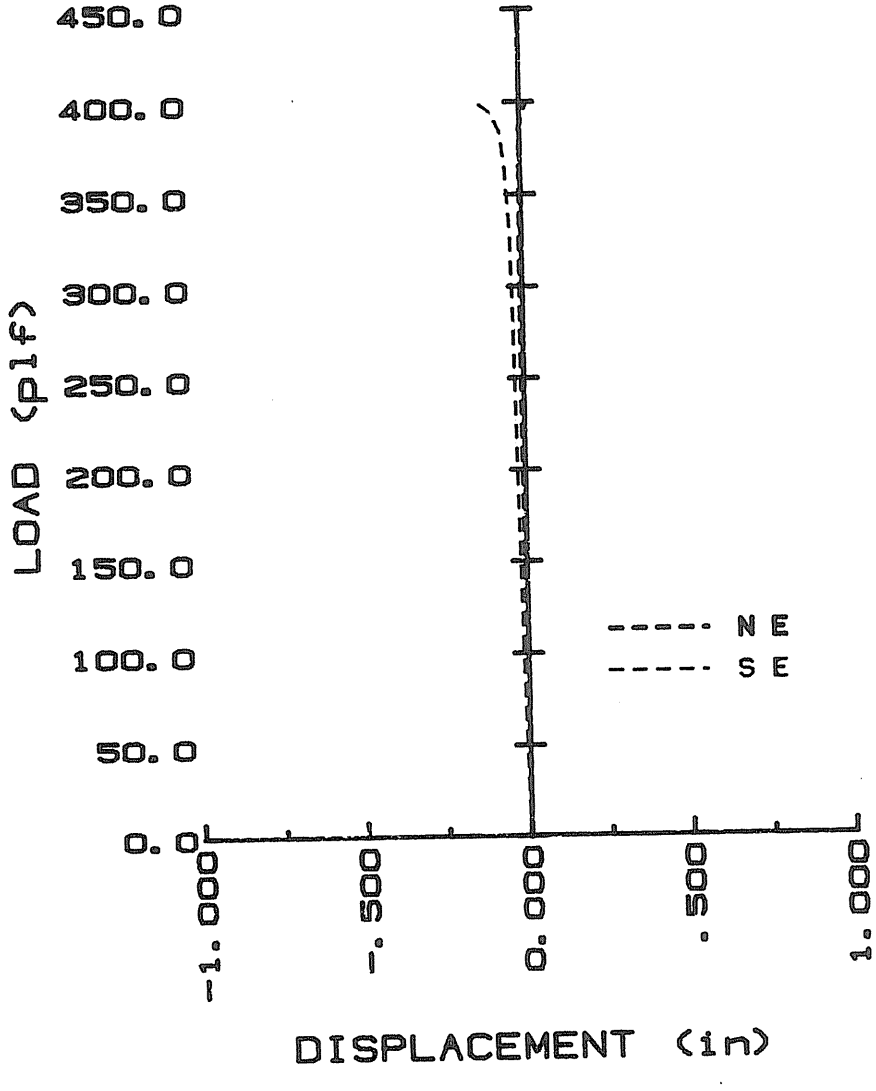
a) Vertical Deflections

b) Midspan Lateral Deflections

Figure 3.5 Typical Load versus Deflection Relationships



c) Lateral Displacement at Anticipated Failure Location, West Joist



d) Lateral Displacement at Anticipated Failure Location, East Joist

Figure 3.5 Typical Load versus Deflection Relationships, Cont.

where I = the gross moment of inertia of the joist with respect to the horizontal axis as reported by VULCRAFT, w = uniform load, ℓ = the span length, and E = modulus of elasticity. The vertical deflection plot for a typical test is shown in Figure 3.5(a).

Lateral displacements were measured and recorded for several locations on each test set-up. For each test, lateral displacements of the top chord at midspan on the east and west test joists as well as the outside joist used as the eave joist (east joist) were measured and plotted against load. These results are shown in Figure 3.5(b) for a typical test. Additional displacement transducers were placed at or near a location where failure was expected, such as the top chord of one or both of the test joists midway between bridging locations north and south of the midspan. Measurements of lateral displacement for a typical test at these locations, plotted against vertical load, are shown in Figure 3.5(c) for the west test joist and in Figure 3.5(d) for the east test joist.

Displacement transducers were mounted on the east eave joist with the measuring wire attached to the east test joist. In this manner the relative displacement of the test joist with respect to the eave joist was measured.

Data packs for each of the tests are found in the appendices of this report. Due to the large number of tests and similarity in the data, it would be repetitive to plot all the data shown in Figure 3.5. Therefore, in the data packs in the appendices only vertical load versus vertical deflection and one set of vertical load versus lateral displacement plots are presented. The 40 ft. span data packs are in Appendices C through F. The 20 psf rod and angle joist data packs are in Appendices C and D,

respectively, with the 40 psf rod and angle web joists data packs in Appendices E and F, respectively. The data packs for the 50 ft. span 40 psf load tests are in Appendix G and the 60 ft. span 20 psf and 40 psf load tests are in Appendices H and I, respectively.

Top chord lateral buckling was the most common failure mode. The location of failure was generally 2 to 4 ft. north or south of midspan (exact location is found on the test summary sheets). The direction the compression chord moved and whether the failure occurred north or south of midspan was random. The panel-to-joist clip at the location of failure was usually pulled apart with the top portion firmly in place without indication that it moved in the panel-to-panel seam. For angle web joists, the location of chord buckling was always located at the nearest to center unbraced top chord panel point where two diagonal web members met. A typical rod web chord failure is shown in Figure 3.6 and a typical angle web failure is shown in Figure 3.7.

Four tests exhibited failure modes different from the two typical modes shown in Figures 3.6 and 3.7. All occurred in the 40 ft. span series. Test 40/3/20-11 failed by lateral buckling of the east test joist and vertical chord buckling of the west joist. In Test 40/3/20-34, failure was due to buckling of the first compression web member of the east outside joist. Angles, 1 in. x 1 in. x 1/8 in., were welded to the first two compression chord members of the replacement joist, however, a similar failure occurred in Test 40/3/40-37 in the next unstiffened compression chord member. The failure mode of Test 40/3/40-38 was bending failure of the top chord of both test joists near the north support. Since the failure mode found in the latter three tests was untypical and did not meet the objectives of the



Figure 3.6 Photograph of Typical Rod Web Joist Top Chord Failure

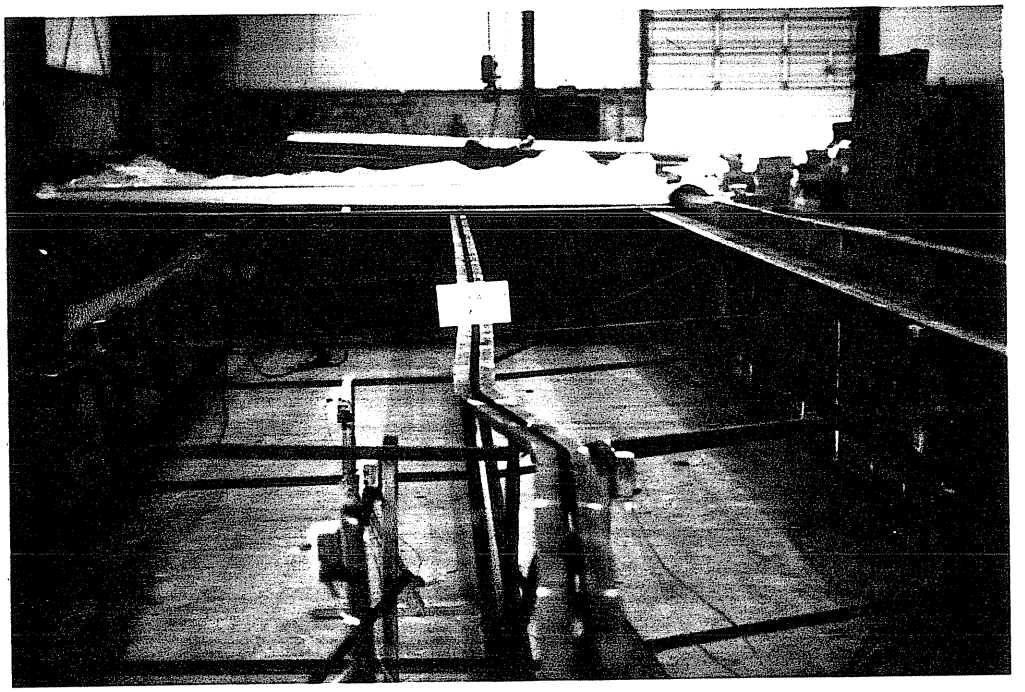


Figure 3.7 Photograph of Typical Angle Web Joist Top Chord Failure

research program, data from these tests are not included in the final results. Specific reasons for the unexpected failure are given in the summary sheets.

Initially, cold-formed 8 in. channels were welded to the top chords of the outside joists to provide a degree of lateral stiffness to the roof system. Beginning with Test 34 of the 40 ft. span series and Test 16 of the 60 ft. span series and for all tests in the 50 ft. span series, hot-rolled C8x11.5 channels were used. The strong axis moment of inertia of the cold-formed and hot-rolled channels were 7.5 $in.^4$ and 32.6 $in.^4$, respectively.

Initially, the top chord bridging was attached to both outside channels (see Figure 1.2(c)). Beginning with Test 15, the top chord bridging was not connected to the east outside joist (see Figure 1.2(e)). Also, for several of the initial tests no "X" bridging was used. Beginning with Test 14, "X" bridging was installed between the east test joist and the east outside joist as shown in Figure 1.2(d). Beginning with Test 42, the location of this bridging was moved to between the two test joists as shown in Figure 1.2(f).

The attachment of the east side of the panel to the eave joist was accomplished for most of the tests by fastening the eave closure plate to the channel on the eave joist and then fastening the panel to the eave closure plate with a self-drilling screw. When the 4" clip with thermal block was used the panel was attached to the eave joist with 3" self-drilling fasteners with 2 in. by 4 in. wood inserted between the panel flat and top of the channel. For tests using the RIS system, the beams were attached to the channels and the panel was attached directly to the RIS beams with self-drilling fasteners.

When the testing program began, a 3/8 in. hole was hand punched into the top chord of the joists at 2 ft. on center. The clips were attached to the joist with 3/8 in. diameter by 1 in. long machine bolts. Beginning with Test 16, self-drilling fasteners were used to attach the clips to the joist chords in the center one-third of the joist span; prepunched holes and machine bolts were used in the other two-thirds.

None of the above changes caused a noticeable effect on the failure load or failure mode of subsequent tests. Hence, discussion of specific results will not include the above differences in specific test set-ups.

3.2 Current Specification Provisions

When a conventional steel deck is used in conjunction with a steel joist, the top chord is considered to be lateral supported and the Steel Joist Institute Standard Specifications[3] suggest a design procedure which considers the unbraced length of the compression chord to be the distance between panel points. In these Specifications, full lateral support is assumed to be provided if the deck-to-chord connection spacing does not exceed 36 in. When a standing seam roof system is used in conjunction with steel joists, the amount of lateral restraint provided by the panel and clip is unknown. Conservatively, the unbraced length can be taken as the distance between bridging lines and the allowable stress computed following either the Steel Joist Institute's provisions for required bracing during construction[3] or the American Institute of Steel Construction provisions[2] for the design of compression members. The three methods described above range from assuming a completely laterally supported top chord to no lateral support to the top chord except at the intermediate bridging locations. Each procedure is described in the following sections.

3.2.1 Analysis Procedure for Chords Braced by Conventional Decks

According to the SJI Specification, if the spacing of deck-to-chord connections is less than 36 in. and if the connections are capable of resisting at least 300 lbs, the governing failure mode is in-plane buckling of the top chord. The SJI Specification provisions are as follows:

"For members with L/r less than C_c:

$$F_a = \frac{\left[1 - \frac{(L/r)^2}{2C_c^2}\right] Q F_y}{\frac{5}{3} + \frac{3}{8}\left(\frac{L/r}{C_c}\right) - \frac{1}{8}\left(\frac{L/r}{C_c}\right)^3} \tag{3.2}$$

where

$$C_c = \sqrt{\frac{2\pi^2 E}{Q F_y}} \tag{3.3}$$

where Q is a form factor equal to unity except when the width-thickness ratio of one or more elements of the profile exceeds the limits specified in the AISC Specifications, Section 1.9 for hot rolled sections and in the AISI Specifications, Section 3, for cold formed sections.

For members with L/r greater than C_c:

$$F_a = \frac{12\pi^2 E}{23(L/r)^2} \tag{3.4}$$

In the above formulas L is taken as the distance between panel points for the chord members, and r is the corresponding least radius of gyration of the member. E is equal to 29,000,000 psi."

The factor of safety in Equation 3.2 is the denominator of that equation and ranges from 1.67 to 1.92 depending on the slenderness ratio L/r.

In Equation 3.4 the factor of safety is 1.92.

The form factor Q for single angles not in contact (the only case considered in this research) is determined from the following.

When $76.0/\sqrt{F_y} < b/t < 155/\sqrt{F_y}$:

$$Q_s = 1.340 - 0.00447(b/t)\sqrt{F_y} \tag{3.5}$$

When $b/t \geq 155/\sqrt{F_y}$:

$$Q_s = 15{,}500/\{F_y(b/t)^2\} \tag{3.6}$$

Since the joist chord is considered to be laterally braced about the vertical axis, the critical L/r ratio is about the horizontal axis (L/r_x). Since the top chord is assumed to be laterally supported in this procedure, an unconservative allowable stress may result if sufficient lateral support is not provided by the standing seam roof system.

3.2.2 SJI Erection Stability Equations

In Section 4.4 of the SJI Specifications[3], an equation to ensure lateral stability of continuous web joists during erection is given. This equation is based on the work of Dr. J.A. Hriber at the Carnegie Institute of Technology[4]. The design equation takes into account possible lateral restraint supplied to the top chord from the web and bottom chord members due to bending in the members when lateral movement of the top chord takes place. Other than this stiffness, the compression chord is assumed to be laterally unbraced between equally spaced bridging lines.

From the SJI specification, the allowable stress for erection loads, with a factor of safety of 2.0 against lateral instability, is expressed by the following formula:

$$F_a = \frac{14.15 \times 10^6 C_1 C_2}{h\, S^2 A_T} \sqrt{(I_T+I_B)(J_T+J_B)S^2+25.6\, I_T I_B\, h^2} \qquad (3.7)$$

where S = Spacing of bridging (in.), h = Effective joist depth (in.), A_T = Area of top chord (in^2), I_T = Moment of inertia of top chord about the vertical axis (in^4), I_B = Moment of inertia of bottom chord about vertical axis (in^4), and J_T,J_B = Torsional constant of top and bottom chord, respectively (in^4). The torsion constant of angles or hat-shaped sections is determined from the formula (assuming t is constant)

$$J = At^2/3 \qquad (3.8)$$

where A is the cross-sectional area of the member being considered and t is its thickness. The coefficient C_1 = 0.85 for two-piece chord joists and C_1 = 1.0 for one-piece chord joists. The coefficient C_2 is a function of the number of rows of bridging as:

Number of Rows of Bridging	C_2
1	4.00
2	3.00
3	4.00
4	3.33
5	4.00

This procedure may be accurate if little or no lateral restraint is provided by the standing roof system. If significant restraint is provided, the use of Equation 3.7 will result in conservative designs.

3.2.3 Analysis Procedure for Unbraced Compression Chords

The AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings"[2] provisions for the allowable stress in compression members are found in Section 1.5.1.3 and Appendix C of that specification. The provisions are essentially the same as found in the SJI Specification, Equations 3.2 and 3.4 of this report. The only

difference is the method for handling local buckling, i.e. Q. AISC includes this provision in Appendix C of its Specification but the end results are identical to the SJI provisions.

Use of the AISC provisions requires consideration of lateral buckling in both the vertical and horizontal directions. The unbraced length in the vertical direction is to be taken as the distance between panel points and that in the horizontal direction as the distance between bridging lines. In both directions, the effective column length factor is to be taken as 1.0.

Use of these provisions for the standing seam roof systems tested in this research program implies that no lateral restraint is assumed to be provided by the sliding clip and panel. Use of these provisions will result in the most conservative designs of the three methods discussed here because the slenderness ratio in the horizontal (out-of-plane) direction is generally greater than in the vertical (in-plane) direction for standard joists and no benefit is considered for the flexural stiffness of the web and tension chord members.

3.2.4 Basis for Experimental/Analytical Comparisons

Comparison of experimental failure loads with allowable working loads from each of the above analysis procedures are made in the following section. The allowable working loads for each test joist were calculated using a computer program developed as part of this research program. In all cases, the allowable working load was calculated using the measured yield stress of the compression chord material as reported in Section 3.4.2. The comparisons are based on a load factor (L.F.) defined as

$$\text{L.F.} = \frac{\text{Experimental Failure Load}}{\text{Allowable Load}} \qquad (3.7)$$

A sample computer printout showing the data used to calculate the allowable loads and associated load factors is shown in Figure 3.3. Similar printouts for each test joist used in the tests are found in the appropriate data packs in the appendices. The terms "CONV", "SJI" and "AISC" are used to identify the results. "CONV" refers to the SJI analysis procedure for chords braced by conventional decks as is described in Section 3.2.1. The failure mode is in-plane buckling of the compression chord. "SJI" refers to the SJI analysis procedure for erection stability as described in Section 3.2.2. The failure mode is lateral-torsional buckling of the joist top chord and web. "AISC" refers to the analysis procedure for unbraced compression chords without considering the effect of the web as described in Section 3.2.3. The failure mode is lateral buckling of the top chord. It is noted that results from all three analyses are given and that the controlling procedure is not noted on either the test summary sheets or computer printouts.

3.3 Discussion of Results of Roof System Tests

3.3.1 40 ft. Span Test Results

General. Eighteen tests using 40 ft. span angle and rod web joists were performed in this part of the investigation. Design load levels of 20 psf and 40 psf and 5 ft. joist spacing were used to develop the test matrix. Test parameters included three panel-to-joist connection configurations and two top chord bridging spacings. For all tests, bottom chord bridging was installed near the outside bottom chord panel points and at midspan. A flowchart of the test matrix is shown in Figures 3.8 and A.1. Experimental failure loads, allowable loads from "AISC", "SJI" and "CONV" analyses and associated load factors are given in Table 3.1. Specific results for each test are found in the appendices of this report as follows: The four 40 ft.

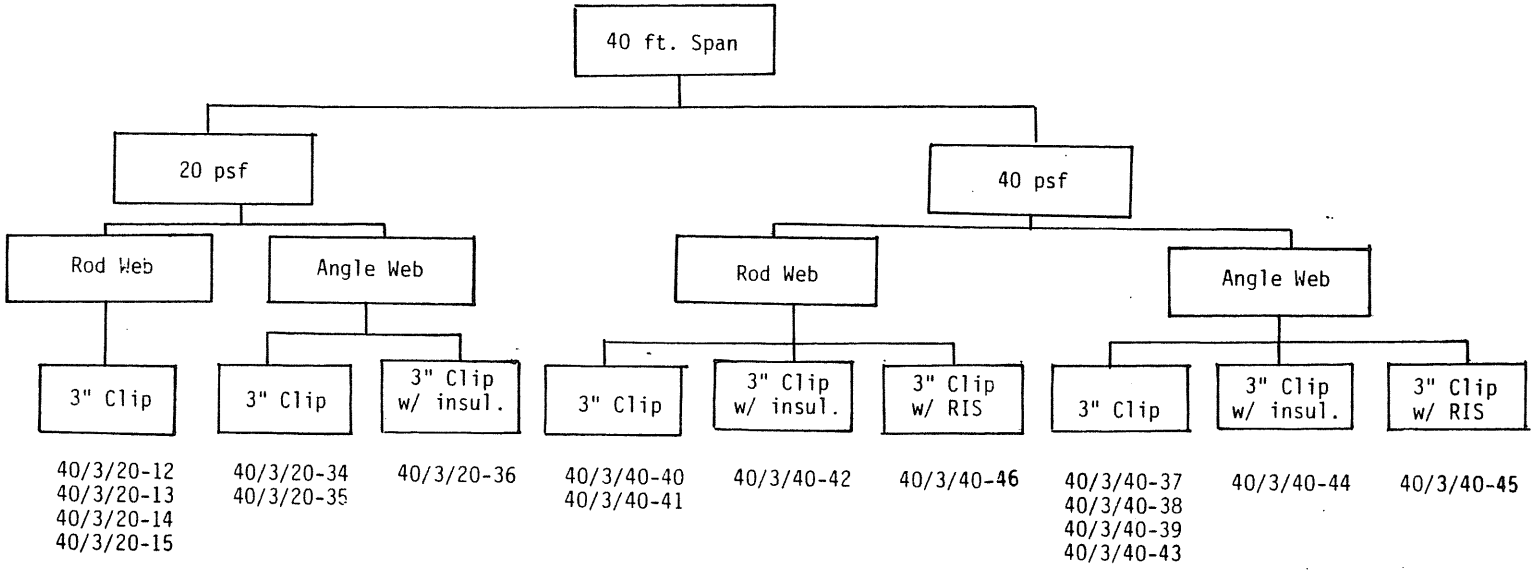


Figure 3.8 Flowchart of 40 ft. Span Tests

Table 3.1
40 ft. Span Tests
Comparison of Experimental and Allowable Loads

		Test No.	Rows of Bridg. T	Rows of Bridg. B	Exp. w_u (plf)	y-Axis (AISC) w plf	y-Axis (AISC) LF	Bridging (SJI) w plf	Bridging (SJI) LF	x-Axis (CONV.) w plf	x-Axis (CONV.) LF	Insulation
20 psf	Rod	40/3/20-12	1	3	208.7	10.5	19.97	18.2	11.48	130.5	1.60	N
		40/3/20-13	3	3	278.1	42.8	6.5	65.2	4.27	131.9	2.11	N
		40/3/20-14	3	3	238.2	45.4	5.25	65.1	3.66	126.2	1.89	N
		40/3/20-15	3	3	268.0	39.7	6.76	65.9	4.07	117.7	2.28	N
	Angle	40/3/20-34[1]	3	3	284.9							N
		40/3/20-35	3	3	235.9	58.0	4.07	84.9	2.78	130.0	1.81	N
		40/3/20-36	3	3	254.5	61.0	4.17	95.9	2.65	136.1	1.87	I
40 psf	Rod	40/3/40-40	3	3	421.2	86.2	4.89	150.0	2.81	232.1	1.81	N
		40/3/40-41	3	3	418.1	85.5	4.89	145.8	2.87	221.3	1.89	N
		40/3/40-42	3	3	433.5	86.2	5.03	144.5	3.00	228.2	1.90	I
		40/3/40-45	3	3	340.9	84.8	4.02	149.9	2.27	222.2	1.53	R
	Angle	40/3/40-37[1]	3	3	302.2							N
		40/3/40-38[1]	3	3	417.2							N
		40/3/40-39	3	3	385.9	124.4	3.10	193.2	2.00	222.4	1.74	N
		40/3/40-43	3	3	382.4	119.0	3.21	190.8	2.00	227.5	1.68	N
		40/3/40-44	3	3	376.3	128.9	2.92	197.6	1.90	226.8	1.66	I
		40/3/40-46	3	3	347.3	115.6	3.00	188.9	1.84	230.5	1.51	R
*		40/3/20-11	1	3	314.2	12.8	24.48	22.1	14.21	169.8	1.85	

*Retest of Test B-2B of Reference 5.

[1]Test not considered to be valid.

N = w/o insulation

I = w/ insulation

R = RIS Beams

span, 20 psf rod web and three angle web tests are found in Appendices C and D, respectively, and the four 40 ft. span, 40 psf rod web and six angle web tests are found in Appendices E and F, respectively. To verify the test setup and testing procedure, a retest of Test B-2B of Reference 5 was performed and results are given in Appendix F (Test 40/3/20-11).

The failure mode for all tests in this series, except Tests 34, 37 and 38 (see previous discussion), was lateral buckling of the top chord as shown in Figures 3.6 and 3.7. From Table 3.1, the allowable loads from the "CONV" analysis (in-plane buckling) exceed the allowable loads from the other two analyses (out-of-plane buckling) in all cases. Thus in-plane top chord buckling can be eliminated from further discussion for this series.

Series 40/3/20. The four rod web joist tests in this series were conducted using the 3 in. clip and no insulation (Tests 12 to 15). Two angle web joist tests were conducted with the 3 in. clip and no insulation (Tests 34 and 35) and one with the 3 in. clip and insulation (Test 36). For previously explained reasons, Test 34 will not be considered in the following discussion.

Test 12, rod web joists, was conducted with a single row of top chord bridging at midspan and three rows of bottom chord bridging. The failure load was 208.7 plf (Table 3.1) and the "AISC" and "SJI" out-of-plane analyses load factors were 19.97 and 18.2, respectively. The remaining rod web tests (Tests 13, 14 and 15) were conducted with three rows of top chord bridging, midspan and 10 ft. each side of midspan, and three rows of bottom chord bridging. The experimental failure loads varied from 238.2 plf to 278.1 plf. The "AISC" load factors exceeded 5.2 and the "SJI" load factors exceeded 3.6.

Both of the valid angle web joist tests, Tests 35 and 36, were conducted with three rows of top chord bridging. Experimental failure loads were 235.9 plf and 254.5 plf. "AISC" load factors were 4.07 and 4.17, and the "SJI" load factors were 2.65 and 2.78, respectively. Test 36 was conducted with insulation.

Series 40/3/40. In this series, both rod and angle web joists were used with the 3 in. clip. Two rod and four angle joist tests were conducted without insulation, one of each type with insulation, and one of each type with the RIS beams. All tests were conducted with three rows of top chord bridging, midspan and 10 ft. each side of midspan. The failure modes for Tests 37 and 38, for reasons given previously, are not considered in the following discussion.

The experimental failure loads for the tests using rod web joists varied from 340.9 plf to 433.5 plf. The failure load for Test 42, with insulation, was slightly greater than for the tests without insulation. Test 45 was conducted with the RIS beams installed and the failure load was significantly less than the other three tests. The "AISC" load factors exceeded 4.0 for all tests and the "SJI" load factors exceeded 2.25.

For the valid tests with angle web joists, the experimental failure loads varied from 347.3 plf to 385.9 plf. The failure load for Test 44, with insulation, was slightly less than the failure loads for Tests 39 and 43 which were conducted without insulation. RIS beams were installed for Test 46 and the failure load was significantly less, 347.3 plf. Load factors for the "AISC" procedures exceeded 2.90 and those for the "SJI" procedure varied from 1.84 to 2.00. The load factors obtained using the Conventional design procedure varied from 1.66 to 1.74 for the tests without the RIS beams and was 1.51 for the test with the RIS beam.

Summary. Results of the 40 ft. span tests are summarized as:

1. Load factors for the "AISC" analysis procedure, that is, assuming no lateral restraint between bridging lines, exceed 2.92 for angle web joists and 4.02 for rod web joists.

2. Load factors for the "SJI" analysis procedure, that is, assuming no lateral restraint between bridging lines but considering the effect of web and bottom chord torsional restraint, exceed 2.27 for the rod web tests and 1.80 for the angle web tests.

3. From 1. and 2., it is obvious that the VULCRAFT standing seam roof system provides significant lateral restraint to the top chord.

4. Insulation had insignificant effect, less than 5%, on the experimental failure load.

5. Use of the RIS beams significantly decreased, approximately 20%, the failure load of both angle and rod web, 40 psf joists.

6. For both the 20 psf and 40 psf tests, angle web joists carried less load than the rod web joists, approximately 6% for the 20 psf tests and approximately 12% for the 40 psf tests.

7. For the rod web joists tested, except those with the RIS beams installed, it appears that three rows of top chord bridging, midspan and 10 ft. each side of midspan together with the standing seam roof system, is adequate to prevent out-of-plane buckling justifying the use of the "CONV" method for this configuration. Load factors greater than 1.80 were found using the "CONV" analysis method.

8. Based on two test results, it appears that the "SJI" method or the "AISC" method can be used to determine the top chord lateral

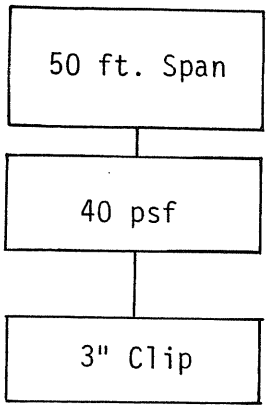
buckling capacity of 40 ft. span joists of the configurations tested with RIS beams installed. The resulting load factor would be greater than 1.80. It is noted, however, that the "SJI" procedure was not developed for angle web joists.

3.3.2 50 ft. Span Test Results

Series 50/3/40. Seven 50 ft., 40 psf, simple span tests were conducted. All tests used angle web joists with 3 in. clips installed and no insulation. The flowchart for the test matrix is shown in Figures 3.9 and A.2. Experimental failure loads, and "AISC", "SJI" and "CONV" allowable loads and load factors are given in Table 3.2. Specific results for each test are found in Appendix G.

Tests were conducted with three rows (midspan and 9 ft. 11 in. each side of midspan), five rows (midspan, 6 ft. 3 in. each side of midspan and 13 ft. 5 in. each side of midspan) and six rows (2 ft. 7 in., 8 ft. 0 in. and 14 ft. 3 in. each side of midspan) and seven rows (midspan, and 4 ft. 7 in., 9 ft. 5 in. and 15 ft. 2 in. each side of midspan) of top chord bridging. All tests were conducted with seven rows of bottom chord bridging installed.

Four of the seven tests were not conducted to failure. Tests 27, 28 and 29 were conducted using the same joists. First Test 27 was conducted to a predetermined load level and then unloaded. The number of rows of bridging was then changed from seven to six, and Test 28 conducted again to a predetermined load level. The system was then unloaded and the number of rows of bridging decreased to five. Test 29 was then conducted to failure. The same procedure was used for Tests 30 and 31 with five and three rows of bridging, respectively. Tests 32 and 33 were loaded directly to



50/3/40-27
50/3/40-28
50/3/40-29
50/3/40-30
50/3/40-31
50/3/40-32
50/3/40-33

Figure 3.9 Flowchart of 50 ft. Span Tests

Table 3.2
50 ft. Span Tests
Comparison of Experimental and Allowable Loads

	Test No.	Rows of Bridg. T	Rows of Bridg. B	Exp. w_u (plf)	y-Axis (AISC) w plf	y-Axis (AISC) LF	Bridging (SJI) w plf	Bridging (SJI) LF	x-Axis (CONV.) w plf	x-Axis (CONV.) LF
Angle Web	50/3/40-31	3	7	264.1	123.2	2.14	202.8	1.30	224.6	1.18
	50/3/40-33	3	7	367.7	123.0	2.99	197.3	1.86	222.2	1.65
	50/3/40-29	5	7	422.2	191.7	2.20	282.1	1.50	223.6	1.89
	50/3/40-30	5	7	347.6*	189.5		281.4		224.6	
	50/3/40-32	5	7	349.3	187.8	1.86	274.2	1.27	222.2	1.57
	50/3/40-28	6	7	334.8*	207.4		282.1		223.6	
	50/3/40-27	7	7	334.2*	215.4		282.1		223.6	

All tests conducted without insulation.
*Not conducted to failure.
XXX.XX The allowable unbraced load ("AISC" or "SJI") exceeds the maximum joist capacity from braced ("CONV") analysis.

failure.

"AISC" load factors varied from 1.86 to 2.99 for the four tests conducted to failure. "SJI" load factors varied from 1.27 to 1.86. The allowable load from the "CONV" analysis was less than the "SJI" analysis for Tests 29 and 32. The lowest allowable loads were from the "AISC" analyses, as expected. The failure mode for all tests conducted to failure was lateral buckling of the top chord as shown in Figure 3.7.

Tests 31 and 33 were essentially identical in configuration, however, the experimental failure loads differ by approximately 40%. A possible explanation is that the joists used in Test 31 were damaged in Test 30. Tests 29 and 32 were essentially identical, but the failure loads differed by approximately 20% with the failure load for Test 29 being higher. Test 29 was the third test conducted with the same joists; Test 32 was loaded directly to failure.

Summary. Results of the 50 ft. tests are summerized as:

1. Load factors for the "AISC" analysis procedure, that is, assuming no lateral restraint between bridging lines, exceed 1.80 for all tests conducted to failure.

2. Load factors for the "SJI" analysis procedure, that is, assuming no lateral restraint between bridging lines but considering the effect of web and bottom chord torsional restraint, are less than 1.67 for three of the four tests which were conducted to failure. However, the configurations tested (unequal bridging spacing and/or angle web joists) do not satisfy the assumptions used to develop the "SJI" method.

3. From 1., it is obvious that the VULCRAFT standing seam roof

system provides significant lateral restraint to the top chord.

4. Rod web joists, insulation and RIS beams were not used in this test series, thus conclusions concerning their effects are not possible.

5. Although the VULCRAFT standing seam roof system provides significant lateral restraint, it is not sufficient to justify the use of the "CONV" procedure (assuming full lateral restraint) as the load factors for this method varied from 1.18 to 1.57.

3.3.3 60 ft. Span Tests

General. Twenty-one tests using 60 ft. span angle web joists were conducted in this part of the investigation. Design load levels of 20 psf and 40 psf at nominal 5 ft. spacing were used to develop the test matrix. Test parameters include three panel-to-joist configurations, and seven top chord bridging spacings. For all tests, bottom chord bridging was installed as near as possible directly below the top chord bridging with two additional lines at the outside bottom panel point locations. A flowchart of the test matrix is shown in Figures 3.10 and A.3. Experimental failure loads, allowable loads from "AISC", "SJI" and "CONV" analyses, and the associated load factors are found in Table 3.3. Specific results for the 20 psf tests are found in Appendix H and for the 40 psf tests in Appendix I.

Series 60/3/20. Sixteen tests were conducted in this series: fourteen with the 3 in. clip installed without insulation and two with the 4 in. clip with insulation and thermal blocks in place. For the 3 in. clip tests, Test 4 was conducted with a single row of top chord bridging

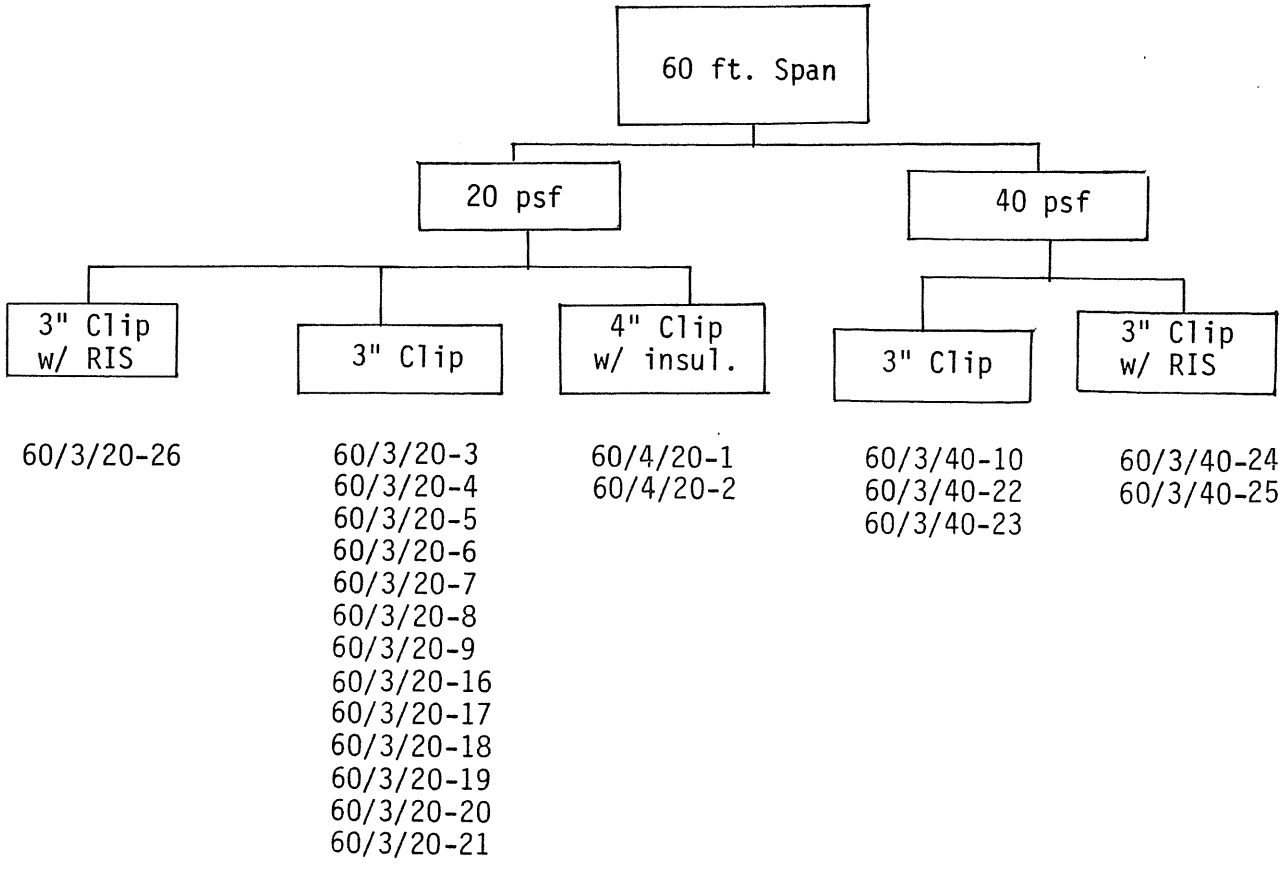


Figure 3.10 Flowchart of 60 ft. Span Tests

Table 3.3
60 ft. Span Tests
Comparison of Experimental and Allowable Load

		Test No.	Rows of Bridg. T	Rows of Bridg. B	Exp. w_u (plf)	y-Axis (AISC) w plf	y-Axis (AISC) LF	Bridging (SJI) w plf	Bridging (SJI) LF	x-Axis (CONV.) w plf	x-Axis (CONV.) LF	Insulation
Angle Web	20 psf	60/3/20-4	1	3	110.0	5.1	21.43	11.5	9.55	130.6	0.84	N
		60/3/20-1	2	4	111.7	12.5	8.95	18.6	5.90	120.3	0.93	I
		60/3/20-2	2	4	111.7	11.6	9.65	18.3	6.11	127.0	0.88	I
		60/3/20-5	3	5	162.9	22.7	7.16	40.2	4.05	123.6	1.32	N
		60/3/20-6	3	5	170.5	30.2	5.64	56.6	3.01	123.9	1.38	N
		60/3/20-3	4	6	123.0	25.5	4.86	49.0	2.52	120	1.03	N
		60/3/20-7	5	7	197.8	54.6	3.62	81.7	2.42	126.0	1.57	N
		60/3/20-8	5	7	138.4	52.9	2.62	82.3	1.68	128.6	1.08	N
		60/3/20-9	5	7	128.9	55.1	2.34	91.5	1.41	129.8	0.99	N
		60/3/20-16	5	7	133.5	52.4	2.55	81.1	1.65	121.4	1.10	N
		60/3/20-17	5	7	210.4	82.7	2.43	128.6	1.57	121.7	1.66	N
		60/3/20-18	5	7	148.3	83.3	1.78	128.6	1.15	123.8	1.20	N
		60/3/20-26	5	7	153.2	81.5	1.88	129.7	1.18	123.4	1.24	N
		60/3/20-19	6	8	163.1	102.0	1.60	156.7	1.04	124.7	1.31	N
		60/3/20-20	10	12	180.4	122.9	1.47	151.3	1.19	119.4	1.51	N
		60/3/20-21	10	12	187.8	122.5	1.53	150.9	1.24	120.0	1.57	N
	40 psf	60/3/40-10	5	7	316.5	121.3	2.61	174.1	1.82	214.0	1.48	N
		60/3/40-24	5	7	306.6	162.4	1.89	241.8	1.27	209.9	1.46	R
		60/3/40-25	5	7	309.1	163.5	1.89	244.3	1.27	211.9	1.46	R
		60/3/40-23	10	7	399.3	209.4	1.91	241.2	1.66	209.5	1.91	N
		60/3/40-22	11	7	411.8	209.4	1.97	241.2	1.71	209.5	1.97	N

N = w/o Insulation.
I = w/ 4 in. clip, insulation and thermal blocks.
R = RIS Beams
XXX.X = Allowable unbraced load exceeds maximum joist capacity from braced ("CONV") analysis.

at midspan. Tests 5 and 6 were conducted with three rows of top chord bridging: midspan and 15 ft. each side of midspan for Test 5 and midspan and 13 ft. 2 in. each side of midspan for Test 6. Test 3 was conducted with four rows of bridging: 6 ft. 7 in. and 13 ft. 2 in. each side of midspan. Tests 8, 9, 16, 17, 18 and 26 were conducted with five rows of top chord bridging: midspan and various spacings each side of midspan (see Table A.1). Test 19 was conducted with six rows of top chord bridging: 3 ft., 10 ft. and 19 ft. each side of midspan. Tests 20 and 21 were conducted using ten rows of top chord bridging: 4 ft., 6 ft. 1 in., 10 ft. 3 in., 14 ft. 10 in. and 20 ft. 5 in. each side of midspan. For the 4 in. clip tests, Tests 1 and 2 were conducted with two rows of top chord bridging, 10 ft. each side of midspan.

The failure mode for all tests was lateral buckling of the top chord as shown in Figure 3.7. The "AISC" allowable loads (out-of-plane buckling) were less than the "CONV" allowable loads except for Tests 20 and 21. Test 20 was conducted using a joist that was damaged from handling and Test 21 was conducted using joists that had been used in previous tests that were conducted to failure (see "Remarks" in Table A.1, p. A.7). The "SJI" allowable loads (out-of-plane) are less than the "CONV" loads for all tests except 17, 18, 19, 20, 21 and 26. The "AISC" load factors vary from 1.47 to 21.43 for tests with the 3 in. clip and were 8.95 and 9.65 for the two tests (Tests 1 and 2) with 4 in. clips, insulation, and thermal blocks. "SJI" load factors vary from 1.04 to 9.55 for tests with the 3 in. clip and were 5.90 and 6.11 for tests with the 4 in. clip. The "CONV" load factors for Tests 17, 18, 19, 20, 21 and

26 (3 in. clips) varied from 1.20 to 1.66.

From the results, it is apparent that the VULCRAFT standing seam system does not provide sufficient lateral support to permit the use of the "CONV" method for top chord design of 60 ft. span, 20 psf angle web joists.

Series 60/3/40. Five tests were conducted in this series: three tests used the 3 in. clip without insulation and two tests were conducted with the RIS beam installed. For the 3 in. clip tests, Test 10 was conducted with five rows of top chord bridging: midspan, 9 ft. 3 in. and 18 ft. 7 in. each side of midspan. Test 23 was conducted using 10 rows and Test 22 with eleven rows of top chord bridging with spacings given in Table A.1. The "CONV" method load factors for these tests varied from 1.48 to 1.97 with increased load factor corresponding to increased number of bridging lines. Both tests with the RIS beams installed (Tests 24 and 25) used five rows of bridging: midspan, 7 ft. 8 in. and 16 ft. 6 in. each side of midspan.

Again, the failure mode for all tests was lateral buckling of the top chord as shown in Figure 3.7. The "AISC" allowable loads (out-of-plane buckling) were less than the "CONV" allowable loads (in-plane buckling) for all tests. The "SJI" allowable loads (out-of-plane) are greater than the "CONV" loads for all tests except Test 10. The "AISC" load factors vary from 1.89 to 2.61. The "SJI" load factor for Test 10 was 1.82. The "CONV" load factors varied from 1.46 to 1.97 for Tests 22, 23, 24 and 25.

From these results, it is again apparant that the standing seam

roof system does not provide sufficient lateral support to permit use of the "CONV" method for top chord design of 60 ft. span, 40 psf angle web joists. For this series, only the "AISC" method provides adequate factor of safety for all cases.

Summary. Results of the 60 ft. span tests are summarized as:

1. Load factors for the "AISC" analysis procedure, that is, assuming no lateral restraint between bridging lines, approximate or exceed 1.80 in all but three cases, Tests 19, 20 and 21. However, for reasons stated above Tests 20 and 21 may not be valid.

2. Load factors for the "SJI" analysis procedure are greater than 1.65, except for Test 9 and when in-plane buckling controls, i.e. the "CONV" load is less than the "SJI" load (Tests 17 thu 26). However, as noted previously, the configurations tested (unequal bridging spacing and/or angle web joists) do not satisfy the assumptions used to develop the "SJI" method.

3. From 1., it is concluded that lateral restraint is provided by the VULCRAFT standing seam roof system. From the data in Table 3.3, it is noted that the effect is much greater for larger bridging spacing (3, 4, 5 or 6 rows of bridging) than for closer bridging spacing (7 or 8 rows of bridging).

4. From the results of two tests (Tests 1 and 2), it appears that the use of the 4 in. clip, thermal blocks and insulation has insignificant effect on load carrying capacity.

5. From the results of Tests 24 and 25, the effect of RIS beams on load carrying capacity cannot be accurately determined.

6. Although the VULCRAFT standing seam system has been shown to provide significant lateral restraint in some instances, it is not nearly sufficient to justify the use of the "CONV" procedure (full lateral restraint) as the load factors for this method varied from 0.84 to 1.97.

Results of supplementary tests are found in the following section. Final comparisons between the 40 ft., 50 ft. and 60 ft. span tests and design recommendations are found in Chapter V.

3.4 Results of Supplementary Tests

3.4.1 Connection Restraint Test Results

Using the test setup described in Section 2.5, 106 connection restraint tests were performed using the VULCRAFT standing seam roof system components. Thirty-eight tests were performed using the 4 in. clip with insulation and thermal block, 42 tests with the 3 in. clip and insulation and 26 tests with the 3 in. clip and no insulation. The tests were conducted at five load levels, representing 12 psf, 20 psf, 40 psf, 55 psf and 70 psf. Test results consist of a plot of a horizontal in-plane force (lateral force) versus horizontal displacement, and the resulting effective coefficient of friction at the time of slip. The effective coefficient of friction is defined as

$$CF = \frac{\text{Lateral force required to produce slip per clip}}{\text{Normal force per clip}} \qquad (3.10)$$

One plot for each connection configuration at each load level is found in Appendix J. Table 3.4 summarizes the test results showing the average friction force (FF) and the average effective coefficient of friction (CF) for

each connection configuration at each load level along with the corresponding standard deviation. (The coefficient of friction calculations are based on 10 sq. ft. of supported roof area per clip.) Data from Table 3.4 is shown plotted in Figures 3.14 and 3.15 as friction force versus normal force and effective coefficient of friction versus normal force.

Table 3.4
Results of Connection Restraint Tests

		4" Clip w/insul.		3" w/ insul.		3" w/o insul.	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
120 psf	FF	67.3	5.32	69.2	3.87	68.4	9.02
	CF	0.5599	0.0435	0.5371	0.0909	0.5681	0.076
200 psf	FF	79.8	5.6789	86.7	14.2	86.8	6.11
	CF	0.399	0.0287	0.4333	0.0703	0.4333	0.031
400 psf	FF	124	6.5574	133.7	19.4	139.7	16.3
	CF	0.3099	0.0166	0.3343	0.0483	0.3493	0.0408
550 psf	FF	174.4	22.48	167.7	12.8	168.8	3.70
	CF	0.3171	0.0406	0.3048	0.023	0.3063	0.0068
700 psf	FF	238	21.86	209.3	6.9	209.8	9.23
	CF	0.3398	0.0313	0.2989	0.0105	0.2995	0.0132

From examination of Figure 3.14, it is seen that the friction force increases relatively linearily with increasing normal force and that little difference exists between connection configurations. Figure 3.15 shows that

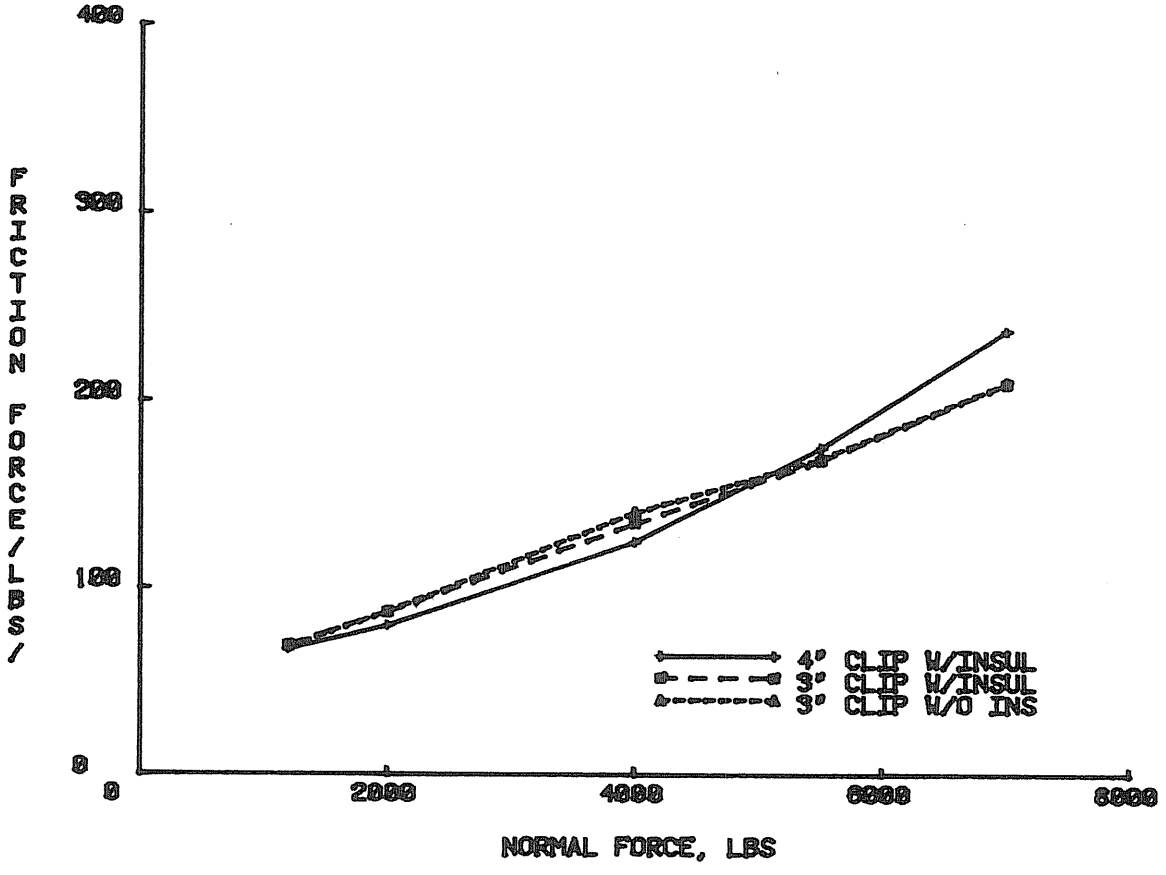


Figure 3.11 Friction Force versus Normal Force for Various Connection Configurations

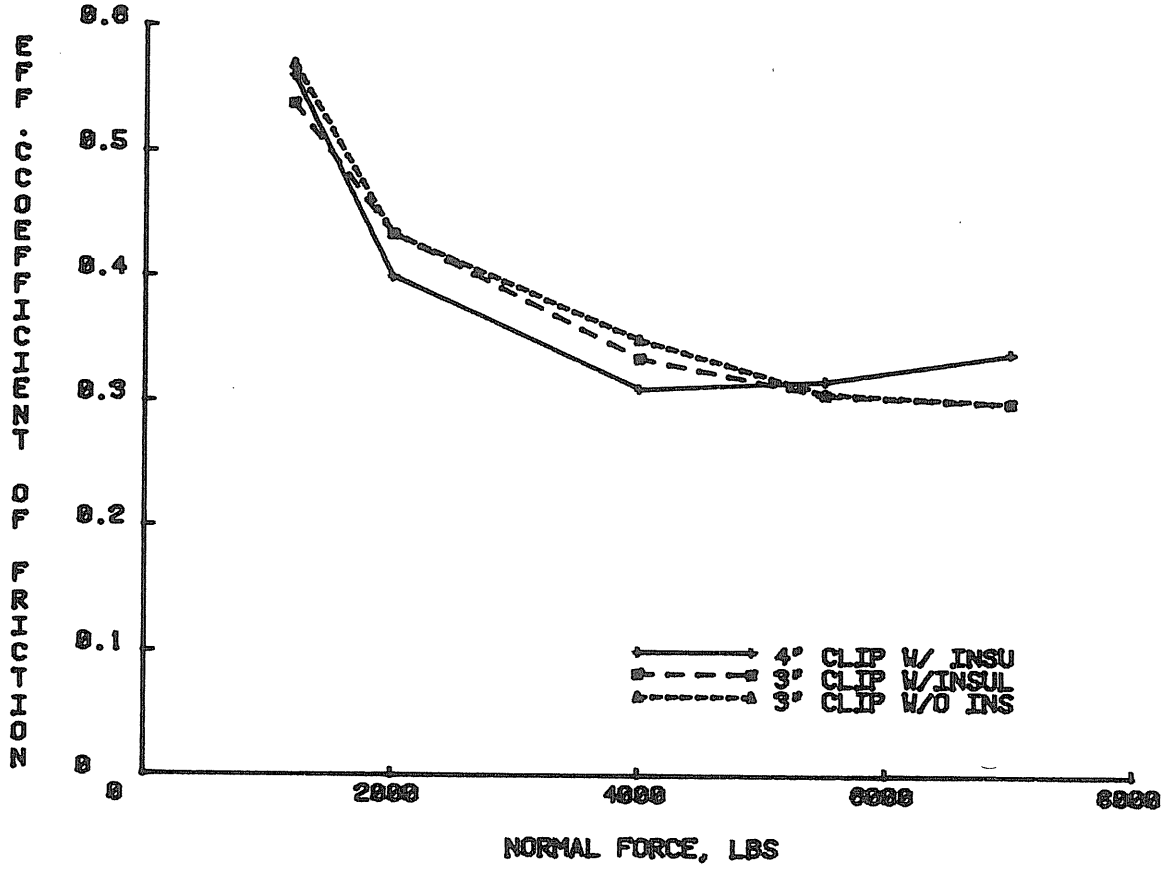


Figure 3.12 Effective Coefficient of Friction versus Normal Force for Various Connection Configurations

the effective coefficient of friction generally decreases with increasing normal force, but tends to level off above 40 psf (400 lbs).

Best fit polynomial function curves for each of the connection configurations are as follows:

4 in. clip with insulation and thermal block

$$FF = 58.04 + 0.04436(NF) + 3.038 \times 10^{-4}(NF)^2 \quad (3.11)$$

3 in. clip with insulation

$$FF = 44.92 + 0.1985(NF) + 5.058 \times 10^{-5}(NF)^2 \quad (3.12)$$

3 in. clip without insulation

$$FF = 38.91 + 0.2454(NF) - 4.396 \times 10^{-6}(NF)^2 \quad (3.13)$$

These equations are limited to a normal force range of 120 lbs to 700 lbs per clip.

3.4.2 Coupon Test Results

Tensile tests of short sections of angles cut from the compression chord of each test joist were made. Results from 105 samples are shown in Table 3.5. The average yield stress for all tests was 53.2 ksi, the highest value was from Test 11 at 61.0 ksi, and the lowest from Test 10 at 46.7 ksi. Tensile strength values ranged from 52.9 ksi to 88.9 ksi. Percent elongation varied from 2.2% to 29.1%.

Table 3.5
Coupon Test Results

Test	Section	Yield ksi	Tensile ksi	Percent Elongation
E-1-A	1 1/2"x1 1/2"x.156"	50.7	72.1	18
E-1-B	" " "	50.0	72.1	16.5
W-1-A	" " "	55.0	67.6	6.2
W-1-B	" " "	51.1	73.0	25.0
E-2-A	" " "	55.0	79.0	22.8
E-2-B	" " "	53.4	75.7	12.3
E-3-A	" " "	50.2	69.4	12.5
E-3-B	" " "	50.9	72.5	26.0
E-4-A	1 3/4"x1 3/4"x.156"	55.4	77.4	27.0
E-4-B	" " "	56.3	78.2	27.9
W-5-A	1 1/2"x1 1/2"x.156"	50.9	68.7	7.1
W-5-B	" " "	55.4	76.8	9.5
W-6-A	" " "	51.4	77.0	14.1
W-6-B	" " "	55.0	80.2	23.6
E-7-A	" " "	55.4	71.2	7.1
E-7-B	" " "	54.7	79.3	17.1
W-7-A	" " "	55.4	66.4	6.2
W-7-B	" " "	55.4	70.0	23.9
W-8-A	" " "	55.4	72.0	8.0
W-8-B	" " "	54.5	73.1	2.2
E-9-A	" " "	56.3	74.8	8.5
E-9-B	" " "	55.0	78.2	13.2
W-9-A	" " "	55.4	75.2	9.0
W-9-B	" " "	55.0	80.4	24.9
W-10-A	2" x 2" x .213"	47.8	70.0	28.0
W-10-B	" " "	46.7	67.2	14.1
E-10-A	2" x 2" x .203"	49.2	71.1	28.1
E-10-B	" " "	49.5	69.1	13.5
E-11-A	1 1/2"x1 1/2"x.138"	59.1	86.1	22.7
E-11-B	" " "	57.2	79.1	25.1

Table 3.6
Coupon Test Results, Cont.

Test	Section	Yield ksi	Tensile ksi	Percent Elongation
W-11-A	1 1/2"x1 1/2"x.138"	56.0	78.5	23.8
W-11-B	" " "	61.0	88.9	23.3
W-12-A	1 1/2"x1 1/2"x.115"	56.9	80.4	24.3
W-12-B	" " "	57.4	80.3	25.3
E-13-A	" " "	58.6	82.1	24.2
E-13-B	" " "	55.7	79.2	23.5
W-13-A	" " "	59.3	82.4	23.6
W-13-B	" " "	55.9	78.8	28.2
E-14-A	" " "	56.8	80.4	25.1
E-14-B	" " "	55.3	78.2	24.4
W-14-A	" " "	59.8	83.6	24.6
W-14-B	" " "	56.0	79.2	27.1
E-15-A	" " "	53.6	76.2	24.6
E-15-B	" " "	56.6	76.0	9.2
W-15-A	" " "	55.2	78.2	23.7
W-15-B	" " "	55.5	70.4	7.9
W-16-A	1 1/2"x1 1/2"x.153"	53.3	70.8	7.9
E-17-A	" " "	53.9	79.6	16.9
W-17-A	" " "	53.8	65.6	6.0
W-18-A	" " "	55.0	78.5	10.8
W-19-A	" " "	53.5	77.0	11.9
E-20-A	" " "	53.8	57.4	5.0
E-21-A	" " "	54.8	72.1	7.9
W-21-A	" " "	53.6	75.5	11.2
E-23-A	2" x 2" x .209"	49.5	73.2	17.8
E-23-B	" " "	48.9	72.2	16.7
W-23-A	" " "	47.6	71.0	26.6
W-23-B	" " "	47.7	67.9	13.2

Table 3.6
Coupon Test Results, Cont.

Test	Section	Yield ksi	Tensile ksi	Percent Elongation
E-25-A	2" x 2" x .210"	48.2	67.7	12.0
E-25-B	" " "	48.6	70.3	14.8
W-25-A	" " "	49.3	71.4	14.9
W-25-B	" " "	48.4	72.5	26.2
E-26-A	1 1/2"x1 1/2"x.156"	55.9	80.1	10.1
E-26-B	" " "	55.3	79.3	10.7
E-27-A	2" x 2" x .165"	54.1	70.8	5.7
E-27-B	" " "	55.1	70.1	8.2
W-27-A	" " "	53.8	54.7	4.5
W-27-B	" " "	53.9	73.3	11.2
W-31-A	" " "	54.9	74.1	9.0
W-31-B	" " "	56.3	67.7	7.9
E-33-A	" " "	53.8	69.7	8.0
W-33-A	" " "	54.3	75.2	23.0
E-34-A	1 1/2"x1 1/2"x.119"	53.7	72.8	11.2
E-34-B	" " "	53.1	74.2	24.2
E-35-A	" " "	52.7	52.9	3.2
E-35-B	" " "	52.9	59.2	4.9
W-35-A	" " "	53.7	73.2	10.1
W-35-B	" " "	54.6	75.1	11.9
E-36-A	" " "	55.1	75.1	26.0
W-36-A	" " "	53.8	74.5	16.7
W-36-B	" " "	54.0	74.1	23.1
E-37-A	1 3/4"x1 3/4"x.165"	50.2	72.5	15.0
E-37-B	" " "	51.4	74.2	14.9
W-37-A	" " "	49.8	69.0	10.9
W-37-B	" " "	52.5	74.5	29.1
E-38-A	" " "	51.3	73.5	23.9
E-38-B	" " "	51.0	73.3	21.9

Table 3.6
Coupon Test Results, Cont.

Test	Section	Yield ksi	Tensile ksi	Percent Elongation
W-38-A	1 3/4"x1 3/4"x.165"	51.3	73.5	23.9
W-38-B	" " "	51.0	73.3	21.9
E-39-A	" " "	51.2	73.5	26.0
W-39-B	" " "	52.4	73.0	27.7
E-40-A	" " "	51.6	65.8	9.4
W-40-A	" " "	51.9	65.9	9.8
E-41-A	1 3/4"x1 3/4"x.170"	51.3	72.8	27.2
W-41-A	" " "	51.2	60.3	7.1
W-41-B	" " "	50.6	68.2	10.8
E-42-A	" " "	50.7	66.7	8.6
W-42-A	" " "	52.1	74.0	16.9
E-43-A	" " "	49.9	67.4	11.5
W-43-A	" " "	51.3	65.8	9.0
E-44-A	" " "	49.4	70.6	26.4
W-44-A	" " "	50.1	59.9	7.2
E-45-A	" " "	52.8	56.2	6.8
W-45-A	" " "	49.8	65.7	10.3
E-46-A	" " "	51.0	71.9	28.0
W-46-A	" " "	50.8	72.2	28.9

CHAPTER IV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

4.1 Summary

Forty-six full scale tests of joist supported roof systems were conducted as part of the research reported here. Eighteen tests were conducted at 40 ft. span, seven at 50 ft. span and twenty-one at 60 ft. span. Five of the tests were conducted with insulation in place and five with RIS beams installed on the joist chords.

Eight of the 40 ft. span tests were conducted with rod web joists; the remaining ten 40 ft. span tests and all of the 50 ft. and 60 ft. span tests were conducted using angle web joists. Light angle bridging was used in all tests. Top chord bridging varied from 1 to 11 rows and bottom chord bridging varied from 3 to 12 rows.

All tests were conducted in a vacuum chamber. Each test setup consisted of two inside test joists and two outside joists. Lateral restraint was provided by channels welded to the top chord(s) of the outside joist(s). All but three tests were conducted to failure. The failure mode for all but three tests was lateral buckling of the top chord near midspan. The failure modes for the three remaining tests were unrelated to the research being conducted.

Failure loads were compared to allowable loads from each of

three analyses, referred to as the "AISC" procedure, the "SJI" procedure and the "CONV" procedure. The "AISC" procedure considers out-of-plane buckling of the top chord with the unbraced length taken as the distance between bridging lines and the effective length factor as 1.0. The "SJI" procedure considers out-of-plane buckling of the top chord between bridging lines but includes the restraining effect of the web and bottom chord. The "CONV" procedure is the analysis procedure used for joists supporting conventional roof deck where only in-plane top chord buckling is considered.

In addition to the full scale roof system tests, supplementary tests were conducted to determine the effective coefficient of friction of the sliding clip configurations in the VULCRAFT standing seam systems. A total of 106 connection restraint tests were conducted and best fit polynomial function curves developed for the 4 in. clip with thermal blocks, the 3 in. clip with insulation and the 3 in. clip without insulation. In addition, 105 tensile coupon tests of samples taken from the compression chord of each test joist were made.

4.2 Conclusions and Recommendations

The following conclusions are drawn from the data generated in the testing program:

1. The lateral buckling strength of rod web joists exceeds the lateral buckling strength of angle web joists. This conclusion is limited to 40 ft. span joists and results from the comparison of load factors for similar tests as shown in Table 3.1.

2. Insulation and clip height have negligible effect on joist

strength. This conclusion is drawn from the data shown in Tables 3.1 (40 ft. span), 3.2 (50 ft. span) and 3.3 (60 ft. span).

3. The use of the RIS beams significantly reduces the bracing effect of the standing seam roof system. This conclusion is reached from the comparison of identical tests with and without the RIS beams installed (Tests 42 versus Test 45 and Tests 39, 43 and 44 versus Test 46), all 40 ft. span. Results from Tests 24 and 25 versus Tests 10, 22 and 23 indicate that the level of bracing provided by the standing seam roof system was equally inadequate with or without the RIS beams.

4. Clip friction and/or panel drape provided substantial lateral restraint in all 40 ft. span tests and in 50 ft. and 60 ft. span tests with relatively large bracing spacing. This conclusion is based on the large load factors (greater than 2.0) that result when the standard AISC column buckling formulas are used to predict the failure loads (Tables 3.1, 3.2 and 3.3).

5. The lateral restraint provided by clip friction and/or panel drape to 40 ft. span rod or angle web joists without RIS beams and with three equally spaced rows of bridging is sufficient to justify design based on full lateral restraint. That is, the design equations used for joist top chords when conventional deck is attached (the "CONV" method) may be used for this configuration. This conclusion is based on the resulting load factors from 13 tests, all of which exceeded 1.65 (Table 3.1). If this recommendation is applied only to rod web joists, the resulting load factors exceed 1.80.

6. Acceptable, but conservative, load factors result from

analysis of the 40 ft. span, angle web joists with the RIS beams attached if clip friction/panel drape and web restraint effects are neglected, i.e. out-of-plane buckling ("AISC" method). From Table 3.1, the resulting load factors are 3.00 and 4.02, Tests 45 (rod web) and 46 (angle web), respectively. These two tests were conducted with equally spaced top chord bridging (3 rows), thus the SJI erection or bridging equation "SJI" method of this report) is applicable for Test 45. The resulting load factor is 2.27.

7. Although there is evidence that clip friction/panel drape effects provide lateral restraint to the top chords of all joists, the magnitude is not sufficient to justify design based only on in-plane buckling ("CONV" method) for 50 ft. and 60 ft. span, angle web joists with or without RIS beams attached. If analysis is based on out-of-plane buckling neglecting clip friction/panel drape effects ("AISC" method), the resulting load factors exceed or are nearly equal to 1.80 for all 50 ft. and 60 ft. span tests (25 tests in Tables 3.2 and 3.3) except Tests 19, 20 and 21. However, as noted previously Tests 20 and 21 may not be valid because of a damaged joist and the use of previously tested joists. Thus, satisfactory results are obtained for 22 of the 23 valid tests; the load factor for the remaining test was 1.60.

8. Of the 46 configurations tested, 27 tests were conducted with unequal bridging spacing. No evidence was found that unequal bridging spacing effects the joist strength and if proper analysis procedures are used the strength can be adequately predicted.

9. From observation of the failure modes, it is evident that top chord bridging is most effective when located at a top chord panel

point.

Based on the results of 46 tests and the various analyses performed, the following design recommendations are made:

1. Only in-plane buckling of the top chord need be considered for 40 ft. span, rod web joists without RIS beams installed (the "CONV" design method of this report).

2. Rod web, 40 ft. span joists with RIS beams installed and with three equally spaced rows of top chord bridging may be designed using the SJI erection or bridging formula (the "SJI" method of this report).

3. For all other configurations (angle web joists with or without RIS beams installed or unequal bridging spacing), it is recommended that clip friction/panel drape effects be neglected and the design of the joist top chords be based in part on out -of-plane lateral bracing spacing equal to the bridging spacing (the "AISC" method of this report).

Although not specifically verified in this project, it is believed that design recommendations 1. and 2. also apply to joist spans less than 40 ft. It is also thought that the SJI erection or bridging formula can be used to design 40 ft. or less span joists with the RIS beams installed with any number of equally spaced rows of top chord bridging.

REFERENCES

1. "Steel Joists & Joist Girders", VULCRAFT Division of NUCOR Corporation, 1979.

2. "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", American Institute of Steel Construction, New York, 1978.

3. "Standard Specifications for Open Web Steel Joists, H Series", Steel Joist Institute, Richmond, Virginia, 1978.

4. Hribar, J.A., "Investigation of the Elastic Lateral Stability of Open Web Steel Joists and the Spacing of Rows of Bridging - Final Report", Department of Civil Engineering, Carnegie Institute of Technology, Pittsburgh, January 1965 (Revised June 1966).

5. "Simulated Live Load Tests of Conventional and Standing Seam Joist Supported Roof Systems", Report submitted to VULCRAFT by Structural Engineers, Inc., Norman, Oklahoma, September 1981.

APPENDIX A

FLOW CHART AND TEST MATRIX

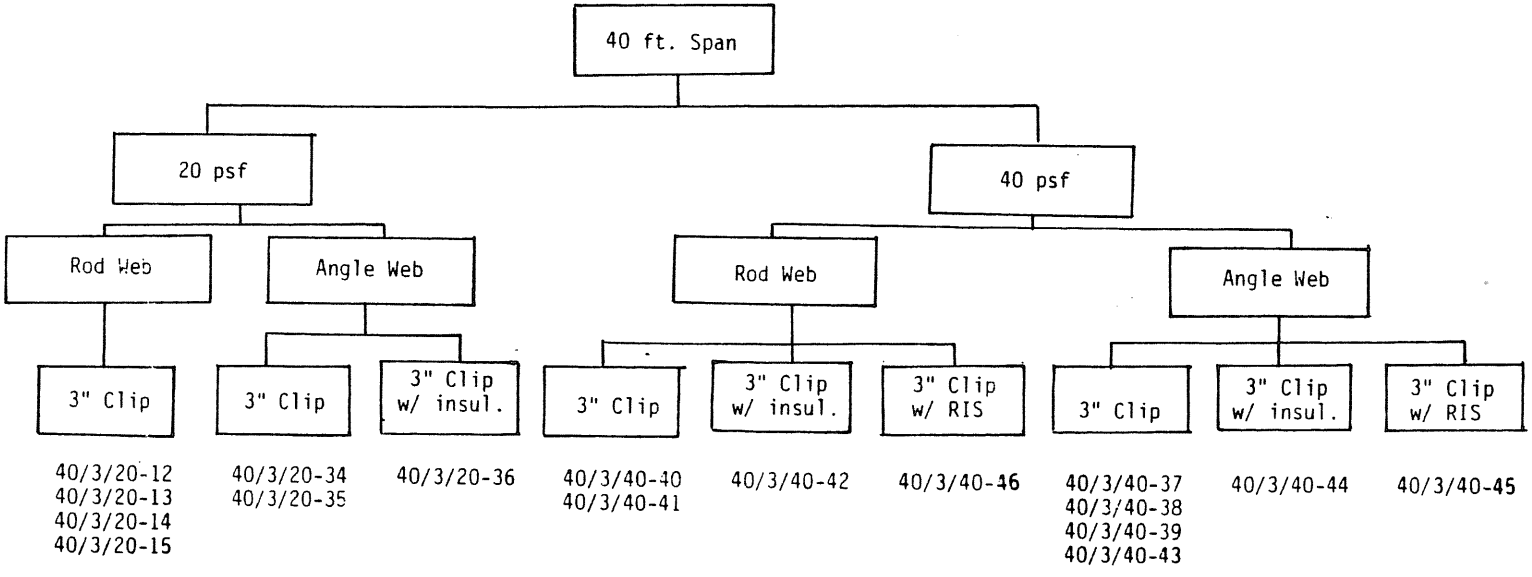
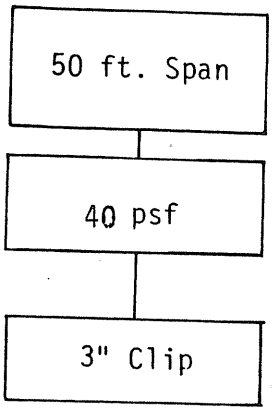


Figure A.1 Flowchart of 40 ft. Span Tests



50/3/40-27
50/3/40-28
50/3/40-29
50/3/40-30
50/3/40-31
50/3/40-32
50/3/40-33

Figure A.2 Flowchart of 50 ft. Span Tests

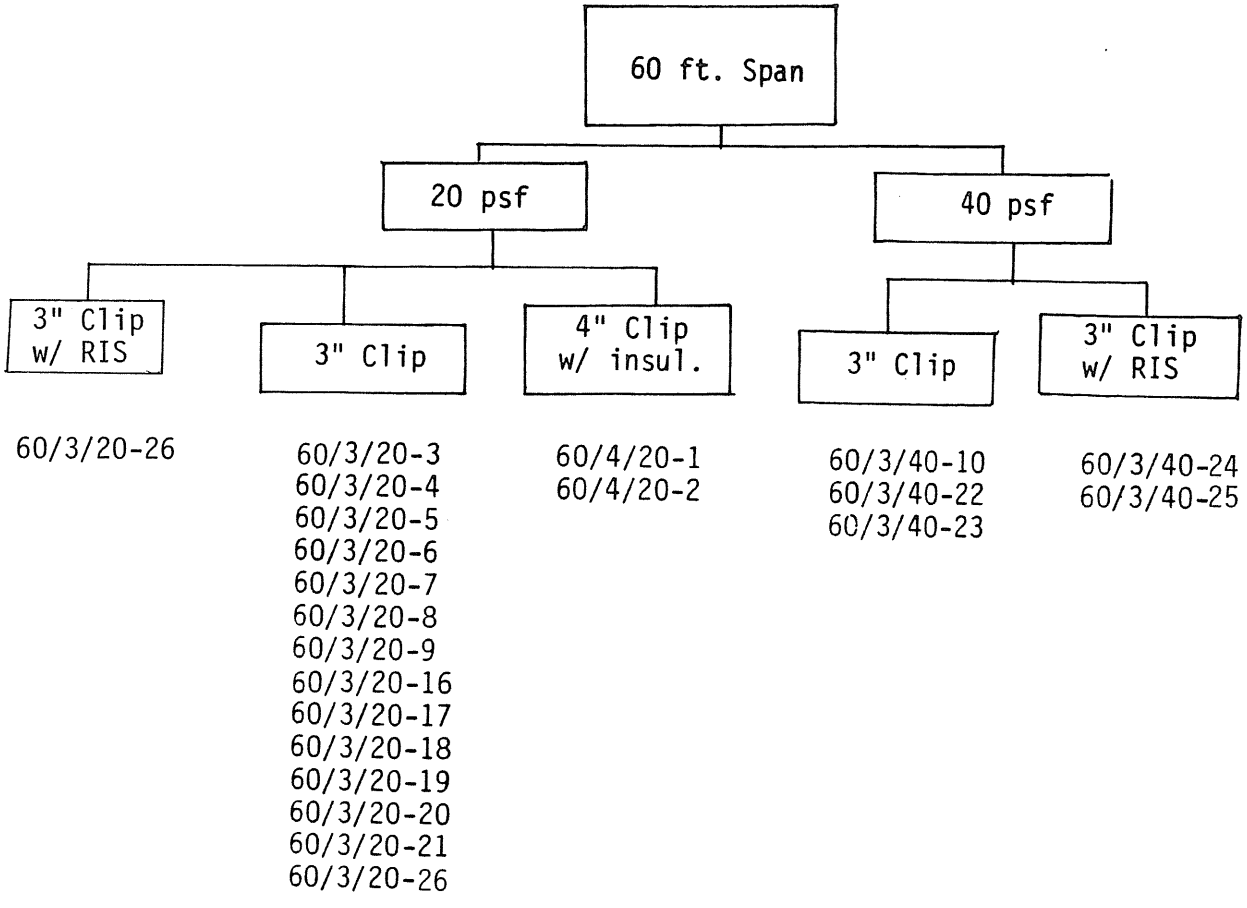


Figure A.3 Flowchart of 60 ft. Span Tests

Table A.1
Test Configurations and Results

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
1	30H116	59.33	2/4	10'	10'	111.7	Failure mode was top chord lateral buckling 4' south of midspan.
2	30H116	59.33	2/4	10'	10'	111.7	Failure mode was top chord lateral buckling 4' north of midspan. East end of panel was attached to channel.
3	30H116	59.33	4/6	6'7"&13'2"	6'7"&13'2"	123.6	Failure mode was top chord lateral buckling 4' south of midspan. East end of pannel was attached.
4	30H116	59.33	1/3	0'	0'	110.0	Failure mode was top chord lateral buckling 4' north of midspan. East end of pannel was attached.
5	30H116	59.33	3/5	0'&15'	0'&15'	162.9	Failure mode was top chord lateral buckling 8' south of midspan. East end of pannel was attached.
6	30H116	59.33	3/5	0'&13'2"	0'&13'2"	170.5	Failure mode was top chord lateral buckling 6.5'south of midspan. East end of pannel was attached to channel.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
7	30H116	59.33	5/7	0'&10'&10'	0'&10'&10'	197.8	Failure mode was top chord lateral buckling 5' north of midspan. East end of pannel was attached to channel.
8	30H116	59.33	5/7	0'&10'&10'	0'&10'&10'	138.4	Failure mode was top chord lateral buckling 4' south of midspan. East end of pannel was attached to channel.
9	30H116	59.33	5/7	0'&9'3"& 9'4"	0'&9'3"& 9'4"	128.9	Failure mode was top chord lateral buckling 4' south of midspan. East end of pannel was attached to channel.
10	30H214	59.33	5/7	0'&10'5"& 11'1"	0'&10'5"& 11'1"	316.5	Failure mode was top chord lateral buckling 5' north of midspan. East end of pannel was attached to channel.
11	20H122	39.83	1/3	0'	0'	314.2	Failure mode was top chord lateral buckling 6' north of midspan.
12	20H112	39.83	1/3	0'	0'	208.7	Failure mode was top chord lateral buckling 8' south of midspan.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
13	20H122	39.83	3/3	0'&10'	0'	278.1	Failure mode was top chord lateral buckling @ midspan
14	20H122	39.83	3/3	0'&10'	0'	238.2	Failure mode was top chord lateral buckling 5' N of midspan old deck was used.
15	20H122	39.83	3/3	0'&10'	0'	268.0	Failure mode was top chord lateral buckling @ midspan on west joist, 5' N of mid-span on east joist. No attachment to west support joist except for bottom chord.
16	30H116	59.79	5/7	0'&9'3"& 9'4"	0'&9'3"& 9'4"	133.5	Failure mode was top chord lateral buckling 4' south of midspan. East end of pannel was attached to chan-nel. Larger channel @ east
17	30H116	59.79	5/7	0'&7'7"& 11'10"	0'&7'7"& 11'10"	210.4	Failure mode was top chord lateral buckling 4' south of midspan. East end of pannel was attached to chan-nel. Larger channel @ east
18	30H116	59.79	5/7	0'&7'7"& 11'10"	0'&7'7"& 11'10"	148.3	Failure mode was top chord lateral buckling 4' south of midspan. East end of pannel was attached to chan-nel. Large channel @ east

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
19	30H116	59.79	6/8	3'&7'&9'	3'&7'&9'	163.1	Failure mode was top chord lateral buckling @ midspan on the west joist. East end of pannel was attached to channel. Larger channel @ east.
20	30H116	59.79	10/10	2'&4'1"& 4'2"&4'7" 5'7"	2'&4'1"& 4'2"&4'7" 5'7"	180.4	Failure mode was top chord lateral buckling 4' south of midspan on east joist. East end of panel was attached to channel. Larger channel @ east. The east joist was damaged from handling before testing.
21	30H116	59.79	10/12	2'&4'1"& 4'2"&4'7" 5'7"	2'&4'1"& 4'2"&4'7" 5'7"	187.8	Failure mode was top chord lateral buckling 4' south of midspan. East end of pannel was attached to channel. Larger channel @ east. Both joists were used before E21 was E19, W21 was W20.
22	30H214	59.79	11/7	0'&4'&4' 4"&4'6"& 5'6"&5'10"	0'&8'&8'6"	411.8	The test was completed when the F.S. of 1.85 was reached. East end of panel was attached to channel. Larger channel @ east.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.2
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
23	30H214	59.79	10/7	2'&4'1"& 4'2"&4'7"& 5'7"	0'&8'&8'6"	399.3	Failure mode was top chord lateral buckling @ midspan both joists. East end of panel was attached to channel. Larger channel @ east.
24	30H214	59.79	5/7	0'&7'8"& 8'10"	0'&7'8"&8'10"	306.6	Failure mode was top chord lateral buckling 4' south of midspan east joist. East end of panel was attached to channel. Larger channel @ east. Only the east joist failed.
25	30H214	59.79	5/7	0'&7'8"& 8'10"	0'&7'8"&8'10"	309.1	Failure mode was top chord lateral buckling 4' north of midspan both joists. East end of panel was attached to channel. Larger channel @ east IRS bridging was used.
26	30H116	59.79	5/7	0'&7'8"& 8'10"	0'&7'8"&8'10"	153.2	Failure mode was top chord lateral buckling 4' south of midspan on east joist. East end of panel was attached to channel. Larger channel at east and IRS bridging was used.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
27	26H214	49.58	7/7	0'&4'7"& 4'10"&5'9"	0'&6'3"&7'2"	334.2	The test was stopped at 331.5 plf. East end of panel was attached to channel. C8x11.5 channels on outside joists.
28	26H214	49.58	6/7	2'7"&5'5"& 6'3"	0'&6'3"&7'2"	334.8	The test was stopped at 331.5 plf. East end of panel was attached to channel. C8x11.5 channels on outside joists.
29	26H214	49.58	5/7	0'&6'3"& 7'2"	0'&6'3"&7'2"	422.2	Failure mode was top chord lateral buckling of both joists. On the east joist failure was at midspan and on the west joist 3' north of midspan. East end of panel was attached to the channel. C8x11.5 channels on outside joists.
30	26H214	49.58	5/7	0&6'3"& 7'2"	0'&6'3"&7'2"	347.6	The test was stopped at 348.5 plf. East end of panel was attached to channel. C8x11.5 channels on outside joists.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
31	26H214	49.58	3/5	0'&9'11"	0'&6'3"&7'2"	264.1	Failure mode was top chord lateral buckling of west joist north and south of midspan. East end of panel was attached to channel. C8x11.5 channels on outside joists.
32	26H214	49.58	5/5	0'&6'3"& 7'2"	0'&6'3"&7'2"	349.3	The test was stopped at 348.5 plf. East end of panel was attached to channel. C8x11.5 channels on outside joist.
33	26H214	49.58	3/5	0'&9'11"	0'&6'3"&7'2"	367.7	Failure mode was top chord lateral buckling of both joists, 3' south of midspan on the east joist and 3' north of midspan on the west joist. East end of panel was attached to channel C8x11.5 channels on outside joists.
34	20H122	39'10½"	3/1	0'&10'	0'	284.9	Failure mode was shear failure of the outside joist and top chord lateral buckling of east test joist. East end of panel was attached to channel. C8x11.5 channels on outside joists.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
35	20H122	39'10½"	3/3	0'&10'	0'	235.9	Failure mode was top chord lateral buckling of both test joists 2' north of midspan. East end of panel was attached to channel. C8x11.5 channels on outside joists.
36	20H122	39'10½" w/insul	3/3	0'&10'	0'	254.5	Failure mode was top chord lateral buckling of west joist 4' north of midspan. East end of panel was attached to channel. C8x11.5 channels on outside joists.
37	20H223	39'10½"	3/3	0'&10'	0'	302.2	Failure mode was top chord lateral buckling 2' south of midspan on east joist. Also shear failure of outside joist. East end of panel was attached to channel. C8x11.5 channels on outside joists.
38	20H223	39'10½"	3/3	0'&10'	0'	417.2	Failure mode was bearing failure of both joists at the north support. East end of panel was attached to the channel. C8x11.5 channels on outside joist.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Continued

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
39	20H223	39'10½"	3/3	0'&10'	0'	385.9	Failure mode was top chord lateral buckling of both joists 2' north of midspan. East end of panel was attached to channel. C8x11.5 channels on outside joist.
40	20H223	39'10½"	3/3	0'&10'	0'	421.2	Failure mode was top chord lateral buckling of both joists. East end of panel was attached to channel. C8x11.5 channels on outside joist.
41	20H223	39'10½"	3/3	0'&10'	0'	418.1	Failure mode was top chord lateral buckling of both joists 2' south of midspan. East end of panel was attached to channel. C8x11.5 channels on outside joist.
42	20H223	39'10½"	3/3	0'&10'	0'	433.5	Failure mode was top chord lateral buckling of both joists. East end of panel was attached to channel. Diagonals ran between test joists only. C8x11.5 channels on outside joist.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Cont.

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacing*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
43	20H225	39'10½"	3/3	0'&10'	0'	382.4	Failure mode was top chord lateral buckling of both joists 4' south of midspan. East end of panel was attached to channel. Diagonals ran between test joists only. C8x11.5 channels on outside joist.
44	20H225	39'10½"	3/3	0'&10'	0'	376.3	Failure mode was top chord lateral buckling of both joists 4' south of midspan. East end of panel was attached to channel. Diagonals ran between test joists only. C8x11.5 channels on outisde joist.
45	20H223	39'10½"	3/3	0'&10'	0'	340.9	Failure mode was top chord lateral buckling of both joists 4' south of midspan. East end of panel was attached to channel. Diagonals ran between test joists only. C8x11.5 channels on outside joist.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

Table A.1
Test Configurations and Results, Cont.

Test No.	Joist Type	Span (ft)	Rows of Bridging	Bridging Spacings*		Failure Load*** (plf)	Remarks
				Top Chord	Bottom Chord**		
46	20H225	39'10½"	3/3	'0'&10'	0'	347.3	Failure mode was top chord lateral buckling of both joists 5' south of midspan. East end of panel was attached to channel. Diagonals ran between test joists only. C8x11.5 channels on outside joist.

*Measured from midspan
**Bridging at o.s. panel points for all tests
***w/Dead Load

APPENDIX B

VULCRAFT DESIGN DATA AND JOIST PROFILES

VULCRAFT - GRAPELAND STEEL SIZES

SECTION SIZE	DESCRIPTION - ANGLES
3	1 x 1 x .109
8	1 1/4 x 1 1/4 x .111
12	1 1/2 x 1 1/2 x .109
13	1 1/2 x 1 1/2 x .115
16	1 1/2 x 1 1/2 x .130
17	1 1/2 x 1 1/2 x .138
18	1 1/2 x 1 1/2 x .145
19	1 3/4 x 1 3/4 x .128
20	1 1/2 x 1 1/2 x .156
21	1 3/4 x 1 3/4 x .141
22	1 1/2 x 1 1/2 x .170
23	1 3/4 x 1 3/4 x .156
24	1 3/4 x 1 3/4 x .165
25	1 3/4 x 1 3/4 x .188
26	2 x 2 x .166
27	2 x 2 x .188
28	2 x 2 x .200
29	2 x 2 x .213
31	2 x 2 x .232
32	2 1/2 x 2 1/2 x .188
34	2 x 2 x .250
36	2 1/2 x 2 1/2 x .212
38	2 1/2 x 2 1/2 x .230
39	2 1/2 x 2 1/2 x .250
42	3 x 3 x .227
43	3 x 3 x .250
46	3 x 3 x .281
48	3 x 3 x .313
51	3 1/2 x 3 1/2 x .287
52	3 1/2 x 3 1/2 x .313
54	3 1/2 x 3 1/2 x .344
57	3 1/2 x 3 1/2 x .375
58	3 1/2 x 3 1/2 x .400
59	4 x 4 x .375
61	4 x 4 x .438
63	4 x 4 x .500
64	5 x 5 x .438
66	5 x 5 x .500
67	6 x 6 x .438
68	6 x 6 x .500
69	6 x 6 x .563
70	6 x 6 x .625
71	6 x 6 x .750

SECTION SIZE	DESCRIPTION - ROUNDS
76	1/2
78	9/16
79	19/32
80	5/8
81	21/32
82	11/16
83	23/32
84	3/4
86	13/16
88	7/8
91	1
92	1 1/8

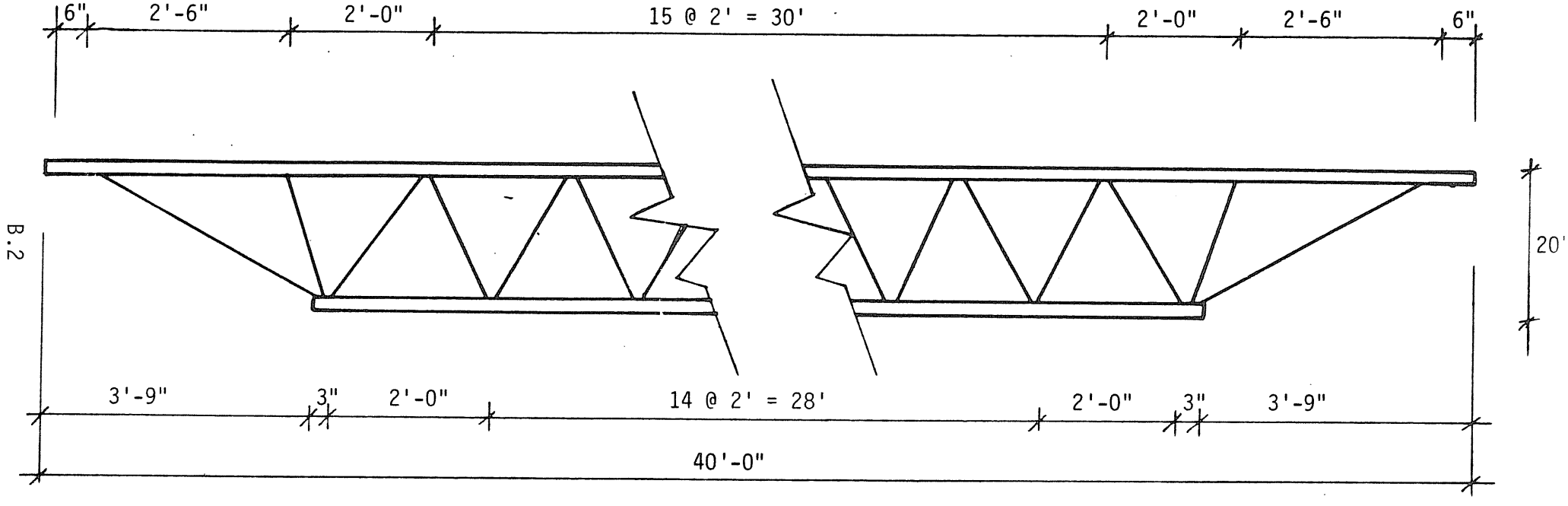


Figure B.1 Nominal Profile of 40 ft. Span, 20 psf Rod Web Joists

TEST JOIST 20 PSF, 40' BS LGTH 08/26/83 14:46:20

J3 20 H 122 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LGTH	TLOAD	REQD RES MOMENT	REQD ENDR	LLOAD	LEFT END STANDARD	RGHT END STANDARD	BRIDG SPAC FT
20.00	40- 0 0/0	122.0	287940.	2420.	0.			6.6

BASIC DIMENSIONS

WK LENGTH	PANEL LENGTH	EFF DEPTH	NP	Y	E MAX IN.	E MIN IN.
39.6667	2- 0 0/0	19.165	17	3- 0 0/0	34.00	22.00

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW STRESS	ALLOW RES MOMENT	RATIO MIDSPAN MID PAN	RATIO MIDSPAN PAN PT	RATIO END PAN MID PAN	RATIO END PAN PAN PT	FR
13	L1.50 X 1.50 X 0.115	22655.2	288125.	0.0000	0.0000	0.8439	0.5449	9
13	L1.50 X 1.50 X 0.115	30000.0	381535.					

SEC	CHORD DESCRIPTION	LENGTH	L/R	JOIST I	IYY	RYY	WMAX	WMIN
13	L1.50 X 1.50 X 0.115	40- 0 0/0	51.44	122.2DEV	0.469	0.840	3.687	3.562
13	L1.50 X 1.50 X 0.115	32- 8 0/0		0.0REQ	0.469	0.840	3.687	3.562

TORSION CONSTANT J = 0.00293 TOP, 0.00293 BOT
FLOOR LIVE LOAD DEV = 73.1 PLF, ROOF LIVE LOAD DEV = 109.7 PLF

WEB DESIGN 50000. PSI CLEAR DEPTH = 17.000 IN

WEB	SEC	DIAM	PANEL SHEAR	FORCE IN WEB	ALLOW STRESS	ACTUAL STRESS	W1 LENGTH	NPW2 EA END
W1	82	0.6875	2247.	5693.5	27000.0	15338.1	4- 3 3/8	2
W2	79	0.5938	2074.	2404.3	8473.3	8683.0		
W3	78	0.5625	1586.	1838.6	7604.2	7398.7		

WELD

EFF. THROAT FILLET SIZE	WELD LBS/IN	ANGLE SHEAR LBS/IN		L1	L2	L3	L4
0.115 IN	2415.0	4600.0	LOAD=	5693.5	2432.5	3421.4	2404.3
			LGTH=	1.179	0.504	0.708	0.498

BRIDGING REQUIREMENTS

MIN BRIDGING = 5 ROW(S) FOR FA > 22640.7 PSI
LATERAL STABILITY FA = 28278.4 PSI

WEIGHT = 250.7 LBS, WT/FT = 6.3

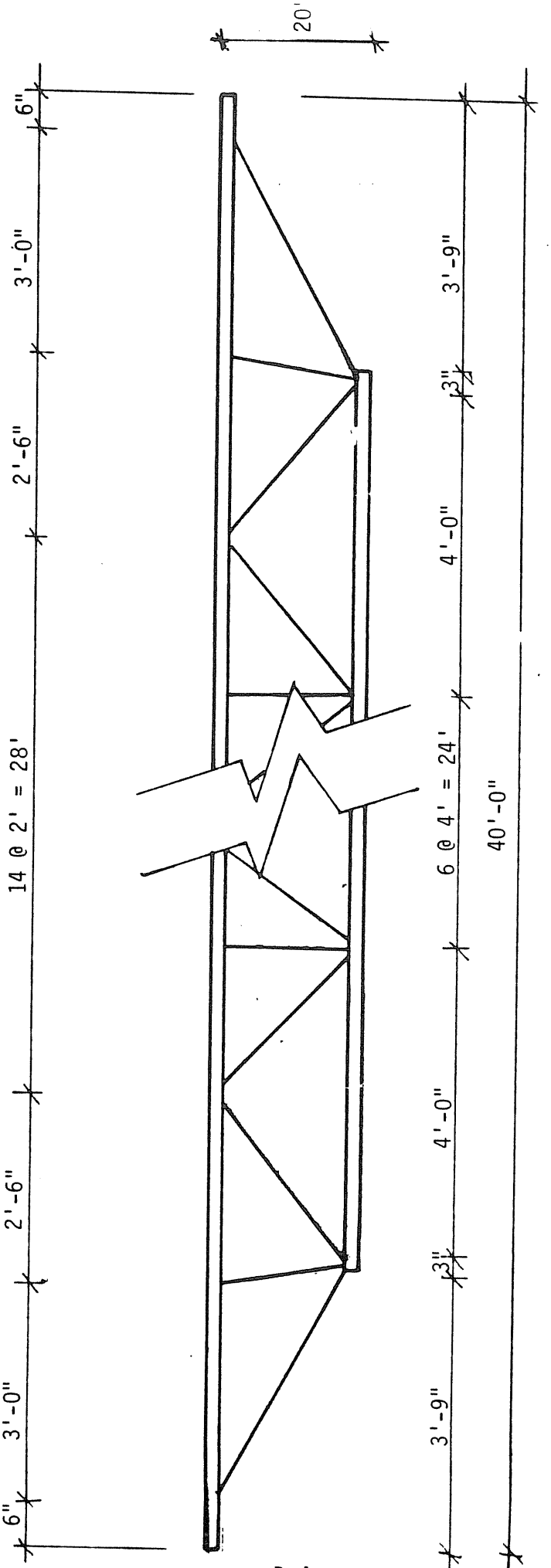


Figure B.2 Nominal Profile of 40 ft. 20 psf Angle Web Joists

STANDING SEAM TEST JOIST 09/13/83 10:08:52

J13 20 H 122 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
20.00	40- 0 0/0	122.0	0.0		

REQD RES MOMENT = 287940.3 REQD ENDR = 2419.7

BRIDGING
SPAC FT
09.8

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
39.6667	4- 0 0/0	4- 0 0/0	1-10 0/0	1-10 0/0	7 AT 4- 0 0/0	19.165

STRESS ANALYSIS

PP	LOAD-LBS	EFF-DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	183.0	19.165	2	-0.399	6031.9	5601.9	0.0
2	355.8	19.165	2D	-1.597	419.8	5379.1	0.0
3	294.8	19.165	3	0.871	2863.4	0.0	7538.2
4	244.0	19.165	4	-0.799	2541.7	9524.3	0.0
5	244.0	19.165	V2	0.000	244.0	9524.3	0.0
6	244.0	19.165	5	0.799	2150.6	0.0	11204.9
7	244.0	19.165	6	-0.799	1759.6	12579.9	0.0
8	244.0	19.165	V3	0.000	244.0	12579.9	0.0
9	244.0	19.165	7	0.799	1368.6	0.0	13649.3
10	244.0	19.165	8	-0.799	977.6	14413.2	0.0
11	244.0	19.165	V4	0.000	244.0	14413.2	0.0
12	244.0	19.165	9	0.799	586.5	0.0	14871.6
13	244.0	19.165	10	-0.799	195.5	15024.4	0.0
14	244.0	19.165	V5	0.000	244.0	15024.4	0.0
15	244.0	19.165	10R	0.799	195.5	0.0	14871.6
16	244.0	19.165	9R	-0.799	586.5	14413.2	0.0
17	294.8	19.165	V6	0.000	244.0	14413.2	0.0
18	355.8	19.165	8R	0.799	977.6	0.0	13649.3
19	183.0	19.165	7R	-0.799	1368.6	12579.9	0.0
20	0.0	0.000	V7	0.000	244.0	12579.9	0.0
21	0.0	0.000	6R	0.799	1759.6	0.0	11204.9
22	0.0	0.000	5R	-0.799	2150.6	9524.3	0.0
23	0.0	0.000	V8	0.000	244.0	9524.3	0.0
24	0.0	0.000	4R	0.799	2541.7	0.0	7538.2
25	0.0	0.000	3R	-0.871	2863.4	5379.1	0.0
26	0.0	0.000	2DR	1.597	419.8	5601.9	0.0
27	0.0	0.000	2R	0.399	6031.9	0.0	0.0

STANDING SEAM TEST JOIST 09/13/83 10:08:59

J13

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
13	L1.50 X 1.50 X 0.115	288141.	1.00	51.4	22641.	0.0	22640.7
13	L1.50 X 1.50 X 0.115	381535.	1.00	161.7	22641.	0.0	22640.7

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
13	L1.50 X 1.50 X 0.115	0.00	0.9993	122.DEV	10	40- 0 0/0
13	L1.50 X 1.50 X 0.115	0.00	0.7547	0.REQ	0	32- 6 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 73.0 PLF, ROOF LIVE LOAD DEV = 109.5 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	5601.9	8441.7	9165.2	17606.9	3156.8	0.6732	1	2D	3- 2 0/0
RIGHT	5601.9	8441.7	9165.2	17606.9	3156.8	0.6732	1	2D	3- 2 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1209.8 LBS.
END REACTION = 2419.7 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL	REQD LD	DEV AXIAL	DEV LD	UREQ AXIAL	UREQ LD	UDEV AXIAL	UDEV LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
2	1	1.00	204.7	+	6032.	+	15555.		0.		0.	3.2X0.115	5.2+ 0.0
2D*	1	1.00	106.1	-	420.	-	2734.		0.		0.	1.0X0.109	1.8+ 0.0
3 *12	1	1.00	93.5	-	2863.	-	4890.		0.		0.	2.0X0.109	3.0+ 0.0
4 *	1	1.00	156.5	+	2542.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0
V2*	1	1.00	86.6	-	244.	-	3636.		0.		0.	1.1X0.109	1.9+ 0.0
5 *	1	1.00	119.4	-	2151.	-	2778.		0.		0.	1.5X0.111	2.8+ 0.0
6 *	1	1.00	156.5	+	1939.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0
V3*	1	1.00	86.6	-	244.	-	3636.		0.		0.	1.1X0.109	1.9+ 0.0
7 *	1	1.00	119.4	-	1939.	-	2778.		0.		0.	1.4X0.111	2.8+ 0.0
8 *	1	1.00	156.5	+	1939.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0
V4*	1	1.00	86.6	-	244.	-	3636.		0.		0.	1.1X0.109	1.9+ 0.0
9 *	1	1.00	119.4	-	1939.	-	2778.		0.		0.	1.4X0.111	2.8+ 0.0
10 *	1	1.00	156.5	+	1939.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0
V5*	1	1.00	86.6	-	244.	-	3636.		0.		0.	1.1X0.109	1.9+ 0.0
10R*	1	1.00	156.5	+	1939.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0
9R*	1	1.00	119.4	-	1939.	-	2778.		0.		0.	1.4X0.111	2.8+ 0.0
V6*	1	1.00	86.6	-	244.	-	3636.		0.		0.	1.1X0.109	1.9+ 0.0
8R*	1	1.00	156.5	+	1939.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0
7R*	1	1.00	119.4	-	1939.	-	2778.		0.		0.	1.4X0.111	2.8+ 0.0
V7*	1	1.00	86.6	-	244.	-	3636.		0.		0.	1.1X0.109	1.9+ 0.0
6R*	1	1.00	156.5	+	1939.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0
5R*	1	1.00	119.4	-	2151.	-	2778.		0.		0.	1.5X0.111	2.8+ 0.0
V8*	1	1.00	86.6	-	244.	-	3636.		0.		0.	1.1X0.109	1.9+ 0.0
4R*	1	1.00	156.5	+	2542.	+	6180.		0.		0.	1.9X0.109	2.4+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

STANDING SEAM TEST JOIST 09/13/83 10:09:12

J13

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1209.8 LBS.
END REACTION = 2419.7 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD		DEV AXIAL LD		UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
3R*12	1	1.00	93.5	-	2863.	-	4890.	0.	0.	2.0X0.109	3.0+ 0.0
2DR* 3	1	1.00	106.1	-	420.	-	2734.	0.	0.	1.0X0.109	1.8+ 0.0
2R 86	1	1.00	204.7	+	6032.	+	15555.	0.	0.	3.2X0.115	5.2+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 18938.3
TCRY = 1.029 BCRY = 1.029 SPAN/TCRY = 462.42
3 ROWS OF H-BRIDGING
WEIGHT = 249.7, WT/FT = 6.2

EAVE JOIST 20PSF, 40'BS LENGTH 09/13/83 09:48:06

J23 16 H 75 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LGTH	TLOAD	REQD RES MOMENT	REQD ENDR	LLOAD	LEFT END STANDARD	RGHT END STANDARD	BRIDG SPAC FT
16.00	40- 0 0/0	75.0	177012.	1487.	0.			7.9

BASIC DIMENSIONS

WK LENGTH	PANEL LENGTH	EFF DEPTH	NP	Y	E MAX IN.	E MIN IN.
39.6667	2- 0 0/0	15.293	17	3- 0 0/0	34.00	22.00

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW STRESS	ALLOW RES MOMENT	RATIO MIDSPAN MID PAN	RATIO MIDSPAN PAN PT	RATIO END PAN MID PAN	RATIO END PAN PAN PT FR
8	L1.25 X 1.25 X 0.111	22088.7	179171.	0.0000	0.0000	0.5874	0.5153 17
8	L1.25 X 1.25 X 0.111	30000.0	243343.				(+2E)

SEC	CHORD DESCRIPTION	LENGTH	L/R	JOIST I	IYY	RYY	WMAX	WMIN
8	L1.25 X 1.25 X 0.111	40- 0 0/0	62.07	62.2DEV	0.272	0.717	3.156	3.000
8	L1.25 X 1.25 X 0.111	32- 8 0/0		0.0REQ	0.272	0.717	3.156	3.000

TORSION CONSTANT J = 0.00218 TOP, 0.00218 BOT
FLOOR LIVE LOAD DEV = 37.2 PLF, ROOF LIVE LOAD DEV = 55.8 PLF

WEB DESIGN 50000. PSI CLEAR DEPTH = 13.500 IN

WEB	SEC	DIAM	PANEL SHEAR	FORCE IN WEB	ALLOW STRESS	ACTUAL STRESS	W1 LENGTH	NPW2 EA END
W1	81	0.6563	1381.	4326.9	27000.0	12790.0	4- 1 7/8	8
W2	76	0.5000	1275.	1593.7	8193.8	8118.9		
W3	76	0.5000	744.	929.7	8193.8	4736.1		

WELD

EFF. THROAT FILLET SIZE	WELD LBS/IN	ANGLE SHEAR LBS/IN		L1	L2	L3	L4
0.111 IN	2331.0	4440.0	LOAD=	4326.9	1912.5	2103.3	1593.7
			LGTH=	0.928	0.410	0.451	0.342

BRIDGING REQUIREMENTS

MIN BRIDGING = 4 ROW(S) FOR FA > 10000.0 PSI
LATERAL STABILITY FA = 12087.0 PSI

WEIGHT = 194.6 LBS, WT/FT = 4.9

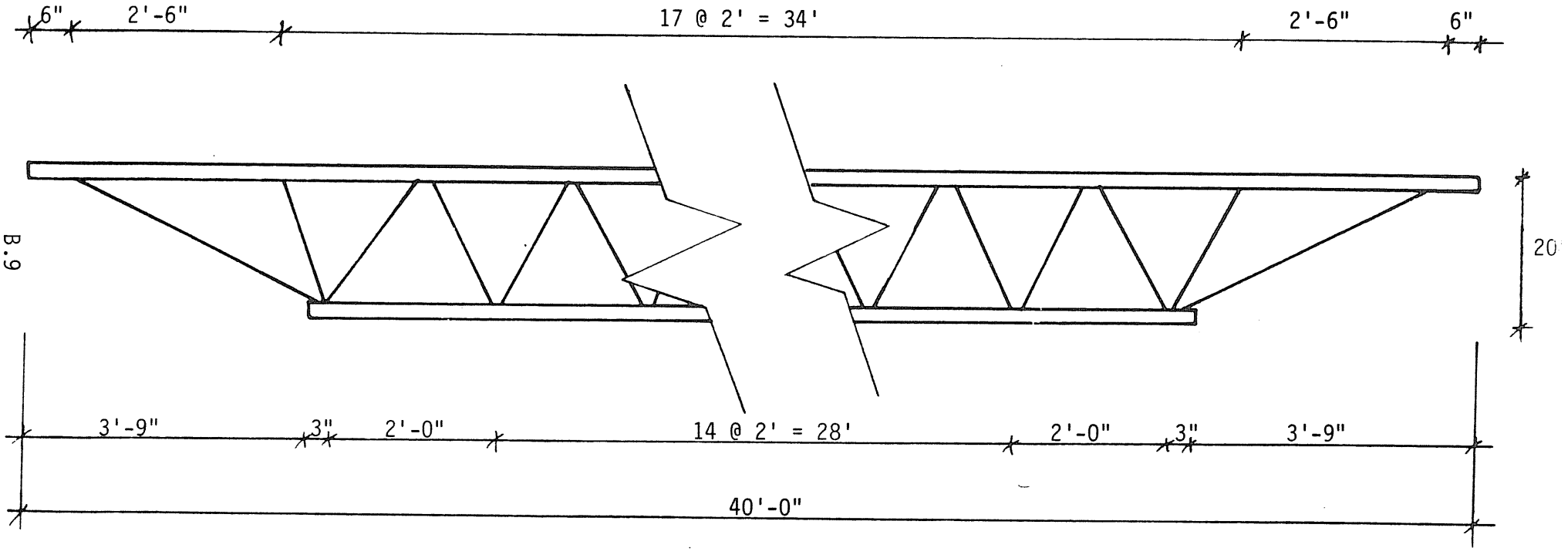


Figure B.3 Nominal Profile of 40 ft. Span, 40 psf Rod Web Joists

```
TEST JOIST   40PSF ROUND WEBS     09/08/83   13:13:55

   J11          20 H 223          40' 0"
-------------------------------------------------------------------------------
**SHORT SPAN JOIST DESIGN REQUIREMENTS**      SJI SPECS      VULCRAFT ENG DEPT**
-------------------------------------------------------------------------------
                          REQD RES  REQD                    LEFT END RGHT END  BRIDG
 DEPTH  BS LGTH    TLOAD  MOMENT    ENDR  LLOAD             STANDARD STANDARD SPAC FT
20.00  40- 0 0/0  223.0  526317.   4423.    0.                                  6.6
--------------------
**BASIC DIMENSIONS**
--------------------
            PANEL      EFF                          E MAX  E MIN
WK LENGTH   LENGTH     DEPTH  NP      Y             IN.    IN.
 39.6667   2- 0 0/0   19.003  17  3- 0 0/0        34.00  22.00
----------------
**CHORD DESIGN**  STEEL FY = 50000. PSI
----------------
                                  ALLOW    RATIO    RATIO    RATIO    RATIO
                          ALLOW    RES     MIDSPAN  MIDSPAN  END PAN  END PAN
SEC  CHORD DESCRIPTION    STRESS   MOMENT  MID PAN  PAN PT   MID PAN  PAN PT FR
 24 L1.75 X 1.75 X 0.165  25193.0  526913. 0.0000   0.0000   0.7141   0.5618  9
 24 L1.75 X 1.75 X 0.165  30000.0  627450.

SEC  CHORD DESCRIPTION    LENGTH     L/R    JOIST I  IYY    RYY    WMAX   WMIN
 24 L1.75 X 1.75 X 0.165  40- 0 0/0  44.44  199.4DEV 1.045  0.974  4.250  4.125
 24 L1.75 X 1.75 X 0.165  32- 8 0/0         0.0REQ 1.045  0.974  4.250  4.125

    TORSION CONSTANT J  = 0.00999 TOP, 0.00999 BOT
    FLOOR LIVE LOAD DEV =   119.3 PLF, ROOF LIVE LOAD DEV =   179.0 PLF
--------------
**WEB DESIGN**  50000. PSI   CLEAR DEPTH = 16.500 IN
--------------
                  PANEL   FORCE    ALLOW    ACTUAL      W1       NPW2
WEB SEC   DIAM    SHEAR   IN WEB   STRESS   STRESS    LENGTH    EA END
 W1  84  0.7500   4107.  10420.6  27000.0  23586.6  4- 3 3/8      3
 W2  83  0.7188   3791.   4395.0  13176.2  10830.3
 W3  80  0.6250   2453.   2843.7   9964.4   9268.9
--------
**WELD**
--------
EFF. THROAT   WELD    ANGLE SHEAR
FILLET SIZE  LBS/IN     LBS/IN          L1        L2        L3        L4
  0.165 IN   3465.0      6600.0  LOAD= 10420.6    4447.0    6253.9    4395.0
                                 LGTH=     1.504     0.642     0.902     0.634
-------------------------
**BRIDGING REQUIREMENTS**
-------------------------
MIN BRIDGING = 5 ROW(S) FOR FA > 25164.6 PSI
          LATERAL STABILITY FA = 38185.2 PSI

WEIGHT =   390.8 LBS, WT/FT =  9.8
```

EXTERIOR EAVE JOIST 09/13/83 09:43:39

J21 16 H 96 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LGTH	TLOAD	REQD RES MOMENT	REQD ENDR	LLOAD	LEFT END STANDARD	RGHT END STANDARD	BRIDG SPAC FT
16.00	40- 0 0/0	96.0	226576.	1904.	0.			6.6

BASIC DIMENSIONS

WK LENGTH	PANEL LENGTH	EFF DEPTH	NP	Y	E MAX IN.	E MIN IN.
39.6667	2- 0 0/0	15.165	17	3- 0 0/0	34.00	22.00

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW STRESS	ALLOW RES MOMENT	RATIO MIDSPAN MID PAN	RATIO MIDSPAN PAN PT	RATIO END PAN MID PAN	RATIO END PAN PAN PT	FR
13	L1.50 X 1.50 X 0.115	22655.2	227989.	0.0000	0.0000	0.8122	0.4850	9
13	L1.50 X 1.50 X 0.115	30000.0	301903.					

SEC	CHORD DESCRIPTION	LENGTH	L/R	JOIST I	IYY	RYY	WMAX	WMIN
13	L1.50 X 1.50 X 0.115	40- 0 0/0	51.44	76.6DEV	0.440	0.814	3.656	3.500
13	L1.50 X 1.50 X 0.115	32- 8 0/0		0.0REQ	0.440	0.814	3.656	3.500

TORSION CONSTANT J = 0.00293 TOP, 0.00293 BOT
FLOOR LIVE LOAD DEV = 45.8 PLF, ROOF LIVE LOAD DEV = 68.8 PLF

WEB DESIGN 50000. PSI CLEAR DEPTH = 13.000 IN

WEB	SEC	DIAM	PANEL SHEAR	FORCE IN WEB	ALLOW STRESS	ACTUAL STRESS	W1 LENGTH	NPW2 EA END
W1	81	0.6563	1768.	5542.1	27000.0	16382.3	4- 1 7/8	3
W2	78	0.5625	1632.	2041.1	11172.4	8213.6		
W3	76	0.5000	1056.	1320.0	8836.2	6724.4		

WELD

EFF. THROAT FILLET SIZE	WELD LBS/IN	ANGLE SHEAR LBS/IN		L1	L2	L3	L4
0.115 IN	2415.0	4600.0	LOAD=	5542.1	2451.6	2692.3	2041.1
			LGTH=	1.147	0.508	0.557	0.423

BRIDGING REQUIREMENTS

MIN BRIDGING = 5 ROW(S) FOR FA > 22514.8 PSI
LATERAL STABILITY FA = 26718.1 PSI

WEIGHT = 232.5 LBS, WT/FT = 5.8

EXTERIOR EAVE JOIST 09/13/83 09:38:17

J21A 16 H 121 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LGTH	TLOAD	REQD RES MOMENT	REQD ENDR	LLOAD	LEFT END STANDARD	RGHT END STANDARD	BRIDG SPAC FT
16.00	40- 0 0/0	121.0	285580.	2400.	0.			6.6

BASIC DIMENSIONS

WK LENGTH	PANEL LENGTH	EFF DEPTH	NP	Y	E MAX IN.	E MIN IN.
39.6667	2- 0 0/0	15.148	17	3- 0 0/0	34.00	22.00

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW STRESS	ALLOW RES MOMENT	RATIO MIDSPAN MID PAN	RATIO MIDSPAN PAN PT	RATIO END PAN MID PAN	RATIO END PAN PAN PT	FR
17	L1.50 X 1.50 X 0.138	23995.2	287152.	0.0000	0.0000	0.8659	0.5153	11
17	L1.50 X 1.50 X 0.138	30000.0	359011.					

SEC	CHORD DESCRIPTION	LENGTH	L/R	JOIST I	IYY	RYY	WMAX	WMIN
17	L1.50 X 1.50 X 0.138	40- 0 0/0	51.80	91.0DEV	0.582	0.859	3.656	3.594
17	L1.50 X 1.50 X 0.138	32- 8 0/0		0.0REQ	0.582	0.859	3.656	3.594

TORSION CONSTANT J = 0.00501 TOP, 0.00501 BOT
FLOOR LIVE LOAD DEV = 54.5 PLF, ROOF LIVE LOAD DEV = 81.7 PLF

WEB DESIGN 50000. PSI CLEAR DEPTH = 13.000 IN

WEB	SEC	DIAM	PANEL SHEAR	FORCE IN WEB	ALLOW STRESS	ACTUAL STRESS	W1 LENGTH	NPW2 EA END
W1	81	0.6563	2228.	6990.2	27000.0	20662.8	4- 1 7/8	1
W2	80	0.6250	2057.	2574.0	13740.4	8389.7		
W3	79	0.5938	1815.	2270.5	12442.9	8199.9		

WELD

EFF. THROAT FILLET SIZE	WELD LBS/IN	ANGLE SHEAR LBS/IN		L1	L2	L3	L4
0.138 IN	2898.0	5520.0	LOAD=	6990.2	3094.5	3393.4	2574.0
			LGTH=	1.206	0.534	0.585	0.444

BRIDGING REQUIREMENTS

MIN BRIDGING = 5 ROW(S) FOR FA > 23863.9 PSI
LATERAL STABILITY FA = 29811.6 PSI

WEIGHT = 280.3 LBS, WT/FT = 7.0

EXTERIOR EAVE JOIST 09/13/83 09:40:55

J21B 16 H 136 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LGTH	TLOAD	REQD RES MOMENT	REQD ENDR	LLOAD	LEFT END STANDARD	RGHT END STANDARD	BRIDG SPAC FT
16.00	40- 0 0/0	136.0	320983.	2697.	0.			6.6

BASIC DIMENSIONS

WK LENGTH	PANEL LENGTH	EFF DEPTH	NP	Y	E MAX IN.	E MIN IN.
39.6667	2- 0 0/0	15.135	17	3- 0 0/0	34.00	22.00

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW STRESS	ALLOW RES MOMENT	RATIO MIDSPAN MID PAN	RATIO MIDSPAN PAN PT	RATIO END PAN MID PAN	RATIO END PAN PAN PT	FR
20	L1.50 X 1.50 X 0.156	24023.7	322661.	0.0000	0.0000	0.8744	0.5169	11
20	L1.50 X 1.50 X 0.156	30000.0	402928.					

SEC	CHORD DESCRIPTION	LENGTH	L/R	JOIST I	IYY	RYY	WMAX	WMIN
20	L1.50 X 1.50 X 0.156	40- 0 0/0	52.08	102.0DEV	0.681	0.876	3.687	3.625
20	L1.50 X 1.50 X 0.156	32- 8 0/0		0.0REQ	0.681	0.876	3.687	3.625

TORSION CONSTANT J = 0.00720 TOP, 0.00720 BOT
FLOOR LIVE LOAD DEV = 61.1 PLF, ROOF LIVE LOAD DEV = 91.6 PLF

WEB DESIGN 50000. PSI CLEAR DEPTH = 13.000 IN

WEB	SEC	DIAM	PANEL SHEAR	FORCE IN WEB	ALLOW STRESS	ACTUAL STRESS	W1 LENGTH	NPW2 EA END
W1	82	0.6875	2505.	7866.3	27000.0	21191.6	4- 1 7/8	2
W2	81	0.6563	2312.	2893.8	14898.1	8554.0		
W3	80	0.6250	1768.	2212.3	13740.3	7211.0		

WELD

EFF. THROAT FILLET SIZE	WELD LBS/IN	ANGLE SHEAR LBS/IN		L1	L2	L3	L4
0.156 IN	3276.0	6240.0	LOAD=	7866.3	3480.7	3814.0	2893.8
			LGTH=	1.201	0.531	0.582	0.442

BRIDGING REQUIREMENTS

MIN BRIDGING = 5 ROW(S) FOR FA > 23898.8 PSI
LATERAL STABILITY FA = 31156.4 PSI

WEIGHT = 314.2 LBS, WT/FT = 7.9

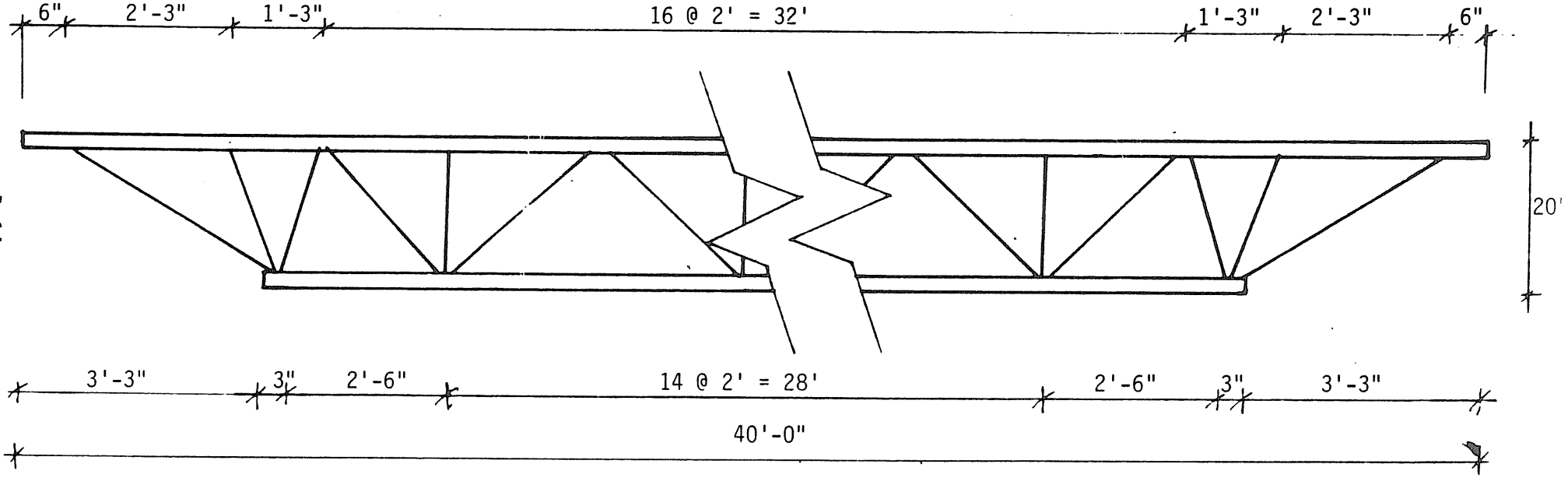


Figure B.4 Nominal Profile of 40 ft. Span, 40 psf Angle Web Joists

STANDING SEAM TEST JOIST 09/09/83 08:55:52

J12 20 H 223 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
20.00	40- 0 0/0	223.0	0.0		

REQD RES MOMENT = 526317.1 REQD ENDR = 4422.8

BRIDGING SPAC FT
09.8

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
39.6667	4- 0 0/0	4- 0 0/0	1-10 0/0	1-10 0/0	7 AT 4- 0 0/0	19.003

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	334.5	19.003	2	-0.396	11106.5	10326.6	0.0
2	650.4	19.003	2D	-1.584	769.2	9915.9	0.0
3	538.9	19.003	3	0.864	5259.3	0.0	13896.0
4	446.0	19.003	4	-0.792	4670.0	17557.2	0.0
5	446.0	19.003	V2	0.000	446.0	17557.2	0.0
6	446.0	19.003	5	0.792	3951.5	0.0	20655.2
7	446.0	19.003	6	-0.792	3233.1	23189.9	0.0
8	446.0	19.003	V3	0.000	446.0	23189.9	0.0
9	446.0	19.003	7	0.792	2514.6	0.0	25161.4
10	446.0	19.003	8	-0.792	1796.2	26569.6	0.0
11	446.0	19.003	V4	0.000	446.0	26569.6	0.0
12	446.0	19.003	9	0.792	1077.7	0.0	27414.5
13	446.0	19.003	10	-0.792	359.2	27696.1	0.0
14	446.0	19.003	V5	0.000	446.0	27696.1	0.0
15	446.0	19.003	10R	0.792	359.2	0.0	27414.5
16	446.0	19.003	9R	-0.792	1077.7	26569.6	0.0
17	538.9	19.003	V6	0.000	446.0	26569.6	0.0
18	650.4	19.003	8R	0.792	1796.2	0.0	25161.4
19	334.5	19.003	7R	-0.792	2514.6	23189.9	0.0
20	0.0	0.000	V7	0.000	446.0	23189.9	0.0
21	0.0	0.000	6R	0.792	3233.1	0.0	20655.2
22	0.0	0.000	5R	-0.792	3951.6	17557.2	0.0
23	0.0	0.000	V8	0.000	446.0	17557.2	0.0
24	0.0	0.000	4R	0.792	4670.0	0.0	13896.0
25	0.0	0.000	3R	-0.864	5259.3	9915.9	0.0
26	0.0	0.000	2DR	1.584	769.2	10326.6	0.0
27	0.0	0.000	2R	0.396	11106.5	0.0	0.0

STANDING SEAM TEST JOIST 09/09/83 08:55:58

J12

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
24	L1.75 X 1.75 X 0.165	526912.	1.00	44.4	25165.	0.0	25164.6
24	L1.75 X 1.75 X 0.165	627450.	1.00	139.3	25165.	0.0	25164.6

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
24	L1.75 X 1.75 X 0.165	0.00	0.9989	199.DEV	10	40- 0 0/0
24	L1.75 X 1.75 X 0.165	0.00	0.8388	0.REQ	0	32- 6 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 119.1 PLF, ROOF LIVE LOAD DEV = 178.7 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	10326.6	9382.7	8719.4	18102.2	3099.9	0.9098	0	2D	3- 2 0/0
RIGHT	10326.6	9382.7	8719.4	18102.2	3099.9	0.9098	0	2D	3- 2 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2211.4 LBS.
END REACTION = 4422.8 LBS.

WEB	NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS	SLOT
2	86	1	1.00	201.5	+ 11106.	+ 15555.	0.	0.	3.2X0.165	6.5+	0.0
2D*	3	1	1.00	104.0	- 769.	- 2837.	0.	0.	1.0X0.109	2.2+	0.0
3	*16	1	1.00	92.9	- 5259.	- 6021.	0.	0.	3.1X0.130	3.6+	0.0
4	* 3	1	1.00	156.0	+ 4670.	+ 6180.	0.	0.	3.3X0.109	3.0+	0.0
V2*	3	1	1.00	84.1	- 446.	- 3745.	0.	0.	1.2X0.109	2.2+	0.0
5	*12	1	1.00	98.0	- 3952.	- 4628.	0.	0.	2.8X0.109	3.7+	0.0
6	* 3	1	1.00	156.0	+ 3562.	+ 6180.	0.	0.	2.5X0.109	3.0+	0.0
V3*	3	1	1.00	84.1	- 446.	- 3745.	0.	0.	1.2X0.109	2.2+	0.0
7	*12	1	1.00	98.0	- 3562.	- 4628.	0.	0.	2.5X0.109	3.7+	0.0
8	* 3	1	1.00	156.0	+ 3562.	+ 6180.	0.	0.	2.5X0.109	3.0+	0.0
V4*	3	1	1.00	84.1	- 446.	- 3745.	0.	0.	1.2X0.109	2.2+	0.0
9	*12	1	1.00	98.0	- 3562.	- 4628.	0.	0.	2.5X0.109	3.7+	0.0
10	* 3	1	1.00	156.0	+ 3562.	+ 6180.	0.	0.	2.5X0.109	3.0+	0.0
V5*	3	1	1.00	84.1	- 446.	- 3745.	0.	0.	1.2X0.109	2.2+	0.0
10R*	3	1	1.00	156.0	+ 3562.	+ 6180.	0.	0.	2.5X0.109	3.0+	0.0
9R*	12	1	1.00	98.0	- 3562.	- 4628.	0.	0.	2.5X0.109	3.7+	0.0
V6*	3	1	1.00	84.1	- 446.	- 3745.	0.	0.	1.2X0.109	2.2+	0.0
8R*	3	1	1.00	156.0	+ 3562.	+ 6180.	0.	0.	2.5X0.109	3.0+	0.0
7R*	12	1	1.00	98.0	- 3562.	- 4628.	0.	0.	2.5X0.109	3.7+	0.0
V7*	3	1	1.00	84.1	- 446.	- 3745.	0.	0.	1.2X0.109	2.2+	0.0
6R*	3	1	1.00	156.0	+ 3562.	+ 6180.	0.	0.	2.5X0.109	3.0+	0.0
5R*	12	1	1.00	98.0	- 3952.	- 4628.	0.	0.	2.8X0.109	3.7+	0.0
V8*	3	1	1.00	84.1	- 446.	- 3745.	0.	0.	1.2X0.109	2.2+	0.0
4R*	3	1	1.00	156.0	+ 4670.	+ 6180.	0.	0.	3.3X0.109	3.0+	0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

STANDING SEAM TEST JOIST 09/09/83 08:56:08

J12

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2211.4 LBS.
END REACTION = 4422.8 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL	REQD LD	DEV AXIAL	DEV LD	UREQ AXIAL	UREQ LD	UDEV AXIAL	UDEV LD	REQ FILLET WELD SIZE	AVAIL WELD PLUS	AVAIL WELD SLOT
3R*16	1	1.00	92.9	-	5259.	-	6021.		0.		0.	3.1X0.130	3.6+	0.0
2DR* 3	1	1.00	104.0	-	769.	-	2837.		0.		0.	1.0X0.109	2.2+	0.0
2R 86	1	1.00	201.5	+	11106.	+	15555.		0.		0.	3.2X0.165	6.5+	0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 23225.4
TCRY = 1.135 BCRY = 1.135 SPAN/TCRY = 419.37
3 ROWS OF H-BRIDGING
WEIGHT = 368.5, WT/FT = 9.2

STANDING SEAM TEST JOIST 09/09/83 10:07:42

J12A 20 H 225 40' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS	LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
20.00	40-	0 0/0	225.0	0.0		

REQD RES MOMENT = 531037.4 REQD ENDR = 4462.5

BRIDGING
SPAC FT
09.8

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
39.6667	3- 4 0/0	3- 4 0/0	0- 6 0/0	0- 6 0/0	8 AT 4- 0 0/0	19.003

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	262.5	19.003	2	-0.475	9787.5	8840.6	0.0
2	431.2	19.003	2D	-1.584	510.0	8568.3	0.0
3	393.7	19.003	3	3.167	3952.1	0.0	9758.2
4	450.0	19.003	4	-0.792	5436.8	14020.6	0.0
5	450.0	19.003	V2	0.000	450.0	14020.6	0.0
6	450.0	19.003	5	0.792	4711.9	0.0	17714.7
7	450.0	19.003	6	-0.792	3987.0	20840.5	0.0
8	450.0	19.003	V3	0.000	450.0	20840.5	0.0
9	450.0	19.003	7	0.792	3262.1	0.0	23397.9
10	450.0	19.003	8	-0.792	2537.2	25387.0	0.0
11	450.0	19.003	V4	0.000	450.0	25387.0	0.0
12	450.0	19.003	9	0.792	1812.3	0.0	26807.9
13	450.0	19.003	10	-0.792	1087.4	27660.3	0.0
14	450.0	19.003	V5	0.000	450.0	27660.3	0.0
15	450.0	19.003	11	0.792	362.5	0.0	27944.5
16	450.0	19.003	11R	-0.792	362.5	27660.3	0.0
17	450.0	19.003	V6	0.000	450.0	27660.3	0.0
18	450.0	19.003	10R	0.792	1087.4	0.0	26807.8
19	393.7	19.003	9R	-0.792	1812.3	25387.0	0.0
20	431.2	19.003	V7	0.000	450.0	25387.0	0.0
21	262.5	19.003	8R	0.792	2537.2	0.0	23397.9
22	0.0	0.000	7R	-0.792	3262.1	20840.5	0.0
23	0.0	0.000	V8	0.000	450.0	20840.5	0.0
24	0.0	0.000	6R	0.792	3987.0	0.0	17714.7
25	0.0	0.000	5R	-0.792	4711.9	14020.6	0.0
26	0.0	0.000	V9	0.000	450.0	14020.6	0.0
27	0.0	0.000	4R	0.792	5436.8	0.0	9758.2
28	0.0	0.000	3R	-3.167	3952.1	8568.2	0.0
29	0.0	0.000	2DR	1.584	510.0	8840.6	0.0
30	0.0	0.000	2R	0.475	9787.5	0.0	0.0

STANDING SEAM TEST JOIST 09/09/83 10:07:45

J12A

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
24	L1.75 X 1.75 X 0.165	526912.	1.00	44.4	25132.	0.0	25132.1
24	L1.75 X 1.75 X 0.165	627450.	1.00	139.3	25390.	0.0	25390.2

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
24	L1.75 X 1.75 X 0.165	0.00	0.9976	199.DEV	12	40- 0 0/0
24	L1.75 X 1.75 X 0.165	0.00	0.8463	0.REQ	0	33-10 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 119.1 PLF, ROOF LIVE LOAD DEV = 178.7 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	8840.6	8032.5	5610.2	13642.7	1845.6	0.5523	0	2D	2- 6 0/0
RIGHT	8840.6	8032.5	5610.2	13642.7	1845.6	0.5523	0	2D	2- 6 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2231.2 LBS.
END REACTION = 4462.5 LBS.

WEB NO	Q	K	KL/R		REQD AXIAL LD		DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
2	1	1.00	173.3	+	9788.	+	15555.	0.	0.	2.8X0.165	5.6+ 0.0
2D*	1	1.00	104.0	-	510.	-	2837.	0.	0.	1.0X0.109	2.2+ 0.0
3 *	1	1.00	71.3	-	3952.	-	5427.	0.	0.	2.7X0.111	2.6+ 0.0
4 *	1	1.00	124.2	+	5437.	+	7950.	0.	0.	3.7X0.111	3.4+ 0.0
V2*	1	1.00	84.1	-	450.	-	3745.	0.	0.	1.2X0.109	2.2+ 0.0
5 *16	1	1.00	98.4	-	4712.	-	5583.	0.	0.	2.8X0.130	3.7+ 0.0
6 *	1	1.00	156.0	+	3987.	+	6180.	0.	0.	2.8X0.109	3.0+ 0.0
V3*	1	1.00	84.1	-	450.	-	3745.	0.	0.	1.2X0.109	2.2+ 0.0
7 *12	1	1.00	98.0	-	3594.	-	4628.	0.	0.	2.5X0.109	3.7+ 0.0
8 *	1	1.00	156.0	+	3594.	+	6180.	0.	0.	2.5X0.109	3.0+ 0.0
V4*	1	1.00	84.1	-	450.	-	3745.	0.	0.	1.2X0.109	2.2+ 0.0
9 *12	1	1.00	98.0	-	3594.	-	4628.	0.	0.	2.5X0.109	3.7+ 0.0
10 *	1	1.00	156.0	+	3594.	+	6180.	0.	0.	2.5X0.109	3.0+ 0.0
V5*	1	1.00	84.1	-	450.	-	3745.	0.	0.	1.2X0.109	2.2+ 0.0
11 *12	1	1.00	98.0	-	3594.	-	4628.	0.	0.	2.5X0.109	3.7+ 0.0
11R*12	1	1.00	98.0	-	3594.	-	4628.	0.	0.	2.5X0.109	3.7+ 0.0
V6*	1	1.00	84.1	-	450.	-	3745.	0.	0.	1.2X0.109	2.2+ 0.0
10R*	1	1.00	156.0	+	3594.	+	6180.	0.	0.	2.5X0.109	3.0+ 0.0
9R*12	1	1.00	98.0	-	3594.	-	4628.	0.	0.	2.5X0.109	3.7+ 0.0
V7*	1	1.00	84.1	-	450.	-	3745.	0.	0.	1.2X0.109	2.2+ 0.0
8R*	1	1.00	156.0	+	3594.	+	6180.	0.	0.	2.5X0.109	3.0+ 0.0
7R*12	1	1.00	98.0	-	3594.	-	4628.	0.	0.	2.5X0.109	3.7+ 0.0
V8*	1	1.00	84.1	-	450.	-	3745.	0.	0.	1.2X0.109	2.2+ 0.0
6R*	1	1.00	156.0	+	3987.	+	6180.	0.	0.	2.8X0.109	3.0+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

STANDING SEAM TEST JOIST 09/09/83 10:07:50

J12A

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2231.2 LBS.
END REACTION = 4462.5 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD		DEV AXIAL LD		UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVRL WELD PLUS SLOT
5R*16	1	1.00	98.4	- 4712.		- 5583.		0.	0.	2.8X0.130	3.7+ 0.0
V9*	3	1	1.00	84.1	- 450.		- 3745.	0.	0.	1.2X0.109	2.2+ 0.0
4R*	8	1	1.00	124.2	+ 5437.		+ 7950.	0.	0.	3.7X0.111	3.4+ 0.0
3R*	8	1	1.00	71.3	- 3952.		- 5427.	0.	0.	2.7X0.111	2.6+ 0.0
2DR*	3	1	1.00	104.0	- 510.		- 2837.	0.	0.	1.0X0.109	2.2+ 0.0
2R	86	1	1.00	173.3	+ 9788.		+ 15555.	0.	0.	2.8X0.165	5.6+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 23225.4
TCRY = 1.135 BCRY = 1.135 SPAN/TCRY = 419.37
3 ROWS OF H-BRIDGING
WEIGHT = 378.4, WT/FT = 9.5

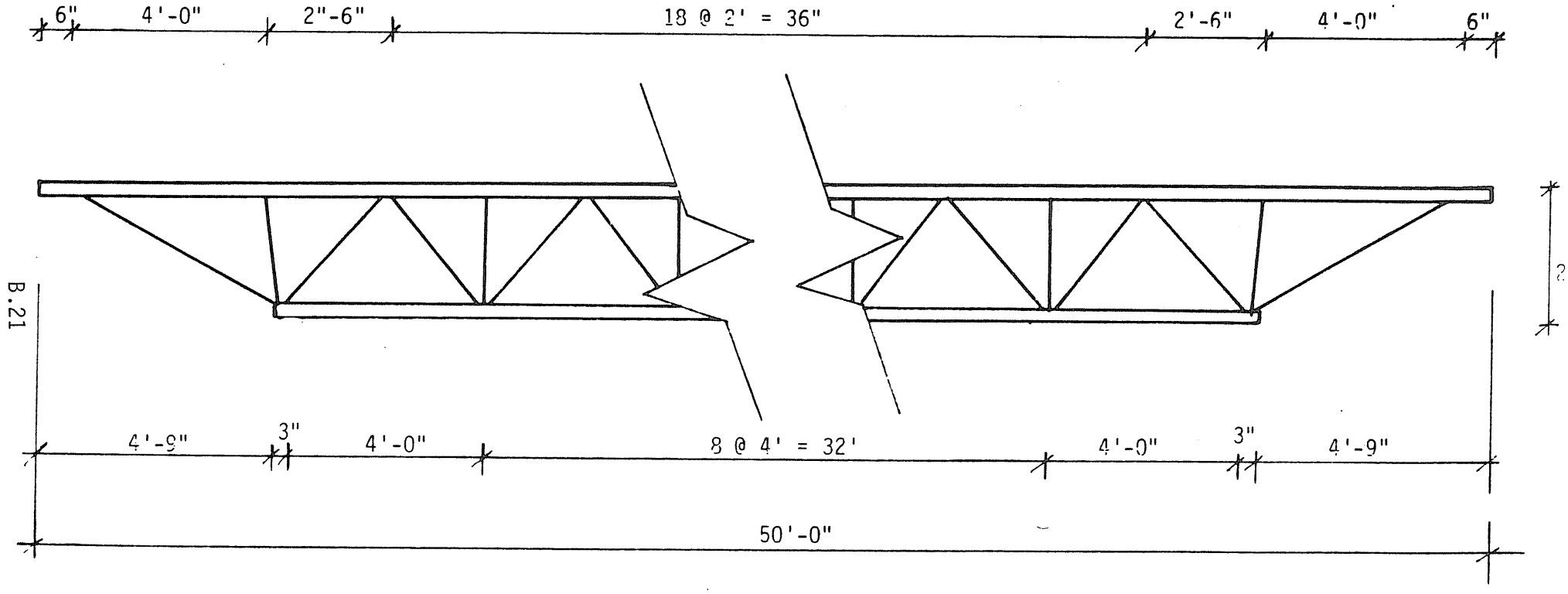


Figure B.5 Nominal Profile of 50 ft. Span, 40 psf Angle Web Joists

STANDING SEAM TEST JOIST 09/07/83 14:41:25

J10 26 H 214 50' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
26.00	50- 0 0/0	214.0	0.0		

REQD RES MOMENT = 791835.6 REQD ENDR = 5314.3

BRIDGING SPAC FT
12.3

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
49.6667	5- 0 0/0	5- 0 0/0	1-10 0/0	1-10 0/0	9 AT 4- 0 0/0	24.877

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	428.0	24.877	2	-0.415	12757.9	11785.0	0.0
2	731.2	24.877	2D	-2.073	811.8	11432.4	0.0
3	517.2	24.877	3	1.131	5546.9	0.0	15106.9
4	428.0	24.877	4	-1.037	5055.0	18616.6	0.0
5	428.0	24.877	V2	0.000	428.0	18616.6	0.0
6	428.0	24.877	5	1.037	4460.3	0.0	21713.4
7	428.0	24.877	6	-1.037	3865.6	24397.3	0.0
8	428.0	24.877	V3	0.000	428.0	24397.3	0.0
9	428.0	24.877	7	1.037	3270.9	0.0	26668.3
10	428.0	24.877	8	-1.037	2676.2	28526.4	0.0
11	428.0	24.877	V4	0.000	428.0	28526.4	0.0
12	428.0	24.877	9	1.037	2081.5	0.0	29971.6
13	428.0	24.877	10	-1.037	1486.8	31003.8	0.0
14	428.0	24.877	V5	0.000	428.0	31003.8	0.0
15	428.0	24.877	11	1.037	892.1	0.0	31623.2
16	428.0	24.877	12	-1.037	297.4	31829.6	0.0
17	428.0	24.877	V6	0.000	428.0	31829.6	0.0
18	428.0	24.877	12R	1.037	297.4	0.0	31623.2
19	428.0	24.877	11R	-1.037	892.1	31003.8	0.0
20	428.0	24.877	V7	0.000	428.0	31003.8	0.0
21	517.2	24.877	10R	1.037	1486.8	0.0	29971.6
22	731.2	24.877	9R	-1.037	2081.5	28526.4	0.0
23	428.0	24.877	V8	0.000	428.0	28526.4	0.0
24	0.0	0.000	8R	1.037	2676.2	0.0	26668.3
25	0.0	0.000	7R	-1.037	3270.9	24397.3	0.0
26	0.0	0.000	V9	0.000	428.0	24397.3	0.0
27	0.0	0.000	6R	1.037	3865.6	0.0	21713.4

J10

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
28	0.0	0.000	5R	-1.037	4460.3	18616.6	0.0
29	0.0	0.000	V10	0.000	428.0	18616.6	0.0
30	0.0	0.000	4R	1.037	5055.0	0.0	15106.9
31	0.0	0.000	3R	-1.131	5546.9	11432.3	0.0
32	0.0	0.000	2DR	2.073	811.8	11785.0	0.0
33	0.0	0.000	2R	0.415	12757.9	0.0	0.0

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
26	L2.00 X 2.00 X 0.166	793440.	1.00	38.7	25008.	0.0	25007.6
26	L2.00 X 2.00 X 0.166	949915.	1.00	121.5	25008.	0.0	25007.6

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
26	L2.00 X 2.00 X 0.166	0.00	0.9980	395.DEV	10	50- 0 0/0
26	L2.00 X 2.00 X 0.166	0.00	0.8336	0.REQ	0	40- 6 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 120.2 PLF, ROOF LIVE LOAD DEV = 180.3 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	11785.0	9259.1	11290.0	20549.2	3889.5	0.7528	1	2D	4- 2 0/0
RIGHT	11785.0	9259.1	11290.0	20549.2	3889.5	0.7528	1	2D	4- 2 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2657.2 LBS.
END REACTION = 5314.3 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
2	91 1	1.00	216.3 +	12758. +	23562.	0.	0.	3.7X0.166	7.0+ 0.0
2D*	3 1	1.00	127.7 -	812. -	1886.	0.	0.	1.0X0.109	2.7+ 0.0
3	*19 1	1.00	89.8 -	5547. -	7014.	0.	0.	3.5X0.128	4.1+ 0.0
4	* 3 1	1.00	176.2 +	5055. +	6180.	0.	0.	3.7X0.109	3.1+ 0.0
V2*	3 1	1.00	112.1 -	428. -	2447.	0.	0.	1.0X0.109	2.6+ 0.0
5	*19 1	1.00	93.9 -	4460. -	6685.	0.	0.	2.8X0.128	4.2+ 0.0
6	* 3 1	1.00	176.2 +	3866. +	6180.	0.	0.	2.8X0.109	3.1+ 0.0
V3*	3 1	1.00	112.1 -	428. -	2447.	0.	0.	1.0X0.109	2.6+ 0.0
7	*16 1	1.00	110.0 -	3692. -	4601.	0.	0.	2.3X0.130	3.9+ 0.0
8	* 3 1	1.00	176.2 +	3692. +	6180.	0.	0.	2.7X0.109	3.1+ 0.0
V4*	3 1	1.00	112.1 -	428. -	2447.	0.	0.	1.0X0.109	2.6+ 0.0
9	*16 1	1.00	110.0 -	3692. -	4601.	0.	0.	2.3X0.130	3.9+ 0.0
10	* 3 1	1.00	176.2 +	3692. +	6180.	0.	0.	2.7X0.109	3.1+ 0.0
V5*	3 1	1.00	112.1 -	428. -	2447.	0.	0.	1.0X0.109	2.6+ 0.0
11	*16 1	1.00	110.0 -	3692. -	4601.	0.	0.	2.3X0.130	3.9+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

J10

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2657.2 LBS.
END REACTION = 5314.3 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
12 *	3	1.00	176.2	+ 3692.	+ 6180.	0.	0.	2.7X0.109	3.1+ 0.0
V6*	3	1.00	112.1	- 428.	- 2447.	0.	0.	1.0X0.109	2.6+ 0.0
12R*	3	1.00	176.2	+ 3692.	+ 6180.	0.	0.	2.7X0.109	3.1+ 0.0
11R*16	1	1.00	110.0	- 3692.	- 4601.	0.	0.	2.3X0.130	3.9+ 0.0
V7*	3	1.00	112.1	- 428.	- 2447.	0.	0.	1.0X0.109	2.6+ 0.0
10R*	3	1.00	176.2	+ 3692.	+ 6180.	0.	0.	2.7X0.109	3.1+ 0.0
9R*16	1	1.00	110.0	- 3692.	- 4601.	0.	0.	2.3X0.130	3.9+ 0.0
V8*	3	1.00	112.1	- 428.	- 2447.	0.	0.	1.0X0.109	2.6+ 0.0
8R*	3	1.00	176.2	+ 3692.	+ 6180.	0.	0.	2.7X0.109	3.1+ 0.0
7R*16	1	1.00	110.0	- 3692.	- 4601.	0.	0.	2.3X0.130	3.9+ 0.0
V9*	3	1.00	112.1	- 428.	- 2447.	0.	0.	1.0X0.109	2.6+ 0.0
6R*	3	1.00	176.2	+ 3866.	+ 6180.	0.	0.	2.8X0.109	3.1+ 0.0
5R*19	1	1.00	93.9	- 4460.	- 6685.	0.	0.	2.8X0.128	4.2+ 0.0
V10*	3	1.00	112.1	- 428.	- 2447.	0.	0.	1.0X0.109	2.6+ 0.0
4R*	3	1.00	176.2	+ 5055.	+ 6180.	0.	0.	3.7X0.109	3.1+ 0.0
3R*19	1	1.00	89.8	- 5547.	- 7014.	0.	0.	3.5X0.128	4.1+ 0.0
2DR*	3	1.00	127.7	- 812.	- 1886.	0.	0.	1.0X0.109	2.7+ 0.0
2R 91	1	1.00	216.3	+ 12758.	+ 23562.	0.	0.	3.7X0.166	7.0+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 17245.8
TCRY = 1.229 BCRY = 1.229 SPAN/TCRY = 484.81
3 ROWS OF H-BRIDGING
WEIGHT = 540.0, WT/FT = 10.8

EXTERIOR JOIST 09/07/83 15:36:27

J20 22 H 109 50' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
22.00	50- 0 0/0	109.0	0.0		

REQD RES MOMENT = 403318.1 REQD ENDR = 2706.8

BRIDGING SPAC FT
12.3

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
49.6667	4- 5 0/0	4- 5 0/0	0- 5 0/0	0- 5 0/0	10 AT 4- 0 0/0	21.148

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	186.2	21.148	2	-0.399	6801.3	6317.0	0.0
2	263.4	21.148	2D	-1.762	302.9	6167.5	0.0
3	186.2	21.148	3	4.230	2319.4	0.0	6701.2
4	218.0	21.148	4	-0.881	3132.5	9051.5	0.0
5	218.0	21.148	V2	0.000	218.0	9051.5	0.0
6	218.0	21.148	5	0.881	2802.8	0.0	11154.4
7	218.0	21.148	6	-0.881	2473.1	13009.8	0.0
8	218.0	21.148	V3	0.000	218.0	13009.8	0.0
9	218.0	21.148	7	0.881	2143.3	0.0	14617.9
10	218.0	21.148	8	-0.881	1813.6	15978.6	0.0
11	218.0	21.148	V4	0.000	218.0	15978.6	0.0
12	218.0	21.148	9	0.881	1483.8	0.0	17091.9
13	218.0	21.148	10	-0.881	1154.1	17957.8	0.0
14	218.0	21.148	V5	0.000	218.0	17957.8	0.0
15	218.0	21.148	11	0.881	824.4	0.0	18576.3
16	218.0	21.148	12	-0.881	494.6	18947.4	0.0
17	218.0	21.148	V6	0.000	218.0	18947.4	0.0
18	218.0	21.148	13	0.881	164.9	0.0	19071.1
19	218.0	21.148	13R	-0.881	164.9	18947.4	0.0
20	218.0	21.148	V7	0.000	218.0	18947.4	0.0
21	218.0	21.148	12R	0.881	494.6	0.0	18576.3
22	218.0	21.148	11R	-0.881	824.4	17957.8	0.0
23	186.2	21.148	V8	0.000	218.0	17957.8	0.0
24	263.4	21.148	10R	0.881	1154.1	0.0	17091.9
25	186.2	21.148	9R	-0.881	1483.8	15978.6	0.0
26	0.0	0.000	V9	0.000	218.0	15978.6	0.0
27	0.0	0.000	8R	0.881	1813.6	0.0	14617.9

J20

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
28	0.0	0.000	7R	-0.881	2143.3	13009.8	0.0
29	0.0	0.000	V10	0.000	218.0	13009.8	0.0
30	0.0	0.000	6R	0.881	2473.1	0.0	11154.4
31	0.0	0.000	5R	-0.881	2802.8	9051.5	0.0
32	0.0	0.000	V11	0.000	218.0	9051.5	0.0
33	0.0	0.000	4R	0.881	3132.5	0.0	6701.2
34	0.0	0.000	3R	-4.230	2319.4	6167.5	0.0
35	0.0	0.000	2DR	1.762	302.9	6317.0	0.0
36	0.0	0.000	2R	0.399	6801.3	0.0	0.0

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
17	L1.50 X 1.50 X 0.138	400913.	1.00	51.8	23984.	0.0	23984.0
17	L1.50 X 1.50 X 0.138	501211.	1.00	162.5	24141.	0.0	24140.6

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
17	L1.50 X 1.50 X 0.138	0.00	0.9995	177.DEV	16	5 0- 0 0/0
17	L1.50 X 1.50 X 0.138	0.00	0.8047	0.REQ	0	41- 8 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 53.9 PLF, ROOF LIVE LOAD DEV = 80.8 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	6317.0	7996.2	8953.5	16949.7	3182.6	0.6937	1	2D	3- 7 0/0
RIGHT	6317.0	7996.2	8953.5	16949.7	3182.6	0.6937	1	2D	3- 7 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1353.4 LBS.
END REACTION = 2706.8 LBS.

WEB	NO	Q	K	KL/R		REQD AXIAL LD		DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
2	86	1	1.00	231.0	+	6801.	+	15555.	0.	0.	2.7X0.138	5.2+ 0.0
2D*	3	1	1.00	114.5	-	303.	-	2345.	0.	0.	1.0X0.109	1.7+ 0.0
3 *	3	1	1.00	100.1	-	2319.	-	3023.	0.	0.	1.7X0.109	1.8+ 0.0
4 *	3	1	1.00	163.0	+	3133.	+	6180.	0.	0.	2.3X0.109	2.2+ 0.0
V2*	3	1	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+ 0.0
5 *	12	1	1.00	103.0	-	2803.	-	4325.	0.	0.	2.1X0.109	3.0+ 0.0
6 *	3	1	1.00	163.0	+	2473.	+	6180.	0.	0.	1.9X0.109	2.2+ 0.0
V3*	3	1	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+ 0.0
7 *	8	1	1.00	124.2	-	2143.	-	2564.	0.	0.	1.5X0.111	2.6+ 0.0
8 *	3	1	1.00	163.0	+	2047.	+	6180.	0.	0.	1.9X0.109	2.2+ 0.0
V4*	3	1	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+ 0.0
9 *	8	1	1.00	124.2	-	2047.	-	2564.	0.	0.	1.5X0.111	2.6+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

EXTERIOR JOIST 09/07/83 15:36:37

J20

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1353.4 LBS.
END REACTION = 2706.8 LBS.

WEB NO	Q	K	KL/R		REQD AXIAL LD		DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS	SLOT
10 *	3	1.00	163.0	+	2047.	+	6180.	0.	0.	1.9X0.109	2.2+	0.0
V5*	3	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+	0.0
11 *	8	1.00	124.2	-	2047.	-	2564.	0.	0.	1.5X0.111	2.6+	0.0
12 *	3	1.00	163.0	+	2047.	+	6180.	0.	0.	1.9X0.109	2.2+	0.0
V6*	3	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+	0.0
13 *	8	1.00	124.2	-	2047.	-	2564.	0.	0.	1.5X0.111	2.6+	0.0
13R*	8	1.00	124.2	-	2047.	-	2564.	0.	0.	1.5X0.111	2.6+	0.0
V7*	3	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+	0.0
12R*	3	1.00	163.0	+	2047.	+	6180.	0.	0.	1.9X0.109	2.2+	0.0
11R*	8	1.00	124.2	-	2047.	-	2564.	0.	0.	1.5X0.111	2.6+	0.0
V8*	3	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+	0.0
10R*	3	1.00	163.0	+	2047.	+	6180.	0.	0.	1.9X0.109	2.2+	0.0
9R*	8	1.00	124.2	-	2047.	-	2564.	0.	0.	1.5X0.111	2.6+	0.0
V9*	3	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+	0.0
8R*	3	1.00	163.0	-+	2047.	+	6180.	0.	0.	1.9X0.109	2.2+	0.0
7R*	8	1.00	124.2	-	2143.	-	2564.	0.	0.	1.5X0.111	2.6+	0.0
V10*	3	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+	0.0
6R*	3	1.00	163.0	+	2473.	+	6180.	0.	0.	1.9X0.109	2.2+	0.0
5R*	12	1.00	103.0	-	2803.	-	4325.	0.	0.	2.1X0.109	3.0+	0.0
V11*	3	1.00	96.8	-	218.	-	3178.	0.	0.	1.0X0.109	1.9+	0.0
4R*	3	1.00	163.0	+	3133.	+	6180.	0.	0.	2.3X0.109	2.2+	0.0
3R*	3	1.00	100.1	-	2319.	-	3023.	0.	0.	1.7X0.109	1.8+	0.0
2DR*	3	1.00	114.5	-	303.	-	2345.	0.	0.	1.0X0.109	1.7+	0.0
2R	86	1.00	231.0	+	6801.	+	15555.	0.	0.	2.7X0.138	5.2+	0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 12301.8
TCRY = 1.035 BCRY = 1.035 SPAN/TCRY = 575.64
3 ROWS OF H-BRIDGING
WEIGHT = 361.7, WT/FT = 7.2

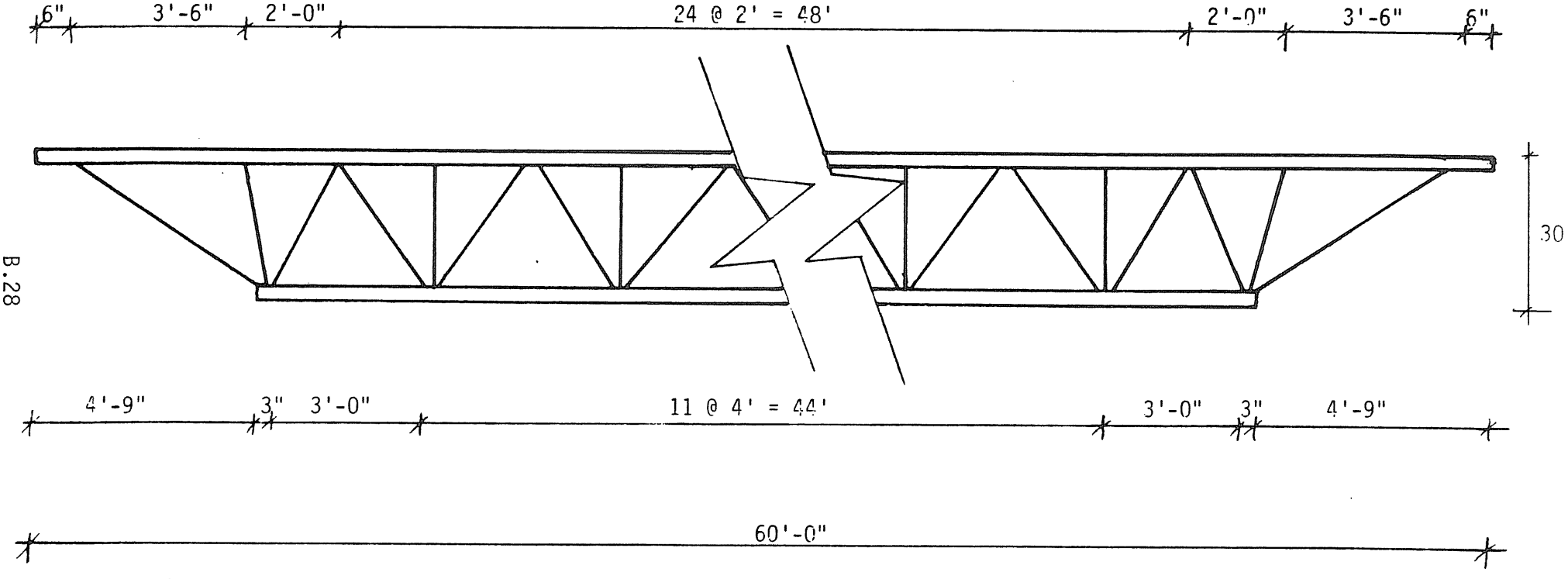


Figure B.6 Nominal Profile of 60 ft. Span, 20 psf Angle Web Joists

J1 30 H 116 60° 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
30.00	60- 0 0/0	116.0	0.0		

REQD RES MOMENT = 619459.2 REQD ENDR = 3460.7

BRIDGING SPAC FT
11.9

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
59.6667	5- 0 0/0	5- 0 0/0	0-10 0/0	0-10 0/0	12 AT 4- 0 0/0	29.145

STRESS ANALYSIS

PP	LOAD-LBS	EFF-DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	232.0	29.145	2	-0.486	7389.5	6646.9	0.0
2	338.3	29.145	2D	-2.429	365.9	6507.6	0.0
3	222.3	29.145	3	2.914	3055.7	0.0	7499.3
4	232.0	29.145	4	-1.214	3456.2	9696.3	0.0
5	232.0	29.145	V2	0.000	232.0	9696.3	0.0
6	232.0	29.145	5	1.214	3155.7	0.0	11702.3
7	232.0	29.145	6	-1.214	2855.1	13517.3	0.0
8	232.0	29.145	V3	0.000	232.0	13517.3	0.0
9	232.0	29.145	7	1.214	2554.6	0.0	15141.2
10	232.0	29.145	8	-1.214	2254.0	16574.0	0.0
11	232.0	29.145	V4	0.000	232.0	16574.0	0.0
12	232.0	29.145	9	1.214	1953.5	0.0	17815.9
13	232.0	29.145	10	-1.214	1653.0	18866.6	0.0
14	232.0	29.145	V5	0.000	232.0	18866.6	0.0
15	232.0	29.145	11	1.214	1352.4	0.0	19726.3
16	232.0	29.145	12	-1.214	1051.9	20395.0	0.0
17	232.0	29.145	V6	0.000	232.0	20395.0	0.0
18	232.0	29.145	13	1.214	751.3	0.0	20872.6
19	232.0	29.145	14	-1.214	450.8	21159.2	0.0
20	232.0	29.145	V7	0.000	232.0	21159.2	0.0
21	232.0	29.145	15	1.214	150.3	0.0	21254.7
22	232.0	29.145	15R	-1.214	150.3	21159.2	0.0
23	232.0	29.145	V8	0.000	232.0	21159.2	0.0
24	232.0	29.145	14R	1.214	450.8	0.0	20872.6
25	232.0	29.145	13R	-1.214	751.3	20395.0	0.0
26	232.0	29.145	V9	0.000	232.0	20395.0	0.0
27	222.3	29.145	12R	1.214	1051.9	0.0	19726.3

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STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
28	338.3	29.145	11R	-1.214	1352.4	18866.6	0.0
29	232.0	29.145	V10	0.000	232.0	18866.6	0.0
30	0.0	0.000	10R	1.214	1653.0	0.0	17815.9
31	0.0	0.000	9R	-1.214	1953.5	16574.0	0.0
32	0.0	0.000	V11	0.000	232.0	16574.0	0.0
33	0.0	0.000	8R	1.214	2254.0	0.0	15141.2
34	0.0	0.000	7R	-1.214	2554.6	13517.3	0.0
35	0.0	0.000	V12	0.000	232.0	13517.3	0.0
36	0.0	0.000	6R	1.214	2855.1	0.0	11702.3
37	0.0	0.000	5R	-1.214	3155.7	9696.3	0.0
38	0.0	0.000	V13	0.000	232.0	9696.3	0.0
39	0.0	0.000	4R	1.214	3456.2	0.0	7499.3
40	0.0	0.000	3R	-2.914	3055.7	6507.6	0.0
41	0.0	0.000	2DR	2.429	365.9	6646.9	0.0
42	0.0	0.000	2R	0.486	7389.5	0.0	0.0

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
20	L1.50 X 1.50 X 0.156	621322.	1.00	52.1	23844.	0.0	23844.0
16	L1.50 X 1.50 X 0.130	652430.	1.00	162.2	28484.	0.0	28483.9

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
20	L1.50 X 1.50 X 0.156	0.00	0.9925	345.DEV	16	60- 0 0/0
16	L1.50 X 1.50 X 0.130	0.00	0.9495	0.REQ	0	50- 6 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 60.5 PLF, ROOF LIVE LOAD DEV = 90.8 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	6646.9	7490.3	11802.2	19292.5	4220.8	0.8931	1	2D	4- 2 0/0
RIGHT	6646.9	7490.3	11802.2	19292.5	4220.8	0.8931	1	2D	4- 2 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1730.3 LBS.
END REACTION = 3460.7 LBS.

WEB	NO	Q	K	KL/R		REQD AXIAL LD		DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
2	91	1	1.00	232.6	+	7390.	+	23562.	0.	0.	4.3X0.130	4.1+ 0.0
2D*	3	1	1.00	150.6	-	366.	-	1356.	0.	0.	1.0X0.109	1.8+ 0.0
3	*12	1	1.00	96.9	-	3056.	-	4695.	0.	0.	1.9X0.109	2.5+ 0.0
4	* 3	1	1.00	192.4	+	3456.	+	6180.	0.	0.	2.2X0.109	1.9+ 0.0
V2*	3	1	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
5	*12	1	1.00	121.6	-	3156.	-	3184.	0.	0.	2.0X0.109	2.7+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

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J1

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1730.3 LBS.
END REACTION = 3460.7 LBS.

WEB NO	Q	K	KL/R		REQD AXIAL LD		DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
6 *	3	1.00	192.4	+	2855.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
V3*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
7 *12	1	1.00	121.6	-	2555.	-	3184.	0.	0.	1.6X0.109	2.7+ 0.0
8 *	3	1.00	192.4	+	2254.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
V4*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
9 *12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
10 *	3	1.00	192.4	+	2242.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
V5*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
11 *12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
12 *	3	1.00	192.4	+	2242.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
V6*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
13 *12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
14 *	3	1.00	192.4	+	2242.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
V7*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
15 *12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
15R*12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
V8*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
14R*	3	1.00	192.4	+	2242.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
13R*12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
V9*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
12R*	3	1.00	192.4	+	2242.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
11R*12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
V10*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
10R*	3	1.00	192.4	+	2242.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
9R*12	1	1.00	121.6	-	2242.	-	3184.	0.	0.	1.4X0.109	2.7+ 0.0
V11*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
8R*	3	1.00	192.4	+	2254.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
7R*12	1	1.00	121.6	-	2555.	-	3184.	0.	0.	1.6X0.109	2.7+ 0.0
V12*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
6R*	3	1.00	192.4	+	2855.	+	6180.	0.	0.	1.9X0.109	1.9+ 0.0
5R*12	1	1.00	121.6	-	3156.	-	3184.	0.	0.	2.0X0.109	2.7+ 0.0
V13*	3	1.00	137.6	-	232.	-	1624.	0.	0.	1.0X0.109	1.9+ 0.0
4R*	3	1.00	192.4	+	3456.	+	6180.	0.	0.	2.2X0.109	1.9+ 0.0
3R*12	1	1.00	96.9	-	3056.	-	4695.	0.	0.	1.9X0.109	2.5+ 0.0
2DR*	3	1.00	150.6	-	366.	-	1356.	0.	0.	1.0X0.109	1.8+ 0.0
2R 91	1	1.00	232.6	+	7390.	+	23562.	0.	0.	4.3X0.130	4.1+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 10077.2
TCRY = 1.040 BCRY = 1.051 SPAN/TCRY = 688.39
4 ROWS OF H-BRIDGING
WEIGHT = 479.6, WT/FT = 8.0

EXTERIOR JOIST 08/08/83 10:34:39

J3 24 H 82 60' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS	LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
24.00	60-	0 0/0	82.0	0.0		

REQD RES MOMENT = 437893.7 REQD ENDR = 2446.3

BRIDGING SPAC FT
11.9

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
59.6667	4- 5 0/0	4- 5 0/0	1- 5 0/0	1- 5 0/0	12 AT 4- 0 0/0	23.151

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	140.1	23.151	2	-0.437	5761.4	5279.7	0.0
2	239.2	23.151	2D	-1.929	269.4	5155.8	0.0
3	181.1	23.151	3	1.362	2564.5	0.0	6673.6
4	164.0	23.151	4	-0.965	2716.5	8628.8	0.0
5	164.0	23.151	V2	0.000	164.0	8628.8	0.0
6	164.0	23.151	5	0.965	2480.3	0.0	10413.9
7	164.0	23.151	6	-0.965	2244.1	12029.1	0.0
8	164.0	23.151	V3	0.000	164.0	12029.1	0.0
9	164.0	23.151	7	0.965	2007.9	0.0	13474.2
10	164.0	23.151	8	-0.965	1771.7	14749.3	0.0
11	164.0	23.151	V4	0.000	164.0	14749.3	0.0
12	164.0	23.151	9	0.965	1535.4	0.0	15854.4
13	164.0	23.151	10	-0.965	1299.2	16789.4	0.0
14	164.0	23.151	V5	0.000	164.0	16789.4	0.0
15	164.0	23.151	11	0.965	1063.0	0.0	17554.5
16	164.0	23.151	12	-0.965	826.8	18149.6	0.0
17	164.0	23.151	V6	0.000	164.0	18149.6	0.0
18	164.0	23.151	13	0.965	590.6	0.0	18574.6
19	164.0	23.151	14	-0.965	354.3	18829.6	0.0
20	164.0	23.151	V7	0.000	164.0	18829.6	0.0
21	164.0	23.151	15	0.965	118.1	0.0	18914.6
22	164.0	23.151	15R	-0.965	118.1	18829.6	0.0
23	164.0	23.151	V8	0.000	164.0	18829.6	0.0
24	164.0	23.151	14R	0.965	354.3	0.0	18574.6
25	164.0	23.151	13R	-0.965	590.6	18149.6	0.0
26	164.0	23.151	V9	0.000	164.0	18149.6	0.0
27	181.1	23.151	12R	0.965	826.8	0.0	17554.5

EXTERIOR JOIST 08/08/83 10:34:40

J3

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
28	239.2	23.151	11R	-0.965	1063.0	16789.4	0.0
29	140.1	23.151	V10	0.000	164.0	16789.4	0.0
30	0.0	0.000	10R	0.965	1299.2	0.0	15854.4
31	0.0	0.000	9R	-0.965	1535.4	14749.3	0.0
32	0.0	0.000	V11	0.000	164.0	14749.3	0.0
33	0.0	0.000	8R	0.965	1771.7	0.0	13474.2
34	0.0	0.000	7R	-0.965	2007.9	12029.1	0.0
35	0.0	0.000	V12	0.000	164.0	12029.1	0.0
36	0.0	0.000	6R	0.965	2244.1	0.0	10413.9
37	0.0	0.000	5R	-0.965	2480.3	8628.8	0.0
38	0.0	0.000	V13	0.000	164.0	8628.8	0.0
39	0.0	0.000	4R	0.965	2716.6	0.0	6673.6
40	0.0	0.000	3R	-1.362	2564.5	5155.8	0.0
41	0.0	0.000	2DR	1.929	269.4	5279.7	0.0
42	0.0	0.000	2R	0.437	5761.4	0.0	0.0

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
17	L1.50 X 1.50 X 0.138	438883.	1.00	51.8	23835.	0.0	23834.9
16	L1.50 X 1.50 X 0.130	518260.	1.00	162.2	25348.	0.0	25347.9

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
17	L1.50 X 1.50 X 0.138	0.00	0.9933	206.DEV	16	60- 0 0/0
16	L1.50 X 1.50 X 0.130	0.00	0.8449	0.REQ	0	51- 8 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 36.2 PLF, ROOF LIVE LOAD DEV = 54.3 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	5279.7	6683.2	6735.7	13418.9	2394.2	0.5535	1	2D	3- 7 0/0
RIGHT	5279.7	6683.2	6735.7	13418.9	2394.2	0.5535	1	2D	3- 7 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1223.2 LBS.
END REACTION = 2446.3 LBS.

WEB	NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS	SLOT
2	86	1	1.00	238.5 +	5761. +	15555.	0.	0.	2.8X0.130	4.9+	0.0
2D*	3	1	1.00	123.3 -	269. -	2024.	0.	0.	1.0X0.109	1.7+	0.0
3 *	8	1	1.00	109.7 -	2565. -	3291.	0.	0.	1.6X0.111	2.2+	0.0
4 *	3	1	1.00	170.0 +	2717. +	6180.	0.	0.	1.9X0.109	2.1+	0.0
V2*	3	1	1.00	107.0 -	164. -	2685.	0.	0.	1.0X0.109	1.9+	0.0
5 *	12	1	1.00	107.3 -	2480. -	4054.	0.	0.	1.6X0.109	2.9+	0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

EXTERIOR JOIST 08/08/83 10:34:48

J3

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 1223.2 LBS.
END REACTION = 2446.3 LBS.

WEB NO	Q	K	KL/R		REQD AXIAL LD		DEV AXIAL LD		UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS	AVBL WELD SLOT
6 *	3	1.00	170.0	+	2244.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
V3*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
7 *	8	1.00	129.4	-	2008.	-	2362.		0.	0.	1.2X0.111	2.5+	0.0
8 *	3	1.00	170.0	+	1772.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
V4*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
9 *	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
10 *	3	1.00	170.0	+	1762.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
V5*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
11 *	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
12 *	3	1.00	170.0	+	1762.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
V6*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
13 *	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
14 *	3	1.00	170.0	+	1762.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
V7*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
15 *	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
15R*	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
V8*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
14R*	3	1.00	170.0	+	1762.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
13R*	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
V9*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
12R*	3	1.00	170.0	+	1762.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
11R*	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
V10*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
10R*	3	1.00	170.0	+	1762.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
9R*	8	1.00	129.4	-	1762.	-	2362.		0.	0.	1.1X0.111	2.5+	0.0
V11*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
8R*	3	1.00	170.0	+	1772.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
7R*	8	1.00	129.4	-	2008.	-	2362.		0.	0.	1.2X0.111	2.5+	0.0
V12*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
6R*	3	1.00	170.0	+	2244.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
5R*	12	1.00	107.3	-	2480.	-	4054.		0.	0.	1.6X0.109	2.9+	0.0
V13*	3	1.00	107.0	-	164.	-	2685.		0.	0.	1.0X0.109	1.9+	0.0
4R*	3	1.00	170.0	+	2717.	+	6180.		0.	0.	1.9X0.109	2.1+	0.0
3R*	8	1.00	109.7	-	2565.	-	3291.		0.	0.	1.6X0.111	2.2+	0.0
2DR*	3	1.00	123.3	-	269.	-	2024.		0.	0.	1.0X0.109	1.7+	0.0
2R	86	1.00	238.5	+	5761.	+	15555.		0.	0.	2.8X0.130	4.9+	0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 10677.1
TCRY = 1.035 BCRY = 1.039 SPAN/TCRY = 691.54
4 ROWS OF H-BRIDGING
WEIGHT = 428.0, TIME = 0.035 HOUR, WT/FT = 7.1.

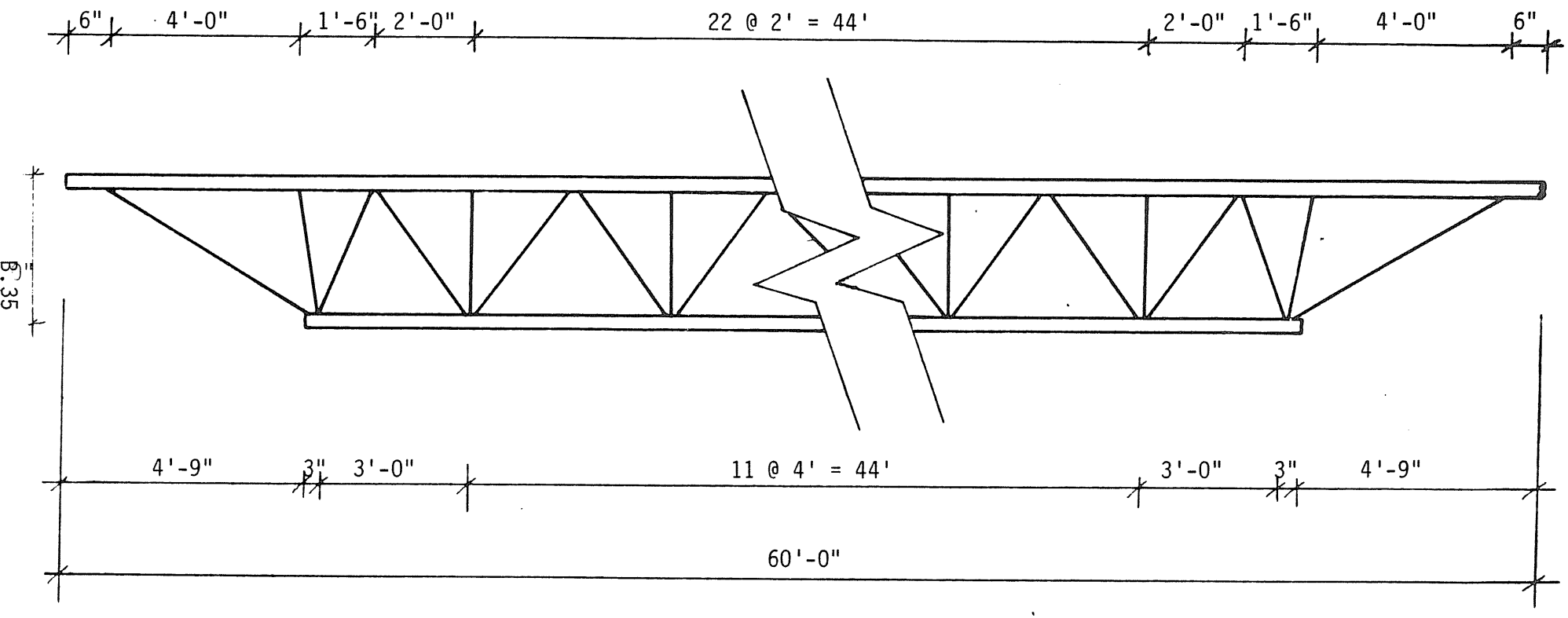


Figure B.7 Nominal Profile of 60 ft. Span, 40 psf Angle Web Joists

STANDING SEAM TEST JOIST 08/08/83 10:13:09

J2 30 H 214 60' 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
30.00	60- 0 0/0	214.0	0.0		

REQD RES MOMENT = 1142795.5 REQD ENDR = 6384.3

BRIDGING SPAC FT
14.8

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
59.6667	5- 0 0/0	5- 0 0/0	0-10 0/0	0-10 0/0	12 AT 4- 0 0/0	28.857

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	428.0	28.857	2	-0.481	13742.4	12384.5	0.0
2	624.2	28.857	2D	-2.405	676.0	12125.0	0.0
3	410.2	28.857	3	2.886	5643.3	0.0	13972.8
4	428.0	28.857	4	-1.202	6401.8	18066.3	0.0
5	428.0	28.857	V2	0.000	428.0	18066.3	0.0
6	428.0	28.857	5	1.202	5845.1	0.0	21803.9
7	428.0	28.857	6	-1.202	5288.5	25185.6	0.0
8	428.0	28.857	V3	0.000	428.0	25185.6	0.0
9	428.0	28.857	7	1.202	4731.8	0.0	28211.3
10	428.0	28.857	8	-1.202	4175.1	30881.0	0.0
11	428.0	28.857	V4	0.000	428.0	30881.0	0.0
12	428.0	28.857	9	1.202	3618.4	0.0	33194.7
13	428.0	28.857	10	-1.202	3061.7	35152.5	0.0
14	428.0	28.857	V5	0.000	428.0	35152.5	0.0
15	428.0	28.857	11	1.202	2505.1	0.0	36754.4
16	428.0	28.857	12	-1.202	1948.4	38000.2	0.0
17	428.0	28.857	V6	0.000	428.0	38000.2	0.0
18	428.0	28.857	13	1.202	1391.7	0.0	38890.1
19	428.0	28.857	14	-1.202	835.0	39424.1	0.0
20	428.0	28.857	V7	0.000	428.0	39424.1	0.0
21	428.0	28.857	15	1.202	278.3	0.0	39602.1
22	428.0	28.857	15R	-1.202	278.3	39424.1	0.0
23	428.0	28.857	V8	0.000	428.0	39424.1	0.0
24	428.0	28.857	14R	1.202	835.0	0.0	38890.1
25	428.0	28.857	13R	-1.202	1391.7	38000.2	0.0
26	428.0	28.857	V9	0.000	428.0	38000.2	0.0
27	410.2	28.857	12R	1.202	1948.4	0.0	36754.4

STANDING SEAM TEST JOIST 08/08/83 10:13:10

J2

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
28	624.2	28.857	11R	-1.202	2505.1	35152.5	0.0
29	428.0	28.857	V10	0.000	428.0	35152.5	0.0
30	0.0	0.000	10R	1.202	3061.7	0.0	33194.7
31	0.0	0.000	9R	-1.202	3618.4	30881.0	0.0
32	0.0	0.000	V11	0.000	428.0	30881.0	0.0
33	0.0	0.000	8R	1.202	4175.1	0.0	28211.3
34	0.0	0.000	7R	-1.202	4731.8	25185.6	0.0
35	0.0	0.000	V12	0.000	428.0	25185.6	0.0
36	0.0	0.000	6R	1.202	5288.5	0.0	21803.9
37	0.0	0.000	5R	-1.202	5845.1	18066.3	0.0
38	0.0	0.000	V13	0.000	428.0	18066.3	0.0
39	0.0	0.000	4R	1.202	6401.8	0.0	13972.7
40	0.0	0.000	3R	-2.886	5643.3	12125.0	0.0
41	0.0	0.000	2DR	2.405	676.0	12384.5	0.0
42	0.0	0.000	2R	0.481	13742.4	0.0	0.0

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
28	L2.00 X 2.00 X 0.200	1139262.	1.00	39.0	25937.	0.0	25936.9
27	L2.00 X 2.00 X 0.188	1240907.	1.00	121.9	27628.	0.0	27628.1

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
28	L2.00 X 2.00 X 0.200	0.00	0.9986	615.DEV	12	60- 0 0/0
27	L2.00 X 2.00 X 0.188	0.00	0.9209	0.REQ	0	50- 6 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 108.1 PLF, ROOF LIVE LOAD DEV = 162.1 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	12384.5	8147.7	9518.3	17666.0	3380.1	0.6350	1	2D	4- 2 0/0
RIGHT	12384.5	8147.7	9518.3	17666.0	3380.1	0.6350	1	2D	4- 2 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 3192.2 LBS.
END REACTION = 6384.3 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
2	1	1.00	228.1	+ 13742.	+ 23562.	0.	0.	3.5X0.188	6.2+ 0.0
2D*	1	1.00	146.0	- 676.	- 1444.	0.	0.	1.0X0.109	2.6+ 0.0
3 *16	1	1.00	94.1	- 5643.	- 5927.	0.	0.	2.9X0.130	3.3+ 0.0
4 * 8	1	1.00	152.3	+ 6402.	+ 7950.	0.	0.	3.8X0.111	3.3+ 0.0
V2* 3	1	1.00	132.5	- 428.	- 1752.	0.	0.	1.0X0.109	2.6+ 0.0
5 *19	1	1.00	102.1	- 5845.	- 6013.	0.	0.	3.0X0.128	4.0+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

STANDING SEAM TEST JOIST 08/08/83 10:13:20

J2

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 3192.2 LBS.
END REACTION = 6384.3 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS	AVBL WELD SLOT
6 *	3	1 1.00	191.3 +	5288. +	6180.	0.	0.	3.2X0.109	2.9+	0.0
V3*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
7 *	19	1 1.00	102.1 -	4732. -	6013.	0.	0.	2.5X0.128	4.0+	0.0
8 *	3	1 1.00	191.3 +	4175. +	6180.	0.	0.	2.6X0.109	2.9+	0.0
V4*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
9 *	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
10 *	3	1 1.00	191.3 +	4152. +	6180.	0.	0.	2.5X0.109	2.9+	0.0
V5*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
11 *	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
12 *	3	1 1.00	191.3 +	4152. +	6180.	0.	0.	2.5X0.109	2.9+	0.0
V6*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
13 *	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
14 *	3	1 1.00	191.3 +	4152. +	6180.	0.	0.	2.5X0.109	2.9+	0.0
V7*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
15 *	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
15R*	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
V8*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
14R*	3	1 1.00	191.3 +	4152. +	6180.	0.	0.	2.5X0.109	2.9+	0.0
13R*	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
V9*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
12R*	3	1 1.00	191.3 +	4152. +	6180.	0.	0.	2.5X0.109	2.9+	0.0
11R*	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
V10*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
10R*	3	1 1.00	191.3 +	4152. +	6180.	0.	0.	2.5X0.109	2.9+	0.0
9R*	17	1 1.00	119.7 -	4152. -	4114.	0.	0.	2.0X0.138	3.7+	0.0
V11*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
8R*	3	1 1.00	191.3 +	4175. +	6180.	0.	0.	2.6X0.109	2.9+	0.0
7R*	19	1 1.00	102.1 -	4732. -	6013.	0.	0.	2.5X0.128	4.0+	0.0
V12*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
6R*	3	1 1.00	191.3 +	5288. +	6180.	0.	0.	3.2X0.109	2.9+	0.0
5R*	19	1 1.00	102.1 -	5845. -	6013.	0.	0.	3.0X0.128	4.0+	0.0
V13*	3	1 1.00	132.5 -	428. -	1752.	0.	0.	1.0X0.109	2.6+	0.0
4R*	8	1 1.00	152.3 +	6402. +	7950.	0.	0.	3.8X0.111	3.3+	0.0
3R*	16	1 1.00	94.1 -	5643. -	5927.	0.	0.	2.9X0.130	3.3+	0.0
2DR*	3	1 1.00	146.0 -	676. -	1444.	0.	0.	1.0X0.109	2.6+	0.0
2R	91	1 1.00	228.1 +	13742. +	23562.	0.	0.	3.5X0.188	6.2+	0.0

* = WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 11793.3
TCRY = 1.238 BCRY = 1.243 SPAN/TCRY = 578.52
3 ROWS OF H-BRIDGING
WEIGHT = 754.1, WT/FT = 12.6

EXTERIOR JOIST 09/08/83 11:13:17

J4 24 H 169 60° 0"

SHORT SPAN JOIST DESIGN REQUIREMENTS SJI SPECS VULCRAFT ENG DEPT**

DEPTH	BS LENGTH	TLOAD	LLOAD	LEFT END STANDARD	RGHT END STANDARD
24.00	60- 0 0/0	169.0	0.0		

REQD RES MOMENT = 902488.1 REQD ENDR = 5041.8

BRIDGING SPAC FT
14.8

BASIC DIMENSIONS

WK LENGTH	LEFT END PANEL	RIGHT END PANEL	LEFT VAR DIM	RIGHT VAR DIM	INTERIOR PANELS	EFF DEPTH
59.6667	4- 5 0/0	4- 5 0/0	1- 5 0/0	1- 5 0/0	12 AT 4- 0 0/0	22.853

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
1	288.7	22.853	2	-0.431	12004.6	11023.5	0.0
2	492.9	22.853	2D	-1.904	556.7	10764.6	0.0
3	373.2	22.853	3	1.344	5309.7	0.0	13933.8
4	338.0	22.853	4	-0.952	5636.7	18016.0	0.0
5	338.0	22.853	V2	0.000	338.0	18016.0	0.0
6	338.0	22.853	5	0.952	5146.6	0.0	21743.1
7	338.0	22.853	6	-0.952	4656.4	25115.4	0.0
8	338.0	22.853	V3	0.000	338.0	25115.4	0.0
9	338.0	22.853	7	0.952	4166.3	0.0	28132.6
10	338.0	22.853	8	-0.952	3676.1	30794.9	0.0
11	338.0	22.853	V4	0.000	338.0	30794.9	0.0
12	338.0	22.853	9	0.952	3186.0	0.0	33102.2
13	338.0	22.853	10	-0.952	2695.8	35054.5	0.0
14	338.0	22.853	V5	0.000	338.0	35054.5	0.0
15	338.0	22.853	11	0.952	2205.7	0.0	36651.9
16	338.0	22.853	12	-0.952	1715.5	37894.3	0.0
17	338.0	22.853	V6	0.000	338.0	37894.3	0.0
18	338.0	22.853	13	0.952	1225.4	0.0	38781.7
19	338.0	22.853	14	-0.952	735.2	39314.2	0.0
20	338.0	22.853	V7	0.000	338.0	39314.2	0.0
21	338.0	22.853	15	0.952	245.1	0.0	39491.6
22	338.0	22.853	15R	-0.952	245.1	39314.2	0.0
23	338.0	22.853	V8	0.000	338.0	39314.2	0.0
24	338.0	22.853	14R	0.952	735.2	0.0	38781.7
25	338.0	22.853	13R	-0.952	1225.4	37894.3	0.0
26	338.0	22.853	V9	0.000	338.0	37894.3	0.0
27	373.2	22.853	12R	0.952	1715.5	0.0	36651.9

EXTERIOR JOIST 09/08/83 11:13:19

J4

STRESS ANALYSIS

PP	LOAD-LBS	EFF DEPTH	WEB MEM	WEB SLOPE	AXIAL LD IN WEB	AXIAL LD TOP CHORD	AXIAL LD BOT CHORD
28	492.9	22.853	11R	-0.952	2205.7	35054.5	0.0
29	288.7	22.853	V10	0.000	338.0	35054.5	0.0
30	0.0	0.000	10R	0.952	2695.8	0.0	33102.2
31	0.0	0.000	9R	-0.952	3186.0	30794.9	0.0
32	0.0	0.000	V11	0.000	338.0	30794.9	0.0
33	0.0	0.000	8R	0.952	3676.1	0.0	28132.6
34	0.0	0.000	7R	-0.952	4166.3	25115.4	0.0
35	0.0	0.000	V12	0.000	338.0	25115.4	0.0
36	0.0	0.000	6R	0.952	4656.4	0.0	21743.1
37	0.0	0.000	5R	-0.952	5146.6	18016.0	0.0
38	0.0	0.000	V13	0.000	338.0	18016.0	0.0
39	0.0	0.000	4R	0.952	5636.7	0.0	13933.8
40	0.0	0.000	3R	-1.344	5309.7	10764.6	0.0
41	0.0	0.000	2DR	1.904	556.7	11023.5	0.0
42	0.0	0.000	2R	0.431	12004.6	0.0	0.0

CHORD DESIGN STEEL FY = 50000. PSI

SEC	CHORD DESCRIPTION	ALLOW RESM	K	KL/R	AXIAL STRESS	BENDING STRESS PAN PT	COMBINED STRESS PAN PT
28	L2.00 X 2.00 X 0.200	902213.	1.00	39.0	25865.	0.0	25864.6
28	L2.00 X 2.00 X 0.200	1042080.	1.00	122.1	25981.	0.0	25981.3

SEC	CHORD DESCRIPTION	BENDING STRESS MID PAN	COMBINED RATIO MID PAN	I OF JOIST	FLRS	LENGTH
28	L2.00 X 2.00 X 0.200	0.00	0.9958	398.DEV	12	60- 0 0/0
28	L2.00 X 2.00 X 0.200	0.00	0.8660	0.REQ	0	51- 8 0/0

BOTTOM CHORD EXTENSION = 0- 5 0/0

FLOOR LIVE LOAD DEV = 69.9 PLF. ROOF LIVE LOAD DEV = 104.8 PLF

END PANEL DESIGN

	AXIAL LOAD	AXIAL STRESS	BENDING STRESS PP	COMBINED STRESS PP	BENDING STRESS MP	COMBINED RATIO MP	F	WEB	TO END OF BASEL
LEFT	11023.5	7252.3	5427.5	12679.8	1956.8	0.6746	0	2D	3- 7 0/0
RIGHT	11023.5	7252.3	5427.5	12679.8	1956.8	0.6746	0	2D	3- 7 0/0

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2520.9 LBS.
END REACTION = 5041.8 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS SLOT
2	86 1	1.00	232.6 +	12005. +	15555.	0.	0.	3.0X0.188	7.2+ 0.0
2D*	3 1	1.00	118.9 -	557. -	2177.	0.	0.	1.0X0.109	2.5+ 0.0
3	*13 1	1.00	88.4 -	5310. -	5531.	0.	0.	2.9X0.109	3.5+ 0.0
4	* 3 1	1.00	168.9 +	5637. +	6180.	0.	0.	3.1X0.109	3.2+ 0.0
V2*	3 1	1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+ 0.0
5	*17 1	1.00	105.7 -	5147. -	5274.	0.	0.	2.3X0.130	4.0+ 0.0

* - WEB SEC NUM, SINGLE OR DOUBLE, REQ'D WELD & FILLET ALL SPECIFIED.

EXTERIOR JOIST 09/08/83 11:13:38

J4

WEB DESIGN STEEL FY = 50000. PSI. MIN VERT SHEAR = 2520.9 LBS.
END REACTION = 5041.8 LBS.

WEB NO	Q	K	KL/R	REQD AXIAL LD	DEV AXIAL LD	UREQ AXIAL LD	UDEV AXIAL LD	REQ FILLET WELD SIZE	AVBL WELD PLUS	SLOT
6 *	3	1 1.00	168.9 +	4656. +	6180.	0.	0.	2.5X0.109	3.2+	0.0
V3*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
7 *12	1	1.00	105.1 -	4166. -	4192.	0.	0.	2.3X0.109	4.0+	0.0
8 *	3	1 1.00	168.9 +	3676. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
V4*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
9 *12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
10 *	3	1 1.00	168.9 +	3656. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
V5*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
11 *12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
12 *	3	1 1.00	168.9 +	3656. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
V6*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
13 *12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
14 *	3	1 1.00	168.9 +	3656. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
V7*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
15 *12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
15R*12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
V8*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
14R*	3	1 1.00	168.9 +	3656. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
13R*12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
V9*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
12R*	3	1 1.00	168.9 +	3656. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
11R*12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
V10*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
10R*	3	1 1.00	168.9 +	3656. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
9R*12	1	1.00	105.1 -	3656. -	4192.	0.	0.	2.0X0.109	4.0+	0.0
V11*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
8R*	3	1 1.00	168.9 +	3676. +	6180.	0.	0.	2.0X0.109	3.2+	0.0
7R*12	1	1.00	105.1 -	4166. -	4192.	0.	0.	2.3X0.109	4.0+	0.0
V12*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
6R*	3	1 1.00	168.9 +	4656. +	6180.	0.	0.	2.5X0.109	3.2+	0.0
5R*17	1	1.00	105.7 -	5147. -	5274.	0.	0.	2.3X0.130	4.0+	0.0
V13*	3	1 1.00	101.9 -	338. -	2936.	0.	0.	1.0X0.109	2.6+	0.0
4R*	3	1 1.00	168.9 +	5637. +	6180.	0.	0.	3.1X0.109	3.2+	0.0
3R*13	1	1.00	88.4 -	5310. -	5531.	0.	0.	2.9X0.109	3.5+	0.0
2DR*	3	1 1.00	118.9 -	557. -	2177.	0.	0.	1.0X0.109	2.5+	0.0
2R	86	1 1.00	232.6 +	12005. +	15555.	0.	0.	3.0X0.188	7.2+	0.0

* - WEB SEC NUM. SINGLE OR DOUBLE. REQ'D WELD & FILLET ALL SPECIFIED.

BRIDGING REQUIREMENTS

LATERAL STABILITY FA = 12366.4
TCRY = 1.238 BCRY = 1.238 SPAN/TCRY = 578.52
3 ROWS OF H-BRIDGING
WEIGHT = 734.6. WT/FT = 12.2

APPENDIX C

40 ft. Span, 20 psf ROD WEB TEST RESULTS

Test No. 40/3/20-11

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 119"^{4} Δ" @ 100 plf 1.64

Dead Load of Joist: 6.7 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 130 plf

TEST PARAMETERS:

Span Length: 39.83' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 1 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'

Bottom Chord: 0'

Others: No attachment (except clips) to outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 13.6

2 Method: SJI Load: 23.9

3 Method: CONV. Load: 169.8

TEST RESULTS:

Failure Mode: Top chord lateral buckling of the east joist.

Applied Failure Load: 301.2 plf Total Failure Load: 314.2 plf

Load Factor (Failure Load/Service Load) 1. 23.09

2. 13.13

3. 1.85

DISCUSSION:

Test 40 /3/20-11

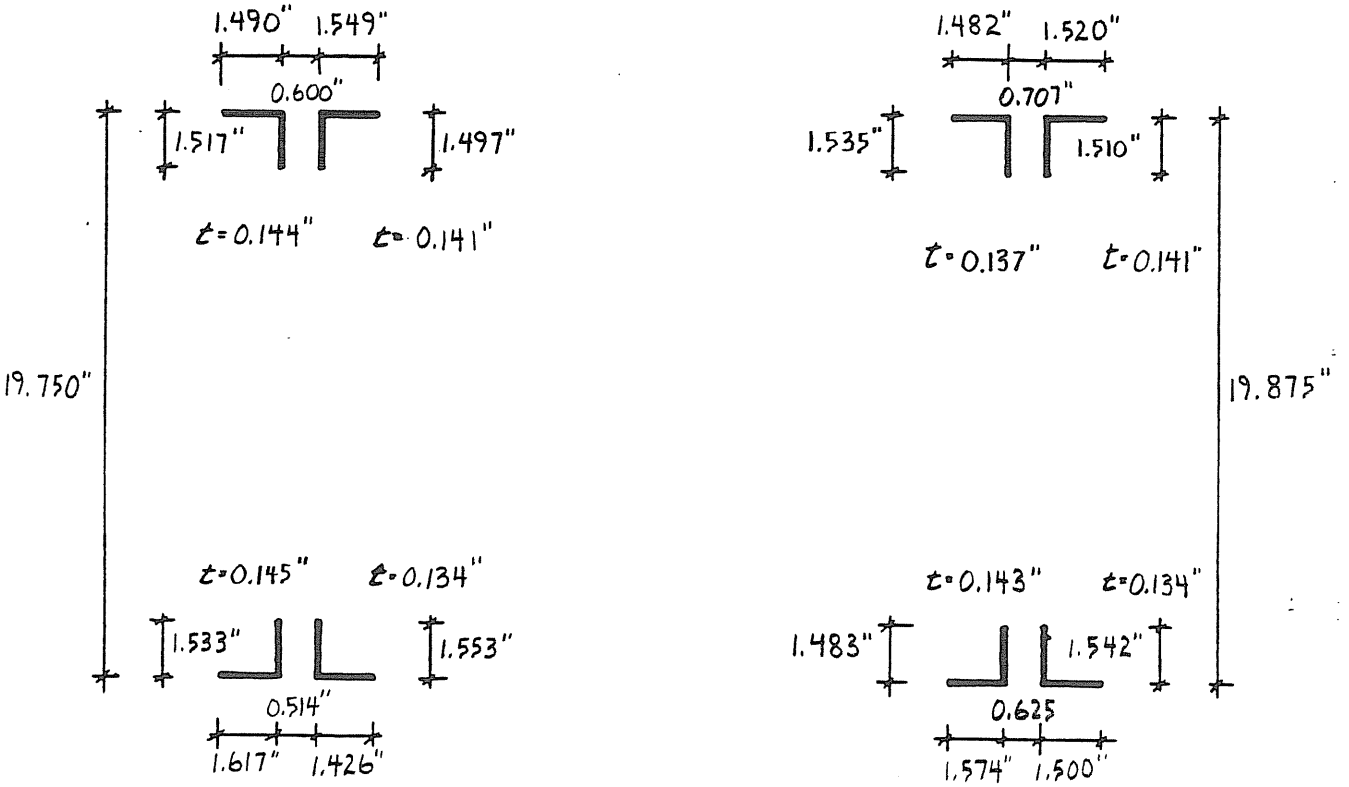


Figure F.25 Cross-Section Properties, Test 40/3/20-11

TEST # 40/3/20-11E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.482	RIGHT HORZ LEG (in) =	1.520
LEFT VER LEG (in) =	1.535	RIGHT VER LEG (in) =	1.510
LEFT THICKNESS (in) =	0.137	RIGHT THICKNESS (in) =	0.141
GAP BETWEEN THE LEGS (in) =	0.707		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.574	RIGHT HORZ LEG (in) =	1.500
LEFT VER LEG (in) =	1.483	RIGHT VER LEG (in) =	1.542
LEFT THICKNESS (in) =	0.143	RIGHT THICKNESS (in) =	0.134
GAP BETWEEN THE LEGS (in) =	0.625		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.178	in^4	Iy =	0.656	in^4
rx =	0.471	in	ry =	0.905	in
A =	0.802	in^2	J =	0.005	in^2
x =	1.857	in	y =	0.447	in

BOTTOM CHORD

Ix =	0.176	in^4	Iy =	0.638	in^4
rx =	0.467	in	ry =	0.889	in
A =	0.806	in^2	J =	0.005	in^2
x =	1.842	in	y =	0.397	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 145.97 (in^4)	# ROWS BRIDGING	= 1.00		
JOIST DEPTH	= 19.88 (in)	EFF. DEPTH	= 19.03	(in.)	
SPAN LENGTH	= 39.83 (ft)	DEF @ 100 plf	= 1.34	(in)	
BRIDGING SPACING	= 20.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 101.33		
KL/ry	= 265.27	KL/rx	= 50.92		
b/t RATIO	= 11.20	Q	= 0.96		
MEA. YIELD STR.	= 58.20 (ksi)	MEA. FAILURE LOAD	= 314.20	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	2.1	1.7	2.7	13.6	23.09
SJI	3.7	3.0	4.7	23.9	13.13
CONV	26.5	21.2	33.7	169.8	1.85

FIGURE F.26a COMPUTED ALLOWABLE LOADS, TEST 40/3/20-11E

TEST # 40/3/20-11EW

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.490	RIGHT HORZ LEG (in) =	1.549
LEFT VER LEG (in) =	1.517	RIGHT VER LEG (in) =	1.497
LEFT THICKNESS (in) =	0.144	RIGHT THICKNESS (in) =	0.141

GAP BETWEEN THE LEGS (in) = 0.600

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.617	RIGHT HORZ LEG (in) =	1.426
LEFT VER LEG (in) =	1.533	RIGHT VER LEG (in) =	1.553
LEFT THICKNESS (in) =	0.145	RIGHT THICKNESS (in) =	0.134

GAP BETWEEN THE LEGS (in) = 0.514

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.178	in^4	Iy =	0.624	in^4
rx =	0.465	in	ry =	0.871	in
A =	0.822	in^2	J =	0.006	in^2
x =	1.799	in	y =	0.438	in

BOTTOM CHORD

Ix =	0.186	in^4	Iy =	0.566	in^4
rx =	0.477	in	ry =	0.832	in
A =	0.817	in^2	J =	0.005	in^2
x =	1.789	in	y =	0.430	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 146.44 (in^4)	# ROWS BRIDGING	= 1.00
JOIST DEPTH	= 19.75 (in)	EFF. DEPTH	= 18.88 (in.)
SPAN LENGTH	= 39.83 (ft)	DEF @ 100 plf	= 1.33 (in)
BRIDGING SPACING	= 20.00 (ft)	PANEL LENGTH	= 24.00 (in)
K	= 1.00	C	= 100.73
KL/ry	= 275.43	KL/rx	= 51.64
b/t RATIO	= 10.99	Q	= 0.96
MEA. YIELD STR.	= 58.50 (ksi)	MEA. FAILURE LOAD	= 314.20 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	2.0	1.6	2.5	12.8	24.48
SJI	3.4	2.8	4.4	22.1	14.21
CONV	26.6	21.9	34.4	173.5	1.81

FIGURE F.26b COMPUTED ALLOWABLE LOADS, TEST 40/3/20-11E

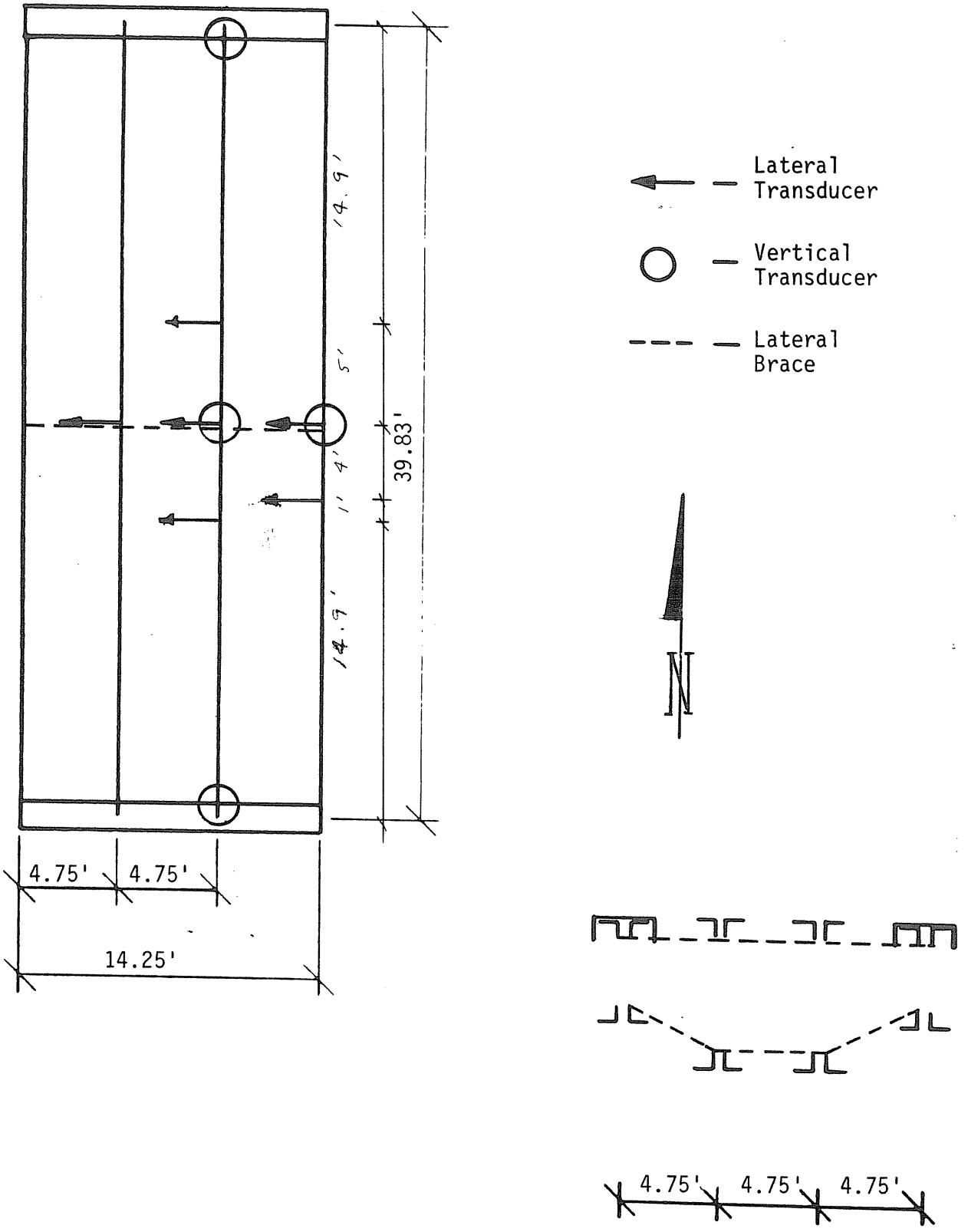
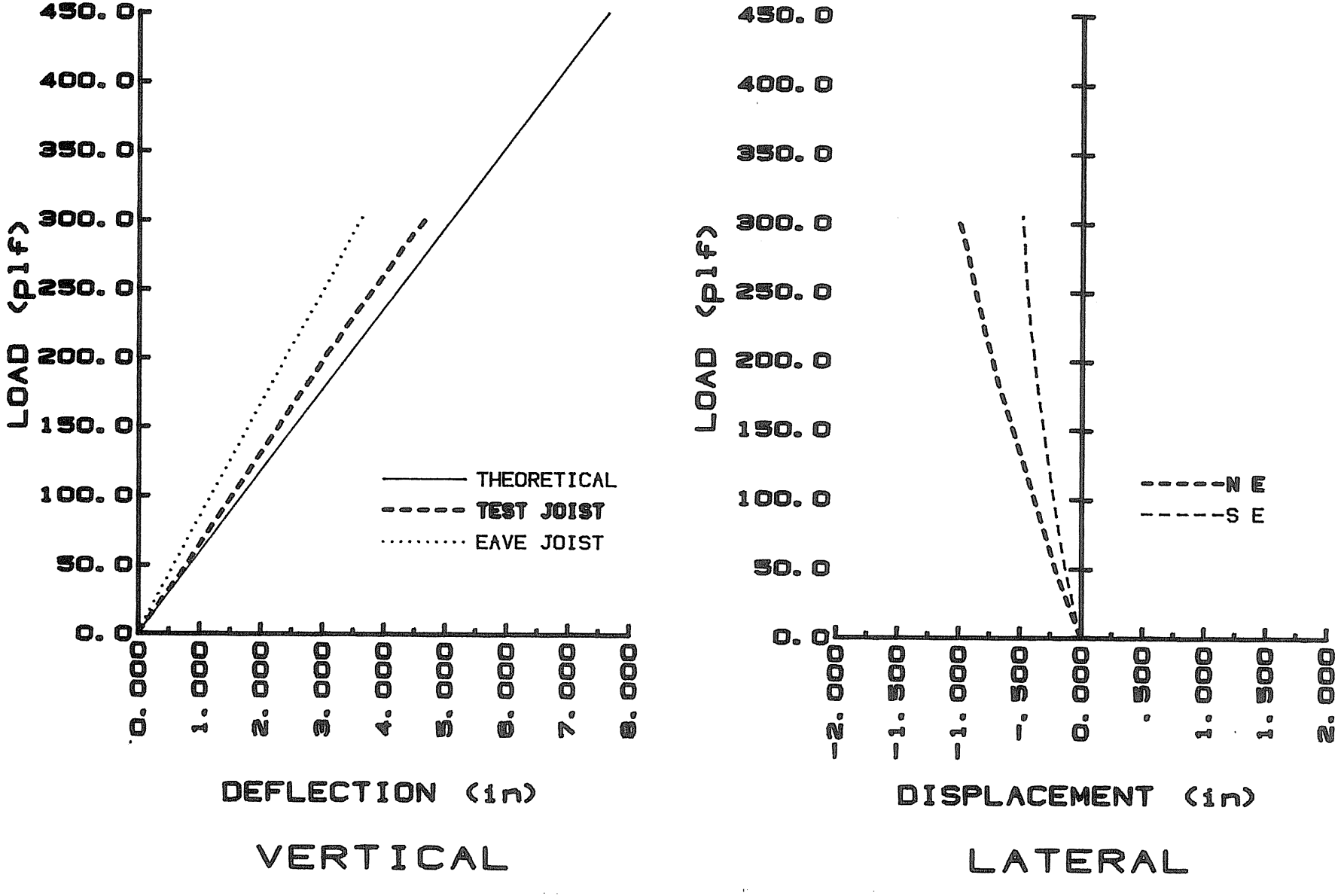


Figure F.27 Plan View of Test Setup, Test 40/3/20-11



C.6

TEST 40/3/40-11

Figure F.28 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/20-12

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 119 Δ" @ 100 plf 1.64

Dead Load of Joist: 4.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 11.1 plf

TEST PARAMETERS:

Span Length: 39.83' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 1 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'

Bottom Chord: 0'

Others: No attachment (except clips) to outside joist from panel.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 10.5

2 Method: SJI Load: 18.2

3 Method: CONV. Load: 130.5

TEST RESULTS:

Failure Mode: Top chord lateral buckling of west joist south of midspan.

Applied Failure Load: 197.6 plf Total Failure Load: 208.7 plf

Load Factor (Failure Load/Service Load) 1. 19.97

2. 11.48

3. 1.60

DISCUSSION:

-Load deflection plot showed good agreement with the predicted.

-The east and west test joists moved laterally together.

Test 40/3/20-12

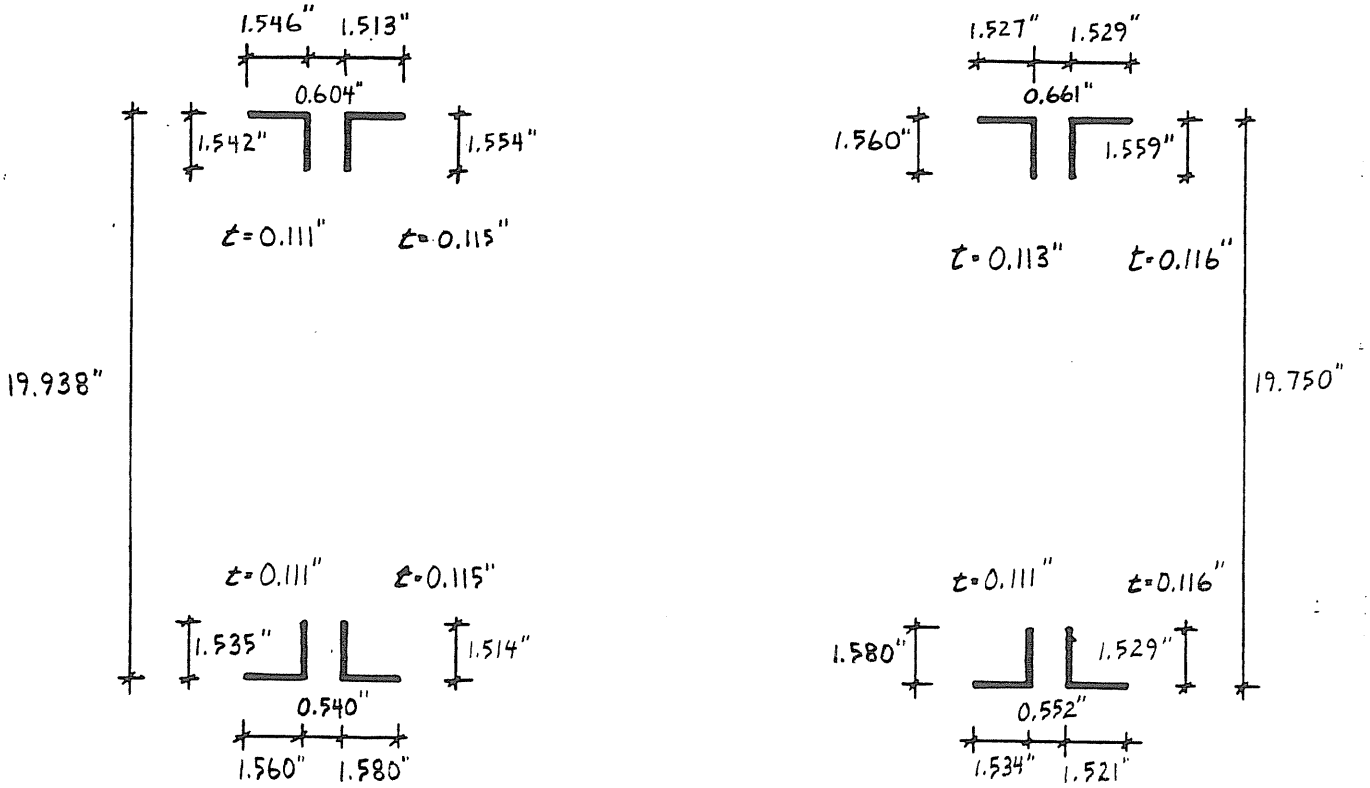


Figure C.1 Cross-Section Properties, Test 40/3/20-12

TEST # 40/3/20-12E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.527	RIGHT HORZ LEG (in) =	1.529
LEFT VER LEG (in) =	1.560	RIGHT VER LEG (in) =	1.559
LEFT THICKNESS (in) =	0.113	RIGHT THICKNESS (in) =	0.116
GAP BETWEEN THE LEGS (in) =	0.661		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.534	RIGHT HORZ LEG (in) =	1.521
LEFT VER LEG (in) =	1.580	RIGHT VER LEG (in) =	1.529
LEFT THICKNESS (in) =	0.111	RIGHT THICKNESS (in) =	0.116
GAP BETWEEN THE LEGS (in) =	0.552		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.161	in^4	Iy =	0.537	in^4
rx =	0.487	in	ry =	0.888	in
A =	0.681	in^2	J =	0.003	in^2
x =	1.868	in	y =	0.437	in

BOTTOM CHORD

Ix =	0.159.	in^4	Iy =	0.479	in^4
rx =	0.486	in	ry =	0.843	in
A =	0.674	in^2	J =	0.003	in^2
x =	1.819	in	y =	0.460	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross = 120.70 (in^4)	# ROWS BRIDGING = 1.00		
JOIST DEPTH = 19.75 (in)	EFF. DEPTH = 18.85 (in.)		
SPAN LENGTH = 39.83 (ft)	DEF @ 100 plf = 1.62 (in)		
BRIDGING SPACING = 20.00 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 107.05		
KL/ry = 270.16	KL/rx = 49.30		
b/t RATIO = 13.81	Q = 0.87		
MEA. YIELD STR. = 57.20 (ksi)	MEA. FAILURE LOAD = 208.70 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	2.0	1.4	2.2	11.0	18.91
SJI	3.4	2.3	3.6	18.2	11.48
CONV	24.4	16.6	26.1	131.8	1.58

FIGURE C.2A COMPUTED ALLOWABLE LOADS, TEST 40/3/20-12E

TEST # 40/3/20-12W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.546	RIGHT HORZ LEG (in) =	1.513
LEFT VER LEG (in) =	1.542	RIGHT VER LEG (in) =	1.554
LEFT THICKNESS (in) =	0.111	RIGHT THICKNESS (in) =	0.115

GAP BETWEEN THE LEGS (in) = 0.604

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.560	RIGHT HORZ LEG (in) =	1.580
LEFT VER LEG (in) =	1.535	RIGHT VER LEG (in) =	1.514
LEFT THICKNESS (in) =	0.111	RIGHT THICKNESS (in) =	0.115

GAP BETWEEN THE LEGS (in) = 0.540

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.156	in^4	Iy =	0.503	in^4
rx =	0.483	in	ry =	0.866	in
A =	0.670	in^2	J =	0.003	in^2
x =	1.852	in	y =	0.425	in

BOTTOM CHORD

Ix =	0.151	in^4	Iy =	0.502	in^4
rx =	0.473	in	ry =	0.863	in
A =	0.674	in^2	J =	0.003	in^2
x =	1.848	in	y =	0.428	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Isross	= 122.67 (in^4)	# ROWS BRIDGING	= 1.00
JOIST DEPTH	= 19.94 (in)	EFF. DEPTH	= 19.08 (in.)
SPAN LENGTH	= 39.83 (ft)	DEF @ 100 plf	= 1.59 (in)
BRIDGING SPACING	= 20.00 (ft)	PANEL LENGTH	= 24.00 (in)
K	= 1.00	C	= 107.31
KL/ry	= 277.07	KL/rx	= 49.69
b/t RATIO	= 13.93	Q	= 0.87
MEA. YIELD STR.	= 57.20 (ksi)	MEA. FAILURE LOAD	= 208.70 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	1.9	1.3	2.1	10.5	19.97
SJI	3.4	2.3	3.6	18.2	11.48
CONV	24.3	16.3	25.9	130.5	1.60

FIGURE C.2b COMPUTED ALLOWABLE LOADS, TEST 40/3/20-12W

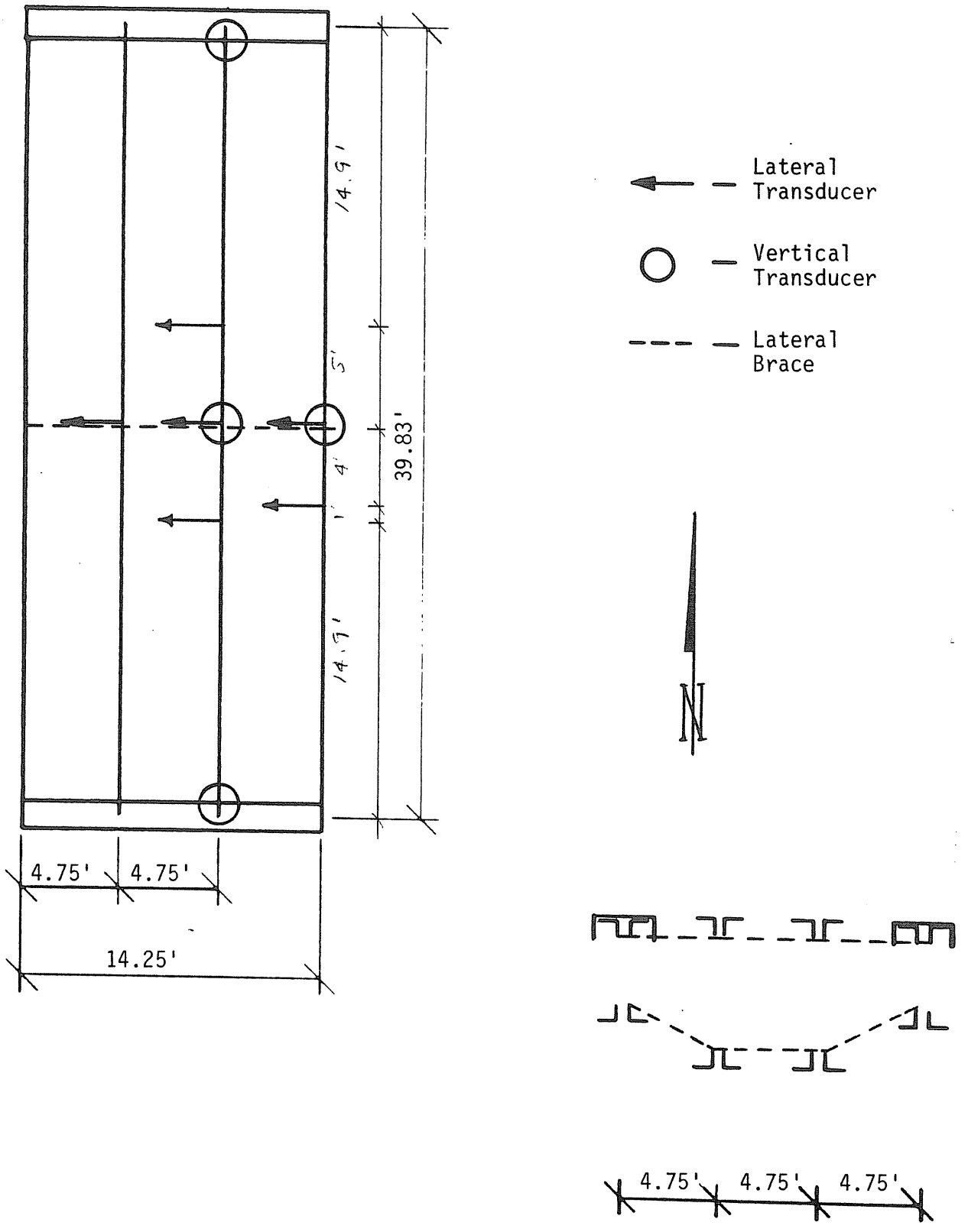
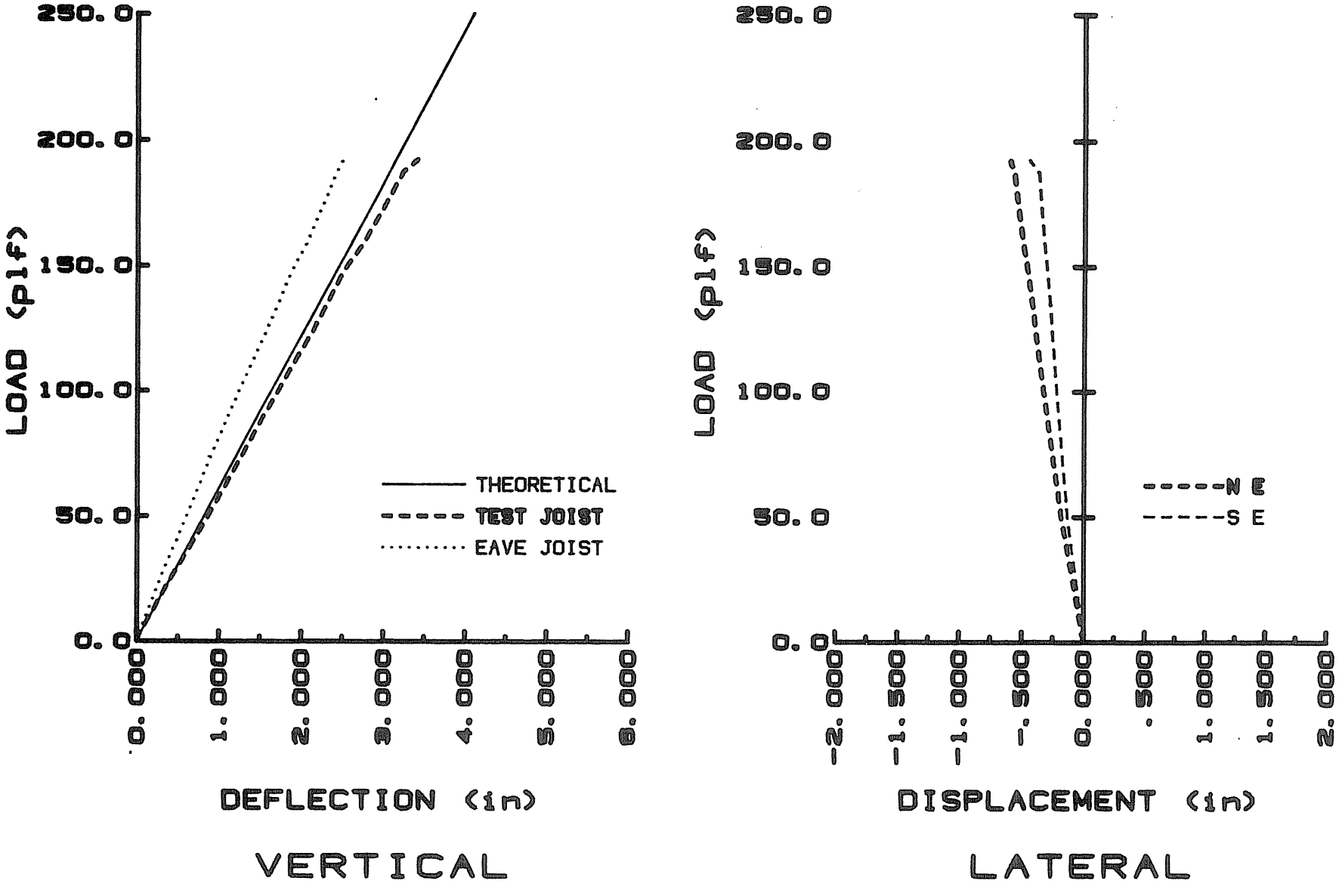


Figure C.3 Plan View of Test Setup, Test 40/3/20-12



TEST 40/3/20-12

Figure C.4 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/20-13

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 119"^{4} Δ" @ 100 plf 1.64

Dead Load of Joist: 4.8 plf Dead Load of Panel: 6.3plf

Total Dead Load: 11.1 plf

TEST PARAMETERS:

Span Length: 39.83' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: No attachment (except clips) to outside joist from panel.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 42.8

2 Method: SJI Load: 65.2

3 Method: CONV. Load: 132.3

TEST RESULTS:

Failure Mode: Top chord lateral buckling 2 ft. north of centerline.

Applied Failure Load: 267 plf Total Failure Load: 278.1 plf

Load Factor (Failure Load/Service Load) 1. 6.50

2. 4.27

3. 2.10

DISCUSSION:

-Load deflection plot showed good agreement with predicted. Toward the end of the test the load deflection plot showed some bottom chord yielding of the test joist.

-The lateral displacement of the east joist 5' north and south of midspan did move together. The south location moved less than the north location.

Test 40/3/25-13

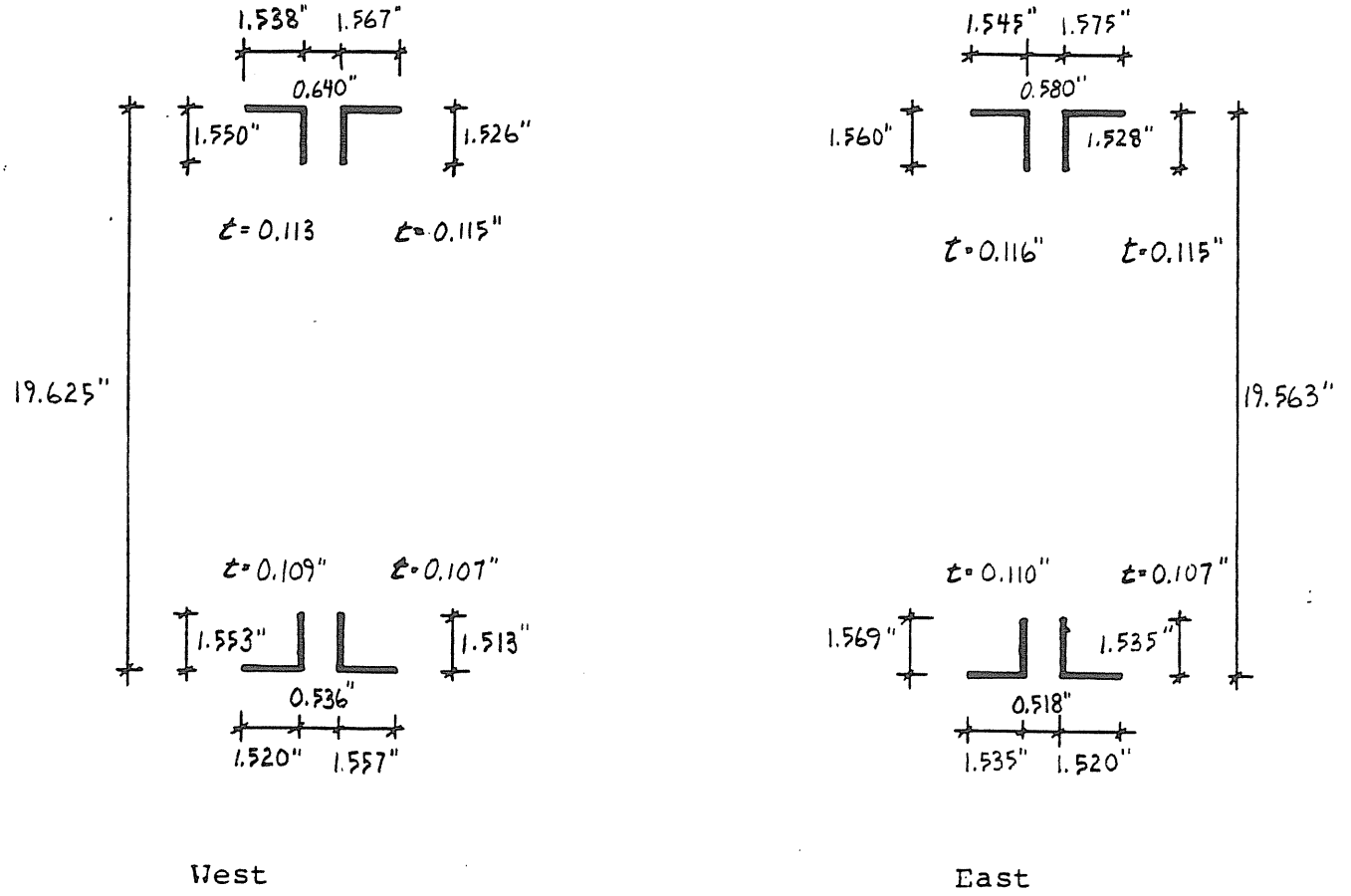


Figure C.5 Cross-Section Properties, Test 40/3/20-13

TEST # 40/3/20-13E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.545	RIGHT HORZ LEG (in) =	1.575
LEFT VER LEG (in) =	1.560	RIGHT VER LEG (in) =	1.528
LEFT THICKNESS (in) =	0.116	RIGHT THICKNESS (in) =	0.115
GAP BETWEEN THE LEGS (in) =	0.580		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.535	RIGHT HORZ LEG (in) =	1.520
LEFT VER LEG (in) =	1.569	RIGHT VER LEG (in) =	1.535
LEFT THICKNESS (in) =	0.110	RIGHT THICKNESS (in) =	0.107
GAP BETWEEN THE LEGS (in) =	0.518		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.159	in^4	Iy =	0.526	in^4
rx =	0.481	in	ry =	0.873	in
A =	0.690	in^2	J =	0.003	in^2
x =	1.839	in	y =	0.443	in

BOTTOM CHORD

Ix =	0.152	in^4	Iy =	0.442	in^4
rx =	0.486	in	ry =	0.828	in
A =	0.645	in^2	J =	0.003	in^2
x =	1.778	in	y =	0.448	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross = 117.09 (in^4)	# ROWS BRIDGING = 3.00		
JOIST DEPTH = 19.56 (in)	EFF. DEPTH = 18.67 (in.)		
SPAN LENGTH = 39.83 (ft)	DEF @ 100 plf = 1.67 (in)		
BRIDGING SPACING = 10.00 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 106.82		
KL/ry = 137.48	KL/rx = 49.94		
b/t RATIO = 13.70	Q = 0.88		
MEA. YIELD STR. = 57.20 (ksi)	MEA. FAILURE LOAD = 278.10 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	7.9	5.5	8.5	42.8	6.50
SJI	12.0	8.3	12.9	65.2	4.27
CONV	24.4	16.9	26.2	132.3	2.10

FIGURE C.6a COMPUTED ALLOWABLE LOADS, TEST 40/3/20-13E

TEST # 40/3/20-13W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.538	RIGHT HORZ LEG (in) =	1.567
LEFT VER LEG (in) =	1.550	RIGHT VER LEG (in) =	1.526
LEFT THICKNESS (in) =	0.113	RIGHT THICKNESS (in) =	0.115
GAP BETWEEN THE LEGS (in) =	0.640		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.520	RIGHT HORZ LEG (in) =	1.557
LEFT VER LEG (in) =	1.553	RIGHT VER LEG (in) =	1.513
LEFT THICKNESS (in) =	0.109	RIGHT THICKNESS (in) =	0.107
GAP BETWEEN THE LEGS (in) =	0.536		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.155	in^4	Iy =	0.543	in^4
rx =	0.479	in	ry =	0.895	in
A =	0.679	in^2	J =	0.003	in^2
x =	1.872	in	y =	0.437	in

BOTTOM CHORD

Ix =	0.147	in^4	Iy =	0.455	in^4
rx =	0.479	in	ry =	0.843	in
A =	0.640	in^2	J =	0.002	in^2
x =	1.791	in	y =	0.443	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross =	116.45 (in^4)	# ROWS BRIDGING =	3.00
JOIST DEPTH =	19.63 (in)	EFF. DEPTH =	18.75 (in.)
SPAN LENGTH =	39.83 (ft)	DEF @ 100 plf =	1.68 (in)
BRIDGING SPACING =	10.00 (ft)	PANEL LENGTH =	24.00 (in)
K =	1.00	C =	106.12
KL/ry =	134.15	KL/rx =	50.14
b/t RATIO =	13.72	Q =	0.87
MEA. YIELD STR. =	58.30 (ksi)	MEA. FAILURE LOAD =	278.10 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	8.3	5.6	8.8	44.4	6.27
SJI	12.6	8.6	13.4	67.4	4.13
CONV	24.7	16.7	26.1	131.9	2.11

FIGURE C.6b COMPUTED ALLOWABLE LOADS, TEST 40/3/20-13W

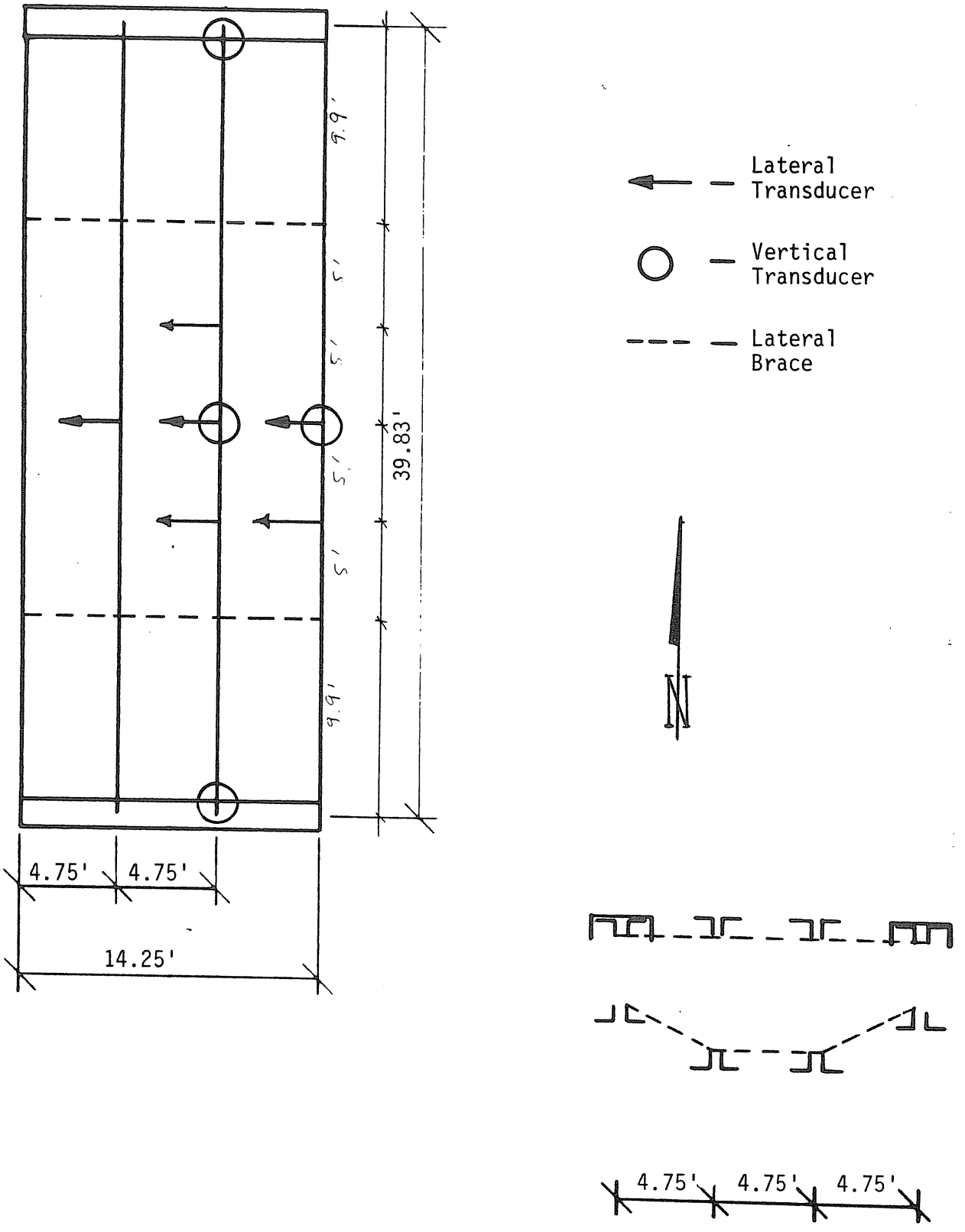


Figure C.7 Plan View of Test Set-up, Test 40/3/20-13

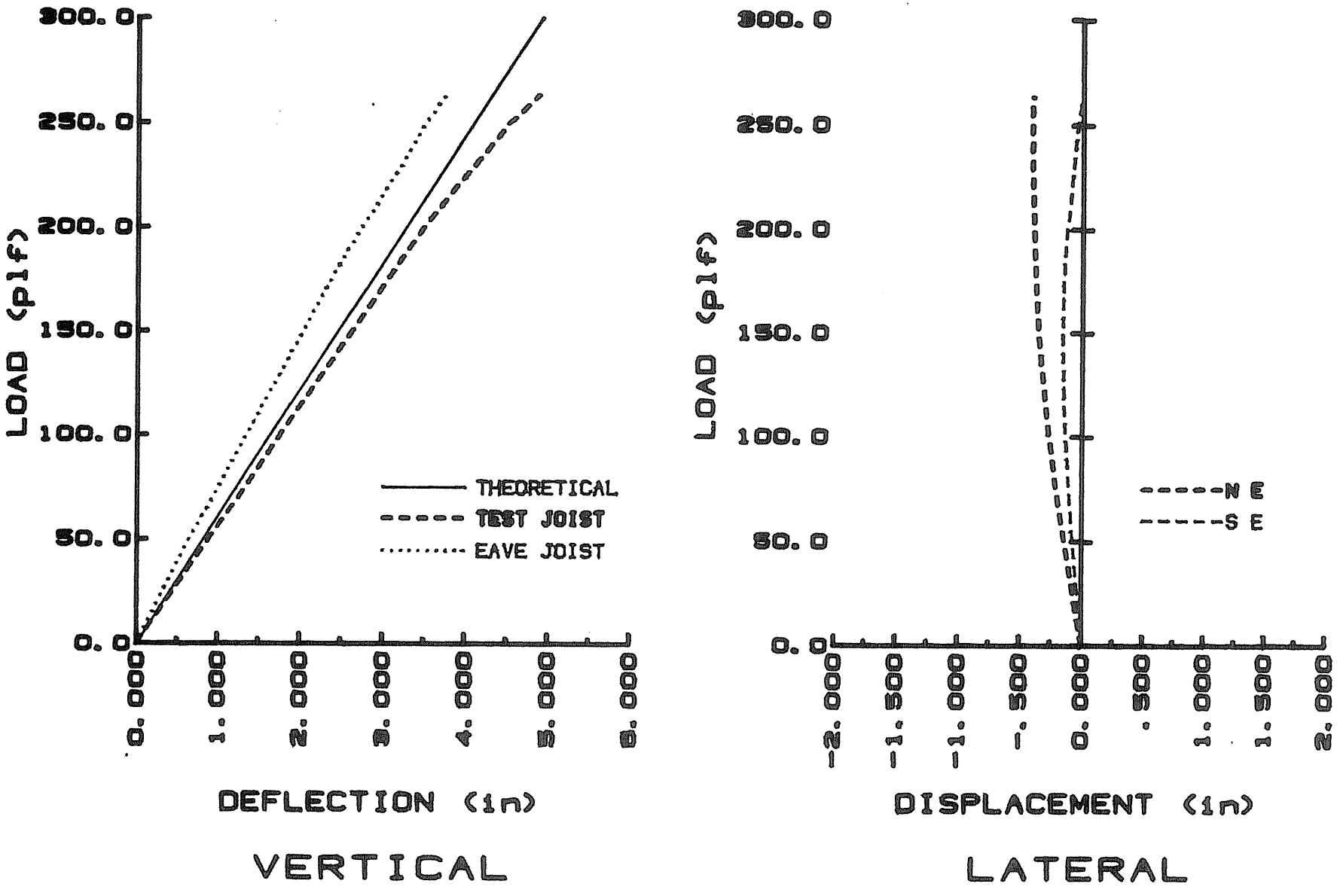


Figure C.8 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/20-14

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 119"^{4} Δ" @ 100 plf 1.64

Dead Load of Joist: 4.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 11.1 plf

TEST PARAMETERS:

Span Length: 39.83' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: No attachment (except clips) to outside joist from panel. Diagonal bracing from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 45.4

2 Method: SJI Load: 65.1

3 Method: CONV. Load: 132.9

TEST RESULTS:

Failure Mode: Top chord lateral buckling 5 ft. north of centerline. (both joists)

Applied Failure Load: 227.1 plf Total Failure Load: 238.2 plf

Load Factor (Failure Load/Service Load) 1. 5.25

2. 3.66

3. 1.79

DISCUSSION:

-Load deflection plot showed good agreement with predicted.

-Lateral displacement of the east joist 5 ft. north and south of midspan showed very little displacement.

Test 40/3/20-14

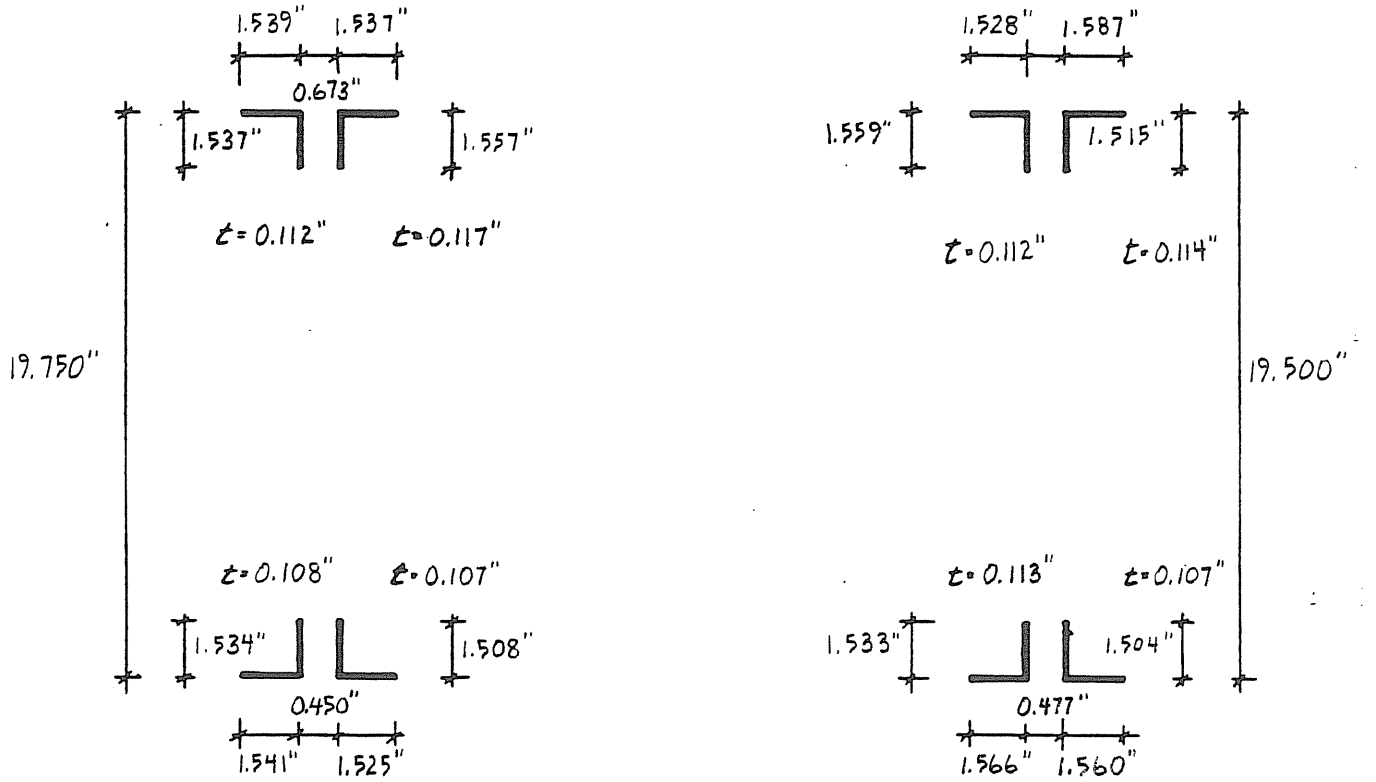


Figure C.9 Cross-Section Properties, Test 40/3/20-14

TEST # 40/3/20-14E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.528	RIGHT HORZ LEG (in) =	1.587
LEFT VER LEG (in) =	1.559	RIGHT VER LEG (in) =	1.515
LEFT THICKNESS (in) =	0.112	RIGHT THICKNESS (in) =	0.114
GAP BETWEEN THE LEGS (in) =	0.673		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.566	RIGHT HORZ LEG (in) =	1.560
LEFT VER LEG (in) =	1.533	RIGHT VER LEG (in) =	1.504
LEFT THICKNESS (in) =	0.113	RIGHT THICKNESS (in) =	0.107
GAP BETWEEN THE LEGS (in) =	0.477		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.154	in^4	Iy =	0.559	in^4
rx =	0.479	in	ry =	0.911	in
A =	0.674	in^2	J =	0.003	in^2
x =	1.887	in	y =	0.446	in

BOTTOM CHORD

Ix =	0.146	in^4	Iy =	0.455	in^4
rx =	0.472	in	ry =	0.834	in
A =	0.654	in^2	J =	0.003	in^2
x =	1.782	in	y =	0.429	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross = 115.52 (in^4)	# ROWS BRIDGING = 3.00		
JOIST DEPTH = 19.50 (in)	EFF. DEPTH = 18.63 (in.)		
SPAN LENGTH = 39.83 (ft)	DEF @ 100 plf = 1.69 (in)		
BRIDGING SPACING = 10.00 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 108.06		
KL/ry = 131.72	KL/rx = 50.13		
b/t RATIO = 13.92	Q = 0.87		
MEA. YIELD STR. = 56.10 (ksi)	MEA. FAILURE LOAD = 238.20 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	8.6	5.8	9.0	45.4	5.25
SJI	12.9	8.7	13.5	67.9	3.51
CONV	23.9	16.1	25.0	126.2	1.89

FIGURE C.10a COMPUTED ALLOWABLE LOADS, TEST 40/3/20-14E

TEST # 40/3/20-14W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.539	RIGHT HORZ LEG (in) =	1.537
LEFT VER LEG (in) =	1.537	RIGHT VER LEG (in) =	1.557
LEFT THICKNESS (in) =	0.112	RIGHT THICKNESS (in) =	0.117
GAP BETWEEN THE LEGS (in) =	0.673		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.541	RIGHT HORZ LEG (in) =	1.525
LEFT VER LEG (in) =	1.534	RIGHT VER LEG (in) =	1.508
LEFT THICKNESS (in) =	0.108	RIGHT THICKNESS (in) =	0.107
GAP BETWEEN THE LEGS (in) =	0.450		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.158	in^4	Iy =	0.551	in^4
rx =	0.482	in	ry =	0.900	in
A =	0.680	in^2	J =	0.003	in^2
x =	1.893	in	y =	0.420	in

BOTTOM CHORD

Ix =	0.143	in^4	Iy =	0.412	in^4
rx =	0.474	in	ry =	0.807	in
A =	0.634	in^2	J =	0.002	in^2
x =	1.757	in	y =	0.431	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 118.05 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 19.75 (in)	EFF. DEPTH	= 18.90	(in.)	
SPAN LENGTH	= 39.83 (ft)	DEF @ 100 plf	= 1.65	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 106.44		
KL/ry	= 133.35	KL/rx	= 49.76		
b/t RATIO	= 13.74	Q	= 0.87		
MEA. YIELD STR.	= 57.90 (ksi)	MEA. FAILURE LOAD	= 238.20	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	8.4	5.7	9.0	45.4	5.25
SJI	12.1	8.2	12.9	65.1	3.66
CONV	24.6	16.7	26.4	132.9	1.79

FIGURE C.10b COMPUTED ALLOWABLE LOADS, TEST 40/3/20-14W

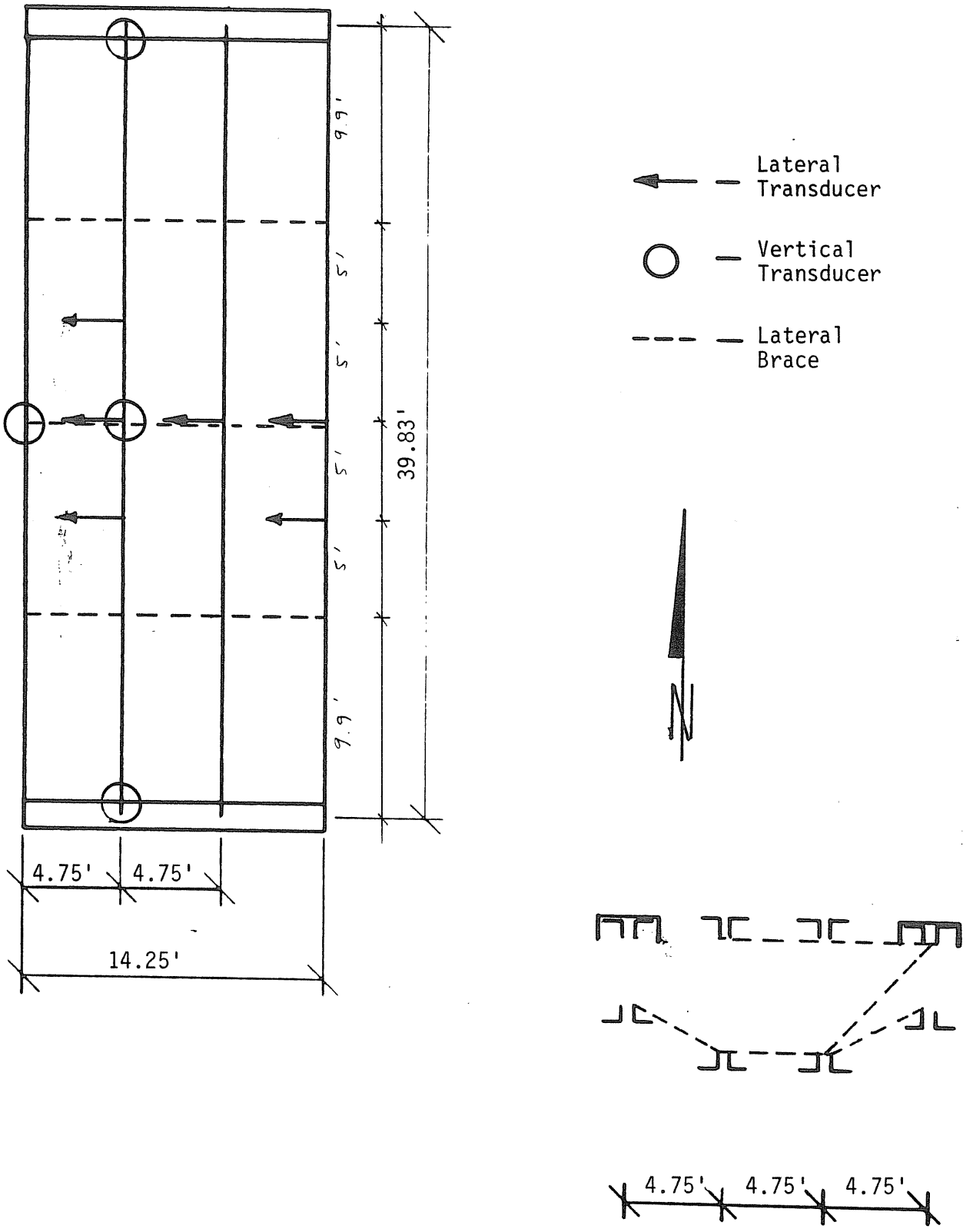
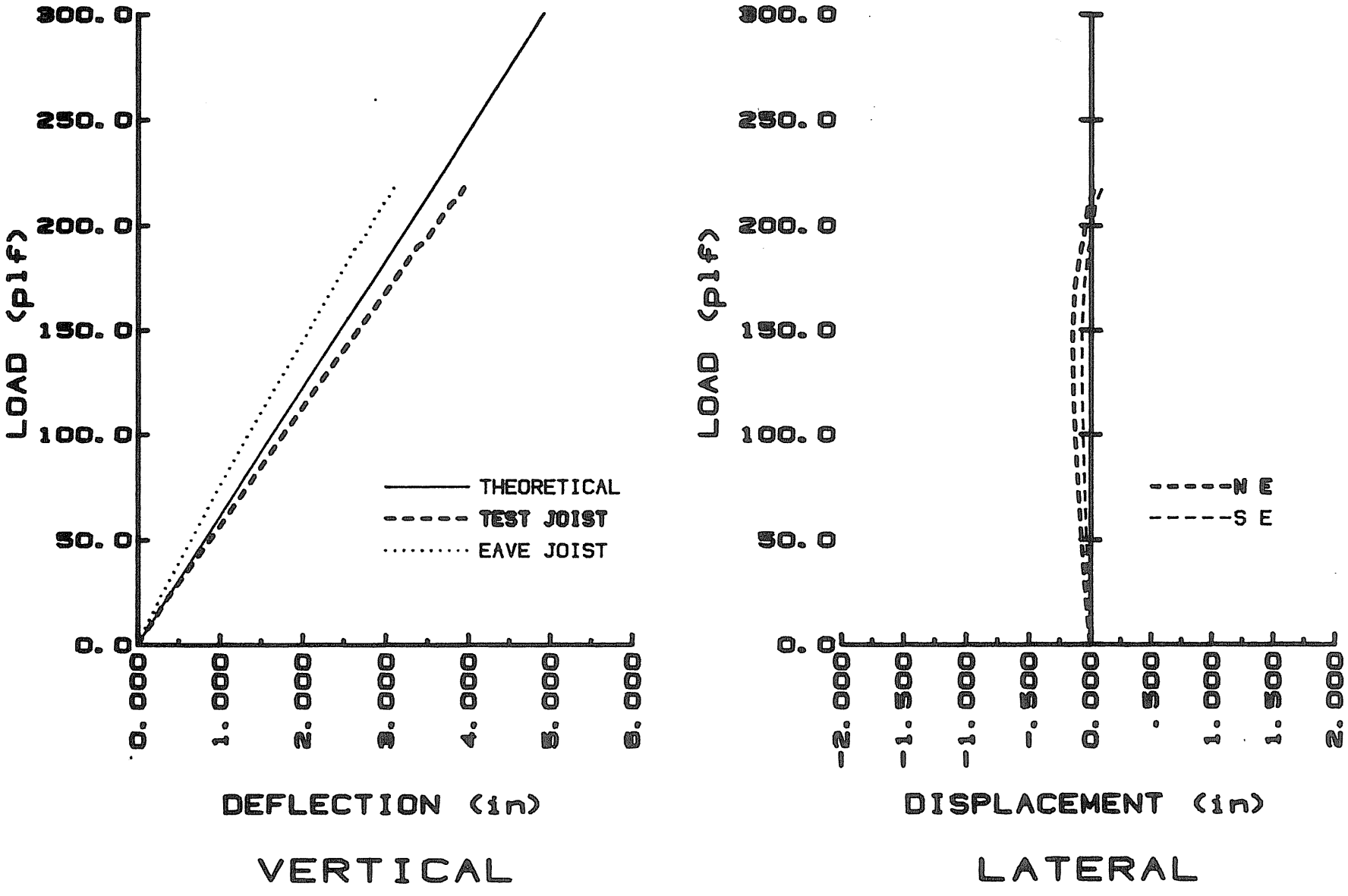


Figure C.11 Plan View of Test Set-up, Test 40/3/20-14



TEST 40/3/20-14

Figure C.12 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/20-15

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 119"^{4} Δ" @ 100 plf 1.64

Dead Load of Joist: 4.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 11.1 plf

TEST PARAMETERS:

Span Length: 39.83' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: East end of panel was attached to channel. Top chord bridging to east channel only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 39.7

2.Method: SJI Load: 68.7

3.Method: CONV. Load: 117.7

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. north of centerline; east joist; centerline west joist.

Applied Failure Load: 256.9 plf Total Failure Load: 268.0 plf

Load Factor (Failure Load/Service Load) 1. 6.76

2. 3.90

3. 2.28

DISCUSSION:

-Load deflection plot showed good agreement with the predicted.

-The lateral displacement of the east joist 5 ft. north and south of midspan moved together about 0.512 in. and 0.70 in. respectively.

Test 40/3/20-15

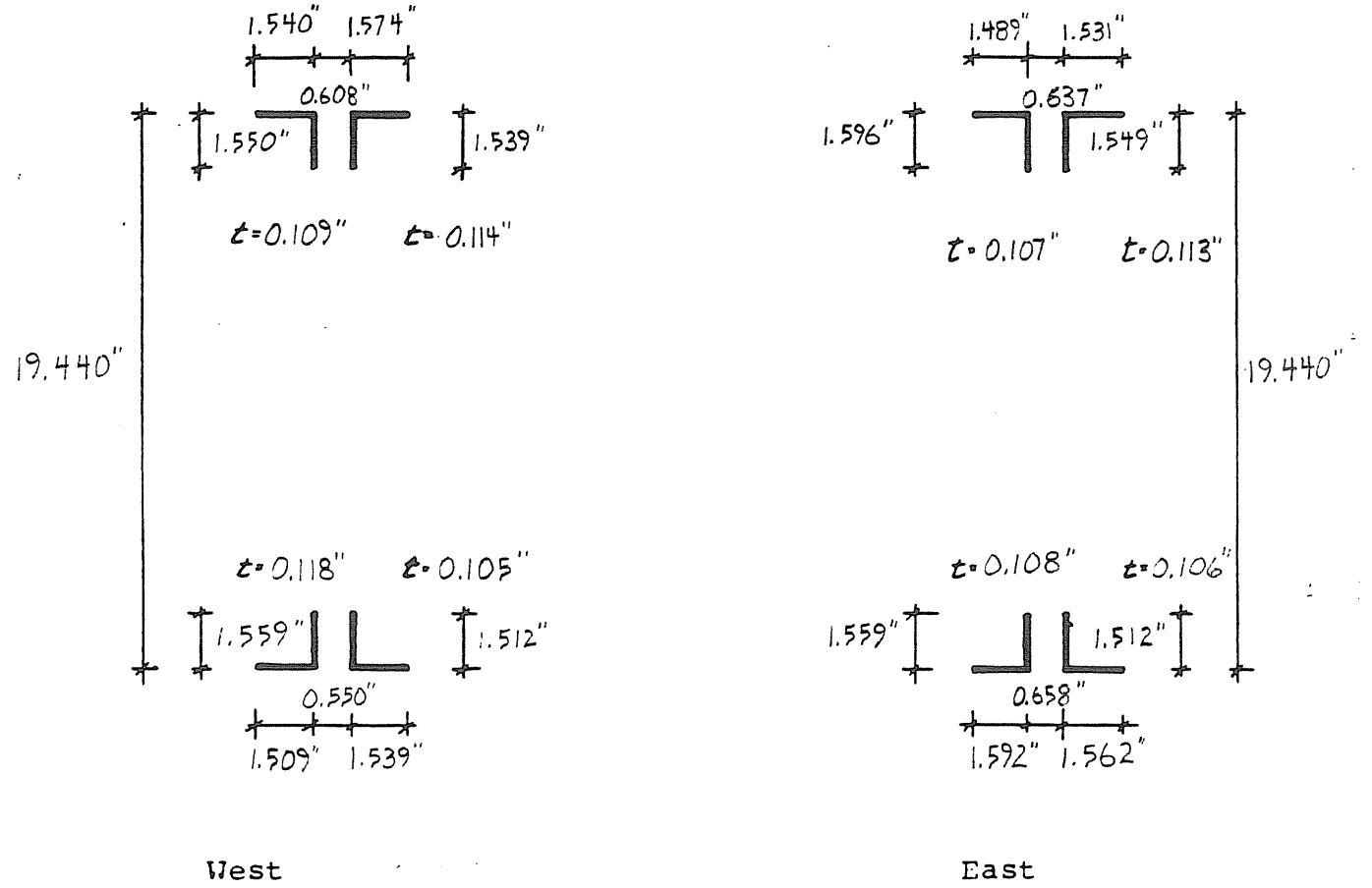


Figure C.13 Cross-Section Properties, Test 40/3/20-15

TEST # 40/3/20-15E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.489	RIGHT HORZ LEG (in) =	1.531
LEFT VER LEG (in) =	1.596	RIGHT VER LEG (in) =	1.549
LEFT THICKNESS (in) =	0.107	RIGHT THICKNESS (in) =	0.113
GAP BETWEEN THE LEGS (in) =	0.637		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.592	RIGHT HORZ LEG (in) =	1.562
LEFT VER LEG (in) =	1.559	RIGHT VER LEG (in) =	1.512
LEFT THICKNESS (in) =	0.108	RIGHT THICKNESS (in) =	0.106
GAP BETWEEN THE LEGS (in) =	0.658		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.159	in^4	Iy =	0.491	in^4
rx =	0.493	in	ry =	0.867	in
A =	0.654	in^2	J =	0.003	in^2
x =	1.838	in	y =	0.466	in

BOTTOM CHORD

Ix =	0.147	in^4	Iy =	0.536	in^4
rx =	0.479	in	ry =	0.913	in
A =	0.643	in^2	J =	0.002	in^2
x =	1.901	in	y =	0.442	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 111.71 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 19.44 (in)	EFF. DEPTH	= 18.53	(in.)	
SPAN LENGTH	= 39.83 (ft)	DEF @ 100 plf	= 1.75	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 110.88		
KL/ry	= 138.46	KL/rx	= 48.66		
b/t RATIO	= 14.92	Q	= 0.85		
MEA. YIELD STR.	= 55.10 (ksi)	MEA. FAILURE LOAD	= 268.00	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	7.8	5.1	7.9	39.7	6.76
SJI	13.5	8.8	13.6	68.7	3.90
CONV	23.1	15.1	23.3	117.7	2.28

FIGURE C.14a COMPUTED ALLOWABLE LOADS, TEST 40/3/20-15E

TEST # 40/3/20-15W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.540	RIGHT HORZ LEG (in) =	1.574
LEFT VER LEG (in) =	1.550	RIGHT VER LEG (in) =	1.539
LEFT THICKNESS (in) =	0.109	RIGHT THICKNESS (in) =	0.114

GAP BETWEEN THE LEGS (in) = 0.608

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.509	RIGHT HORZ LEG (in) =	1.539
LEFT VER LEG (in) =	1.559	RIGHT VER LEG (in) =	1.512
LEFT THICKNESS (in) =	0.118	RIGHT THICKNESS (in) =	0.105

GAP BETWEEN THE LEGS (in) = 0.550

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.154	in^4	Iy =	0.519	in^4
rx =	0.481	in	ry =	0.882	in
A =	0.667	in^2	J =	0.003	in^2
x =	1.871	in	y =	0.431	in

BOTTOM CHORD

Ix =	0.152	in^4	Iy =	0.465	in^4
rx =	0.480	in	ry =	0.841	in
A =	0.657	in^2	J =	0.003	in^2
x =	1.749	in	y =	0.450	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 114.35 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 19.44 (in)	EFF. DEPTH	=	18.56	(in.)
SPAN LENGTH	= 39.83 (ft)	DEF @ 100 plf	=	1.71	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	109.18	
KL/ry	= 136.07	KL/rx	=	49.90	
b/t RATIO	= 14.22	Q	=	0.87	
MEA. YIELD STR.	= 55.40 (ksi)	MEA. FAILURE LOAD	=	268.00	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	8.1	5.4	8.3	41.9	6.39
SJI	12.7	8.5	13.1	65.9	4.07
CONV	23.6	15.7	24.3	122.5	2.19

FIGURE C.14b COMPUTED ALLOWABLE LOADS, TEST 40/3/20-15W

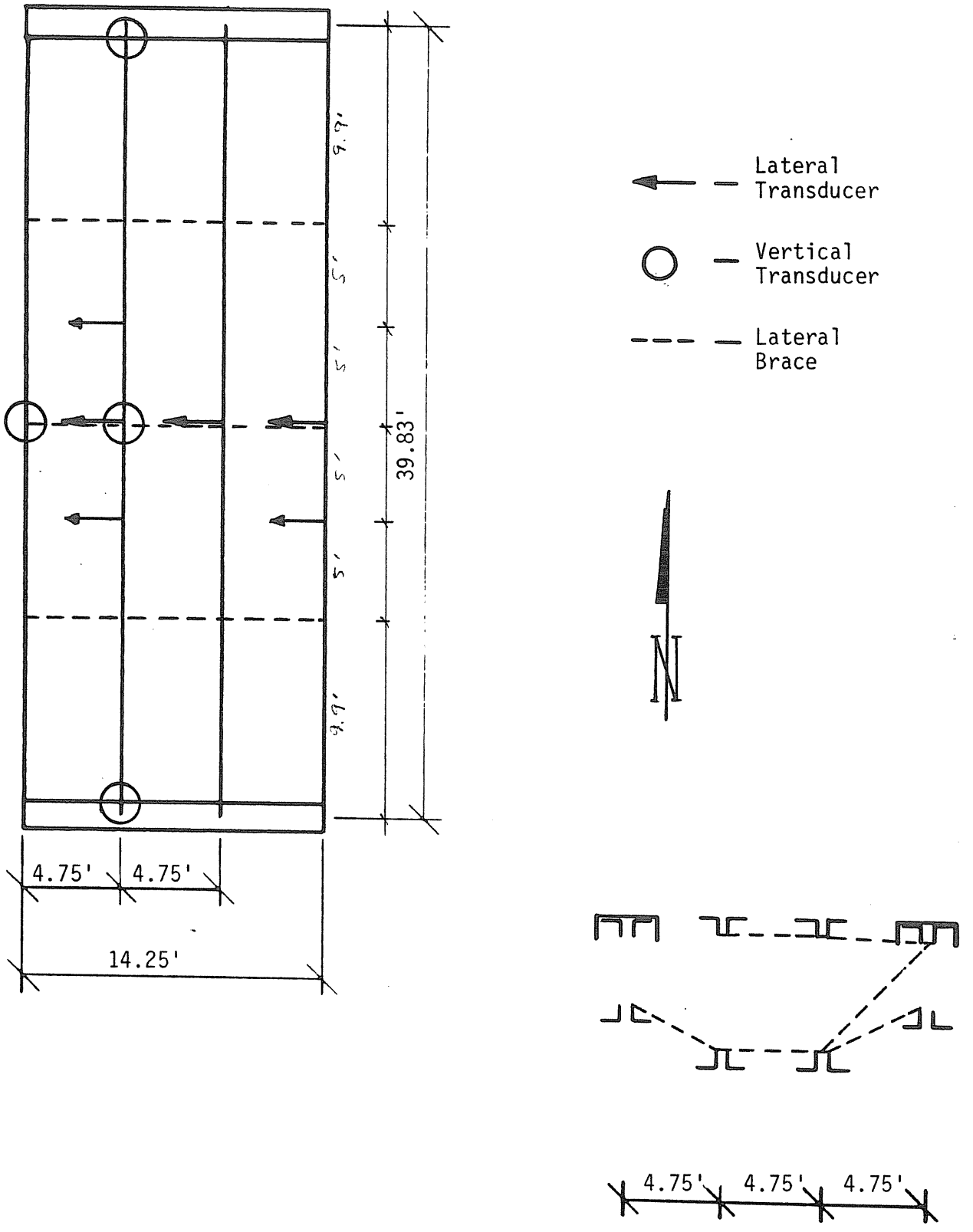


Figure C.15 Plan View of Test Set-up, Test 40/3/20-15

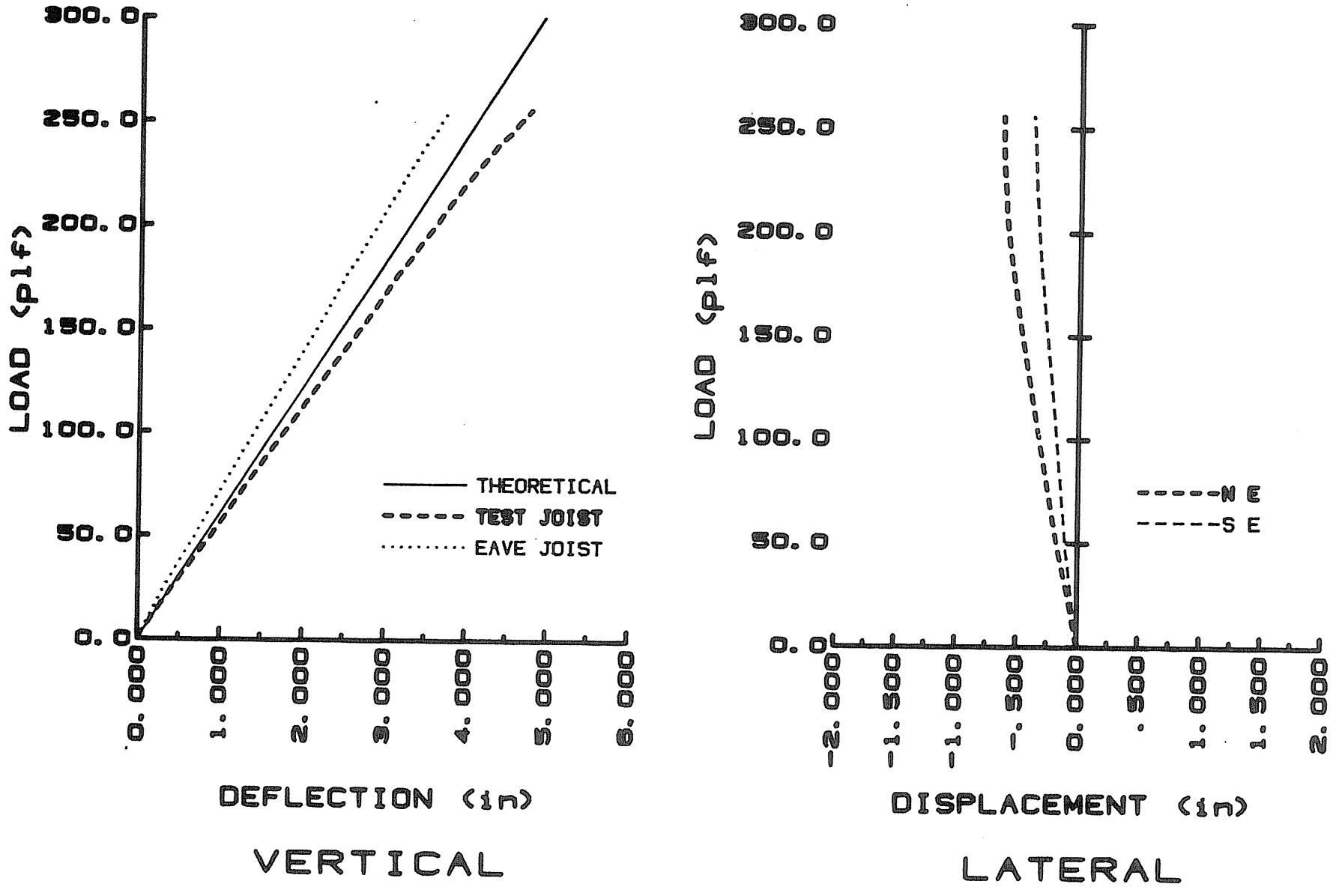


Figure C.16 Applied Load vs. Vertical and Lateral Displacements

APPENDIX D

40 ft. Span, 20 psf ANGLE WEB TEST RESULTS

Test No. 40/3/20-34

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 122.2"^{4} Δ" @ 100 plf 1.61

Dead Load of Joist: 6.1 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 12.4 plf

TEST PARAMETERS:

Span Length: 39.88' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 63.3

2 Method: SJI Load: 91.3

3 Method: CONV. Load: 132.7

TEST RESULTS:

Failure Mode: Shear failure of east outside joist. Top chord lateral buckling of east joist.

Applied Failure Load: 272.5 plf Total Failure Load: 284.9 plf

Load Factor (Failure Load/Service Load) 1. 4.50

2. 3.12

3. 2.15

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-The outside joist was not deflecting with the test joist. There was about an inch difference.

Test 40/3/20-34

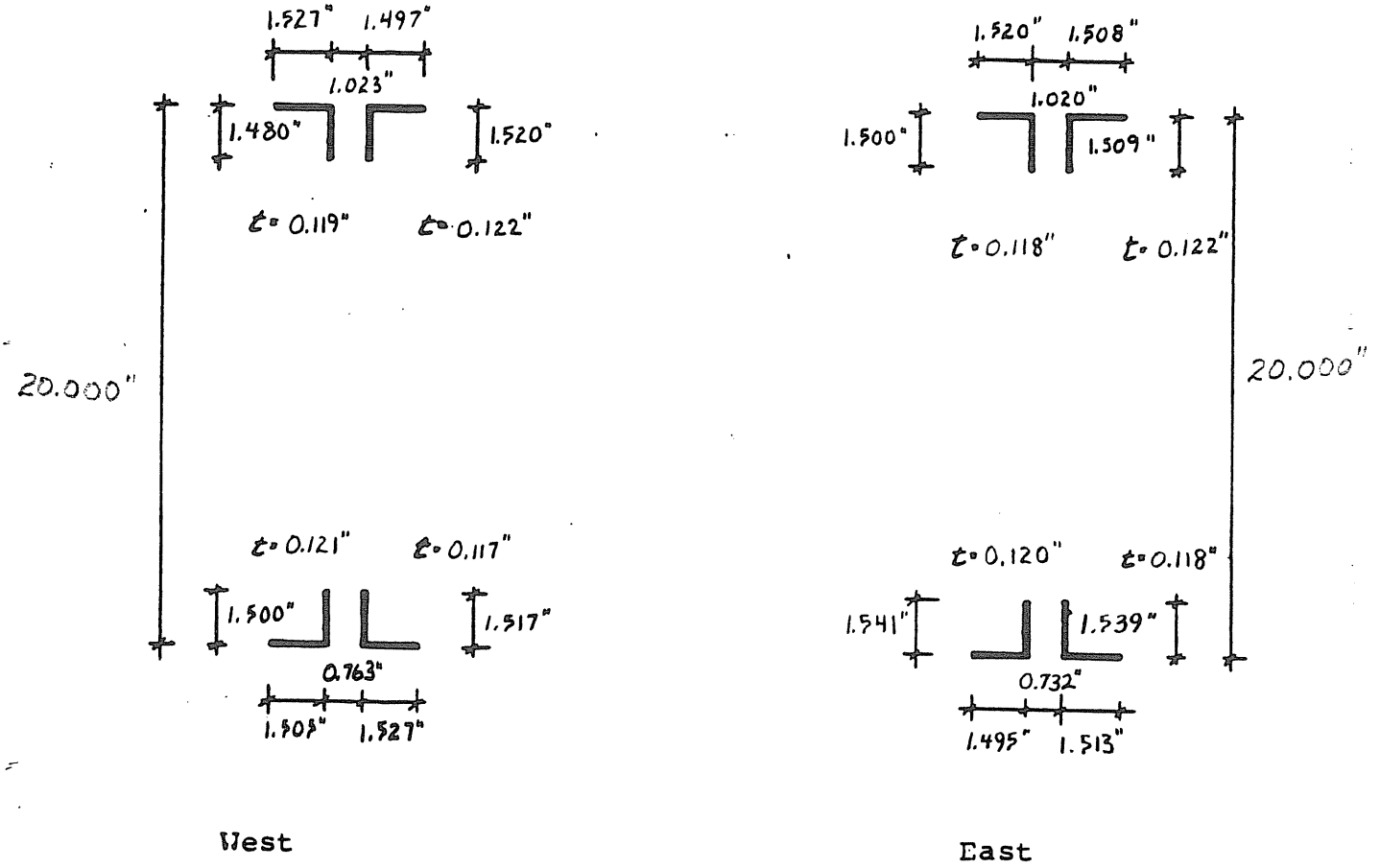


Figure D.1 Cross-Section Properties, Test 40/3/20-34

TEST # 40/3/20-34E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.520	RIGHT HORZ LEG (in) =	1.508
LEFT VER LEG (in) =	1.500	RIGHT VER LEG (in) =	1.509
LEFT THICKNESS (in) =	0.118	RIGHT THICKNESS (in) =	0.122

GAP BETWEEN THE LEGS (in) = 1.020

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.495	RIGHT HORZ LEG (in) =	1.513
LEFT VER LEG (in) =	1.541	RIGHT VER LEG (in) =	1.539
LEFT THICKNESS (in) =	0.120	RIGHT THICKNESS (in) =	0.118

GAP BETWEEN THE LEGS (in) = 0.732

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.152	in^4	Iy =	0.761	in^4
rx =	0.467	in	ry =	1.046	in
A =	0.696	in^2	J =	0.003	in^2
x =	2.042	in	y =	0.415	in

BOTTOM CHORD

Ix =	0.160	in^4	Iy =	0.576	in^4
rx =	0.480	in	ry =	0.910	in
A =	0.696	in^2	J =	0.003	in^2
x =	1.860	in	y =	0.435	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross =	127.92 (in^4)	# ROWS BRIDGING =	3.00
JOIST DEPTH =	20.00 (in)	EFF. DEPTH =	19.15 (in.)
SPAN LENGTH =	39.88 (ft)	DEF @ 100 plf =	1.53 (in)
BRIDGING SPACING =	10.00 (ft)	PANEL LENGTH =	24.00 (in)
K =	1.00	C =	107.99
KL/ry =	114.74	KL/rx =	51.38
b/t RATIO =	12.88	Q =	0.92
MEA. YIELD STR. =	53.40 (ksi)	MEA. FAILURE LOAD =	284.90 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.3	7.9	12.6	63.3	4.50
SJI	16.3	11.4	18.1	91.3	3.12
CONV	23.8	16.5	26.4	132.7	2.15

FIGURE D.2a COMPUTED ALLOWABLE LOADS, TEST 40/3/20-34E

TEST # 40/3/20-34W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.527	RIGHT HORZ LEG (in) =	1.497
LEFT VER LEG (in) =	1.480	RIGHT VER LEG (in) =	1.520
LEFT THICKNESS (in) =	0.119	RIGHT THICKNESS (in) =	0.122
GAP BETWEEN THE LEGS (in) =	1.023		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.505	RIGHT HORZ LEG (in) =	1.527
LEFT VER LEG (in) =	1.500	RIGHT VER LEG (in) =	1.517
LEFT THICKNESS (in) =	0.121	RIGHT THICKNESS (in) =	0.177
GAP BETWEEN THE LEGS (in) =	0.763		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.151	in^4	Iy =	0.764	in^4
rx =	0.466	in	ry =	1.047	in
A =	0.697	in^2	J =	0.003	in^2
x =	2.044	in	y =	0.398	in

BOTTOM CHORD

Ix =	0.185	in^4	Iy =	0.738	in^4
rx =	0.464	in	ry =	0.928	in
A =	0.856	in^2	J =	0.007	in^2
x =	2.051	in	y =	0.423	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Isgross =	147.69 (in^4)	# ROWS BRIDGING =	3.00
JOIST DEPTH =	20.00 (in)	EFF. DEPTH =	19.18 (in.)
SPAN LENGTH =	39.88 (ft)	DEF @ 100 plf =	1.33 (in)
BRIDGING SPACING =	10.00 (ft)	PANEL LENGTH =	24.00 (in)
K =	1.00	C =	107.89
KL/ry =	114.62	KL/rx =	51.49
b/t RATIO =	12.83	Q =	0.92
MEA. YIELD STR. =	53.40 (ksi)	MEA. FAILURE LOAD =	284.90 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.4	7.9	12.7	63.7	4.47
SJI	18.6	13.0	20.7	104.2	2.73
CONV	23.8	16.6	26.5	133.2	2.14

FIGURE D.2d COMPUTED ALLOWABLE LOADS, TEST 40/3/20-34W

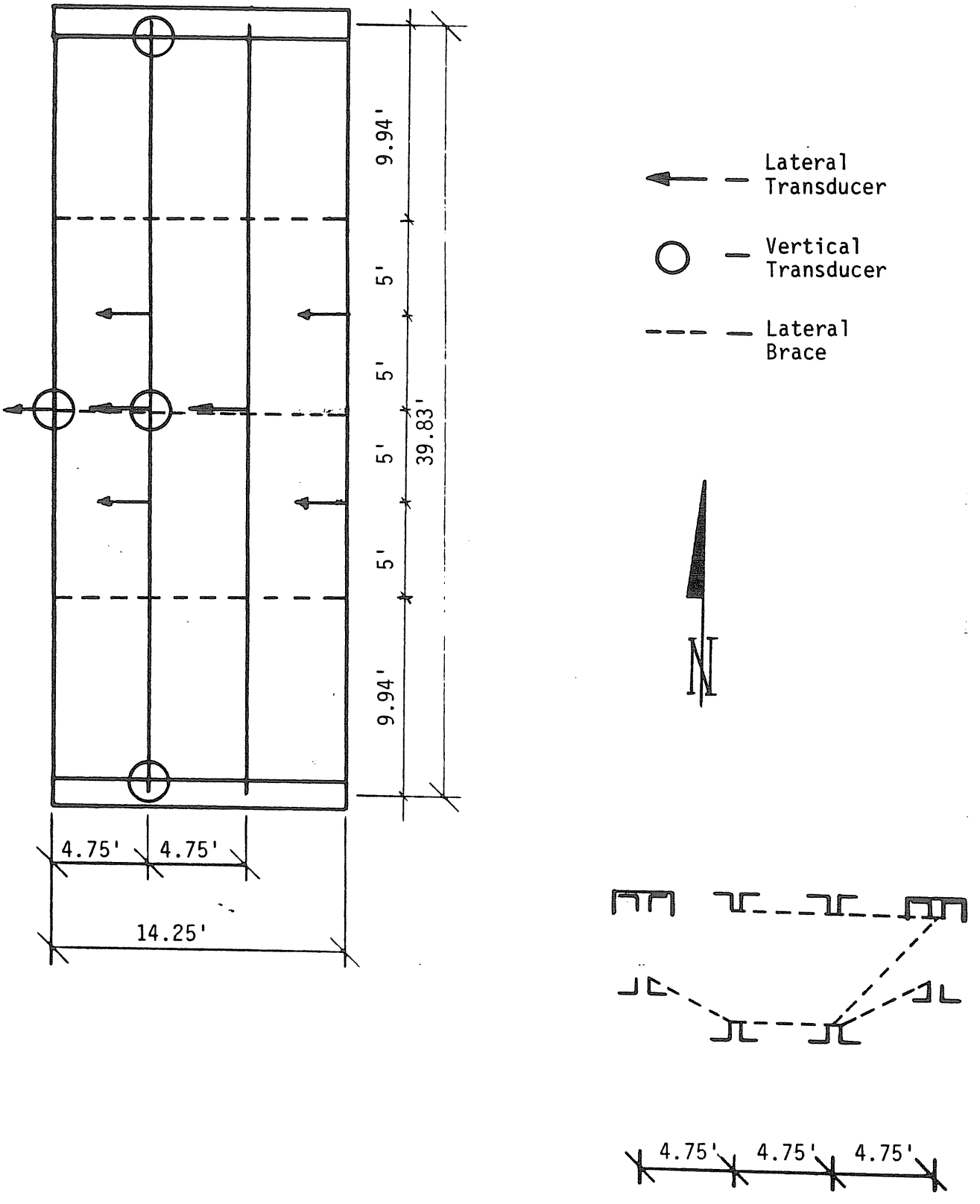
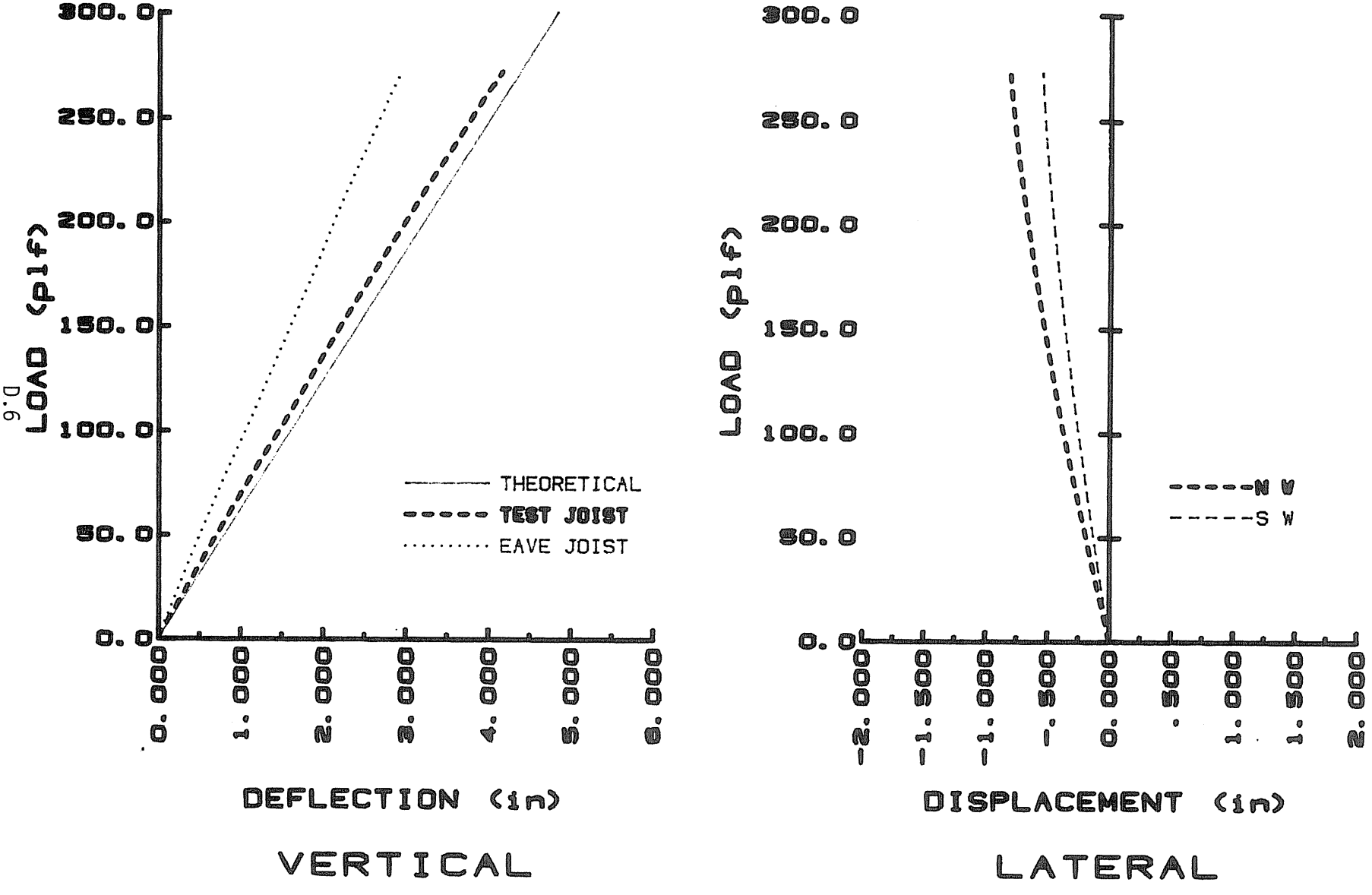


Figure D.3 Plan View of Test Setup, Test 40/3/20-34



40/3/20-34

Figure D.4 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/20-35

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 122.2"^{4} Δ" @ 100 plf 1.61

Dead Load of Joist: 6.1 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 12.4 plf

TEST PARAMETERS:

Span Length: 39.88' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 58.0

2 Method: SJI Load: 84.9

3 Method: CONV. Load: 131.6

TEST RESULTS:

Failure Mode: Top chord lateral buckling of both joists 2 ft. north of centerline.

Applied Failure Load: 223.5 plf Total Failure Load: 235.9 plf

Load Factor (Failure Load/Service Load) 1. 4.07

2. 2.78

3. 1.78

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

Test 40/3/20-35

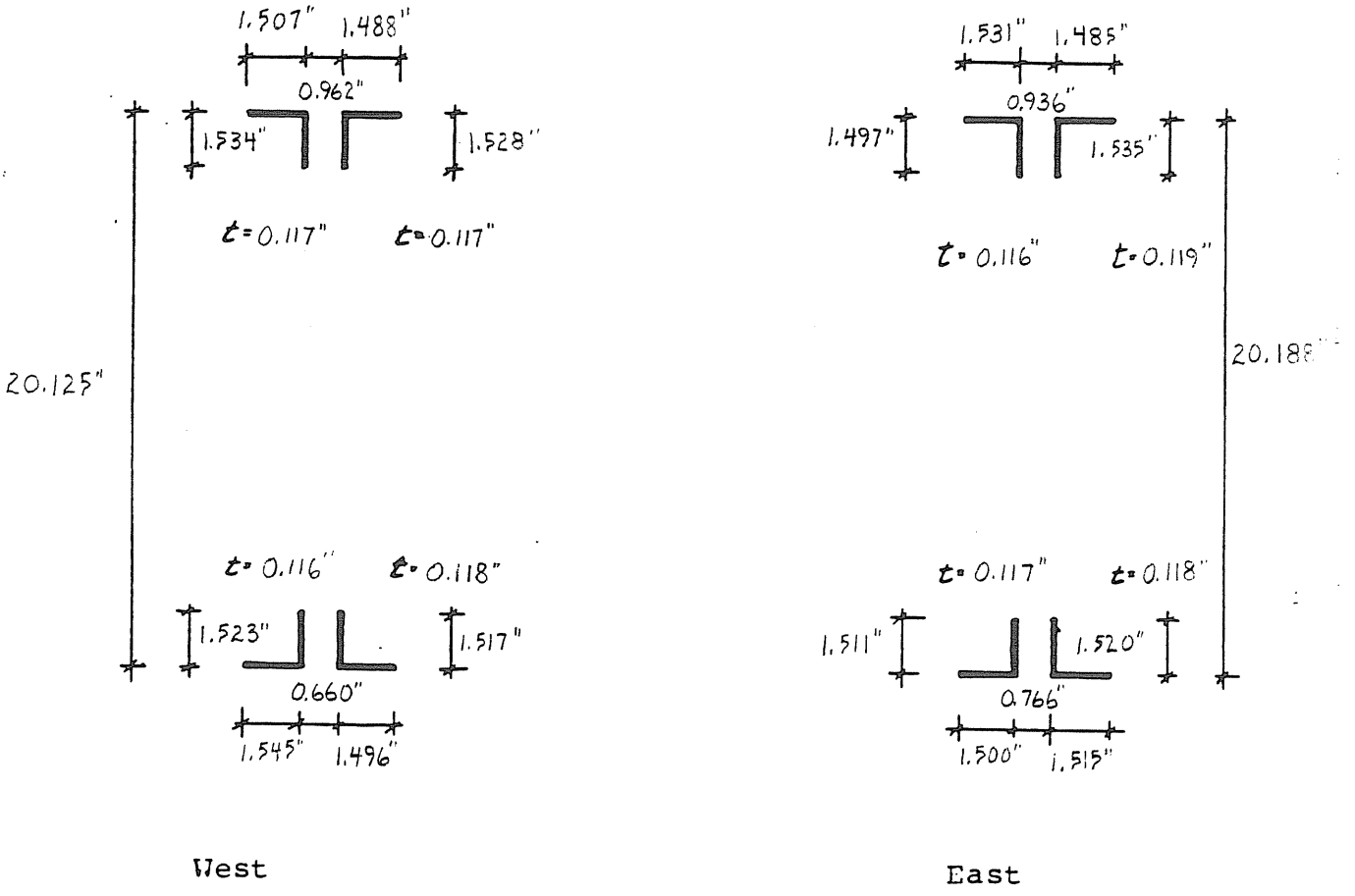


Figure D.5 Cross-Section Properties, Test 40/3/20-35

TEST # 40/3/20-35E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.531	RIGHT HORZ LEG (in) =	1.485
LEFT VER LEG (in) =	1.497	RIGHT VER LEG (in) =	1.535
LEFT THICKNESS (in) =	0.116	RIGHT THICKNESS (in) =	0.119
GAP BETWEEN THE LEGS (in) =	0.936		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.500	RIGHT HORZ LEG (in) =	1.515
LEFT VER LEG (in) =	1.511	RIGHT VER LEG (in) =	1.520
LEFT THICKNESS (in) =	0.117	RIGHT THICKNESS (in) =	0.118
GAP BETWEEN THE LEGS (in) =	0.766		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.152	in^4	Iy =	0.688	in^4
rx =	0.472	in	ry =	1.004	in
A =	0.683	in^2	J =	0.003	in^2
x =	1.998	in	y =	0.404	in

BOTTOM CHORD

Ix =	0.152	in^4	Iy =	0.589	in^4
rx =	0.472	in	ry =	0.929	in
A =	0.683	in^2	J =	0.003	in^2
x =	1.892	in	y =	0.419	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 128.35 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 20.19 (in)	EFF. DEPTH	= 19.36	(in.)	
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 1.53	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 109.07		
KL/ry	= 119.57	KL/rx	= 50.82		
b/t RATIO	= 13.20	Q	= 0.91		
MEA. YIELD STR.	= 52.80 (ksi)	MEA. FAILURE LOAD	= 235.90	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	10.4	7.1	11.5	57.9	4.07
SJI	16.0	10.9	17.6	88.7	2.66
CONV	23.5	16.0	25.9	130.0	1.81

FIGURE D.6a COMPUTED ALLOWABLE LOADS, TEST 40/3/20-35E

TEST # 40/3/20-35W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.507	RIGHT HORZ LEG (in) =	1.488
LEFT VER LEG (in) =	1.534	RIGHT VER LEG (in) =	1.528
LEFT THICKNESS (in) =	0.117	RIGHT THICKNESS (in) =	0.117
GAP BETWEEN THE LEGS (in) =	0.962		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.545	RIGHT HORZ LEG (in) =	1.496
LEFT VER LEG (in) =	1.523	RIGHT VER LEG (in) =	1.517
LEFT THICKNESS (in) =	0.116	RIGHT THICKNESS (in) =	0.118
GAP BETWEEN THE LEGS (in) =	0.660		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.155	in^4	Iy =	0.692	in^4
rx =	0.477	in	ry =	1.008	in
A =	0.681	in^2	J =	0.003	in^2
x =	1.981	in	y =	0.433	in

BOTTOM CHORD

Ix =	0.153	in^4	Iy =	0.541	in^4
rx =	0.473	in	ry =	0.890	in
A =	0.684	in^2	J =	0.003	in^2
x =	1.866	in	y =	0.426	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 127.00 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 20.13 (in)	EFF. DEPTH	= 19.27	(in.)	
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 1.55	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 108.05		
KL/ry	= 119.06	KL/rx	= 50.27		
b/t RATIO	= 13.11	Q	= 0.91		
MEA. YIELD STR.	= 53.90 (ksi)	MEA. FAILURE LOAD	= 235.90	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	10.5	7.2	11.5	58.0	4.07
SJI	15.4	10.5	16.9	84.9	2.78
CONV	23.9	16.3	26.2	131.6	1.79

FIGURE D.6b COMPUTED ALLOWABLE LOADS, TEST 40/3/20-35W

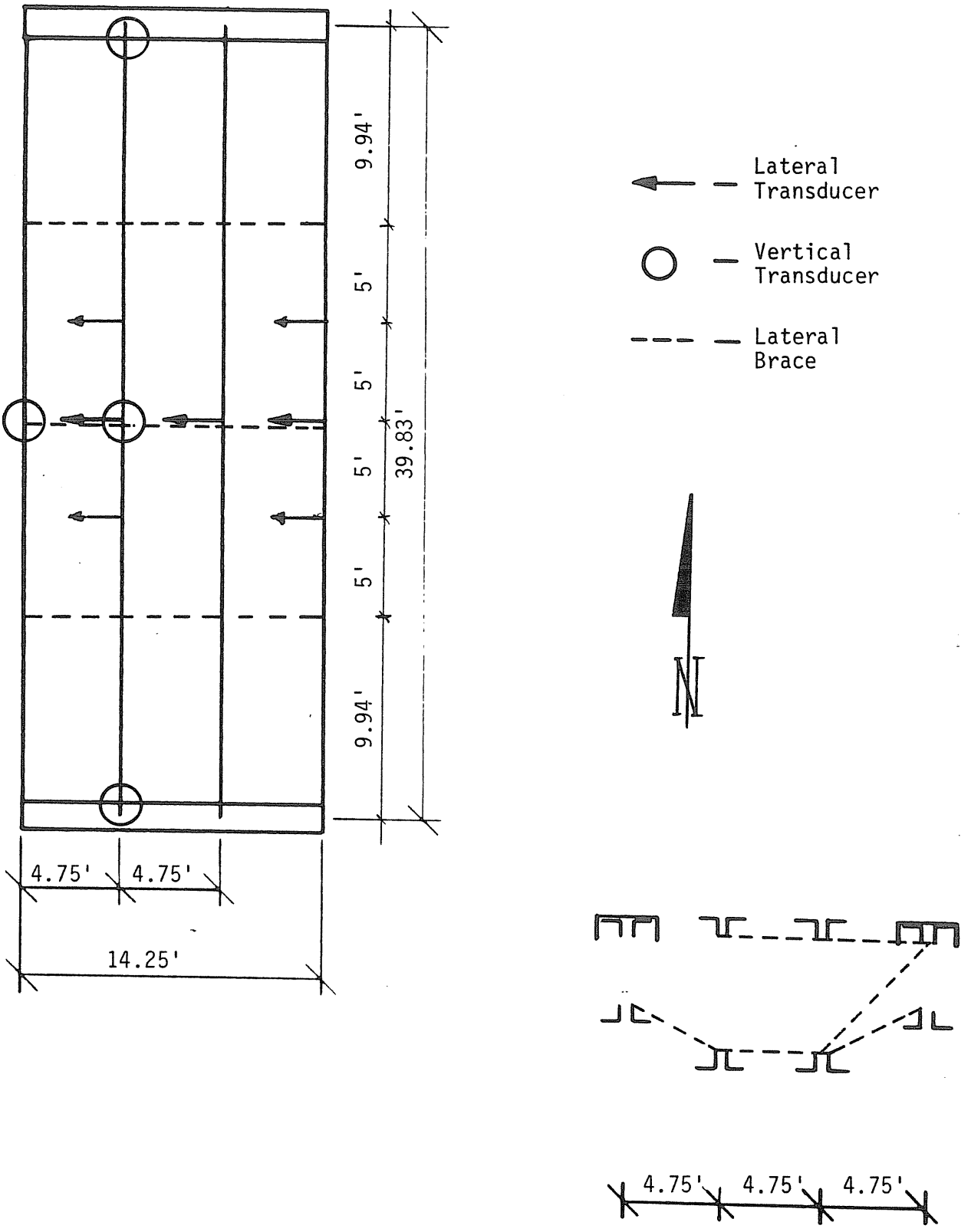
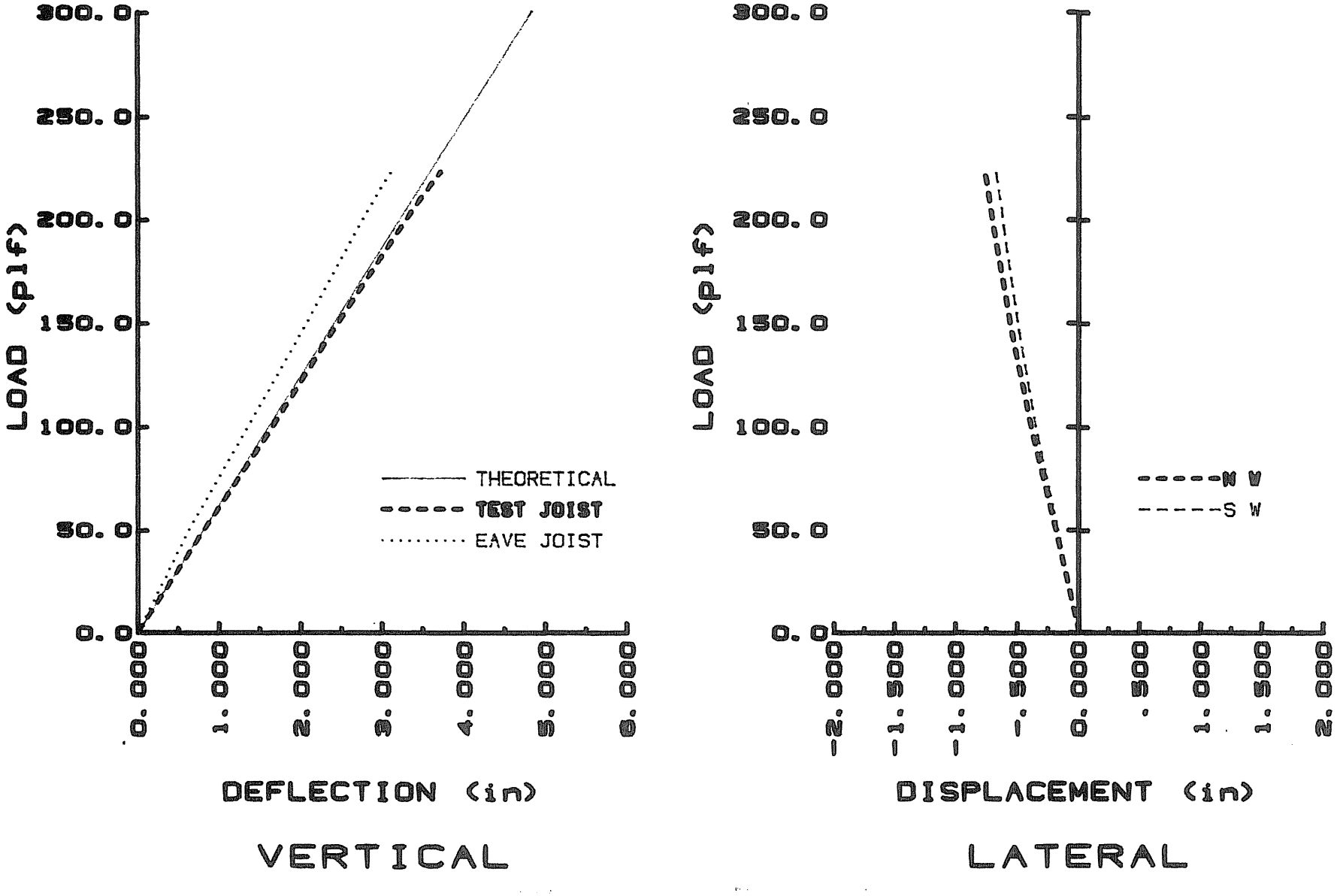


Figure D.7 Plan View of Test Setup, Test 40/3/20-35 ·



40/3/20-35

Figure D.8 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/20-36

JOIST DESCRIPTION:

Joist Type: 20H122 Load: 20 (psf)

Moment of Inertia: 122.2"^{4} Δ" @ 100 plf 1.61

Dead Load of Joist: 6.1 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 12.4 plf

TEST PARAMETERS:

Span Length: 39.88' Spacing: 4.75'

Clip Type: 3" Insulation yes 6"

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 63.2

2 Method: SJI Load: 97.0

3 Method: CONV. Load: 136.2

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. north of centerline of west joist.

Applied Failure Load: 242.1 plf Total Failure Load: 254.5 plf

Load Factor (Failure Load/Service Load) 1. 4.03

2. 2.62

3. 1.87

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

Test 40/3/20-36

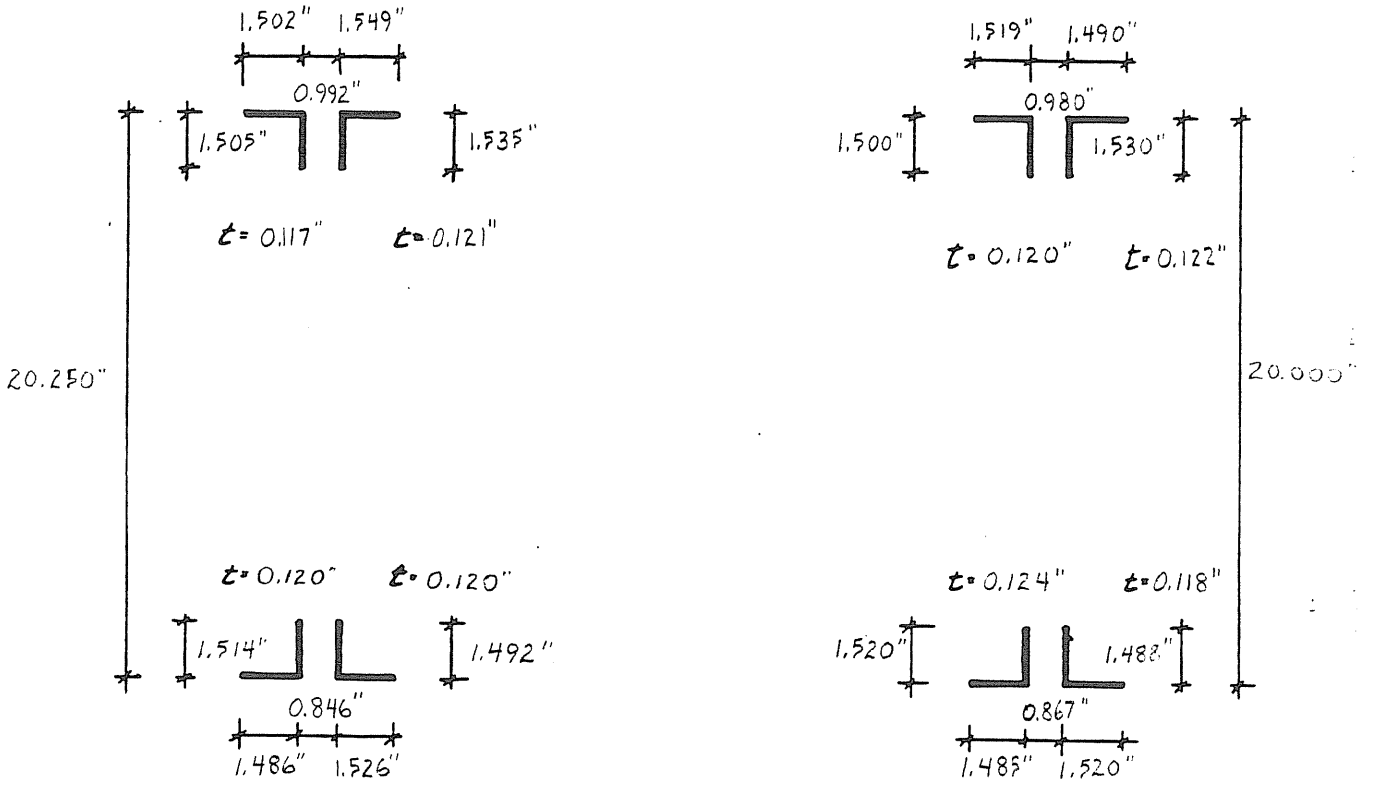


Figure D.9 Cross-Section Properties, Test 40/3/20-36

TEST # 40/3/20-36E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.519	RIGHT HORZ LEG (in) =	1.490
LEFT VER LEG (in) =	1.500	RIGHT VER LEG (in) =	1.530
LEFT THICKNESS (in) =	0.120	RIGHT THICKNESS (in) =	0.122
GAP BETWEEN THE LEGS (in) =	0.980		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.485	RIGHT HORZ LEG (in) =	1.520
LEFT VER LEG (in) =	1.520	RIGHT VER LEG (in) =	1.488
LEFT THICKNESS (in) =	0.124	RIGHT THICKNESS (in) =	0.118
GAP BETWEEN THE LEGS (in) =	0.867		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.156	in^4	Iy =	0.733	in^4
rx =	0.471	in	ry =	1.022	in
A =	0.701	in^2	J =	0.003	in^2
x =	2.009	in	y =	0.410	in

BOTTOM CHORD

Ix =	0.153	in^4	Iy =	0.661	in^4
rx =	0.468	in	ry =	0.973	in
A =	0.698	in^2	J =	0.003	in^2
x =	1.906	in	y =	0.437	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 128.68 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 20.00 (in)	EFF. DEPTH	= 19.15	(in.)	
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 1.53	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 106.27		
KL/ry	= 117.37	KL/rx	= 50.92		
b/t RATIO	= 12.66	Q	= 0.92		
MEA. YIELD STR.	= 55.10 (ksi)	MEA. FAILURE LOAD	= 254.50	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	10.8	7.6	12.1	61.0	4.17
SJI	17.0	11.9	19.1	95.9	2.65
CONV	24.5	17.2	27.4	137.9	1.85

FIGURE D.10a COMPUTED ALLOWABLE LOADS, TEST 40/3/20-36E

TEST # 40/3/20-36W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.502	RIGHT HORZ LEG (in) =	1.549
LEFT VER LEG (in) =	1.505	RIGHT VER LEG (in) =	1.535
LEFT THICKNESS (in) =	0.117	RIGHT THICKNESS (in) =	0.121

GAP BETWEEN THE LEGS (in) = 0.992

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.486	RIGHT HORZ LEG (in) =	1.526
LEFT VER LEG (in) =	1.514	RIGHT VER LEG (in) =	1.492
LEFT THICKNESS (in) =	0.120	RIGHT THICKNESS (in) =	0.120

GAP BETWEEN THE LEGS (in) = 0.846

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.156	in^4	Iy =	0.749	in^4
rx =	0.473	in	ry =	1.037	in
A =	0.697	in^2	J =	0.003	in^2
x =	2.033	in	y =	0.408	in

BOTTOM CHORD

Ix =	0.151	in^4	Iy =	0.646	in^4
rx =	0.467	in	ry =	0.965	in
A =	0.693	in^2	J =	0.003	in^2
x =	1.921	in	y =	0.431	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 131.25 (in^4)	# ROWS BRIDGING	= 3.00
JOIST DEPTH	= 20.25 (in)	EFF. DEPTH	= 19.41 (in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 1.50 (in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00 (in)
K	= 1.00	C	= 107.57
KL/ry	= 115.75	KL/rx	= 50.77
b/t RATIO	= 12.86	Q	= 0.92
MEA. YIELD STR.	= 53.90 (ksi)	MEA. FAILURE LOAD	= 254.50 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.1	7.8	12.6	63.2	4.03
SJI	17.1	11.9	19.3	97.0	2.62
CONV	24.0	16.7	27.1	136.1	1.87

FIGURE D.10b COMPUTED ALLOWABLE LOADS, TEST 40/3/20-36W

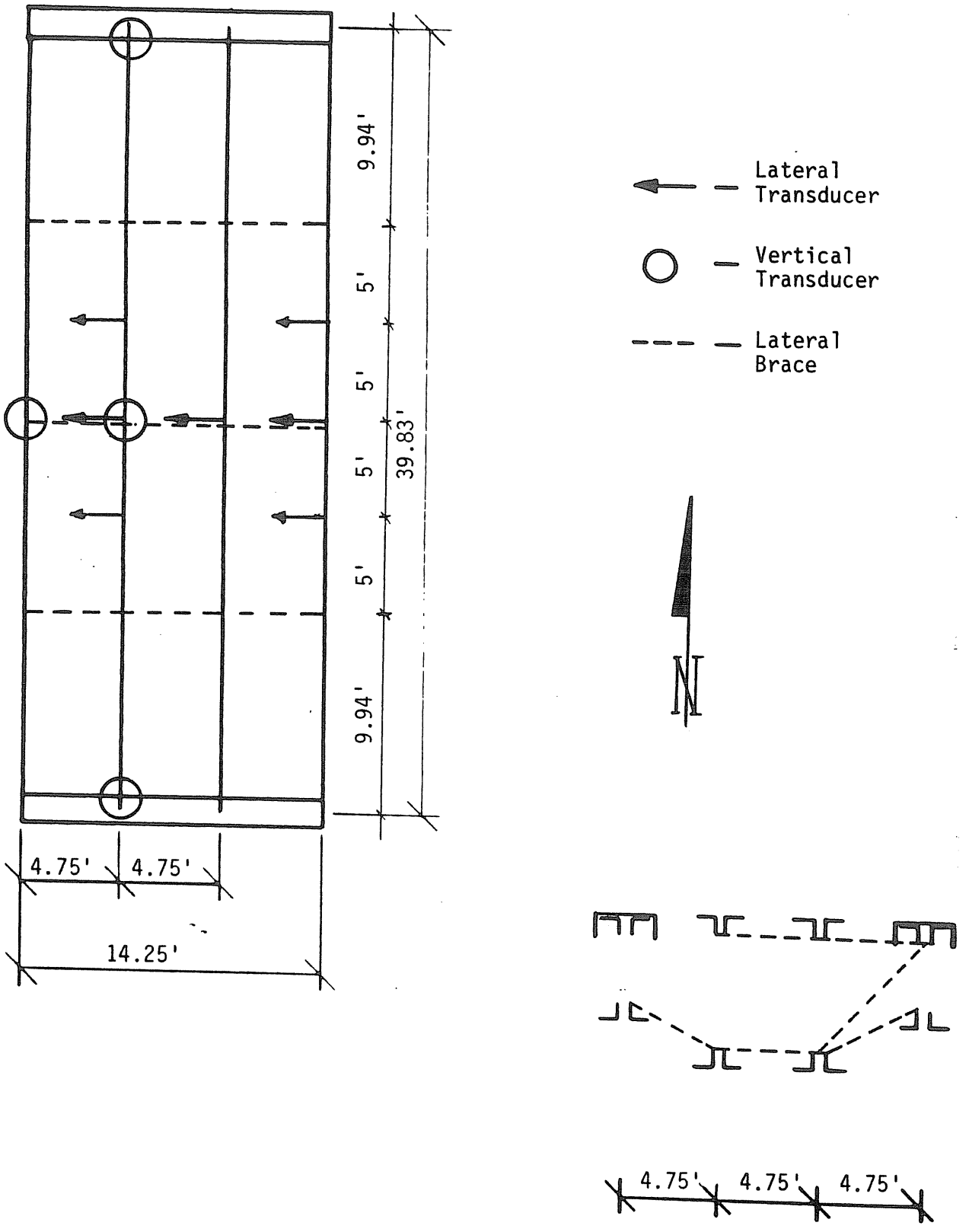
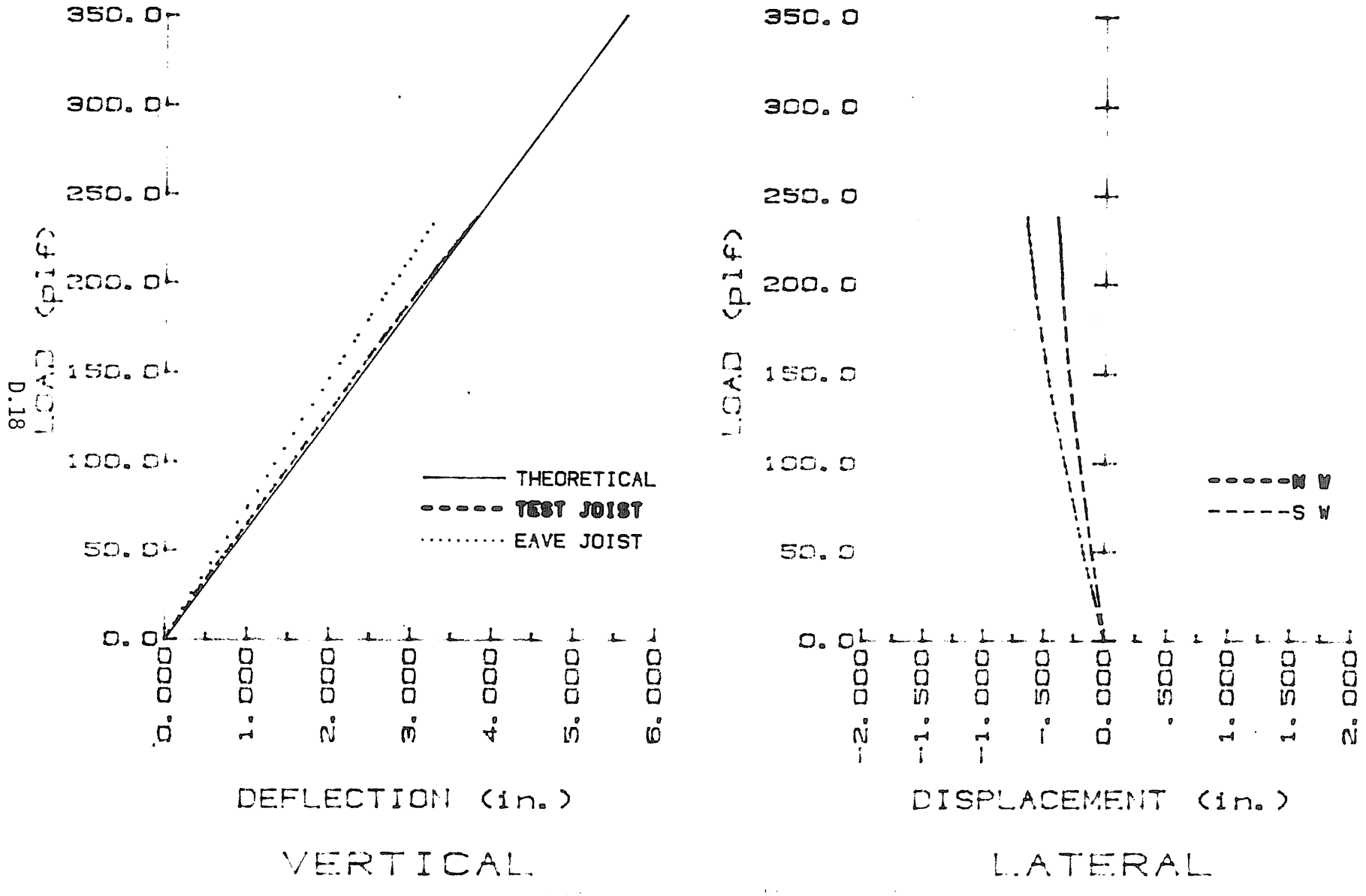


Figure D.11 Plan View of Test Setup, Test 40/3/20-36



D.18

40/3/20-36

Figure D.12 Applied Load vs. Vertical and Lateral Displacements

APPENDIX E

40 ft. Span, 40 psf ROD WEB TEST RESULTS

Test No. 40/3/40-40

JOIST DESCRIPTION:

Joist Type: 20H223 Load: 40 (psf)

Moment of Inertia: 212.4"^{4} Δ" @ 100 plf 0.923

Dead Load of Joist: 9.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 16.1 plf

TEST PARAMETERS:

Span Length: 39.88' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 86.2

2 Method: SJI Load: 150.0

3 Method: CONV. Load: 236.6

TEST RESULTS:

Failure Mode: Top chord lateral buckling of both joists.

Applied Failure Load: 405.1 plf Total Failure Load: 421.2 plf

Load Factor (Failure Load/Service Load) 1. 4.89

2. 2.81

3. 1.78

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

Test 40/3/40-40

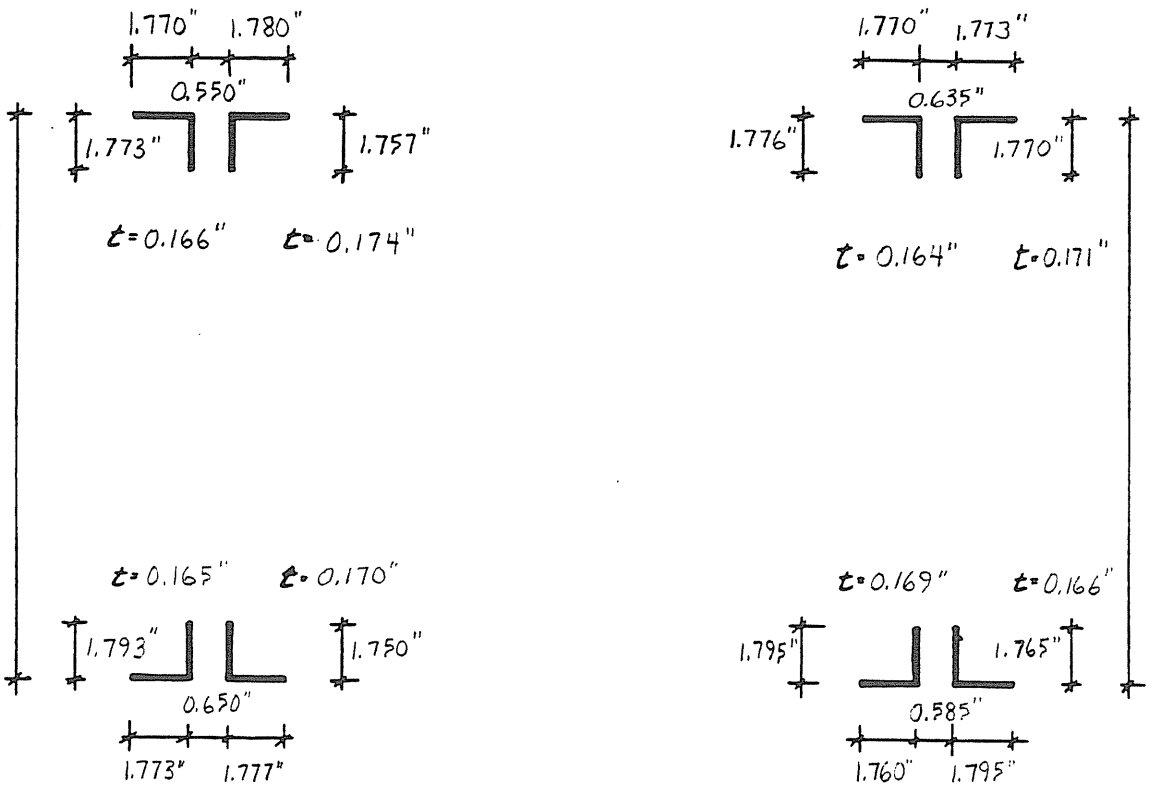


Figure E.1 Cross-Section Properties, Test 40/3/40-40

TEST # 40/3/40-40E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.770	RIGHT HORZ LEG (in) =	1.773
LEFT VER LEG (in) =	1.776	RIGHT VER LEG (in) =	1.770
LEFT THICKNESS (in) =	0.164	RIGHT THICKNESS (in) =	0.171

GAP BETWEEN THE LEGS (in) = 0.635

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.760	RIGHT HORZ LEG (in) =	1.795
LEFT VER LEG (in) =	1.795	RIGHT VER LEG (in) =	1.765
LEFT THICKNESS (in) =	0.169	RIGHT THICKNESS (in) =	0.166

GAP BETWEEN THE LEGS (in) = 0.585

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.339	in^4	Iy =	1.102	in^4
rx =	0.547	in	ry =	0.987	in
A =	1.131	in^2	J =	0.011	in^2
x =	2.106	in	y =	0.508	in

BOTTOM CHORD

Ix =	0.343	in^4	Iy =	1.065	in^4
rx =	0.550	in	ry =	0.969	in
A =	1.136	in^2	J =	0.011	in^2
x =	2.054	in	y =	0.522	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 204.62 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 20.00 (in)	EFF. DEPTH	=	18.97	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.96	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.74	
KL/ry	= 121.59	KL/rx	=	43.87	
b/t RATIO	= 10.83	Q	=	0.99	
MEA. YIELD STR.	= 51.60 (ksi)	MEA. FAILURE LOAD	=	421.20	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	10.1	11.4	18.1	90.9	4.64
SJI	16.7	18.9	29.8	150.0	2.81
CONV	25.8	29.2	46.1	232.1	1.81

FIGURE E.2a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-40E

TEST # 40/3/40-40W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.770	RIGHT HORZ LEG (in) =	1.780
LEFT VER LEG (in) =	1.773	RIGHT VER LEG (in) =	1.757
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.174
GAP BETWEEN THE LEGS (in) =	0.550		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.773	RIGHT HORZ LEG (in) =	1.777
LEFT VER LEG (in) =	1.793	RIGHT VER LEG (in) =	1.750
LEFT THICKNESS (in) =	0.165	RIGHT THICKNESS (in) =	0.170
GAP BETWEEN THE LEGS (in) =	0.650		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.339	in^4	Iy =	1.045	in^4
rx =	0.544	in	ry =	0.955	in
A =	1.146	in^2	J =	0.011	in^2
x =	2.066	in	y =	0.511	in

BOTTOM CHORD

Ix =	0.339	in^4	Iy =	1.121	in^4
rx =	0.547	in	ry =	0.995	in
A =	1.132	in^2	J =	0.011	in^2
x =	2.109	in	y =	0.526	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 205.46 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 20.00 (in)	EFF. DEPTH	=	18.96	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.96	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.23	
KL/ry	= 125.63	KL/rx	=	44.13	
b/t RATIO	= 10.68	Q	=	1.00	
MEA. YIELD STR.	= 51.90 (ksi)	MEA. FAILURE LOAD	=	421.20	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	9.5	10.8	17.1	86.2	4.89
SJI	16.5	18.9	29.8	150.0	2.81
CONV	26.0	29.8	47.0	236.6	1.78

FIGURE E.2b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-40W

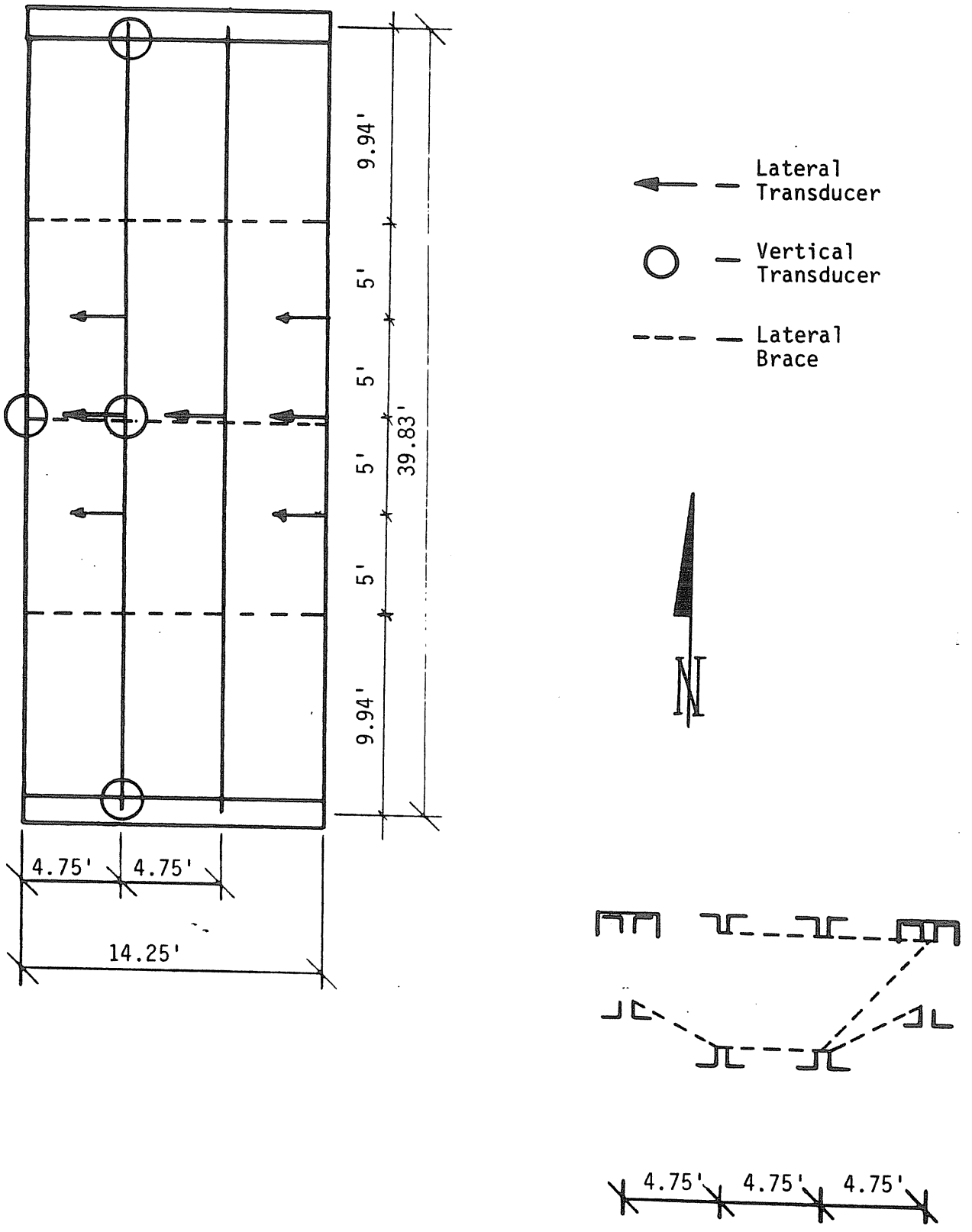


Figure E.3 Plan View of Test Setup, Test 40/3/40-40

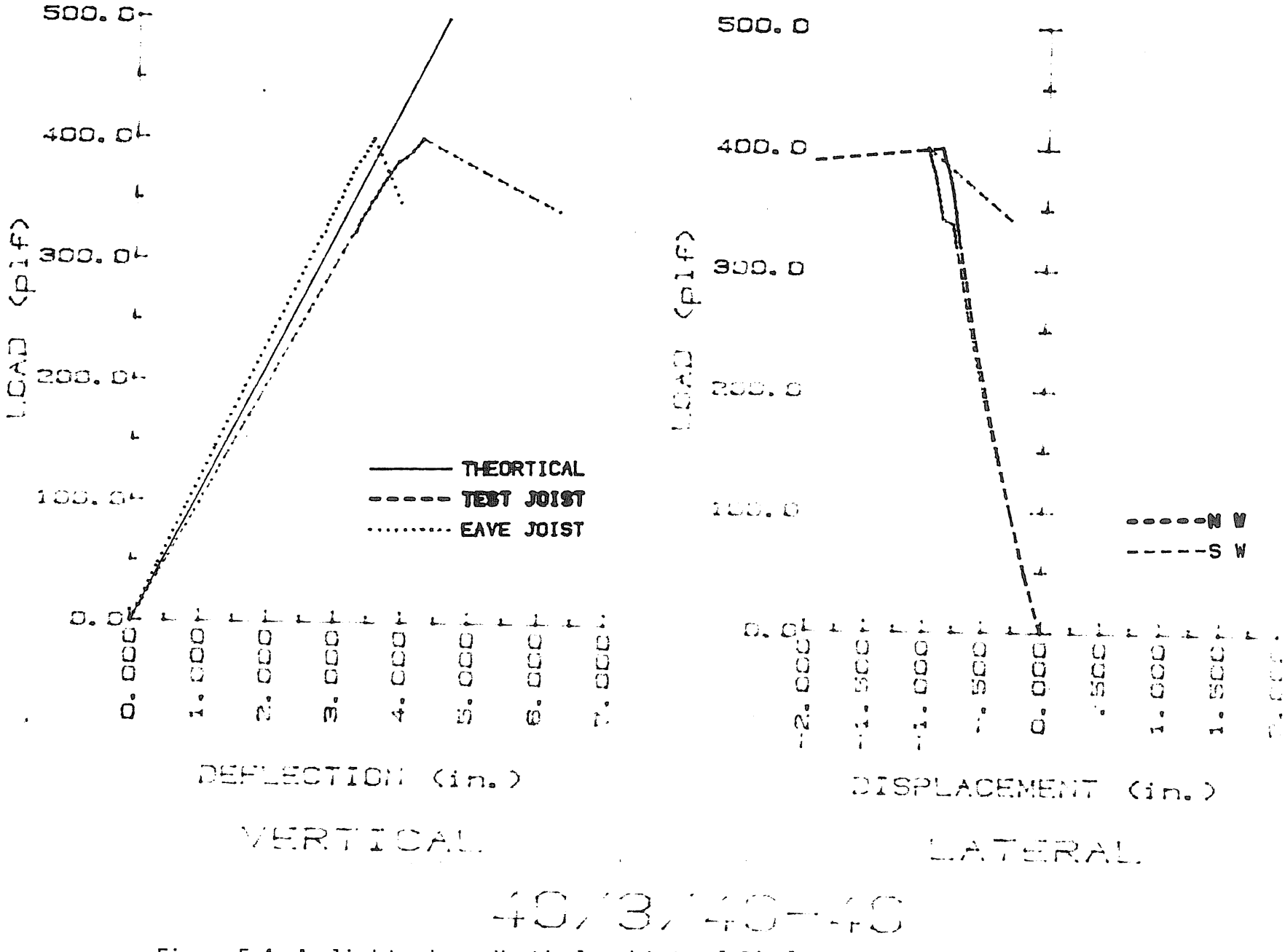


Figure E.4 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-41

JOIST DESCRIPTION:

Joist Type: 20H223 Load: 40 (psf)

Moment of Inertia: 212.4"^{4} Δ" @ 100 plf 0.923"

Dead Load of Joist: 9.8 plf Dead Load of Panel: 6.3

Total Dead Load: 16.1 plf

TEST PARAMETERS:

Span Length: 39'10½" Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others:

CALCULATED SERVICE LOADS:

Method: AISC Load: 86.8

Method: SJI Load: 146.4

Method: CONV. Load: 229.9

TEST RESULTS:

Failure Mode: TCLB 2' South of midspan both joists

Applied Failure Load: 402 plf Total Failure Load: 418.1 plf

Load Factor (Failure Load/Service Load): [1] 4.82

[2] 2.86

[3] 1.82

DISCUSSION:

-The rod was cut and test restarted.

Test 40/3/40-41

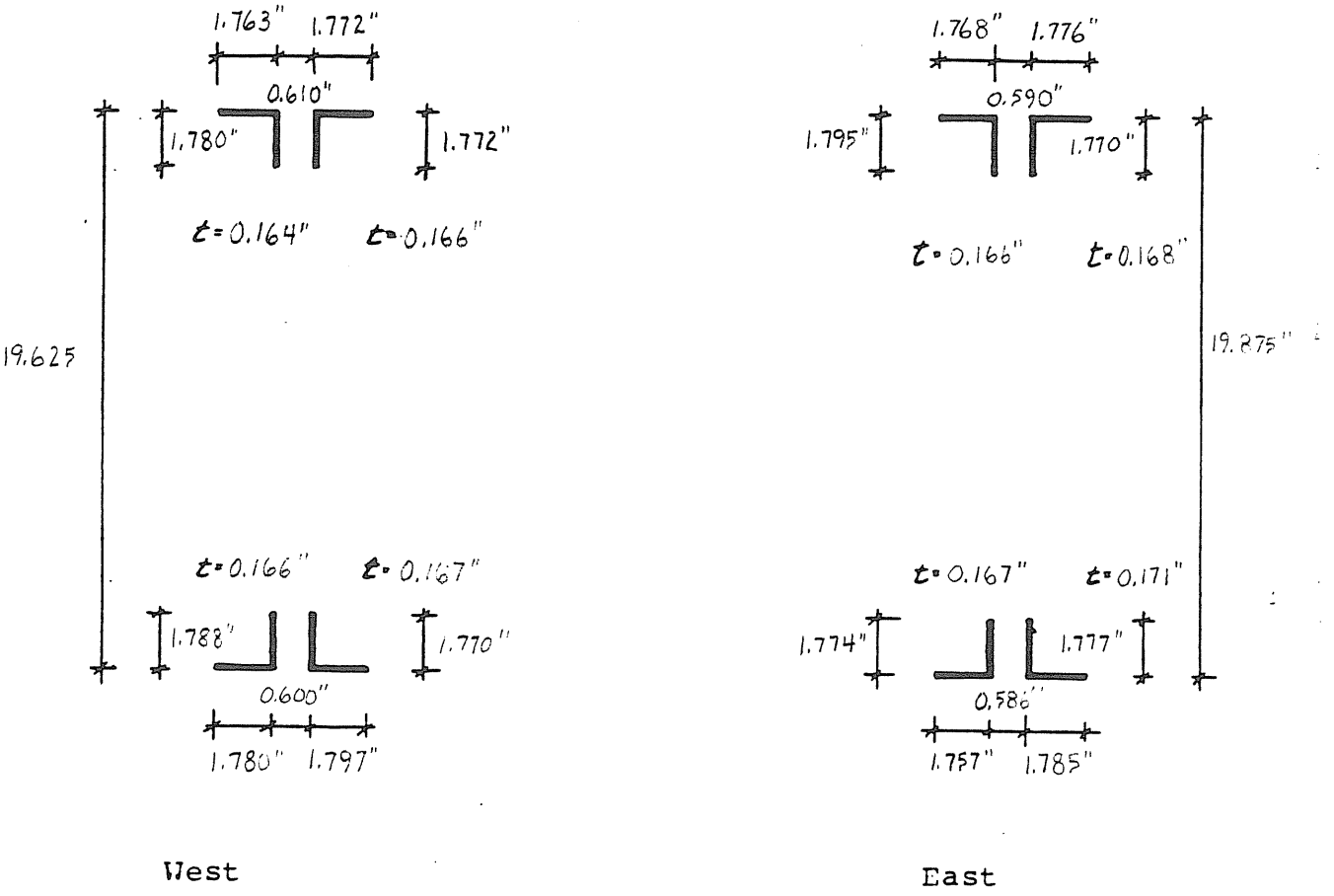


Figure E.5 Cross-Section Properties, Test 40/3/40-41

TEST # 40/3/40-41E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.768	RIGHT HORZ LEG (in) =	1.776
LEFT VER LEG (in) =	1.795	RIGHT VER LEG (in) =	1.770
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.168
GAP BETWEEN THE LEGS (in) =	0.590		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.757	RIGHT HORZ LEG (in) =	1.785
LEFT VER LEG (in) =	1.774	RIGHT VER LEG (in) =	1.777
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.171
GAP BETWEEN THE LEGS (in) =	0.586		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.343	in^4	Iy =	1.059	in^4
rx =	0.551	in	ry =	0.967	in
A =	1.131	in^2	J =	0.011	in^2
x =	2.069	in	y =	0.521	in

BOTTOM CHORD

Ix =	0.343	in^4	Iy =	1.066	in^4
rx =	0.548	in	ry =	0.967	in
A =	1.142	in^2	J =	0.011	in^2
x =	2.068	in	y =	0.505	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 202.59 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 19.88 (in)	EFF. DEPTH	=	18.85	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.97	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.05	
KL/ry	= 124.04	KL/rx	=	43.58	
b/t RATIO	= 10.81	Q	=	0.99	
MEA. YIELD STR.	= 51.20 (ksi)	MEA. FAILURE LOAD	=	418.10	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	9.7	11.0	17.2	86.8	4.82
SJI	16.4	18.5	29.1	146.4	2.86
CONV	25.7	29.1	45.7	229.9	1.82

FIGURE E.6a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-41E

TEST # 40/3/40-41W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.763	RIGHT HORZ LEG (in) =	1.772
LEFT VER LEG (in) =	1.780	RIGHT VER LEG (in) =	1.772
LEFT THICKNESS (in) =	0.164	RIGHT THICKNESS (in) =	0.166
GAP BETWEEN THE LEGS (in) =	0.610		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.780	RIGHT HORZ LEG (in) =	1.797
LEFT VER LEG (in) =	1.788	RIGHT VER LEG (in) =	1.770
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.167
GAP BETWEEN THE LEGS (in) =	0.600		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.336	in^4	Iy =	1.057	in^4
rx =	0.549	in	ry =	0.974	in
A =	1.115	in^2	J =	0.010	in^2
x =	2.075	in	y =	0.510	in

BOTTOM CHORD

Ix =	0.341	in^4	Iy =	1.088	in^4
rx =	0.549	in	ry =	0.980	in
A =	1.133	in^2	J =	0.010	in^2
x =	2.087	in	y =	0.514	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 195.12 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 19.63 (in)	EFF. DEPTH	=	18.60	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	1.01	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.64	
KL/ry	= 123.24	KL/rx	=	43.74	
b/t RATIO	= 10.85	Q	=	0.99	
MEA. YIELD STR.	= 50.60 (ksi)	MEA. FAILURE LOAD	=	418.10	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	9.8	11.0	17.0	85.5	4.89
SJI	16.8	18.7	29.0	145.8	2.87
CONV	25.4	28.4	44.0	221.3	1.89

FIGURE E.6b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-41W

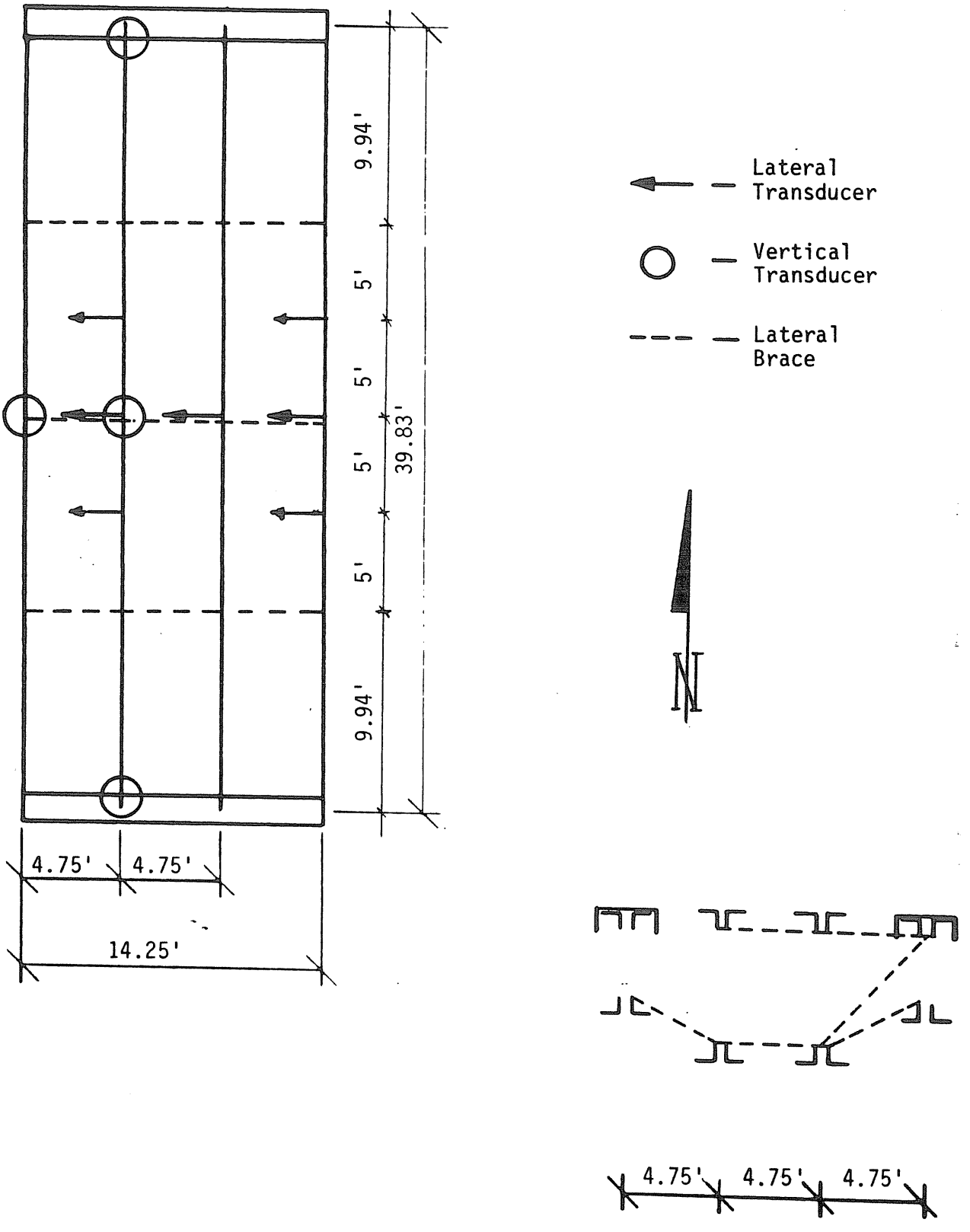
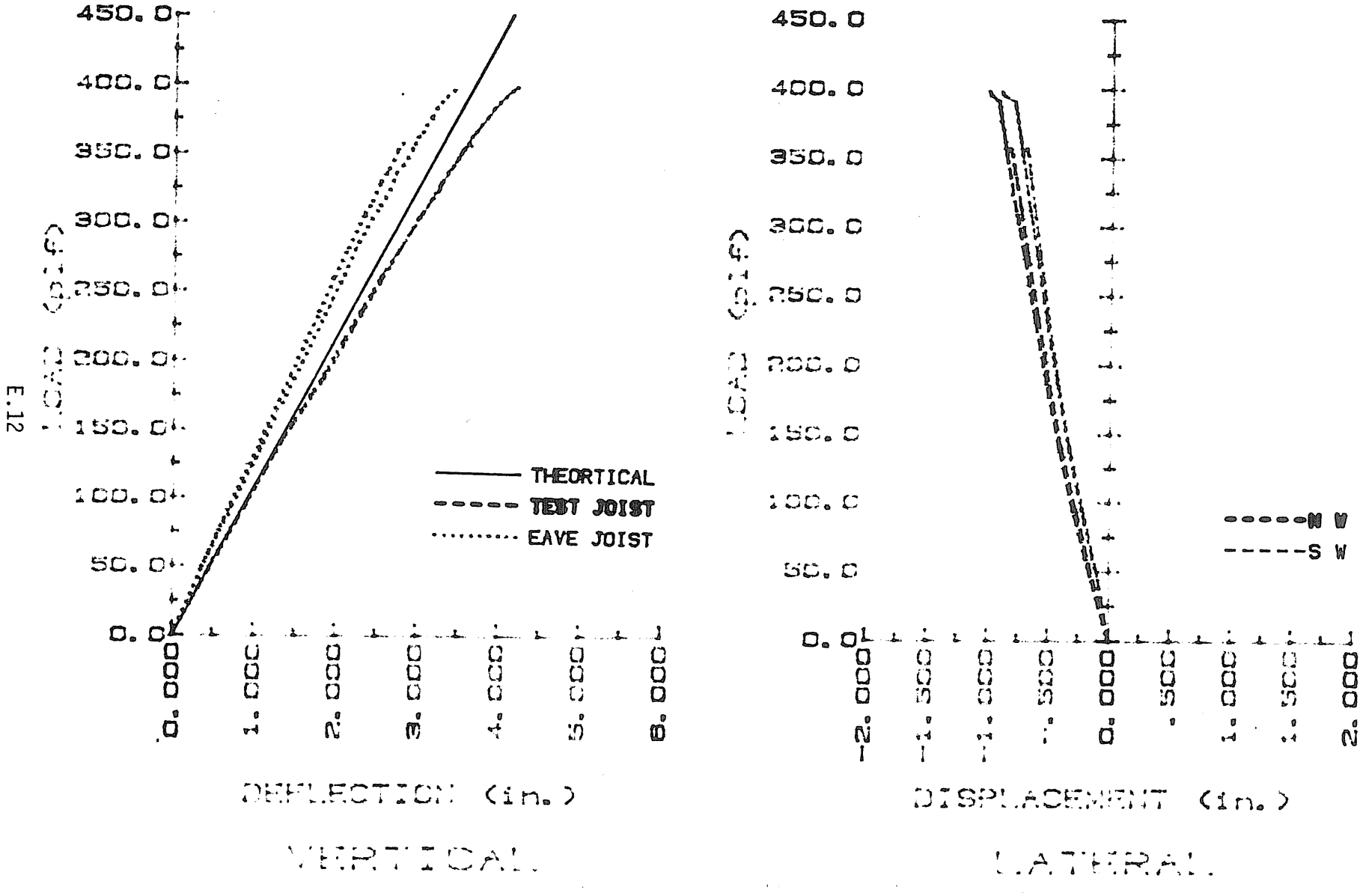


Figure E.7 Plan View of Test Setup, Test 40/3/40-41



40.3.40-41

Figure E.8 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-42

JOIST DESCRIPTION:

Joist Type: 20H223 Load: 40 (psf)

Moment of Inertia: 212.4"^{4} Δ" @ 100 plf 0.923"

Dead Load of Joist: 9.8 plf Dead Load of Panel: 6.3

Total Dead Load: 16.1 plf

TEST PARAMETERS:

Span Length: 39'10½" Spacing: 4.75

Clip Type: 3 Insulation yes

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Diag @ test joists only

CALCULATED SERVICE LOADS:

Method: AISC Load: 86.7

Method: SJI Load: 144.5

Method: CONV. Load: 228.2

TEST RESULTS:

Failure Mode: Top chord lateral buckling both joists

Applied Failure Load: 417.4 Total Failure Load: 433.5 plf

Load Factor (Failure Load/Service Load): [1] 5.0

[2] 3.0

[3] 1.90

DISCUSSION:

Test 40/3/40-42

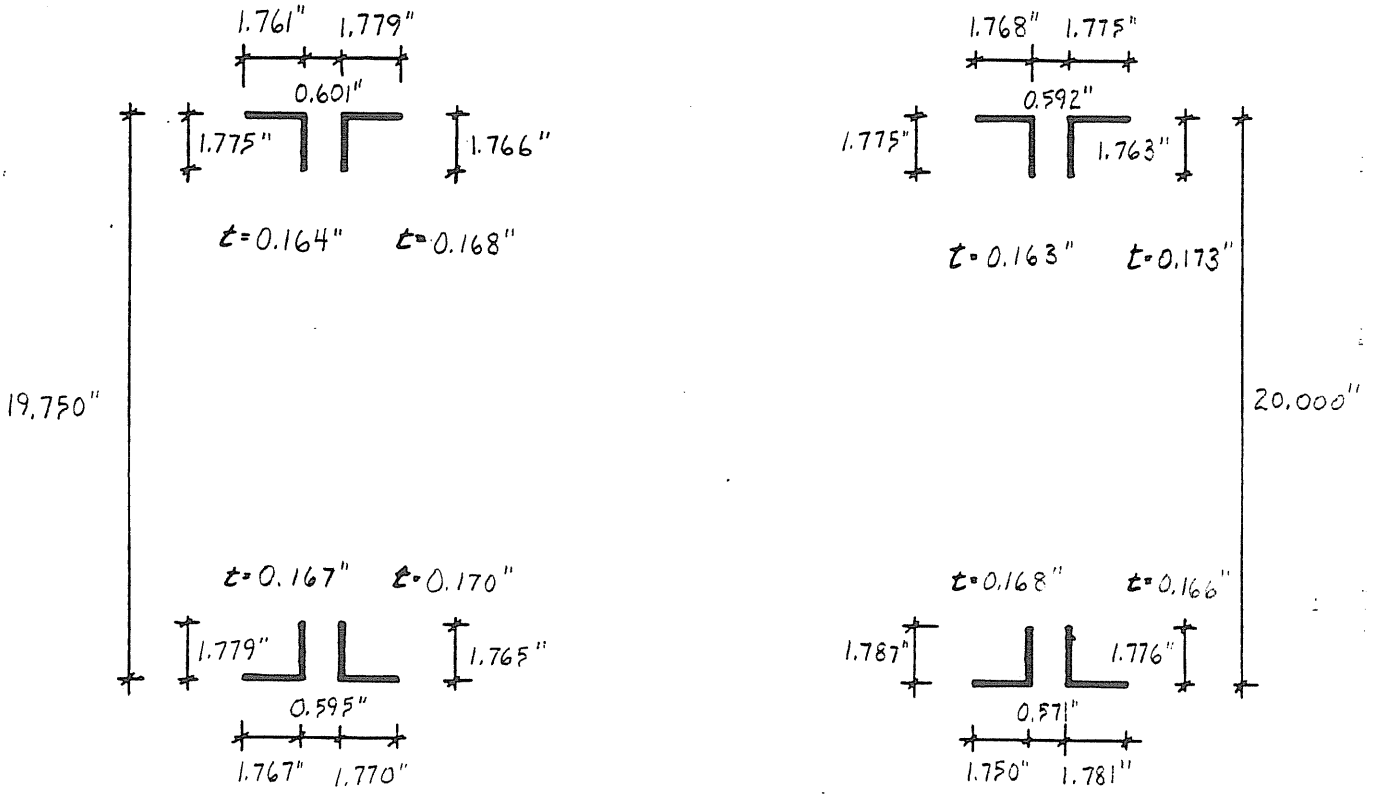


Figure E.9 Cross-Section Properties, Test 40/3/40-42

TEST # 40/3/40-42E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.768	RIGHT HORZ LEG (in) =	1.775
LEFT VER LEG (in) =	1.775	RIGHT VER LEG (in) =	1.763
LEFT THICKNESS (in) =	0.163	RIGHT THICKNESS (in) =	0.173
GAP BETWEEN THE LEGS (in) =	0.592		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.750	RIGHT HORZ LEG (in) =	1.781
LEFT VER LEG (in) =	1.787	RIGHT VER LEG (in) =	1.776
LEFT THICKNESS (in) =	0.168	RIGHT THICKNESS (in) =	0.166
GAP BETWEEN THE LEGS (in) =	0.571		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.337	in^4	Iy =	1.065	in^4
rx =	0.546	in	ry =	0.970	in
A =	1.133	in^2	J =	0.011	in^2
x =	2.090	in	y =	0.510	in

BOTTOM CHORD

Ix =	0.342	in^4	Iy =	1.033	in^4
rx =	0.550	in	ry =	0.956	in
A =	1.129	in^2	J =	0.010	in^2
x =	2.039	in	y =	0.514	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 204.30 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 20.00 (in)	EFF. DEPTH	=	18.98	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.96	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.70	
KL/ry	= 123.76	KL/rx	=	43.99	
b/t RATIO	= 10.89	Q	=	0.99	
MEA. YIELD STR.	= 50.60 (ksi)	MEA. FAILURE LOAD	=	433.50	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	9.7	11.0	17.5	87.9	4.93
SJI	16.1	18.3	28.9	145.4	2.98
CONV	25.4	28.8	45.5	228.8	1.89

FIGURE E.10a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-42E

TEST # 40/3/40-42W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.761	RIGHT HORZ LEG (in) =	1.779
LEFT VER LEG (in) =	1.775	RIGHT VER LEG (in) =	1.766
LEFT THICKNESS (in) =	0.164	RIGHT THICKNESS (in) =	0.168
GAP BETWEEN THE LEGS (in) =	0.601		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.767	RIGHT HORZ LEG (in) =	1.770
LEFT VER LEG (in) =	1.779	RIGHT VER LEG (in) =	1.765
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.170
GAP BETWEEN THE LEGS (in) =	0.595		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.335	in^4	Iy =	1.059	in^4
rx =	0.546	in	ry =	0.972	in
A =	1.120	in^2	J =	0.010	in^2
x =	2.076	in	y =	0.508	in

BOTTOM CHORD

Ix =	0.340	in^4	Iy =	1.068	in^4
rx =	0.547	in	ry =	0.969	in
A =	1.136	in^2	J =	0.011	in^2
x =	2.072	in	y =	0.513	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 198.60	(in^4)	# ROWS BRIDGING	= 3.00	
JOIST DEPTH	= 19.75	(in)	EFF. DEPTH	= 18.73	(in.)
SPAN LENGTH	= 39.88	(ft)	DEF @ 100 plf	= 0.99	(in)
BRIDGING SPACING	= 10.00	(ft)	PANEL LENGTH	= 24.00	(in)
K	= 1.00		C	= 105.31	
KL/ry	= 123.44		KL/rx	= 43.92	
b/t RATIO	= 10.82		Q	= 0.99	
MEA. YIELD STR.	= 52.10	(ksi)	MEA. FAILURE LOAD	= 433.50	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	9.8	11.0	17.1	86.2	5.03
SJI	16.5	18.5	28.9	145.5	2.98
CONV	26.0	29.1	45.4	228.6	1.90

FIGURE E.10b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-42W

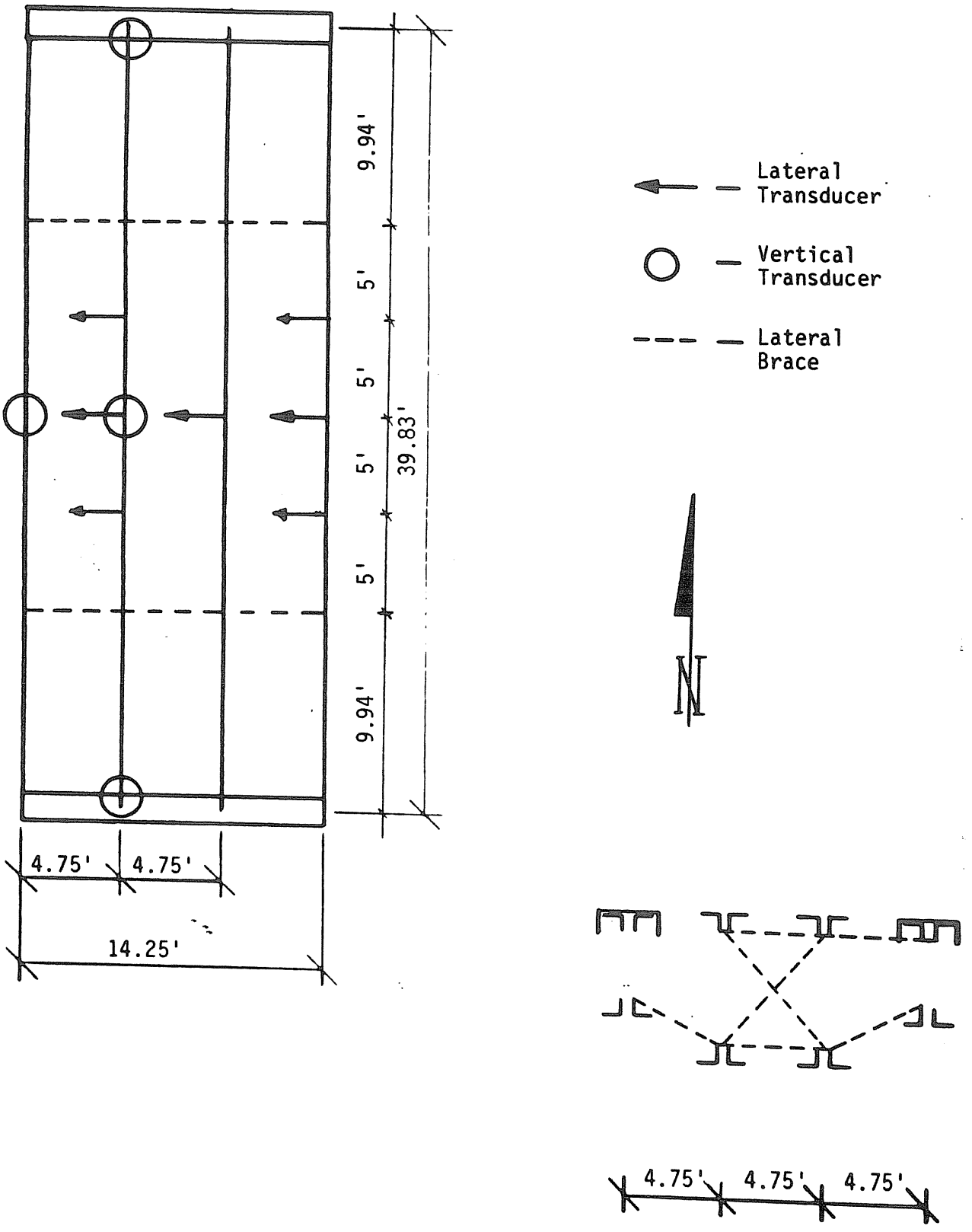
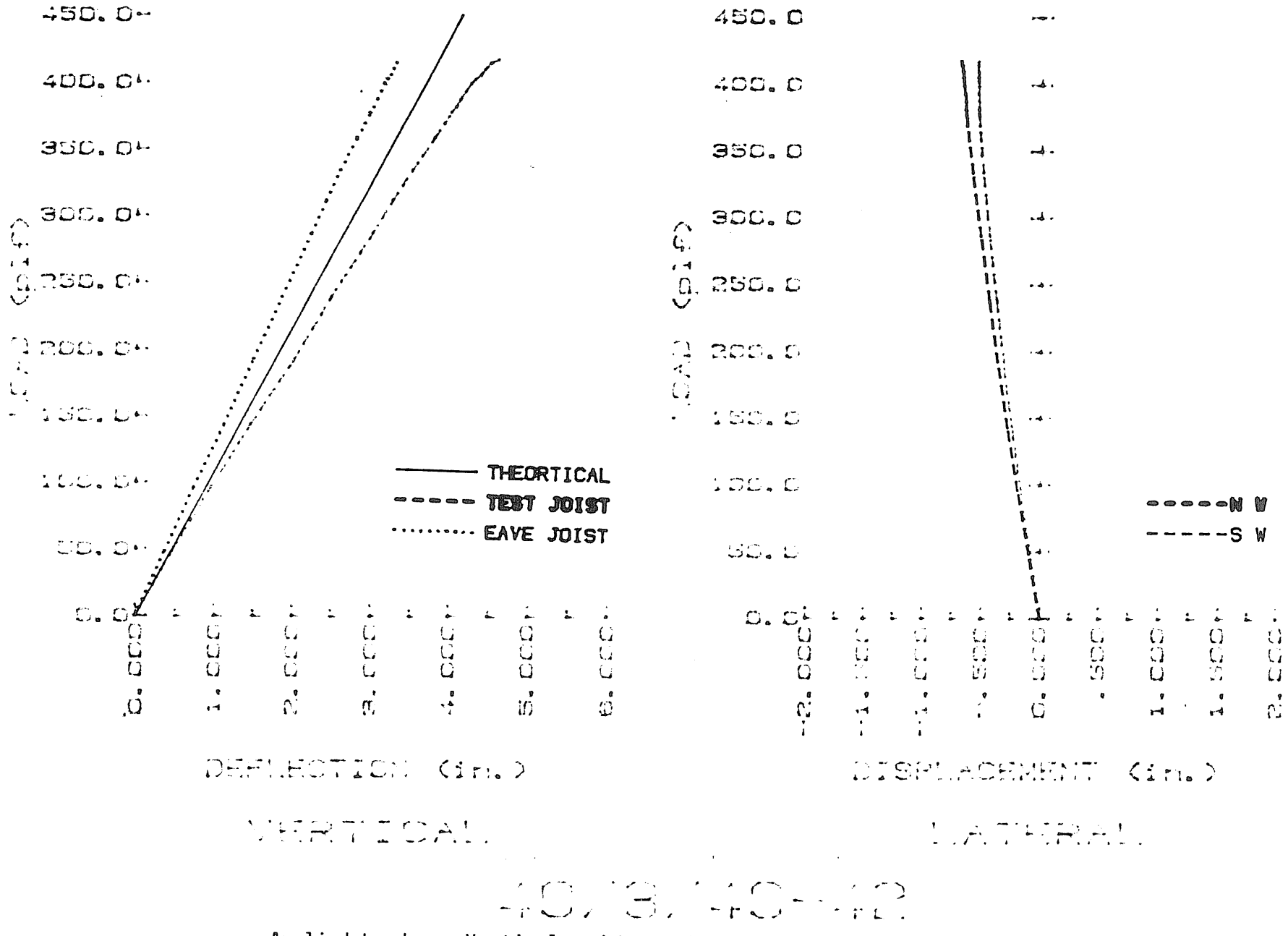


Figure E.11 Plan View of Test Setup, Test 40/3/40-42



Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-45

JOIST DESCRIPTION:

Joist Type: 20H223 Load: 40 (psf)

Moment of Inertia: 212.4"^{4} Δ" @ 100 plf 0.923"

Dead Load of Joist: 9.8 plf Dead Load of Panel: 6.3

Total Dead Load: 16.1 plf

TEST PARAMETERS:

Span Length: 39'10½" Spacing: 4.75'

Clip Type: 3" w/RIS Beams Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others:

CALCULATED SERVICE LOADS:

Method: AISC Load: 84.6

Method: SJI Load: 149.6

Method: CONV. Load: 231.7

TEST RESULTS:

Failure Mode: Lateral torsional buckling of top chord of both joist (4' south of centerline).

Applied Failure Load: 324.8 Total Failure Load: 340.9

Load Factor (Failure Load/Service Load): [1] 4.03

[2] 2.28

[3] 1.47

DISCUSSION:

-Failed at 14.5" of water.

-For west joist it was noted that the filler top chord angle was not welded on one angle at the location of the failure for the west joist.

Test 40/3/40-45

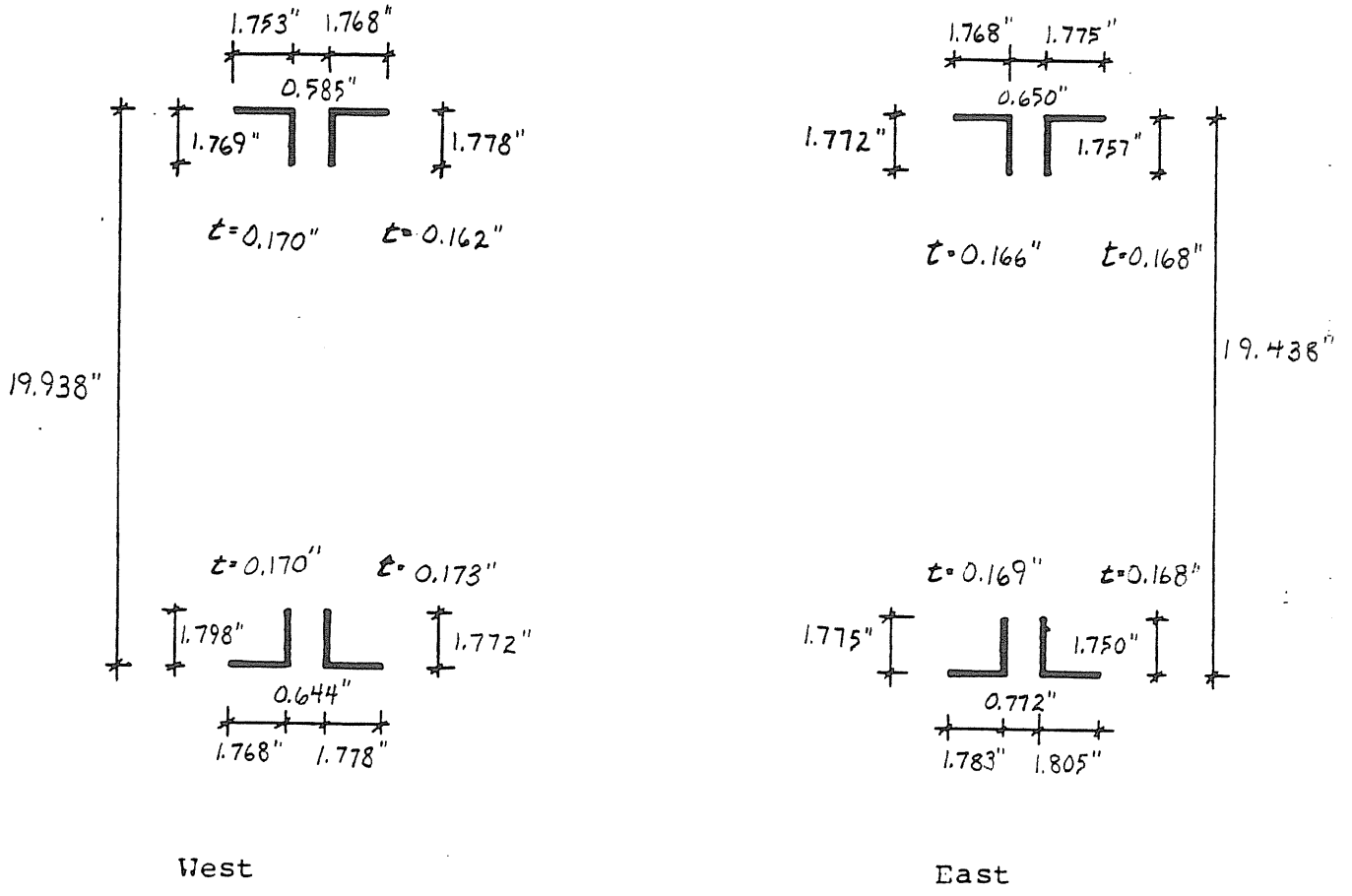


Figure E.13 Cross-Section Properties, Test 40/3/40-45

TEST # 40/3/40-45E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.768	RIGHT HORZ LEG (in) =	1.775
LEFT VER LEG (in) =	1.772	RIGHT VER LEG (in) =	1.757
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.168

GAP BETWEEN THE LEGS (in) = 0.650

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.783	RIGHT HORZ LEG (in) =	1.805
LEFT VER LEG (in) =	1.775	RIGHT VER LEG (in) =	1.750
LEFT THICKNESS (in) =	0.169	RIGHT THICKNESS (in) =	0.168

GAP BETWEEN THE LEGS (in) = 0.772

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.333	in^4	Iy =	1.112	in^4
rx =	0.544	in	ry =	0.994	in
A =	1.125	in^2	J =	0.010	in^2
x =	2.099	in	y =	0.509	in

BOTTOM CHORD

Ix =	0.336	in^4	Iy =	1.277	in^4
rx =	0.543	in	ry =	1.058	in
A =	1.142	in^2	J =	0.011	in^2
x =	2.172	in	y =	0.511	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 192.93 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 19.44 (in)	EFF. DEPTH	=	18.42	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	1.02	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	104.47	
KL/ry	= 120.69	KL/rx	=	44.10	
b/t RATIO	= 10.67	Q	=	0.99	
MEA. YIELD STR.	= 52.80 (ksi)	MEA. FAILURE LOAD	=	340.90	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	10.3	11.5	17.7	89.1	3.83
SJI	18.4	20.7	31.8	160.1	2.13
CONV	26.3	29.6	45.4	228.6	1.49

FIGURE E.14a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-45E

TEST # 40/3/40-45W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.753	RIGHT HORZ LEG (in) =	1.768
LEFT VER LEG (in) =	1.769	RIGHT VER LEG (in) =	1.778
LEFT THICKNESS (in) =	0.170	RIGHT THICKNESS (in) =	0.162

GAP BETWEEN THE LEGS (in) = 0.583

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.768	RIGHT HORZ LEG (in) =	1.778
LEFT VER LEG (in) =	1.798	RIGHT VER LEG (in) =	1.772
LEFT THICKNESS (in) =	0.170	RIGHT THICKNESS (in) =	0.173

GAP BETWEEN THE LEGS (in) = 0.644

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.336	in^4	Iy =	1.029	in^4
rx =	0.548	in	ry =	0.959	in
A =	1.118	in^2	J =	0.010	in^2
x =	2.030	in	y =	0.502	in

BOTTOM CHORD

Ix =	0.353	in^4	Iy =	1.141	in^4
rx =	0.551	in	ry =	0.991	in
A =	1.162	in^2	J =	0.011	in^2
x =	2.099	in	y =	0.524	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross = 204.73 (in^4)	# ROWS BRIDGING = 3.00		
JOIST DEPTH = 19.94 (in)	EFF. DEPTH = 18.91 (in.)		
SPAN LENGTH = 39.88 (ft)	DEF @ 100 plf = 0.96 (in)		
BRIDGING SPACING = 10.00 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 104.99		
KL/ry = 125.08	KL/rx = 43.81		
b/t RATIO = 10.98	Q = 0.98		
MEA. YIELD STR. = 52.80 (ksi)	MEA. FAILURE LOAD = 340.90 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	9.5	10.7	16.8	84.6	4.03
SJI	16.9	18.9	29.8	149.7	2.28
CONV	26.1	29.2	46.0	231.7	1.47

FIGURE E.14b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-45W

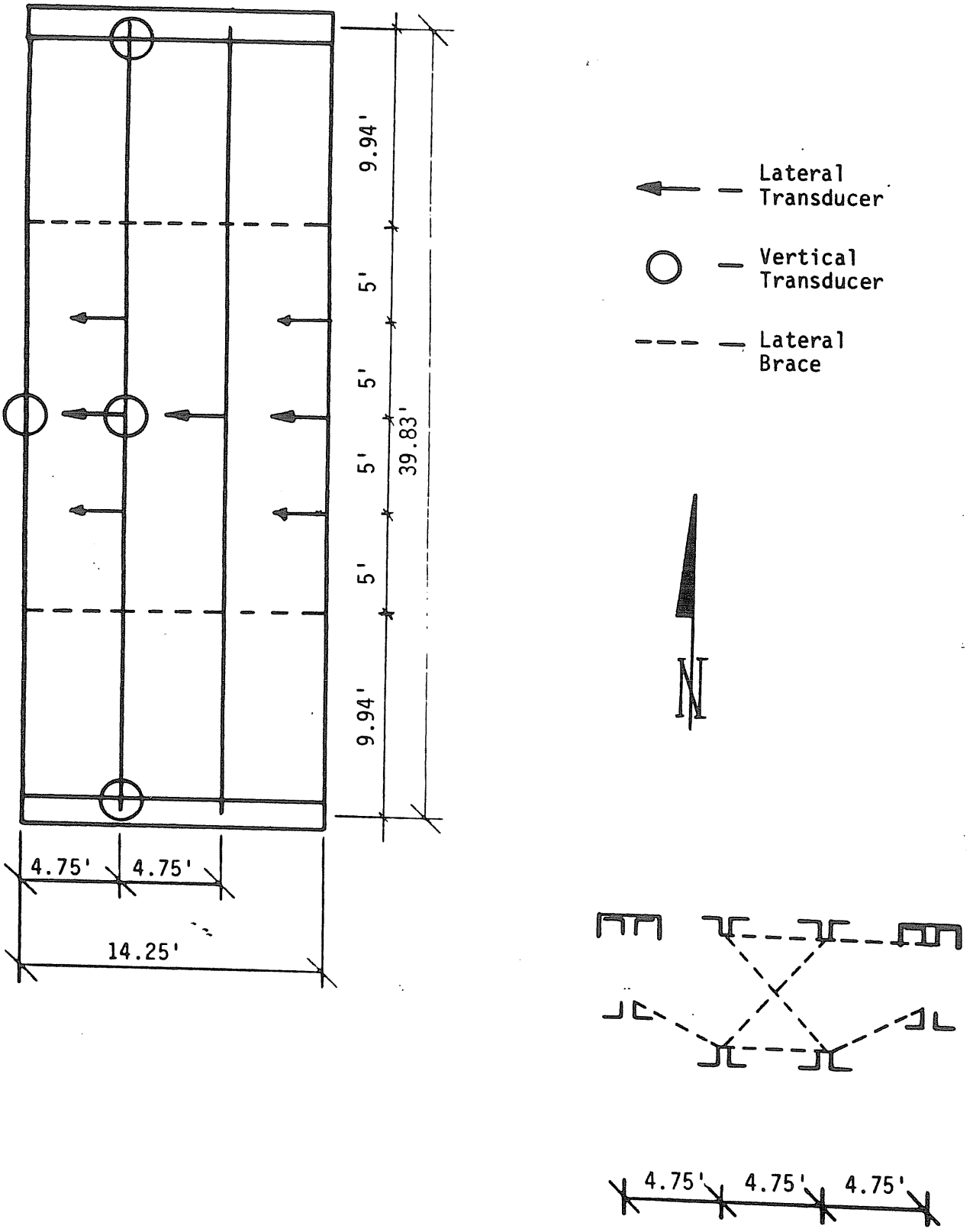
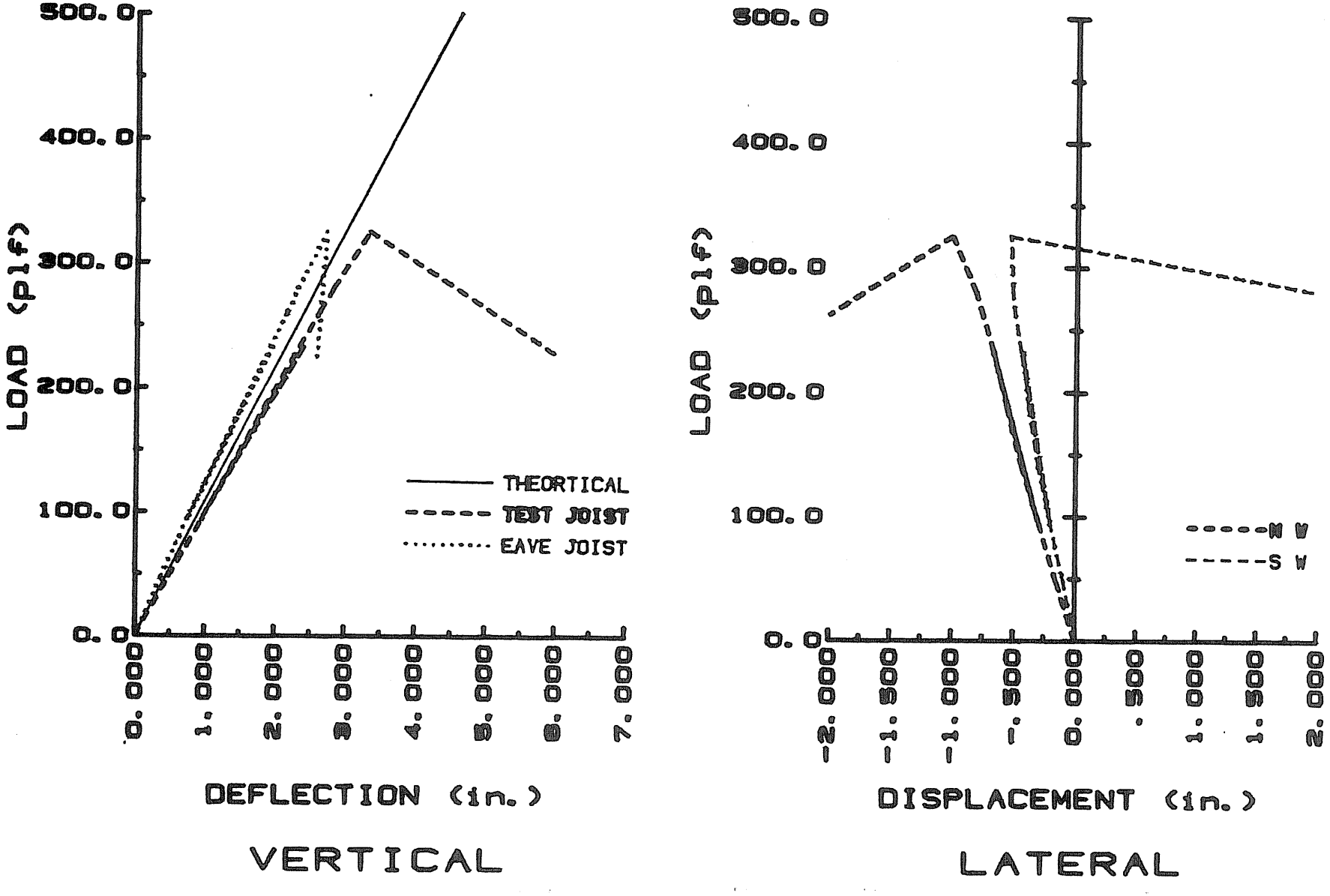


Figure E.15 Plan View of Test Setup, Test 40/3/40-45



40/3/40-45

Figure E.16 Applied Load vs. Vertical and Lateral Displacements

APPENDIX F

40 ft. Span, 40 psf ANGLE WEB TEST RESULTS

Test No. 40/3/40-37

JOIST DESCRIPTION:

Joist Type: 20H223 Load: 40 (psf)

Moment of Inertia: 199.2"^{4} Δ" @ 100 plf 0.985

Dead Load of Joist: 9.1 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 15.4 plf

TEST PARAMETERS:

Span Length: 39.88' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 130.0

2 Method: SJI Load: 195.4

3 Method: CONV Load: 222.2

TEST RESULTS:

Failure Mode: Top chord lateral buckling of east joist 2' north of centerline. Shear failure of outside east joist.

Applied Failure Load: 286.8 plf Total Failure Load: 302.2 plf

Load Factor (Failure Load/Service Load) 1. 2.33

2. 1.55

3. 1.36

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

Test 40/3/40-37

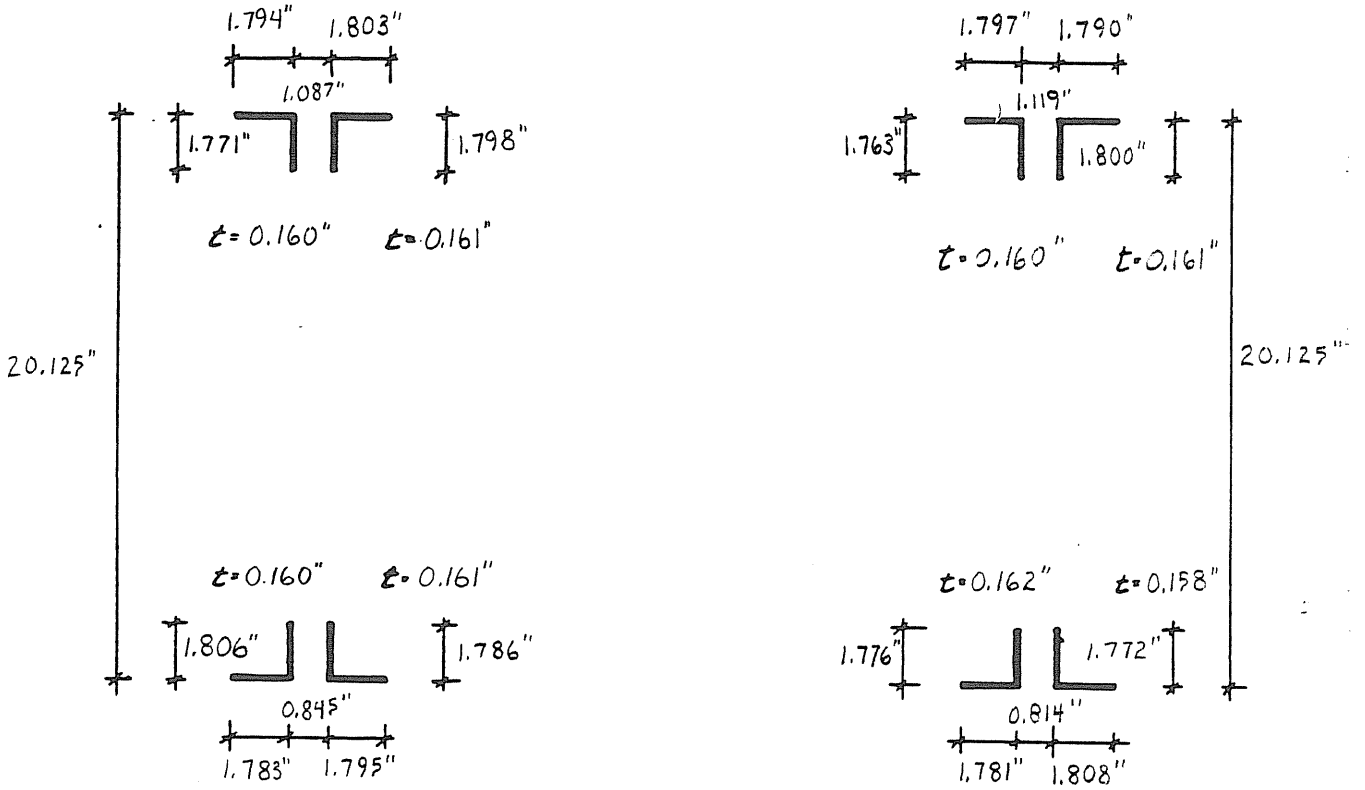


Figure F.1 Cross-Section Properties, Test 40/3/40-37

TEST # 40/3/40-37E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.797	RIGHT HORZ LEG (in) =	1.790
LEFT VER LEG (in) =	1.763	RIGHT VER LEG (in) =	1.800
LEFT THICKNESS (in) =	0.160	RIGHT THICKNESS (in) =	0.161
GAP BETWEEN THE LEGS (in) =	1.119		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.781	RIGHT HORZ LEG (in) =	1.808
LEFT VER LEG (in) =	1.776	RIGHT VER LEG (in) =	1.772
LEFT THICKNESS (in) =	0.162	RIGHT THICKNESS (in) =	0.158
GAP BETWEEN THE LEGS (in) =	0.814		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.333	in^4	Iy =	1.589	in^4
rx =	0.551	in	ry =	1.204	in
A =	1.096	in^2	J =	0.009	in^2
x =	2.361	in	y =	0.485	in

BOTTOM CHORD

Ix =	0.327	in^4	Iy =	1.254	in^4
rx =	0.548	in	ry =	1.072	in
A =	1.091	in^2	J =	0.009	in^2
x =	2.185	in	y =	0.502	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 200.90 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 20.13 (in)	EFF. DEPTH	= 19.14	(in.)	
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 0.98	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 107.11		
KL/ry	= 99.66	KL/rx	= 43.57		
b/t RATIO	= 11.23	Q	= 0.98		
MEA. YIELD STR.	= 50.80 (ksi)	MEA. FAILURE LOAD	= 302.20	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.8	16.2	25.8	130.0	2.33
SJI	22.2	24.4	38.8	195.4	1.55
CONV	25.3	27.7	44.2	222.2	1.36

FIGURE F.2a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-37E

TEST # 40/3/40-37W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.794	RIGHT HORZ LEG (in) =	1.803
LEFT VER LEG (in) =	1.771	RIGHT VER LEG (in) =	1.798
LEFT THICKNESS (in) =	0.160	RIGHT THICKNESS (in) =	0.161

GAP BETWEEN THE LEGS (in) = 1.087

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.783	RIGHT HORZ LEG (in) =	1.795
LEFT VER LEG (in) =	1.806	RIGHT VER LEG (in) =	1.786
LEFT THICKNESS (in) =	0.160	RIGHT THICKNESS (in) =	0.161

GAP BETWEEN THE LEGS (in) = 0.845

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.334	in^4	Iy =	1.561	in^4
rx =	0.552	in	ry =	1.192	in
A =	1.099	in^2	J =	0.009	in^2
x =	2.346	in	y =	0.490	in

BOTTOM CHORD

Ix =	0.340	in^4	Iy =	1.283	in^4
rx =	0.556	in	ry =	1.080	in
A =	1.099	in^2	J =	0.009	in^2
x =	2.211	in	y =	0.519	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 201.46 (in^4)	# ROWS BRIDGING	= 3.00
JOIST DEPTH	= 20.13 (in)	EFF. DEPTH	= 19.12 (in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 0.97 (in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00 (in)
K	= 1.00	C	= 106.74
KL/ry	= 100.66	KL/rx	= 43.51
b/t RATIO	= 11.21	Q	= 0.98
MEA. YIELD STR.	= 51.20 (ksi)	MEA. FAILURE LOAD	= 302.20 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.6	16.0	25.5	128.2	2.36
SJI	22.2	24.4	38.9	195.6	1.54
CONV	25.4	27.9	44.5	223.9	1.35

FIGURE F.2b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-37W

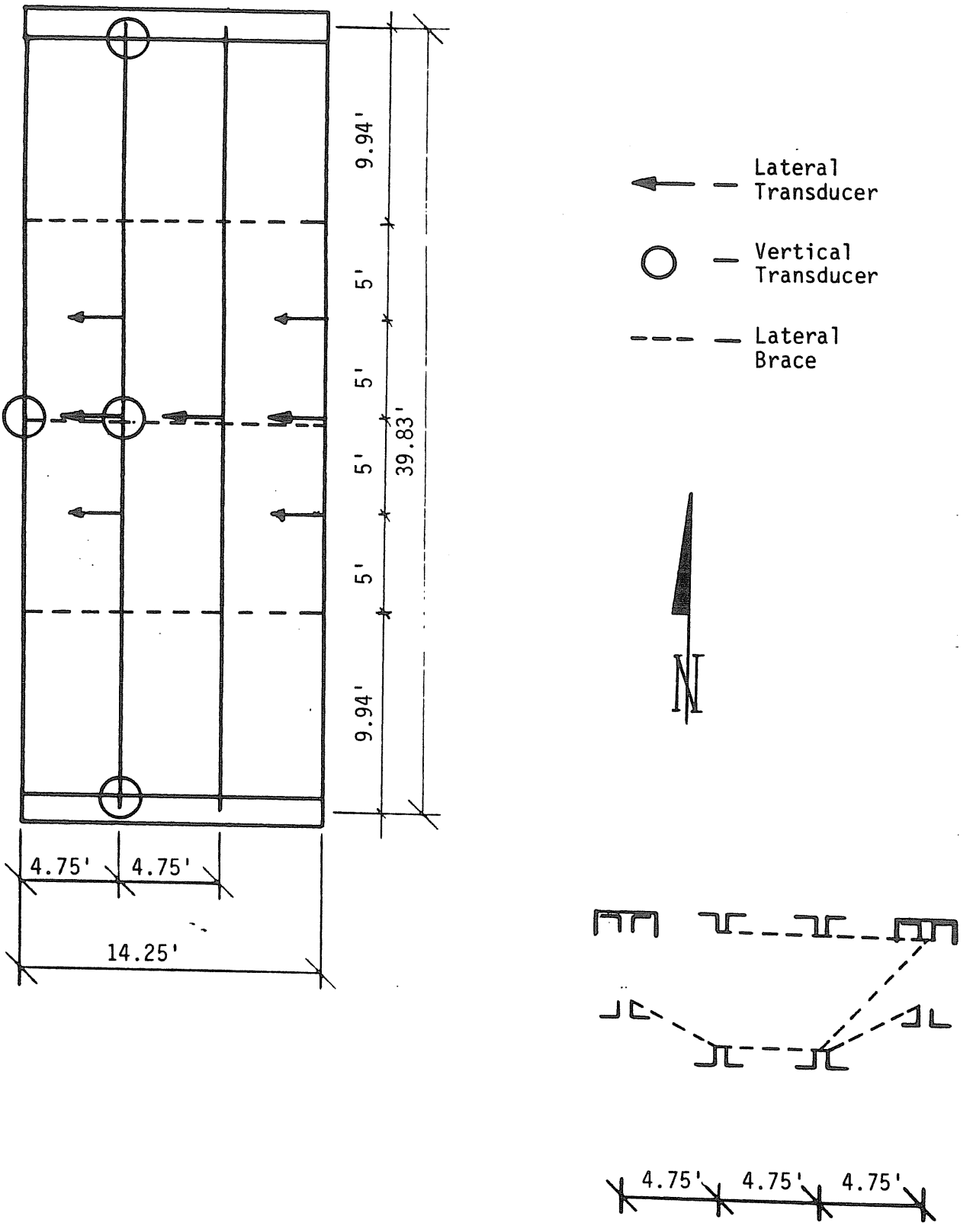
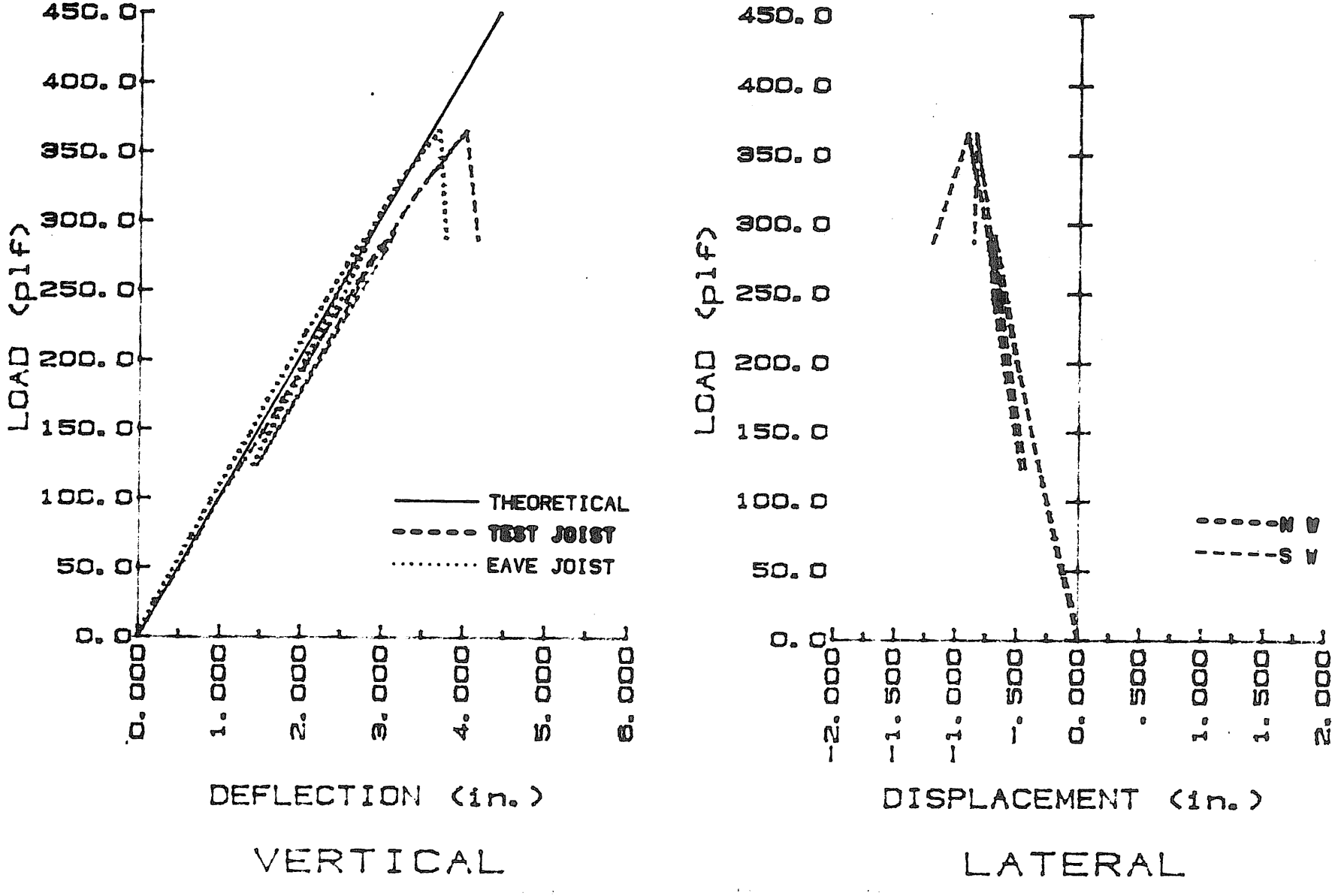


Figure F.3 Plan View of Test Setup, Test 40/3/40-37 ·



40/3/40-37

Figure F.4 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-38

JOIST DESCRIPTION:

Joist Type: 20H223 Load: 40 (psf)

Moment of Inertia: 199.2"^{4} Δ" @ 100 plf 0.985

Dead Load of Joist: 9.1 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 15.4 plf

TEST PARAMETERS:

Span Length: 39.88' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 126.6

2 Method: SJI Load: 189.8

3 Method: CONV. Load: 223.7

TEST RESULTS:

Failure Mode: Bearing failure at the north end both joists.

Applied Failure Load: 402 plf Total Failure Load: 417.4 plf

Load Factor (Failure Load/Service Load) 1. 3.30

2. 2.20

3. 1.87

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-Bottom chord yielding was observed at approximately 380 plf.

Test 40/3/40-38

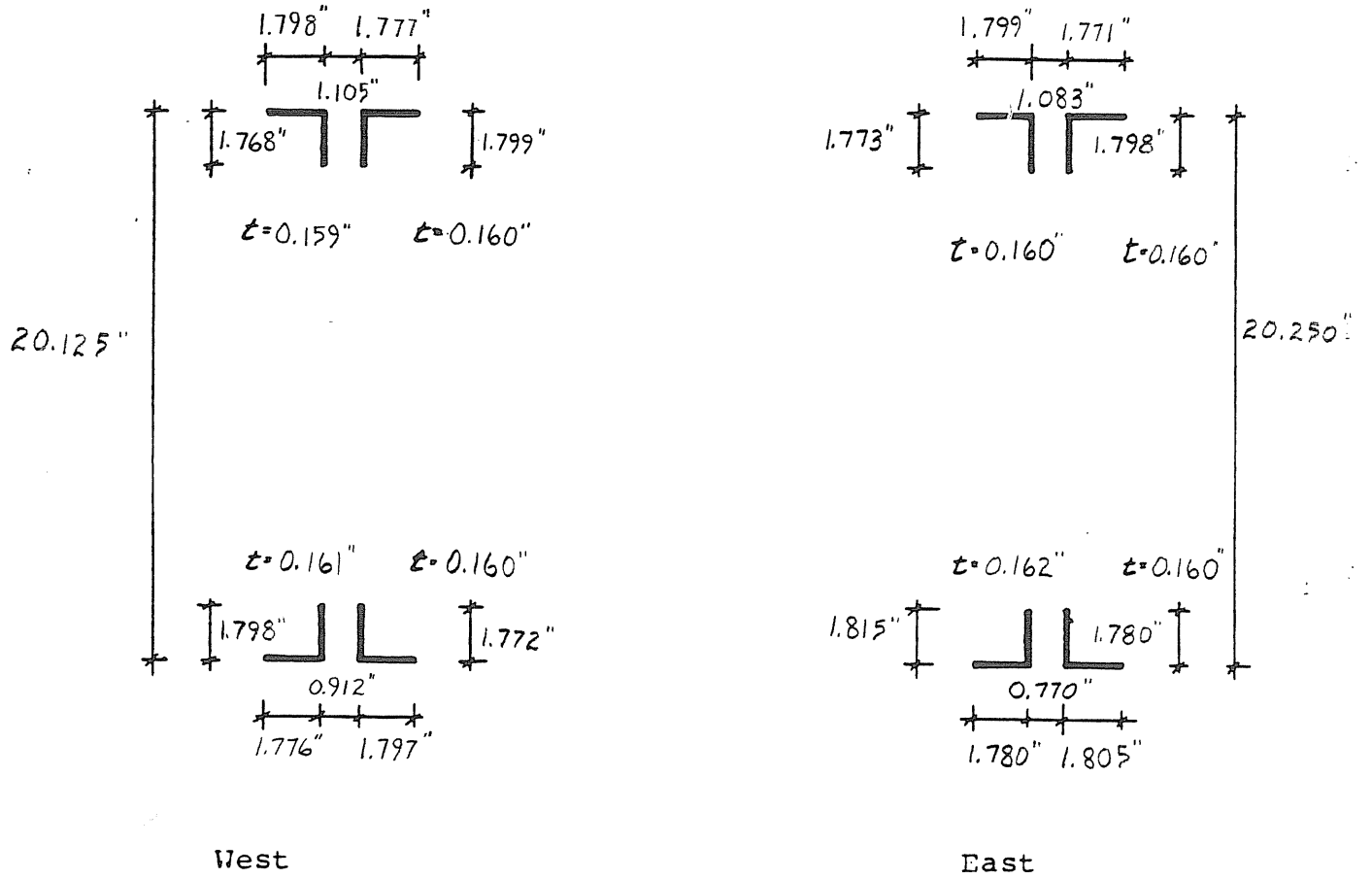


Figure F.5 Cross-Section Properties, Test 40/3/40-38

TEST # 40/3/40-38E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.799	RIGHT HORZ LEG (in) =	1.771
LEFT VER LEG (in) =	1.773	RIGHT VER LEG (in) =	1.798
LEFT THICKNESS (in) =	0.160	RIGHT THICKNESS (in) =	0.160
GAP BETWEEN THE LEGS (in) =	1.083		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.780	RIGHT HORZ LEG (in) =	1.805
LEFT VER LEG (in) =	1.815	RIGHT VER LEG (in) =	1.780
LEFT THICKNESS (in) =	0.162	RIGHT THICKNESS (in) =	0.160
GAP BETWEEN THE LEGS (in) =	0.770		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.333	in^4	Iy =	1.528	in^4
rx =	0.552	in	ry =	1.183	in
A =	1.091	in^2	J =	0.009	in^2
x =	2.333	in	y =	0.493	in

BOTTOM CHORD

Ix =	0.342	in^4	Iy =	1.217	in^4
rx =	0.556	in	ry =	1.050	in
A =	1.104	in^2	J =	0.010	in^2
x =	2.165	in	y =	0.527	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross =	203.67 (in^4)	# ROWS BRIDGING =	3.00
JOIST DEPTH =	20.25 (in)	EFF. DEPTH =	19.23 (in.)
SPAN LENGTH =	39.88 (ft)	DEF @ 100 plf =	0.96 (in)
BRIDGING SPACING =	10.00 (ft)	PANEL LENGTH =	24.00 (in)
K =	1.00	C =	106.79
KL/ry =	101.40	KL/rx =	43.45
b/t RATIO =	11.24	Q =	0.98
MEA. YIELD STR. =	51.20 (ksi)	MEA. FAILURE LOAD =	417.20 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.4	15.7	25.2	126.6	3.30
SJI	21.6	23.5	37.7	189.8	2.20
CONV	25.4	27.7	44.5	223.7	1.87

FIGURE F.6a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-38E

TEST # 40/3/40-38W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.798	RIGHT HORZ LEG (in) =	1.777
LEFT VER LEG (in) =	1.768	RIGHT VER LEG (in) =	1.799
LEFT THICKNESS (in) =	0.159	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 1.105

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.776	RIGHT HORZ LEG (in) =	1.797
LEFT VER LEG (in) =	1.798	RIGHT VER LEG (in) =	1.772
LEFT THICKNESS (in) =	0.161	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.912

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.331	in^4	Iy =	1.553	in^4
rx =	0.552	in	ry =	1.194	in
A =	1.088	in^2	J =	0.009	in^2
x =	2.350	in	y =	0.489	in

BOTTOM CHORD

Ix =	0.334	in^4	Iy =	1.348	in^4
rx =	0.552	in	ry =	1.109	in
A =	1.095	in^2	J =	0.009	in^2
x =	2.234	in	y =	0.518	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 200.16 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 20.13 (in)	EFF. DEPTH	=	19.12	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.98	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.90	
KL/ry	= 100.46	KL/rx	=	43.50	
b/t RATIO	= 11.31	Q	=	0.98	
MEA. YIELD STR.	= 51.20 (ksi)	MEA. FAILURE LOAD	=	417.20	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.6	15.9	25.3	127.4	3.28
SJI	22.9	24.9	39.7	199.8	2.09
CONV	25.4	27.6	44.0	221.3	1.89

FIGURE F.6b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-38W

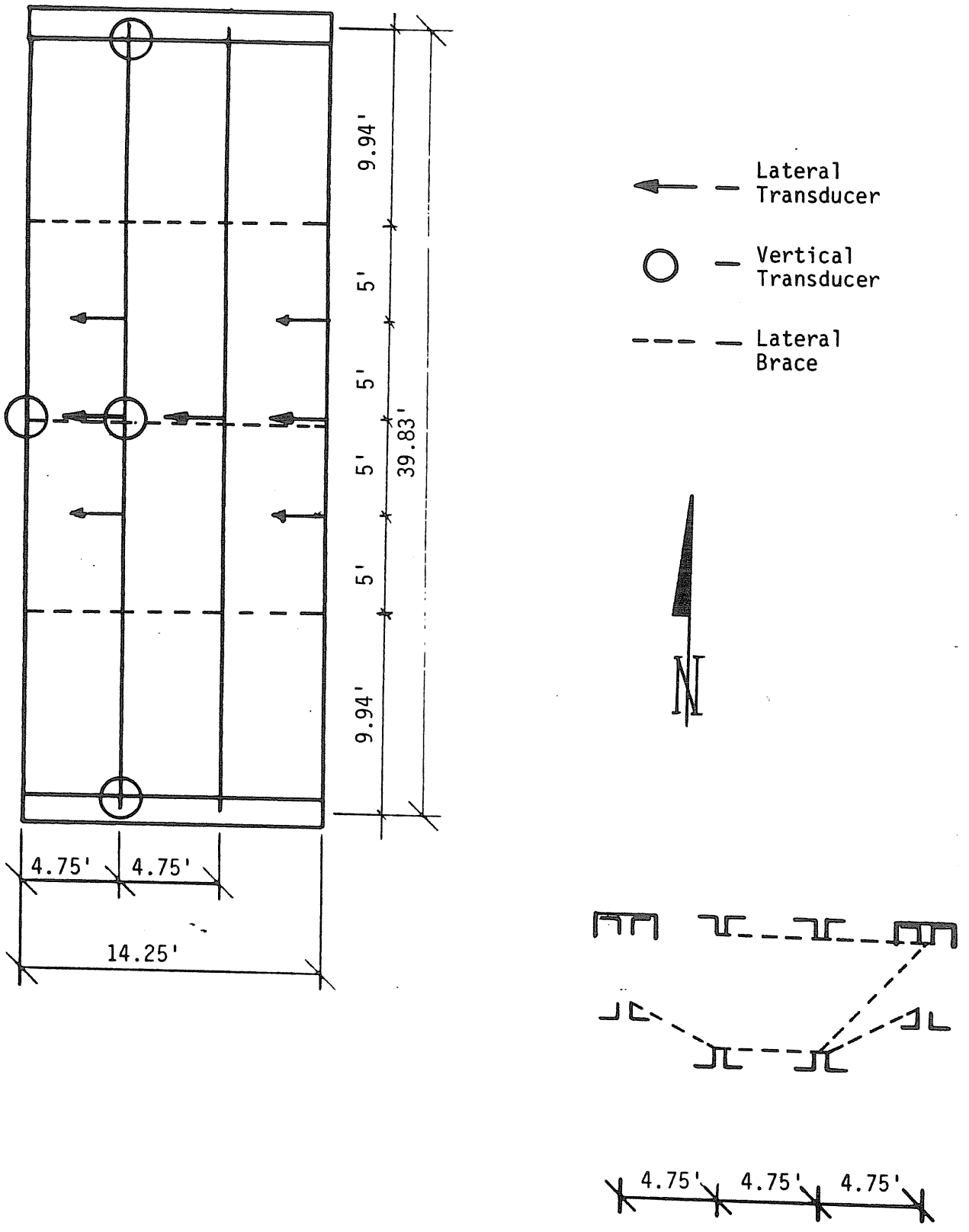
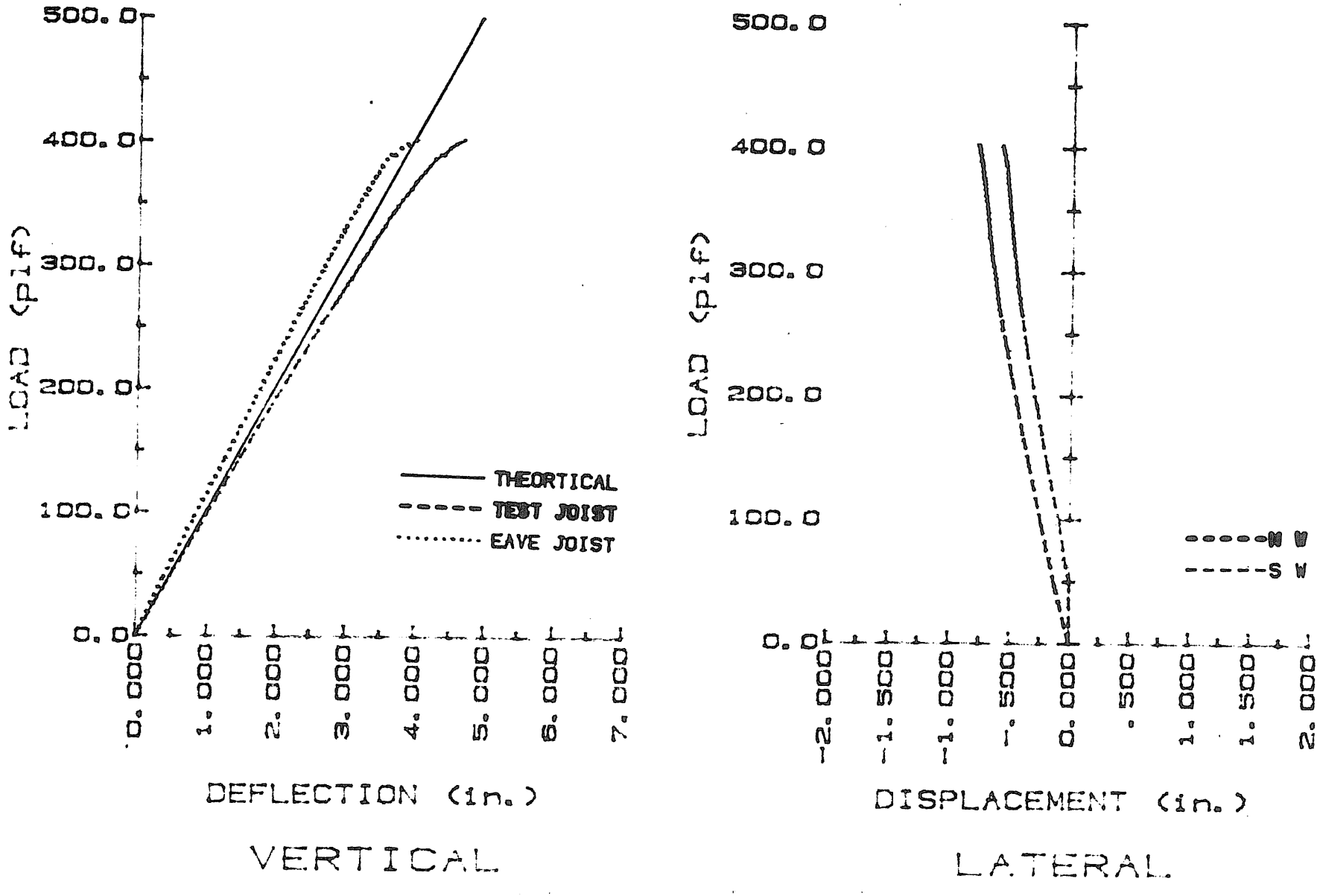


Figure F.7 Plan View of Test Setup, Test 40/3/40-38



40,3,40-38

Figure F.8 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-39

JOIST DESCRIPTION:

Joist Type: 20H223 Load: 40 (psf)

Moment of Inertia: 199.2"^{4} Δ" @ 100 plf 0.985

Dead Load of Joist: 9.1 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 15.4 plf

TEST PARAMETERS:

Span Length: 39.88' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 127.4

2 Method: SJI Load: 196.2

3 Method: CONV. Load: 222.8

TEST RESULTS:

Failure Mode: Top chord lateral buckling 2 ft. south of centerline west joist.

Applied Failure Load: 370.5 plf Total Failure Load: 385.9 plf

Load Factor (Failure Load/Service Load) 1. 3.03

2. 1.97

3. 1.73

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

Test 40/3/40-39

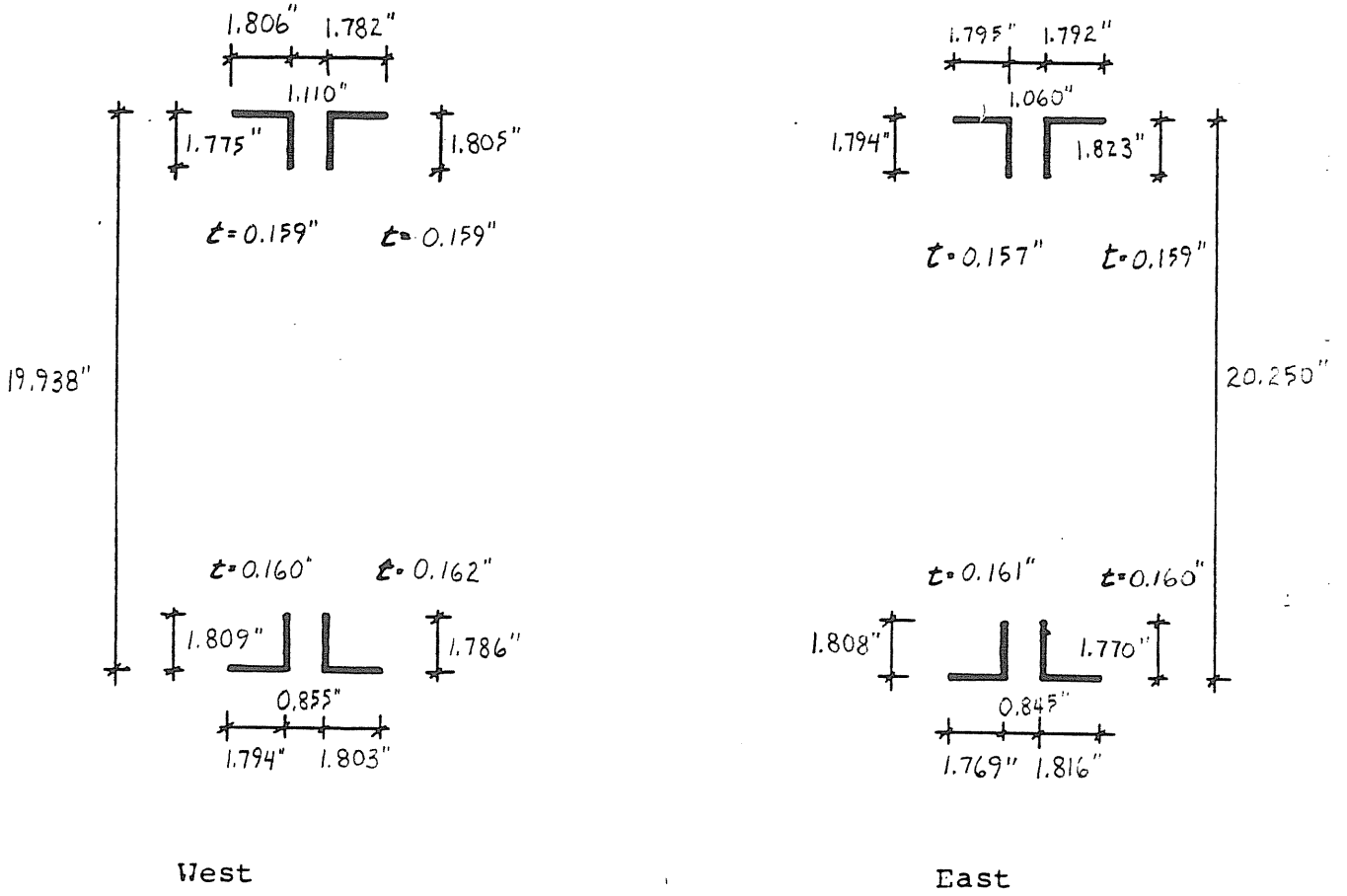


Figure F.9 Cross-Section Properties, Test 40/3/40-39

TEST # 40/3/40-39E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.795	RIGHT HORZ LEG (in) =	1.792
LEFT VER LEG (in) =	1.794	RIGHT VER LEG (in) =	1.823
LEFT THICKNESS (in) =	0.157	RIGHT THICKNESS (in) =	0.159

GAP BETWEEN THE LEGS (in) = 1.060

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.769	RIGHT HORZ LEG (in) =	1.816
LEFT VER LEG (in) =	1.808	RIGHT VER LEG (in) =	1.770
LEFT THICKNESS (in) =	0.161	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.845

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.342	in^4	Iy =	1.500	in^4
rx =	0.561	in	ry =	1.174	in
A =	1.088	in^2	J =	0.009	in^2
x =	2.333	in	y =	0.498	in

BOTTOM CHORD

Ix =	0.336	in^4	Iy =	1.288	in^4
rx =	0.554	in	ry =	1.083	in
A =	1.098	in^2	J =	0.009	in^2
x =	2.201	in	y =	0.525	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 202.76 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 20.25 (in)	EFF. DEPTH	= 19.23	(in.)	
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 0.97	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 107.18		
KL/ry	= 102.21	KL/rx	= 42.81		
b/t RATIO	= 11.47	Q	= 0.97		
MEA. YIELD STR.	= 51.20 (ksi)	MEA. FAILURE LOAD	= 385.90	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.2	15.4	24.7	124.4	3.10
SJI	22.0	24.0	38.4	193.2	2.00
CONV	25.4	27.6	44.2	222.4	1.74

FIGURE F.10a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-39E

TEST # 40/3/40-39W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.806	RIGHT HORZ LEG (in) =	1.782
LEFT VER LEG (in) =	1.775	RIGHT VER LEG (in) =	1.805
LEFT THICKNESS (in) =	0.159	RIGHT THICKNESS (in) =	0.159
GAP BETWEEN THE LEGS (in) =	1.110		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.794	RIGHT HORZ LEG (in) =	1.803
LEFT VER LEG (in) =	1.809	RIGHT VER LEG (in) =	1.786
LEFT THICKNESS (in) =	0.160	RIGHT THICKNESS (in) =	0.162
GAP BETWEEN THE LEGS (in) =	0.855		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.334	in^4	Iy =	1.566	in^4
rx =	0.554	in	ry =	1.199	in
A =	1.089	in^2	J =	0.009	in^2
x =	2.356	in	y =	0.491	in

BOTTOM CHORD

Ix =	0.342	in^4	Iy =	1.313	in^4
rx =	0.556	in	ry =	1.089	in
A =	1.106	in^2	J =	0.010	in^2
x =	2.229	in	y =	0.520	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross = 197.31 (in^4)	# ROWS BRIDGING = 3.00		
JOIST DEPTH = 19.94 (in)	EFF. DEPTH = 18.93 (in.)		
SPAN LENGTH = 39.88 (ft)	DEF @ 100 plf = 0.99 (in)		
BRIDGING SPACING = 10.00 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 105.99		
KL/ry = 100.08	KL/rx = 43.33		
b/t RATIO = 11.36	Q = 0.97		
MEA. YIELD STR. = 52.40 (ksi)	MEA. FAILURE LOAD = 385.90 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.7	16.1	25.3	127.4	3.03
SJI	22.7	24.7	39.0	196.2	1.97
CONV	25.8	28.1	44.3	222.8	1.73

FIGURE F.10b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-39W

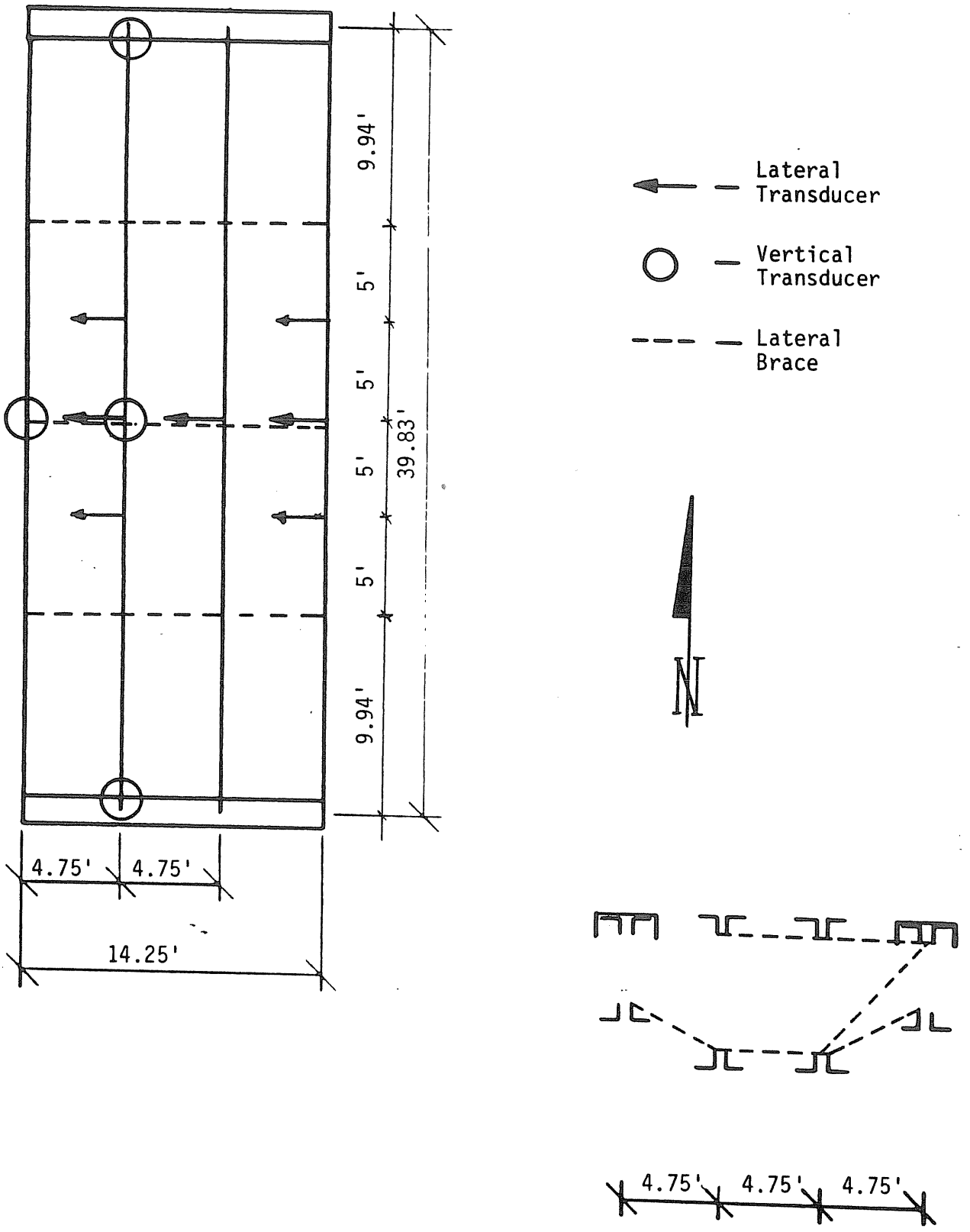
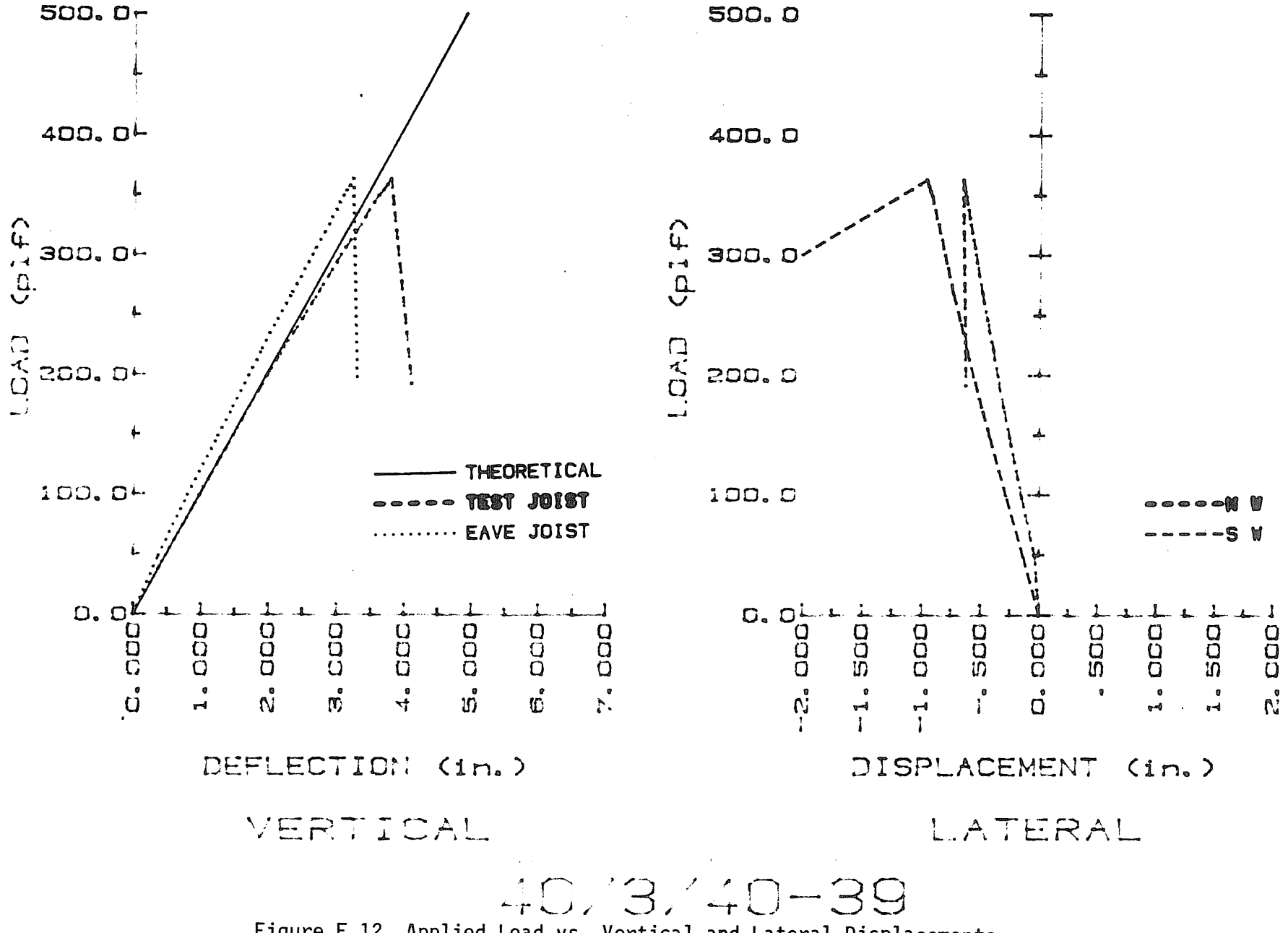


Figure F.11 Plan View of Test Setup, Test 40/3/40-39



40/3/40-39

Figure F.12 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-43

JOIST DESCRIPTION:

Joist Type: 20H225 Load: 40 (psf)

Moment of Inertia: 199.23 Δ" @ 100 plf 0.985

Dead Load of Joist: 9.1plf Dead Load of Panel: 6.33 plf

Total Dead Load: 15.4 plf

TEST PARAMETERS:

Span Length: 39'10½" Spacing: 4'9"

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: Centerline - 10'

Bottom Chord: Centerline

Others: Angle web joists. Diag. between the test joists.

CALCULATED SERVICE LOADS:

Method: AISC Load: 119.0

Method: SJI Load: 190.8

Method: CONV. Load: 237.5

TEST RESULTS:

Failure Mode: Lateral buckling of top chord at 4' south of midspan of both test joists.

Applied Failure Load: 366.96 plf Total Failure Load: 382.4

Load Factor (Failure Load/Service Load): [1] 3.21

[2] 2.00

[3] 1.61

DISCUSSION:

Test 40/3/40-43

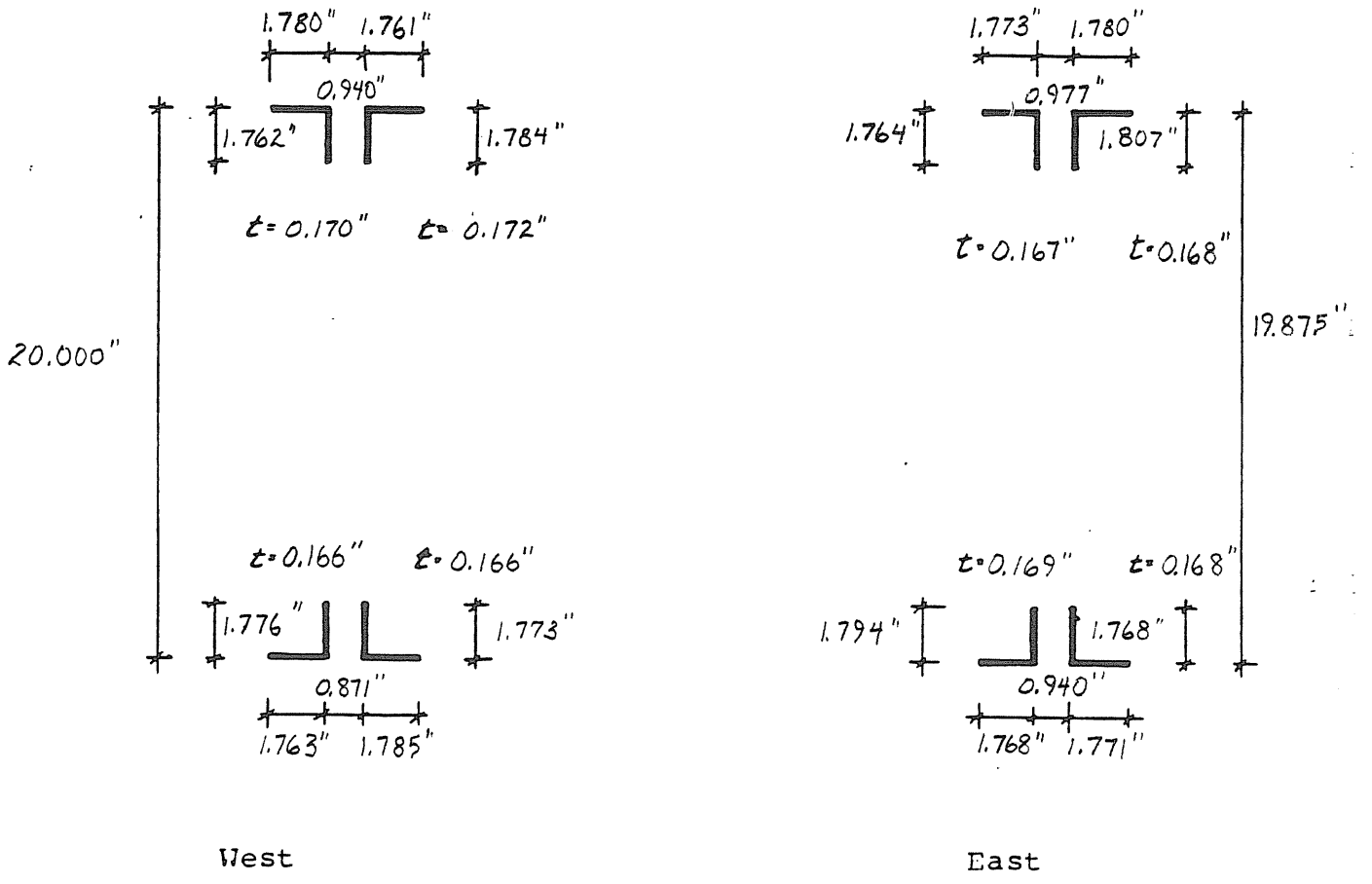


Figure F.13 Cross-Section Properties, Test 40/3/40-43

TEST # 40/3/40-43E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.773	RIGHT HORZ LEG (in) =	1.780
LEFT VER LEG (in) =	1.764	RIGHT VER LEG (in) =	1.807
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.168
GAP BETWEEN THE LEGS (in) =	0.977		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.768	RIGHT HORZ LEG (in) =	1.771
LEFT VER LEG (in) =	1.794	RIGHT VER LEG (in) =	1.768
LEFT THICKNESS (in) =	0.169	RIGHT THICKNESS (in) =	0.168
GAP BETWEEN THE LEGS (in) =	0.940		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.346	in^4	Iy =	1.463	in^4
rx =	0.552	in	ry =	1.134	in
A =	1.137	in^2	J =	0.011	in^2
x =	2.270	in	y =	0.488	in

BOTTOM CHORD

Ix =	0.345	in^4	Iy =	1.418	in^4
rx =	0.550	in	ry =	1.116	in
A =	1.140	in^2	J =	0.011	in^2
x =	2.234	in	y =	0.522	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 203.29 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 19.88 (in)	EFF. DEPTH	=	18.87	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.96	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	107.11	
KL/ry	= 105.79	KL/rx	=	43.48	
b/t RATIO	= 10.76	Q	=	1.00	
MEA. YIELD STR.	= 49.90 (ksi)	MEA. FAILURE LOAD	=	382.40	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	13.3	15.2	23.8	120.0	3.19
SJI	21.9	24.9	39.2	197.1	1.94
CONV	25.3	28.8	45.2	227.5	1.68

FIGURE F.14a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-43E

TEST # 40/3/40-43W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.780	RIGHT HORZ LEG (in) =	1.761
LEFT VER LEG (in) =	1.762	RIGHT VER LEG (in) =	1.784
LEFT THICKNESS (in) =	0.170	RIGHT THICKNESS (in) =	0.172
GAP BETWEEN THE LEGS (in) =	0.940		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.763	RIGHT HORZ LEG (in) =	1.785
LEFT VER LEG (in) =	1.776	RIGHT VER LEG (in) =	1.773
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.166
GAP BETWEEN THE LEGS (in) =	0.871		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.345	in^4	Iy =	1.441	in^4
rx =	0.547	in	ry =	1.118	in
A =	1.153	in^2	J =	0.011	in^2
x =	2.251	in	y =	0.496	in

BOTTOM CHORD

Ix =	0.337	in^4	Iy =	1.329	in^4
rx =	0.548	in	ry =	1.088	in
A =	1.123	in^2	J =	0.010	in^2
x =	2.205	in	y =	0.506	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 206.19 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 20.00 (in)	EFF. DEPTH	=	19.00	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.95	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.63	
KL/ry	= 107.37	KL/rx	=	43.89	
b/t RATIO	= 10.47	Q	=	1.00	
MEA. YIELD STR.	= 51.30 (ksi)	MEA. FAILURE LOAD	=	382.40	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	13.0	14.9	23.7	119.0	3.21
SJI	20.8	24.0	37.9	190.8	2.00
CONV	25.8	29.8	47.2	237.5	1.61

FIGURE F.14b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-43W

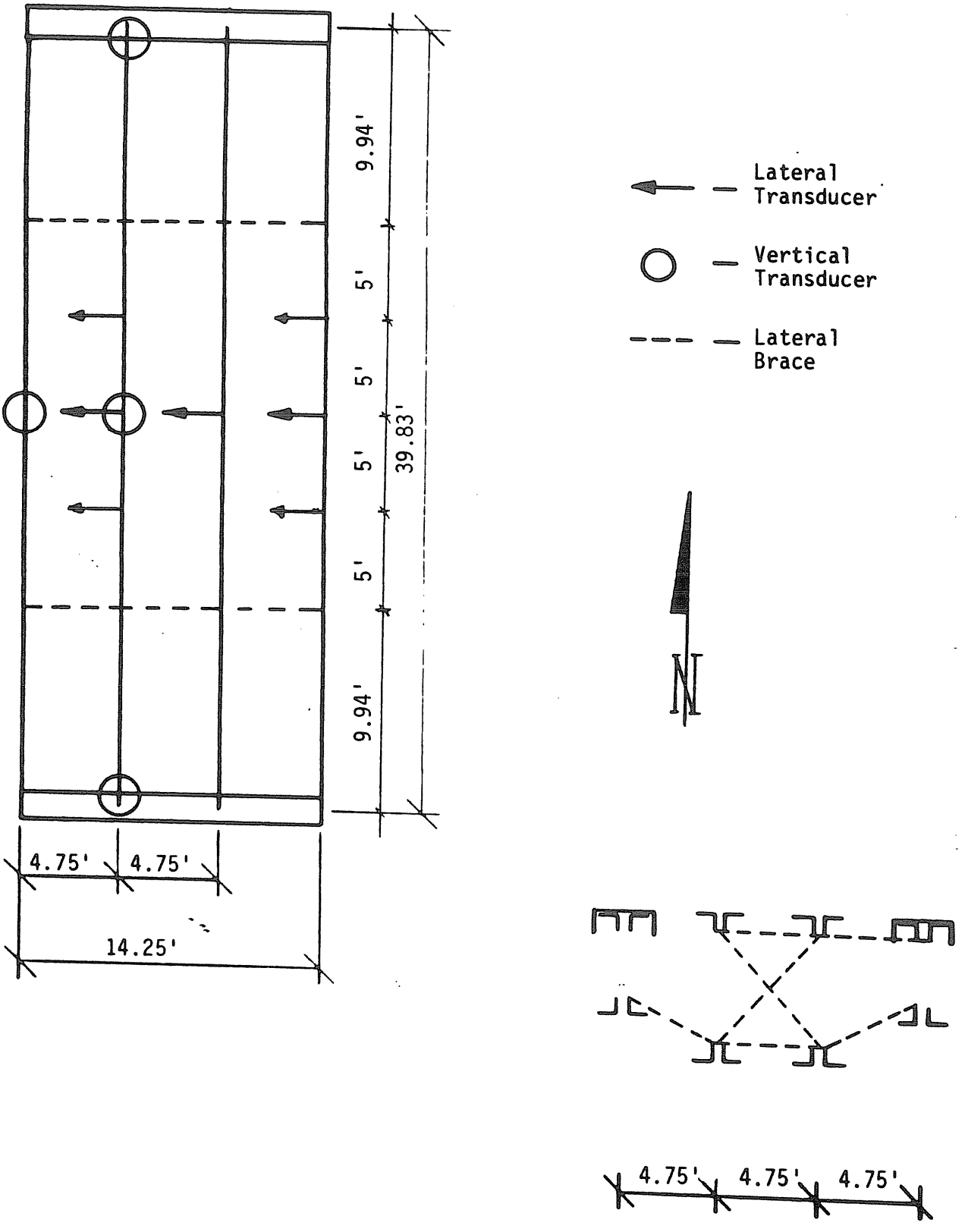
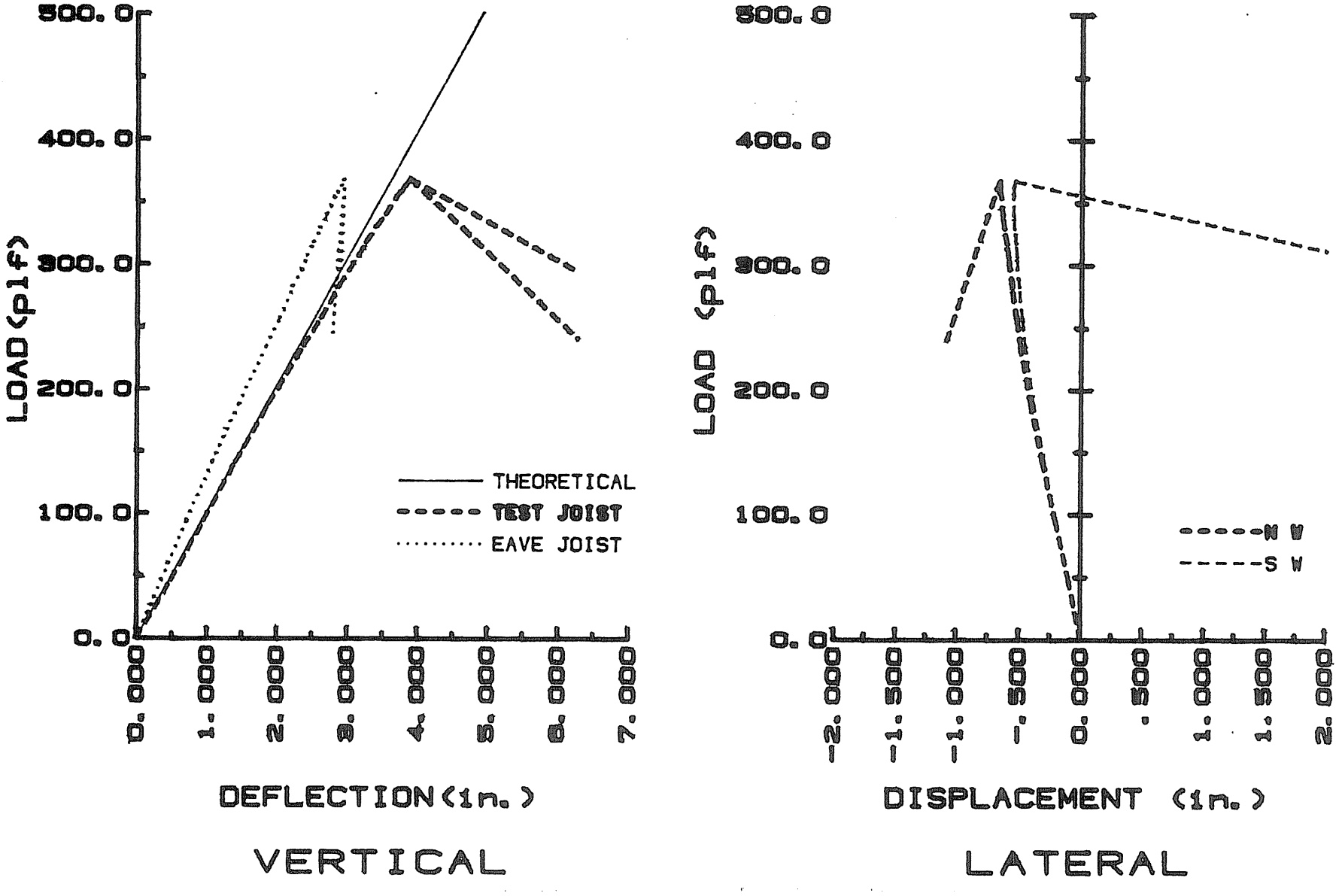


Figure F.15 Plan View of Test Setup, Test 40/3/40-43



40/3/40-43

Figure F.16 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-44

JOIST DESCRIPTION:

Joist Type: 20H225 Load: 40 (psf)

Moment of Inertia: 199.23 Δ" @ 100 plf 0.985

Dead Load of Joist: 9.1 plf Dead Load of Panel: 6.33 plf

Total Dead Load: 15.4 plf

TEST PARAMETERS:

Span Length: 39'10½" Spacing: 4'9"

Clip Type: 3" Insulation Yes

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: Centerline - 10'

Bottom Chord: Centerline

Others: Angle web joist, diag. between the test joists.

CALCULATED SERVICE LOADS:

Method: AISC Load: 133.1

Method: SJI Load: 202.0

Method: CONV. Load: 232.1

TEST RESULTS:

Failure Mode: Lateral torsional buckling of top chord of both joists (4' south of midspan).

Applied Failure Load: 360.9 plf Total Failure Load: 376.3 plf

Load Factor (Failure Load/Service Load): [1] 2.83

[2] 1.86

[3] 1.62

DISCUSSION:

-Failed at 15.6 inches of water.

Test 40/3/40-44

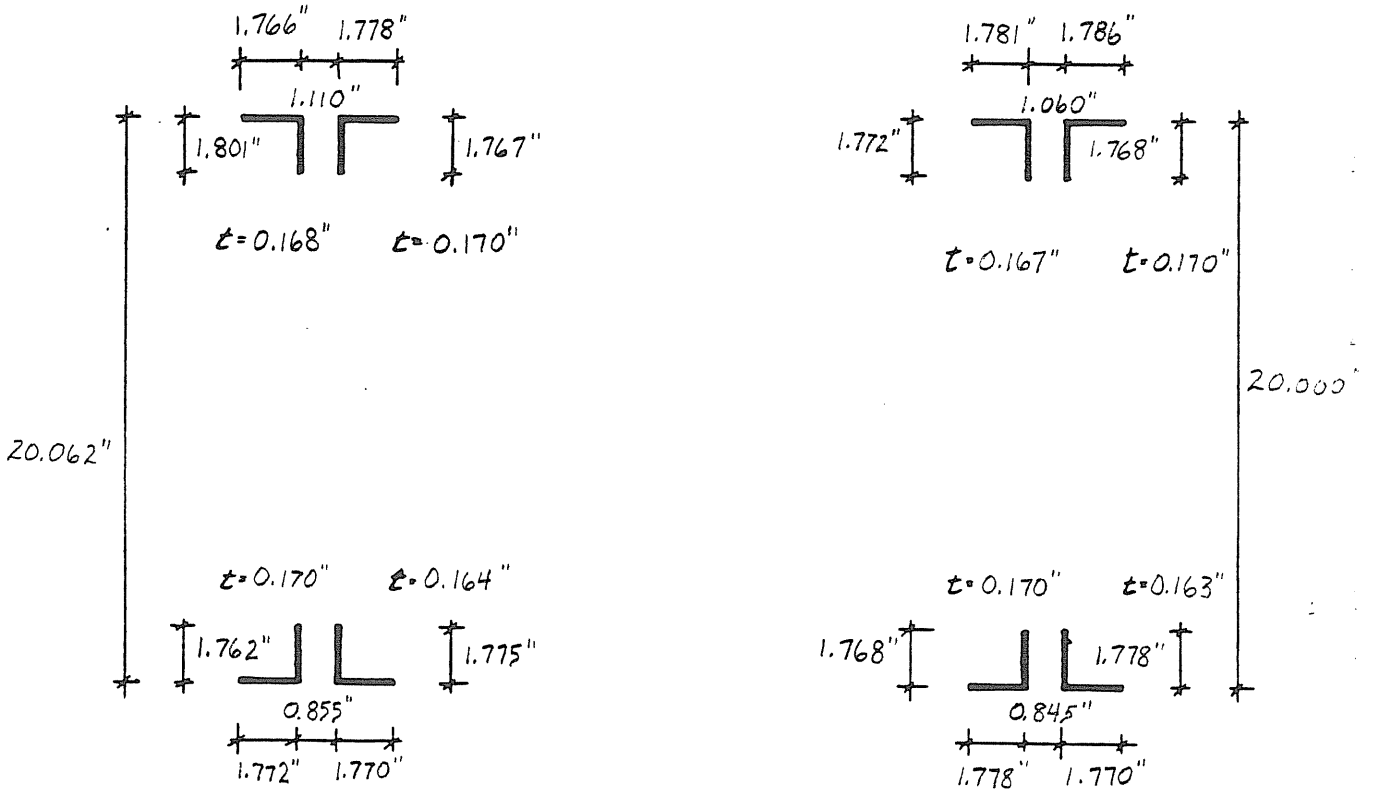


Figure F.17 Cross-Section Properties, Test 40/3/40-44

TEST # 40/3/40-44E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.781	RIGHT HORZ LEG (in) =	1.786
LEFT VER LEG (in) =	1.772	RIGHT VER LEG (in) =	1.768
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.170
GAP BETWEEN THE LEGS (in) =	1.060		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.778	RIGHT HORZ LEG (in) =	1.770
LEFT VER LEG (in) =	1.768	RIGHT VER LEG (in) =	1.778
LEFT THICKNESS (in) =	0.170	RIGHT THICKNESS (in) =	0.163
GAP BETWEEN THE LEGS (in) =	0.845		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.339	in^4	Iy =	1.577	in^4
rx =	0.546	in	ry =	1.176	in
A =	1.139	in^2	J =	0.011	in^2
x =	2.320	in	y =	0.505	in

BOTTOM CHORD

Ix =	0.337	in^4	Iy =	1.306	in^4
rx =	0.547	in	ry =	1.077	in
A =	1.126	in^2	J =	0.010	in^2
x =	2.179	in	y =	0.500	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 205.00 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 20.00 (in)	EFF. DEPTH	= 19.00	(in.)	
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 0.96	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 107.65		
KL/ry	= 102.00	KL/rx	= 43.99		
b/t RATIO	= 10.66	Q	= 1.00		
MEA. YIELD STR.	= 49.40 (ksi)	MEA. FAILURE LOAD	= 376.30	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.2	16.2	25.6	128.9	2.92
SJI	21.8	24.8	39.3	197.6	1.90
CONV	25.0	28.5	45.1	226.8	1.66

FIGURE F.18a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-44E

TEST # 40/3/40-44W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.766	RIGHT HORZ LEG (in) =	1.778
LEFT VER LEG (in) =	1.801	RIGHT VER LEG (in) =	1.767
LEFT THICKNESS (in) =	0.168	RIGHT THICKNESS (in) =	0.170
GAP BETWEEN THE LEGS (in) =	1.110		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.772	RIGHT HORZ LEG (in) =	1.770
LEFT VER LEG (in) =	1.762	RIGHT VER LEG (in) =	1.775
LEFT THICKNESS (in) =	0.170	RIGHT THICKNESS (in) =	0.164
GAP BETWEEN THE LEGS (in) =	0.855		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.348	in^4	Iy =	1.625	in^4
rx =	0.551	in	ry =	1.191	in
A =	1.145	in^2	J =	0.011	in^2
x =	2.328	in	y =	0.527	in

BOTTOM CHORD

Ix =	0.335	in^4	Iy =	1.315	in^4
rx =	0.546	in	ry =	1.080	in
A =	1.126	in^2	J =	0.010	in^2
x =	2.183	in	y =	0.497	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 206.48 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 20.06 (in)	EFF. DEPTH	=	19.04	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.95	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.89	
KL/ry	= 100.72	KL/rx	=	43.55	
b/t RATIO	= 10.72	Q	=	1.00	
MEA. YIELD STR.	= 50.10 (ksi)	MEA. FAILURE LOAD	=	376.30	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.5	16.6	26.4	132.9	2.83
SJI	22.1	25.3	40.1	201.6	1.87
CONV	25.4	29.0	46.1	231.7	1.62

FIGURE F.18b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-44W

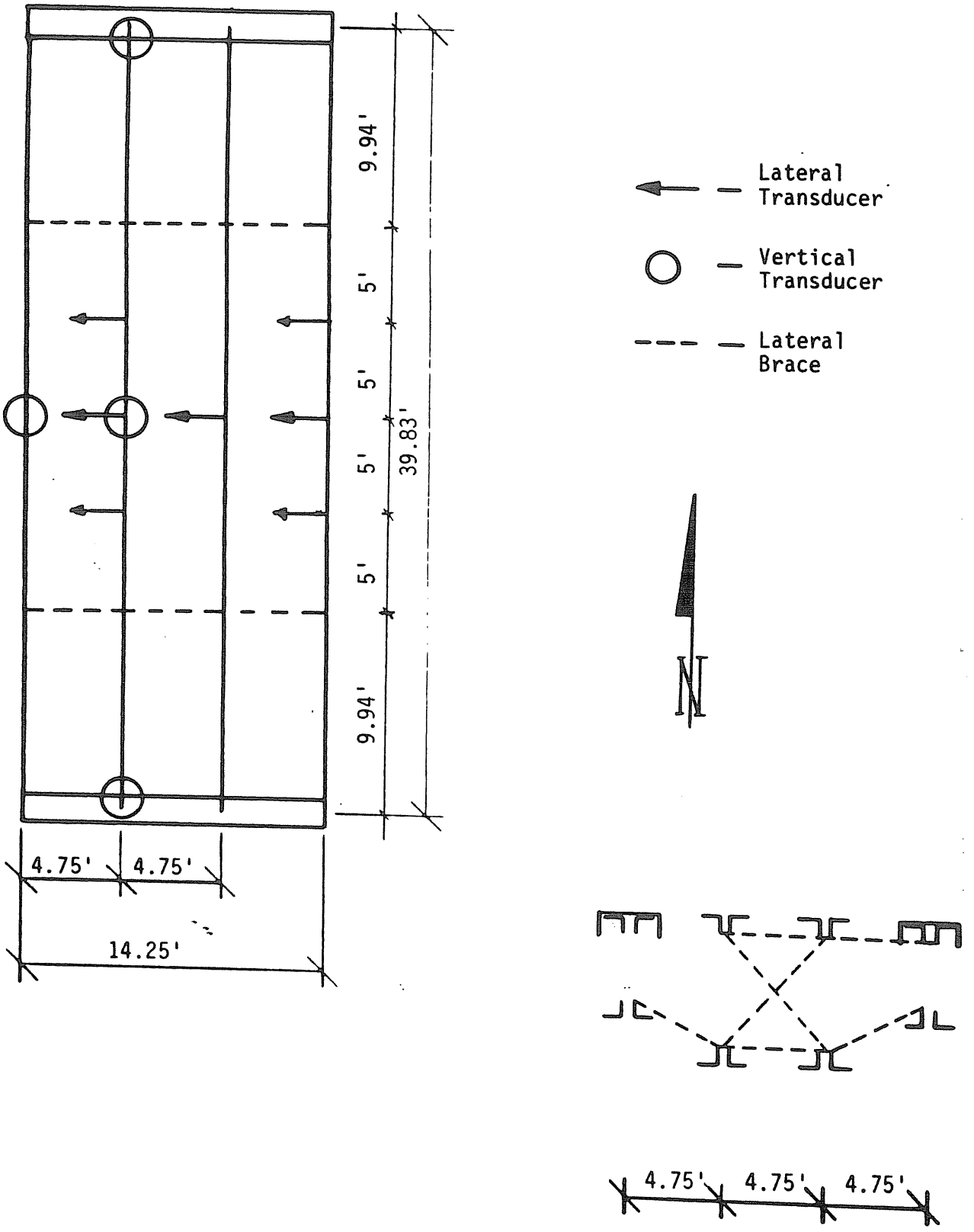
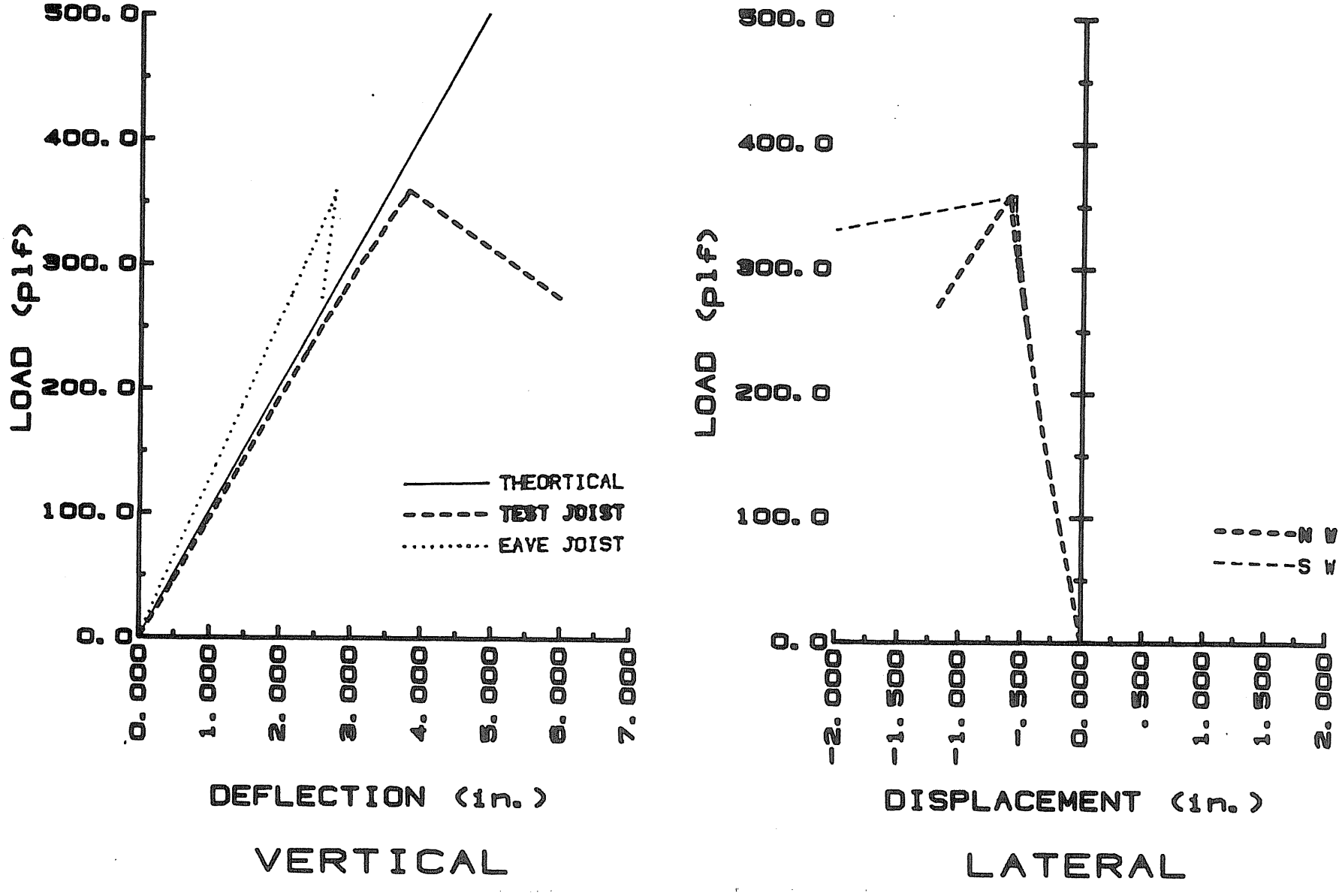


Figure F.19 Plan View of Test Setup, Test 40/3/40-44



40/3/40-44

Figure F.20 Applied Load vs. Vertical and Lateral Displacements

Test No. 40/3/40-46

JOIST DESCRIPTION:

Joist Type: 20H225 Load: 40 (psf)

Moment of Inertia: 199.2"^{4} Δ" @ 100 plf 0.985

Dead Load of Joist: 9.1 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 15.4 plf

TEST PARAMETERS:

Span Length: 39'10½" Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 1

Bridging Spacing:

Top Chord: 0'-10'

Bottom Chord: 0'

Others:

CALCULATED SERVICE LOADS:

Method: AISC Load: 118.2

Method: SJI Load: 199.6

Method: CONV. Load: 230.5

TEST RESULTS:

Failure Mode: Lateral torsional buckling of top chord 5' north of midspan of west joist.

Applied Failure Load: 331.9 Total Failure Load: 347.3

Load Factor (Failure Load/Service Load): [1] 2.94

[2] 1.74

[3] 1.51

DISCUSSION:

Test 40/3/40-46

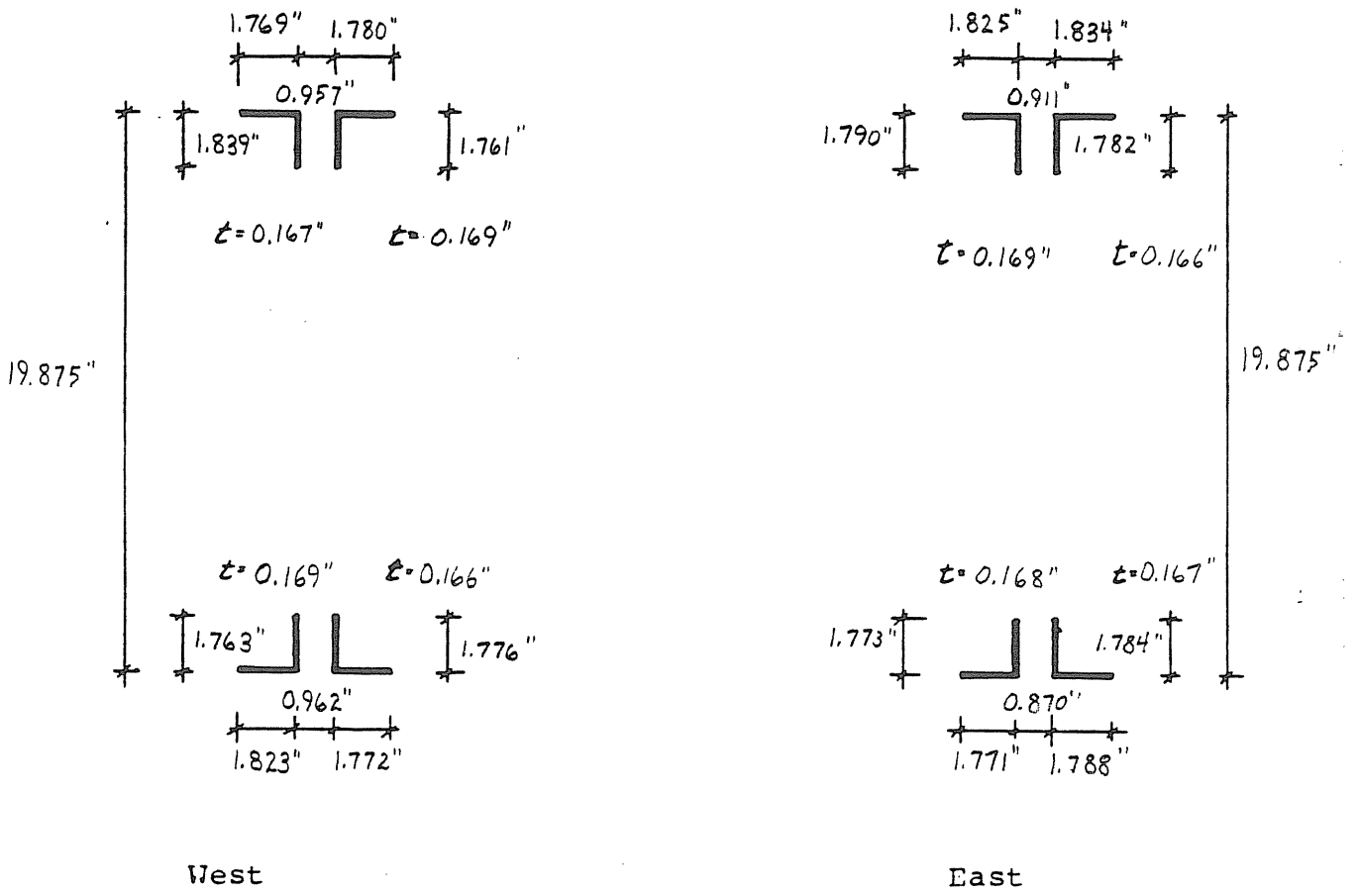


Figure F.21 Cross-Section Properties, Test 40/3/40-46

TEST # 40/3/40-46E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.825	RIGHT HORZ LEG (in) =	1.834
LEFT VER LEG (in) =	1.790	RIGHT VER LEG (in) =	1.782
LEFT THICKNESS (in) =	0.169	RIGHT THICKNESS (in) =	0.166
GAP BETWEEN THE LEGS (in) =	0.911		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.771	RIGHT HORZ LEG (in) =	1.788
LEFT VER LEG (in) =	1.773	RIGHT VER LEG (in) =	1.784
LEFT THICKNESS (in) =	0.168	RIGHT THICKNESS (in) =	0.167
GAP BETWEEN THE LEGS (in) =	0.870		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.349	in^4	Iy =	1.481	in^4
rx =	0.550	in	ry =	1.132	in
A =	1.155	in^2	J =	0.011	in^2
x =	2.274	in	y =	0.507	in

BOTTOM CHORD

Ix =	0.342	in^4	Iy =	1.350	in^4
rx =	0.549	in	ry =	1.090	in
A =	1.136	in^2	J =	0.011	in^2
x =	2.210	in	y =	0.501	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 204.72 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 19.88 (in)	EFF. DEPTH	=	18.87	(in.)
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	=	0.96	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.62	
KL/ry	= 105.99	KL/rx	=	43.65	
b/t RATIO	= 11.05	Q	=	0.99	
MEA. YIELD STR.	= 51.00 (ksi)	MEA. FAILURE LOAD	=	347.30	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	13.3	15.4	24.1	121.4	2.86
SJI	21.2	24.5	38.5	193.5	1.79
CONV	25.5	29.4	46.3	232.7	1.49

FIGURE F.22a COMPUTED ALLOWABLE LOADS, TEST 40/3/40-46E

TEST # 40/3/40-46W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.769	RIGHT HORZ LEG (in) =	1.780
LEFT VER LEG (in) =	1.839	RIGHT VER LEG (in) =	1.761
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.169
GAP BETWEEN THE LEGS (in) =	0.957		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.823	RIGHT HORZ LEG (in) =	1.772
LEFT VER LEG (in) =	1.763	RIGHT VER LEG (in) =	1.776
LEFT THICKNESS (in) =	0.169	RIGHT THICKNESS (in) =	0.166
GAP BETWEEN THE LEGS (in) =	0.962		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.357	in^4	Iy =	1.443	in^4
rx =	0.558	in	ry =	1.123	in
A =	1.145	in^2	J =	0.011	in^2
x =	2.251	in	y =	0.554	in

BOTTOM CHORD

Ix =	0.338	in^4	Iy =	1.481	in^4
rx =	0.545	in	ry =	1.140	in
A =	1.139	in^2	J =	0.011	in^2
x =	2.279	in	y =	0.494	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 203.03 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 19.88 (in)	EFF. DEPTH	= 18.83	(in.)	
SPAN LENGTH	= 39.88 (ft)	DEF @ 100 plf	= 0.97	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 106.73		
KL/ry	= 106.86	KL/rx	= 42.99		
b/t RATIO	= 11.01	Q	= 0.99		
MEA. YIELD STR.	= 50.80 (ksi)	MEA. FAILURE LOAD	= 347.30	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	13.1	15.0	23.5	118.2	2.94
SJI	22.1	25.3	39.7	199.6	1.74
CONV	25.5	29.2	45.8	230.5	1.51

FIGURE F.22b COMPUTED ALLOWABLE LOADS, TEST 40/3/40-46W

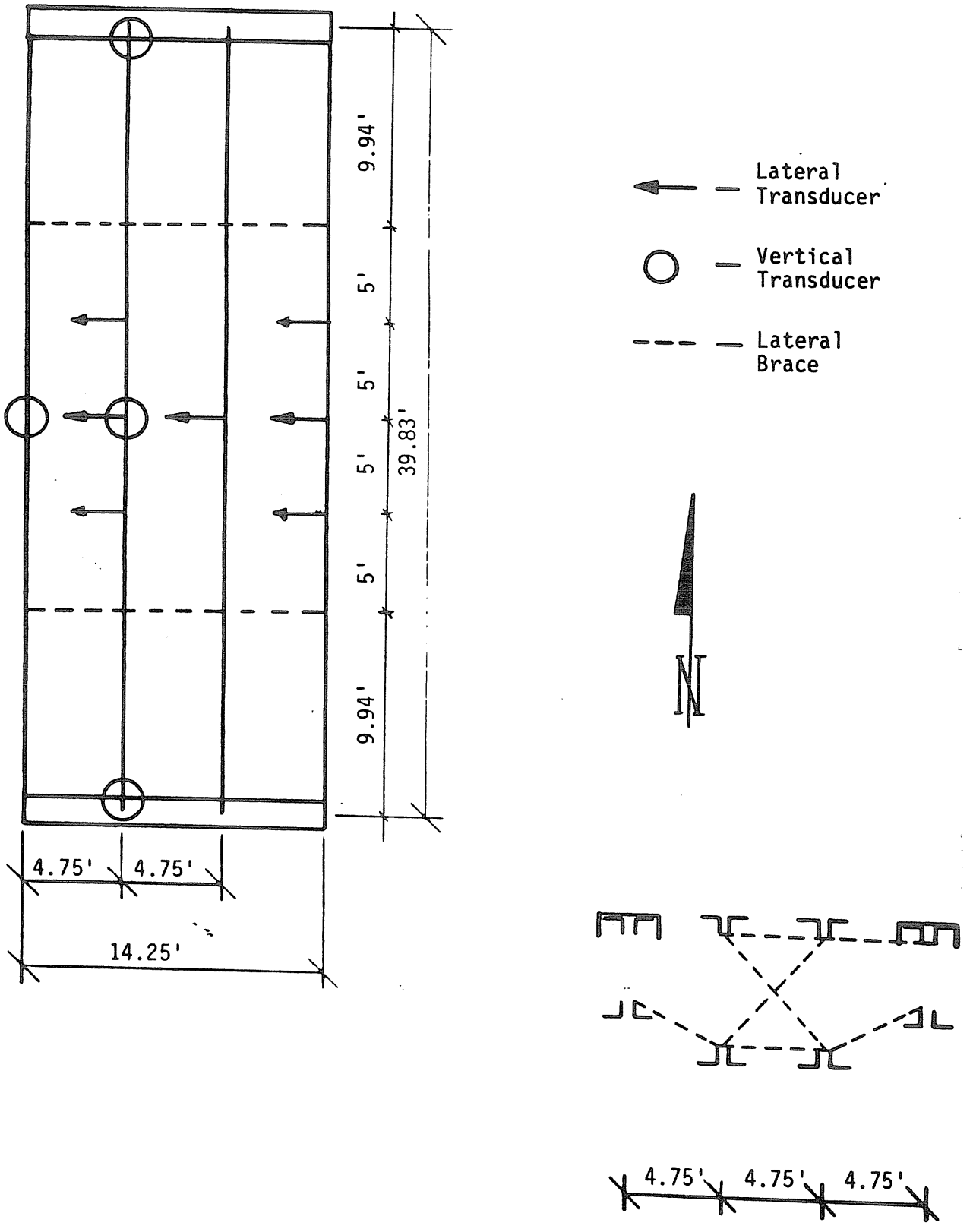
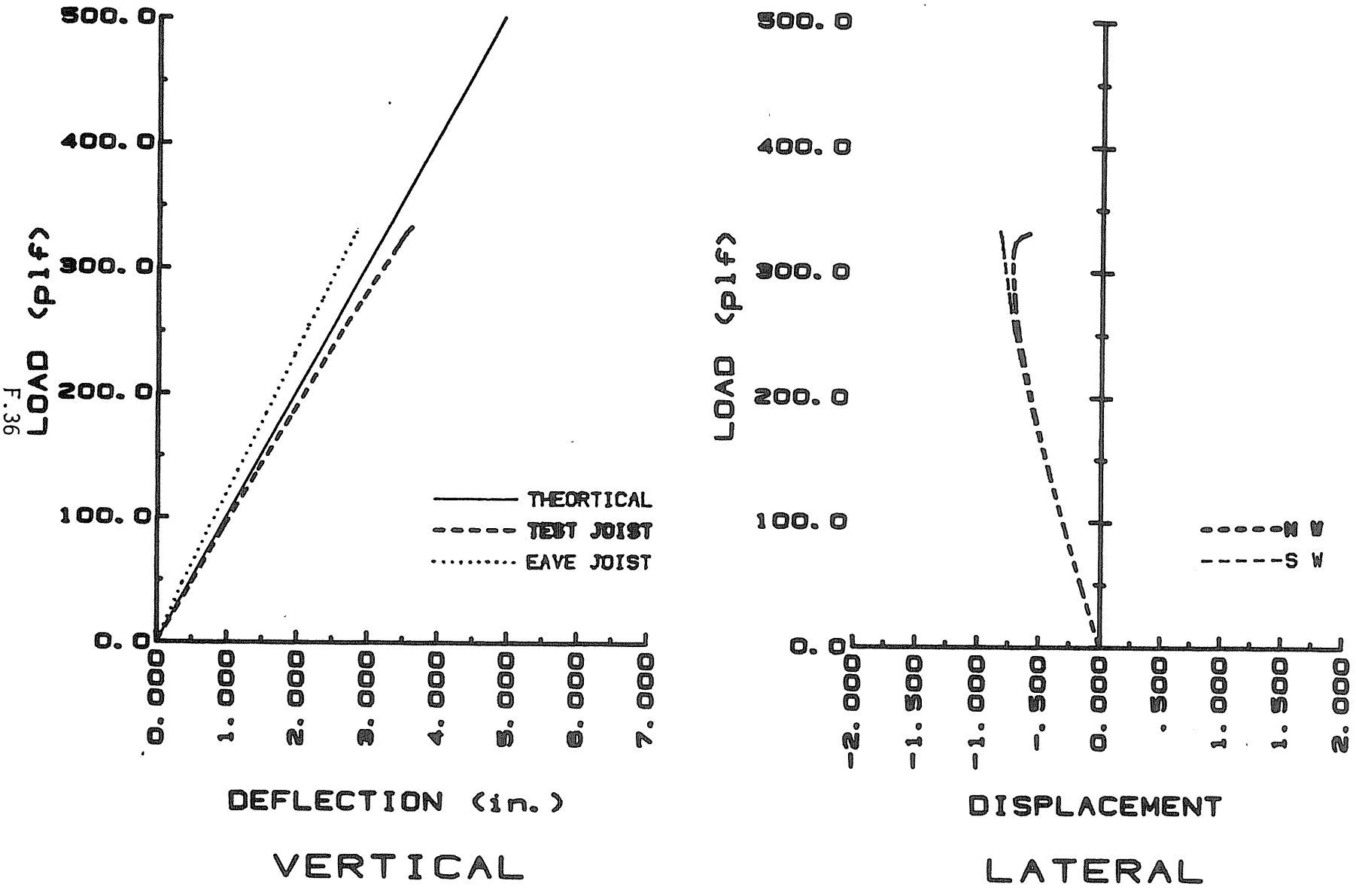


Figure F.23 Plan View of Test Setup, Test 40/3/40-46



40/3/40-46

Figure F.24 Applied Load vs. Vertical and Lateral Displacements

APPENDIX G

50 ft. Span, 40 psf ANGLE WEB TEST RESULTS

Test No. 50/3/40-27

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.6"^{4} Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 7 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-4'7"-4'10"-5'9"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel attached to east channel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 222.2
2. Method: SJI Load: 288.1
3. Method: CONV. Load: 231.0

TEST RESULTS:

Failure Mode: Test was completed when a load of 317 plf was reached.

Applied Failure Load: 317.1 plf Total Failure Load: 334.2 plf

Load Factor (Failure Load/Service Load) 1. 1.50

2. 1.16

3. 1.45

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-There was a residual vertical deflection of 0.20 in.

Test 50/3/40-27

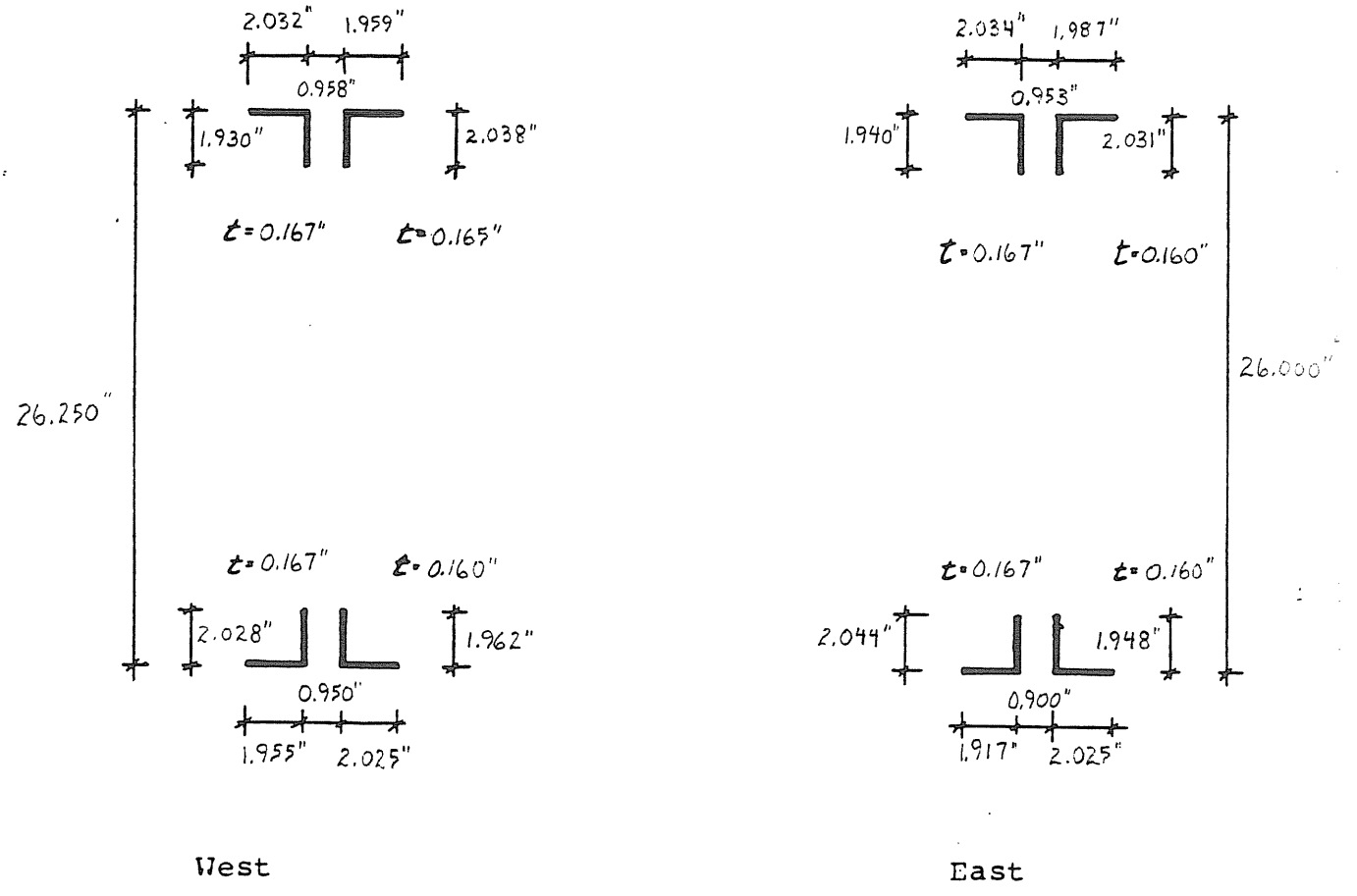


Figure G.1 Cross-Section Properties, Test 50/3/40-27

TEST # 50/3/40-27E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.034	RIGHT HORZ LEG (in) =	1.987
LEFT VER LEG (in) =	1.940	RIGHT VER LEG (in) =	2.031
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.953

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.917	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	2.044	RIGHT VER LEG (in) =	1.948
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.900

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.477	in^4	Iy =	1.852	in^4
rx =	0.617	in	ry =	1.216	in
A =	1.253	in^2	J =	0.011	in^2
x =	2.479	in	y =	0.509	in

BOTTOM CHORD

Ix =	0.483	in^4	Iy =	1.708	in^4
rx =	0.623	in	ry =	1.172	in
A =	1.244	in^2	J =	0.011	in^2
x =	2.373	in	y =	0.611	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 387.38 (in^4)	# ROWS BRIDGING	=	7.00	
JOIST DEPTH	= 26.00 (in)	EFF. DEPTH	=	24.88	(in.)
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	=	1.21	(in)
BRIDGING SPACING	= 4.60 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.97	
KL/ry	= 45.40	KL/rx	=	38.89	
b/t RATIO	= 12.69	Q	=	0.92	
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	=	334.20	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	25.5	31.9	66.2	215.4	1.55
SJI	33.4	41.8	86.7	282.1	1.18
CONV	26.4	33.1	68.7	223.6	1.49

FIGURE G.2a COMPUTED ALLOWABLE LOADS, TEST 50/3/40-27E

TEST # 50/3/40-27W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.032	RIGHT HORZ LEG (in) =	1.959
LEFT VER LEG (in) =	1.930	RIGHT VER LEG (in) =	2.038
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.165
GAP BETWEEN THE LEGS (in) =	0.958		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.955	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	2.028	RIGHT VER LEG (in) =	1.962
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160
GAP BETWEEN THE LEGS (in) =	0.950		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.483	in^4	Iy =	1.858	in^4
rx =	0.618	in	ry =	1.211	in
A =	1.266	in^2	J =	0.012	in^2
x =	2.489	in	y =	0.502	in

BOTTOM CHORD

Ix =	0.481	in^4	Iy =	1.807	in^4
rx =	0.621	in	ry =	1.203	in
A =	1.250	in^2	J =	0.011	in^2
x =	2.425	in	y =	0.593	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 398.98 (in^4)	# ROWS BRIDGING	= 7.00		
JOIST DEPTH	= 26.25 (in)	EFF. DEPTH	= 25.16	(in.)	
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	= 1.18	(in)	
BRIDGING SPACING	= 4.60 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 105.31		
KL/ry	= 45.57	KL/rx	= 38.84		
b/t RATIO	= 12.35	Q	= 0.93		
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	= 334.20	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	25.7	32.6	68.3	222.2	1.50
SJI	33.4	42.2	88.5	288.1	1.16
CONV	26.7	33.9	71.0	231.0	1.45

FIGURE G.2b COMPUTED ALLOWABLE LOADS, TEST 50/3/40-27W

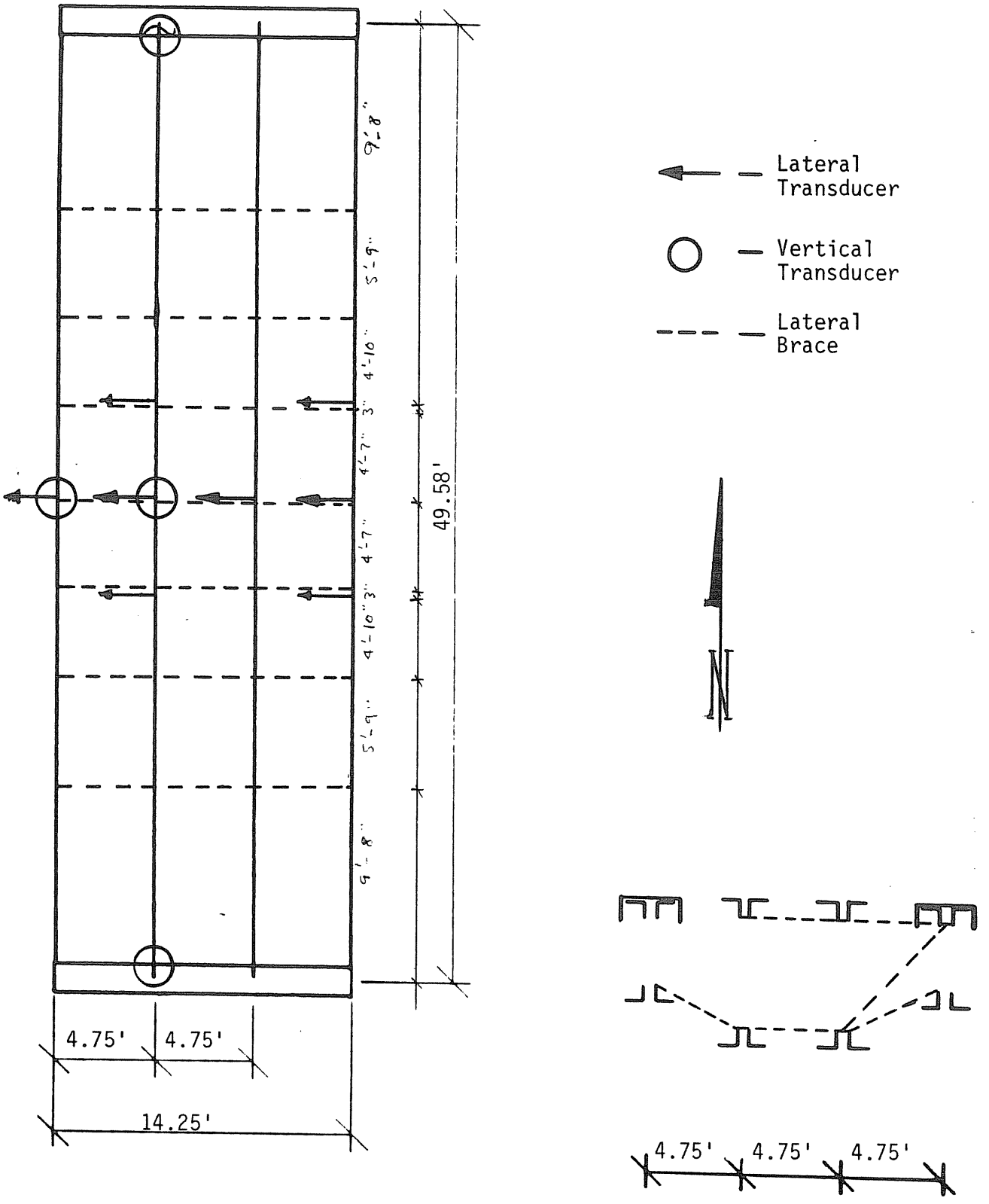
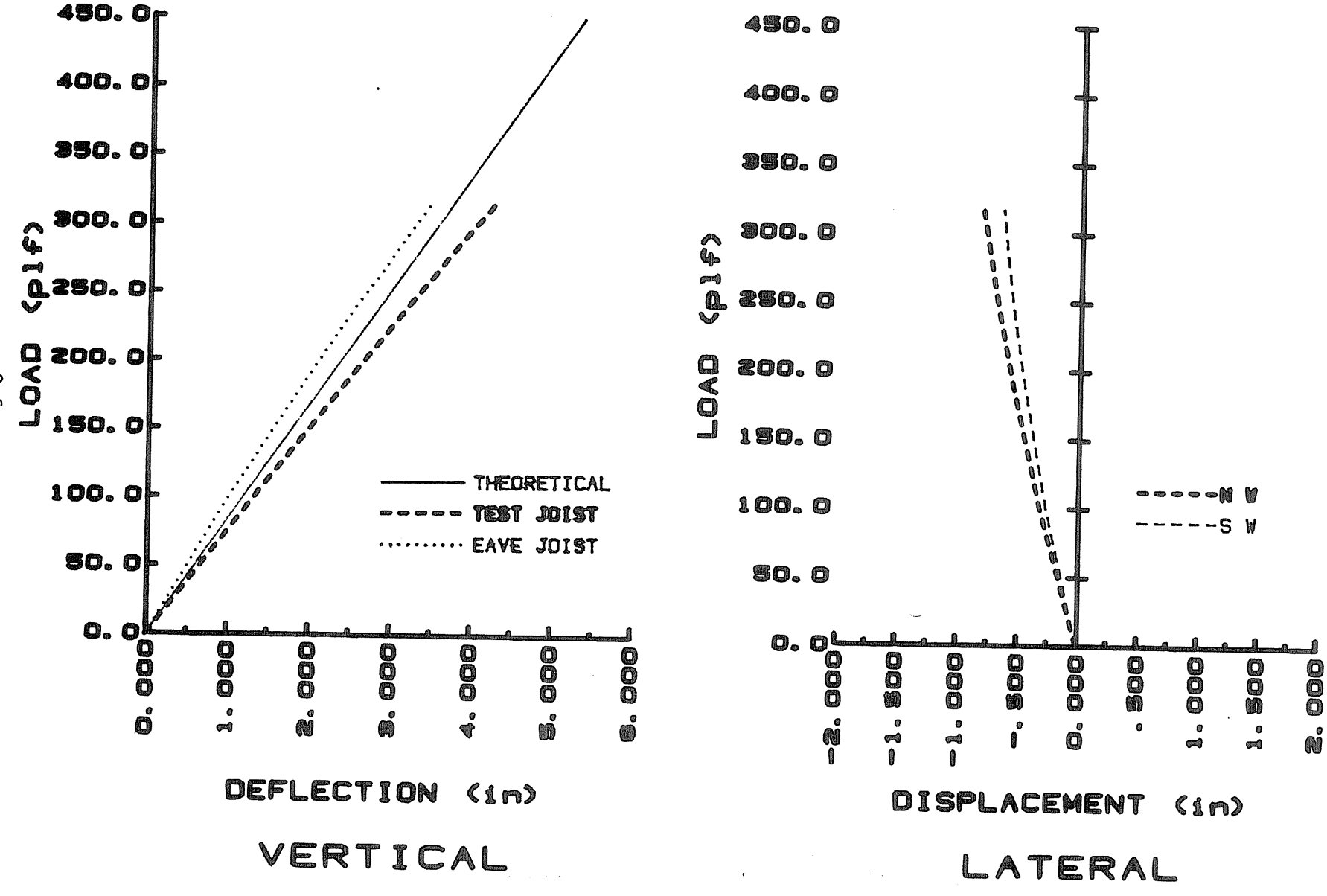


Figure G.3 Plan View of Test Setup, Test 50/3/40-27



50/3/40-27

Figure G.4 Applied Load vs. Vertical and Lateral Displacements

Test No. 50/3/40-28

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.6"^{4} Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 6 Bottom Chord: 5

Bridging Spacing:

Top Chord: -2'7"-5'5"-6'3"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel was attached to channel. Large channel used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 213.8
2. Method: SJI Load: 288.1
3. Method: CONV. Load: 231.0

TEST RESULTS:

Failure Mode: Test was completed when a load of 314.5 plf was reached.

Applied Failure Load: 317.7 Total Failure Load: 334.8 plf

Load Factor (Failure Load/Service Load) 1. 1.57

2. 1.16

3. 1.45

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

Test 50/3/40-28

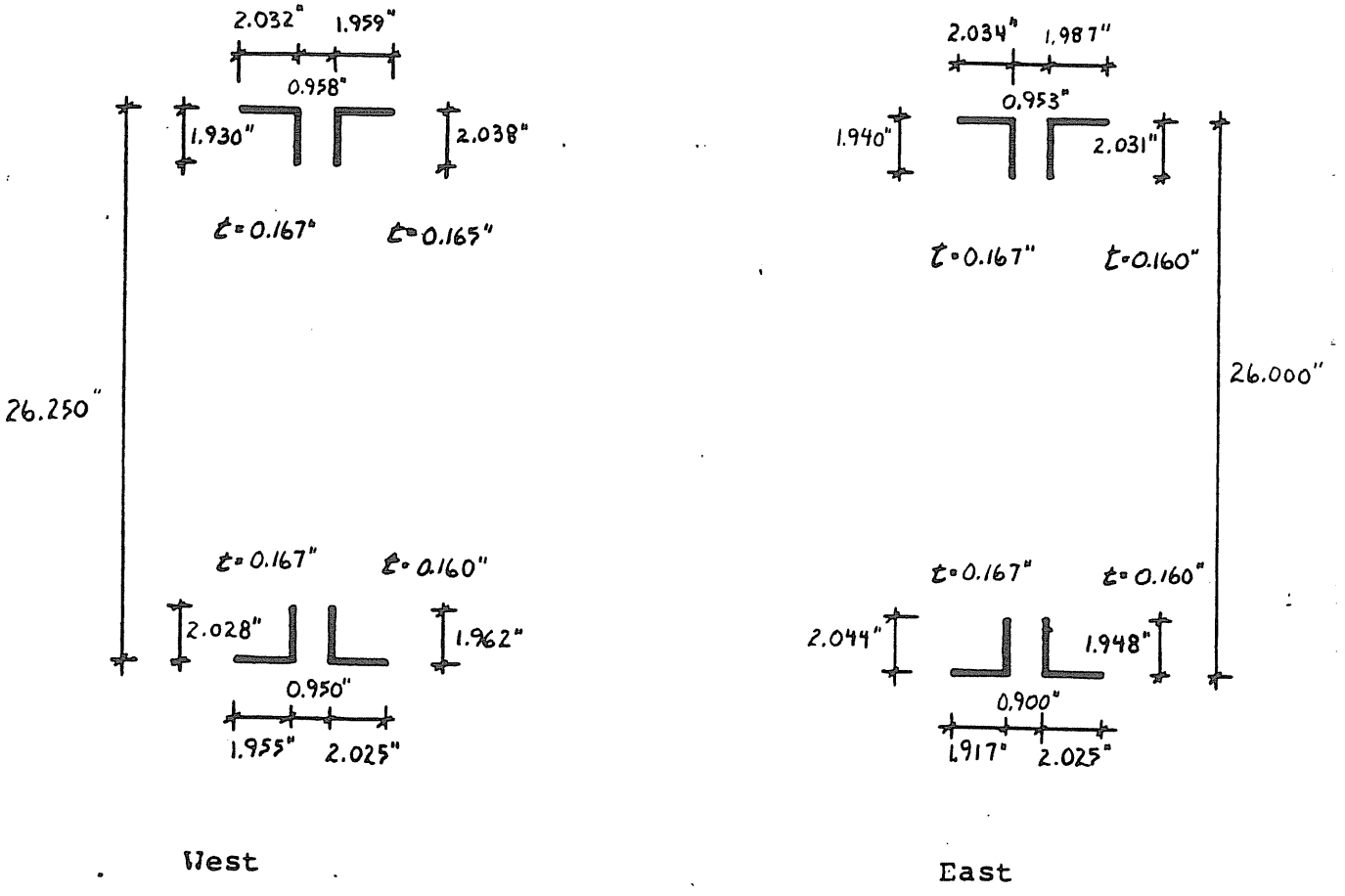


Figure G.5 Cross-Section Properties, Test 50/3/40-28

TEST # 50/3/40-28E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.034	RIGHT HORZ LEG (in) =	1.987
LEFT VER LEG (in) =	1.940	RIGHT VER LEG (in) =	2.031
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.953

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.917	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	2.044	RIGHT VER LEG (in) =	1.948
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.900

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.477	in^4	Iy =	1.852	in^4
rx =	0.617	in	ry =	1.216	in
A =	1.253	in^2	J =	0.011	in^2
x =	2.479	in	y =	0.509	in

BOTTOM CHORD

Ix =	0.483	in^4	Iy =	1.708	in^4
rx =	0.623	in	ry =	1.172	in
A =	1.244	in^2	J =	0.011	in^2
x =	2.373	in	y =	0.611	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Isgross	= 387.38 (in^4)	# ROWS BRIDGING	=	6.00	
JOIST DEPTH	= 26.00 (in)	EFF. DEPTH	=	24.88	(in.)
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	=	1.21	(in)
BRIDGING SPACING	= 5.20 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.97	
KL/ry	= 51.33	KL/rx	=	38.89	
b/t RATIO	= 12.69	Q	=	0.92	
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	=	334.80	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	24.5	30.7	63.7	207.4	1.61
SJI	33.4	41.8	86.7	282.1	1.19
CONV	26.4	33.1	68.7	223.6	1.50

FIGURE G.6a COMPUTED ALLOWABLE LOADS, TEST 50/3/40-28E

TEST # 50/3/40-28W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.032	RIGHT HORZ LEG (in) =	1.959
LEFT VER LEG (in) =	1.930	RIGHT VER LEG (in) =	2.038
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.165
GAP BETWEEN THE LEGS (in) =	0.958		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.955	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	2.028	RIGHT VER LEG (in) =	1.962
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160
GAP BETWEEN THE LEGS (in) =	0.950		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.483	in^4	Iy =	1.858	in^4
rx =	0.618	in	ry =	1.211	in
A =	1.266	in^2	J =	0.012	in^2
x =	2.489	in	y =	0.502	in

BOTTOM CHORD

Ix =	0.481	in^4	Iy =	1.807	in^4
rx =	0.621	in	ry =	1.203	in
A =	1.250	in^2	J =	0.011	in^2
x =	2.425	in	y =	0.593	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross = 398.98 (in^4)	# ROWS BRIDGING = 6.00		
JOIST DEPTH = 26.25 (in)	EFF. DEPTH = 25.16 (in.)		
SPAN LENGTH = 49.58 (ft)	DEF @ 100 plf = 1.18 (in)		
BRIDGING SPACING = 5.20 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 105.31		
KL/ry = 51.52	KL/rx = 38.84		
b/t RATIO = 12.35	Q = 0.93		
MEA. YIELD STR. = 55.60 (ksi)	MEA. FAILURE LOAD = 334.80 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	24.8	31.3	65.7	213.8	1.57
SJI	33.4	42.2	88.5	288.1	1.16
CONV	26.7	33.9	71.0	231.0	1.45

FIGURE G.6b COMPUTED ALLOWABLE LOADS, TEST 50/3/40-28W

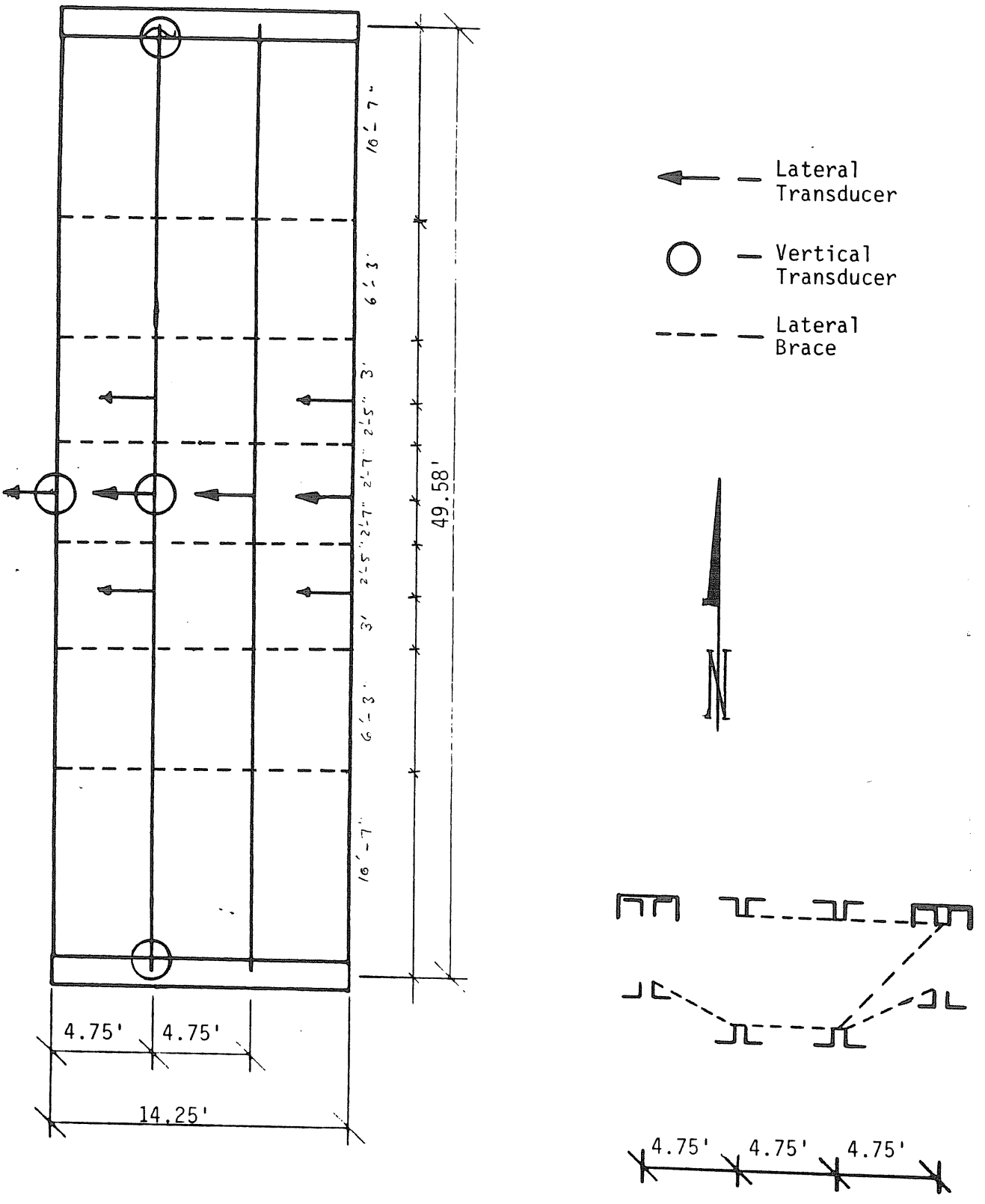
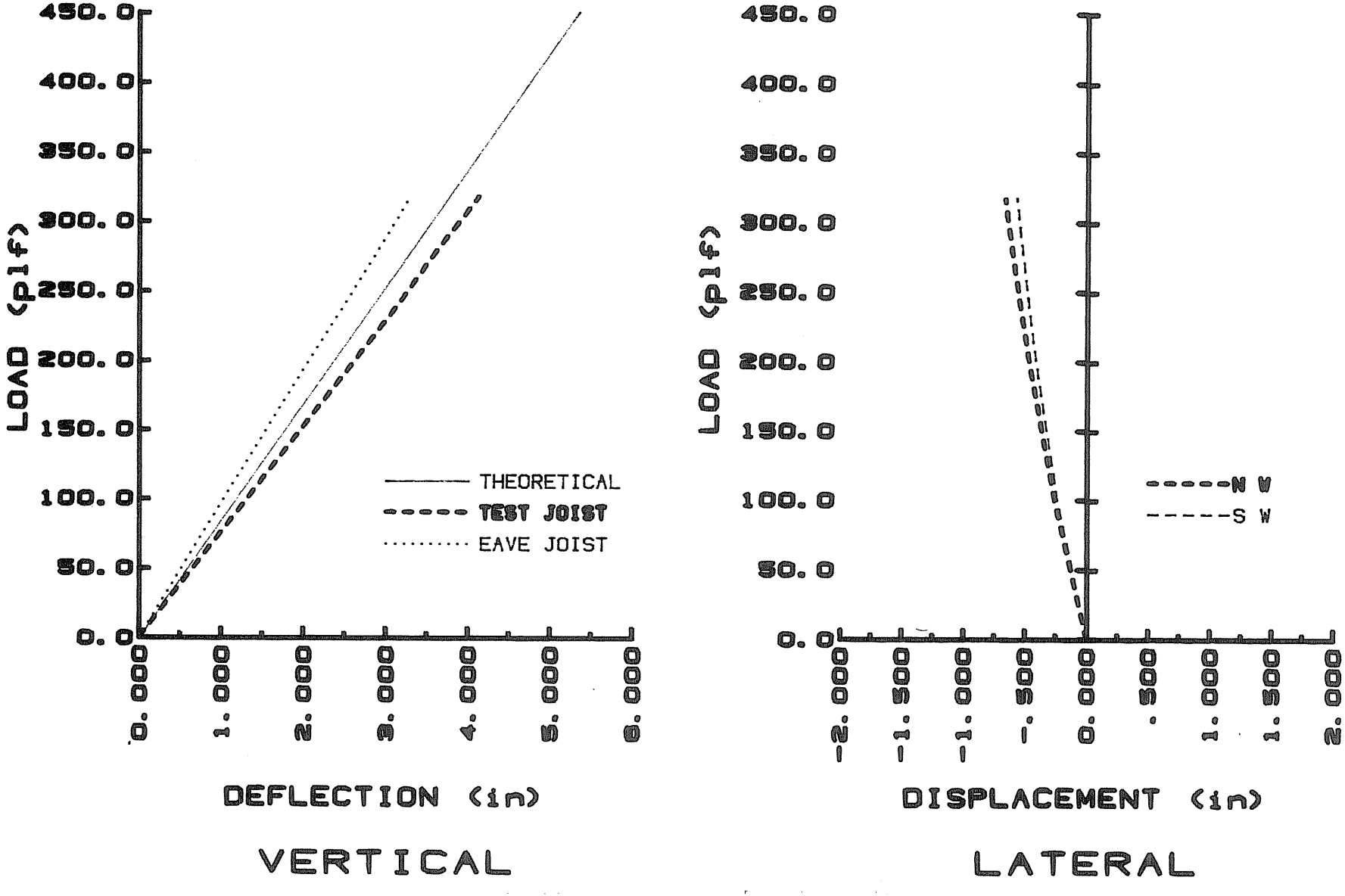


Figure G.7 Plan View of Test Setup, Test 50/3/40-28



50/3/40-28

Figure G.8 Applied Load vs. Vertical and Lateral Displacements

Test No. 50/3/40-29

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.6"^{4} Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-6'3"-7'2"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel was attached to channel. Large channel used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 197.3
2. Method: SJI Load: 288.1
3. Method: CONV. Load: 231.0

TEST RESULTS:

Failure Mode: Top chord lateral buckling both joists. Centerline of east joist and 3 ft. north of centerline west joist.

Applied Failure Load: 405.1 plf Total Failure Load: 422.2 plf

Load Factor (Failure Load/Service Load) 1. 2.14

2. 1.47

3. 1.83

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-Bottom chord yielding was shown at approximately 350 plf.

Test 50/3/40-29

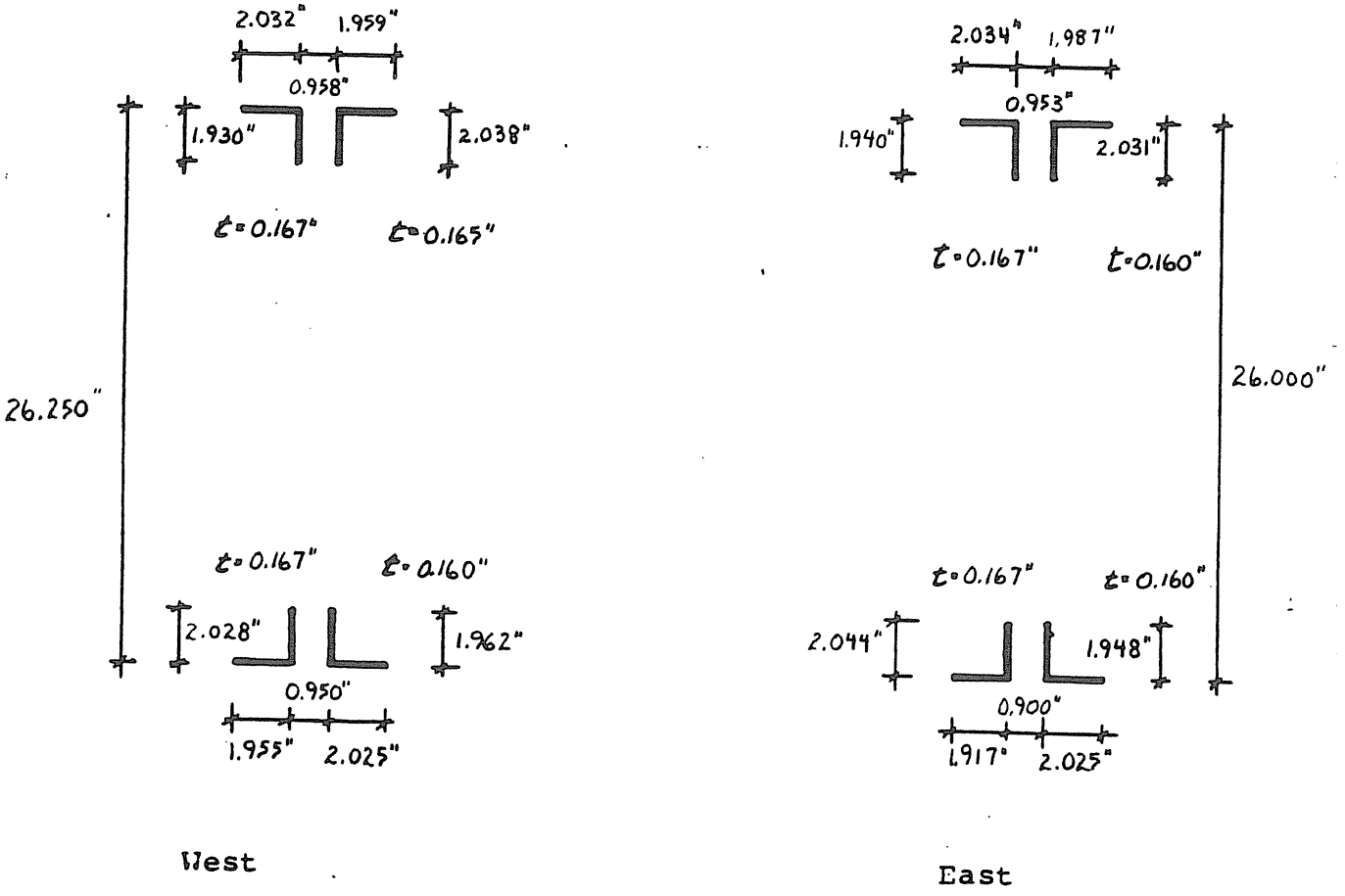


Figure G.9 Cross-Section Properties, Test 50/3/40-29

TEST # 50/3/40-29E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.034	RIGHT HORZ LEG (in) =	1.987
LEFT VER LEG (in) =	1.940	RIGHT VER LEG (in) =	2.031
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.953

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.917	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	2.044	RIGHT VER LEG (in) =	1.948
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.900

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.477	in^4	Iy =	1.852	in^4
rx =	0.617	in	ry =	1.216	in
A =	1.253	in^2	J =	0.011	in^2
x =	2.479	in	y =	0.509	in

BOTTOM CHORD

Ix =	0.483	in^4	Iy =	1.708	in^4
rx =	0.623	in	ry =	1.172	in
A =	1.244	in^2	J =	0.011	in^2
x =	2.373	in	y =	0.611	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 387.38 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 26.00 (in)	EFF. DEPTH	=	24.88	(in.)
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	=	1.21	(in)
BRIDGING SPACING	= 6.30 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.97	
KL/ry	= 62.18	KL/rx	=	38.89	
b/t RATIO	= 12.69	Q	=	0.92	
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	=	422.20	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	22.7	28.4	58.9	191.7	2.20
SJI	33.4	41.8	86.7	282.1	1.50
CONV	26.4	33.1	68.7	223.6	1.89

FIGURE G.10a COMPUTED ALLOWABLE LOADS, TEST 50/3/40-29E

TEST # 50/3/40-29W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.032	RIGHT HORZ LEG (in) =	1.959
LEFT VER LEG (in) =	1.930	RIGHT VER LEG (in) =	2.038
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.165

GAP BETWEEN THE LEGS (in) = 0.958

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.955	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	2.028	RIGHT VER LEG (in) =	1.962
LEFT THICKNESS (in) =	0.167	RIGHT THICKNESS (in) =	0.160

GAP BETWEEN THE LEGS (in) = 0.950

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.483	in^4	Iy =	1.858	in^4
rx =	0.618	in	ry =	1.211	in
A =	1.266	in^2	J =	0.012	in^2
x =	2.489	in	y =	0.502	in

BOTTOM CHORD

Ix =	0.481	in^4	Iy =	1.807	in^4
rx =	0.621	in	ry =	1.203	in
A =	1.250	in^2	J =	0.011	in^2
x =	2.425	in	y =	0.593	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Isgross	= 398.98 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 26.25 (in)	EFF. DEPTH	=	25.16	(in.)
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	=	1.18	(in)
BRIDGING SPACING	= 6.30 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.31	
KL/ry	= 62.41	KL/rx	=	38.84	
b/t RATIO	= 12.35	Q	=	0.93	
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	=	422.20	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	22.8	28.9	60.6	197.3	2.14
SJI	33.4	42.2	88.5	288.1	1.47
CONV	26.7	33.9	71.0	231.0	1.83

FIGURE G.10b COMPUTED ALLOWABLE LOADS, TEST 50/3/40-29W

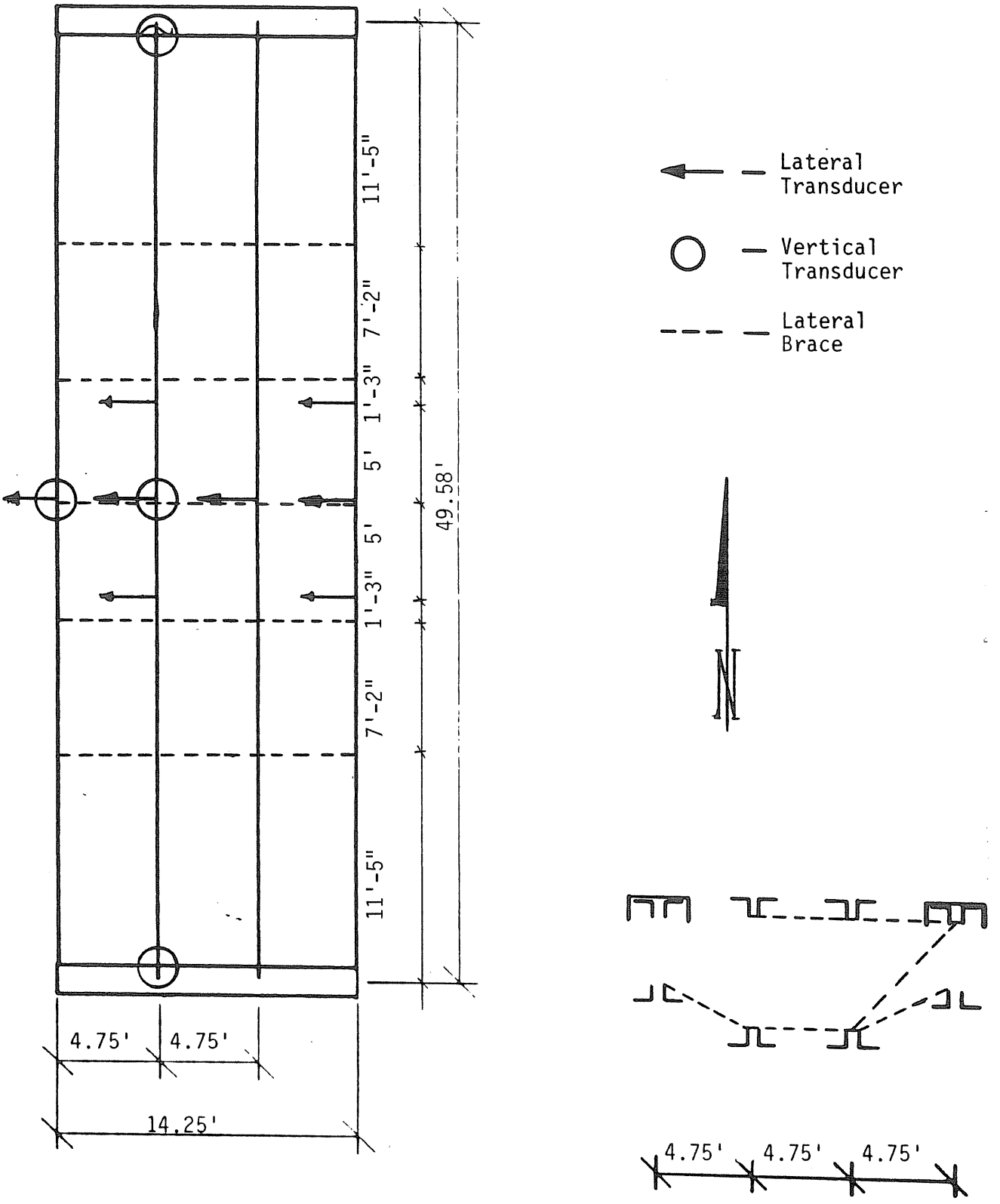


Figure G.11 Plan View of Test Setup, Test 50/3/40-29

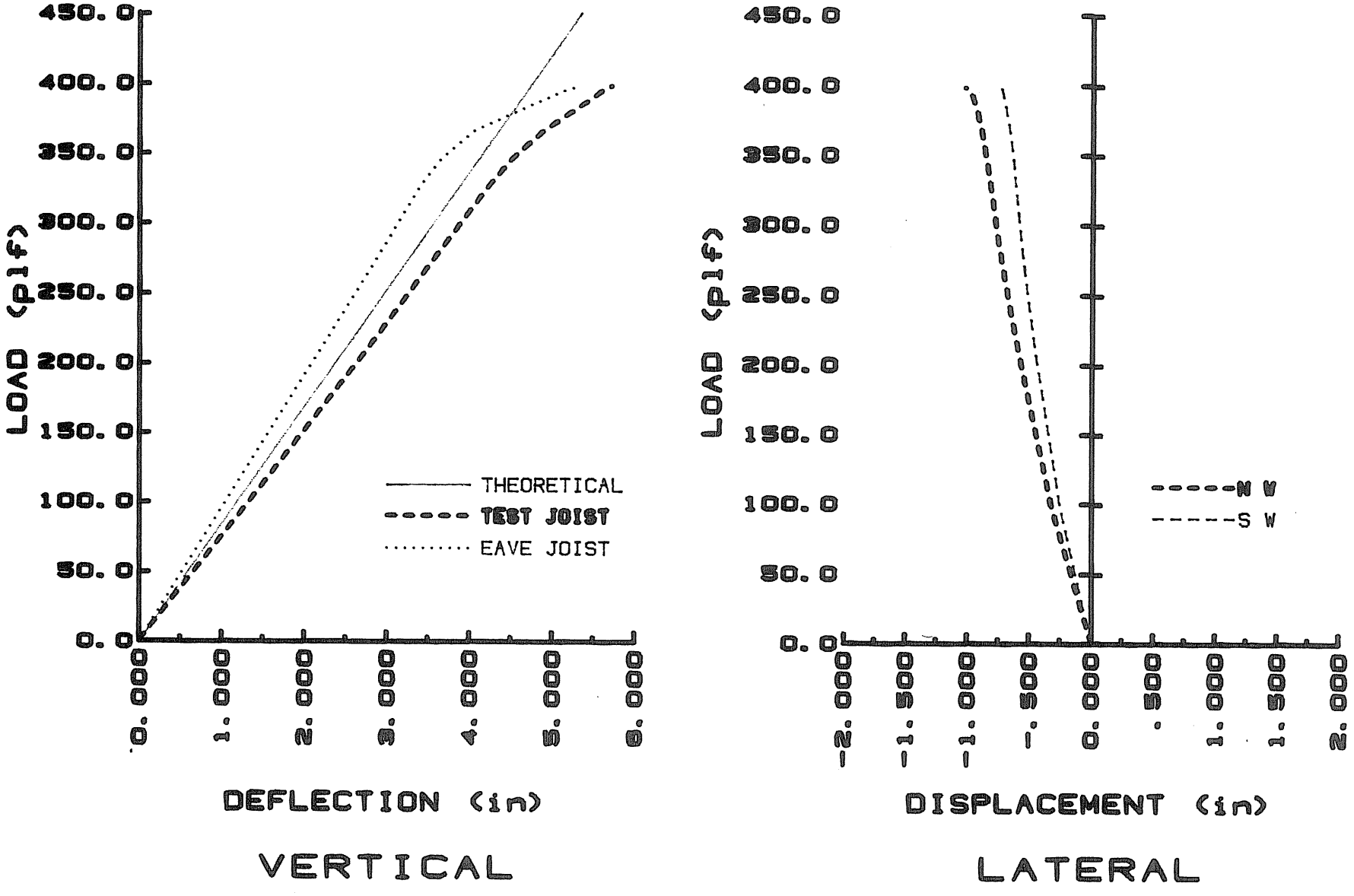


Figure G.12 Applied Load vs. Vertical and Lateral Displacements

Test No. 50/3/40-30

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.6"^{4} Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-6'3"-7'2"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel was attached to channel. Large channel used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 189.5
2. Method: SJI Load: 281.4
3. Method: CONV. Load: 224.6

TEST RESULTS:

Failure Mode: Test was completed when a load of 330.5 plf applied was reached.

Applied Failure Load: 330.5 plf Total Failure Load: 347.6 plf

Load Factor (Failure Load/Service Load) 1. 1.83

2. 1.24

3. 1.55

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-There was a residual vertical deflection of 0.194".

Test 50/3/40-30

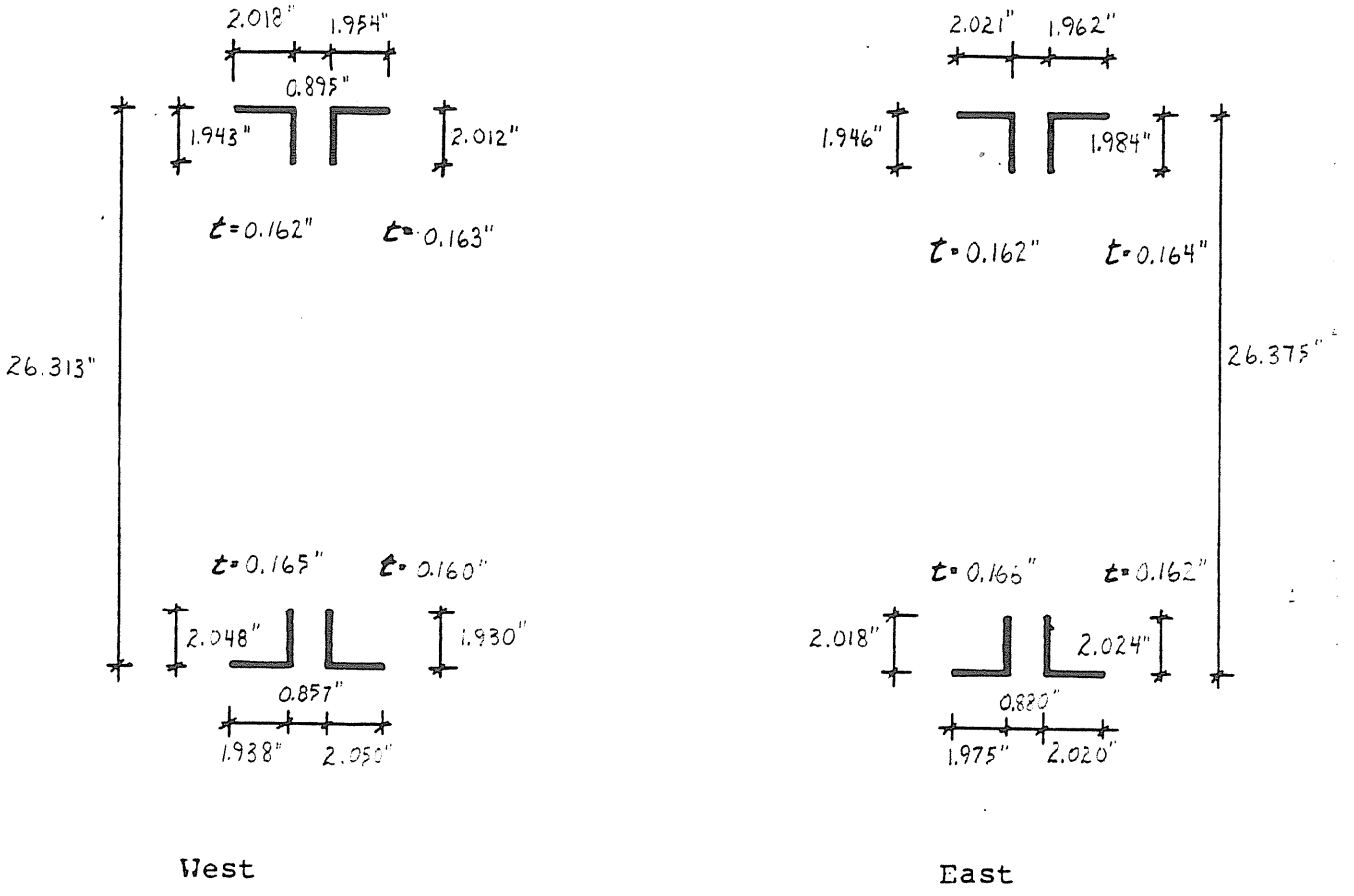


Figure G.13 Cross-Section Properties, Test 50/3/40-30

TEST # 50/3/40-30E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.021	RIGHT HORZ LEG (in) =	1.962
LEFT VER LEG (in) =	1.946	RIGHT VER LEG (in) =	1.984
LEFT THICKNESS (in) =	0.162	RIGHT THICKNESS (in) =	0.164
GAP BETWEEN THE LEGS (in) =	0.895		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.975	RIGHT HORZ LEG (in) =	2.020
LEFT VER LEG (in) =	2.018	RIGHT VER LEG (in) =	2.024
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.162
GAP BETWEEN THE LEGS (in) =	0.880		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.459	in^4	Iy =	1.733	in^4
rx =	0.609	in	ry =	1.184	in
A =	1.237	in^2	J =	0.011	in^2
x =	2.458	in	y =	0.529	in

BOTTOM CHORD

Ix =	0.499	in^4	Iy =	1.741	in^4
rx =	0.628	in	ry =	1.174	in
A =	1.264	in^2	J =	0.011	in^2
x =	2.417	in	y =	0.566	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 400.65 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 26.38 (in)	EFF. DEPTH	= 25.28	(in.)	
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	= 1.17	(in)	
BRIDGING SPACING	= 6.30 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 105.55		
KL/ry	= 63.87	KL/rx	= 39.40		
b/t RATIO	= 12.48	Q	= 0.92		
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	= 347.60	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	22.5	27.8	58.6	190.7	1.82
SJI	33.4	41.3	86.9	282.8	1.23
CONV	26.6	32.8	69.2	225.2	1.54

FIGURE G.14a COMPUTED ALLOWABLE LOADS, TEST 50/3/40-30E

TEST # 50/3/40-30W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.018	RIGHT HORZ LEG (in) =	1.954
LEFT VER LEG (in) =	1.943	RIGHT VER LEG (in) =	2.012
LEFT THICKNESS (in) =	0.162	RIGHT THICKNESS (in) =	0.163
GAP BETWEEN THE LEGS (in) =	0.895		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.938	RIGHT HORZ LEG (in) =	2.050
LEFT VER LEG (in) =	2.048	RIGHT VER LEG (in) =	1.930
LEFT THICKNESS (in) =	0.165	RIGHT THICKNESS (in) =	0.160
GAP BETWEEN THE LEGS (in) =	0.857		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.467	in^4	Iy =	1.718	in^4
rx =	0.615	in	ry =	1.179	in
A =	1.235	in^2	J =	0.011	in^2
x =	2.453	in	y =	0.519	in

BOTTOM CHORD

Ix =	0.479	in^4	Iy =	1.688	in^4
rx =	0.621	in	ry =	1.166	in
A =	1.242	in^2	J =	0.011	in^2
x =	2.379	in	y =	0.616	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Isgross	= 393.53 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 26.31 (in)	EFF. DEPTH	=	25.18	(in.)
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	=	1.19	(in)
BRIDGING SPACING	= 6.30 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	105.51	
KL/ry	= 64.10	KL/rx	=	39.04	
b/t RATIO	= 12.46	Q	=	0.92	
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	=	347.60	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	22.5	27.8	58.2	189.5	1.83
SJI	33.4	41.2	86.5	281.4	1.24
CONV	26.6	32.9	69.0	224.6	1.55

FIGURE G.14b COMPUTED ALLOWABLE LOADS, TEST 50/3/40-30W

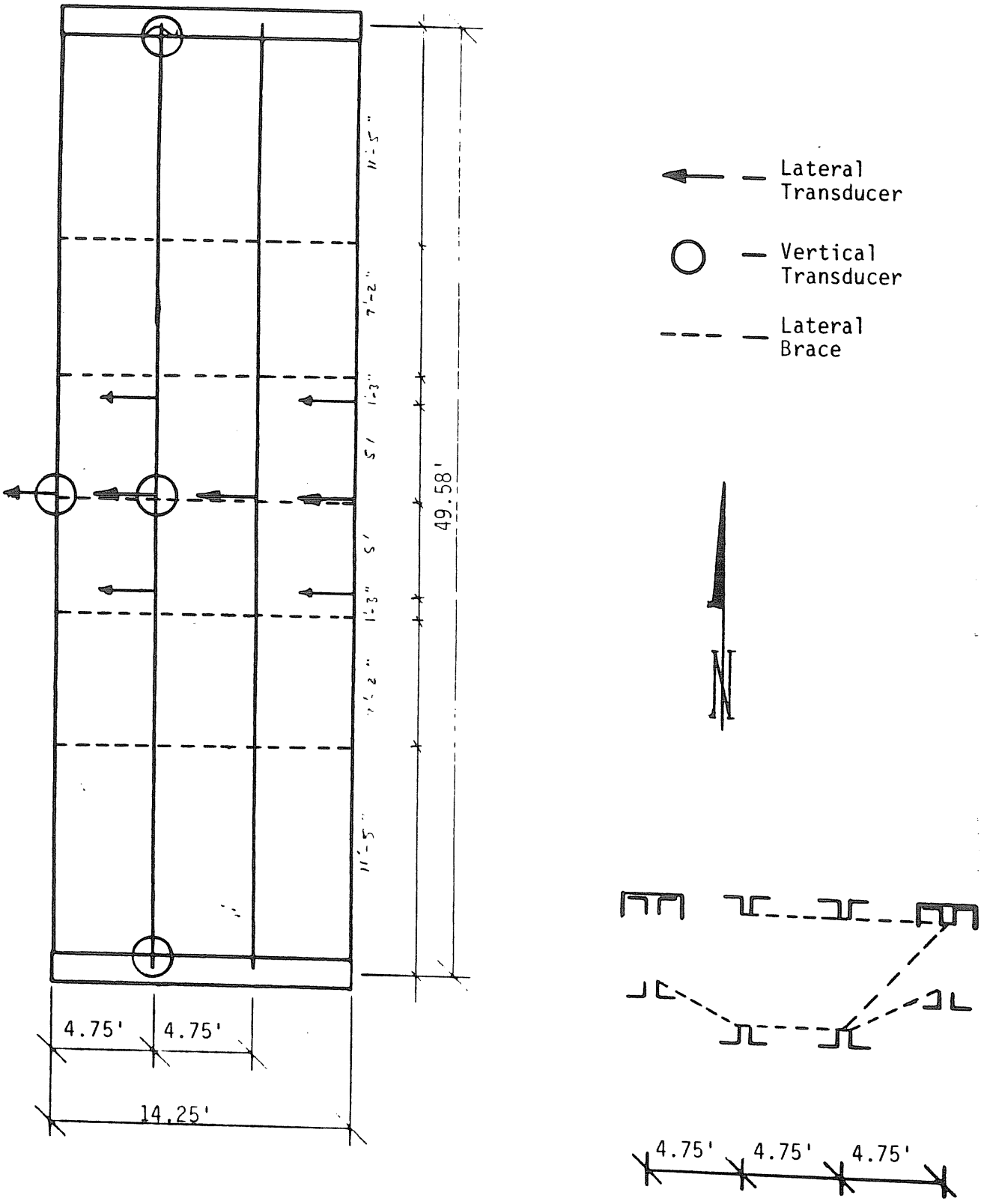
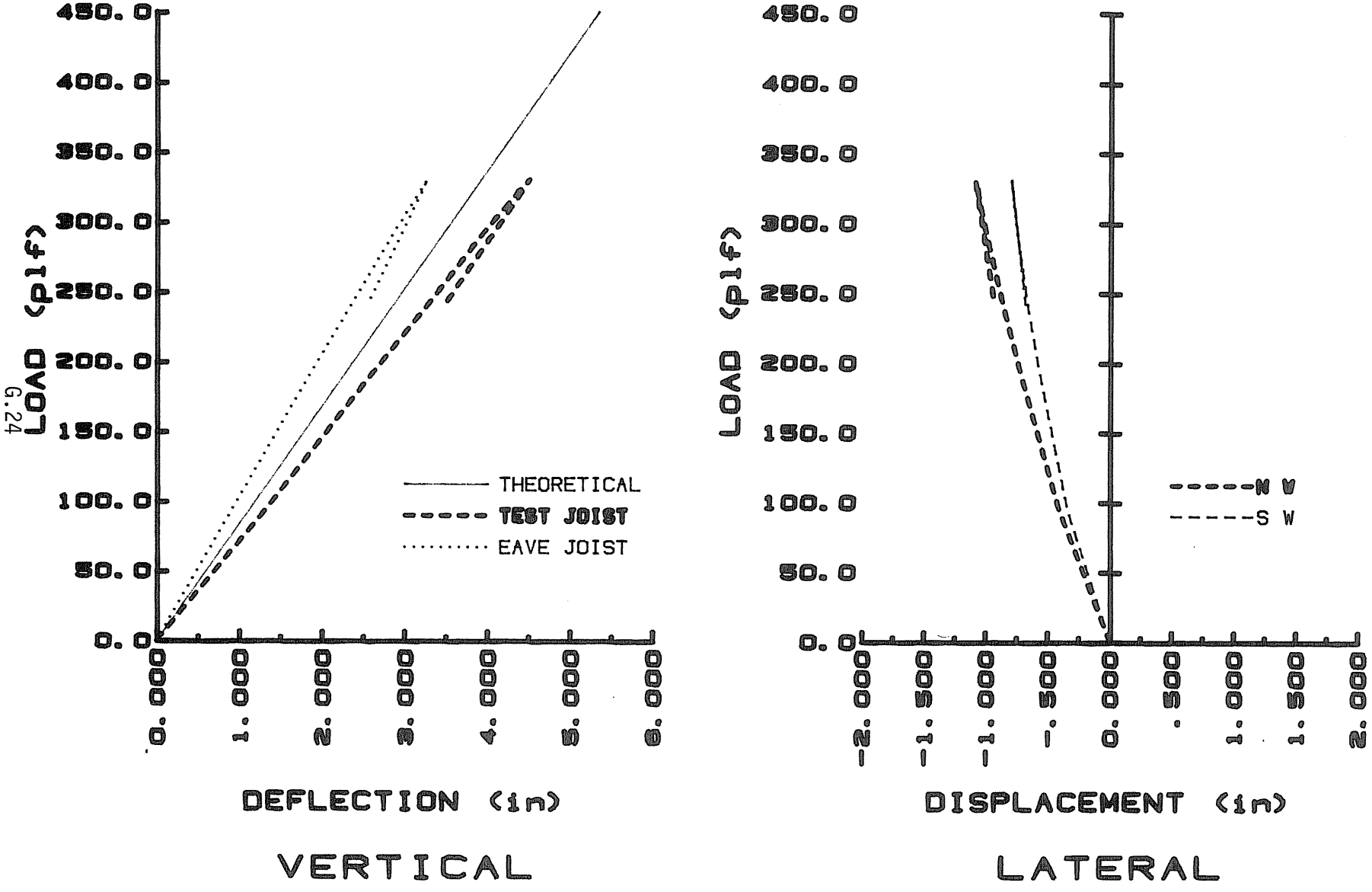


Figure G.15 Plan View of Test Setup, Test 50/3/40-30



50/3/40-30

Figure G.16 Applied Load vs. Vertical and Lateral Displacements

Test No. 50/3/40-31

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.7"^{4} Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-9'11"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel was attached to channel. Large channel used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 124.6

2 Method: SJI Load: 207.7

3 Method: CONV. Load: 225.2

TEST RESULTS:

Failure Mode: Top chord lateral buckling of both joists.

Applied Failure Load: 247 plf Total Failure Load: 264.1 plf

Load Factor (Failure Load/Service Load) 1. 2.12

2. 1.27

3. 1.17

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-The lateral displacement of the west joist 2½' north of centerline showed large lateral displacement just before failure.

Test 50/3/40-31

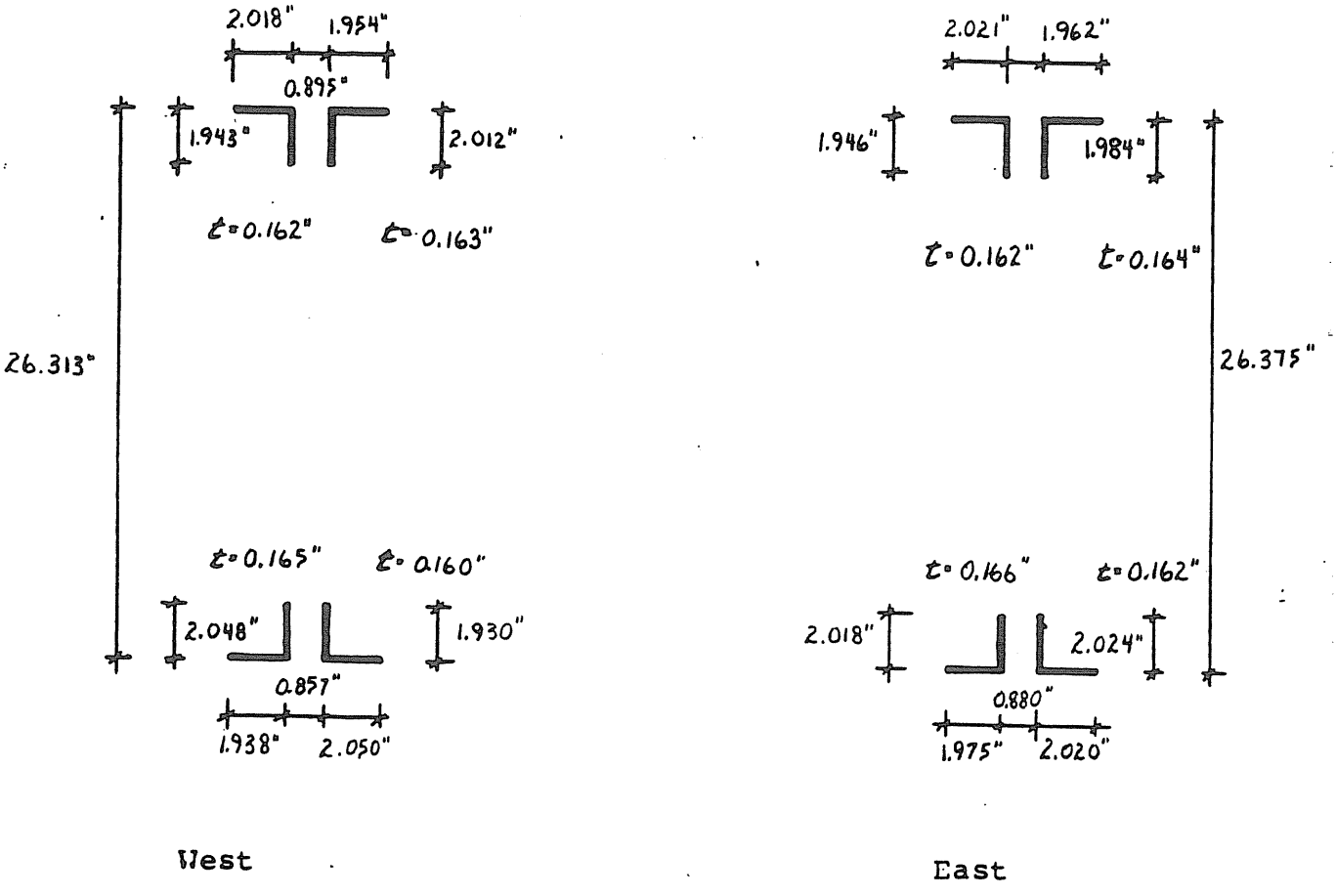


Figure G.17 Cross-Section Properties, Test 50/3/40-31

TEST # 50/3/40-31E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.021	RIGHT HORZ LEG (in) =	1.962
LEFT VER LEG (in) =	1.946	RIGHT VER LEG (in) =	1.984
LEFT THICKNESS (in) =	0.162	RIGHT THICKNESS (in) =	0.164
GAP BETWEEN THE LEGS (in) =	0.895		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.975	RIGHT HORZ LEG (in) =	2.020
LEFT VER LEG (in) =	2.018	RIGHT VER LEG (in) =	2.024
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.162
GAP BETWEEN THE LEGS (in) =	0.880		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.459	in^4	Iy =	1.733	in^4
rx =	0.609	in	ry =	1.184	in
A =	1.237	in^2	J =	0.011	in^2
x =	2.458	in	y =	0.529	in

BOTTOM CHORD

Ix =	0.499	in^4	Iy =	1.741	in^4
rx =	0.628	in	ry =	1.174	in
A =	1.264	in^2	J =	0.011	in^2
x =	2.417	in	y =	0.566	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 400.65 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 26.38 (in)	EFF. DEPTH	= 25.28	(in.)	
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	= 1.17	(in)	
BRIDGING SPACING	= 9.90 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 105.55		
KL/ry	= 100.36	KL/rx	= 39.40		
b/t RATIO	= 12.48	Q	= 0.92		
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	= 264.10	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.7	18.2	38.3	124.6	2.12
SJI	24.5	30.3	63.8	207.7	1.27
CONV	26.6	32.8	69.2	225.2	1.17

FIGURE G.18a COMPUTED ALLOWABLE LOADS, TEST 50/3/40-31E

TEST # 50/3/40-31W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.018	RIGHT HORZ LEG (in) =	1.954
LEFT VER LEG (in) =	1.943	RIGHT VER LEG (in) =	2.012
LEFT THICKNESS (in) =	0.162	RIGHT THICKNESS (in) =	0.163
GAP BETWEEN THE LEGS (in) =	0.895		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.938	RIGHT HORZ LEG (in) =	2.050
LEFT VER LEG (in) =	2.048	RIGHT VER LEG (in) =	1.930
LEFT THICKNESS (in) =	0.165	RIGHT THICKNESS (in) =	0.160
GAP BETWEEN THE LEGS (in) =	0.857		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.467	in^4	Iy =	1.718	in^4
rx =	0.615	in	ry =	1.179	in
A =	1.235	in^2	J =	0.011	in^2
x =	2.453	in	y =	0.519	in

BOTTOM CHORD

Ix =	0.479	in^4	Iy =	1.688	in^4
rx =	0.621	in	ry =	1.166	in
A =	1.242	in^2	J =	0.011	in^2
x =	2.379	in	y =	0.616	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 393.53 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 26.31 (in)	EFF. DEPTH	= 25.18	(in.)	
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	= 1.19	(in)	
BRIDGING SPACING	= 9.90 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 105.51		
KL/ry	= 100.73	KL/rx	= 39.04		
b/t RATIO	= 12.46	Q	= 0.92		
MEA. YIELD STR.	= 55.60 (ksi)	MEA. FAILURE LOAD	= 264.10	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.6	18.0	37.9	123.2	2.14
SJI	24.0	29.7	62.3	202.8	1.30
CONV	26.6	32.9	69.0	224.6	1.18

FIGURE G.18b COMPUTED ALLOWABLE LOADS, TEST 50/3/40-31W

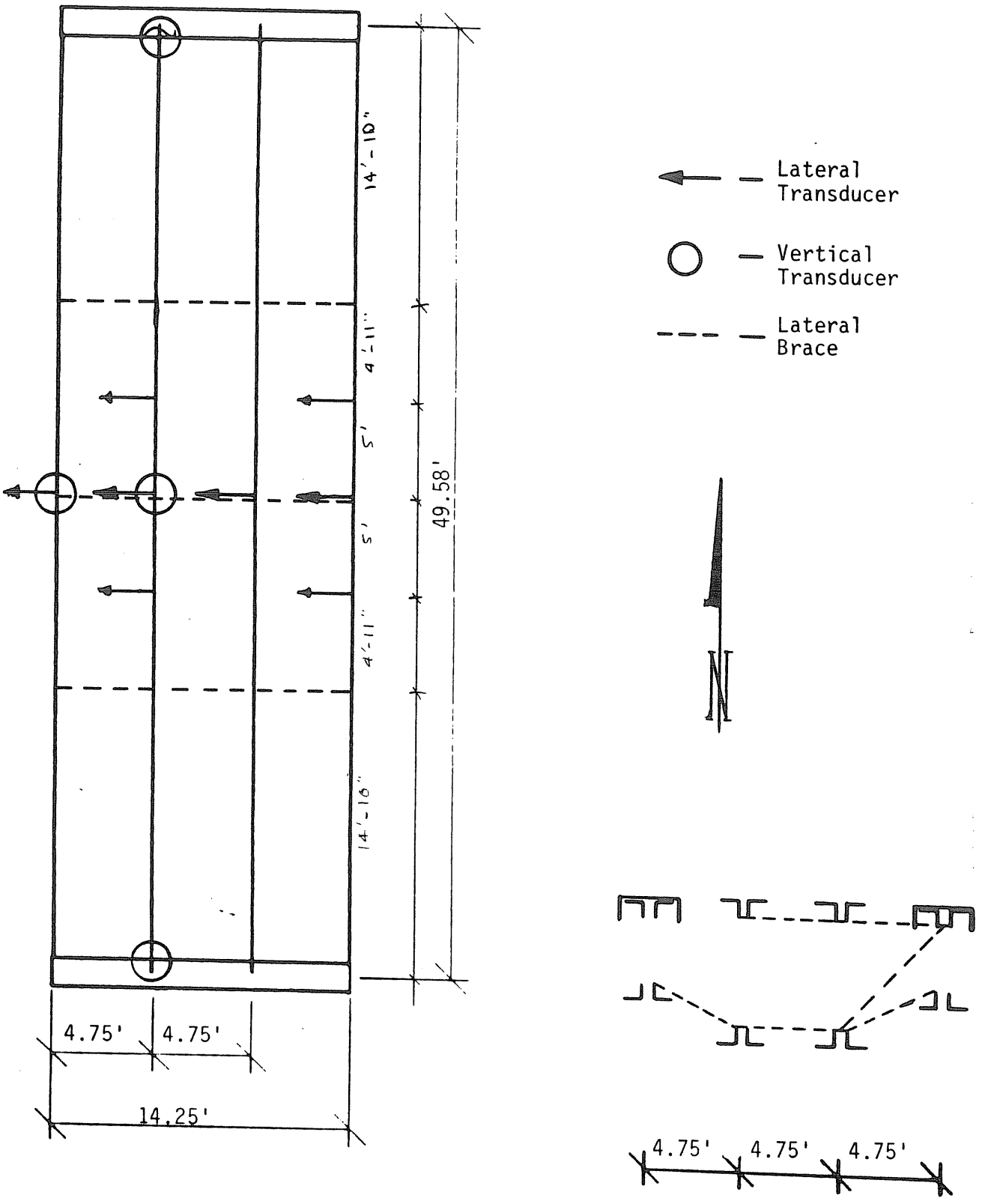
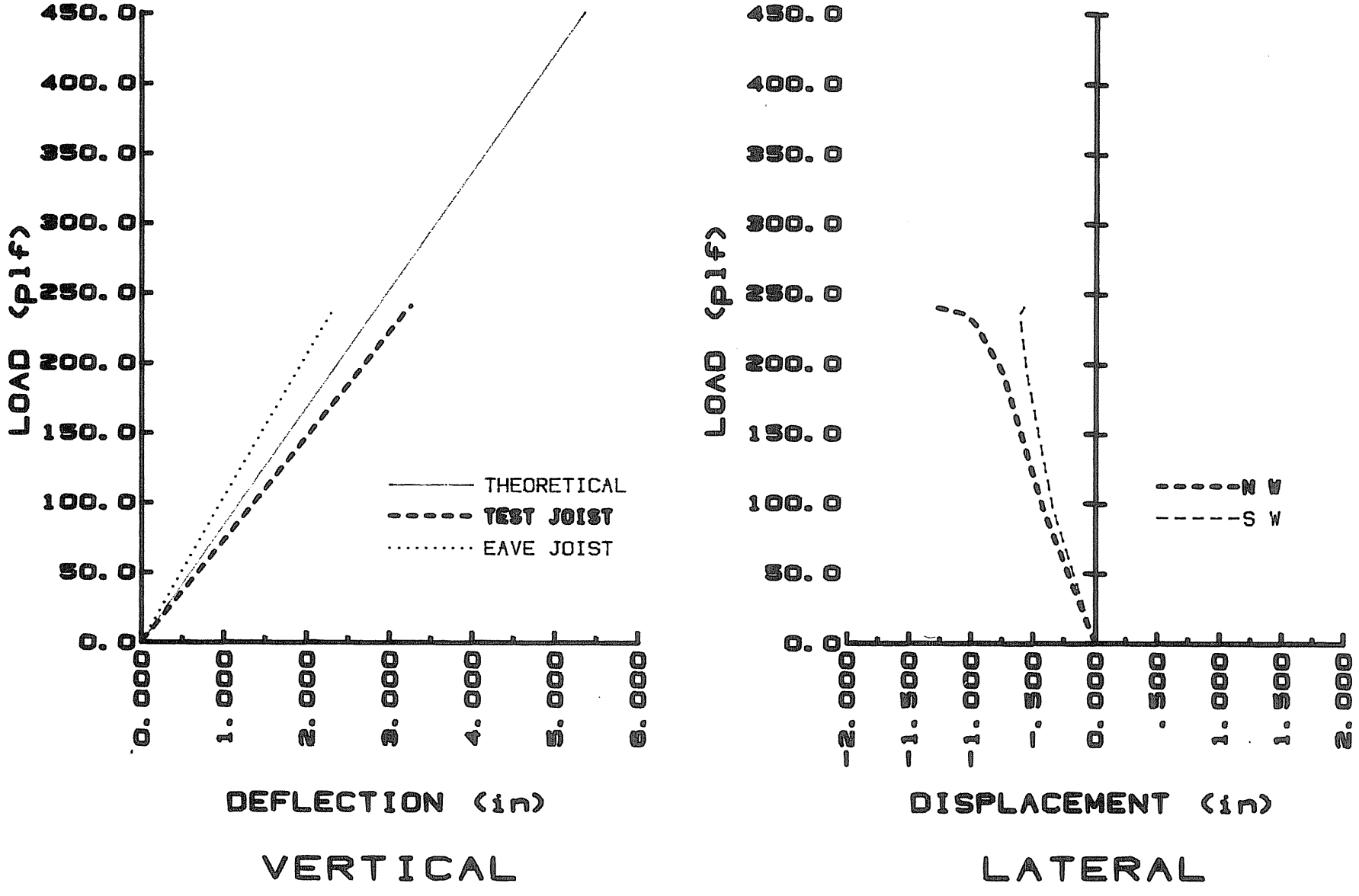


Figure G.19 Plan View of Test Setup, Test 50/3/40-31



50/3/40-31

Figure G.20 Applied Load vs. Vertical and Lateral Displacements

Test No. 50/3/40-32

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.7"^{4} Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-6'3"-7'2"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 187.8

2 Method: SJI Load: 274.2

3 Method: CONV. Load: 222.7

TEST RESULTS:

Failure Mode: Test was complete when an applied load of 332.2 plf was reached.

Applied Failure Load: 332.2 plf Total Failure Load: 349.3 plf

Load Factor (Failure Load/Service Load) 1. 1.86

2. 1.27

3. 1.57

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-There was a residual vertical deflection of 0.277 in. on the test joist.

-There was a residual lateral displacement of the west joist of 0.139 and 0.152 at the north and south 2' locations.

Test 50/3/40-32

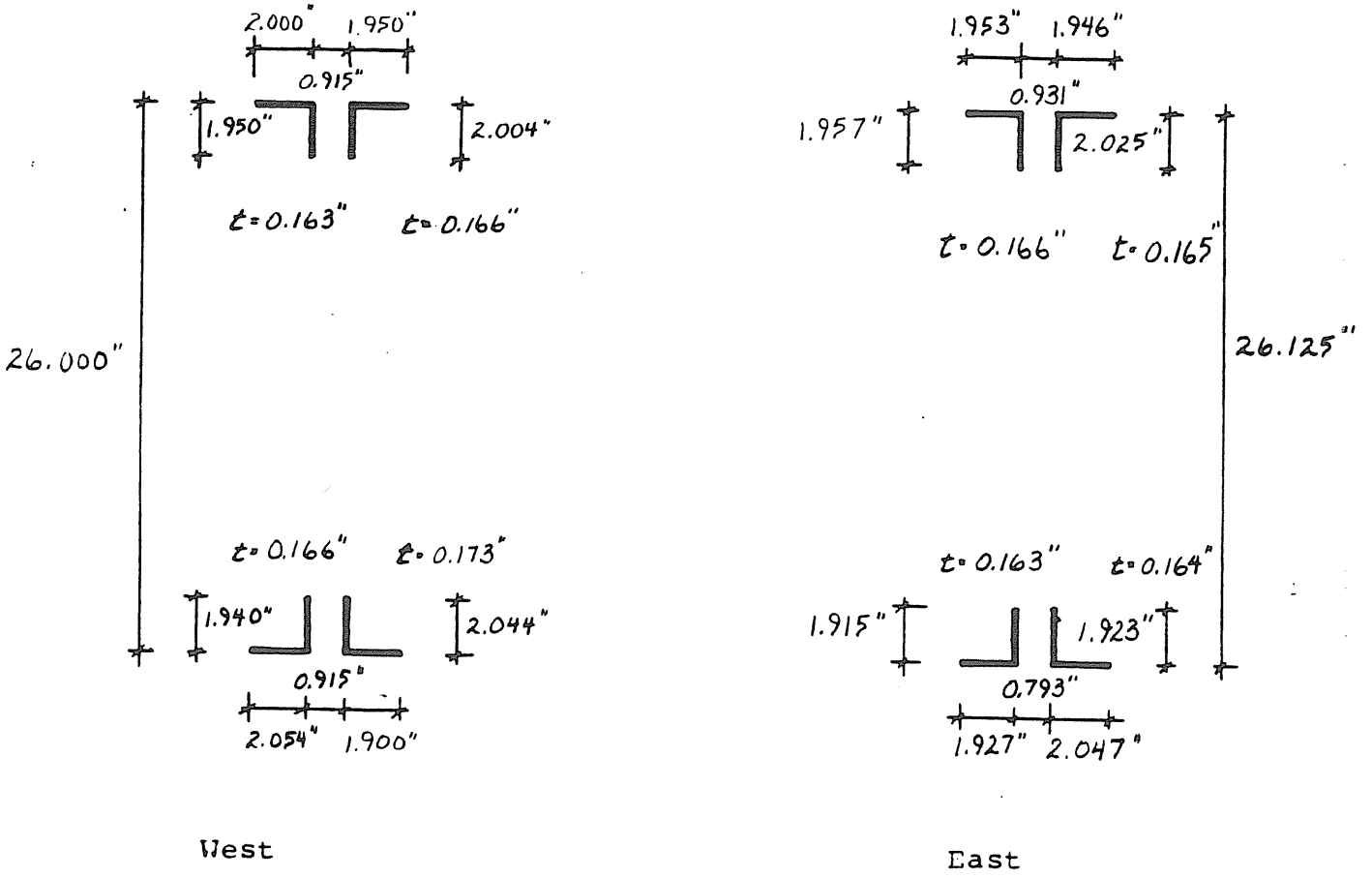


Figure G.21 Cross-Section Properties, Test 50/3/40-32

TEST # 50/3/40-32E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.953	RIGHT HORZ LEG (in) =	1.946
LEFT VER LEG (in) =	1.957	RIGHT VER LEG (in) =	2.025
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.165

GAP BETWEEN THE LEGS (in) = 0.931

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.927	RIGHT HORZ LEG (in) =	2.047
LEFT VER LEG (in) =	1.915	RIGHT VER LEG (in) =	1.923
LEFT THICKNESS (in) =	0.163	RIGHT THICKNESS (in) =	0.164

GAP BETWEEN THE LEGS (in) = 0.793

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.480	in^4	Iy =	1.726	in^4
rx =	0.620	in	ry =	1.175	in
A =	1.249	in^2	J =	0.011	in^2
x =	2.418	in	y =	0.530	in

BOTTOM CHORD

Ix =	0.430	in^4	Iy =	1.603	in^4
rx =	0.592	in	ry =	1.144	in
A =	1.224	in^2	J =	0.011	in^2
x =	2.365	in	y =	0.528	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 389.58 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 26.13 (in)	EFF. DEPTH	= 25.07	(in.)	
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	= 1.20	(in)	
BRIDGING SPACING	= 6.30 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 106.53		
KL/ry	= 64.32	KL/rx	= 38.70		
b/t RATIO	= 12.27	Q	= 0.94		
MEA. YIELD STR.	= 53.80 (ksi)	MEA. FAILURE LOAD	= 349.30	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	22.1	27.6	57.7	187.8	1.86
SJI	32.3	40.3	84.3	274.2	1.27
CONV	26.2	32.8	68.4	222.7	1.57

FIGURE G.22a COMPUTED ALLOWABLE LOADS, TEST 50/3/40-32E

TEST # 50/3/40-32W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.000	RIGHT HORZ LEG (in) =	1.950
LEFT VER LEG (in) =	1.950	RIGHT VER LEG (in) =	2.004
LEFT THICKNESS (in) =	0.163	RIGHT THICKNESS (in) =	0.166
GAP BETWEEN THE LEGS (in) =	0.915		

BOTTOM CHORD

LEFT HORZ LEG (in) =	2.054	RIGHT HORZ LEG (in) =	1.900
LEFT VER LEG (in) =	1.940	RIGHT VER LEG (in) =	2.044
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.173
GAP BETWEEN THE LEGS (in) =	0.915		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.470	in^4	Iy =	1.743	in^4
rx =	0.614	in	ry =	1.183	in
A =	1.246	in^2	J =	0.011	in^2
x =	2.455	in	y =	0.528	in

BOTTOM CHORD

Ix =	0.497	in^4	Iy =	1.804	in^4
rx =	0.621	in	ry =	1.184	in
A =	1.288	in^2	J =	0.012	in^2
x =	2.491	in	y =	0.511	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 395.98 (in^4)	# ROWS BRIDGING	= 5.00
JOIST DEPTH	= 26.00 (in)	EFF. DEPTH	= 24.96 (in.)
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	= 1.18 (in)
BRIDGING SPACING	= 6.30 (ft)	PANEL LENGTH	= 24.00 (in)
K	= 1.00	C	= 106.14
KL/ry	= 63.92	KL/rx	= 39.08
b/t RATIO	= 12.27	Q	= 0.94
MEA. YIELD STR.	= 54.30 (ksi)	MEA. FAILURE LOAD	= 349.30 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	22.3	27.8	57.8	188.1	1.86
SJI	32.6	40.6	84.4	274.8	1.27
CONV	26.3	32.8	68.3	222.2	1.57

FIGURE G.22b COMPUTED ALLOWABLE LOADS, TEST 50/3/40-32W

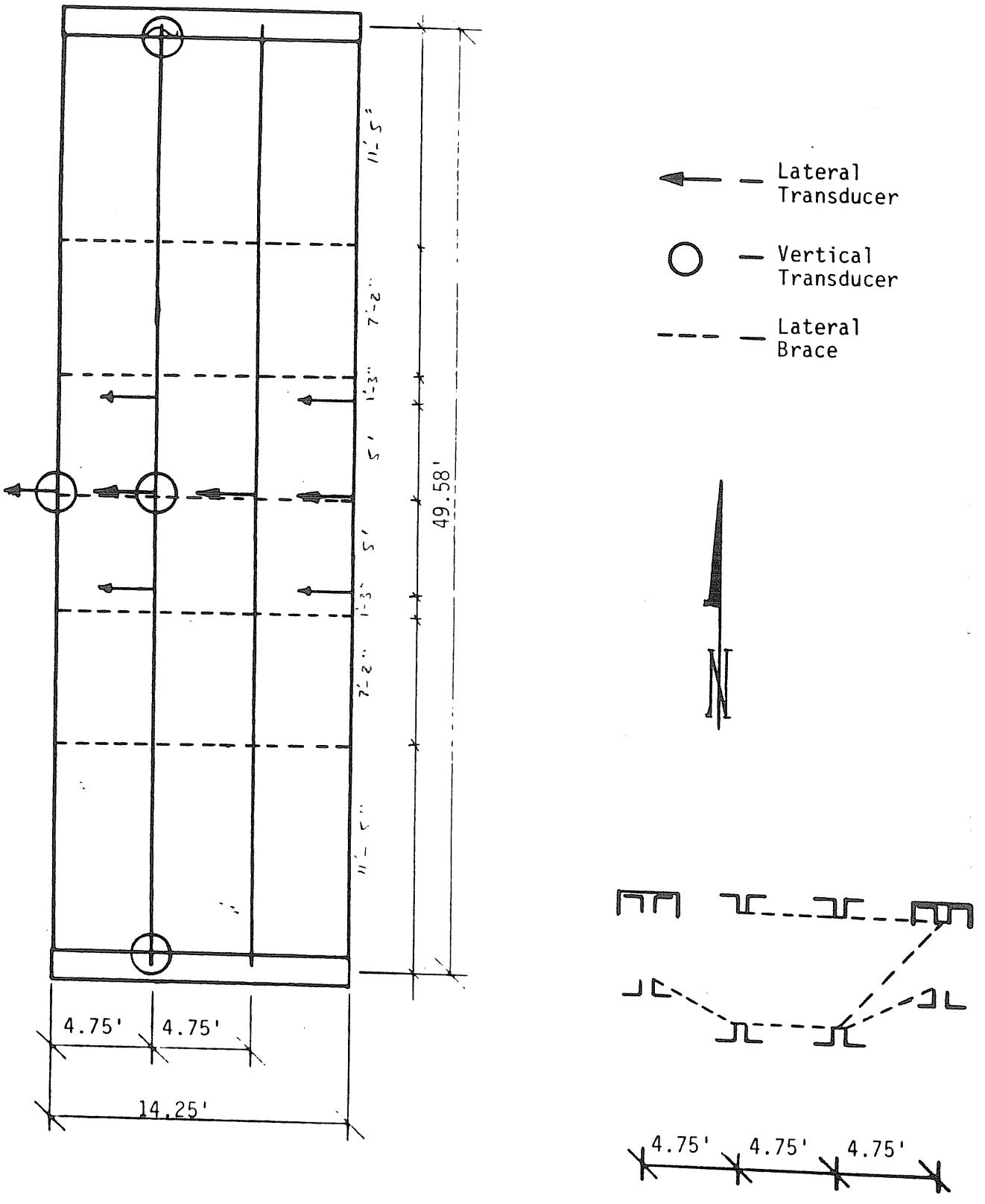
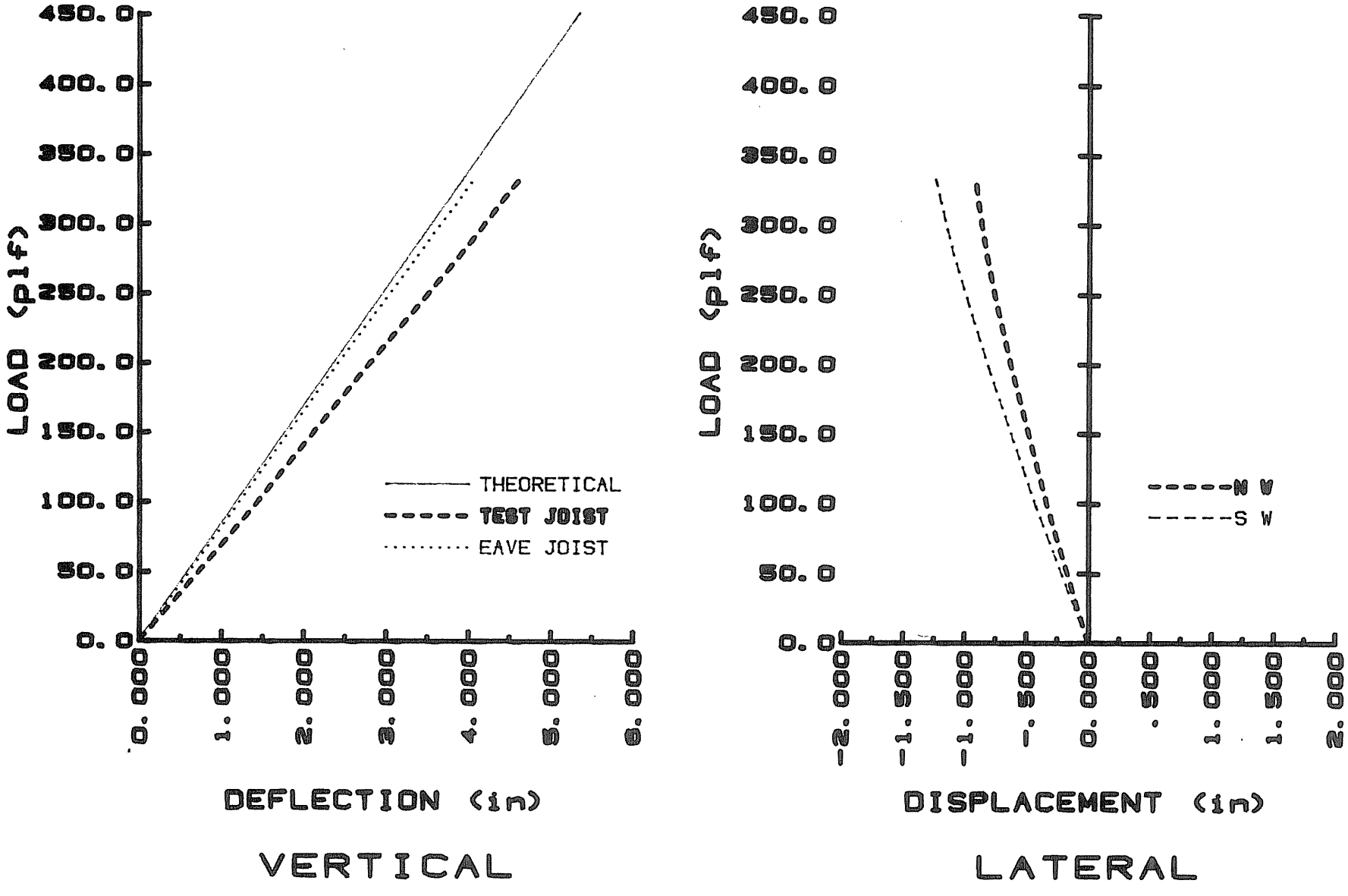


Figure G.23 Plan View of Test Setup, Test 50/3/40-32



50/3/40-32

Figure G.24 Applied Load vs. Vertical and Lateral Displacements

Test No. 50/3/40-33

JOIST DESCRIPTION:

Joist Type: 26H214 Load: 40 (psf)

Moment of Inertia: 394.7 Δ" @ 100 plf 1.188

Dead Load of Joist: 10.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 17.1 plf

TEST PARAMETERS:

Span Length: 49.58' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-9'11"

Bottom Chord: 0'-6'3"-7'2"

Others: Panel was attached to channel. Large channels were used (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 123.6

2 Method: SJI Load: 209.5

3 Method: CONV. Load: 222.2

TEST RESULTS:

Failure Mode: Top chord lateral buckling of both joists. 3' north of midspan east joist, 3' north of midspan west joist.

Applied Failure Load: 350.6 Total Failure Load: 367.7 plf

Load Factor (Failure Load/Service Load) 1. 2.98

2. 1.76

3. 1.65

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-There is a lot of residual deflection in the outside joists.

Test 50/3/40-33

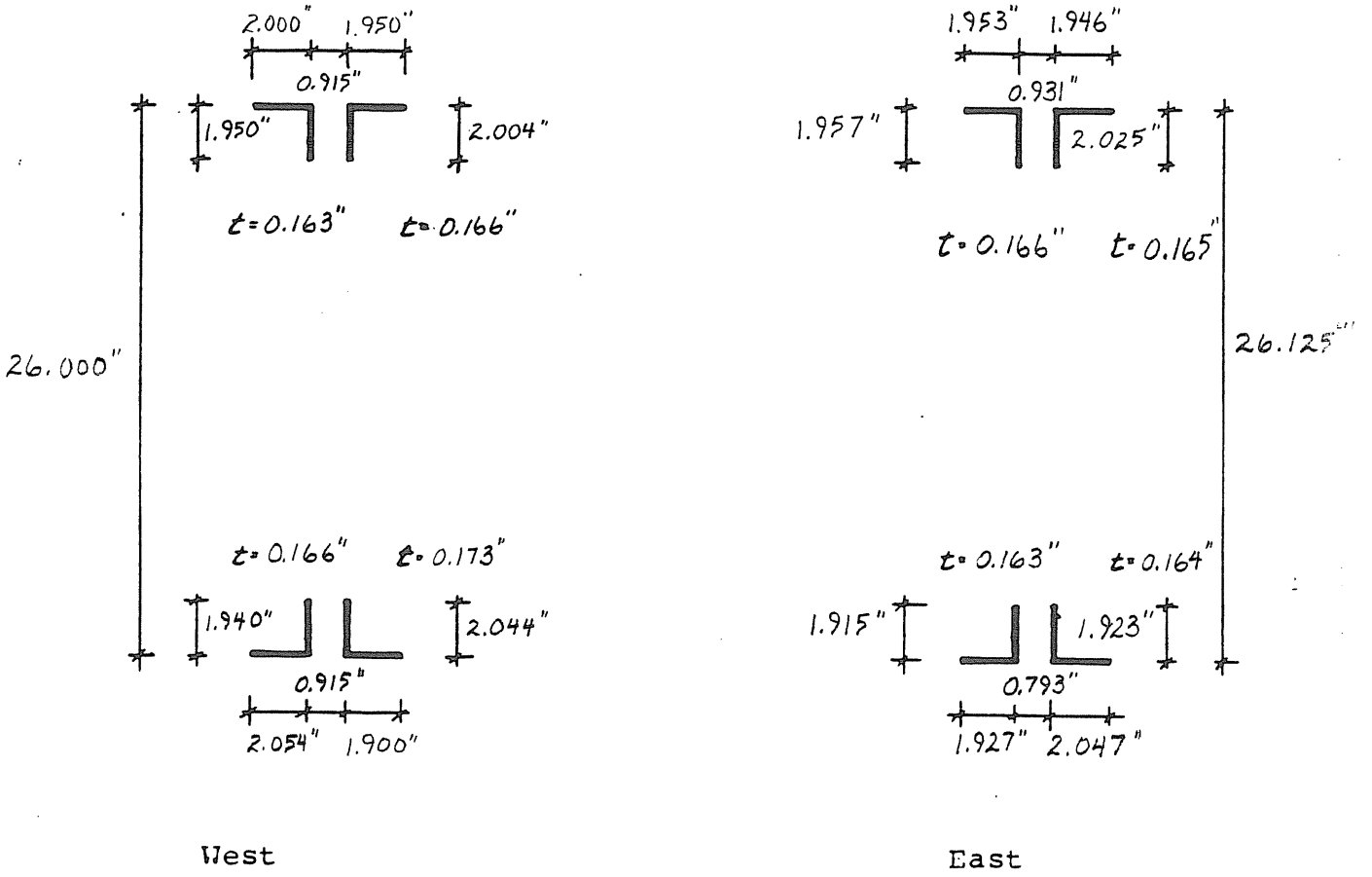


Figure G.25 Cross-Section Properties, Test 50/3/40-33

TEST # 50/3/40-33E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.953	RIGHT HORZ LEG (in) =	1.946
LEFT VER LEG (in) =	1.957	RIGHT VER LEG (in) =	2.025
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.165
GAP BETWEEN THE LEGS (in) =	0.931		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.927	RIGHT HORZ LEG (in) =	2.047
LEFT VER LEG (in) =	1.915	RIGHT VER LEG (in) =	1.923
LEFT THICKNESS (in) =	0.163	RIGHT THICKNESS (in) =	0.164
GAP BETWEEN THE LEGS (in) =	0.793		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.480	in^4	Iy =	1.726	in^4
rx =	0.620	in	ry =	1.175	in
A =	1.249	in^2	J =	0.011	in^2
x =	2.418	in	y =	0.530	in

BOTTOM CHORD

Ix =	0.430	in^4	Iy =	1.603	in^4
rx =	0.592	in	ry =	1.144	in
A =	1.224	in^2	J =	0.011	in^2
x =	2.365	in	y =	0.528	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross = 389.58 (in^4)	# ROWS BRIDGING = 3.00		
JOIST DEPTH = 26.13 (in)	EFF. DEPTH = 25.07 (in.)		
SPAN LENGTH = 49.58 (ft)	DEF @ 100 plf = 1.20 (in)		
BRIDGING SPACING = 9.90 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 106.53		
KL/ry = 101.08	KL/rx = 38.70		
b/t RATIO = 12.27	Q = 0.94		
MEA. YIELD STR. = 53.80 (ksi)	MEA. FAILURE LOAD = 367.70 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.5	18.1	37.8	123.0	2.99
SJI	23.2	29.0	60.6	197.3	1.86
CONV	26.2	32.8	68.4	222.7	1.65

FIGURE G.26a COMPUTED ALLOWABLE LOADS, TEST 50/3/40-33E

TEST # 50/3/40-33W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.000	RIGHT HORZ LEG (in) =	1.950
LEFT VER LEG (in) =	1.950	RIGHT VER LEG (in) =	2.004
LEFT THICKNESS (in) =	0.163	RIGHT THICKNESS (in) =	0.166
GAP BETWEEN THE LEGS (in) =	0.915		

BOTTOM CHORD

LEFT HORZ LEG (in) =	2.054	RIGHT HORZ LEG (in) =	1.900
LEFT VER LEG (in) =	1.940	RIGHT VER LEG (in) =	2.044
LEFT THICKNESS (in) =	0.166	RIGHT THICKNESS (in) =	0.173
GAP BETWEEN THE LEGS (in) =	0.915		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.470	in^4	Iy =	1.743	in^4
rx =	0.614	in	ry =	1.183	in
A =	1.246	in^2	J =	0.011	in^2
x =	2.455	in	y =	0.528	in

BOTTOM CHORD

Ix =	0.497	in^4	Iy =	1.804	in^4
rx =	0.621	in	ry =	1.184	in
A =	1.288	in^2	J =	0.012	in^2
x =	2.491	in	y =	0.511	in

x bar and y bar are measured from the tip of the left horz.

WARNING! SECTION DOES NOT MET AISC 1.9 LOCAL BUCKLING

RESULTS OF LAST ANALYSIS

Igross	= 395.98 (in^4)	# ROWS BRIDGING	=	3.00	
JOIST DEPTH	= 26.00 (in)	EFF. DEPTH	=	24.96	(in.)
SPAN LENGTH	= 49.58 (ft)	DEF @ 100 plf	=	1.18	(in)
BRIDGING SPACING	= 9.90 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.14	
KL/ry	= 100.45	KL/rx	=	39.08	
b/t RATIO	= 12.27	Q	=	0.94	
MEA. YIELD STR.	= 54.30 (ksi)	MEA. FAILURE LOAD	=	367.70	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.6	18.3	38.0	123.6	2.98
SJI	24.8	30.9	64.4	209.5	1.76
CONV	26.3	32.8	68.3	222.2	1.65

FIGURE G.26b COMPUTED ALLOWABLE LOADS, TEST 50/3/40-33W

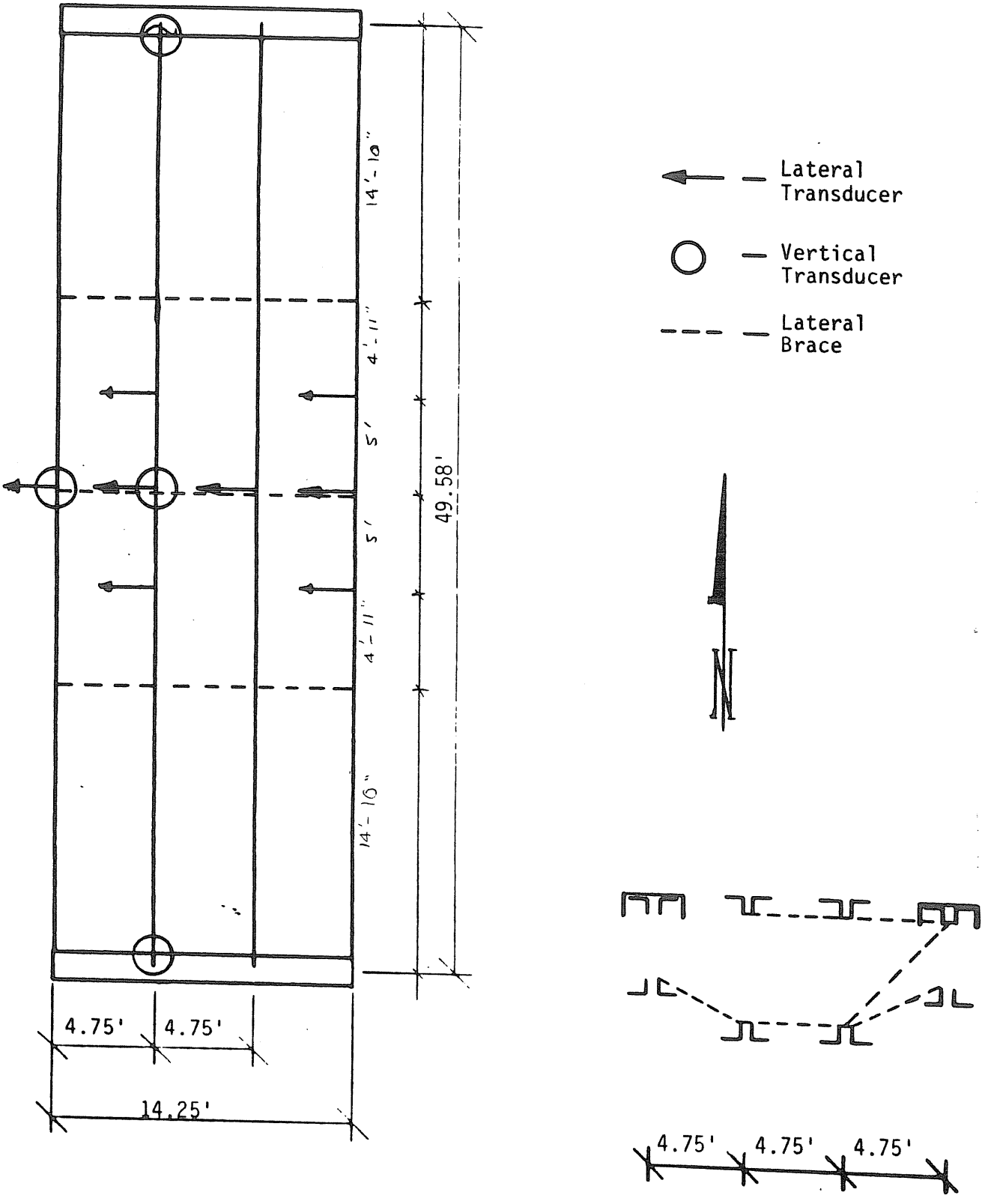
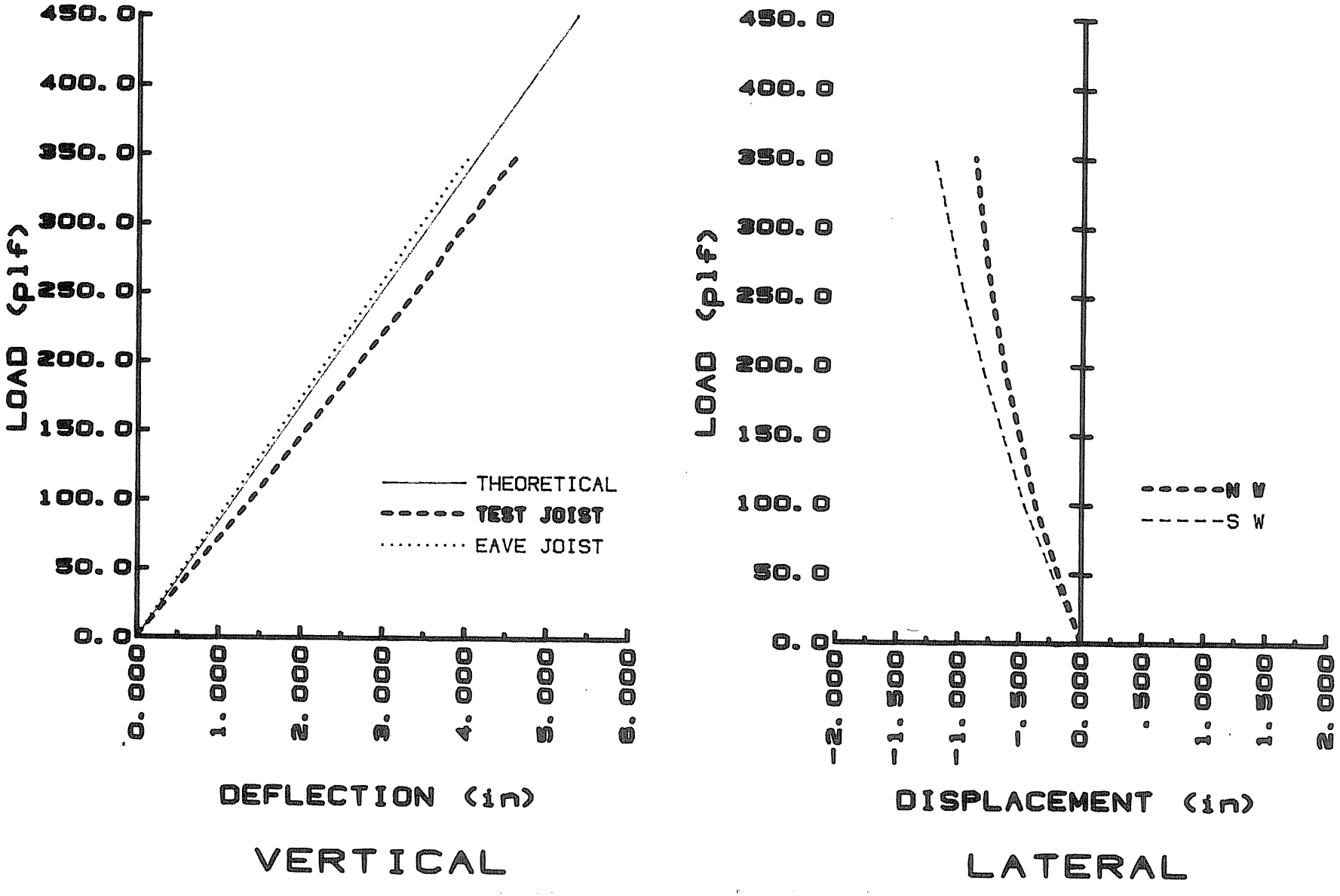


Figure G.27 Plan View of Test Setup, Test 50/3/40-33



50/3/40-33

Figure G.28 Applied Load vs. Vertical and Lateral Displacements

APPENDIX H

60 ft. Span, 20 psf ANGLE WEB TEST RESULTS

Test No. 60/3/20-3

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 4 Bottom Chord: 4

Bridging Spacing:

Top Chord: - 6'7" - 13'2"

Bottom Chord: - 6'7" - 13'2"

Others: East end of panel was attached to channel.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 29.5

2. Method: SJI Load: 52.7

3. Method: CONV. Load: 122.6

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4' south of centerline. (both joists).

Applied Failure Load: 108.7 plf Total Failure Load: 123.6 plf

Load Factor (Failure Load/Service Load) 1. 4.19

2. 2.35

3. 1.01

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-The east test joist and the outside joist deflected the same amount.

Date October 14, 1982

Test 60/3/20-3

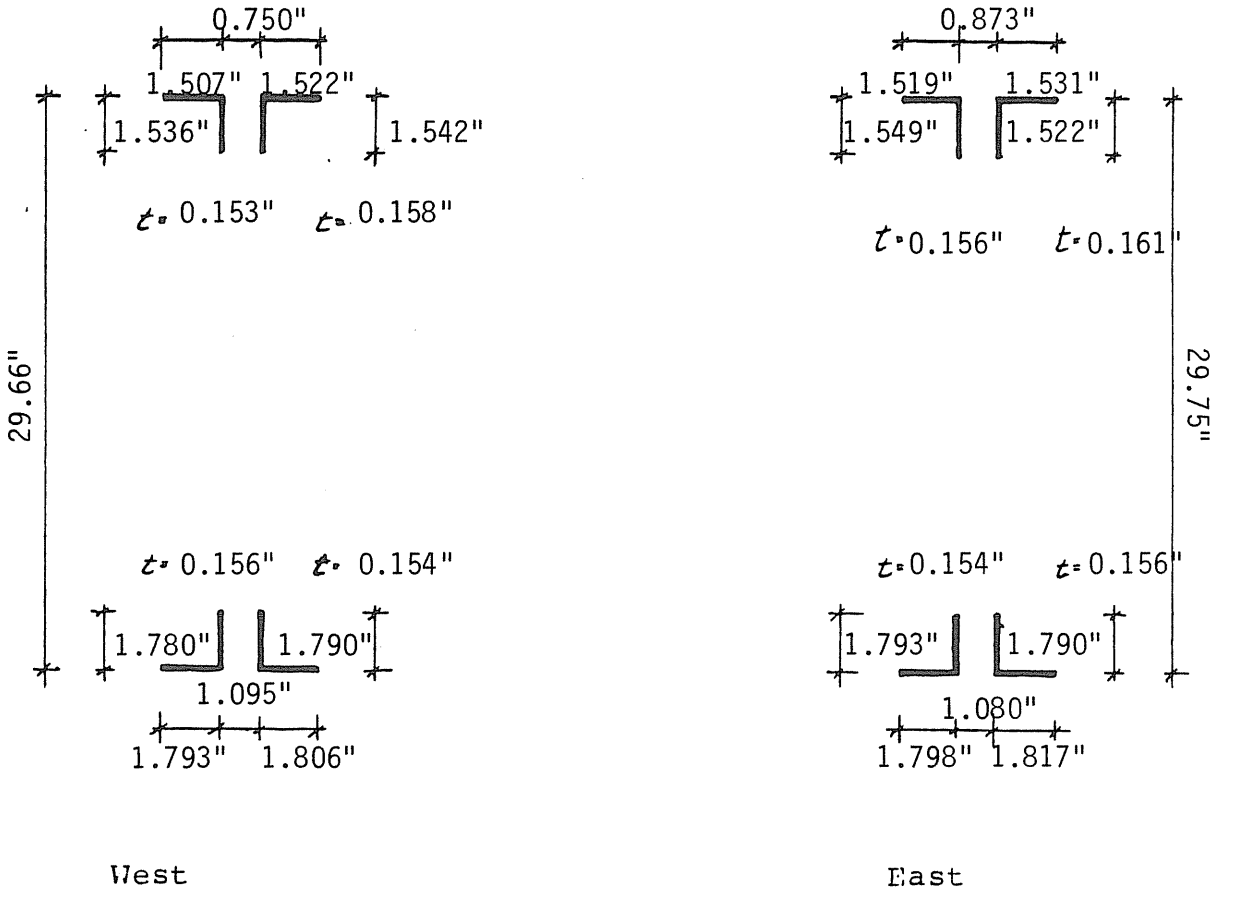


Figure H.1 Cross-Section Properties, Test 60/3/20-3

TEST # 60/3/20-3E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.519	RIGHT HORZ LEG (in) =	1.531
LEFT VER LEG (in) =	1.549	RIGHT VER LEG (in) =	1.522
LEFT THICKNESS (in) =	0.156	RIGHT THICKNESS (in) =	0.161

GAP BETWEEN THE LEGS (in) = 0.873

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.798	RIGHT HORZ LEG (in) =	1.817
LEFT VER LEG (in) =	1.793	RIGHT VER LEG (in) =	1.790
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.156

GAP BETWEEN THE LEGS (in) = 1.080

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.205	in^4	Iy =	0.906	in^4
rx =	0.472	in	ry =	0.992	in
A =	0.920	in^2	J =	0.008	in^2
x =	1.971	in	y =	0.457	in

BOTTOM CHORD

Ix =	0.328	in^4	Iy =	1.515	in^4
rx =	0.554	in	ry =	1.191	in
A =	1.068	in^2	J =	0.009	in^2
x =	2.351	in	y =	0.505	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 419.16 (in^4)	# ROWS BRIDGING	=	4.00	
JOIST DEPTH	= 29.75 (in)	EFF. DEPTH	=	28.79	(in.)
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	=	2.29	(in)
BRIDGING SPACING	= 13.17 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.42	
KL/ry	= 159.28	KL/rx	=	50.80	
b/t RATIO	= 9.93	Q	=	1.00	
MEA. YIELD STR.	= 50.55 (ksi)	MEA. FAILURE LOAD	=	123.60	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	5.9	5.4	13.0	29.5	4.19
SJI	10.5	9.7	23.2	52.7	2.35
CONV	24.4	22.5	54.0	122.6	1.01

FIGURE H.2a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-3E

TEST # 60/3/20-3W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.507	RIGHT HORZ LEG (in) =	1.522
LEFT VER LEG (in) =	1.536	RIGHT VER LEG (in) =	1.542
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.158
GAP BETWEEN THE LEGS (in) =	0.750		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.793	RIGHT HORZ LEG (in) =	1.806
LEFT VER LEG (in) =	1.780	RIGHT VER LEG (in) =	1.790
LEFT THICKNESS (in) =	0.156	RIGHT THICKNESS (in) =	0.154
GAP BETWEEN THE LEGS (in) =	1.095		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.203	in^4	Iy =	0.783	in^4
rx =	0.474	in	ry =	0.932	in
A =	0.901	in^2	J =	0.007	in^2
x =	1.901	in	y =	0.442	in

BOTTOM CHORD

Ix =	0.324	in^4	Iy =	1.517	in^4
rx =	0.552	in	ry =	1.195	in
A =	1.063	in^2	J =	0.009	in^2
x =	2.339	in	y =	0.497	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 413.89 (in^4)	# ROWS BRIDGING	= 4.00		
JOIST DEPTH	= 29.66 (in)	EFF. DEPTH	= 28.72	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.32	(in)	
BRIDGING SPACING	= 13.17 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 106.42		
KL/ry	= 169.58	KL/rx	= 50.60		
b/t RATIO	= 10.04	Q	= 1.00		
MEA. YIELD STR.	= 50.55 (ksi)	MEA. FAILURE LOAD	= 123.60	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	5.2	4.7	11.2	25.5	4.86
SJI	10.0	9.0	21.5	49.0	2.52
CONV	24.5	22.1	52.8	120.0	1.03

FIGURE H.2b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-3W

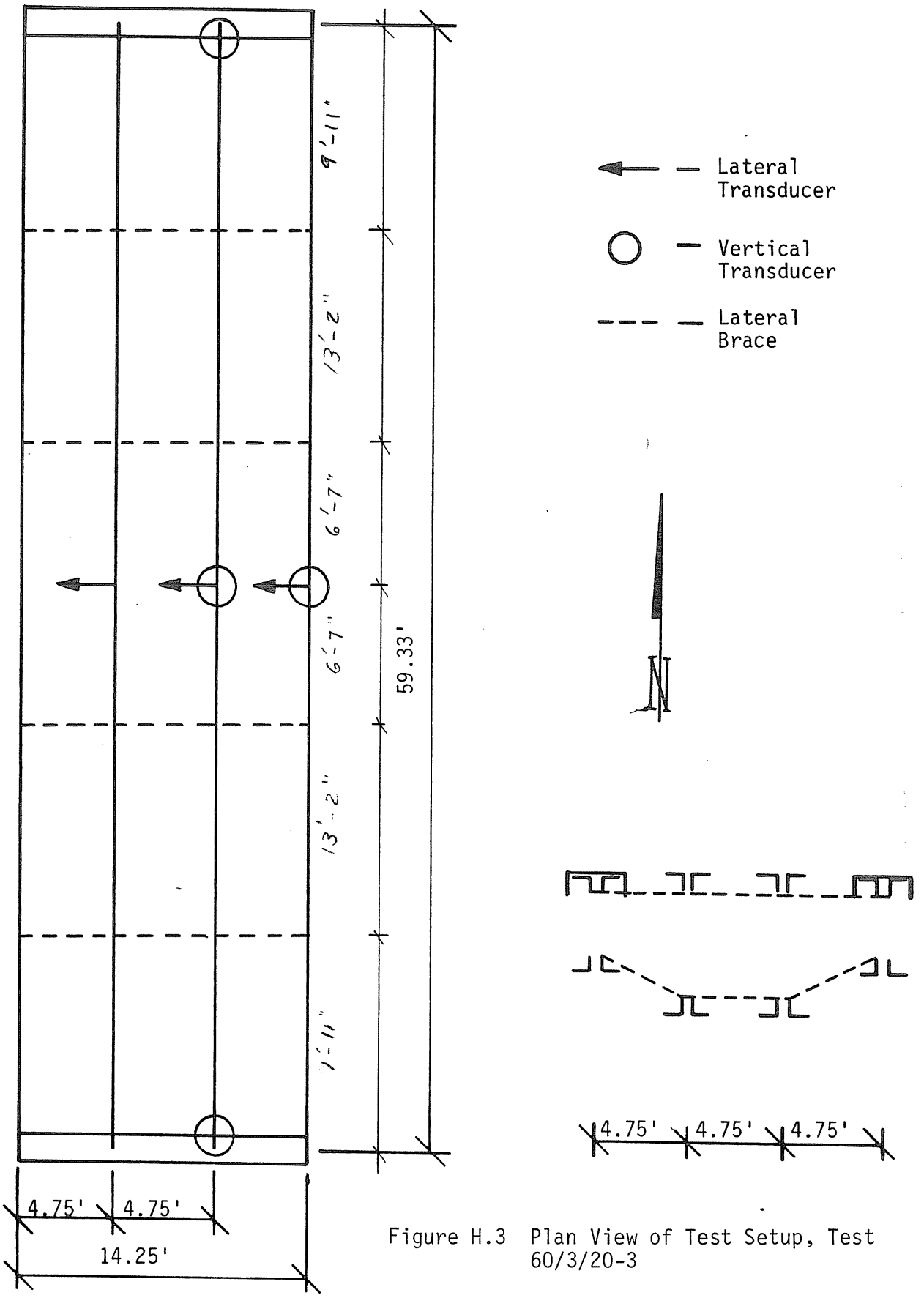
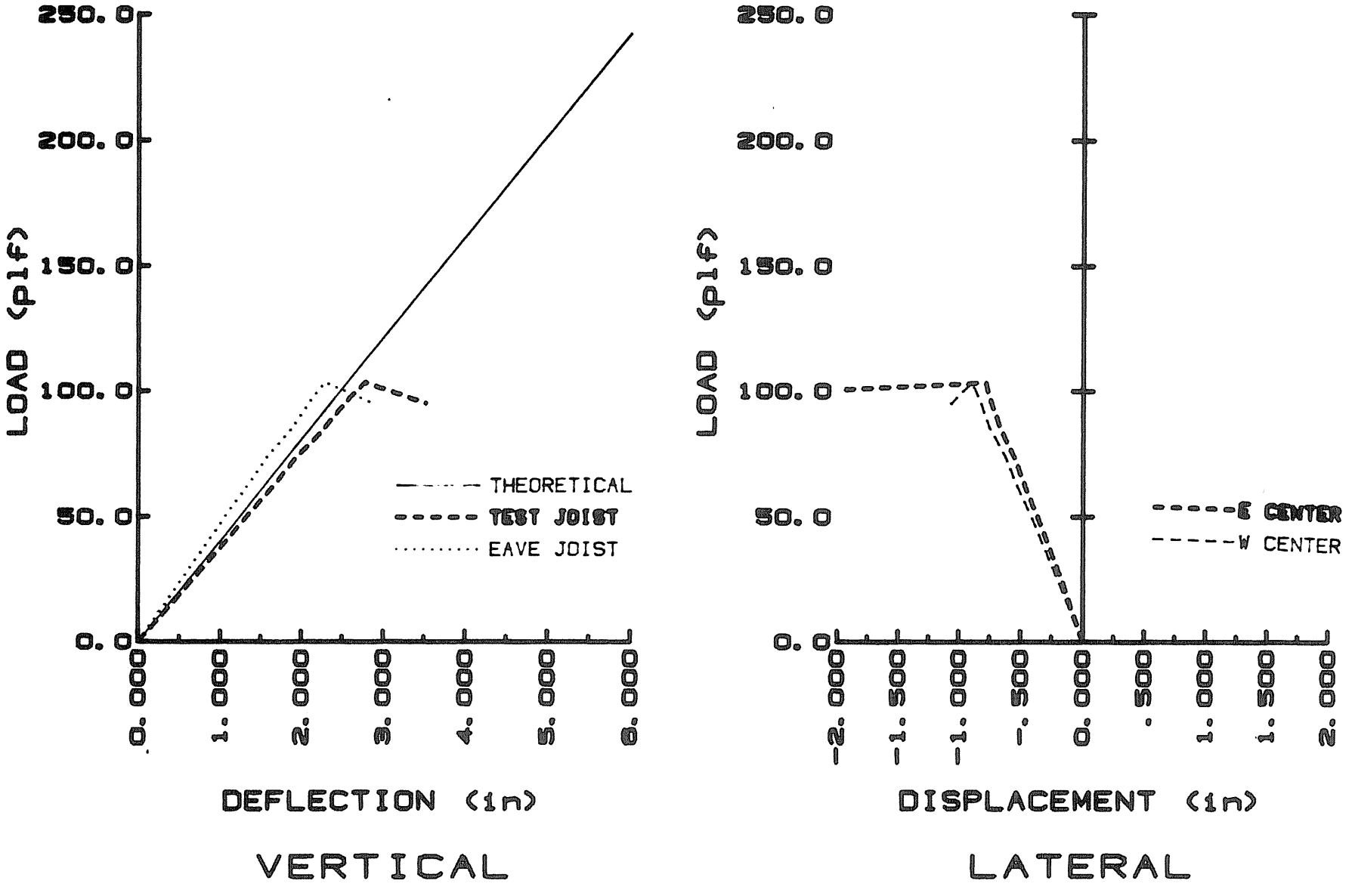


Figure H.3 Plan View of Test Setup, Test 60/3/20-3



60/3/20-3

Figure H.4 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-4

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388 Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 1 Bottom Chord: 1

Bridging Spacing:

Top Chord: - 0'

Bottom Chord: 0'

Others: East end of panel was attached to channel.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 5.3
2. Method: SJI Load: 11.7
3. Method: CONV. Load: 130.6

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4' north of centerline. (east joist only).

Applied Failure Load: 95.1 plf Total Failure Load: 110.0 plf

Load Factor (Failure Load/Service Load) 1. 20.87

2. 9.42

3. 0.84

DISCUSSION:

-There was large lateral displacement of the top chord at the point of failure.

-Load deflection plot was in good agreement with predicted.

-East test joist and the outside joist deflected the same amount.

Date October 19, 1982

Test 60/3/20-4

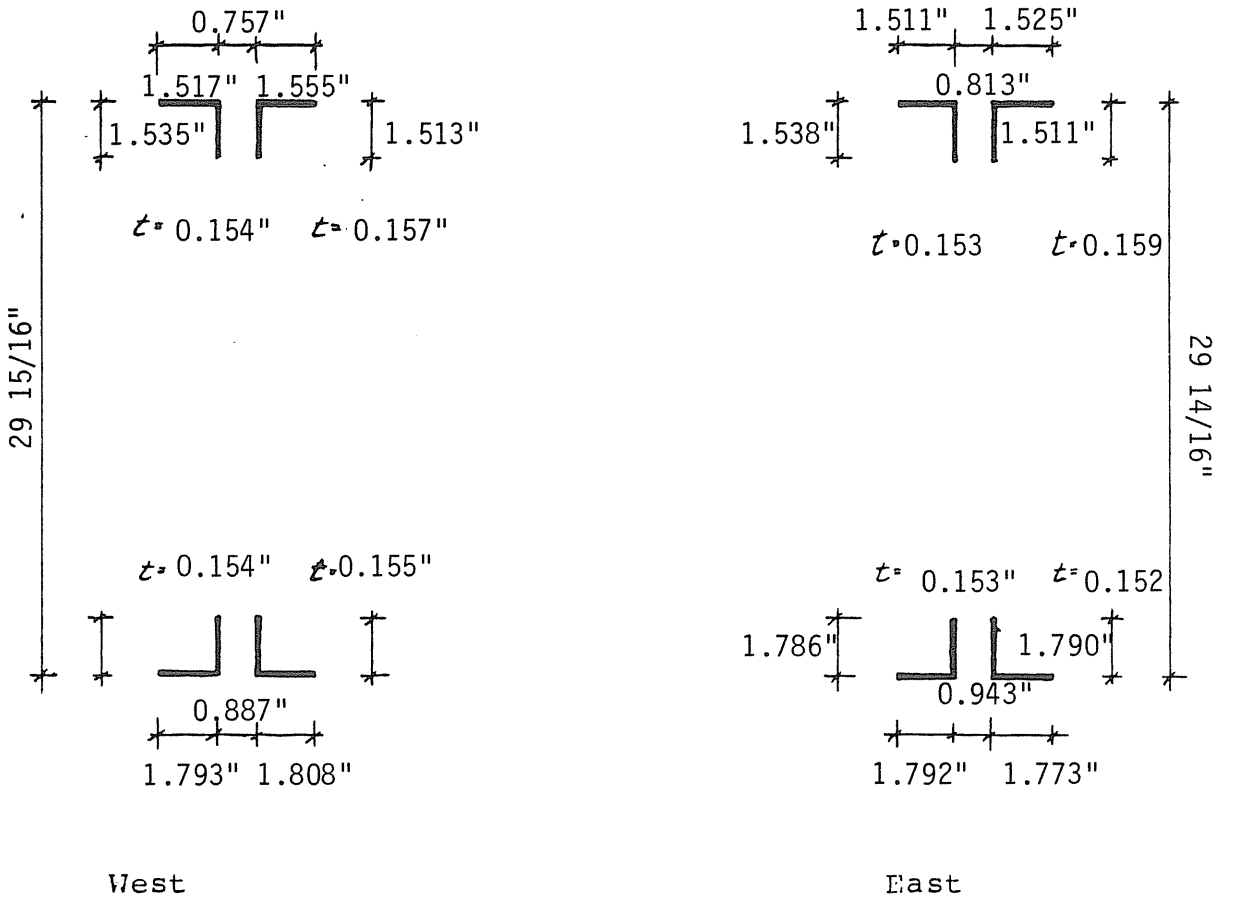


Figure H.5 Cross-Section Properties, Test 60/3/20-4

TEST # 60/3/20-4E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.511	RIGHT HORZ LEG (in) =	1.525
LEFT VER LEG (in) =	1.538	RIGHT VER LEG (in) =	1.511
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.159

GAP BETWEEN THE LEGS (in) = 0.813

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.792	RIGHT HORZ LEG (in) =	1.773
LEFT VER LEG (in) =	1.786	RIGHT VER LEG (in) =	1.790
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.152

GAP BETWEEN THE LEGS (in) = 0.943

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.198	in^4	Iy =	0.835	in^4
rx =	0.469	in	ry =	0.963	in
A =	0.901	in^2	J =	0.007	in^2
x =	1.936	in	y =	0.453	in

BOTTOM CHORD

Ix =	0.320	in^4	Iy =	1.304	in^4
rx =	0.554	in	ry =	1.119	in
A =	1.042	in^2	J =	0.008	in^2
x =	2.254	in	y =	0.502	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Isross	= 413.29 (in^4)	# ROWS BRIDGING	= 1.00		
JOIST DEPTH	= 29.88 (in)	EFF. DEPTH	= 28.92	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.33	(in)	
BRIDGING SPACING	= 30.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 101.24		
KL/ry	= 373.80	KL/rx	= 51.16		
b/t RATIO	= 10.05	Q	= 1.00		
MEA. YIELD STR.	= 55.85 (ksi)	MEA. FAILURE LOAD	= 110.00	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	1.1	1.0	2.3	5.3	20.87
SJI	2.4	2.1	5.1	11.7	9.42
CONV	26.5	23.8	57.5	130.6	0.84

FIGURE H.6a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-4E

TEST # 60/3/20-4W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.517	RIGHT HORZ LEG (in) =	1.555
LEFT VER LEG (in) =	1.535	RIGHT VER LEG (in) =	1.513
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.157
GAP BETWEEN THE LEGS (in) =	0.757		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.793	RIGHT HORZ LEG (in) =	1.808
LEFT VER LEG (in) =	1.786	RIGHT VER LEG (in) =	1.790
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.155
GAP BETWEEN THE LEGS (in) =	0.887		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.198	in^4	Iy =	0.811	in^4
rx =	0.468	in	ry =	0.948	in
A =	0.903	in^2	J =	0.007	in^2
x =	1.914	in	y =	0.448	in

BOTTOM CHORD

Ix =	0.325	in^4	Iy =	1.293	in^4
rx =	0.553	in	ry =	1.104	in
A =	1.061	in^2	J =	0.008	in^2
x =	2.245	in	y =	0.501	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 421.24 (in^4)	# ROWS BRIDGING	= 1.00		
JOIST DEPTH	= 29.94 (in)	EFF. DEPTH	= 28.99	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.28	(in)	
BRIDGING SPACING	= 30.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 101.24		
KL/ry	= 379.85	KL/rx	= 51.24		
b/t RATIO	= 9.97	Q	= 1.00		
MEA. YIELD STR.	= 55.85 (ksi)	MEA. FAILURE LOAD	= 110.00	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	1.0	0.9	2.3	5.1	21.43
SJI	2.3	2.1	5.1	11.5	9.55
CONV	26.5	23.9	57.7	131.2	0.84

FIGURE H.6b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-4W

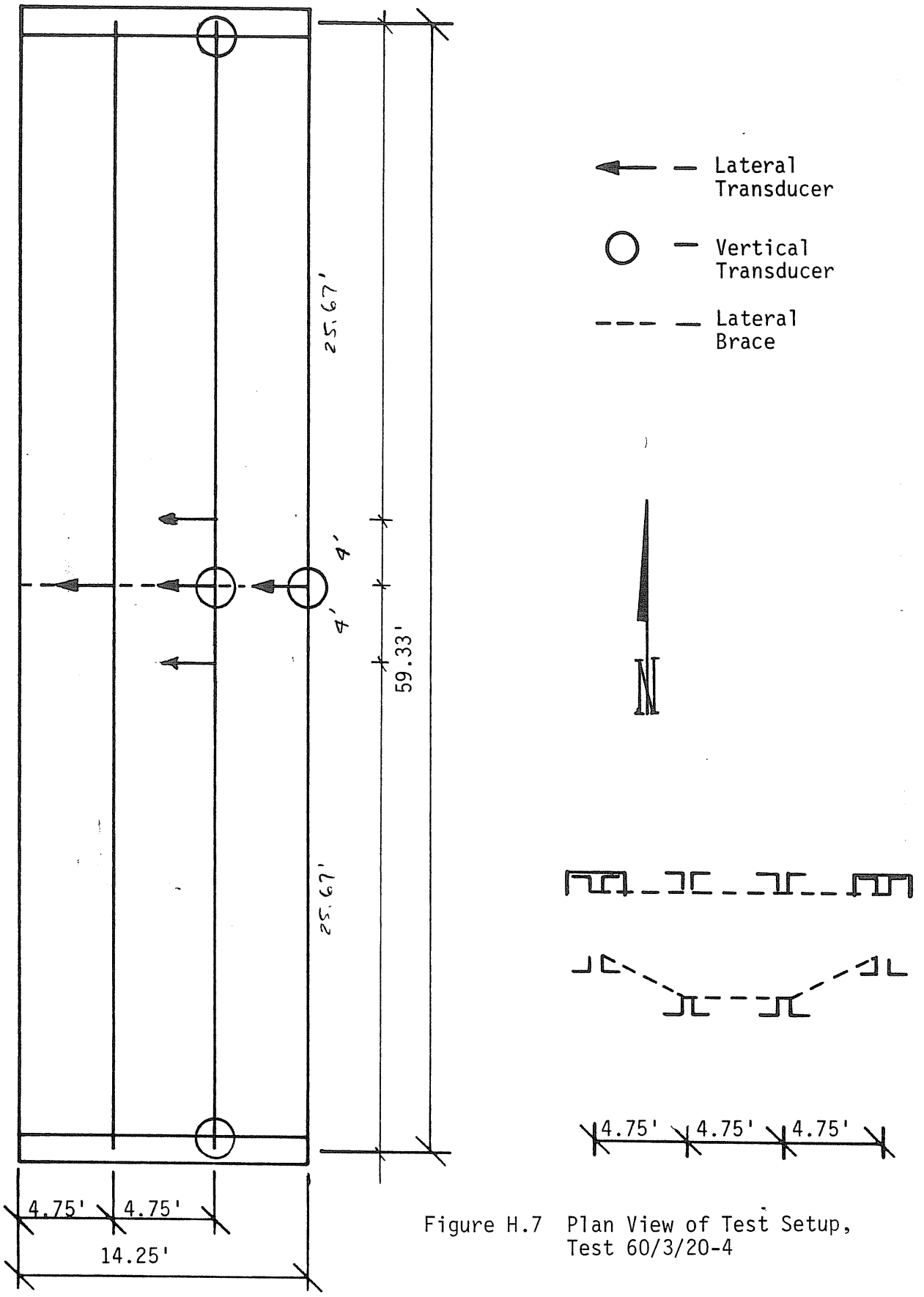
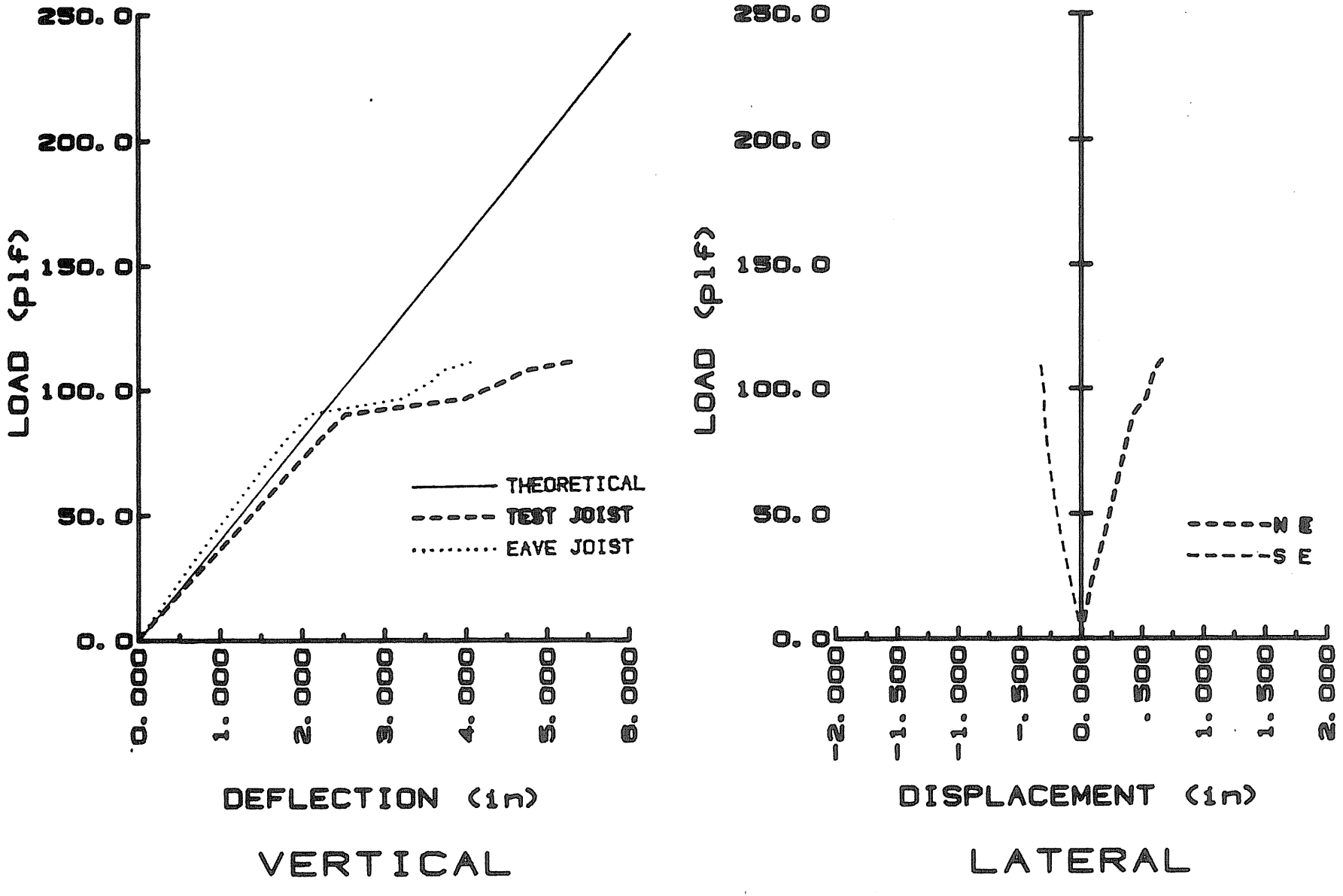


Figure H.7 Plan View of Test Setup, Test 60/3/20-4



60/3/20-4

Figure H.8 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-5

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 3

Bridging Spacing:

Top Chord: 0'-15'

Bottom Chord: 0'-15'

Others: East end of panel was attached to the channel.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 23.4

2.Method: SJI Load: 44.6

3.Method: CONV. Load: 124.0

TEST RESULTS:

Failure Mode: Top chord lateral buckling 8 ft. south of centerline

Applied Failure Load: 148 plf Total Failure Load: 162.9 plf

Load Factor (Failure Load/Service Load) 1. 6.95

2. 3.65

3. 1.31

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-The test joist and the outside joist deflected approximately the same amount.

-The lateral displacements of the test joists was to the east up to a load of approximately 104 plf then the displacement was back to the west up to failure.

Test 60/3/20-5

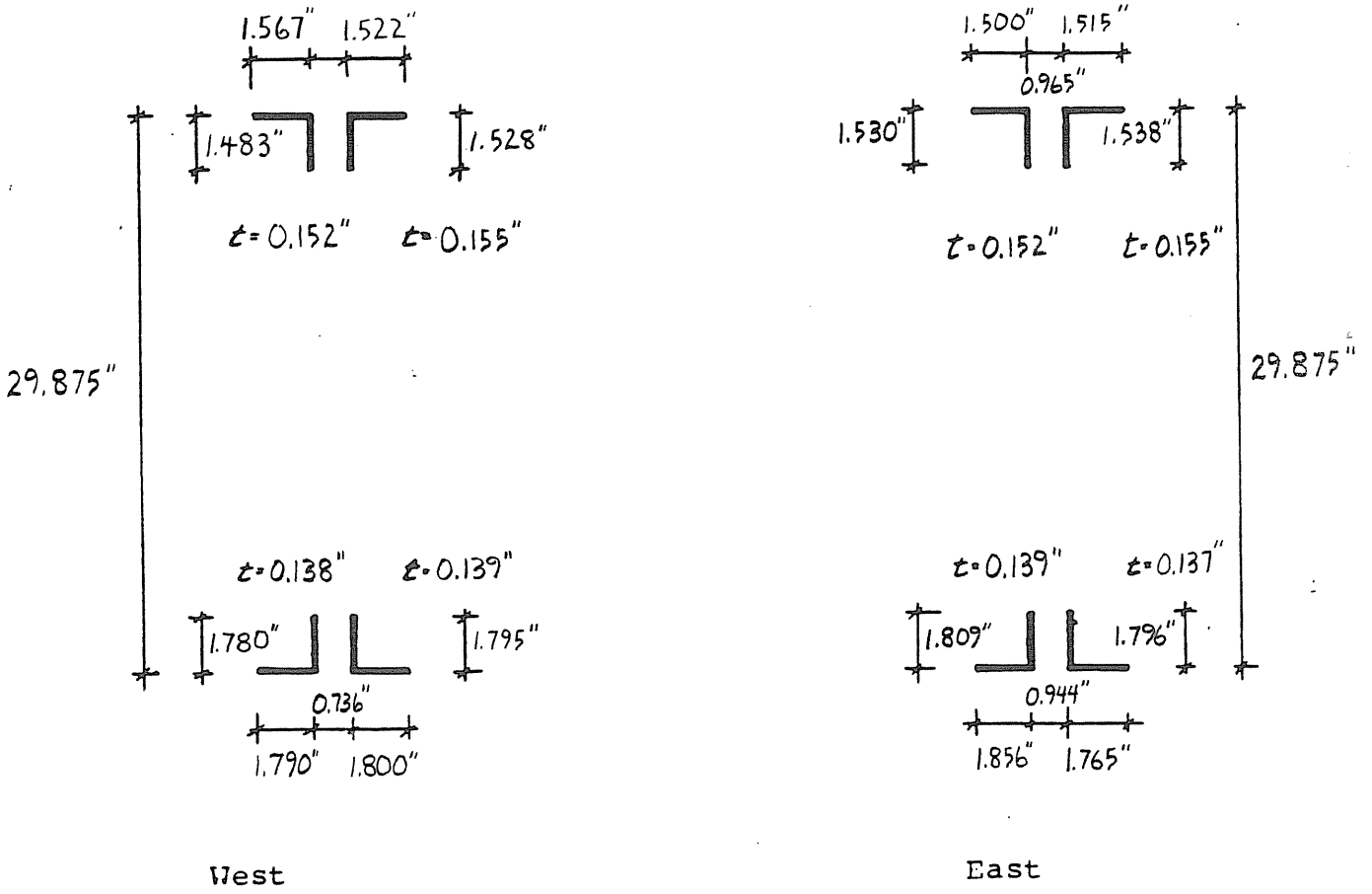


Figure H.9 Cross-Section Properties, Test 60-3/20-5

TEST # 60/3/20-5E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.500	RIGHT HORZ LEG (in) =	1.515
LEFT VER LEG (in) =	1.530	RIGHT VER LEG (in) =	1.538
LEFT THICKNESS (in) =	0.152	RIGHT THICKNESS (in) =	0.155

GAP BETWEEN THE LEGS (in) = 0.965

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.856	RIGHT HORZ LEG (in) =	1.765
LEFT VER LEG (in) =	1.809	RIGHT VER LEG (in) =	1.796
LEFT THICKNESS (in) =	0.139	RIGHT THICKNESS (in) =	0.137

GAP BETWEEN THE LEGS (in) = 0.944

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.198	in^4	Iy =	0.928	in^4
rx =	0.473	in	ry =	1.023	in
A =	0.887	in^2	J =	0.007	in^2
x =	1.997	in	y =	0.439	in

BOTTOM CHORD

Ix =	0.301	in^4	Iy =	1.220	in^4
rx =	0.561	in	ry =	1.128	in
A =	0.959	in^2	J =	0.006	in^2
x =	2.290	in	y =	0.507	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 388.47 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 29.88 (in)	EFF. DEPTH	= 28.93	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.47	(in)	
BRIDGING SPACING	= 15.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.73		
KL/ry	= 175.92	KL/rx	= 50.74		
b/t RATIO	= 10.07	Q	= 1.00		
MEA. YIELD STR.	= 53.20 (ksi)	MEA. FAILURE LOAD	= 162.90	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	4.8	4.3	10.3	23.4	6.95
SJI	9.2	8.1	19.6	44.6	3.65
CONV	25.5	22.6	54.5	124.0	1.31

FIGURE H.10a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-5E

TEST # 60/3/20-5W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.567	RIGHT HORZ LEG (in) =	1.522
LEFT VER LEG (in) =	1.483	RIGHT VER LEG (in) =	1.528
LEFT THICKNESS (in) =	0.152	RIGHT THICKNESS (in) =	0.155

GAP BETWEEN THE LEGS (in) = 0.875

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.790	RIGHT HORZ LEG (in) =	1.800
LEFT VER LEG (in) =	1.780	RIGHT VER LEG (in) =	1.795
LEFT THICKNESS (in) =	0.138	RIGHT THICKNESS (in) =	0.139

GAP BETWEEN THE LEGS (in) = 0.736

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.190	in^4	Iy =	0.899	in^4
rx =	0.463	in	ry =	1.005	in
A =	0.889	in^2	J =	0.007	in^2
x =	2.002	in	y =	0.406	in

BOTTOM CHORD

Ix =	0.295	in^4	Iy =	1.018	in^4
rx =	0.556	in	ry =	1.033	in
A =	0.954	in^2	J =	0.006	in^2
x =	2.165	in	y =	0.490	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 388.92 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 29.88 (in)	EFF. DEPTH	= 28.98	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.47	(in)	
BRIDGING SPACING	= 15.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.73		
KL/ry	= 179.03	KL/rx	= 51.88		
b/t RATIO	= 10.31	Q	= 1.00		
MEA. YIELD STR.	= 53.20 (ksi)	MEA. FAILURE LOAD	= 162.90	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	4.7	4.1	10.0	22.7	7.16
SJI	8.2	7.3	17.7	40.2	4.05
CONV	25.3	22.5	54.4	123.6	1.32

FIGURE H.10b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-5W

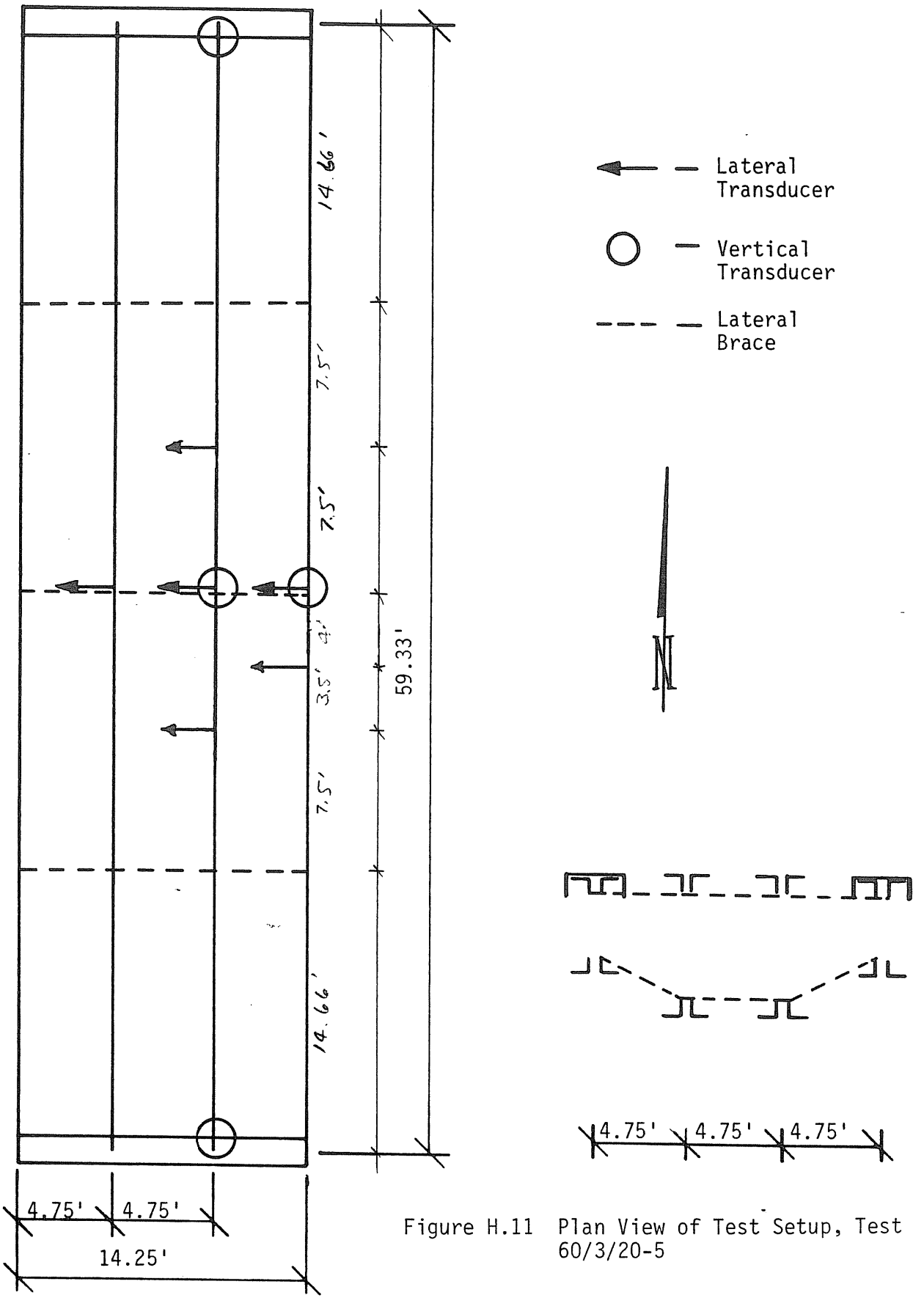
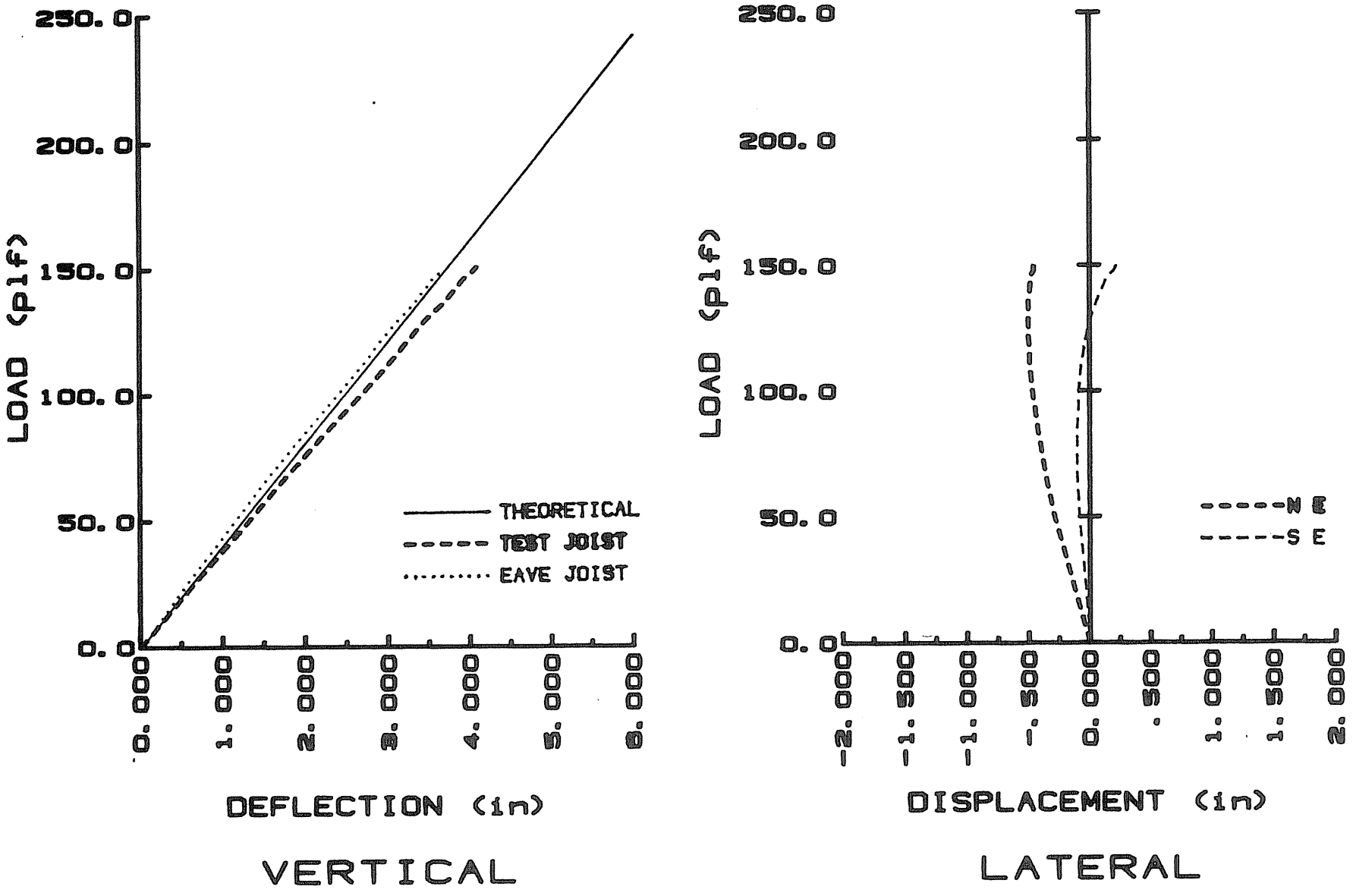


Figure H.11 Plan View of Test Setup, Test 60/3/20-5



60/3/20-5

Figure H.12 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-6

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 3 Bottom Chord: 3

Bridging Spacing:

Top Chord: 0'-13'2"

Bottom Chord: 0'-13'2"

Others: East end of panel was attached to the channel.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 30.7

2.Method: SJI Load: 56.7

3.Method: CONV. Load: 125.0

TEST RESULTS:

Failure Mode: Top chord lateral buckling 6½ ft. south of centerline.

Applied Failure Load: 155.6 plf Total Failure Load: 170.5 plf

Load Factor (Failure Load/Service Load): 1. 5.56

2. 3.01

3. 1.36

DISCUSSION:

-The load deflection curve showed good agreement with predicted.

-The test joist and outside joist moved together vertically.

-The east and west test joist moved to the east approximately the same amount.

-The lateral displacement 6.6' south of centerline on the east test joist moved to the east until approximately 50 plf. The lateral displacement remained the same until approximately 125 plf when the joist began to move to the west and then failed.

Test 60/3/20-6

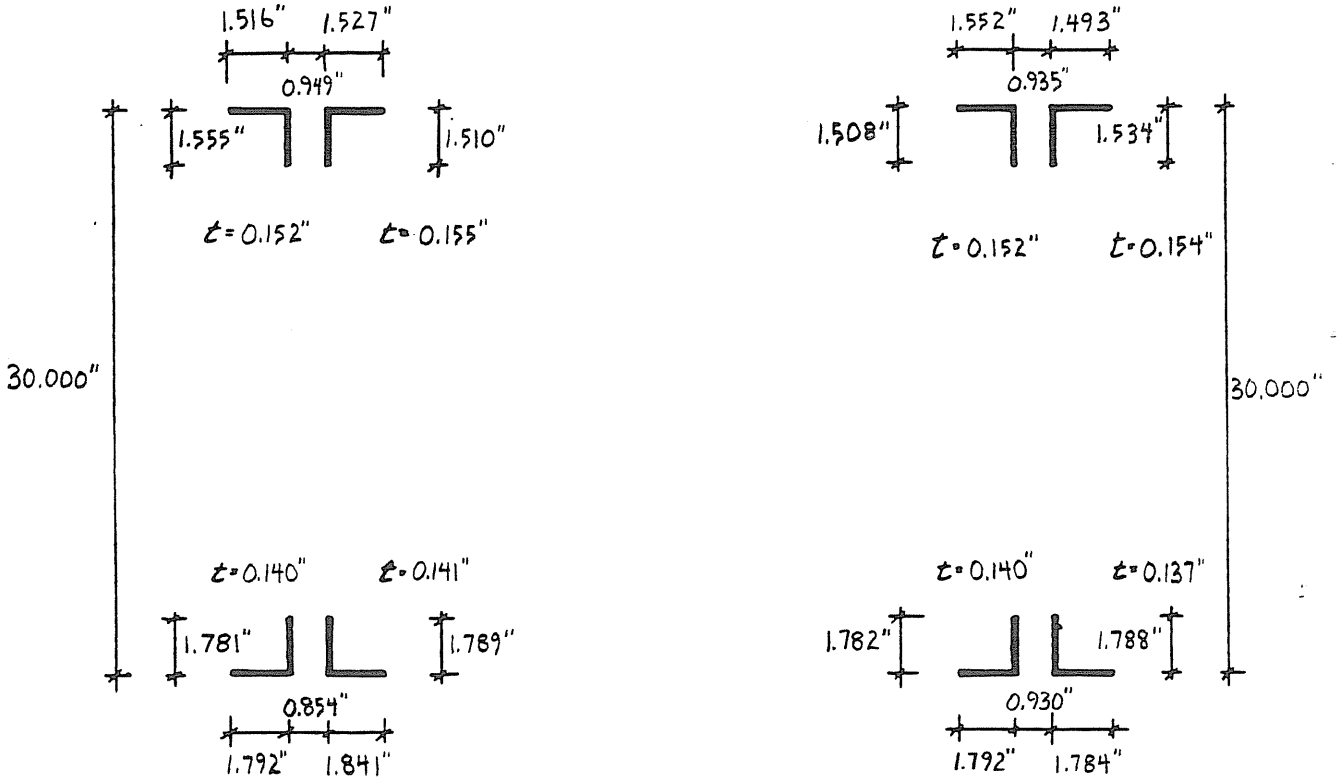


Figure H.13 Cross-Section Properties, Test 60/3/20-6

TEST # 60/3/20-6E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.552	RIGHT HORZ LEG (in) =	1.493
LEFT VER LEG (in) =	1.508	RIGHT VER LEG (in) =	1.534
LEFT THICKNESS (in) =	0.152	RIGHT THICKNESS (in) =	0.154
GAP BETWEEN THE LEGS (in) =	0.935		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.792	RIGHT HORZ LEG (in) =	1.784
LEFT VER LEG (in) =	1.782	RIGHT VER LEG (in) =	1.788
LEFT THICKNESS (in) =	0.140	RIGHT THICKNESS (in) =	0.137
GAP BETWEEN THE LEGS (in) =	0.930		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.194	in^4	Iy =	0.918	in^4
rx =	0.468	in	ry =	1.019	in
A =	0.884	in^2	J =	0.007	in^2
x =	2.008	in	y =	0.424	in

BOTTOM CHORD

Ix =	0.293	in^4	Iy =	1.177	in^4
rx =	0.555	in	ry =	1.113	in
A =	0.951	in^2	J =	0.006	in^2
x =	2.244	in	y =	0.494	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 390.21 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 29.08	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.46	(in)	
BRIDGING SPACING	= 13.17 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.73		
KL/ry	= 155.10	KL/rx	= 51.25		
b/t RATIO	= 10.21	Q	= 1.00		
MEA. YIELD STR.	= 53.20 (ksi)	MEA. FAILURE LOAD	= 170.50	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	6.2	5.5	13.3	30.2	5.64
SJI	11.6	10.3	24.9	56.6	3.01
CONV	25.4	22.5	54.5	123.9	1.38

FIGURE H.14a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-6E

TEST # 60/3/20-6W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.516	RIGHT HORZ LEG (in) =	1.527
LEFT VER LEG (in) =	1.555	RIGHT VER LEG (in) =	1.510
LEFT THICKNESS (in) =	0.152	RIGHT THICKNESS (in) =	0.155
GAP BETWEEN THE LEGS (in) =	0.949		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.792	RIGHT HORZ LEG (in) =	1.841
LEFT VER LEG (in) =	1.781	RIGHT VER LEG (in) =	1.789
LEFT THICKNESS (in) =	0.140	RIGHT THICKNESS (in) =	0.141
GAP BETWEEN THE LEGS (in) =	0.854		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.199	in^4	Iy =	0.932	in^4
rx =	0.473	in	ry =	1.023	in
A =	0.890	in^2	J =	0.007	in^2
x =	1.999	in	y =	0.464	in

BOTTOM CHORD

Ix =	0.298	in^4	Iy =	1.166	in^4
rx =	0.554	in	ry =	1.095	in
A =	0.973	in^2	J =	0.006	in^2
x =	2.239	in	y =	0.490	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 395.73 (in^4)	# ROWS BRIDGING	= 3.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 29.05	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.43	(in)	
BRIDGING SPACING	= 13.17 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.73		
KL/ry	= 154.45	KL/rx	= 50.77		
b/t RATIO	= 10.23	Q	= 1.00		
MEA. YIELD STR.	= 53.20 (ksi)	MEA. FAILURE LOAD	= 170.50	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	6.3	5.6	13.5	30.7	5.56
SJI	11.6	10.3	25.0	56.7	3.01
CONV	25.5	22.7	55.0	125.0	1.36

FIGURE H.14b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-6W

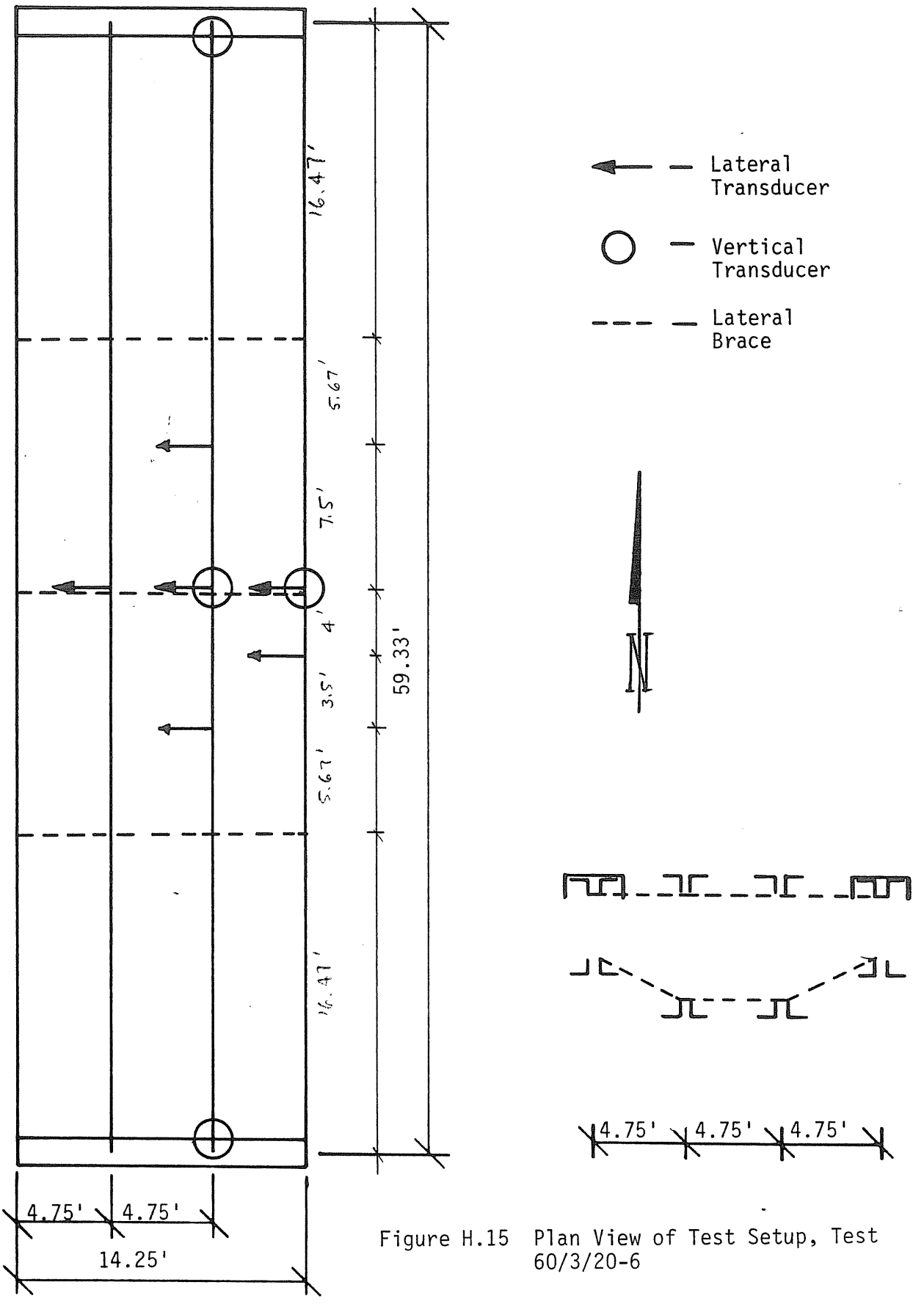
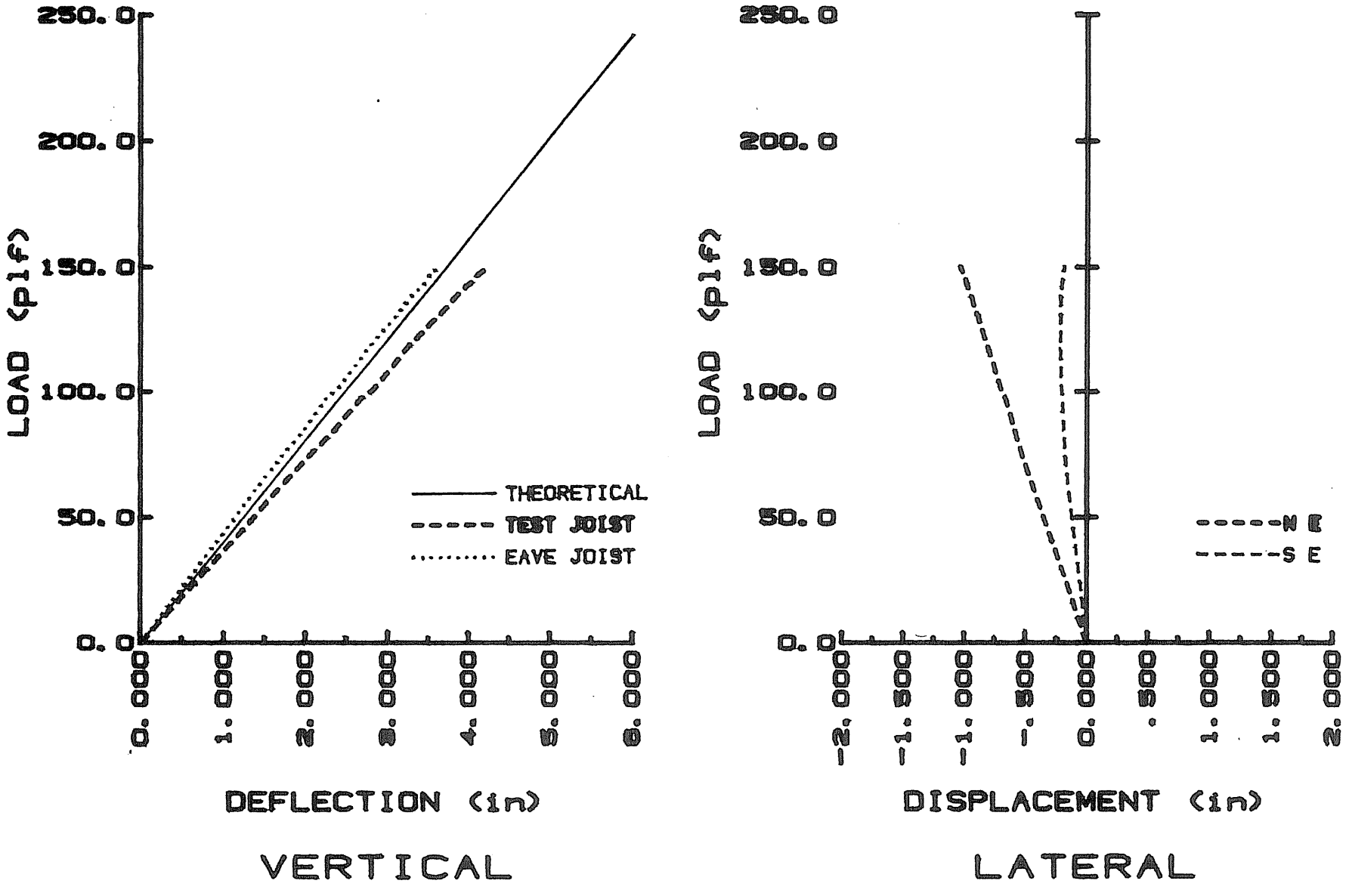


Figure H.15 Plan View of Test Setup, Test 60/3/20-6



60/3/20-6

Figure H.16 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-7

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388 Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-10'-10'

Bottom Chord: 0'-10'-10'

Others: East end of panel was attached to the channel.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 54.6

2 Method: SJI Load: 81.7

3 Method: CONV. Load: 127.3

TEST RESULTS:

Failure Mode: Top chord lateral buckling 5 ft. north of centerline. (both joists)

Applied Failure Load: 182.9 plf Total Failure Load: 197.8 plf

Load Factor (Failure Load/Service Load) 1. 3.62

2. 2.42

3. 1.55

DISCUSSION:

-The load deflection curve had a good agreement with theoretical.

-The test joist and the outside joist vertically deflected approximately the same amount.

-The east and west test joist moved to the east up to failure.

Test 60/3/20-7

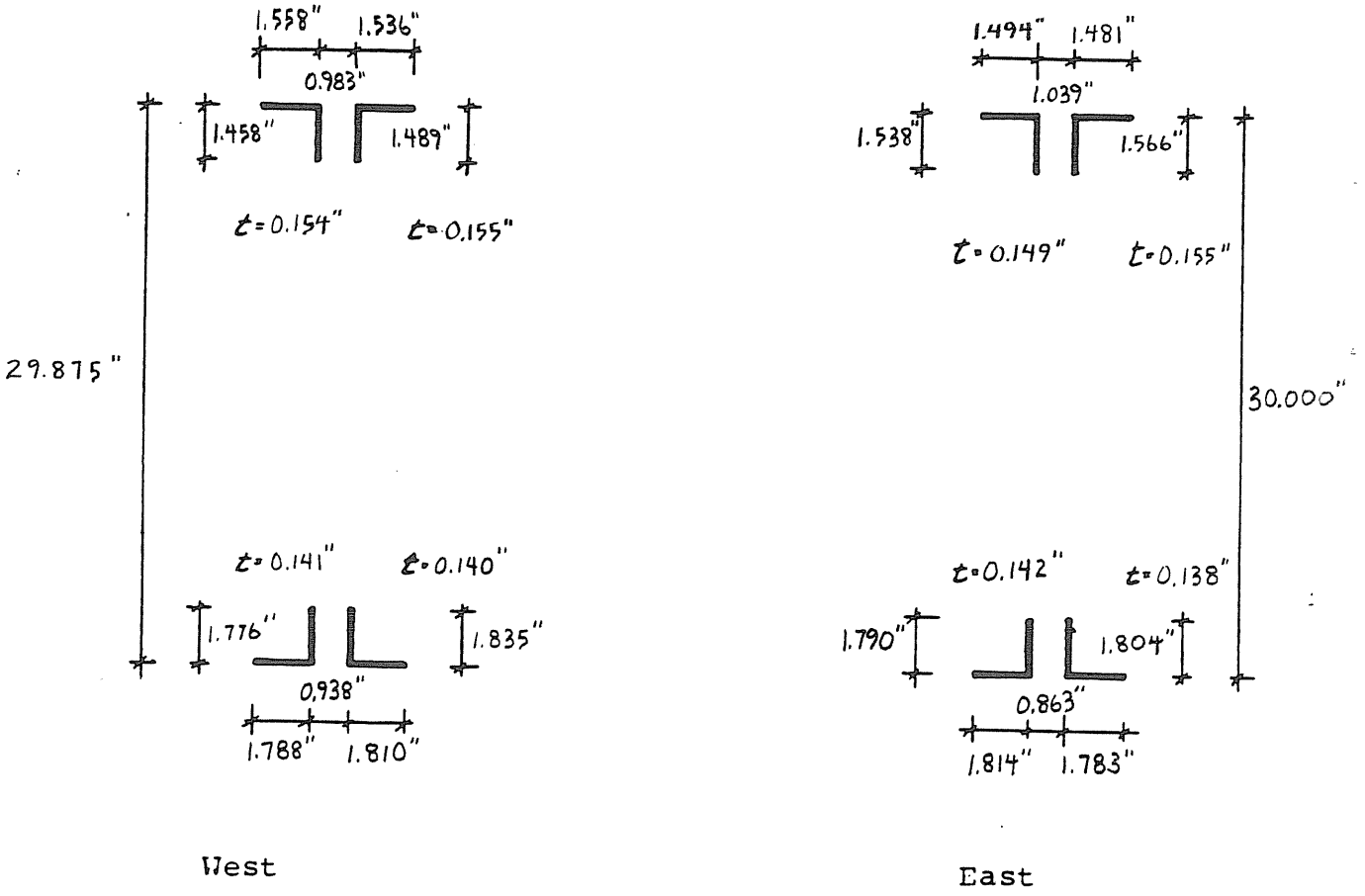


Figure H.17 Cross-Section Properties, Test 60/3/20-7

TEST # 60/3/20-7E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.494	RIGHT HORZ LEG (in) =	1.481
LEFT VER LEG (in) =	1.538	RIGHT VER LEG (in) =	1.566
LEFT THICKNESS (in) =	0.149	RIGHT THICKNESS (in) =	0.155
GAP BETWEEN THE LEGS (in) =	1.039		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.814	RIGHT HORZ LEG (in) =	1.783
LEFT VER LEG (in) =	1.790	RIGHT VER LEG (in) =	1.804
LEFT THICKNESS (in) =	0.142	RIGHT THICKNESS (in) =	0.138
GAP BETWEEN THE LEGS (in) =	0.863		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.203	in^4	Iy =	0.956	in^4
rx =	0.481	in	ry =	1.044	in
A =	0.878	in^2	J =	0.007	in^2
x =	2.031	in	y =	0.438	in

BOTTOM CHORD

Ix =	0.302	in^4	Iy =	1.145	in^4
rx =	0.559	in	ry =	1.088	in
A =	0.968	in^2	J =	0.006	in^2
x =	2.223	in	y =	0.494	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 393.08 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 29.07	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.45	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 102.09		
KL/ry	= 114.96	KL/rx	= 49.94		
b/t RATIO	= 10.32	Q	= 1.00		
MEA. YIELD STR.	= 55.05 (ksi)	MEA. FAILURE LOAD	= 197.80	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.3	9.9	24.0	54.6	3.62
SJI	16.9	14.8	36.0	81.7	2.42
CONV	26.3	23.1	56.0	127.3	1.55

FIGURE H.18a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-7E

TEST # 60/3/20-7W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.558	RIGHT HORZ LEG (in) =	1.536
LEFT VER LEG (in) =	1.458	RIGHT VER LEG (in) =	1.489
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.155
GAP BETWEEN THE LEGS (in) =	0.983		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.788	RIGHT HORZ LEG (in) =	1.810
LEFT VER LEG (in) =	1.776	RIGHT VER LEG (in) =	1.835
LEFT THICKNESS (in) =	0.141	RIGHT THICKNESS (in) =	0.140
GAP BETWEEN THE LEGS (in) =	0.938		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.180	in^4	Iy =	0.993	in^4
rx =	0.451	in	ry =	1.059	in
A =	0.886	in^2	J =	0.007	in^2
x =	2.048	in	y =	0.401	in

BOTTOM CHORD

Ix =	0.308	in^4	Iy =	1.220	in^4
rx =	0.563	in	ry =	1.119	in
A =	0.973	in^2	J =	0.006	in^2
x =	2.265	in	y =	0.475	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross = 393.93 (in^4)	# ROWS BRIDGING = 5.00		
JOIST DEPTH = 29.88 (in)	EFF. DEPTH = 29.00 (in.)		
SPAN LENGTH = 59.33 (ft)	DEF @ 100 plf = 2.44 (in)		
BRIDGING SPACING = 10.00 (ft)	PANEL LENGTH = 24.00 (in)		
K = 1.00	C = 101.65		
KL/ry = 113.33	KL/rx = 53.27		
b/t RATIO = 10.12	Q = 1.00		
MEA. YIELD STR. = 55.40 (ksi)	MEA. FAILURE LOAD = 197.80 (plf)		

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.6	10.3	24.9	56.6	3.50
SJI	17.6	15.6	37.7	85.8	2.31
CONV	25.9	22.9	55.4	126.0	1.57

FIGURE H.18b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-7W

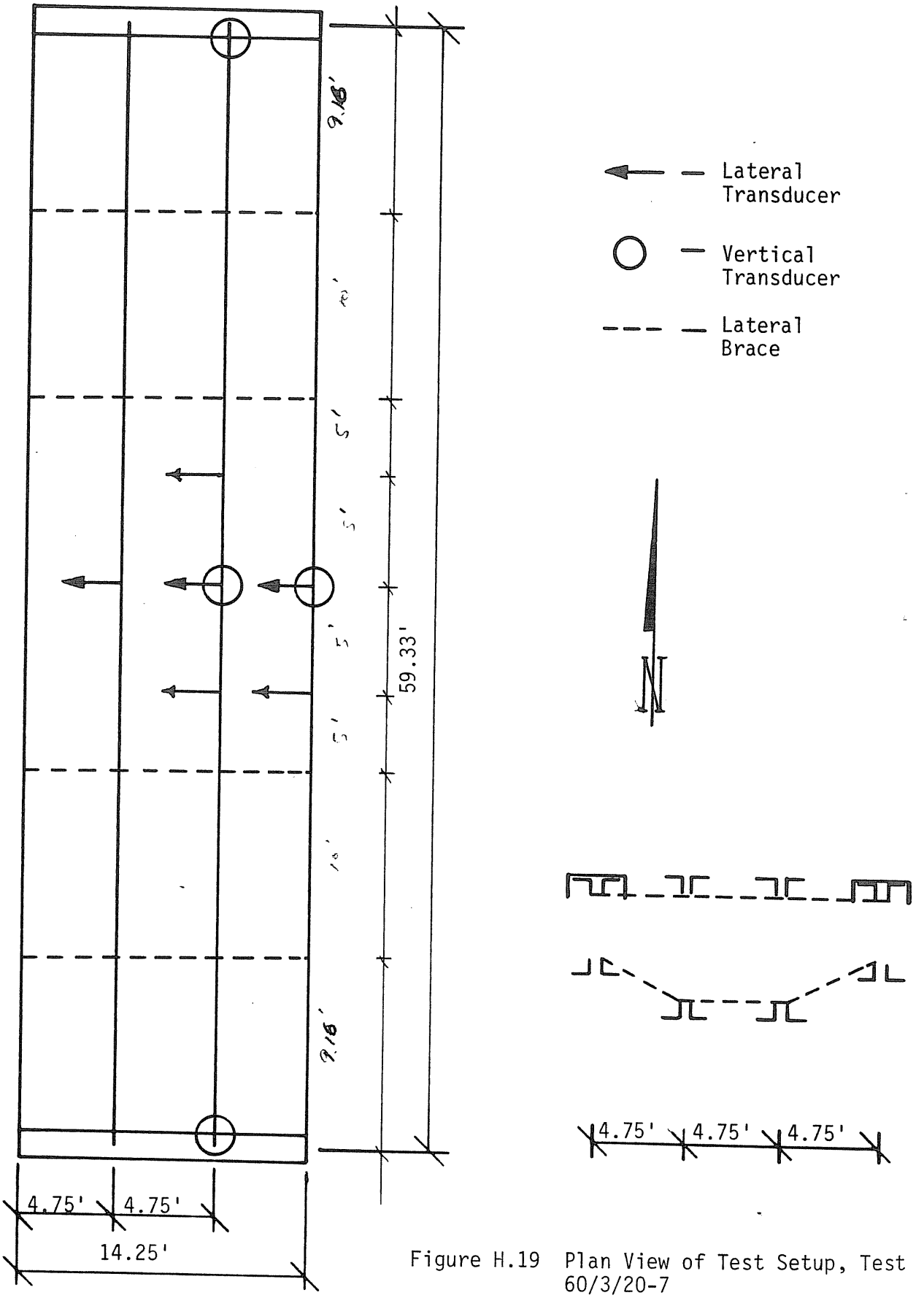
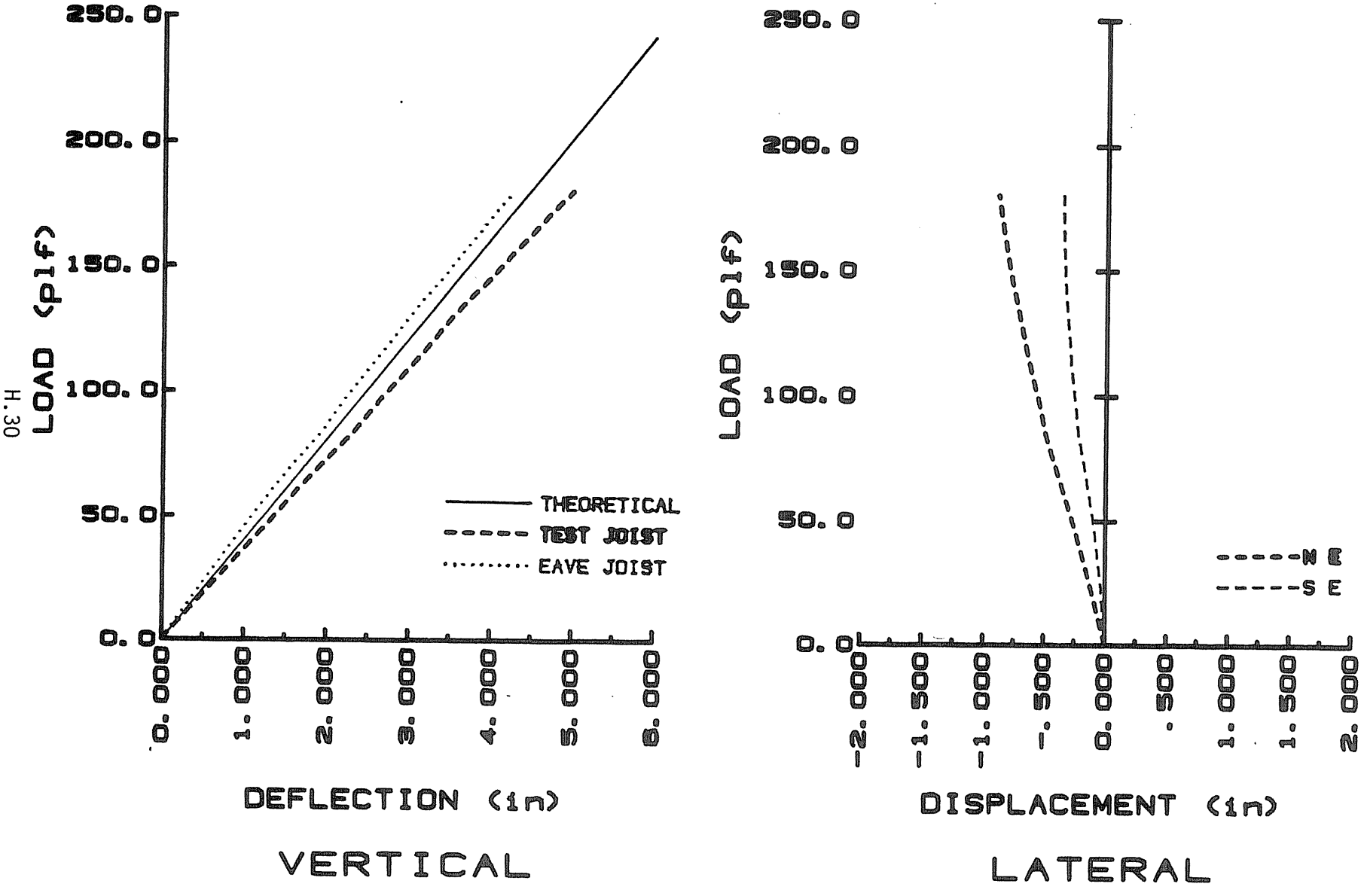


Figure H.19 Plan View of Test Setup, Test 60/3/20-7



60/3/20-7

Figure H.20 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-8

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-10'-10'

Bottom Chord: 0'-10'-10'

Others: East end of panel was attached to the channel.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 58.3

2.Method: SJI Load: 88.2

3.Method: CONV. Load: 131.8

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of centerline.

Applied Failure Load: 123.5 plf Total Failure Load: 138.4 plf

Load Factor (Failure Load/Service Load) 1. 2.37

2. 1.57

3. 1.05

DISCUSSION:

-Clip looked as if it may have slipped in the deck at the point of failure.

-The load deflection curve had good agreement with the theoretical.

-The test joist and the outside joist deflected approximately the same amount.

-The east and west test joist moved to the east up to failure.

-The east joist location 5' south of midspan moved to the east up to approximately 75 plf where it started to move to the west.

-The outside joist moved to the west 0.661".

Test 60/3/20-8

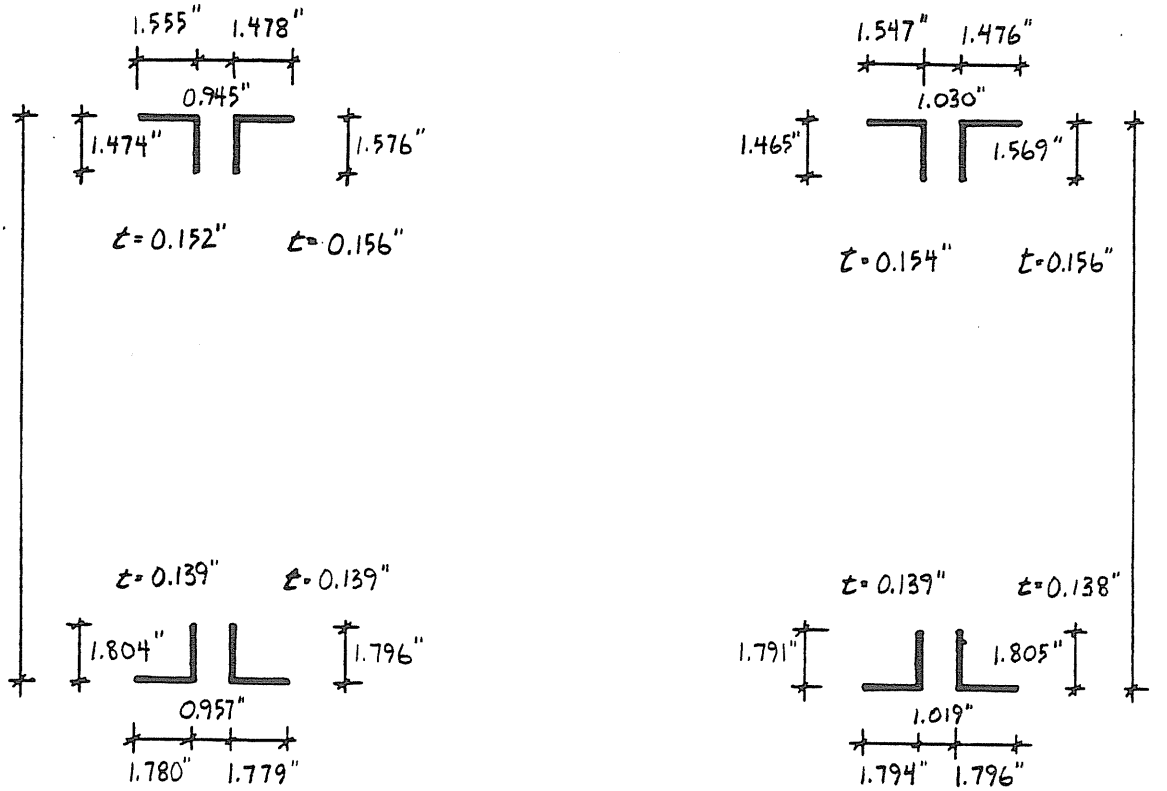


Figure H.21 Cross-Section Properties, Test 60/3/20-8

TEST # 60/3/20-8E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.547	RIGHT HORZ LEG (in) =	1.476
LEFT VER LEG (in) =	1.465	RIGHT VER LEG (in) =	1.569
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.156
GAP BETWEEN THE LEGS (in) =	1.030		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.794	RIGHT HORZ LEG (in) =	1.796
LEFT VER LEG (in) =	1.791	RIGHT VER LEG (in) =	1.805
LEFT THICKNESS (in) =	0.139	RIGHT THICKNESS (in) =	0.138
GAP BETWEEN THE LEGS (in) =	1.019		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.197	in^4	Iy =	0.995	in^4
rx =	0.471	in	ry =	1.057	in
A =	0.891	in^2	J =	0.007	in^2
x =	2.054	in	y =	0.385	in

BOTTOM CHORD

Ix =	0.299	in^4	Iy =	1.273	in^4
rx =	0.559	in	ry =	1.153	in
A =	0.957	in^2	J =	0.006	in^2
x =	2.302	in	y =	0.494	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 393.72 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	=	29.12	(in.)
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	=	2.44	(in)
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	102.02	
KL/ry	= 113.52	KL/rx	=	50.97	
b/t RATIO	= 10.06	Q	=	1.00	
MEA. YIELD STR.	= 55.00 (ksi)	MEA. FAILURE LOAD	=	138.40	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.6	10.3	25.1	56.9	2.43
SJI	17.9	16.0	38.7	88.0	1.57
CONV	26.2	23.3	56.6	128.6	1.08

FIGURE H.22a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-8E

TEST # 60/3/20-8W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.555	RIGHT HORZ LEG (in) =	1.478
LEFT VER LEG (in) =	1.474	RIGHT VER LEG (in) =	1.576
LEFT THICKNESS (in) =	0.152	RIGHT THICKNESS (in) =	0.156
GAP BETWEEN THE LEGS (in) =	0.945		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.780	RIGHT HORZ LEG (in) =	1.779
LEFT VER LEG (in) =	1.804	RIGHT VER LEG (in) =	1.796
LEFT THICKNESS (in) =	0.139	RIGHT THICKNESS (in) =	0.139
GAP BETWEEN THE LEGS (in) =	0.957		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.199	in^4	Iy =	0.926	in^4
rx =	0.474	in	ry =	1.020	in
A =	0.889	in^2	J =	0.007	in^2
x =	2.023	in	y =	0.388	in

BOTTOM CHORD

Ix =	0.300	in^4	Iy =	1.196	in^4
rx =	0.560	in	ry =	1.118	in
A =	0.956	in^2	J =	0.006	in^2
x =	2.258	in	y =	0.508	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 392.93 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 29.10	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.45	(in)	
BRIDGING SPACING	= 10.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 102.02		
KL/ry	= 117.62	KL/rx	= 50.68		
b/t RATIO	= 10.23	Q	= 1.00		
MEA. YIELD STR.	= 55.00 (ksi)	MEA. FAILURE LOAD	= 138.40	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	10.8	9.6	23.3	52.9	2.62
SJI	16.8	14.9	36.2	82.3	1.68
CONV	26.2	23.3	56.6	128.6	1.08

FIGURE H.22b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-8W

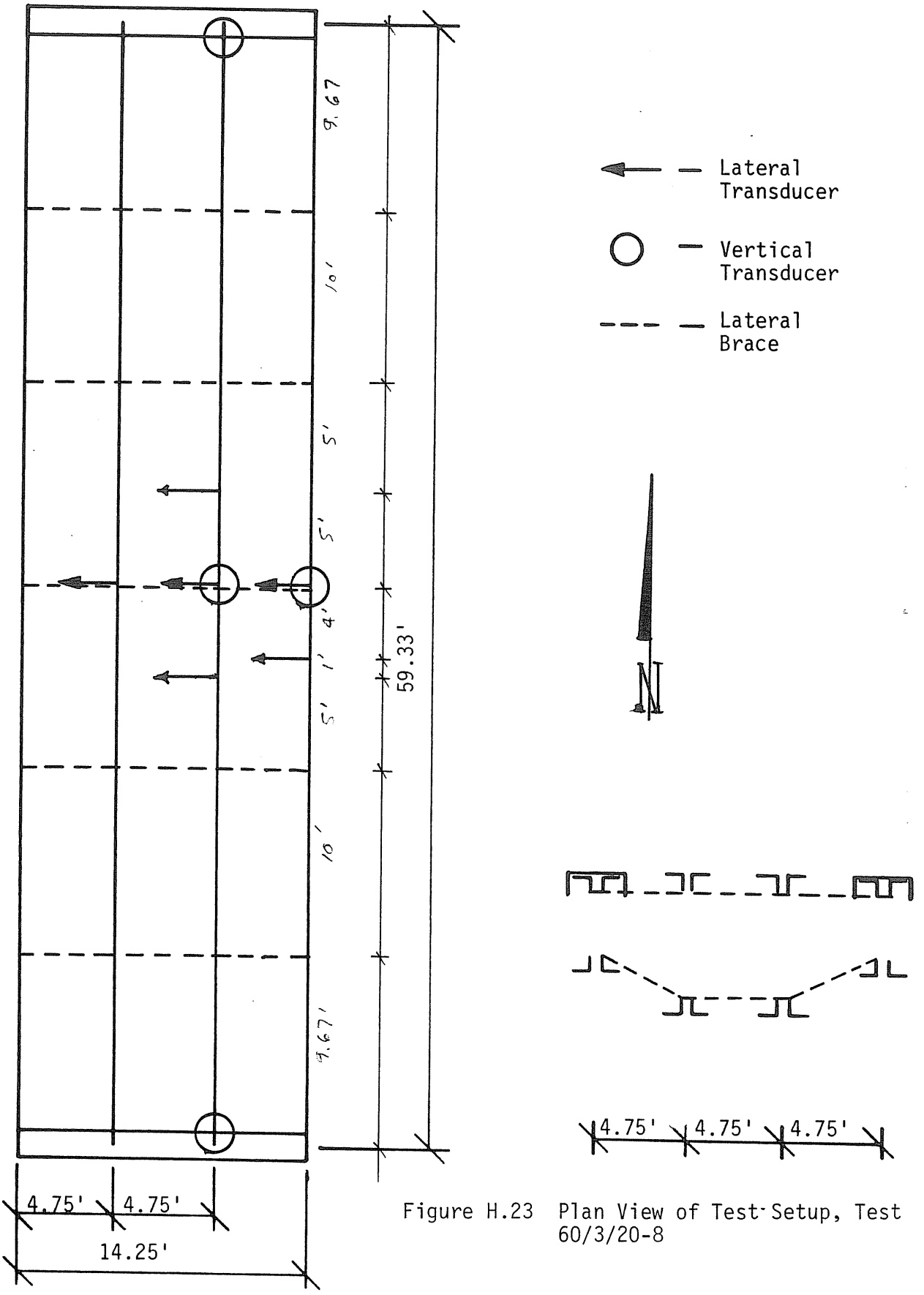
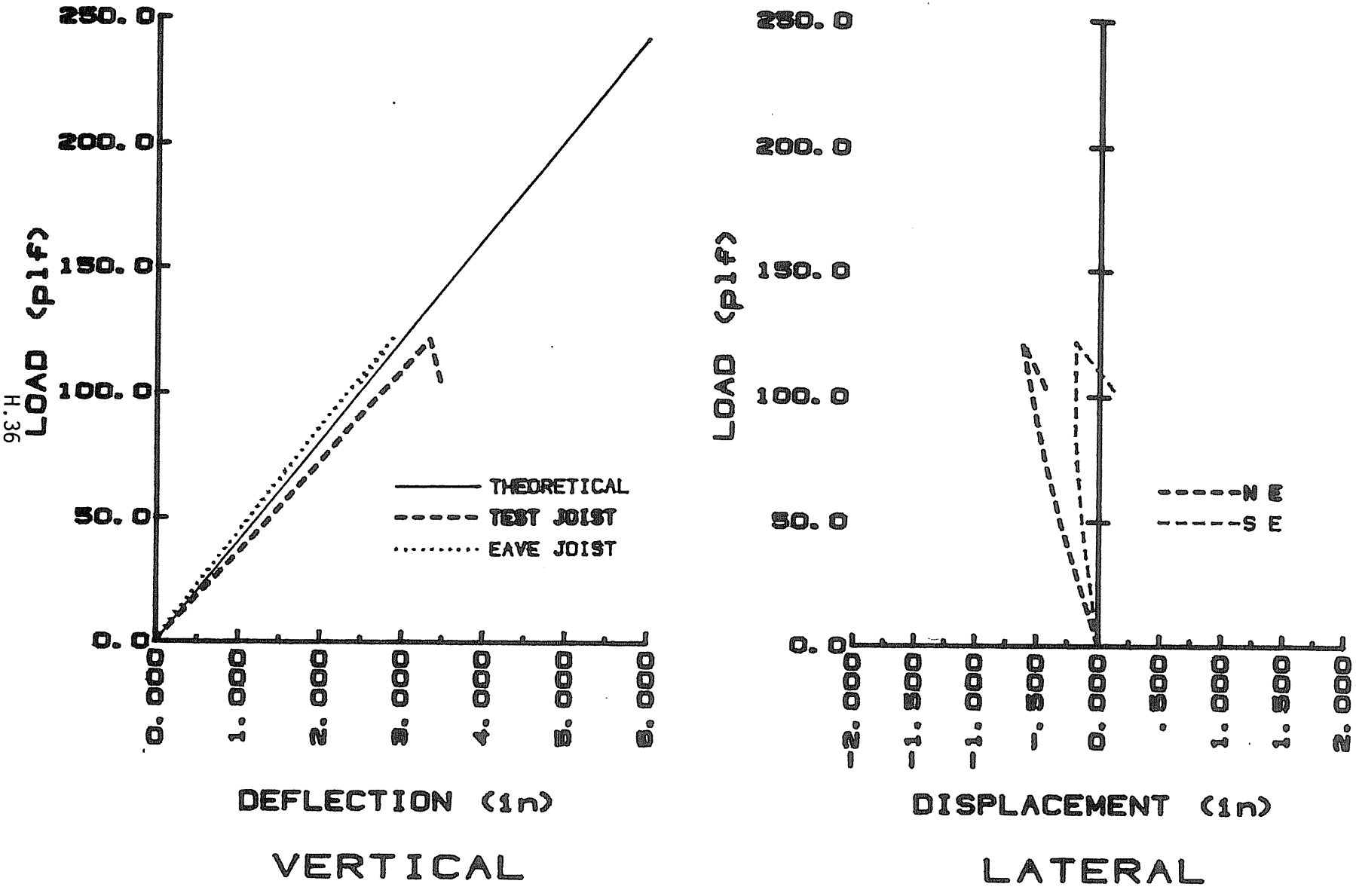


Figure H.23 Plan View of Test Setup, Test 60/3/20-8



TEST 60/3/20-8

Figure H.24 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-9

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-9'3"-9'4"

Bottom Chord: 0'-9'3"-9'4"

Others: East end of panel was attached to the channel.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 55.1

2.Method: SJI Load: 91.5

3.Method: CONV. Load: 129.8

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of midspan.

Applied Failure Load: 114 plf Total Failure Load: 128 plf

Load Factor (Failure Load/Service Load) 1. 2.34

2. 1.41

3. 0.99

DISCUSSION:

-Clip moved inside deck at point of failure. New deck was used 10 ft. on either side of midspan.

-Load deflection curve had good agreement with theoretical.

-The test joist and outside joist deflected approximately the same amount.

-The east and west joist moved to the west until failure.

-The outside joist moved to the west 0.194" (the magnet was moved for this test from the channel to the vertical member of the joist).

Test 60/3/20-9

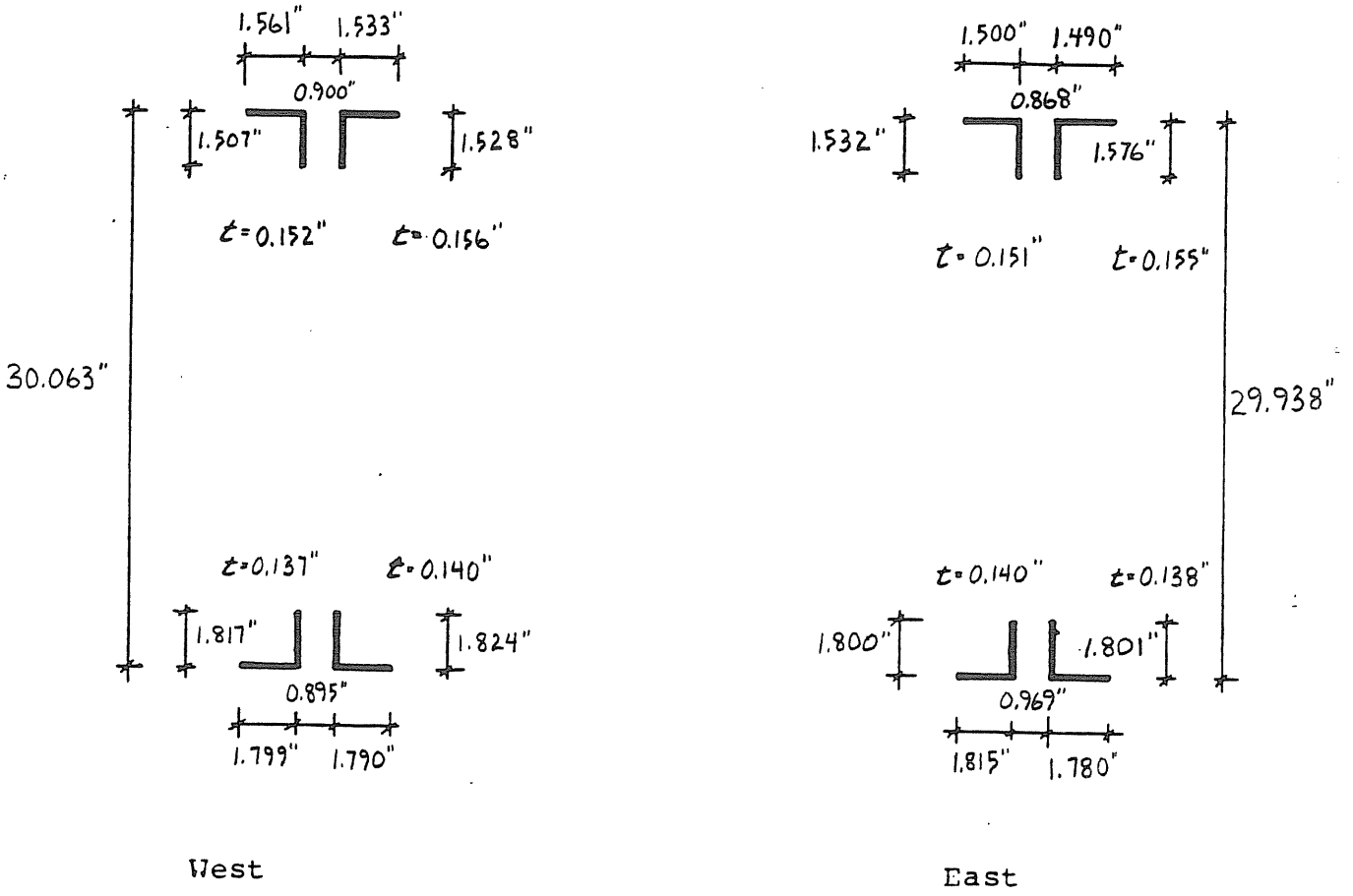


Figure H.25 Cross-Section Properties, Test 60/3/20-9

TEST # 60/3/20-9E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.500	RIGHT HORZ LEG (in) =	1.490
LEFT VER LEG (in) =	1.532	RIGHT VER LEG (in) =	1.576
LEFT THICKNESS (in) =	0.151	RIGHT THICKNESS (in) =	0.155

GAP BETWEEN THE LEGS (in) = 0.868

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.815	RIGHT HORZ LEG (in) =	1.780
LEFT VER LEG (in) =	1.800	RIGHT VER LEG (in) =	1.801
LEFT THICKNESS (in) =	0.140	RIGHT THICKNESS (in) =	0.138

GAP BETWEEN THE LEGS (in) = 0.969

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.205	in^4	Iy =	0.836	in^4
rx =	0.481	in	ry =	0.971	in
A =	0.886	in^2	J =	0.007	in^2
x =	1.946	in	y =	0.430	in

BOTTOM CHORD

Ix =	0.302	in^4	Iy =	1.233	in^4
rx =	0.560	in	ry =	1.132	in
A =	0.962	in^2	J =	0.006	in^2
x =	2.281	in	y =	0.501	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 391.13 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 29.94 (in)	EFF. DEPTH	= 29.01	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.46	(in)	
BRIDGING SPACING	= 9.30 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 101.38		
KL/ry	= 114.89	KL/rx	= 49.86		
b/t RATIO	= 10.17	Q	= 1.00		
MEA. YIELD STR.	= 55.70 (ksi)	MEA. FAILURE LOAD	= 128.90	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.3	10.0	24.2	55.1	2.34
SJI	18.8	16.6	40.2	91.5	1.41
CONV	26.7	23.6	57.1	129.8	0.99

FIGURE H.26a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-9E

TEST # 60/3/20-9W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.561	RIGHT HORZ LEG (in) =	1.533
LEFT VER LEG (in) =	1.507	RIGHT VER LEG (in) =	1.528
LEFT THICKNESS (in) =	0.152	RIGHT THICKNESS (in) =	0.156

GAP BETWEEN THE LEGS (in) = 0.900

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.799	RIGHT HORZ LEG (in) =	1.790
LEFT VER LEG (in) =	1.817	RIGHT VER LEG (in) =	1.824
LEFT THICKNESS (in) =	0.137	RIGHT THICKNESS (in) =	0.140

GAP BETWEEN THE LEGS (in) = 0.895

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.195	in^4	Iy =	0.926	in^4
rx =	0.466	in	ry =	1.016	in
A =	0.896	in^2	J =	0.007	in^2
x =	2.015	in	y =	0.422	in

BOTTOM CHORD

Ix =	0.310	in^4	Iy =	1.157	in^4
rx =	0.567	in	ry =	1.096	in
A =	0.963	in^2	J =	0.006	in^2
x =	2.254	in	y =	0.506	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 396.61 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 30.06 (in)	EFF. DEPTH	= 29.13	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.42	(in)	
BRIDGING SPACING	= 9.30 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 101.89		
KL/ry	= 109.82	KL/rx	= 51.50		
b/t RATIO	= 10.27	Q	= 1.00		
MEA. YIELD STR.	= 55.20 (ksi)	MEA. FAILURE LOAD	= 128.90	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	12.4	11.1	26.9	61.2	2.10
SJI	18.9	17.0	41.2	93.6	1.38
CONV	26.1	23.4	56.9	129.3	1.00

FIGURE H.26b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-9W

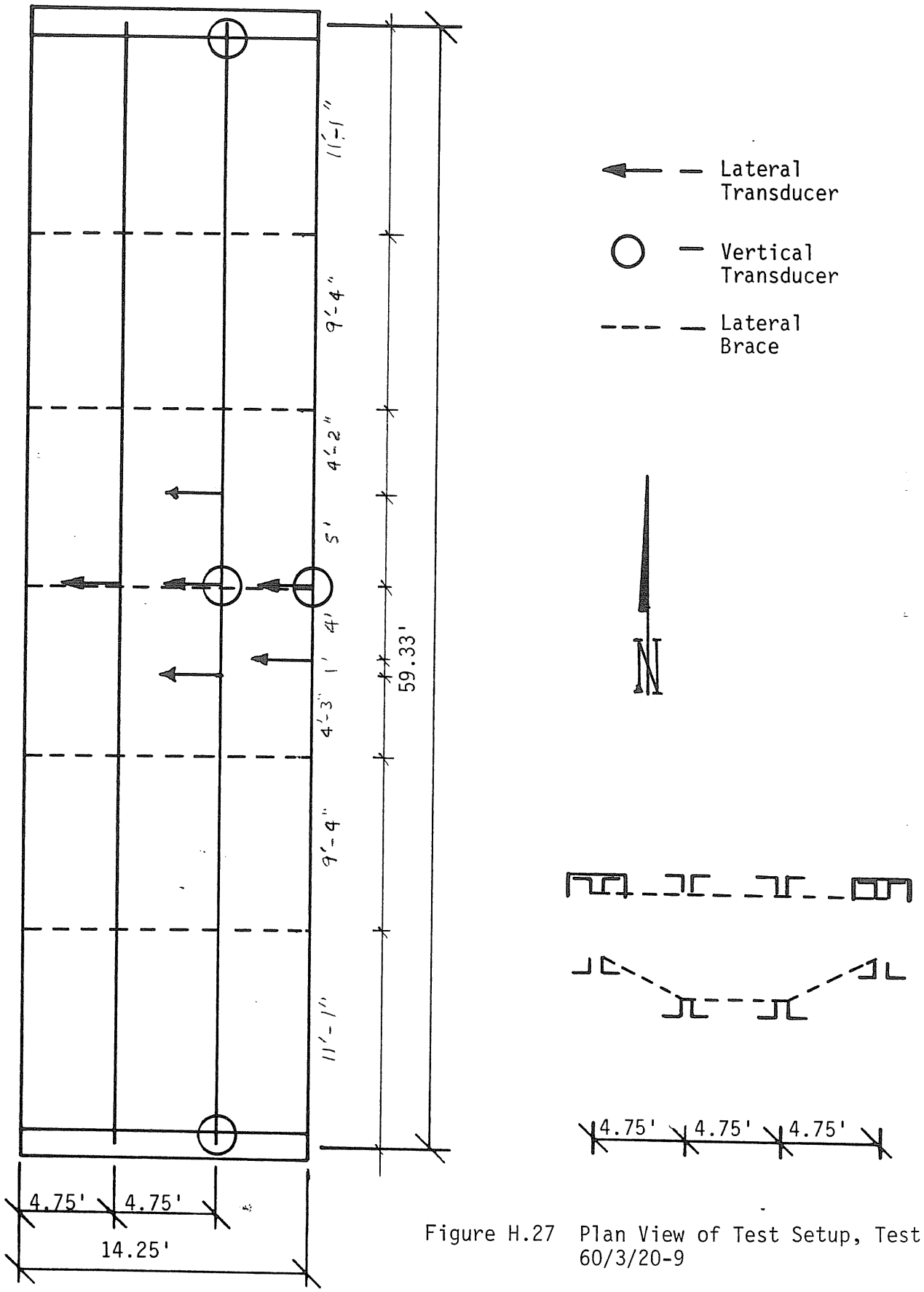


Figure H.27 Plan View of Test Setup, Test 60/3/20-9

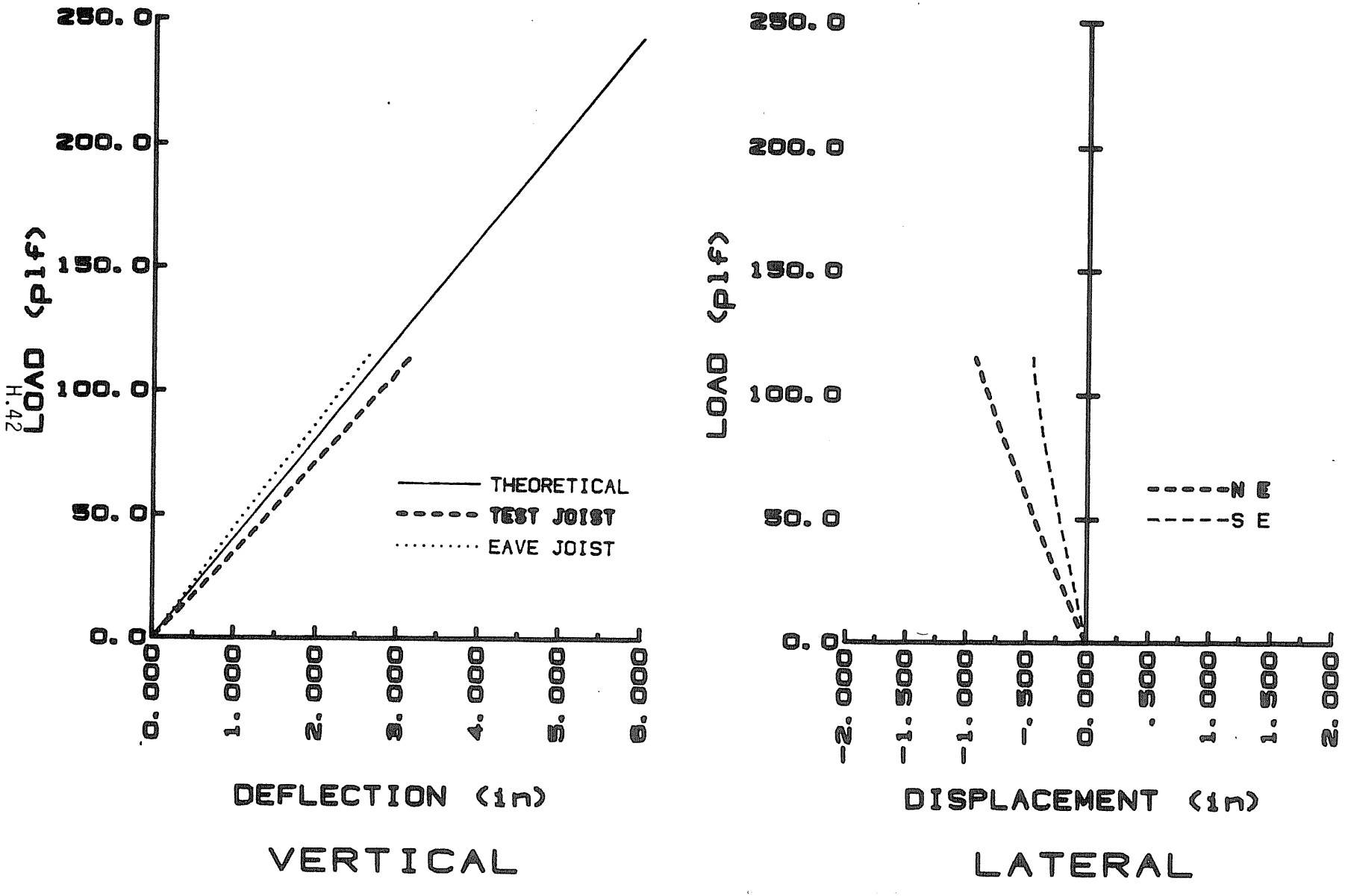


Figure H.28 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-16

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388 Δ" @ 100 plf 2.56"

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-9'3"-9'4"

Bottom Chord: 0'-9'3"-9'4"

Others: Panel attached to east channel. Large channel at east (8 x 11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 52.4

2. Method: SJI Load: 81.1

3. Method: CONV. Load: 121.4

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of centerline. (west joist only).

Applied Failure Load: 118.6 plf Total Failure Load: 133.5 plf

Load Factor (Failure Load/Service Load) 1. 2.55

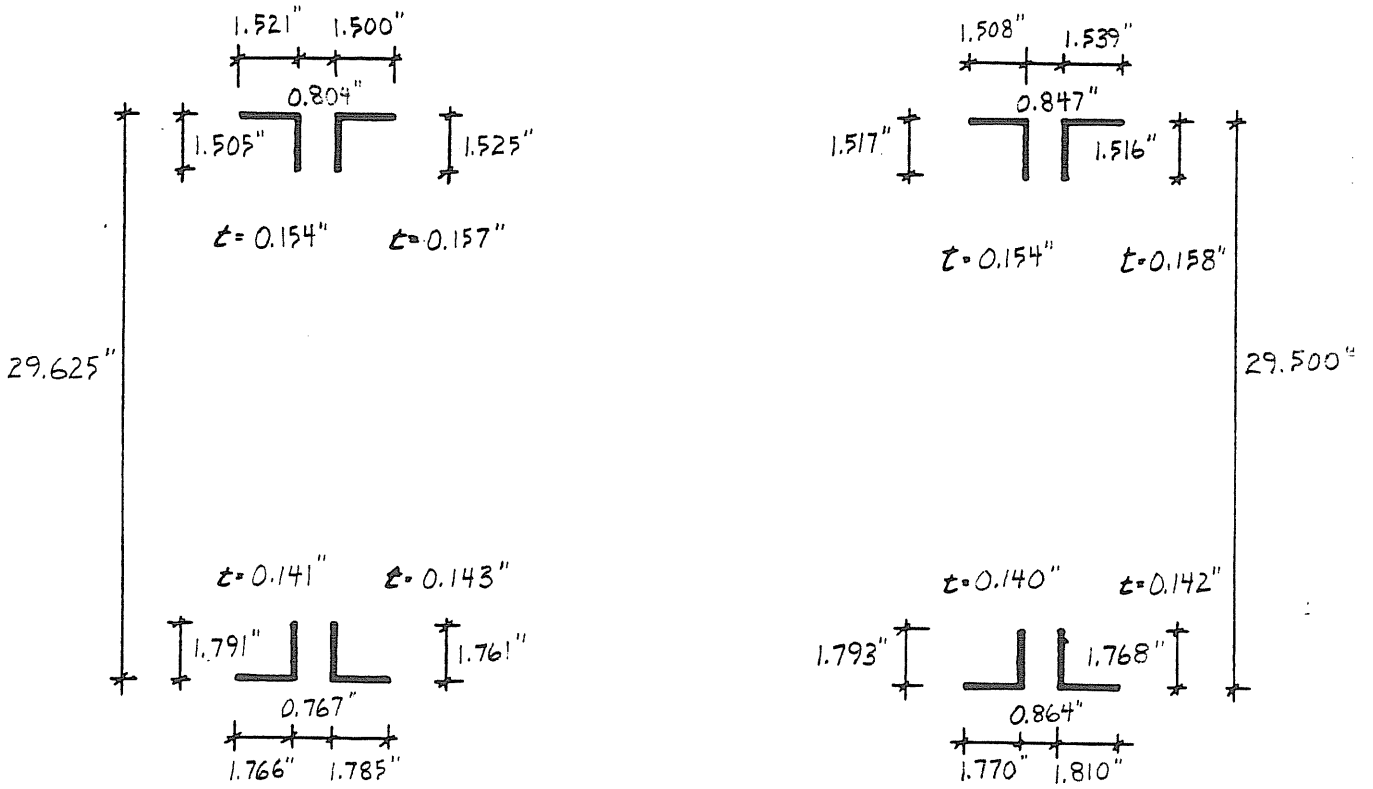
2. 1.65

3. 1.10

DISCUSSION:

-Load deflection plot showed good agreement with predicted.

Test ~~60/3/20-16~~



West East

Figure H.29 Cross-Section Properties, Test 60/3/20-16

TEST # 60/3/20-16E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.508	RIGHT HORZ LEG (in) =	1.539
LEFT VER LEG (in) =	1.517	RIGHT VER LEG (in) =	1.516
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.158

GAP BETWEEN THE LEGS (in) = 0.847

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.770	RIGHT HORZ LEG (in) =	1.810
LEFT VER LEG (in) =	1.793	RIGHT VER LEG (in) =	1.768
LEFT THICKNESS (in) =	0.140	RIGHT THICKNESS (in) =	0.142

GAP BETWEEN THE LEGS (in) = 0.864

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.195	in^4	Iy =	0.867	in^4
rx =	0.466	in	ry =	0.982	in
A =	0.900	in^2	J =	0.007	in^2
x =	1.953	in	y =	0.436	in

BOTTOM CHORD

Ix =	0.296	in^4	Iy =	1.141	in^4
rx =	0.553	in	ry =	1.086	in
A =	0.967	in^2	J =	0.006	in^2
x =	2.220	in	y =	0.509	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 382.56 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 29.50 (in)	EFF. DEPTH	=	28.56	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	2.59	(in)
BRIDGING SPACING	= 9.30 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	103.63	
KL/ry	= 113.68	KL/rx	=	51.51	
b/t RATIO	= 9.85	Q	=	1.00	
MEA. YIELD STR.	= 53.30 (ksi)	MEA. FAILURE LOAD	=	133.50	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.6	10.4	24.7	55.4	2.41
SJI	18.1	16.3	38.8	86.9	1.54
CONV	25.4	22.9	54.4	121.8	1.10

FIGURE H.30a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-16E

TEST # 60/3/20-16W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.521	RIGHT HORZ LEG (in) =	1.500
LEFT VER LEG (in) =	1.505	RIGHT VER LEG (in) =	1.525
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.157

GAP BETWEEN THE LEGS (in) = 0.804

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.766	RIGHT HORZ LEG (in) =	1.785
LEFT VER LEG (in) =	1.791	RIGHT VER LEG (in) =	1.761
LEFT THICKNESS (in) =	0.141	RIGHT THICKNESS (in) =	0.143

GAP BETWEEN THE LEGS (in) = 0.767

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.194	in^4	Iy =	0.817	in^4
rx =	0.466	in	ry =	0.956	in
A =	0.893	in^2	J =	0.007	in^2
x =	1.926	in	y =	0.427	in

BOTTOM CHORD

Ix =	0.295	in^4	Iy =	1.044	in^4
rx =	0.552	in	ry =	1.038	in
A =	0.968	in^2	J =	0.007	in^2
x =	2.160	in	y =	0.512	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 385.23 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 29.63 (in)	EFF. DEPTH	= 28.69	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.57	(in)	
BRIDGING SPACING	= 9.30 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.63		
KL/ry	= 116.68	KL/rx	= 51.49		
b/t RATIO	= 9.88	Q	= 1.00		
MEA. YIELD STR.	= 53.30 (ksi)	MEA. FAILURE LOAD	= 133.50	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	11.0	9.8	23.4	52.4	2.55
SJI	17.0	15.2	36.2	81.1	1.65
CONV	25.4	22.7	54.2	121.4	1.10

FIGURE H.30b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-16W

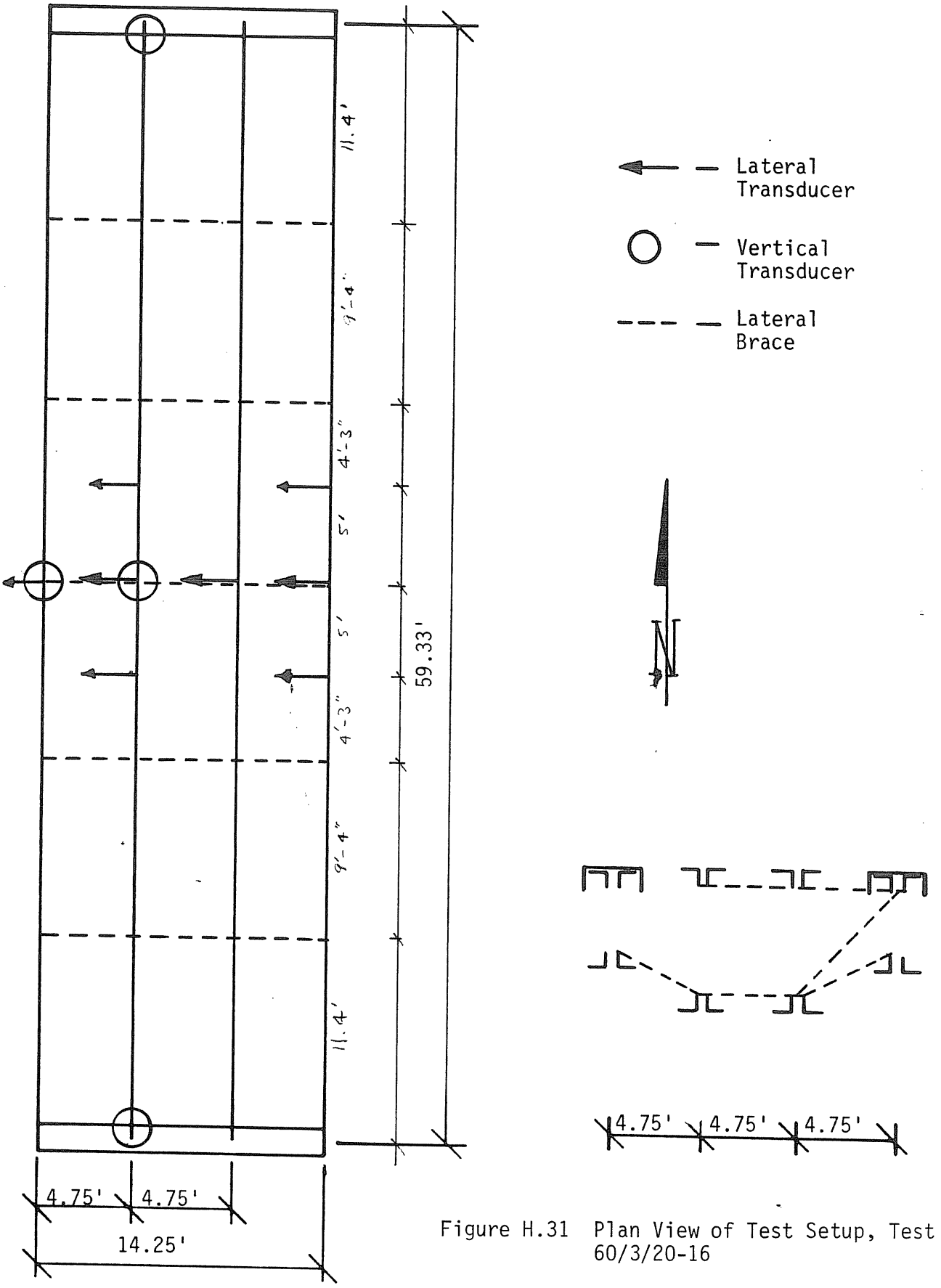
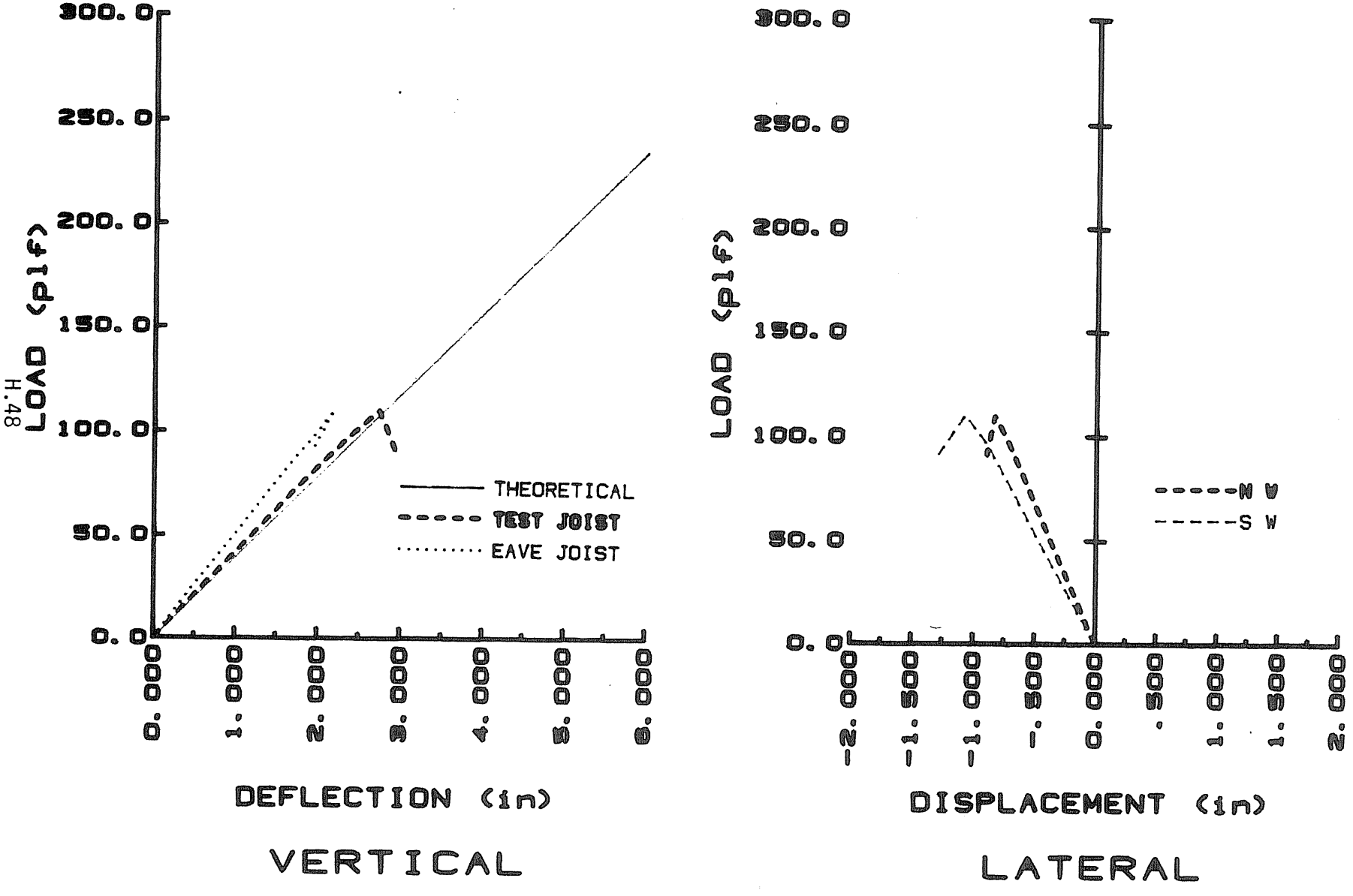


Figure H.31 Plan View of Test Setup, Test 60/3/20-16



60/3/20-16

Figure H.32 Applied Load vs. Vertical and Lateral Displacements

Test No. 6/3/20-17

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.56

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-7'7"-11'10"

Bottom Chord: 0'-7'7"-11'10"

Others: Panel attached to east channel. Large channel at east (C8x11.5). Top chord bridging to east only. Diagonals from east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 84.0

2. Method: SJI Load: 135.5

3. Method: CONV. Load: 121.7

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of centerline. (west joist).

Applied Failure Load: 195.1 plf Total Failure Load: 210.4 plf

Load Factor (Failure Load/Service Load) 1. 2.40

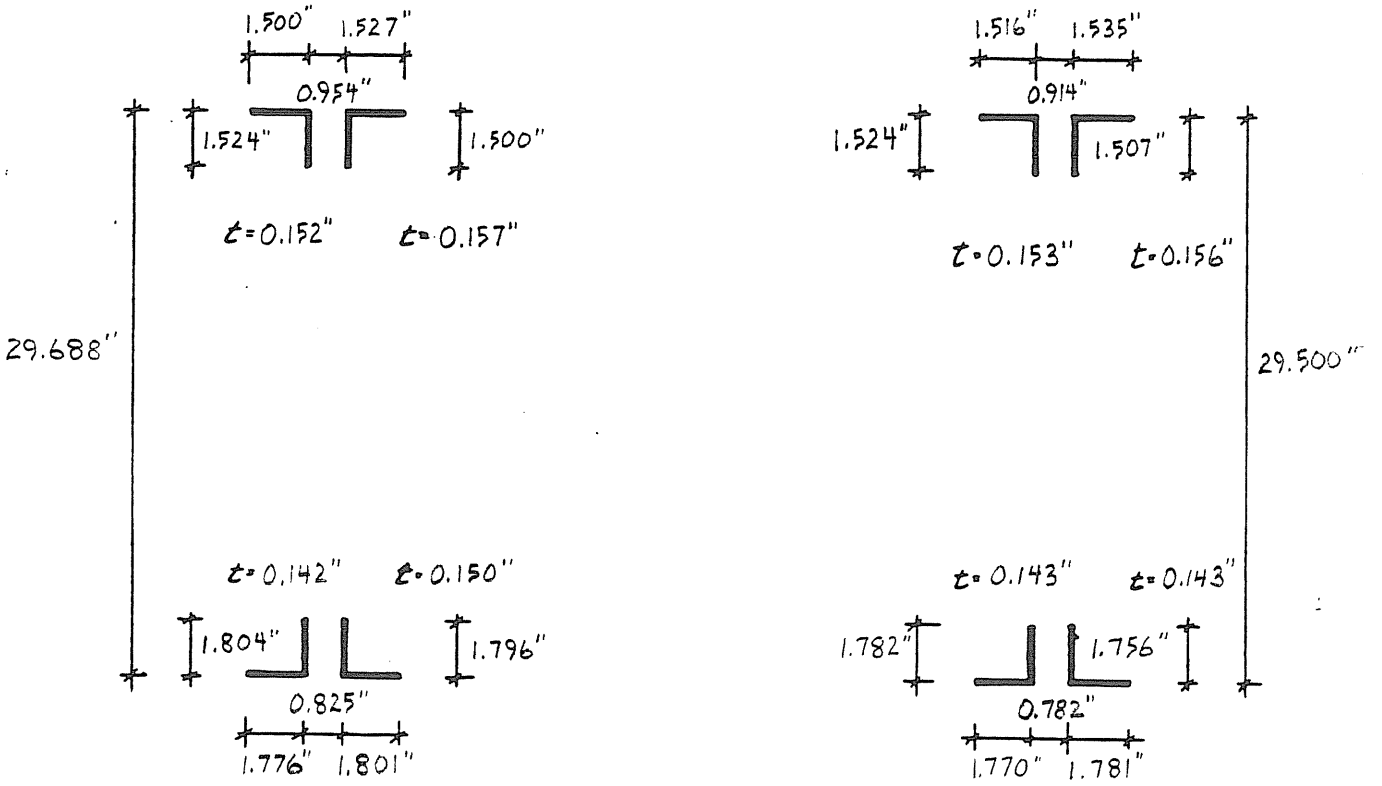
2. 1.49

3. 1.66

DISCUSSION:

-Load deflection plot showed good agreement with predicted.

Test 60/3/20-17



H.33 Cross-Section Properties, Test 60/3/20-17

TEST # 60/3/20-17E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.516	RIGHT HORZ LEG (in) =	1.535
LEFT VER LEG (in) =	1.524	RIGHT VER LEG (in) =	1.507
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.156

GAP BETWEEN THE LEGS (in) = 0.914

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.770	RIGHT HORZ LEG (in) =	1.781
LEFT VER LEG (in) =	1.782	RIGHT VER LEG (in) =	1.756
LEFT THICKNESS (in) =	0.143	RIGHT THICKNESS (in) =	0.143

GAP BETWEEN THE LEGS (in) = 0.782

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.194	in^4	Iy =	0.914	in^4
rx =	0.466	in	ry =	1.012	in
A =	0.892	in^2	J =	0.007	in^2
x =	1.987	in	y =	0.443	in

BOTTOM CHORD

Ix =	0.293	in^4	Iy =	1.064	in^4
rx =	0.549	in	ry =	1.046	in
A =	0.973	in^2	J =	0.007	in^2
x =	2.163	in	y =	0.507	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 382.61 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 29.50 (in)	EFF. DEPTH	= 28.55	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.59	(in)	
BRIDGING SPACING	= 7.60 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.06		
KL/ry	= 90.11	KL/rx	= 51.52		
b/t RATIO	= 9.96	Q	= 1.00		
MEA. YIELD STR.	= 53.90 (ksi)	MEA. FAILURE LOAD	= 210.40	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	17.4	15.5	37.0	82.7	2.54
SJI	27.1	24.2	57.5	128.6	1.64
CONV	25.7	22.9	54.4	121.8	1.73

FIGURE H.34a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-17E

TEST # 60/3/20-17W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.500	RIGHT HORZ LEG (in) =	1.527
LEFT VER LEG (in) =	1.524	RIGHT VER LEG (in) =	1.500
LEFT THICKNESS (in) =	0.152	RIGHT THICKNESS (in) =	0.157
GAP BETWEEN THE LEGS (in) =	0.954		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.776	RIGHT HORZ LEG (in) =	1.801
LEFT VER LEG (in) =	1.804	RIGHT VER LEG (in) =	1.796
LEFT THICKNESS (in) =	0.142	RIGHT THICKNESS (in) =	0.150
GAP BETWEEN THE LEGS (in) =	0.825		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.192	in^4	Iy =	0.931	in^4
rx =	0.465	in	ry =	1.024	in
A =	0.887	in^2	J =	0.007	in^2
x =	1.999	in	y =	0.447	in

BOTTOM CHORD

Ix =	0.314	in^4	Iy =	1.145	in^4
rx =	0.559	in	ry =	1.067	in
A =	1.005	in^2	J =	0.007	in^2
x =	2.221	in	y =	0.509	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 395.67 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 29.69 (in)	EFF. DEPTH	=	28.73	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	2.51	(in)
BRIDGING SPACING	= 7.60 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	103.15	
KL/ry	= 89.04	KL/rx	=	51.61	
b/t RATIO	= 10.03	Q	=	1.00	
MEA. YIELD STR.	= 53.80 (ksi)	MEA. FAILURE LOAD	=	210.40	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	17.7	15.7	37.5	84.0	2.50
SJI	28.5	25.3	60.6	135.5	1.55
CONV	25.6	22.7	54.4	121.7	1.73

FIGURE H.34b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-17W

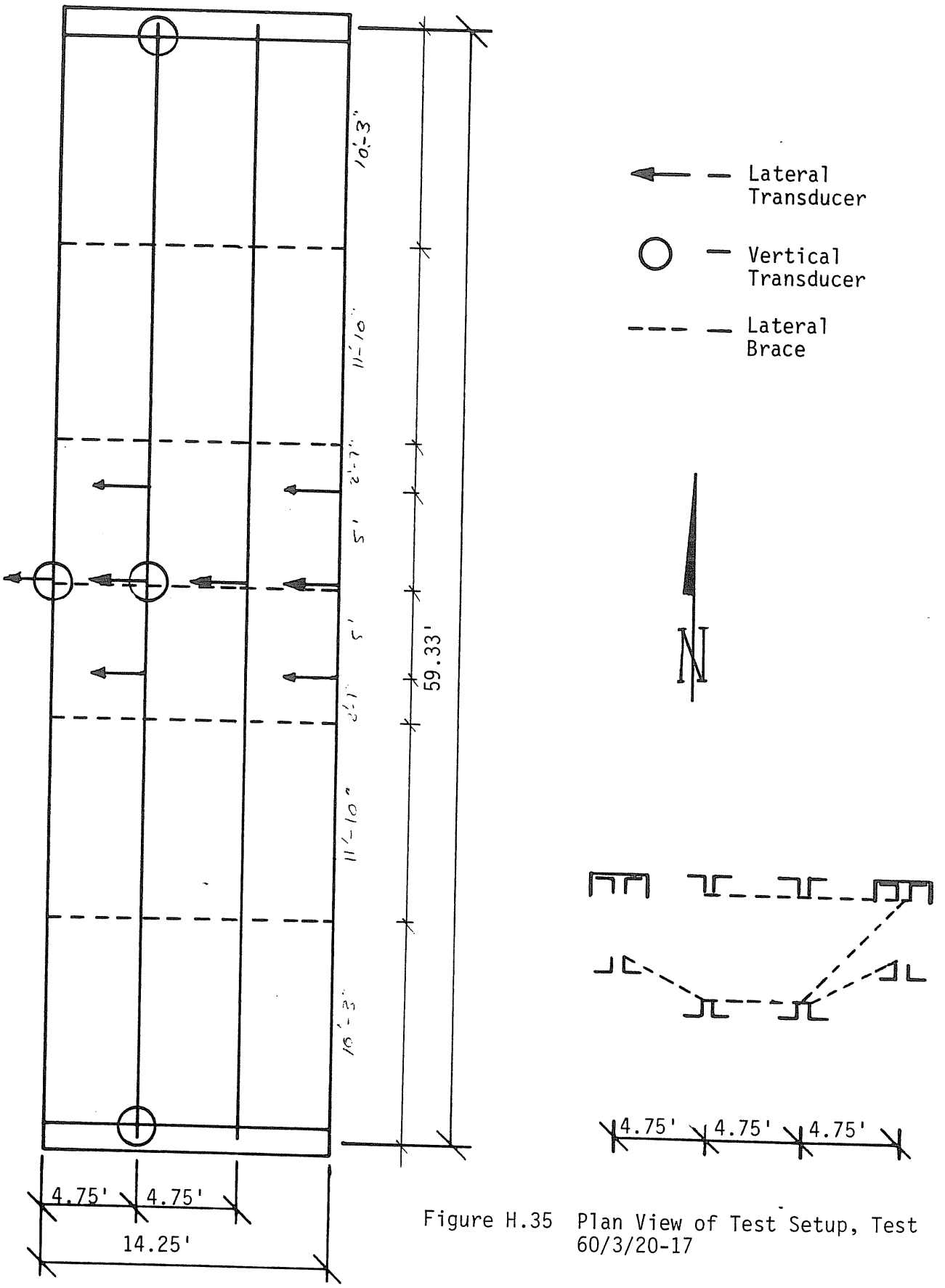
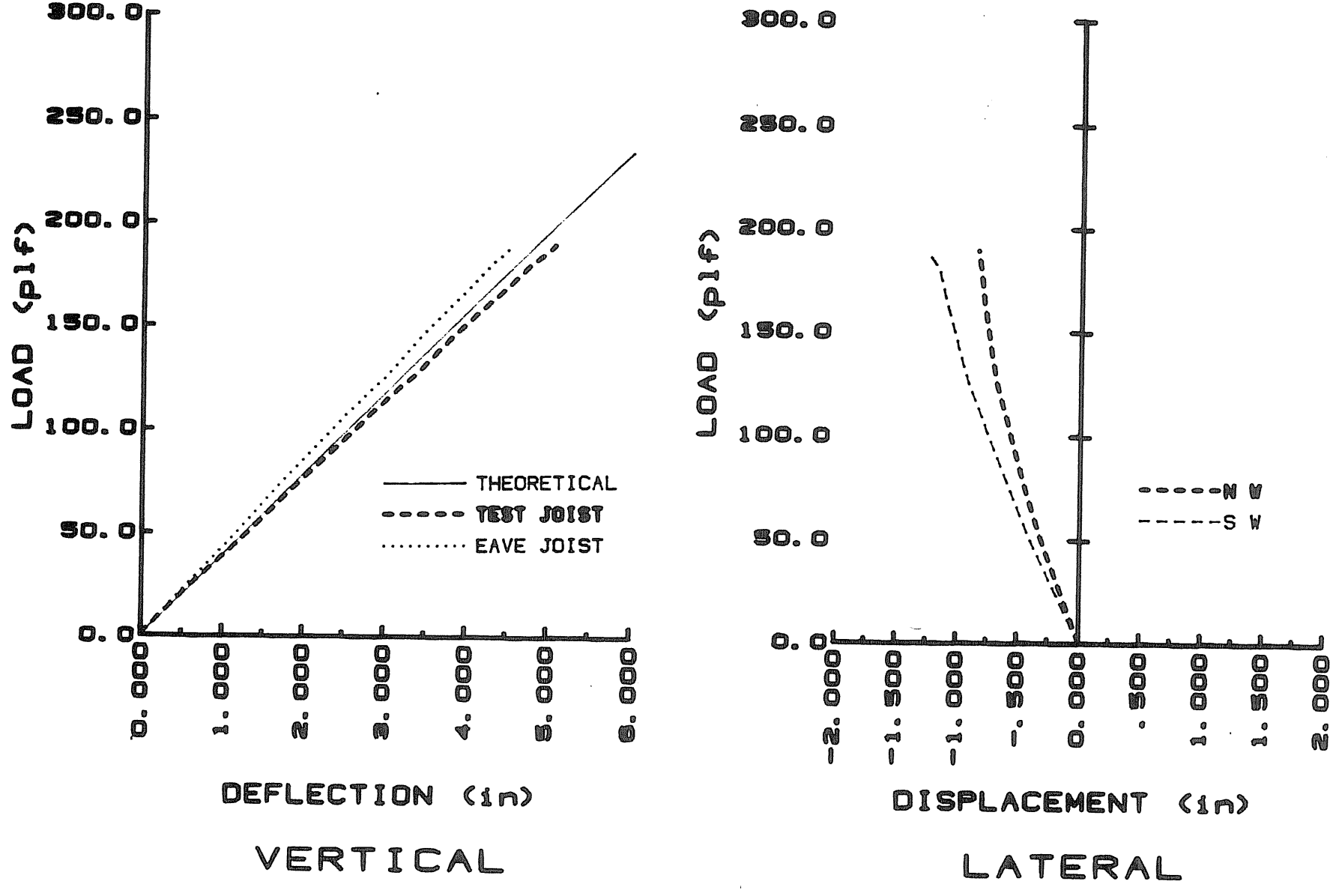


Figure H.35 Plan View of Test Setup, Test 60/3/20-17



60/3/20-17

Figure H.36 Applied Load vs. Vertical and Lateral Displacements

Test No. 6/3/20-18

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.56

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-7'7"-11'10"

Bottom Chord: 0'-7'7"-11'10"

Others: Panel attached to east channel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonal from east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 84.7

2.Method: SJI Load: 135.5

3.Method: CONV. Load: 123.9

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of centerline. (west joist).

Applied Failure Load: 133.4 plf Total Failure Load: 148.3 plf

Load Factor (Failure Load/Service Load) 1. 1.75

2. 1.09

3. 1.20

DISCUSSION:

-Load deflection plot showed good agreement with predicted.

-Lateral displacement of at 4' south of midspan on the test joist showed a noticable change in the linearity of the displacement just before failure.

Test 60/3/20-18

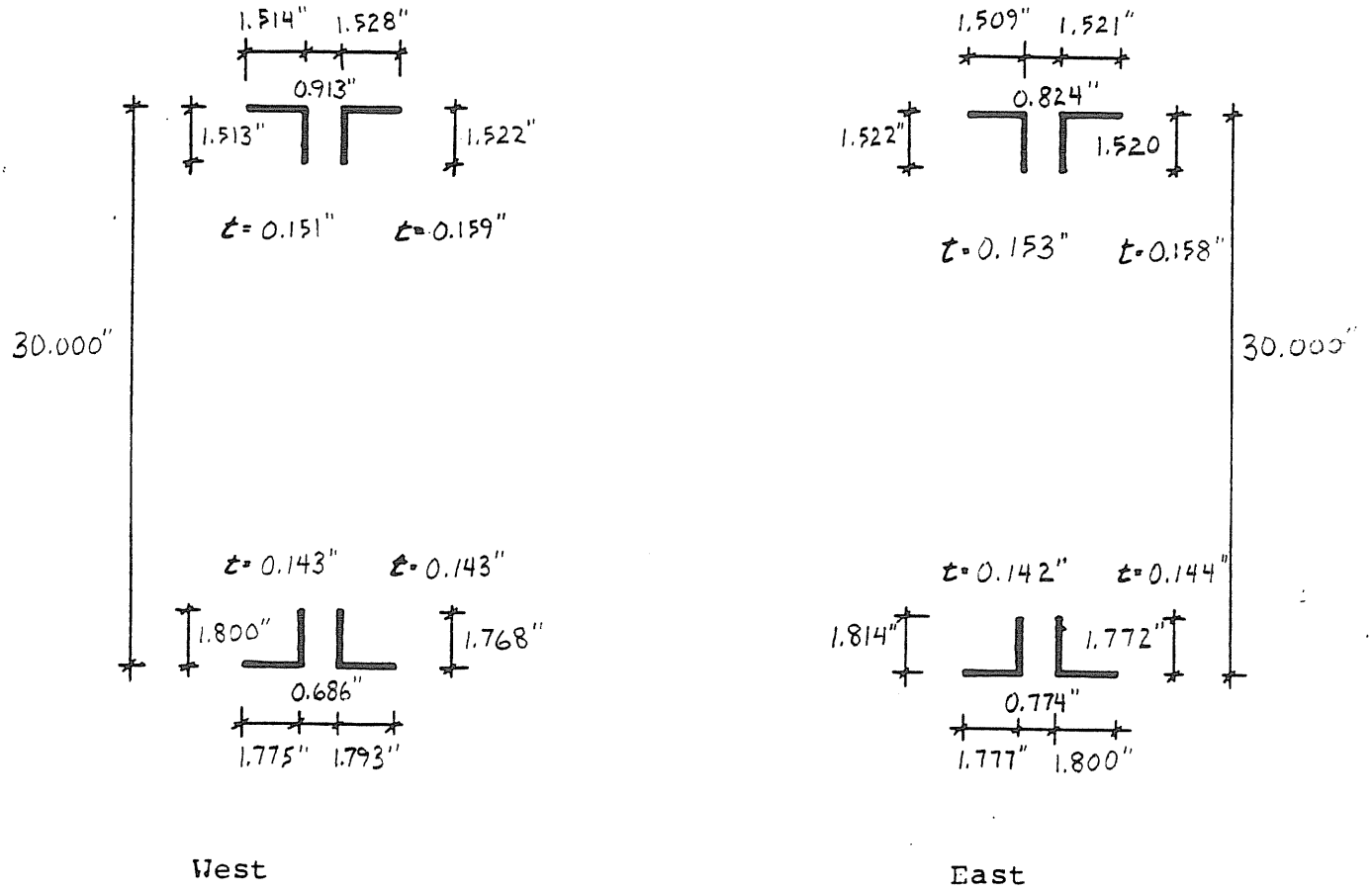


Figure H.37 Cross-Section Properties, Test 60/3/20-18

TEST # 60/3/20-18E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.509	RIGHT HORZ LEG (in) =	1.521
LEFT VER LEG (in) =	1.522	RIGHT VER LEG (in) =	1.520
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.158
GAP BETWEEN THE LEGS (in) =	0.824		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.777	RIGHT HORZ LEG (in) =	1.800
LEFT VER LEG (in) =	1.814	RIGHT VER LEG (in) =	1.772
LEFT THICKNESS (in) =	0.142	RIGHT THICKNESS (in) =	0.144
GAP BETWEEN THE LEGS (in) =	0.774		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.196	in^4	Iy =	0.837	in^4
rx =	0.468	in	ry =	0.967	in
A =	0.896	in^2	J =	0.007	in^2
x =	1.939	in	y =	0.439	in

BOTTOM CHORD

Ix =	0.306	in^4	Iy =	1.076	in^4
rx =	0.558	in	ry =	1.046	in
A =	0.983	in^2	J =	0.007	in^2
x =	2.175	in	y =	0.523	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 399.23 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	=	29.04	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	2.48	(in)
BRIDGING SPACING	= 7.60 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	102.02	
KL/ry	= 94.34	KL/rx	=	51.30	
b/t RATIO	= 9.95	Q	=	1.00	
MEA. YIELD STR.	= 55.00 (ksi)	MEA. FAILURE LOAD	=	148.30	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	16.4	14.7	35.6	79.8	1.86
SJI	26.0	23.3	56.3	125.9	1.18
CONV	26.1	23.4	56.6	126.7	1.17

FIGURE H.38a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-18E

TEST # 60/3/20-18W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.514	RIGHT HORZ LEG (in) =	1.528
LEFT VER LEG (in) =	1.513	RIGHT VER LEG (in) =	1.522
LEFT THICKNESS (in) =	0.151	RIGHT THICKNESS (in) =	0.159

GAP BETWEEN THE LEGS (in) = 0.913

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.775	RIGHT HORZ LEG (in) =	1.793
LEFT VER LEG (in) =	1.800	RIGHT VER LEG (in) =	1.768
LEFT THICKNESS (in) =	0.143	RIGHT THICKNESS (in) =	0.143

GAP BETWEEN THE LEGS (in) = 0.686

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.195	in^4	Iy =	0.910	in^4
rx =	0.467	in	ry =	1.009	in
A =	0.894	in^2	J =	0.007	in^2
x =	1.999	in	y =	0.431	in

BOTTOM CHORD

Ix =	0.301	in^4	Iy =	0.995	in^4
rx =	0.554	in	ry =	1.008	in
A =	0.980	in^2	J =	0.007	in^2
x =	2.122	in	y =	0.515	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 398.33 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	=	29.05	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	2.49	(in)
BRIDGING SPACING	= 7.60 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	102.02	
KL/ry	= 90.39	KL/rx	=	51.44	
b/t RATIO	= 10.03	Q	=	1.00	
MEA. YIELD STR.	= 55.00 (ksi)	MEA. FAILURE LOAD	=	148.30	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	17.5	15.6	37.8	84.6	1.75
SJI	26.1	23.3	56.4	126.3	1.17
CONV	26.1	23.3	56.5	126.4	1.17

FIGURE H.38b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-18W

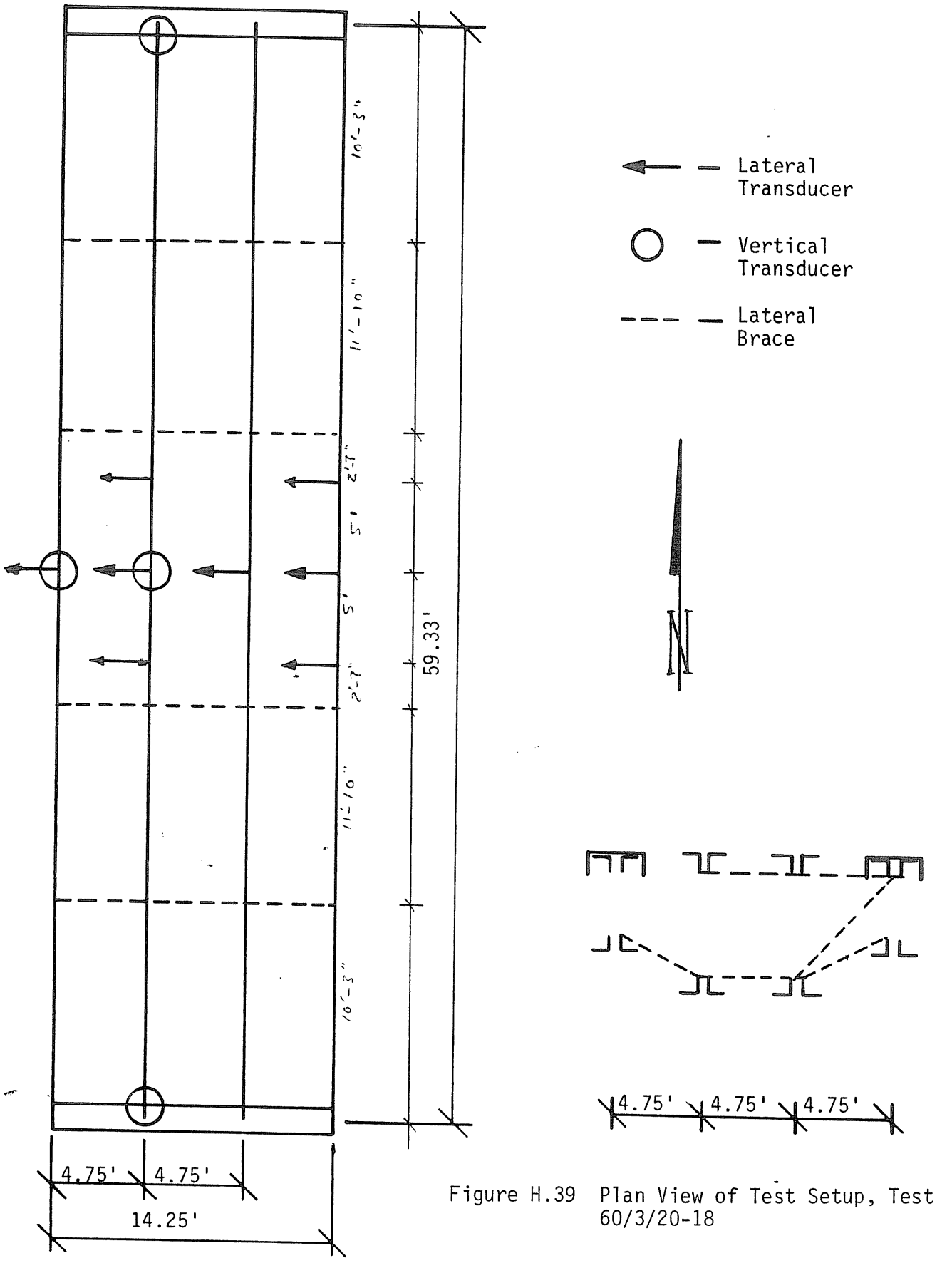
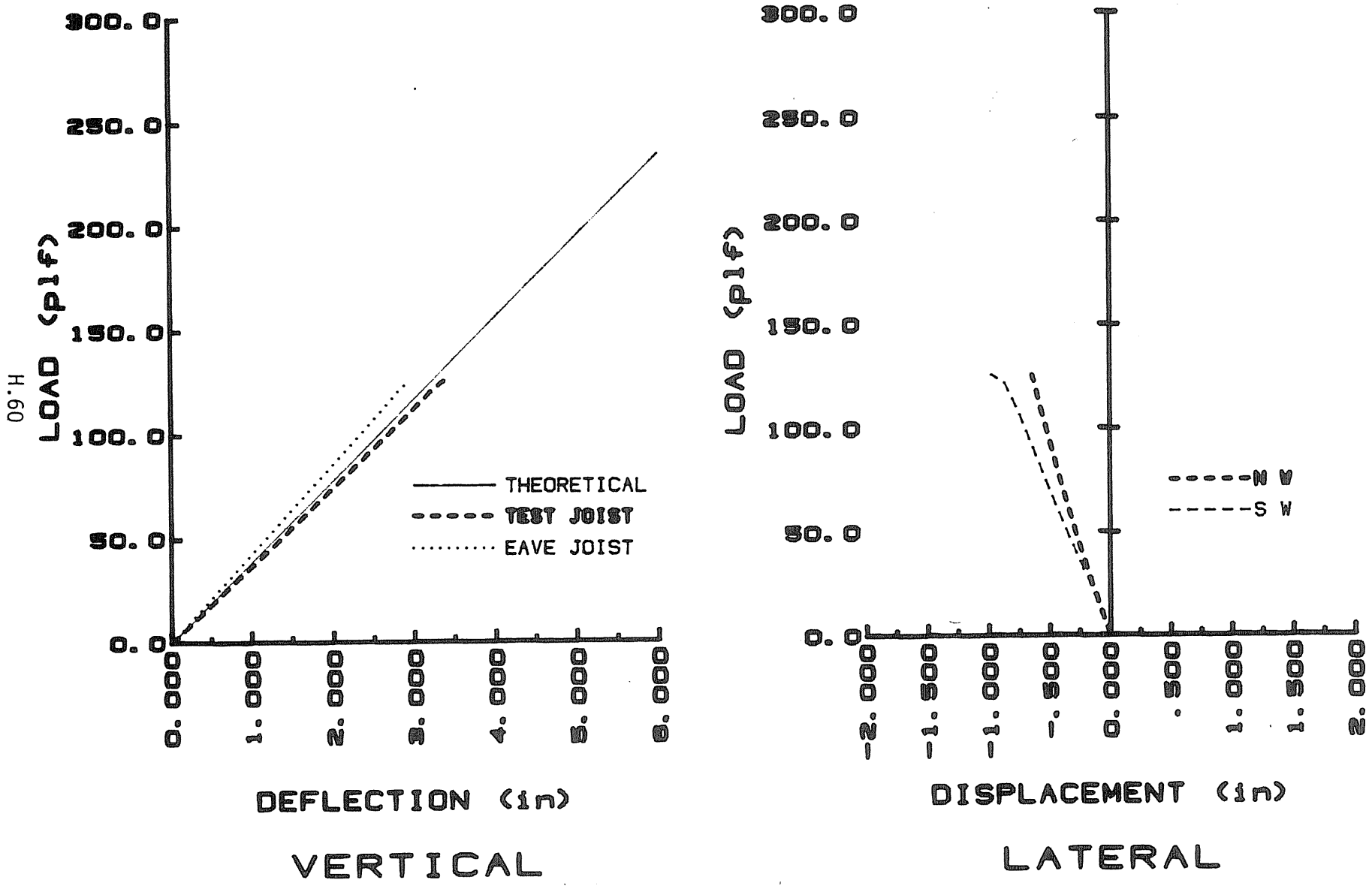


Figure H.39 Plan View of Test Setup, Test 60/3/20-18



60/3/20-18

Figure H.40 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-19

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.56

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 6 Bottom Chord: 6

Bridging Spacing:

Top Chord: -3'-7'-9'

Bottom Chord: -3'-7'-9'

Others: Panel attached to east channel. Large channel at east (c8 x 11.5). Top chord bridging to east only. Diagonal from bottom of east joist to top of west joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 107.4

2. Method: SJI Load: 158.2

3. Method: CONV. Load: 125.7

TEST RESULTS:

Failure Mode: Top chord lateral buckling of west joist at midspan.

Applied Failure Load: 148.2 plf Total Failure Load: 163.1 plf

Load Factor (Failure Load/Service Load) 1. 1.52

2. 1.03

3. 1.30

DISCUSSION:

-Load deflection plot showed good agreement with predicted.

Test 60/3/20-19

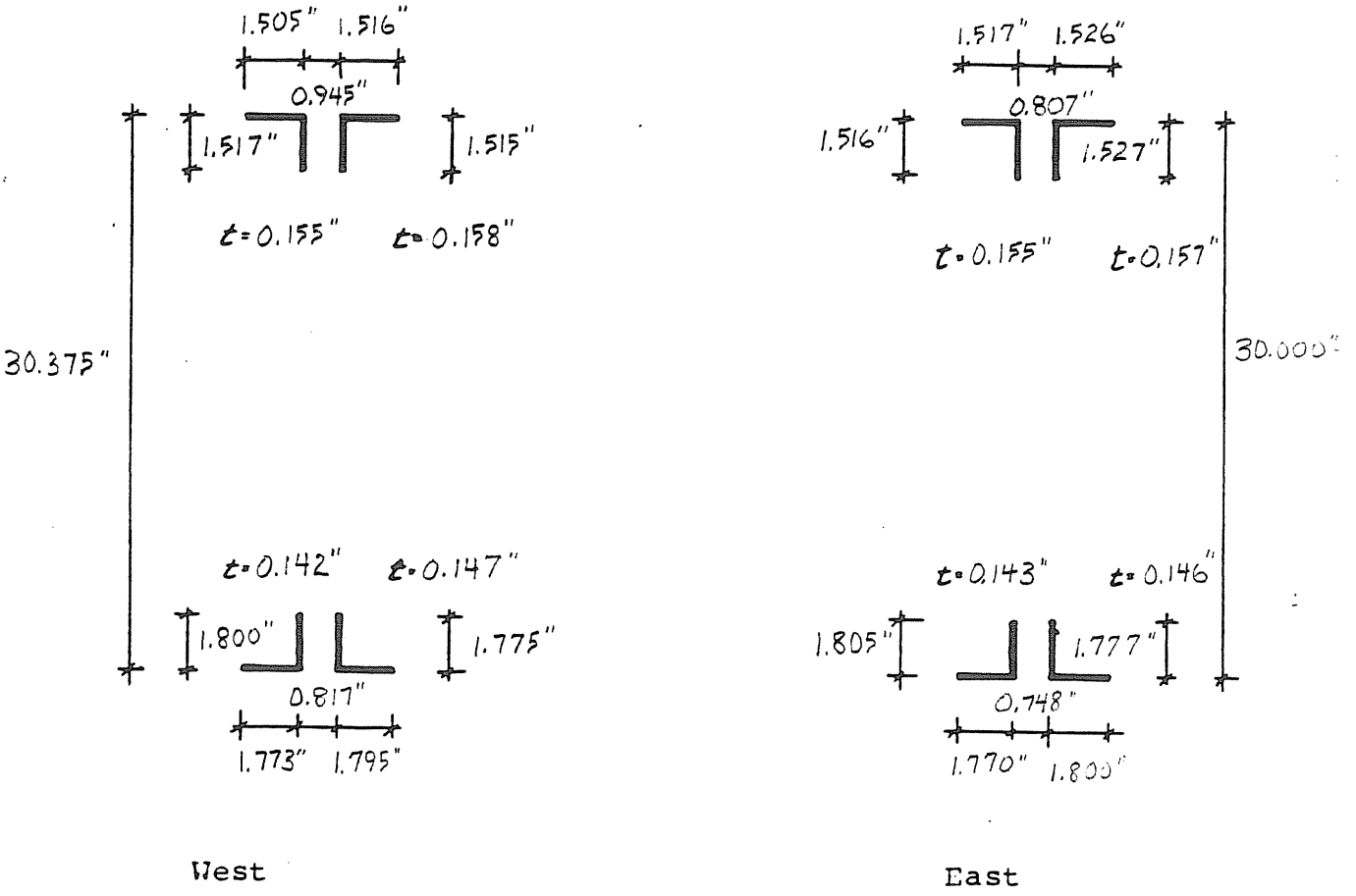


Figure H.41 Cross-Section Properties, Test 60/3/20-19

TEST # 60/3/20-19E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.517	RIGHT HORZ LEG (in) =	1.526
LEFT VER LEG (in) =	1.516	RIGHT VER LEG (in) =	1.527
LEFT THICKNESS (in) =	0.155	RIGHT THICKNESS (in) =	0.157
GAP BETWEEN THE LEGS (in) =	0.807		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.770	RIGHT HORZ LEG (in) =	1.800
LEFT VER LEG (in) =	1.805	RIGHT VER LEG (in) =	1.777
LEFT THICKNESS (in) =	0.143	RIGHT THICKNESS (in) =	0.146
GAP BETWEEN THE LEGS (in) =	0.748		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.197	in^4	Iy =	0.835	in^4
rx =	0.468	in	ry =	0.963	in
A =	0.901	in^2	J =	0.007	in^2
x =	1.930	in	y =	0.432	in

BOTTOM CHORD

Ix =	0.307	in^4	Iy =	1.060	in^4
rx =	0.556	in	ry =	1.034	in
A =	0.992	in^2	J =	0.007	in^2
x =	2.161	in	y =	0.516	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 402.58 (in^4)	# ROWS BRIDGING	= 6.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 29.05	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.46	(in)	
BRIDGING SPACING	= 6.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.44		
KL/ry	= 74.80	KL/rx	= 51.30		
b/t RATIO	= 9.79	Q	= 1.00		
MEA. YIELD STR.	= 53.50 (ksi)	MEA. FAILURE LOAD	= 163.10	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	20.9	18.8	45.6	102.0	1.60
SJI	32.1	28.9	70.0	156.7	1.04
CONV	25.5	23.0	55.7	124.6	1.31

FIGURE H.42a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-19E

TEST # 60/3/20-19W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.505	RIGHT HORZ LEG (in) =	1.516
LEFT VER LEG (in) =	1.517	RIGHT VER LEG (in) =	1.515
LEFT THICKNESS (in) =	0.155	RIGHT THICKNESS (in) =	0.158

GAP BETWEEN THE LEGS (in) = 0.945

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.773	RIGHT HORZ LEG (in) =	1.795
LEFT VER LEG (in) =	1.800	RIGHT VER LEG (in) =	1.775
LEFT THICKNESS (in) =	0.142	RIGHT THICKNESS (in) =	0.147

GAP BETWEEN THE LEGS (in) = 0.817

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.195	in^4	Iy =	0.932	in^4
rx =	0.466	in	ry =	1.019	in
A =	0.898	in^2	J =	0.007	in^2
x =	1.990	in	y =	0.438	in

BOTTOM CHORD

Ix =	0.305	in^4	Iy =	1.119	in^4
rx =	0.555	in	ry =	1.063	in
A =	0.990	in^2	J =	0.007	in^2
x =	2.203	in	y =	0.513	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 412.19 (in^4)	# ROWS BRIDGING	=	6.00	
JOIST DEPTH	= 30.38 (in)	EFF. DEPTH	=	29.42	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	2.41	(in)
BRIDGING SPACING	= 6.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	103.44	
KL/ry	= 70.67	KL/rx	=	51.49	
b/t RATIO	= 9.79	Q	=	1.00	
MEA. YIELD STR.	= 53.50 (ksi)	MEA. FAILURE LOAD	=	163.10	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	21.8	19.6	48.0	107.4	1.52
SJI	32.1	28.8	70.7	158.2	1.03
CONV	25.5	22.9	56.2	125.7	1.30

FIGURE H.42b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-19W

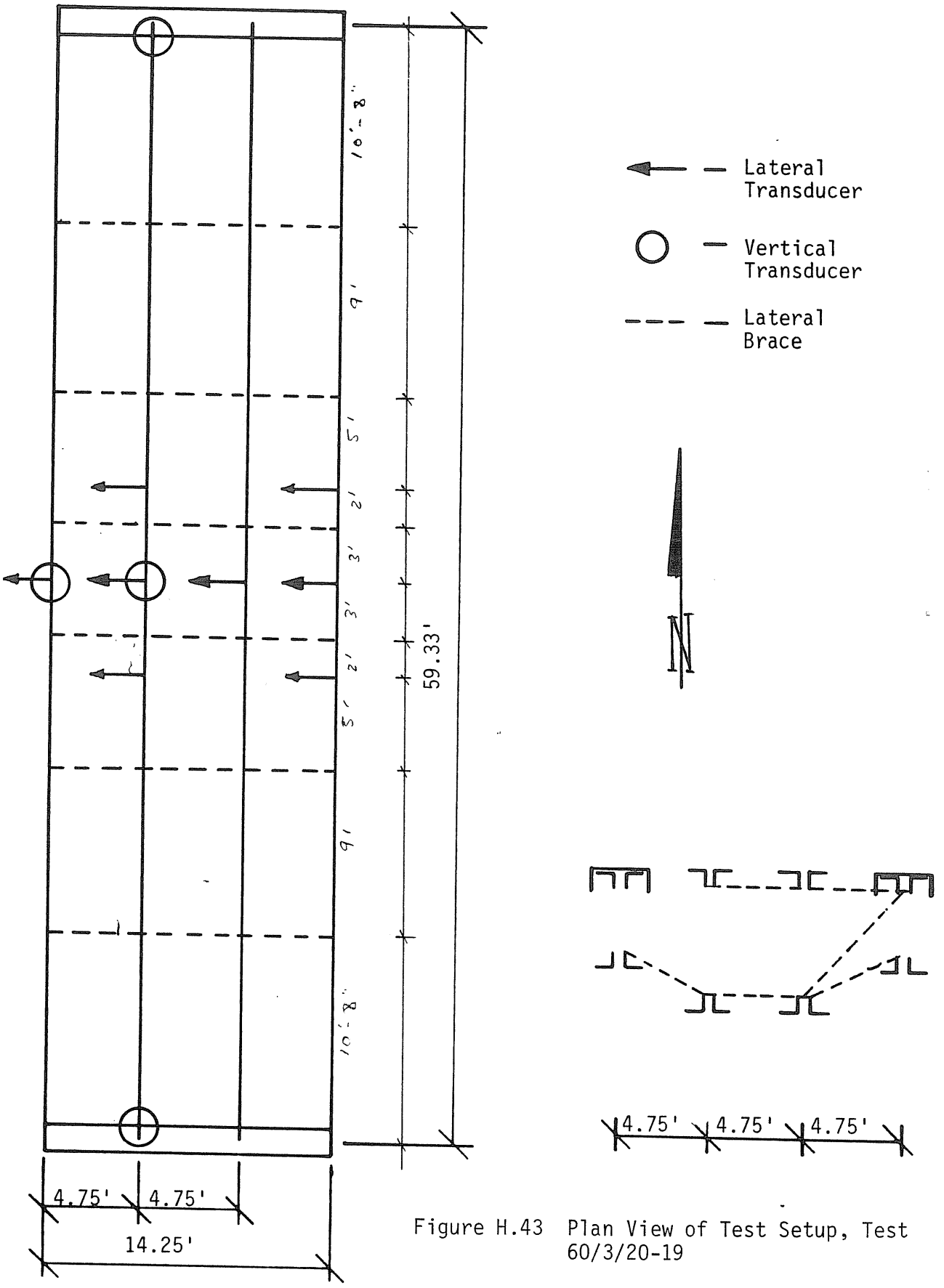
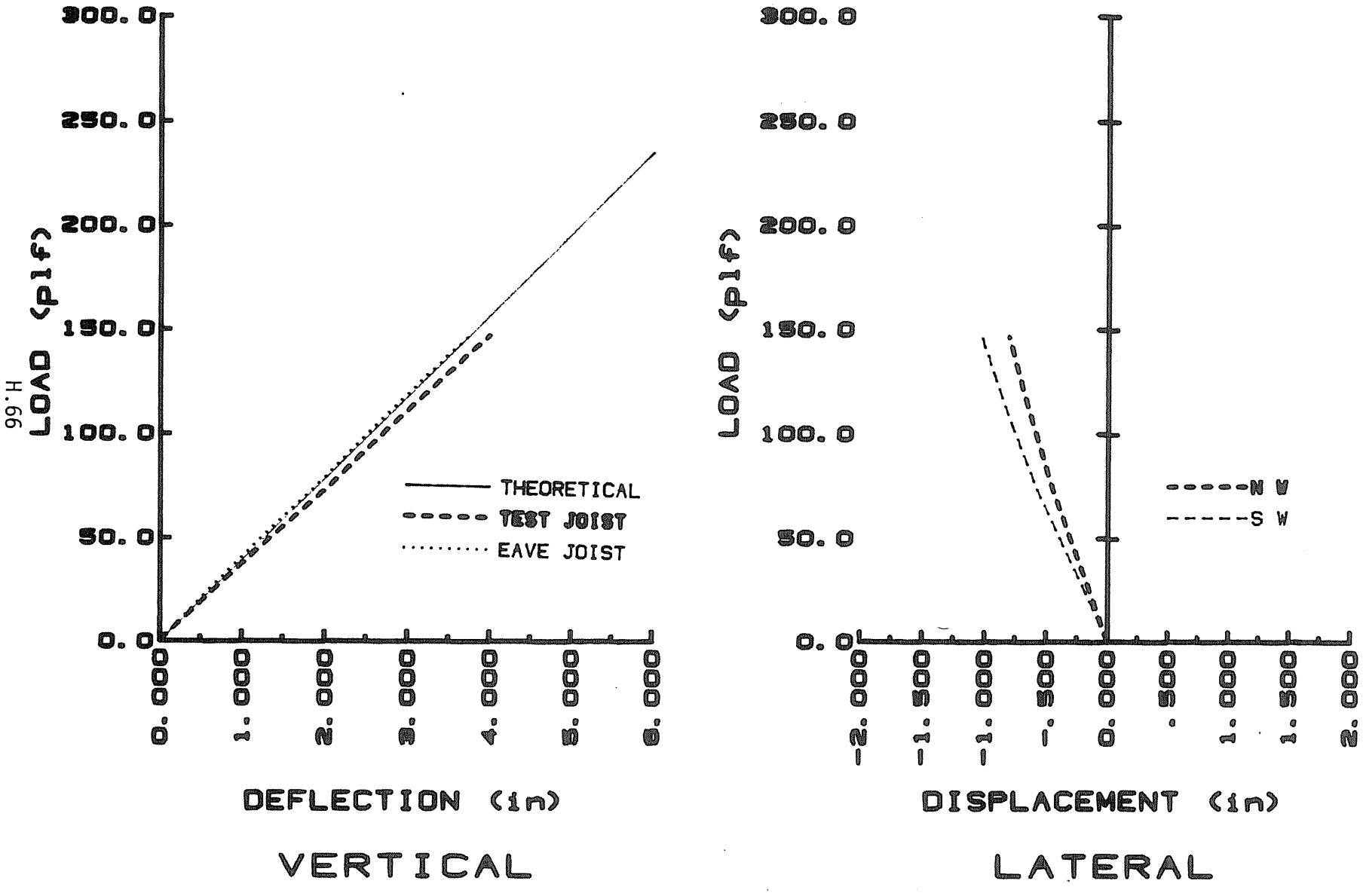


Figure H.43 Plan View of Test Setup, Test 60/3/20-19



60/3/20-19

Figure H.44 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-20

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.56

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 10 Bottom Chord: 10

Bridging Spacing:

Top Chord: -2'-4'1"-4'2"-4'7"-5'7"

Bottom Chord: -2'-4'1"-4'2"-4'7"-5'7"

Others: Panel attached to east channel. Large channel at east (c8 x 11.5) Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 123.6

2 Method: SJI Load: 151.3

3 Method: CONV. Load: 119.4

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of centerline. (East joist).

Applied Failure Load: 165.5 plf Total Failure Load: 180.4 plf

Load Factor (Failure Load/Service Load) 1. 1.46

2. 1.19

3. 1.51

DISCUSSION:

-Load deflection plot showed good agreement with predicted.

-It was determined that failure occurred due to a bend in the top chord that occurred due to handling.

Test 60/3/20-20

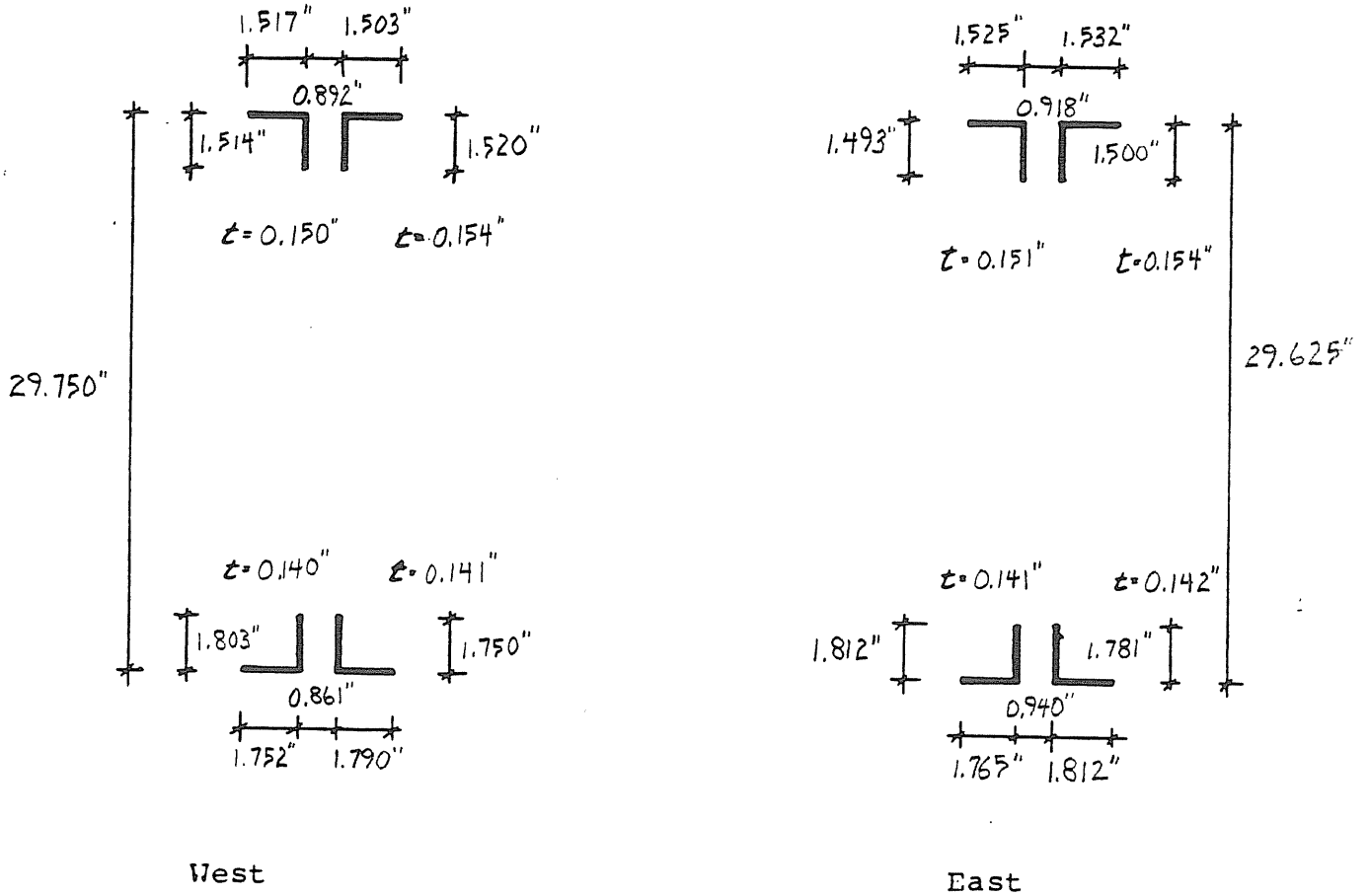


Figure H.45 Cross-Section Properties, Test 60/3/20-20

TEST # 60/3/20-20E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.525	RIGHT HORZ LEG (in) =	1.532
LEFT VER LEG (in) =	1.493	RIGHT VER LEG (in) =	1.500
LEFT THICKNESS (in) =	0.151	RIGHT THICKNESS (in) =	0.154
GAP BETWEEN THE LEGS (in) =	0.918		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.765	RIGHT HORZ LEG (in) =	1.812
LEFT VER LEG (in) =	1.812	RIGHT VER LEG (in) =	1.781
LEFT THICKNESS (in) =	0.141	RIGHT THICKNESS (in) =	0.142
GAP BETWEEN THE LEGS (in) =	0.940		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.185	in^4	Iy =	0.907	in^4
rx =	0.459	in	ry =	1.017	in
A =	0.876	in^2	J =	0.007	in^2
x =	1.996	in	y =	0.423	in

BOTTOM CHORD

Ix =	0.304	in^4	Iy =	1.215	in^4
rx =	0.559	in	ry =	1.117	in
A =	0.975	in^2	J =	0.007	in^2
x =	2.251	in	y =	0.518	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 384.39 (in^4)	# ROWS BRIDGING	= 10.00		
JOIST DEPTH	= 29.63 (in)	EFF. DEPTH	= 28.68	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.58	(in)	
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.15		
KL/ry	= 47.19	KL/rx	= 52.26		
b/t RATIO	= 10.10	Q	= 1.00		
MEA. YIELD STR.	= 53.80 (ksi)	MEA. FAILURE LOAD	= 180.40	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	26.4	23.1	55.2	123.6	1.46
SJI	32.3	28.3	67.6	151.3	1.19
CONV	25.5	22.3	53.4	119.4	1.51

FIGURE H.46a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-20E

TEST # 60/3/20-20W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.517	RIGHT HORZ LEG (in) =	1.503
LEFT VER LEG (in) =	1.514	RIGHT VER LEG (in) =	1.520
LEFT THICKNESS (in) =	0.150	RIGHT THICKNESS (in) =	0.154
GAP BETWEEN THE LEGS (in) =	0.892		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.752	RIGHT HORZ LEG (in) =	1.790
LEFT VER LEG (in) =	1.803	RIGHT VER LEG (in) =	1.750
LEFT THICKNESS (in) =	0.140	RIGHT THICKNESS (in) =	0.141
GAP BETWEEN THE LEGS (in) =	0.861		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.191	in^4	Iy =	0.863	in^4
rx =	0.467	in	ry =	0.994	in
A =	0.874	in^2	J =	0.007	in^2
x =	1.970	in	y =	0.433	in

BOTTOM CHORD

Ix =	0.293	in^4	Iy =	1.108	in^4
rx =	0.553	in	ry =	1.076	in
A =	0.957	in^2	J =	0.006	in^2
x =	2.194	in	y =	0.523	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 382.42 (in^4)	# ROWS BRIDGING	= 10.00		
JOIST DEPTH	= 29.75 (in)	EFF. DEPTH	= 28.79	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.59	(in)	
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.15		
KL/ry	= 48.30	KL/rx	= 51.38		
b/t RATIO	= 10.11	Q	= 1.00		
MEA. YIELD STR.	= 53.80 (ksi)	MEA. FAILURE LOAD	= 180.40	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	26.2	22.9	54.9	122.9	1.47
SJI	32.3	28.2	67.7	151.5	1.19
CONV	25.6	22.4	53.8	120.3	1.50

FIGURE H.46b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-20W

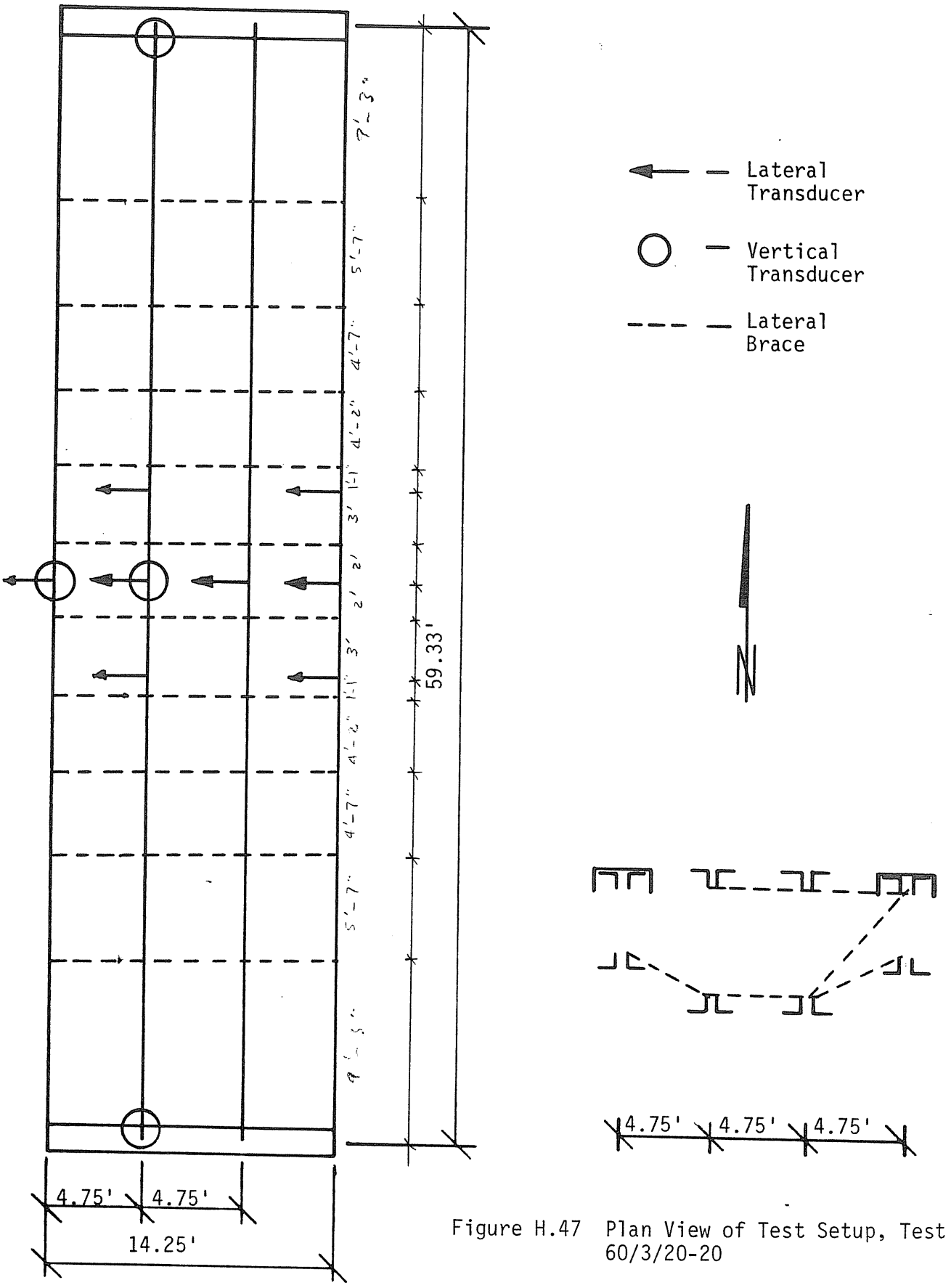
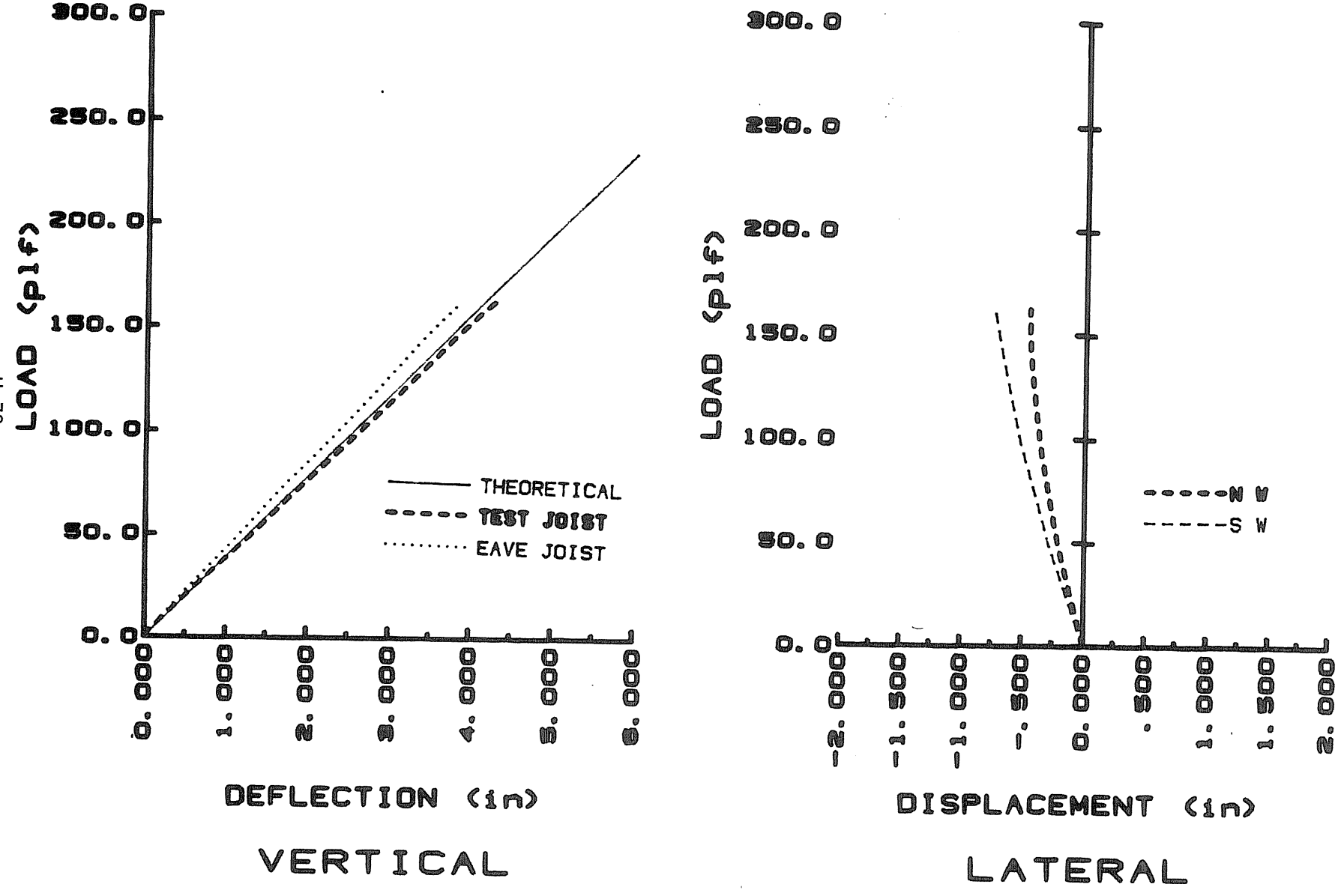


Figure H.47 Plan View of Test Setup, Test 60/3/20-20



60/3/20-20

Figure H.48 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-21

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.56

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 10 Bottom Chord: 10

Bridging Spacing:

Top Chord: -2'-4'1"-4'2"-4'7"-5'7"

Bottom Chord: -2'-4'1"-4'2"-4'7"-5'7"

Others: Panel attached to east channel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonal from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 128.4

2. Method: SJI Load: 160.5

3. Method: CONV. Load: 127.1

TEST RESULTS:

Failure Mode: Top chord lateral buckling of both joists.

Applied Failure Load: 172.9 plf Total Failure Load: 187.8 plf

Load Factor (Failure Load/Service Load) 1. 1.46

2. 1.17

3. 1.48

DISCUSSION:

-Both joists were used before: East joist was E19, West joist was W20.

-Load deflection plot showed good agreement with predicted.

Test 60/3/20-21

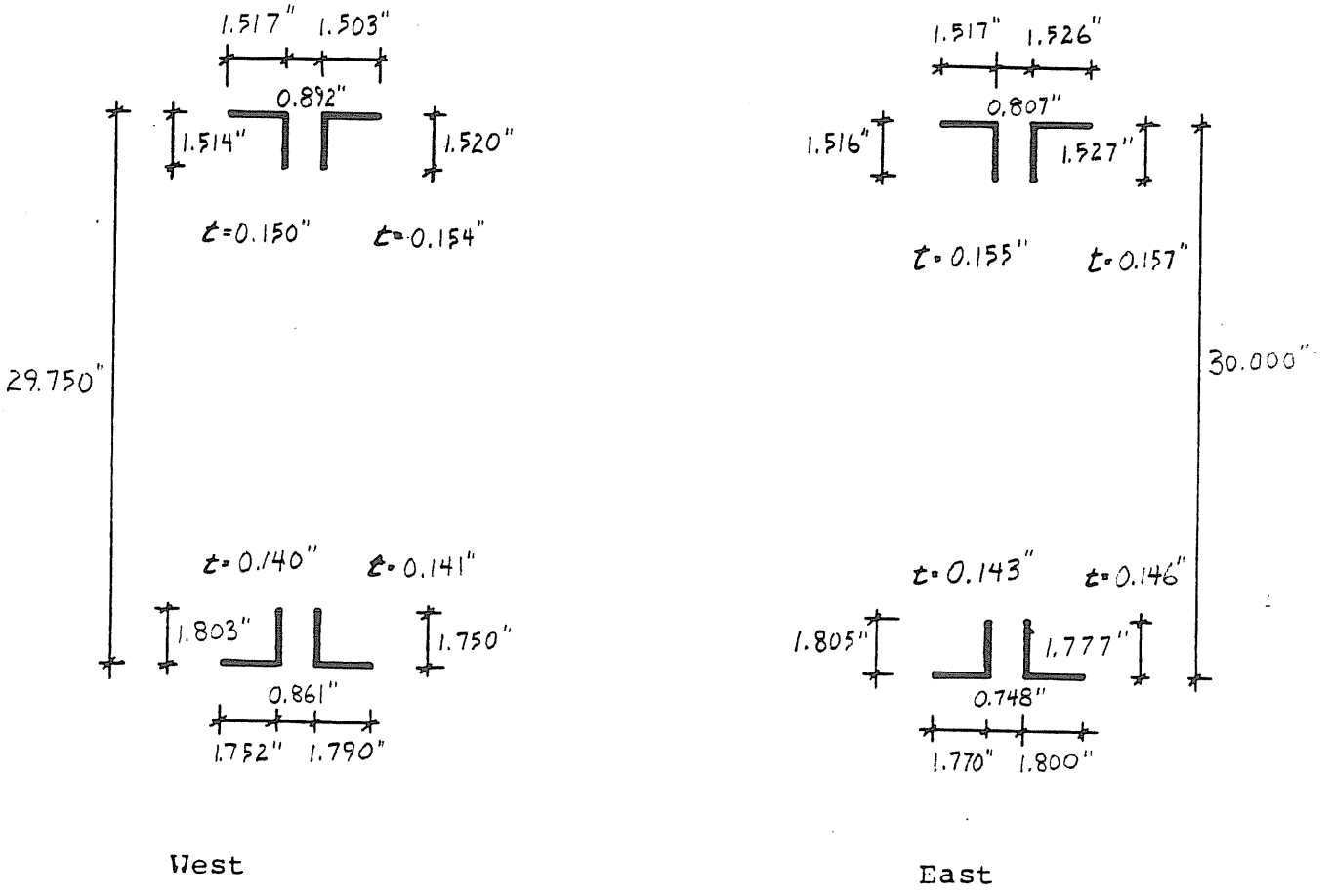


Figure H.49 Cross-Section Properties, Test 60/3/20-21

TEST # 60/3/20-21E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.517	RIGHT HORZ LEG (in) =	1.526
LEFT VER LEG (in) =	1.516	RIGHT VER LEG (in) =	1.527
LEFT THICKNESS (in) =	0.155	RIGHT THICKNESS (in) =	0.157
GAP BETWEEN THE LEGS (in) =	0.807		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.770	RIGHT HORZ LEG (in) =	1.800
LEFT VER LEG (in) =	1.805	RIGHT VER LEG (in) =	1.777
LEFT THICKNESS (in) =	0.143	RIGHT THICKNESS (in) =	0.146
GAP BETWEEN THE LEGS (in) =	0.748		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.197	in^4	Iy =	0.835	in^4
rx =	0.468	in	ry =	0.963	in
A =	0.901	in^2	J =	0.007	in^2
x =	1.930	in	y =	0.432	in

BOTTOM CHORD

Ix =	0.307	in^4	Iy =	1.060	in^4
rx =	0.556	in	ry =	1.034	in
A =	0.992	in^2	J =	0.007	in^2
x =	2.161	in	y =	0.516	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 402.58 (in^4)	# ROWS BRIDGING	=	10.00	
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	=	29.05	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	2.46	(in)
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	102.21	
KL/ry	= 49.87	KL/rx	=	51.30	
b/t RATIO	= 9.79	Q	=	1.00	
MEA. YIELD STR.	= 54.80 (ksi)	MEA. FAILURE LOAD	=	187.80	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	26.3	23.7	57.4	128.4	1.46
SJI	32.9	29.6	71.7	160.5	1.17
CONV	26.0	23.5	56.8	127.1	1.48

FIGURE H.50a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-21E

TEST # 60/3/20-21W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.517	RIGHT HORZ LEG (in) =	1.503
LEFT VER LEG (in) =	1.514	RIGHT VER LEG (in) =	1.520
LEFT THICKNESS (in) =	0.150	RIGHT THICKNESS (in) =	0.154

GAP BETWEEN THE LEGS (in) = 0.892

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.752	RIGHT HORZ LEG (in) =	1.790
LEFT VER LEG (in) =	1.803	RIGHT VER LEG (in) =	1.750
LEFT THICKNESS (in) =	0.140	RIGHT THICKNESS (in) =	0.141

GAP BETWEEN THE LEGS (in) = 0.861

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.191	in^4	Iy =	0.863	in^4
rx =	0.467	in	ry =	0.994	in
A =	0.874	in^2	J =	0.007	in^2
x =	1.970	in	y =	0.433	in

BOTTOM CHORD

Ix =	0.293	in^4	Iy =	1.108	in^4
rx =	0.553	in	ry =	1.076	in
A =	0.957	in^2	J =	0.006	in^2
x =	2.194	in	y =	0.523	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 382.42 (in^4)	# ROWS BRIDGING	= 10.00		
JOIST DEPTH	= 29.75 (in)	EFF. DEPTH	= 28.79	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.59	(in)	
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.34		
KL/ry	= 48.30	KL/rx	= 51.38		
b/t RATIO	= 10.11	Q	= 1.00		
MEA. YIELD STR.	= 53.60 (ksi)	MEA. FAILURE LOAD	= 187.80	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	26.1	22.8	54.7	122.5	1.53
SJI	32.2	28.1	67.4	150.9	1.24
CONV	25.6	22.3	53.6	120.0	1.57

FIGURE H.50b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-21W

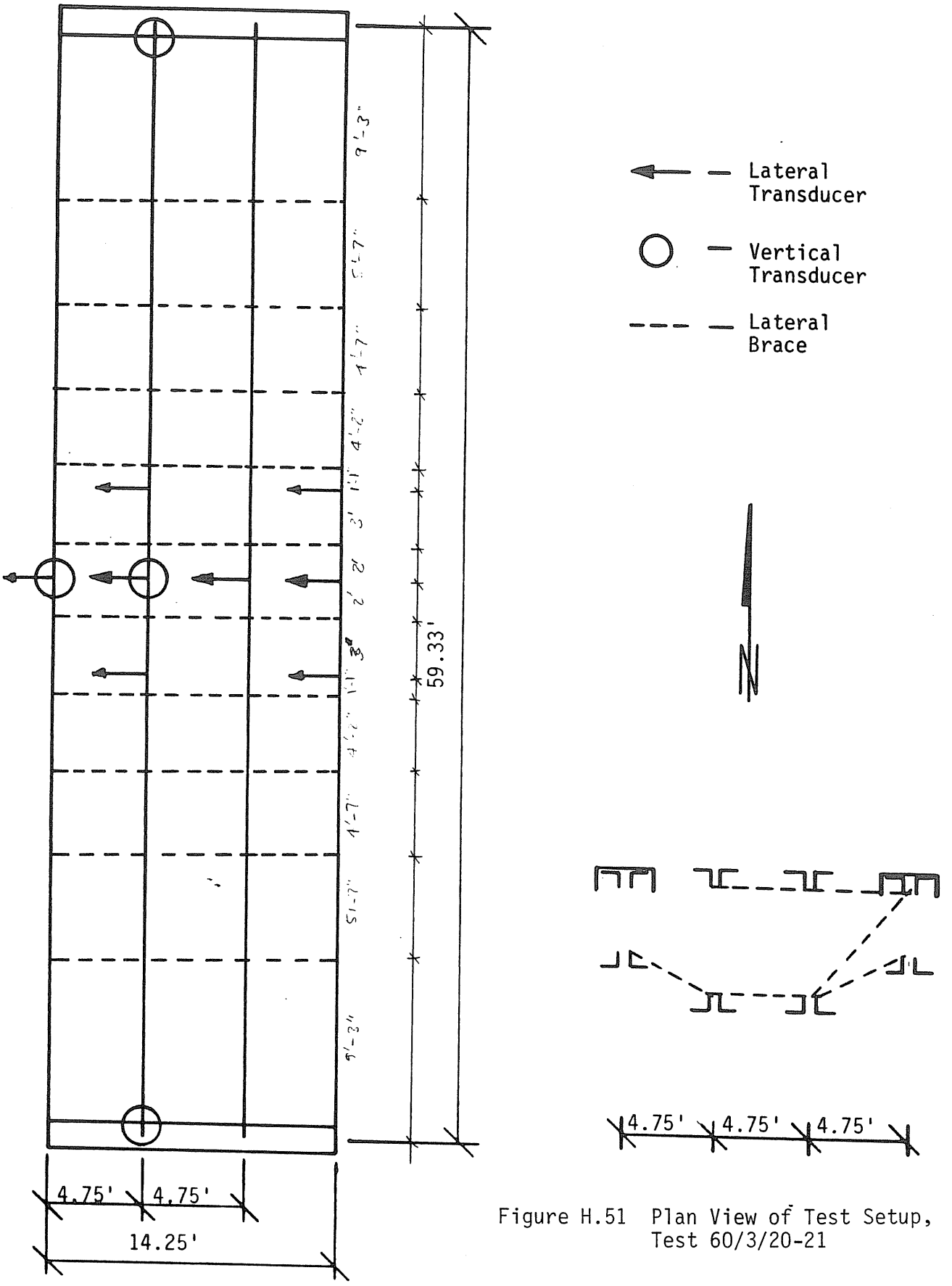
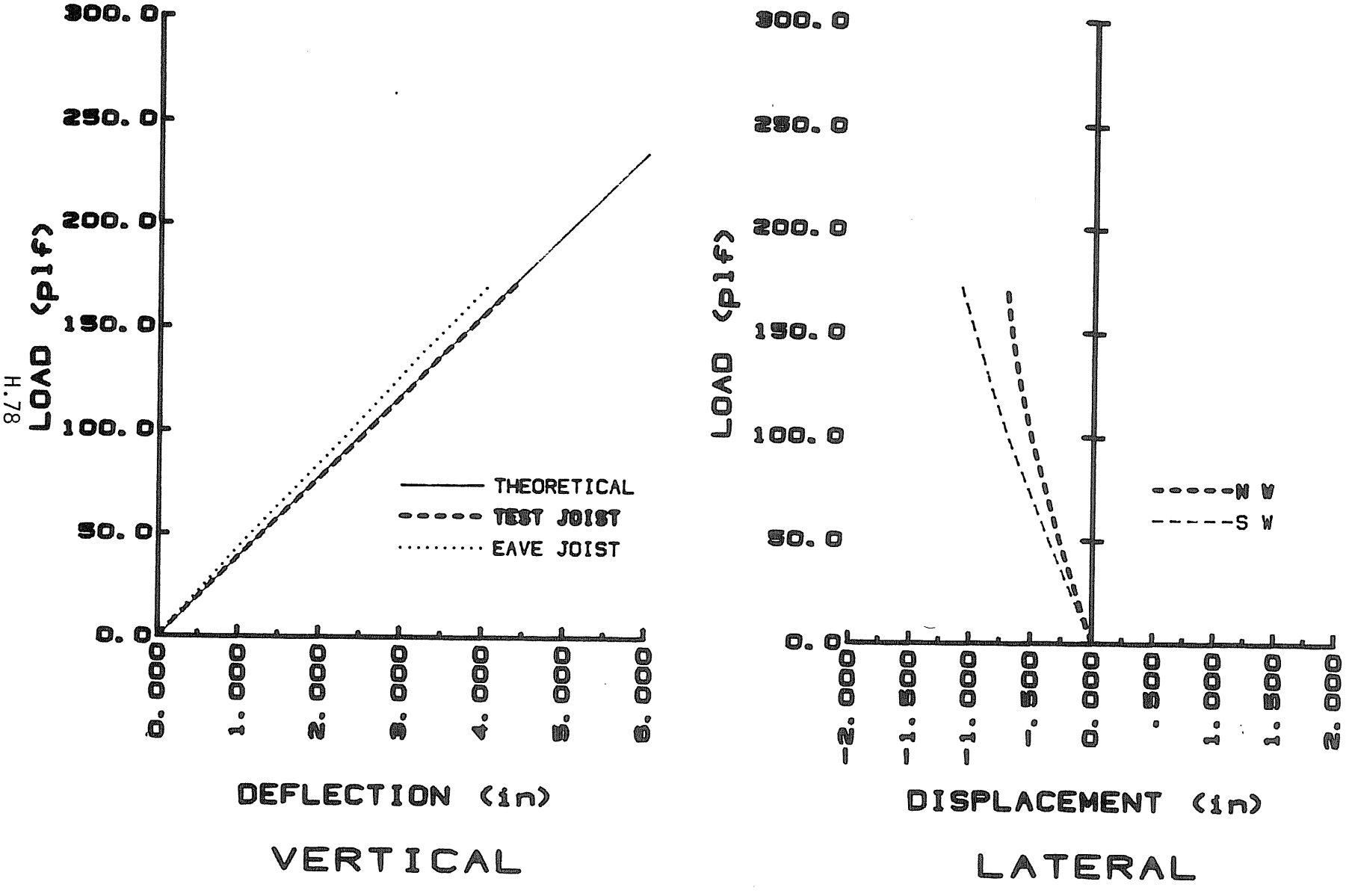


Figure H.51 Plan View of Test Setup, Test 60/3/20-21



60/3/20-21

Figure H.52 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/20-26

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.56

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" w/RIS Bridge Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-7'8"-8'10"

Bottom Chord: 0'-7'8"-8'10"

Others: Panel attached to east channel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonal from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 82.0

2 Method: SJI Load: 129.7

3 Method: CONV. Load: 124.3

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of centerline. (East joist).

Applied Failure Load: 138.3 plf Total Failure Load: 153.2 plf

Load Factor (Failure Load/Service Load) 1. 1.87

2. 1.18

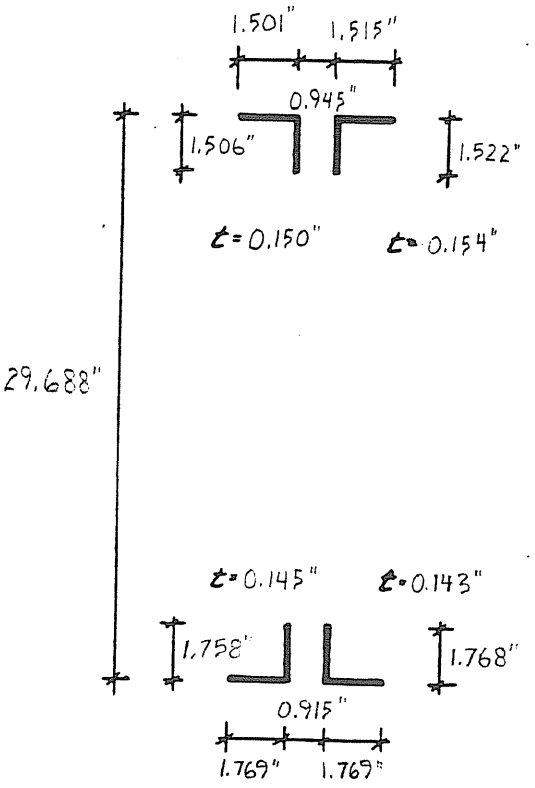
3. 1.23

DISCUSSION:

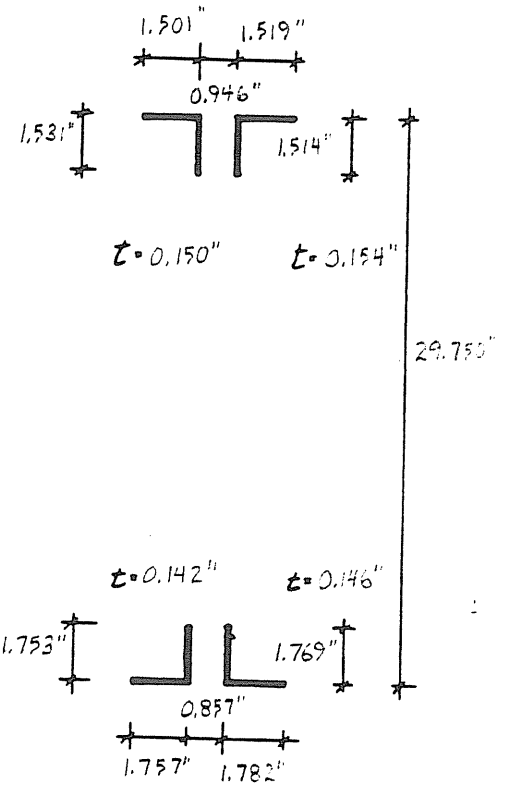
-Load deflection plot was in good agreement with predicted.

-Lateral displacement of west joist 4 ft. north and south of midspan moved together.

Test 60/3/20-26



West



East

Figure H.53 Cross-Section Properties, Test 60/3/20-26

TEST # 60/3/20-26E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.501	RIGHT HORZ LEG (in) =	1.519
LEFT VER LEG (in) =	1.531	RIGHT VER LEG (in) =	1.514
LEFT THICKNESS (in) =	0.150	RIGHT THICKNESS (in) =	0.154

GAP BETWEEN THE LEGS (in) = 0.946

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.757	RIGHT HORZ LEG (in) =	1.782
LEFT VER LEG (in) =	1.753	RIGHT VER LEG (in) =	1.769
LEFT THICKNESS (in) =	0.142	RIGHT THICKNESS (in) =	0.146

GAP BETWEEN THE LEGS (in) = 0.857

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.193	in^4	Iy =	0.906	in^4
rx =	0.469	in	ry =	1.017	in
A =	0.876	in^2	J =	0.007	in^2
x =	1.991	in	y =	0.447	in

BOTTOM CHORD

Ix =	0.291	in^4	Iy =	1.129	in^4
rx =	0.546	in	ry =	1.076	in
A =	0.975	in^2	J =	0.007	in^2
x =	2.208	in	y =	0.484	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 388.17 (in^4)	# ROWS BRIDGING	= 5.00
JOIST DEPTH	= 29.75 (in)	EFF. DEPTH	= 28.82 (in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.55 (in)
BRIDGING SPACING	= 7.70 (ft)	PANEL LENGTH	= 24.00 (in)
K	= 1.00	C	= 101.40
KL/ry	= 90.85	KL/rx	= 51.16
b/t RATIO	= 10.21	Q	= 1.00
MEA. YIELD STR.	= 55.70 (ksi)	MEA. FAILURE LOAD	= 153.20 (plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	17.4	15.3	36.6	82.0	1.87
SJI	27.6	24.1	58.0	129.7	1.18
CONV	26.4	23.1	55.5	124.3	1.23

FIGURE H.54a COMPUTED ALLOWABLE LOADS, TEST 60/3/20-26E

TEST # 60/3/20-26W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.501	RIGHT HORZ LEG (in) =	1.515
LEFT VER LEG (in) =	1.506	RIGHT VER LEG (in) =	1.522
LEFT THICKNESS (in) =	0.150	RIGHT THICKNESS (in) =	0.154
GAP BETWEEN THE LEGS (in) =	0.945		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.769	RIGHT HORZ LEG (in) =	1.769
LEFT VER LEG (in) =	1.758	RIGHT VER LEG (in) =	1.768
LEFT THICKNESS (in) =	0.145	RIGHT THICKNESS (in) =	0.143
GAP BETWEEN THE LEGS (in) =	0.915		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.190	in^4	Iy =	0.902	in^4
rx =	0.466	in	ry =	1.017	in
A =	0.873	in^2	J =	0.007	in^2
x =	1.992	in	y =	0.427	in

BOTTOM CHORD

Ix =	0.292	in^4	Iy =	1.182	in^4
rx =	0.547	in	ry =	1.101	in
A =	0.976	in^2	J =	0.007	in^2
x =	2.221	in	y =	0.488	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Isgross	= 386.59 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 29.69 (in)	EFF. DEPTH	= 28.77	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 2.56	(in)	
BRIDGING SPACING	= 7.70 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 101.38		
KL/ry	= 90.89	KL/rx	= 51.48		
b/t RATIO	= 10.04	Q	= 1.00		
MEA. YIELD STR.	= 55.70 (ksi)	MEA. FAILURE LOAD	= 153.20	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	17.4	15.2	36.4	81.5	1.88
SJI	28.2	24.6	59.1	132.2	1.16
CONV	26.4	23.0	55.1	123.4	1.24

FIGURE H.54b COMPUTED ALLOWABLE LOADS, TEST 60/3/20-26W

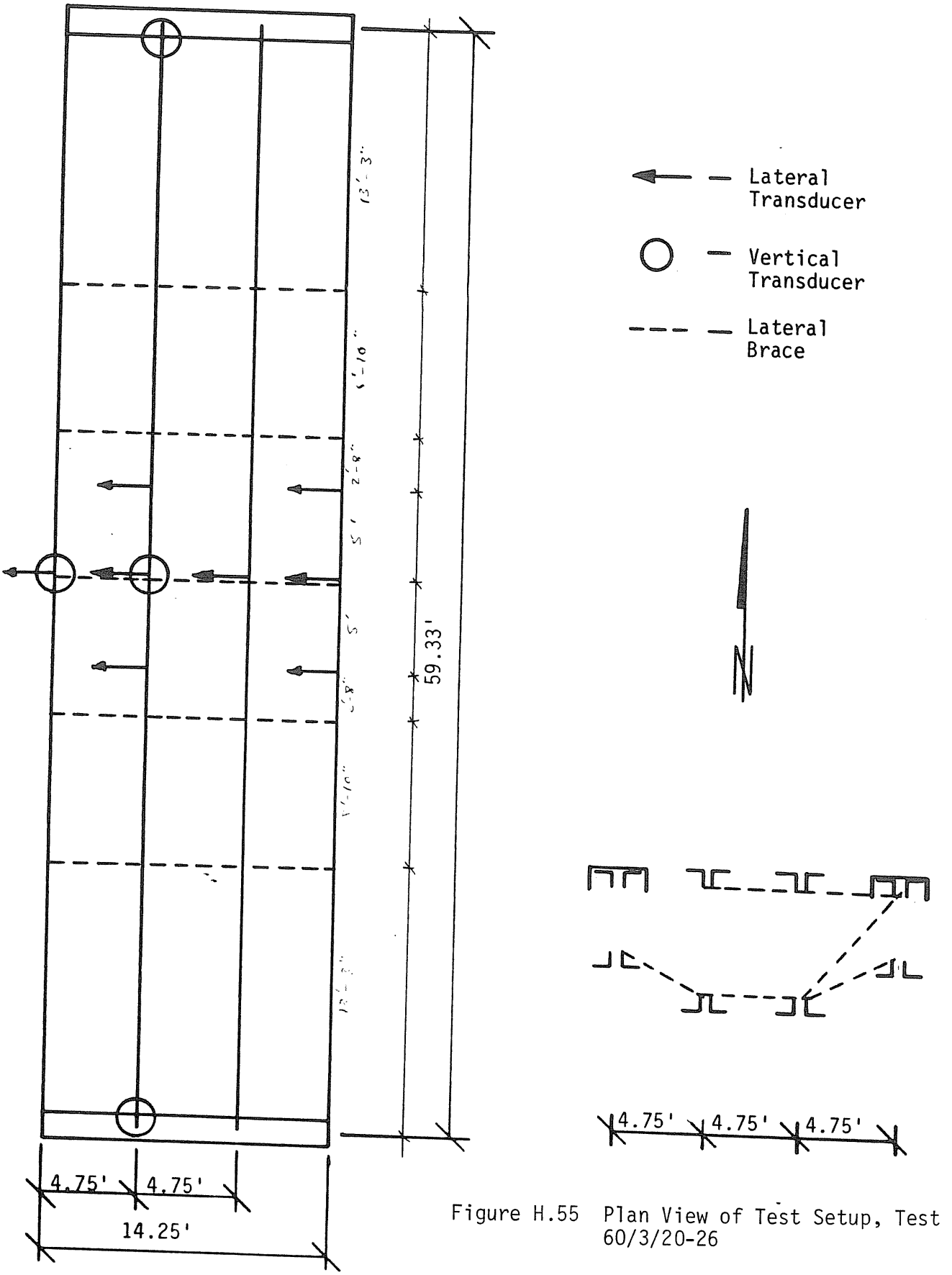
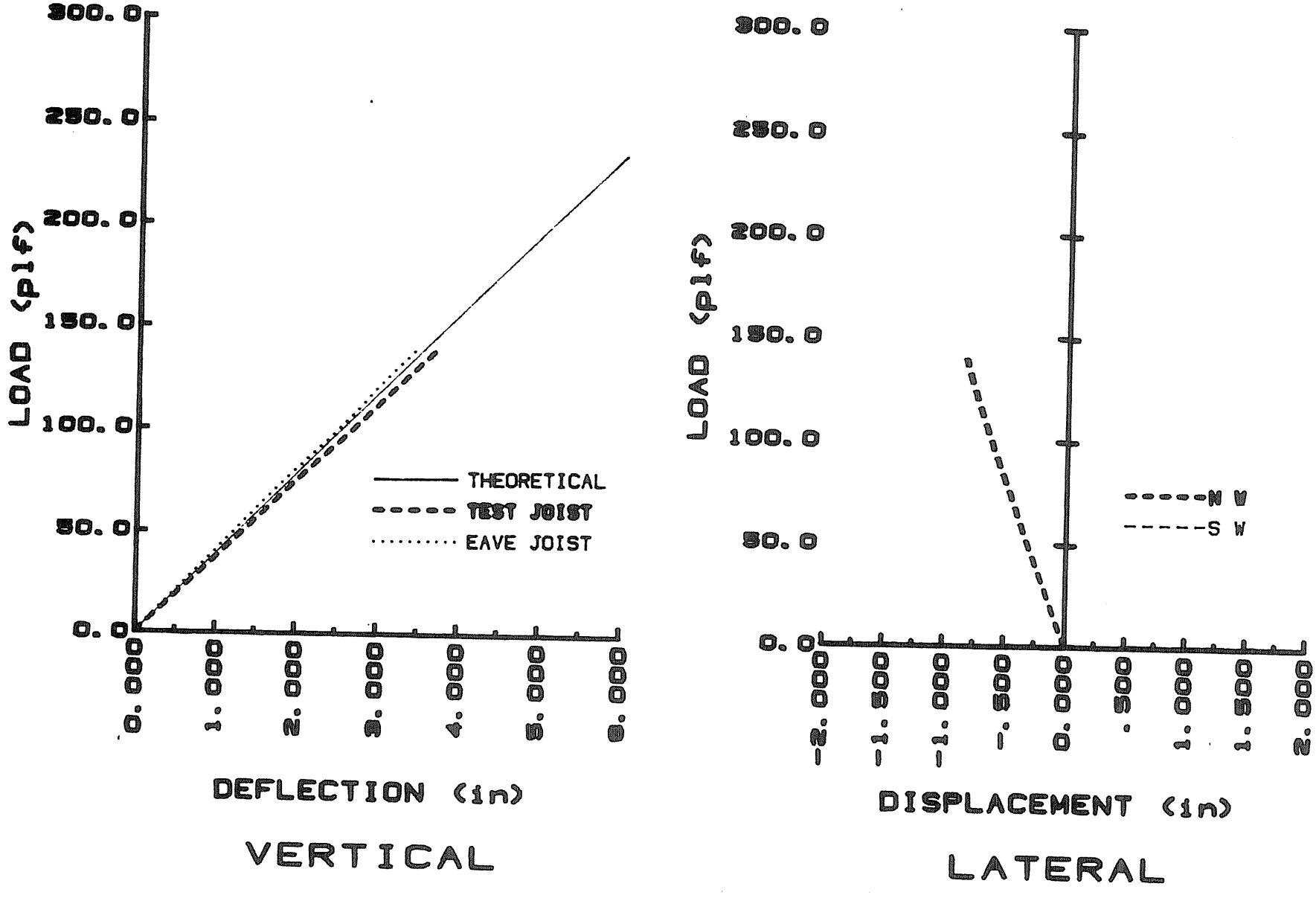


Figure H.55 Plan View of Test Setup, Test 60/3/20-26



60/3/20-26

Figure H.56 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/4/20-1

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 4" Insulation Yes with "T" block

Number of Rows of Bridging:

Top Chord: 2 Bottom Chord: 2

Bridging Spacing:

Top Chord: - 10'

Bottom Chord: - 10'

Others: No attachment (except clips) to outside joists.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 12.5

2.Method: SJI Load: 18.6

3.Method: CONV. Load: 120.3

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of centerline (both joists).

Applied Failure Load: 96.8 plf Total Failure Load: 111.7 plf

Load Factor (Failure Load/Service Load) 1. 8.95

2. 5.99

3. 0.93

DISCUSSION:

-Did not reach the working load.

-Load deflection plot was in good agreement with predicted.

-Test joist moved east until 2" H_2O (48.0 plf) then moved west.

-Lateral deflection of test joist immediately before failure was zero.

Date September 20, 1982

Test V 60/4/20-1

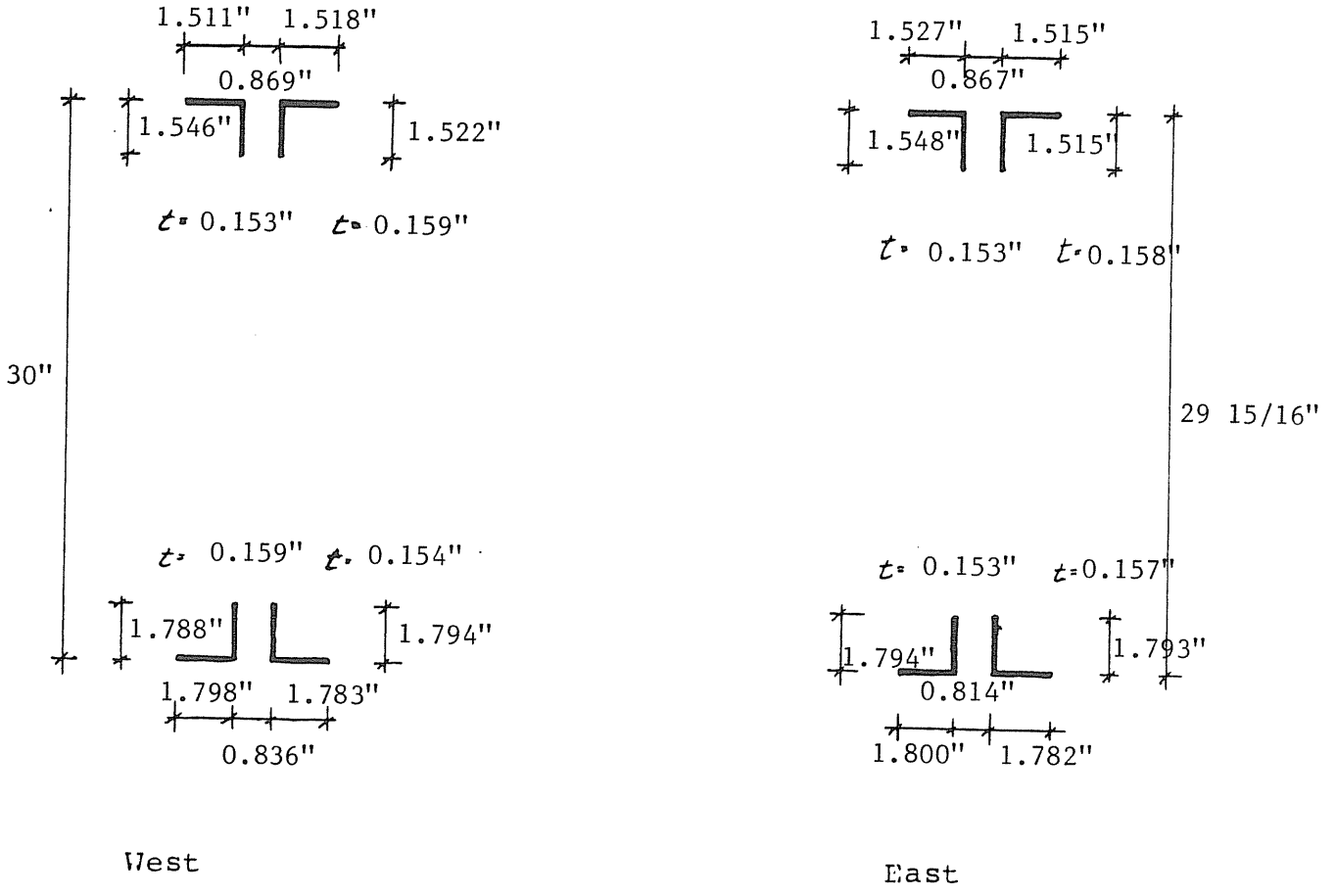


Figure H.57 Cross-Section Properties, Test 60/4/20-1

TEST # 60/4/20-1E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.527	RIGHT HORZ LEG (in) =	1.515
LEFT VER LEG (in) =	1.548	RIGHT VER LEG (in) =	1.515
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.158
GAP BETWEEN THE LEGS (in) =	0.867		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.800	RIGHT HORZ LEG (in) =	1.782
LEFT VER LEG (in) =	1.794	RIGHT VER LEG (in) =	1.793
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.157
GAP BETWEEN THE LEGS (in) =	0.814		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.200	in^4	Iy =	0.878	in^4
rx =	0.472	in	ry =	0.987	in
A =	0.901	in^2	J =	0.007	in^2
x =	1.968	in	y =	0.458	in

BOTTOM CHORD

Ix =	0.328	in^4	Iy =	1.210	in^4
rx =	0.555	in	ry =	1.067	in
A =	1.063	in^2	J =	0.009	in^2
x =	2.213	in	y =	0.506	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 420.03 (in^4)	# ROWS BRIDGING	=	2.00	
JOIST DEPTH	= 29.90 (in)	EFF. DEPTH	=	28.94	(in.)
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	=	2.29	(in)
BRIDGING SPACING	= 20.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	106.57	
KL/ry	= 243.09	KL/rx	=	50.88	
b/t RATIO	= 10.12	Q	=	1.00	
MEA. YIELD STR.	= 50.40 (ksi)	MEA. FAILURE LOAD	=	111.70	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	2.5	2.3	5.5	12.5	8.95
SJI	3.8	3.4	8.2	18.6	5.99
CONV	24.4	22.0	52.9	120.3	0.93

FIGURE H.58a COMPUTED ALLOWABLE LOADS, TEST 60/4/20-1E

TEST # 60/4/20-1w

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.511	RIGHT HORZ LEG (in) =	1.518
LEFT VER LEG (in) =	1.546	RIGHT VER LEG (in) =	1.522
LEFT THICKNESS (in) =	0.153	RIGHT THICKNESS (in) =	0.159
GAP BETWEEN THE LEGS (in) =	0.869		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.798	RIGHT HORZ LEG (in) =	1.783
LEFT VER LEG (in) =	1.788	RIGHT VER LEG (in) =	1.794
LEFT THICKNESS (in) =	0.159	RIGHT THICKNESS (in) =	0.154
GAP BETWEEN THE LEGS (in) =	0.836		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.202	in^4	Iy =	0.875	in^4
rx =	0.473	in	ry =	0.985	in
A =	0.902	in^2	J =	0.007	in^2
x =	1.963	in	y =	0.456	in

BOTTOM CHORD

Ix =	0.330	in^4	Iy =	1.243	in^4
rx =	0.554	in	ry =	1.077	in
A =	1.072	in^2	J =	0.009	in^2
x =	2.197	in	y =	0.503	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 426.07 (in^4)	# ROWS BRIDGING	= 2.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 29.04	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.26	(in)	
BRIDGING SPACING	= 20.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 103.93		
KL/ry	= 243.72	KL/rx	= 50.79		
b/t RATIO	= 10.10	Q	= 1.00		
MEA. YIELD STR.	= 53.00 (ksi)	MEA. FAILURE LOAD	= 111.70	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	2.5	2.3	5.5	12.5	8.95
SJI	3.8	3.4	8.3	18.9	5.90
CONV	25.4	22.9	55.5	126.2	0.88

FIGURE H.58b COMPUTED ALLOWABLE LOADS, TEST 60/4/20-1w

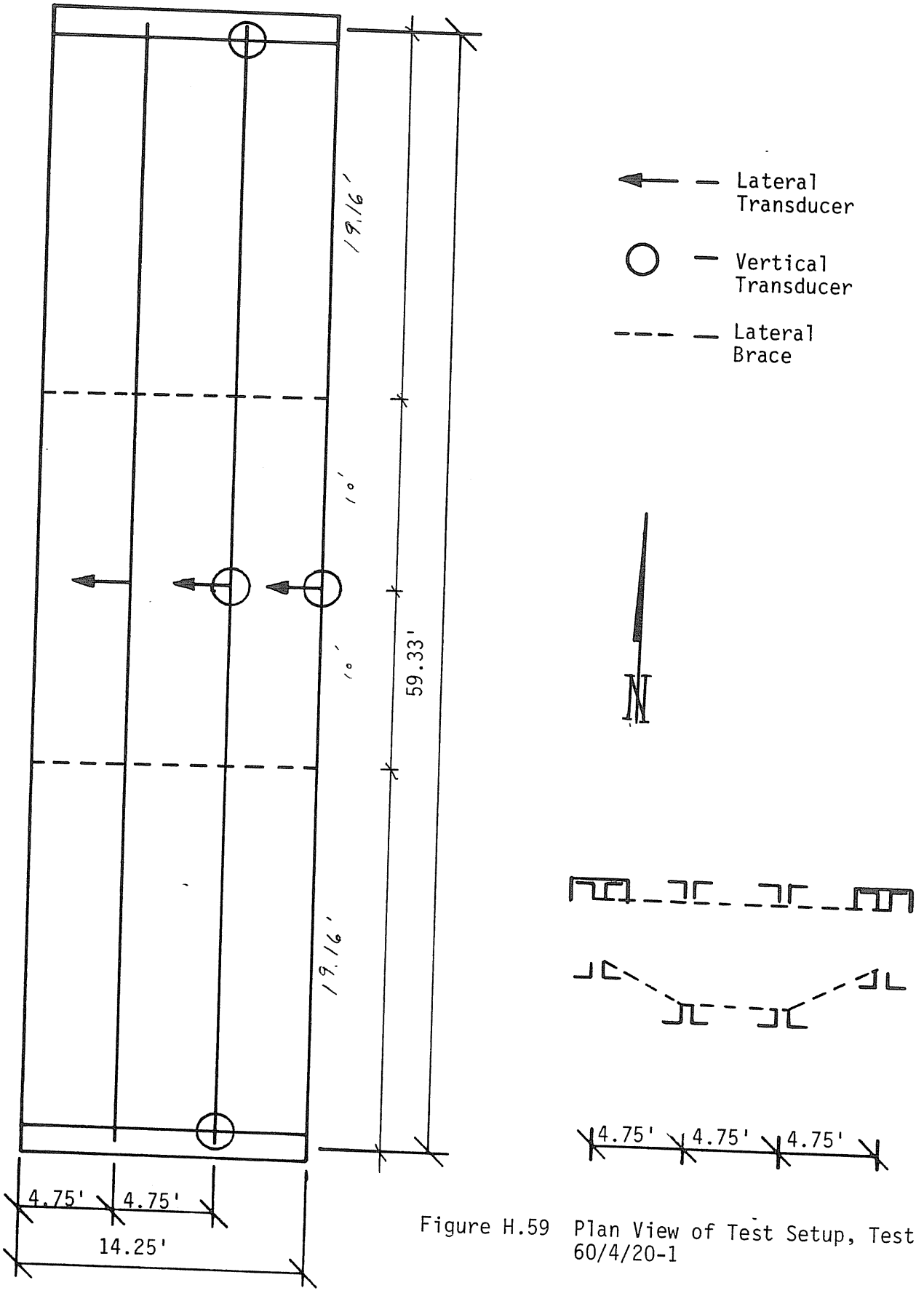
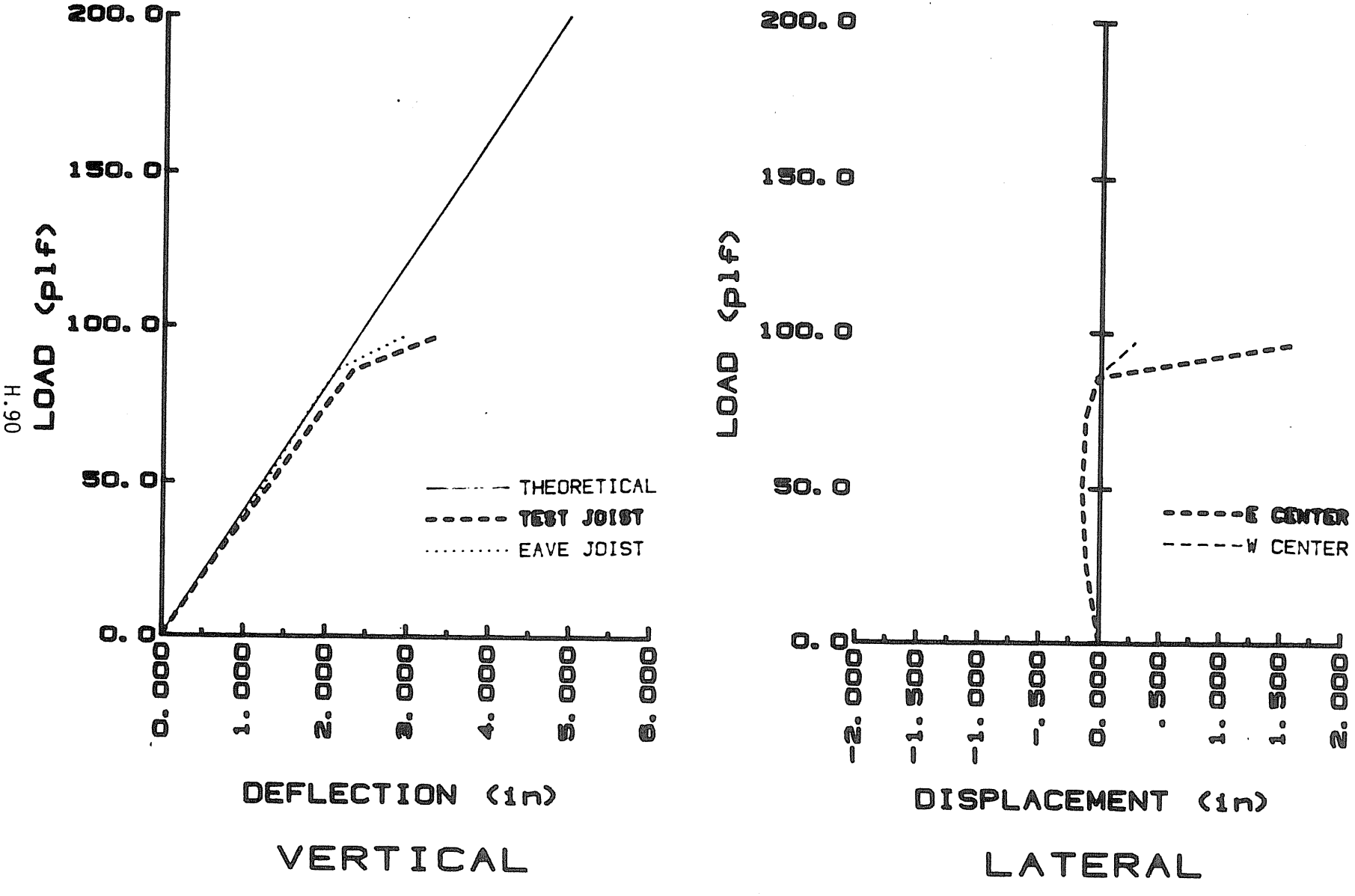


Figure H.59 Plan View of Test Setup, Test 60/4/20-1



60/4/20-1

Figure H.60 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/4/20-2

JOIST DESCRIPTION:

Joist Type: 30H116 Load: 20 (psf)

Moment of Inertia: 388"^{4} Δ" @ 100 plf 2.48

Dead Load of Joist: 8.6 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 14.9 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 4" Insulation Yes with "T" block

Number of Rows of Bridging:

Top Chord: 2 Bottom Chord: 2

Bridging Spacing:

Top Chord: - 10'

Bottom Chord: - 10'

Others: East end of panel was attached to the channel.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 12.6

2.Method: SJI Load: 18.3

3.Method: CONV. Load: 127.4

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. north of centerline. (east joist).

Applied Failure Load: 96.8 Total Failure Load: 111.7 plf

Load Factor (Failure Load/Service Load) 1. 8.90

2. 6.11

3. 0.88

DISCUSSION:

-Failed at working load.

-Load deflection plot was in good agreement with predicted.

-Outside joist and test joist centerline vertical deflections were very close.

-East and west test joist moved to the east together until failure where the east joist moved to the west 0.417 in.

Date October 11, 1982

Test 60/4/20-2

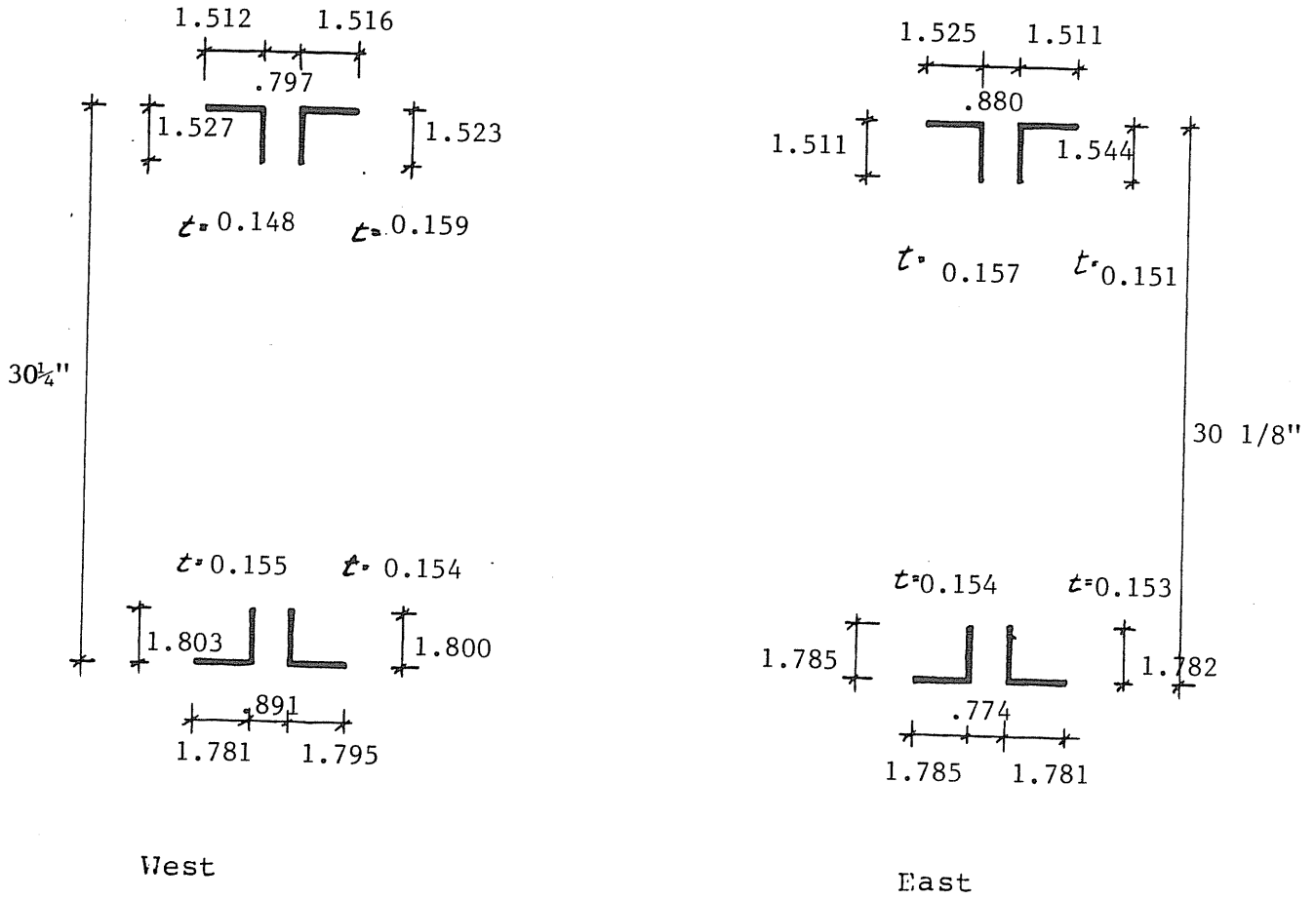


Figure H.61 Cross-Section Properties, Test 60/4/20-2

TEST # 60/4/20-2E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.525	RIGHT HORZ LEG (in) =	1.511
LEFT VER LEG (in) =	1.511	RIGHT VER LEG (in) =	1.544
LEFT THICKNESS (in) =	0.157	RIGHT THICKNESS (in) =	0.151
GAP BETWEEN THE LEGS (in) =	0.880		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.785	RIGHT HORZ LEG (in) =	1.781
LEFT VER LEG (in) =	1.785	RIGHT VER LEG (in) =	1.782
LEFT THICKNESS (in) =	0.154	RIGHT THICKNESS (in) =	0.153
GAP BETWEEN THE LEGS (in) =	0.774		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.197	in^4	Iy =	0.876	in^4
rx =	0.471	in	ry =	0.992	in
A =	0.891	in^2	J =	0.007	in^2
x =	1.946	in	y =	0.423	in

BOTTOM CHORD

Ix =	0.320	in^4	Iy =	1.148	in^4
rx =	0.552	in	ry =	1.047	in
A =	1.048	in^2	J =	0.008	in^2
x =	2.168	in	y =	0.504	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 421.77 (in^4)	# ROWS BRIDGING	= 2.00		
JOIST DEPTH	= 30.13 (in)	EFF. DEPTH	= 29.20	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 2.28	(in)	
BRIDGING SPACING	= 20.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 102.77		
KL/ry	= 242.02	KL/rx	= 51.00		
b/t RATIO	= 10.23	Q	= 1.00		
MEA. YIELD STR.	= 54.20 (ksi)	MEA. FAILURE LOAD	= 111.70	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	2.5	2.3	5.5	12.6	8.90
SJI	3.7	3.3	8.0	18.3	6.11
CONV	25.9	23.0	56.0	127.4	0.88

FIGURE H.62a COMPUTED ALLOWABLE LOADS, TEST 60/4/20-2E

TEST # 60/4/20-2W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.512	RIGHT HORZ LEG (in) =	1.516
LEFT VER LEG (in) =	1.527	RIGHT VER LEG (in) =	1.523
LEFT THICKNESS (in) =	0.148	RIGHT THICKNESS (in) =	0.159
GAP BETWEEN THE LEGS (in) =	0.797		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.781	RIGHT HORZ LEG (in) =	1.795
LEFT VER LEG (in) =	1.803	RIGHT VER LEG (in) =	1.800
LEFT THICKNESS (in) =	0.155	RIGHT THICKNESS (in) =	0.154
GAP BETWEEN THE LEGS (in) =	0.891		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.195	in^4	Iy =	0.805	in^4
rx =	0.470	in	ry =	0.953	in
A =	0.886	in^2	J =	0.007	in^2
x =	1.942	in	y =	0.441	in

BOTTOM CHORD

Ix =	0.331	in^4	Iy =	1.279	in^4
rx =	0.559	in	ry =	1.098	in
A =	1.061	in^2	J =	0.008	in^2
x =	2.228	in	y =	0.511	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Isgross	= 428.58 (in^4)	# ROWS BRIDGING	=	2.00	
JOIST DEPTH	= 30.25 (in)	EFF. DEPTH	=	29.30	(in.)
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	=	2.24	(in)
BRIDGING SPACING	= 20.00 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	102.77	
KL/ry	= 251.83	KL/rx	=	51.11	
b/t RATIO	= 10.32	Q	=	1.00	
MEA. YIELD STR.	= 54.20 (ksi)	MEA. FAILURE LOAD	=	111.70	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	2.4	2.1	5.1	11.6	9.65
SJI	3.8	3.3	8.2	18.6	6.02
CONV	25.8	22.9	55.9	127.0	0.88

FIGURE H.62b COMPUTED ALLOWABLE LOADS, TEST 60/4/20-2W

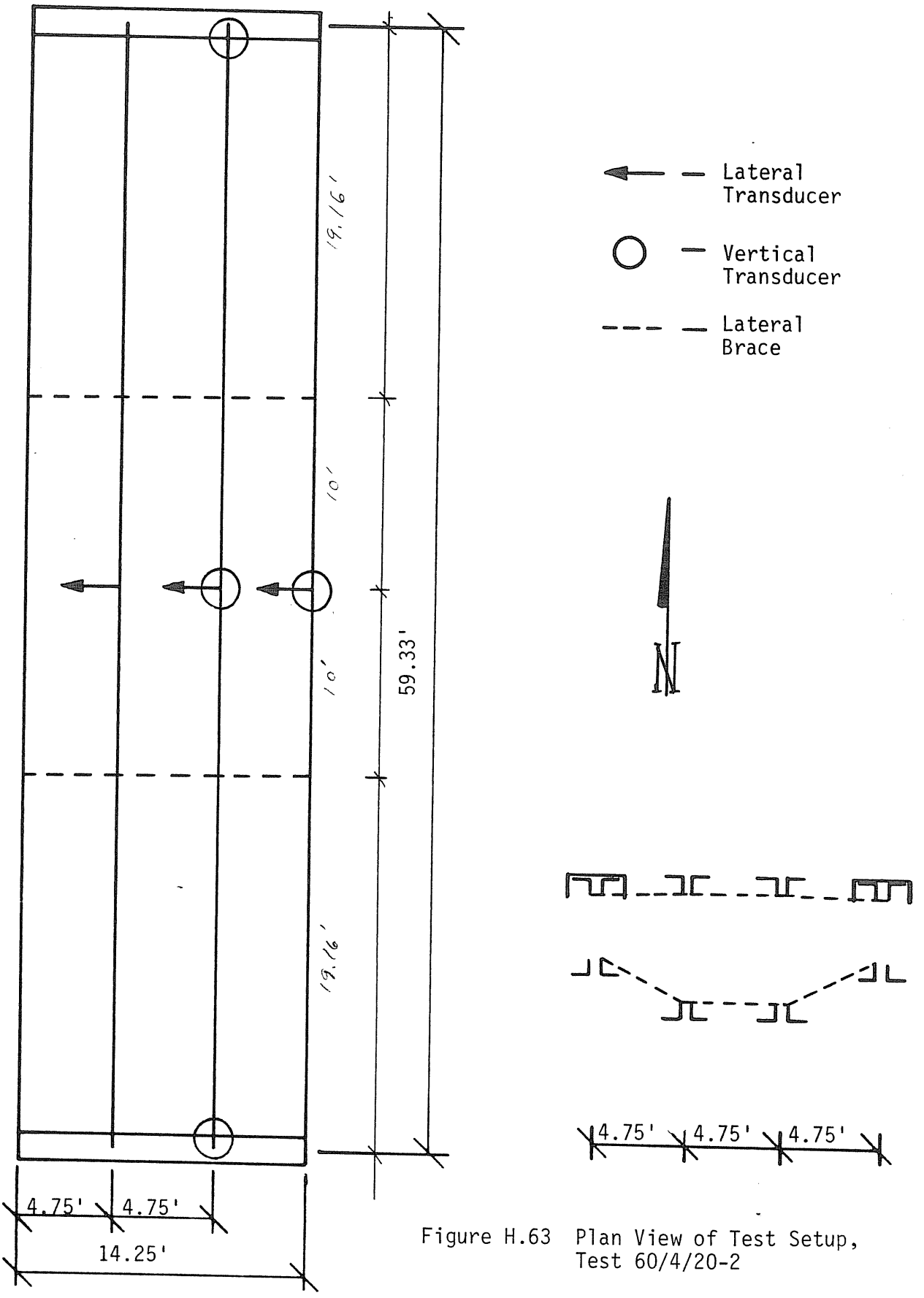
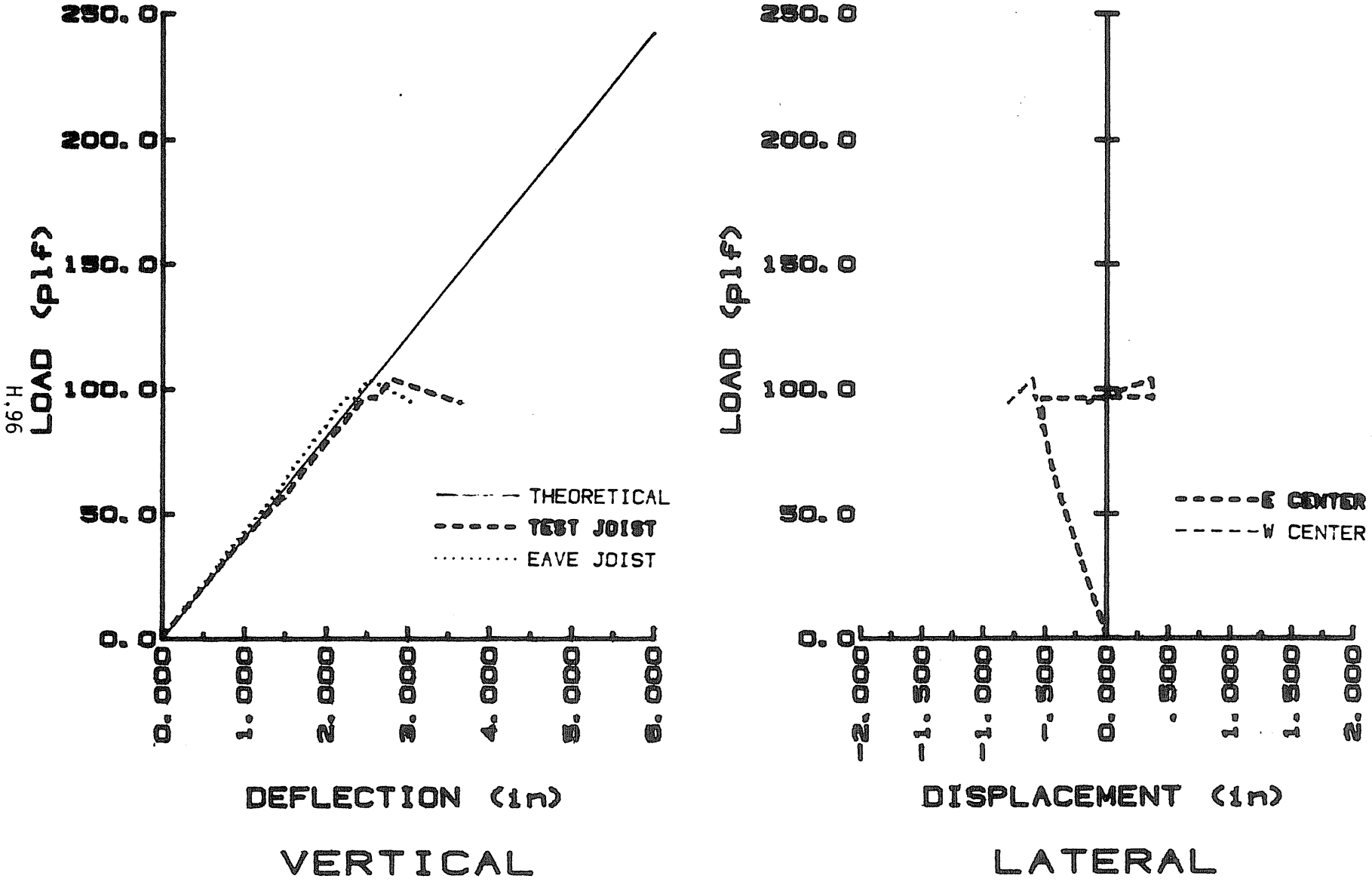


Figure H.63 Plan View of Test Setup, Test 60/4/20-2



60/4/20-2

Figure H.64 Applied Load vs. Vertical and Lateral Displacements

APPENDIX I

60 ft. Span, 40 psf ANGLE WEB TEST RESULTS

Test No. 60/3/40-10

JOIST DESCRIPTION:

Joist Type: 30H214 Load: 40 (psf)

Moment of Inertia: 678"^{4} Δ" @ 100 plf 1.418

Dead Load of Joist: 13.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 20.1 plf

TEST PARAMETERS:

Span Length: 59.33' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-10'5"-11'1"

Bottom Chord: 0'-10'5"-11'1"

Others: East end of panel was attached to the channel.

CALCULATED SERVICE LOADS:

1.Method: AISC Load: 121.6

2.Method: SJI Load: 174.1

3.Method: CONV. Load: 219.2

TEST RESULTS:

Failure Mode: Top chord lateral buckling 5 ft. north of centerline. (both joists).

Applied Failure Load: 296.4 plf Total Failure Load: 316.5 plf

Load Factor (Failure Load/Service Load) 1. 2.60

2. 1.82

3. 1.44

DISCUSSION:

-Load deflection curve had good agreement with the theoretical.

-Test joist and outside joist deflected approximately the same amount.

-The east and west test joists moved to the east up to failure.

-The outside joist moved to the west 0.124".

-The deck movement was 0.103" in relationship to the deck.

Test 60/3/40-10

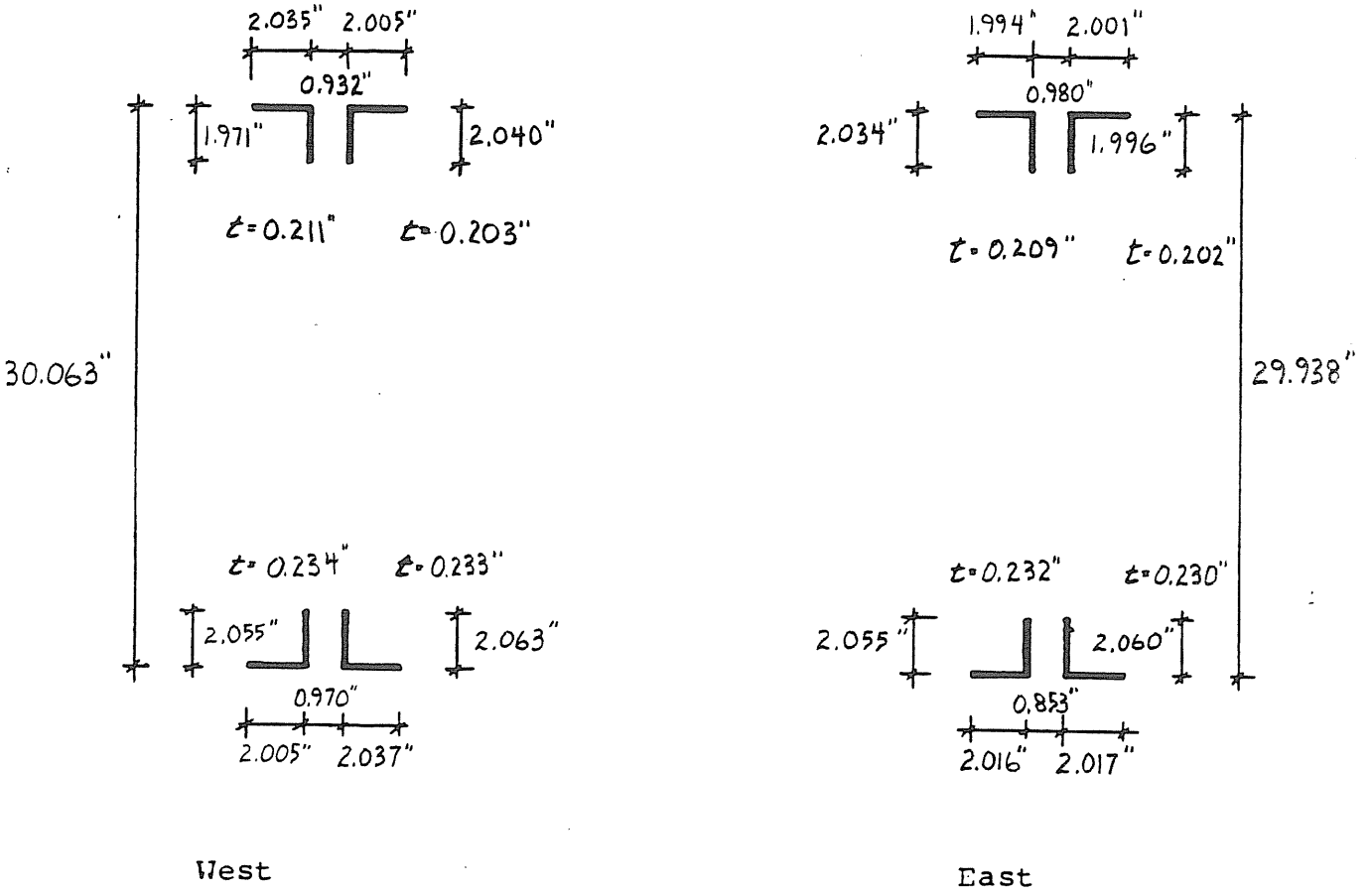


Figure I.1 Cross-Section Properties, Test 60/3/40-10

TEST # 60/3/40-10E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.994	RIGHT HORZ LEG (in) =	2.001
LEFT VER LEG (in) =	2.034	RIGHT VER LEG (in) =	1.996
LEFT THICKNESS (in) =	0.209	RIGHT THICKNESS (in) =	0.202
GAP BETWEEN THE LEGS (in) =	0.980		

BOTTOM CHORD

LEFT HORZ LEG (in) =	2.016	RIGHT HORZ LEG (in) =	2.017
LEFT VER LEG (in) =	2.055	RIGHT VER LEG (in) =	2.060
LEFT THICKNESS (in) =	0.232	RIGHT THICKNESS (in) =	0.230
GAP BETWEEN THE LEGS (in) =	0.853		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.603	in^4	Iy =	2.356	in^4
rx =	0.621	in	ry =	1.227	in
A =	1.565	in^2	J =	0.022	in^2
x =	2.465	in	y =	0.600	in

BOTTOM CHORD

Ix =	0.707	in^4	Iy =	2.485	in^4
rx =	0.631	in	ry =	1.183	in
A =	1.775	in^2	J =	0.032	in^2
x =	2.439	in	y =	0.602	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 699.08 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 29.94 (in)	EFF. DEPTH	=	28.74	(in.)
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	=	1.38	(in)
BRIDGING SPACING	= 10.40 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	107.65	
KL/ry	= 101.71	KL/rx	=	38.66	
b/t RATIO	= 9.91	Q	=	1.00	
MEA. YIELD STR.	= 49.40 (ksi)	MEA. FAILURE LOAD	=	316.50	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.3	22.3	53.5	121.6	2.60
SJI	20.4	32.0	76.6	174.1	1.82
CONV	25.7	40.3	96.4	219.2	1.44

FIGURE I.2a COMPUTED ALLOWABLE LOADS, TEST 60/3/40-10E

TEST # 60/3/40-10W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.035	RIGHT HORZ LEG (in) =	2.005
LEFT VER LEG (in) =	1.971	RIGHT VER LEG (in) =	2.040
LEFT THICKNESS (in) =	0.211	RIGHT THICKNESS (in) =	0.203
GAP BETWEEN THE LEGS (in) =	0.932		

BOTTOM CHORD

LEFT HORZ LEG (in) =	2.005	RIGHT HORZ LEG (in) =	2.037
LEFT VER LEG (in) =	2.055	RIGHT VER LEG (in) =	2.063
LEFT THICKNESS (in) =	0.234	RIGHT THICKNESS (in) =	0.233
GAP BETWEEN THE LEGS (in) =	0.970		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.602	in^4	Iy =	2.350	in^4
rx =	0.617	in	ry =	1.219	in
A =	1.581	in^2	J =	0.023	in^2
x =	2.476	in	y =	0.542	in

BOTTOM CHORD

Ix =	0.716	in^4	Iy =	2.745	in^4
rx =	0.631	in	ry =	1.236	in
A =	1.796	in^2	J =	0.033	in^2
x =	2.499	in	y =	0.601	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 716.05 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 30.06 (in)	EFF. DEPTH	= 28.92	(in.)	
SPAN LENGTH	= 59.33 (ft)	DEF @ 100 plf	= 1.34	(in)	
BRIDGING SPACING	= 10.40 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 110.01		
KL/ry	= 102.35	KL/rx	= 38.90		
b/t RATIO	= 10.05	Q	= 1.00		
MEA. YIELD STR.	= 47.30 (ksi)	MEA. FAILURE LOAD	= 316.50	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	14.0	22.1	53.4	121.3	2.61
SJI	21.2	33.6	80.9	183.8	1.72
CONV	24.7	39.1	94.2	214.0	1.48

FIGURE I.2b COMPUTED ALLOWABLE LOADS, TEST 60/3/40-10W

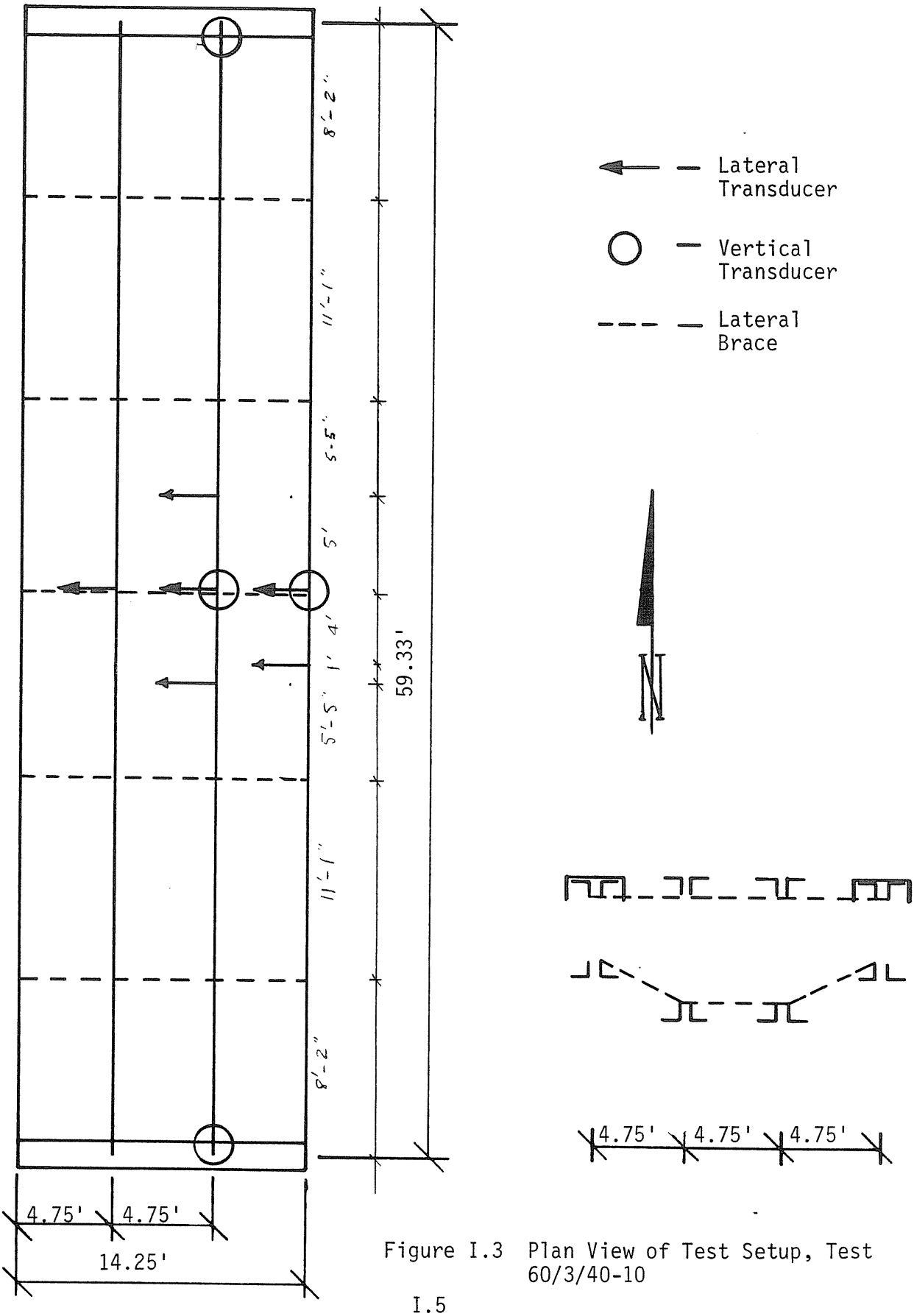


Figure I.3 Plan View of Test Setup, Test 60/3/40-10

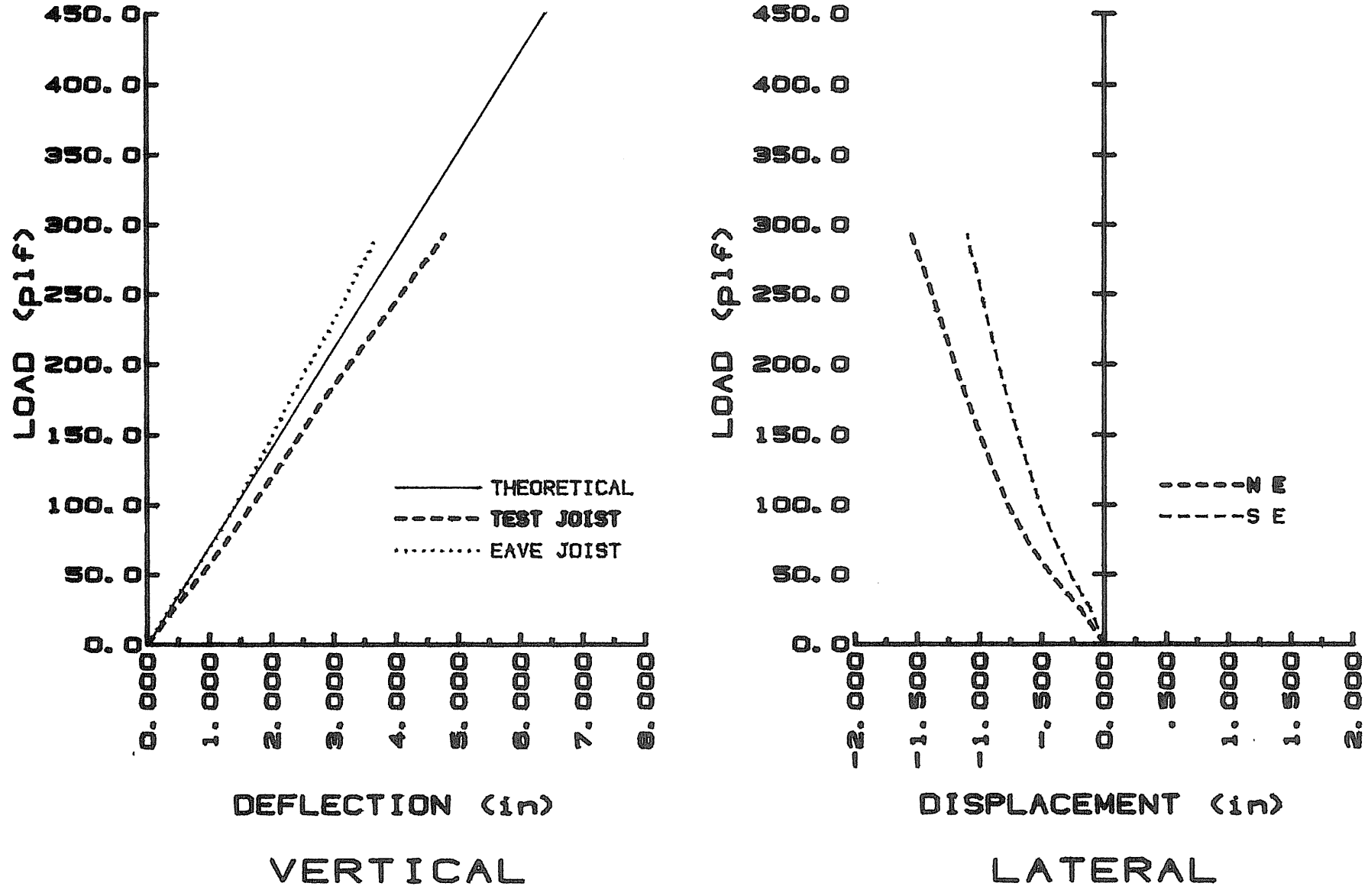


Figure I.4 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/40-22

JOIST DESCRIPTION:

Joist Type: 30H214 Load: 40 (psf)

Moment of Inertia: 678"^{4} Δ" @ 100 plf 1.462

Dead Load of Joist: 13.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 20.1 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 11 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-4'-4'4"-4'6"-5'6"-5'10"

Bottom Chord: 0'-8'-8'6"

Others: Panel attached to east channel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonal from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 215.8

2. Method: SJI Load: 248.7

3. Method: CONV. Load: 216.1

TEST RESULTS:

Failure Mode: Test was completed when an applied load of 391.67 plf was reached.

Applied Failure Load: 391.67 plf Total Failure Load: 411.8 plf

Load Factor (Failure Load/Service Load) 1. 1.91

2. 1.66

3. 1.91

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-There was 0.29 in. of residual vertical displacement.

Test 60/3/40-22

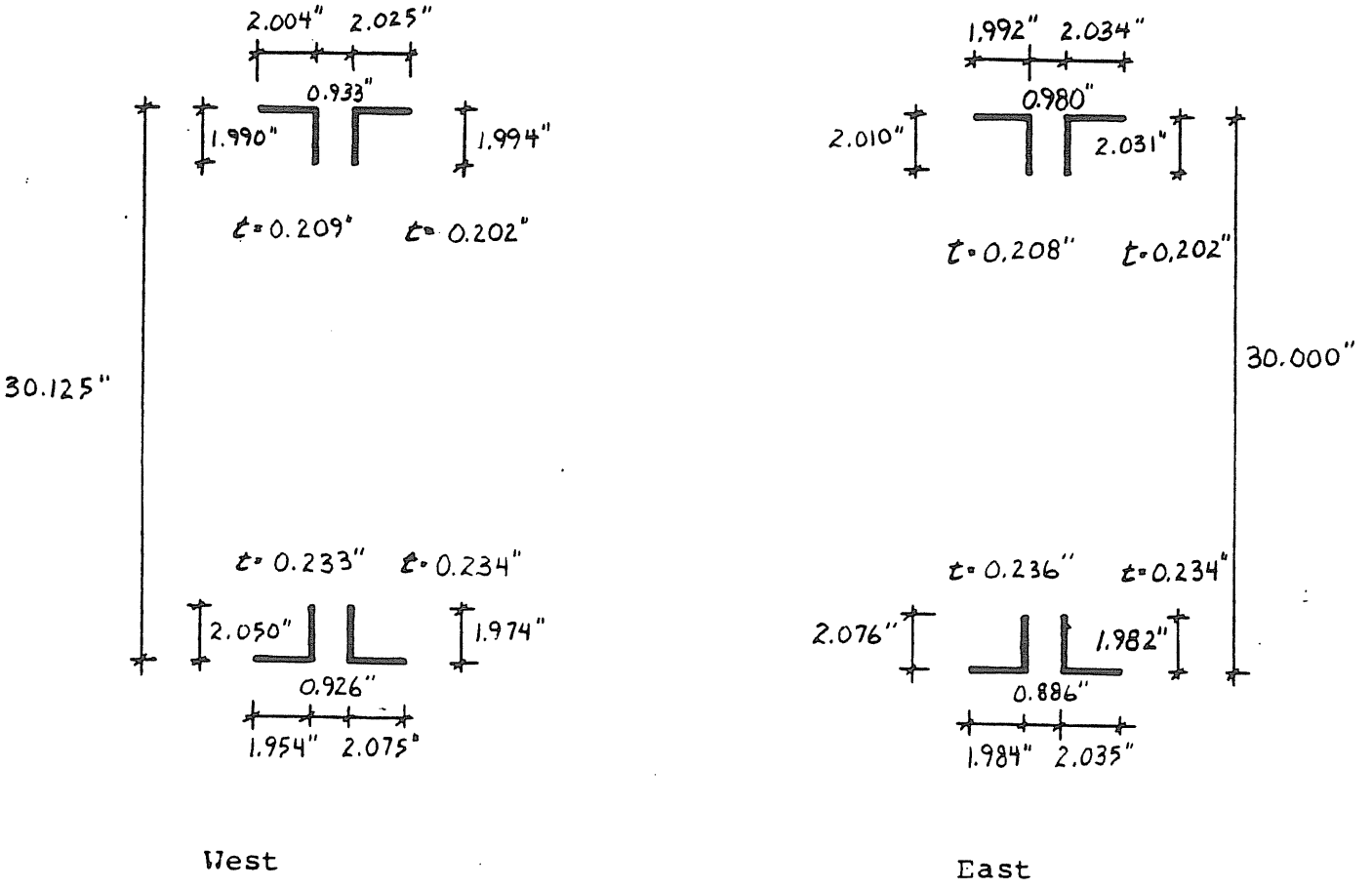


Figure I.5 Cross-Section Properties, Test 60/3/40-22

TEST # 60/3/40-22E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.992	RIGHT HORZ LEG (in) =	2.034
LEFT VER LEG (in) =	2.010	RIGHT VER LEG (in) =	2.031
LEFT THICKNESS (in) =	0.208	RIGHT THICKNESS (in) =	0.202

GAP BETWEEN THE LEGS (in) = 0.980

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.984	RIGHT HORZ LEG (in) =	2.035
LEFT VER LEG (in) =	2.076	RIGHT VER LEG (in) =	1.982
LEFT THICKNESS (in) =	0.236	RIGHT THICKNESS (in) =	0.234

GAP BETWEEN THE LEGS (in) = 0.886

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.607	in^4	Iy =	2.391	in^4
rx =	0.622	in	ry =	1.234	in
A =	1.569	in^2	J =	0.022	in^2
x =	2.481	in	y =	0.571	in

BOTTOM CHORD

Ix =	0.695	in^4	Iy =	2.567	in^4
rx =	0.623	in	ry =	1.198	in
A =	1.788	in^2	J =	0.033	in^2
x =	2.432	in	y =	0.643	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 705.58 (in^4)	# ROWS BRIDGING	= 11.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 28.79	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 1.41	(in)	
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 107.87		
KL/ry	= 38.89	KL/rx	= 38.60		
b/t RATIO	= 10.07	Q	= 1.00		
MEA. YIELD STR.	= 49.20 (ksi)	MEA. FAILURE LOAD	= 411.80	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	25.6	40.2	96.4	215.8	1.91
SJI	29.5	46.3	111.1	248.7	1.66
CONV	25.7	40.3	96.6	216.1	1.91

FIGURE I.6a COMPUTED ALLOWABLE LOADS, TEST 60/3/40-22E

TEST # 60/3/40-22W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.004	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	1.990	RIGHT VER LEG (in) =	1.994
LEFT THICKNESS (in) =	0.209	RIGHT THICKNESS (in) =	0.202

GAP BETWEEN THE LEGS (in) = 0.933

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.954	RIGHT HORZ LEG (in) =	2.075
LEFT VER LEG (in) =	2.050	RIGHT VER LEG (in) =	1.974
LEFT THICKNESS (in) =	0.233	RIGHT THICKNESS (in) =	0.234

GAP BETWEEN THE LEGS (in) = 0.926

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.584	in^4	Iy =	2.318	in^4
rx =	0.612	in	ry =	1.218	in
A =	1.562	in^2	J =	0.022	in^2
x =	2.459	in	y =	0.569	in

BOTTOM CHORD

Ix =	0.673	in^4	Iy =	2.637	in^4
rx =	0.616	in	ry =	1.220	in
A =	1.771	in^2	J =	0.032	in^2
x =	2.453	in	y =	0.627	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 706.94 (in^4)	# ROWS BRIDGING	= 11.00		
JOIST DEPTH	= 30.13 (in)	EFF. DEPTH	= 28.93	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 1.40	(in)	
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 109.55		
KL/ry	= 39.40	KL/rx	= 39.25		
b/t RATIO	= 10.02	Q	= 1.00		
MEA. YIELD STR.	= 47.70 (ksi)	MEA. FAILURE LOAD	= 411.80	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	24.8	38.8	93.6	209.4	1.97
SJI	28.6	44.7	107.8	241.2	1.71
CONV	24.9	38.8	93.6	209.5	1.97

FIGURE I.6b COMPUTED ALLOWABLE LOADS, TEST 60/3/40-22W

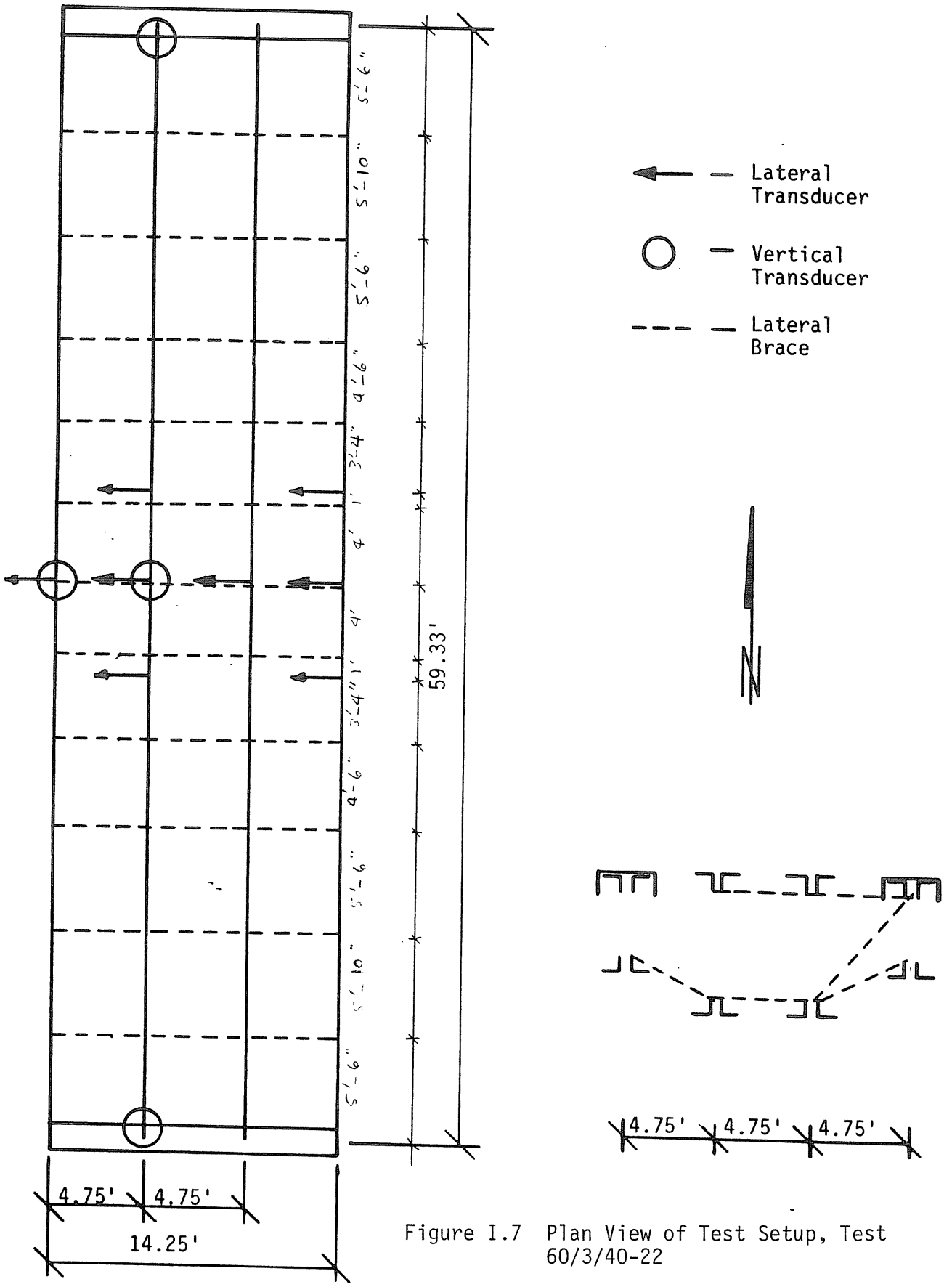
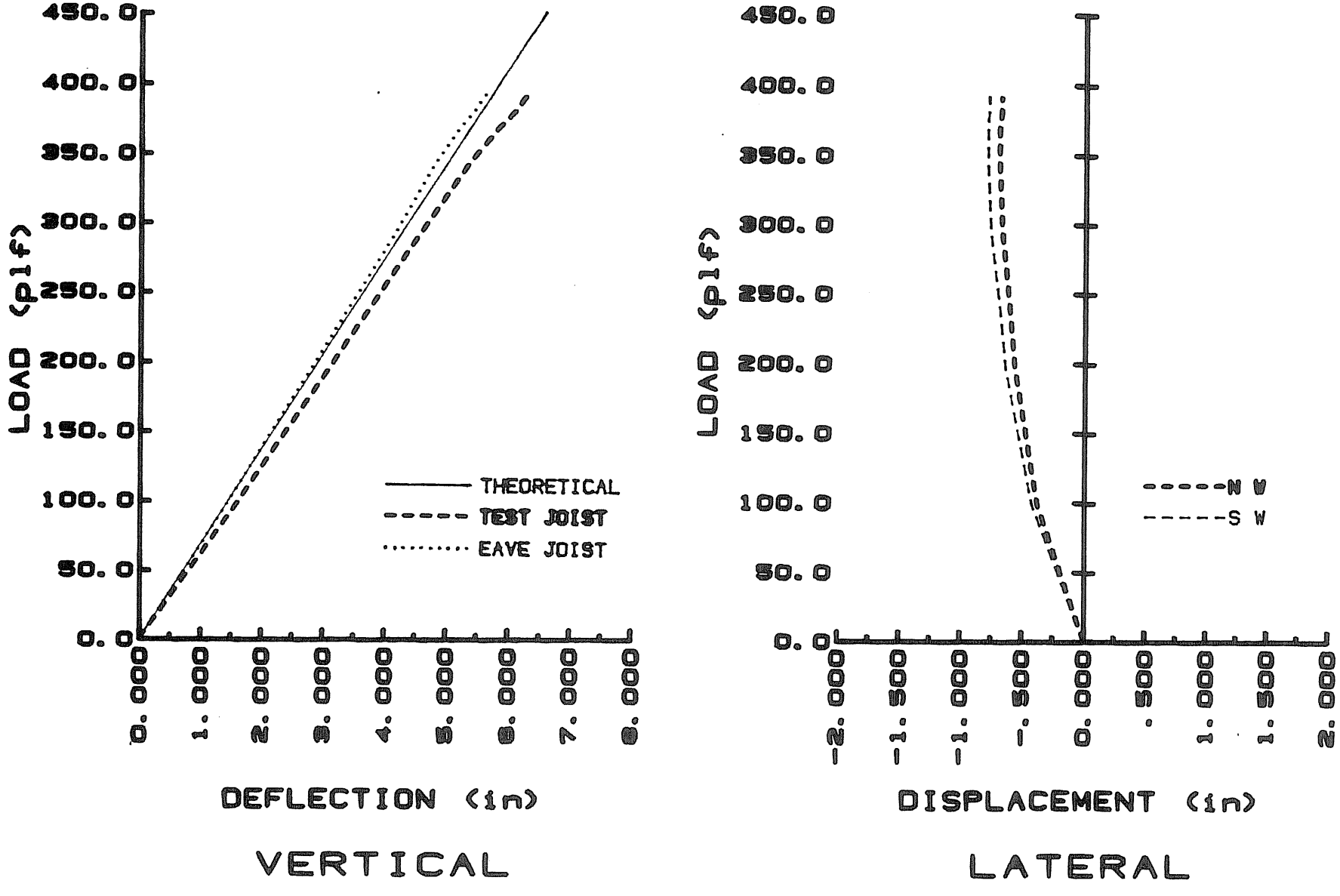


Figure I.7 Plan View of Test Setup, Test 60/3/40-22



60/3/40-22

Figure I.8 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/40-23

JOIST DESCRIPTION:

Joist Type: 30H214 Load: 40 (psf)

Moment of Inertia: 678"^{4} Δ" @ 100 plf 1.462

Dead Load of Joist: 13.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 20.1 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 10 Bottom Chord: 5

Bridging Spacing:

Top Chord: -2'-4'1"-4'2"-4'7"-5'7"

Bottom Chord: 0'-8'-8'6"

Others: Panel was attached to channel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 215.8

2. Method: SJI Load: 248.7

3. Method: CONV. Load: 216.1

TEST RESULTS:

Failure Mode: Top chord lateral buckling at centerline of both joists.

Applied Failure Load: 379.2 plf Total Failure Load: 399.3 plf

Load Factor (Failure Load/Service Load) 1. 1.85

2. 1.61

3. 1.85

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

Test 60/3/40-23

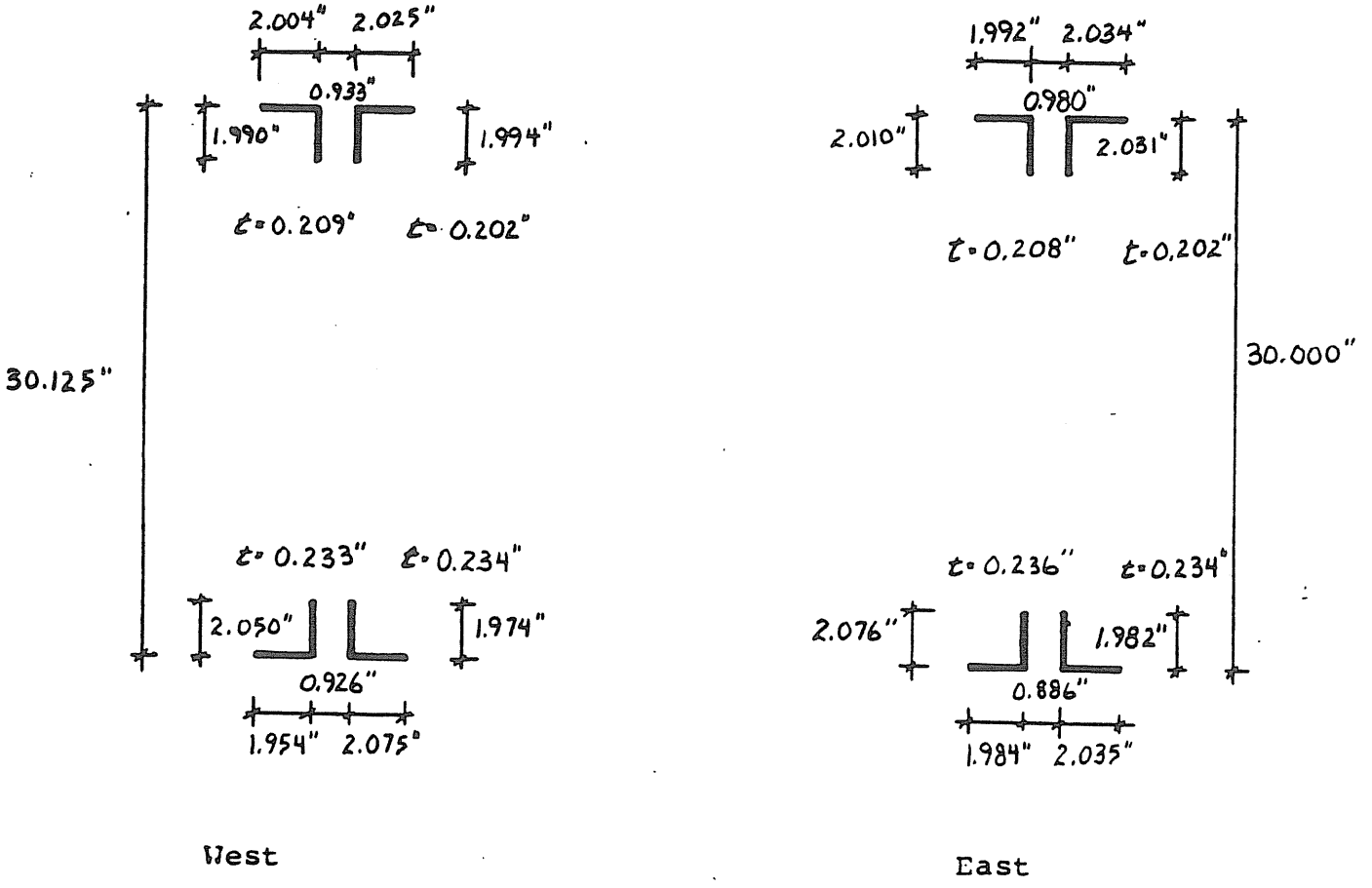


Figure I.9 Cross-Section Properties, Test 60/3/40-23

TEST # 60/3/40-23E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.992	RIGHT HORZ LEG (in) =	2.034
LEFT VER LEG (in) =	2.010	RIGHT VER LEG (in) =	2.031
LEFT THICKNESS (in) =	0.208	RIGHT THICKNESS (in) =	0.202
GAP BETWEEN THE LEGS (in) =	0.980		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.984	RIGHT HORZ LEG (in) =	2.035
LEFT VER LEG (in) =	2.076	RIGHT VER LEG (in) =	1.982
LEFT THICKNESS (in) =	0.236	RIGHT THICKNESS (in) =	0.234
GAP BETWEEN THE LEGS (in) =	0.886		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.607	in^4	Iy =	2.391	in^4
rx =	0.622	in	ry =	1.234	in
A =	1.569	in^2	J =	0.022	in^2
x =	2.481	in	y =	0.571	in

BOTTOM CHORD

Ix =	0.695	in^4	Iy =	2.567	in^4
rx =	0.623	in	ry =	1.198	in
A =	1.788	in^2	J =	0.033	in^2
x =	2.432	in	y =	0.643	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 705.58 (in^4)	# ROWS BRIDGING	= 10.00		
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	= 28.79	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 1.41	(in)	
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 107.87		
KL/ry	= 38.89	KL/rx	= 38.60		
b/t RATIO	= 10.07	Q	= 1.00		
MEA. YIELD STR.	= 49.20 (ksi)	MEA. FAILURE LOAD	= 399.30	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	25.6	40.2	96.4	215.8	1.85
SJI .	29.5	46.3	111.1	248.7	1.61
CONV	25.7	40.3	96.6	216.1	1.85

FIGURE I.10a COMPUTED ALLOWABLE LOADS, TEST 60/3/40-23E

TEST # 60/3/40-23W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.004	RIGHT HORZ LEG (in) =	2.025
LEFT VER LEG (in) =	1.990	RIGHT VER LEG (in) =	1.994
LEFT THICKNESS (in) =	0.209	RIGHT THICKNESS (in) =	0.202
GAP BETWEEN THE LEGS (in) =	0.933		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.954	RIGHT HORZ LEG (in) =	2.075
LEFT VER LEG (in) =	2.050	RIGHT VER LEG (in) =	1.974
LEFT THICKNESS (in) =	0.233	RIGHT THICKNESS (in) =	0.234
GAP BETWEEN THE LEGS (in) =	0.926		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.584	in^4	Iy =	2.318	in^4
rx =	0.612	in	ry =	1.218	in
A =	1.562	in^2	J =	0.022	in^2
x =	2.459	in	y =	0.569	in

BOTTOM CHORD

Ix =	0.673	in^4	Iy =	2.637	in^4
rx =	0.616	in	ry =	1.220	in
A =	1.771	in^2	J =	0.032	in^2
x =	2.453	in	y =	0.627	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Isross	= 706.94 (in^4)	# ROWS BRIDGING	= 10.00		
JOIST DEPTH	= 30.13 (in)	EFF. DEPTH	= 28.93	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 1.40	(in)	
BRIDGING SPACING	= 4.00 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 109.55		
KL/ry	= 39.40	KL/rx	= 39.25		
b/t RATIO	= 10.02	Q	= 1.00		
MEA. YIELD STR.	= 47.70 (ksi)	MEA. FAILURE LOAD	= 399.30	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	24.8	38.8	93.6	209.4	1.91
SJI	28.6	44.7	107.8	241.2	1.66
CONV	24.9	38.8	93.6	209.5	1.91

FIGURE I.10b COMPUTED ALLOWABLE LOADS, TEST 60/3/40-23W

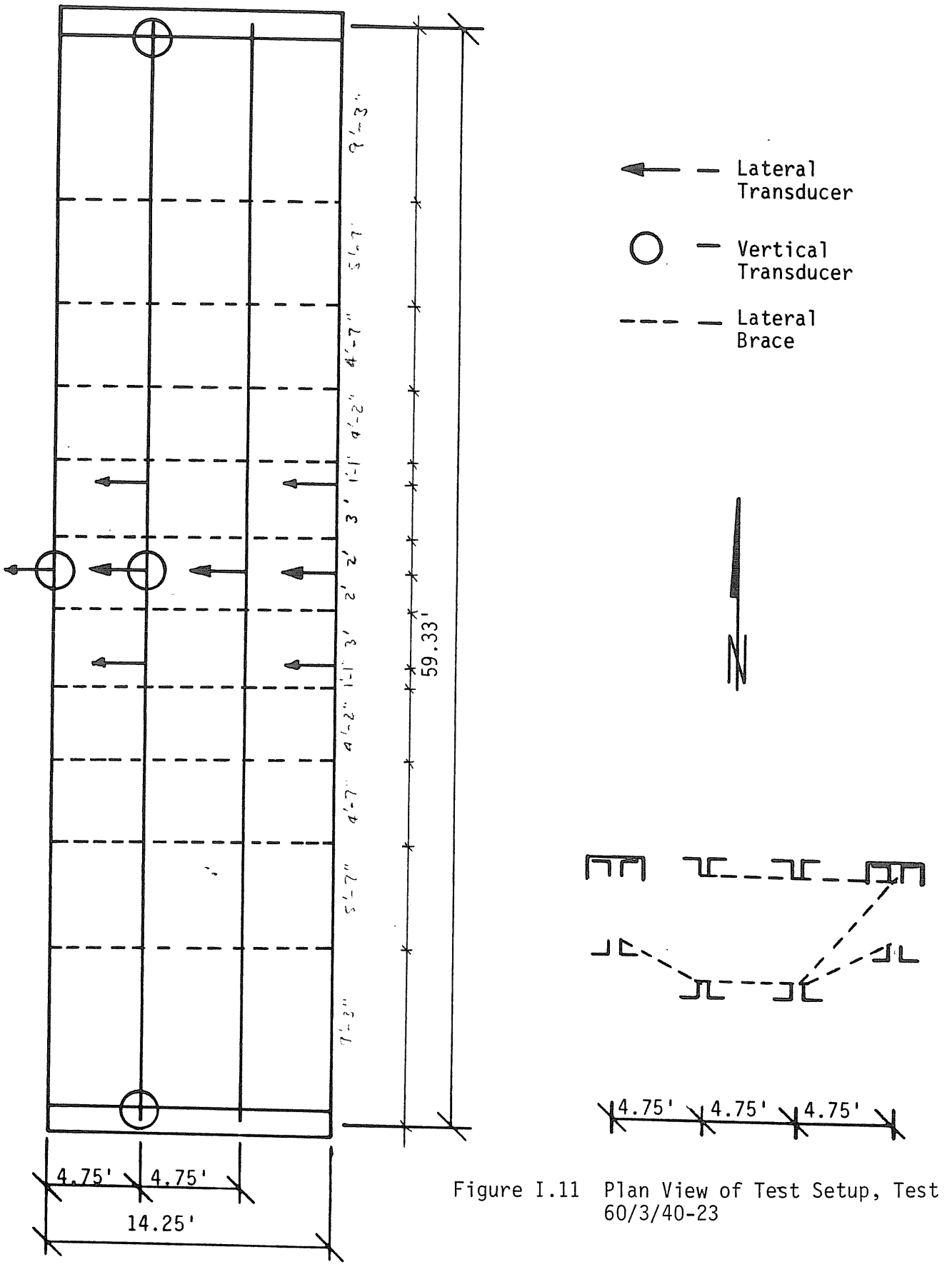
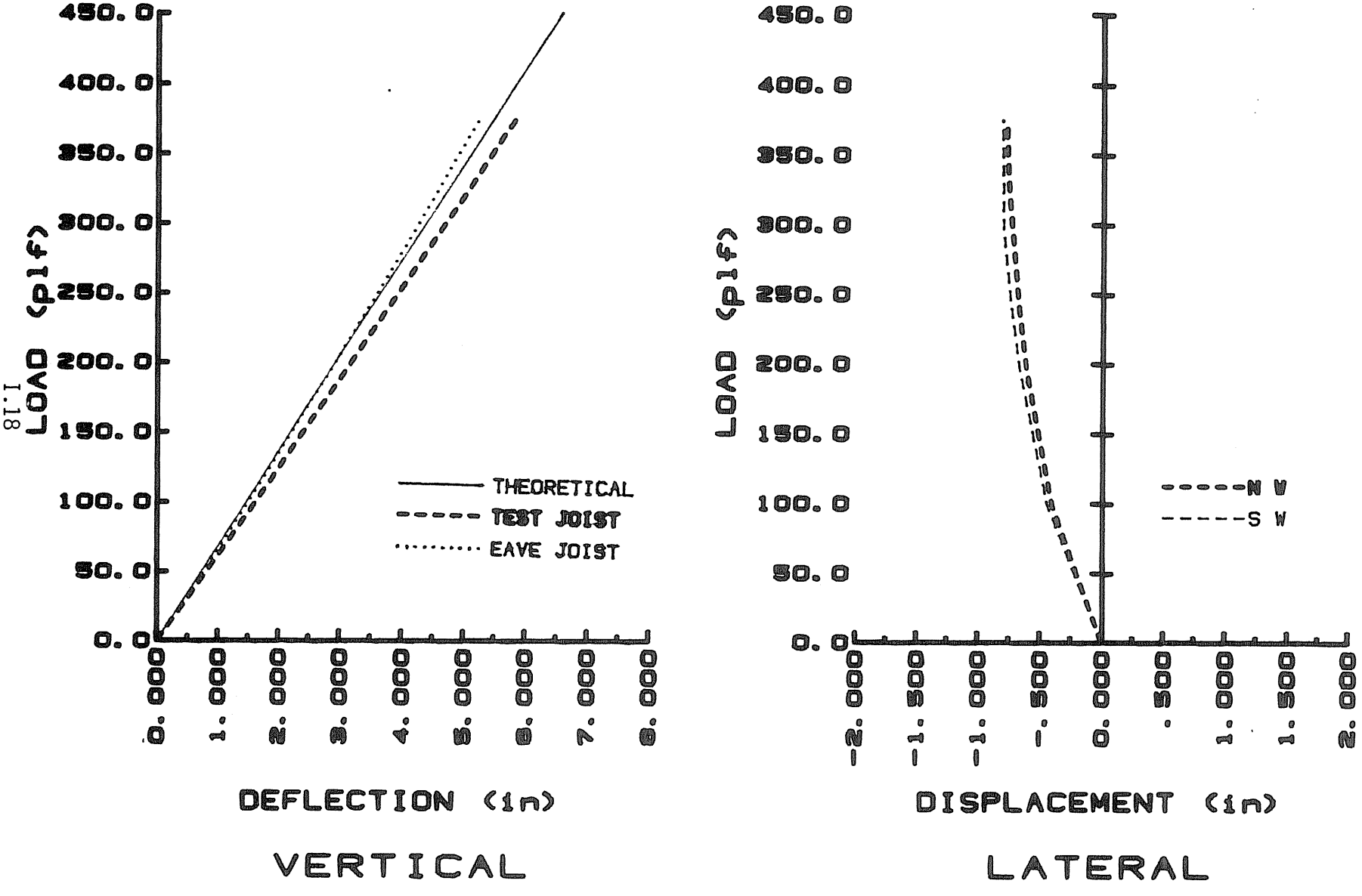


Figure I.11 Plan View of Test Setup, Test 60/3/40-23



60/3/40-23

Figure I.12 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/40-24

JOIST DESCRIPTION:

Joist Type: 30H214 Load: 40 (psf)

Moment of Inertia: 678"^{4} Δ" @ 100 plf 1.462

Dead Load of Joist: 13.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 20.1 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-7'8"-8'10"

Bottom Chord: 0'-7'8"-8'10"

Others: Panel attached to channel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1 Method: AISC Load: 162.4

2 Method: SJI Load: 241.8

3 Method: CONV. Load: 209.9

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. south of midspan. (East joist).

Applied Failure Load: 286.5 plf Total Failure Load: 306.6 plf

Load Factor (Failure Load/Service Load) 1. 1.89

2. 1.27

3. 1.46

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-Lateral displacement of west joist 4' north and south of midspan moved together.

Test 60/3/40-24

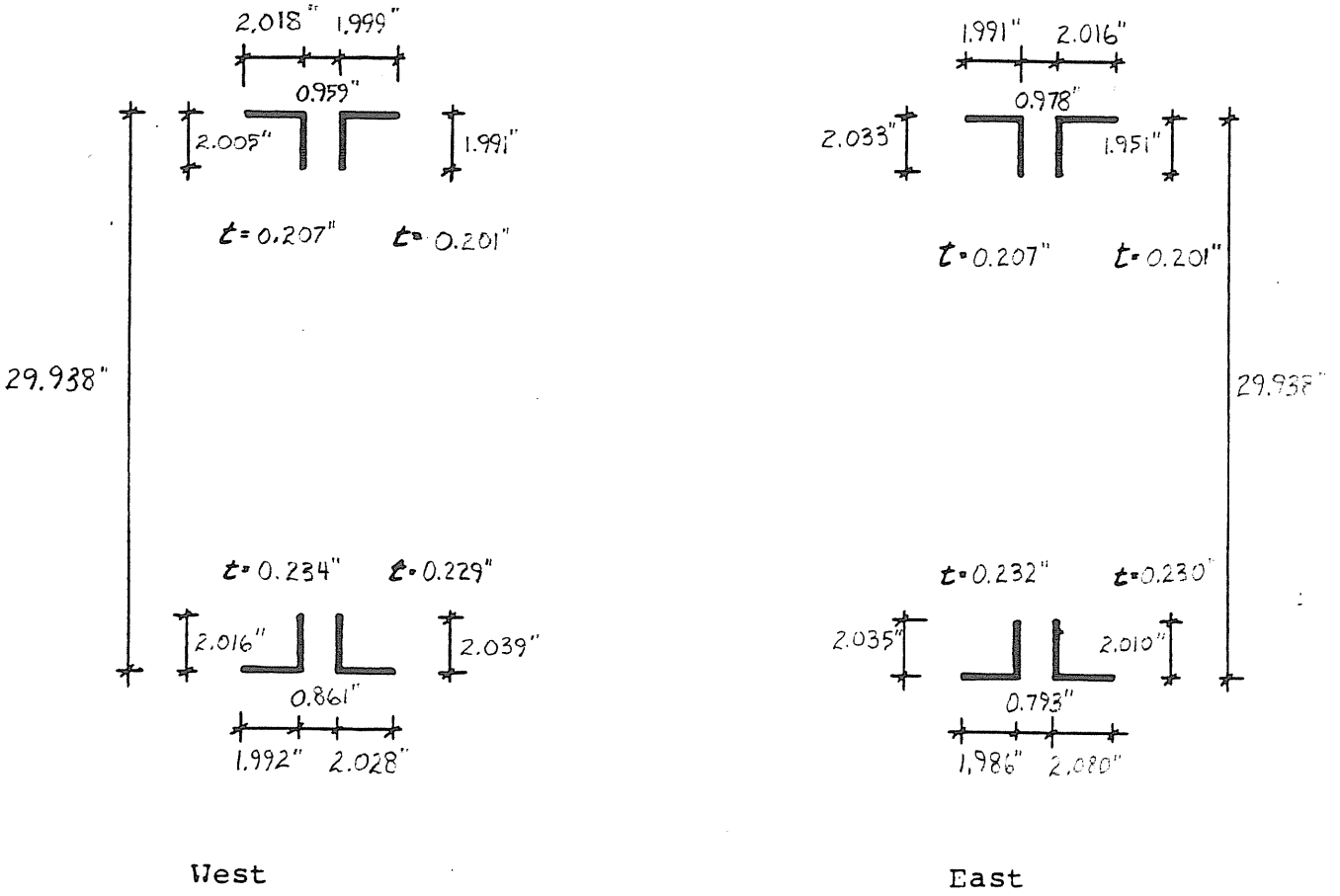


Figure I.13 Cross-Section Properties, Test 60/3/40-24

TEST # 60/3/40-24E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.991	RIGHT HORZ LEG (in) =	2.016
LEFT VER LEG (in) =	2.033	RIGHT VER LEG (in) =	1.951
LEFT THICKNESS (in) =	0.207	RIGHT THICKNESS (in) =	0.201
GAP BETWEEN THE LEGS (in) =	0.978		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.986	RIGHT HORZ LEG (in) =	2.080
LEFT VER LEG (in) =	2.035	RIGHT VER LEG (in) =	2.010
LEFT THICKNESS (in) =	0.232	RIGHT THICKNESS (in) =	0.230
GAP BETWEEN THE LEGS (in) =	0.793		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.584	in^4	Iy =	2.347	in^4
rx =	0.614	in	ry =	1.232	in
A =	1.547	in^2	J =	0.021	in^2
x =	2.466	in	y =	0.612	in

BOTTOM CHORD

Ix =	0.676	in^4	Iy =	2.420	in^4
rx =	0.618	in	ry =	1.170	in
A =	1.767	in^2	J =	0.031	in^2
x =	2.406	in	y =	0.602	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 693.92 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 29.94 (in)	EFF. DEPTH	=	28.73	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	1.43	(in)
BRIDGING SPACING	= 7.70 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00		=	108.75	
KL/ry	= 75.02	KL/rx	=	39.08	
b/t RATIO	= 10.03	Q	=	1.00	
MEA. YIELD STR.	= 48.40 (ksi)	MEA. FAILURE LOAD	=	306.60	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	19.6	30.3	72.5	162.2	1.89
SJI	29.0	44.9	107.5	240.7	1.27
CONV	25.2	39.0	93.4	209.0	1.47

FIGURE I.14a COMPUTED ALLOWABLE LOADS, TEST 60/3/40-24E

TEST # 60/3/40-24W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.018	RIGHT HORZ LEG (in) =	1.999
LEFT VER LEG (in) =	2.005	RIGHT VER LEG (in) =	1.991
LEFT THICKNESS (in) =	0.207	RIGHT THICKNESS (in) =	0.201

GAP BETWEEN THE LEGS (in) = 0.959

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.992	RIGHT HORZ LEG (in) =	2.028
LEFT VER LEG (in) =	2.016	RIGHT VER LEG (in) =	2.039
LEFT THICKNESS (in) =	0.234	RIGHT THICKNESS (in) =	0.229

GAP BETWEEN THE LEGS (in) = 0.861

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.585	in^4	Iy =	2.329	in^4
rx =	0.614	in	ry =	1.225	in
A =	1.552	in^2	J =	0.022	in^2
x =	2.474	in	y =	0.580	in

BOTTOM CHORD

Ix =	0.679	in^4	Iy =	2.483	in^4
rx =	0.621	in	ry =	1.187	in
A =	1.762	in^2	J =	0.031	in^2
x =	2.424	in	y =	0.583	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Isgross	= 695.47 (in^4)	# ROWS BRIDGING	= 5.00		
JOIST DEPTH	= 29.94 (in)	EFF. DEPTH	= 28.78	(in.)	
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	= 1.43	(in)	
BRIDGING SPACING	= 7.70 (ft)	PANEL LENGTH	= 24.00	(in)	
K	= 1.00	C	= 108.20		
KL/ry	= 75.41	KL/rx	= 39.08		
b/t RATIO	= 9.95	Q	= 1.00		
MEA. YIELD STR.	= 48.90 (ksi)	MEA. FAILURE LOAD	= 306.60	(plf)	

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	19.6	30.5	73.0	163.5	1.88
SJI	29.3	45.5	109.2	244.3	1.26
CONV	25.4	39.5	94.7	211.9	1.45

FIGURE I.14b COMPUTED ALLOWABLE LOADS, TEST 60/3/40-24W

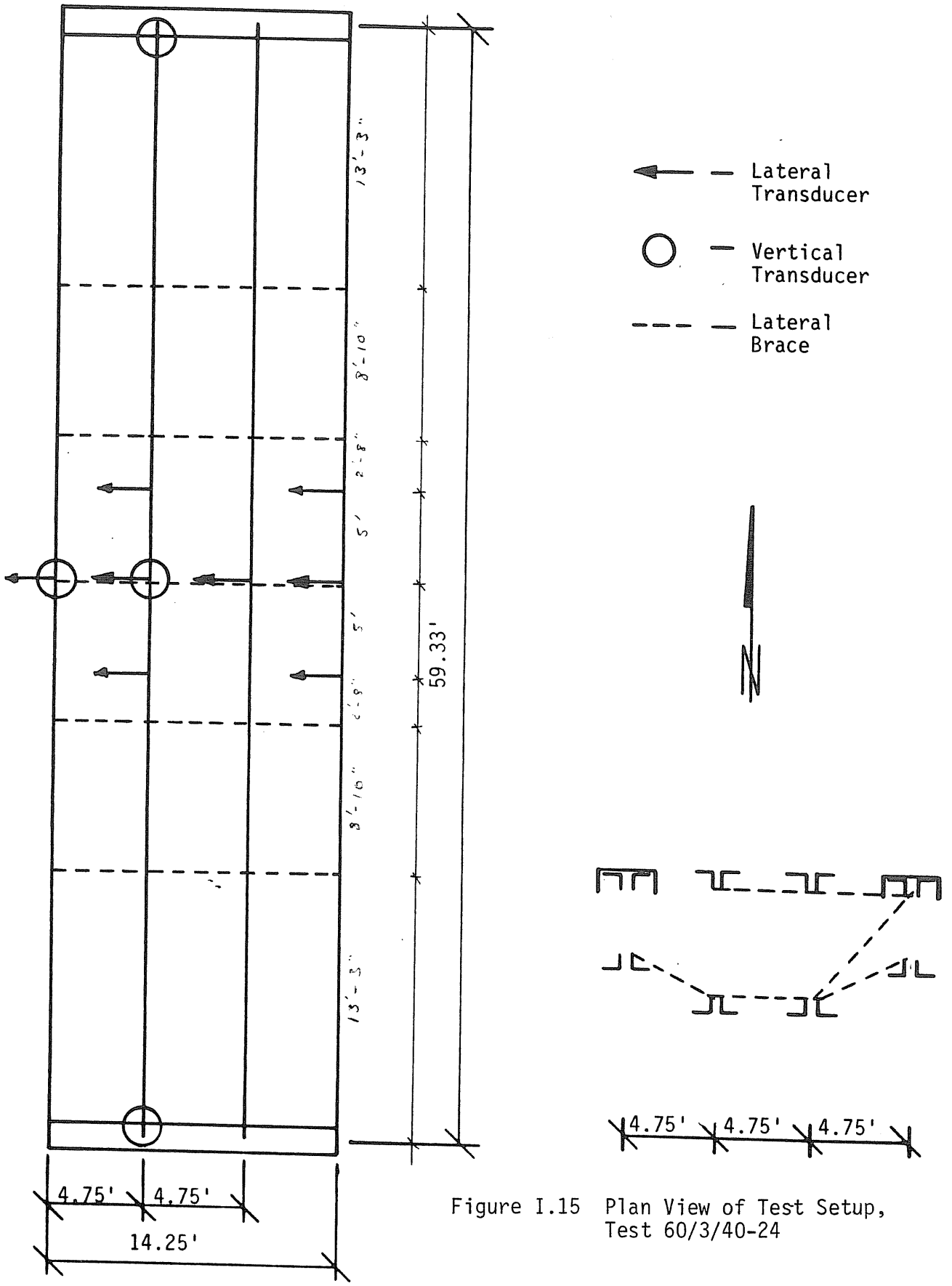
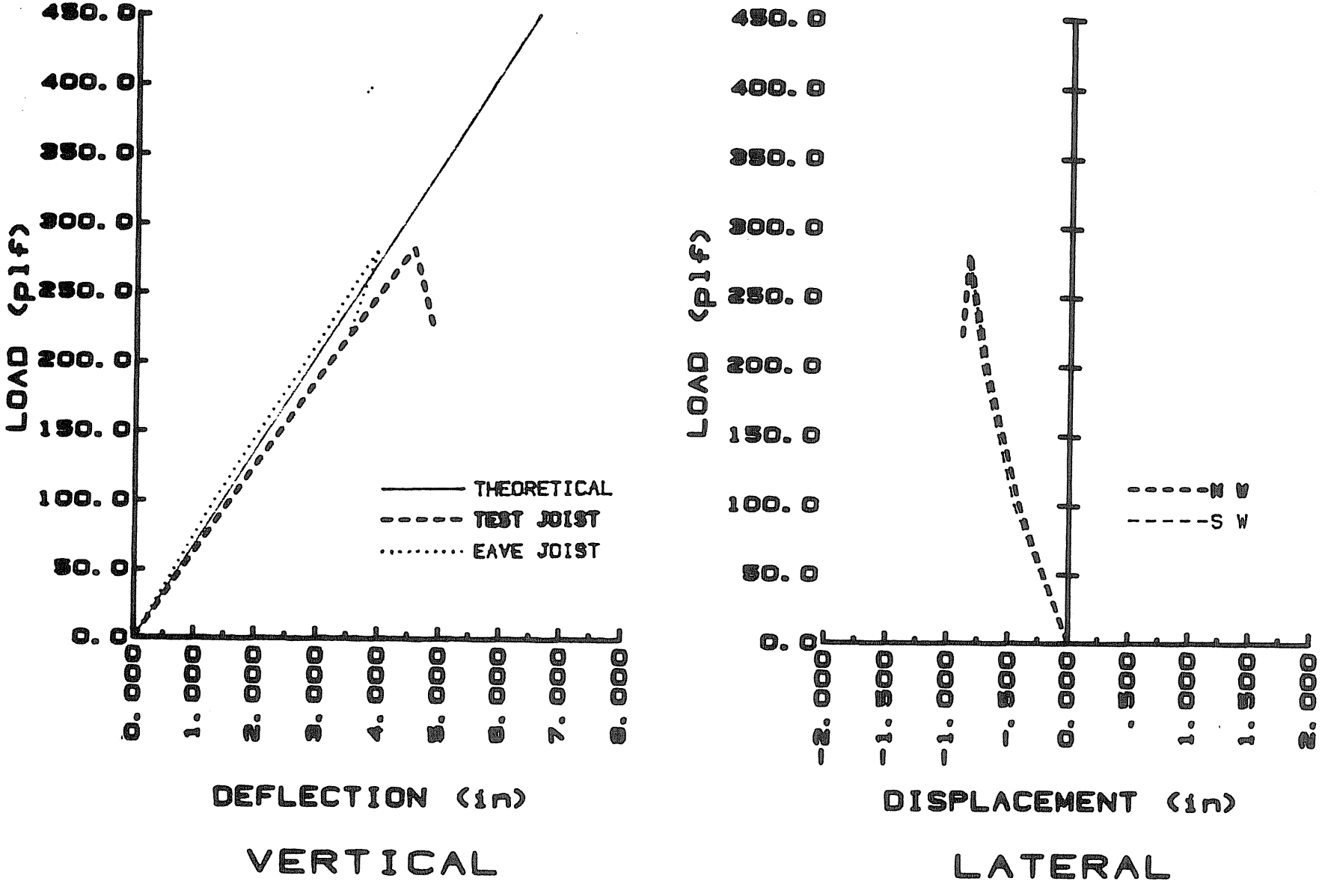


Figure I.15 Plan View of Test Setup, Test 60/3/40-24



60/3/40-24

Figure I.16 Applied Load vs. Vertical and Lateral Displacements

Test No. 60/3/40-25

JOIST DESCRIPTION:

Joist Type: 30H214 Load: 40 (psf)

Moment of Inertia: 678"^{4} Δ" @ 100 plf 1.462

Dead Load of Joist: 13.8 plf Dead Load of Panel: 6.3 plf

Total Dead Load: 20.1 plf

TEST PARAMETERS:

Span Length: 59.79' Spacing: 4.75'

Clip Type: 3" w/ RIS Bridge Insulation No

Number of Rows of Bridging:

Top Chord: 5 Bottom Chord: 5

Bridging Spacing:

Top Chord: 0'-7'8"-8'10"

Bottom Chord: 0'-7'8"-8'10"

Others: Panel was attached to chanel. Large channel at east (c8x11.5). Top chord bridging to east only. Diagonals from bottom of east joist to top of outside joist.

CALCULATED SERVICE LOADS:

1. Method: AISC Load: 166.4
2. Method: SJI Load: 245.5
3. Method: CONV. Load: 213.0

TEST RESULTS:

Failure Mode: Top chord lateral buckling 4 ft. north of centerline. (Both joists).

Applied Failure Load: 289.0 plf Total Failure Load: 309.1 plf

Load Factor (Failure Load/Service Load) 1. 1.86

2. 1.26

3. 1.45

DISCUSSION:

-Load deflection plot was in good agreement with predicted.

-Lateral displacement of west joist 4 ft. north and south of centerline moved in different directions after about 250 plf.

Test 60/3/40-25

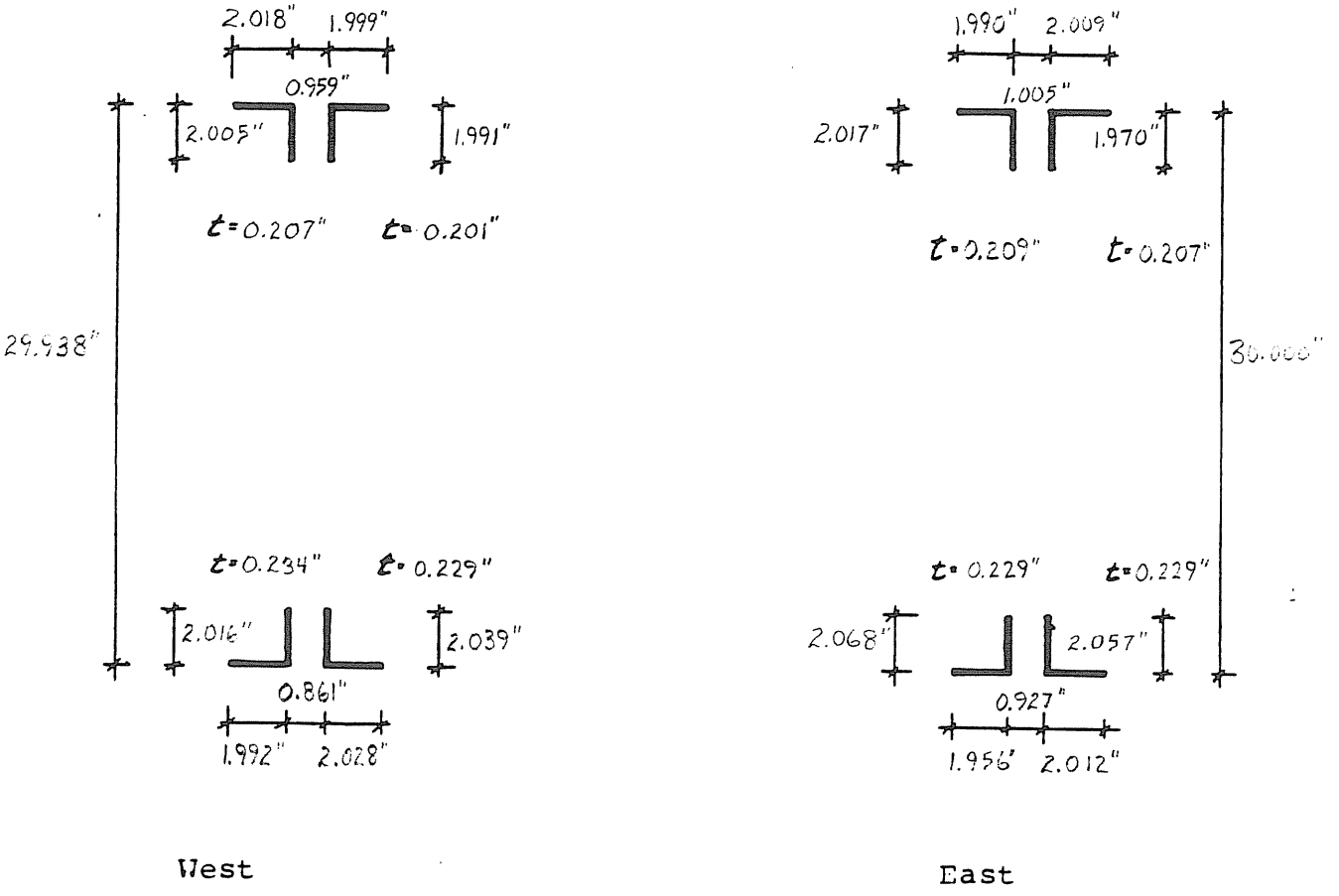


Figure I.17 Cross-Section Properties, Test 60/3/40-25

TEST # 60/3/40-25E

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	1.990	RIGHT HORZ LEG (in) =	2.009
LEFT VER LEG (in) =	2.017	RIGHT VER LEG (in) =	1.970
LEFT THICKNESS (in) =	0.209	RIGHT THICKNESS (in) =	0.207
GAP BETWEEN THE LEGS (in) =	1.005		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.956	RIGHT HORZ LEG (in) =	2.012
LEFT VER LEG (in) =	2.068	RIGHT VER LEG (in) =	2.057
LEFT THICKNESS (in) =	0.229	RIGHT THICKNESS (in) =	0.229
GAP BETWEEN THE LEGS (in) =	0.927		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.591	in^4	Iy =	2.430	in^4
rx =	0.613	in	ry =	1.242	in
A =	1.575	in^2	J =	0.023	in^2
x =	2.490	in	y =	0.598	in

BOTTOM CHORD

Ix =	0.703	in^4	Iy =	2.508	in^4
rx =	0.634	in	ry =	1.198	in
A =	1.748	in^2	J =	0.031	in^2
x =	2.437	in	y =	0.615	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 695.38 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 30.00 (in)	EFF. DEPTH	=	28.79	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	1.43	(in)
BRIDGING SPACING	= 7.70 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	108.75	
KL/ry	= 74.38	KL/rx	=	39.16	
b/t RATIO	= 9.71	Q	=	1.00	
MEA. YIELD STR.	= 48.40 (ksi)	MEA. FAILURE LOAD	=	309.10	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	19.7	31.0	74.4	166.4	1.86
SJI	29.0	45.7	109.7	245.5	1.26
CONV	25.2	39.7	95.2	213.0	1.45

FIGURE I.18a COMPUTED ALLOWABLE LOADS, TEST 60/3/40-25E

TEST # 60/3/40-25W

MEASURED DIMENSIONS

TOP CHORD

LEFT HORZ LEG (in) =	2.018	RIGHT HORZ LEG (in) =	1.999
LEFT VER LEG (in) =	2.005	RIGHT VER LEG (in) =	1.991
LEFT THICKNESS (in) =	0.207	RIGHT THICKNESS (in) =	0.201
GAP BETWEEN THE LEGS (in) =	0.959		

BOTTOM CHORD

LEFT HORZ LEG (in) =	1.992	RIGHT HORZ LEG (in) =	2.028
LEFT VER LEG (in) =	2.016	RIGHT VER LEG (in) =	2.039
LEFT THICKNESS (in) =	0.234	RIGHT THICKNESS (in) =	0.229
GAP BETWEEN THE LEGS (in) =	0.861		

COMPUTED SECTION PROPERTIES

TOP CHORD

Ix =	0.585	in^4	Iy =	2.329	in^4
rx =	0.614	in	ry =	1.225	in
A =	1.552	in^2	J =	0.022	in^2
x =	2.474	in	y =	0.580	in

BOTTOM CHORD

Ix =	0.679	in^4	Iy =	2.483	in^4
rx =	0.621	in	ry =	1.187	in
A =	1.762	in^2	J =	0.031	in^2
x =	2.424	in	y =	0.583	in

x bar and y bar are measured from the tip of the left horz.

RESULTS OF LAST ANALYSIS

Igross	= 695.47 (in^4)	# ROWS BRIDGING	=	5.00	
JOIST DEPTH	= 29.94 (in)	EFF. DEPTH	=	28.78	(in.)
SPAN LENGTH	= 59.79 (ft)	DEF @ 100 plf	=	1.43	(in)
BRIDGING SPACING	= 7.70 (ft)	PANEL LENGTH	=	24.00	(in)
K	= 1.00	C	=	108.20	
KL/ry	= 75.41	KL/rx	=	39.08	
b/t RATIO	= 9.95	Q	=	1.00	
MEA. YIELD STR.	= 48.90 (ksi)	MEA. FAILURE LOAD	=	309.10	(plf)

METHOD	Fa ksi	Pa kip	Ma k-ft	Wa plf	LOAD FACTOR
AISC	19.6	30.5	73.0	163.5	1.89
SJI	29.3	45.5	109.2	244.3	1.27
CONV	25.4	39.5	94.7	211.9	1.46

FIGURE I.18b COMPUTED ALLOWABLE LOADS, TEST 60/3/40-25W

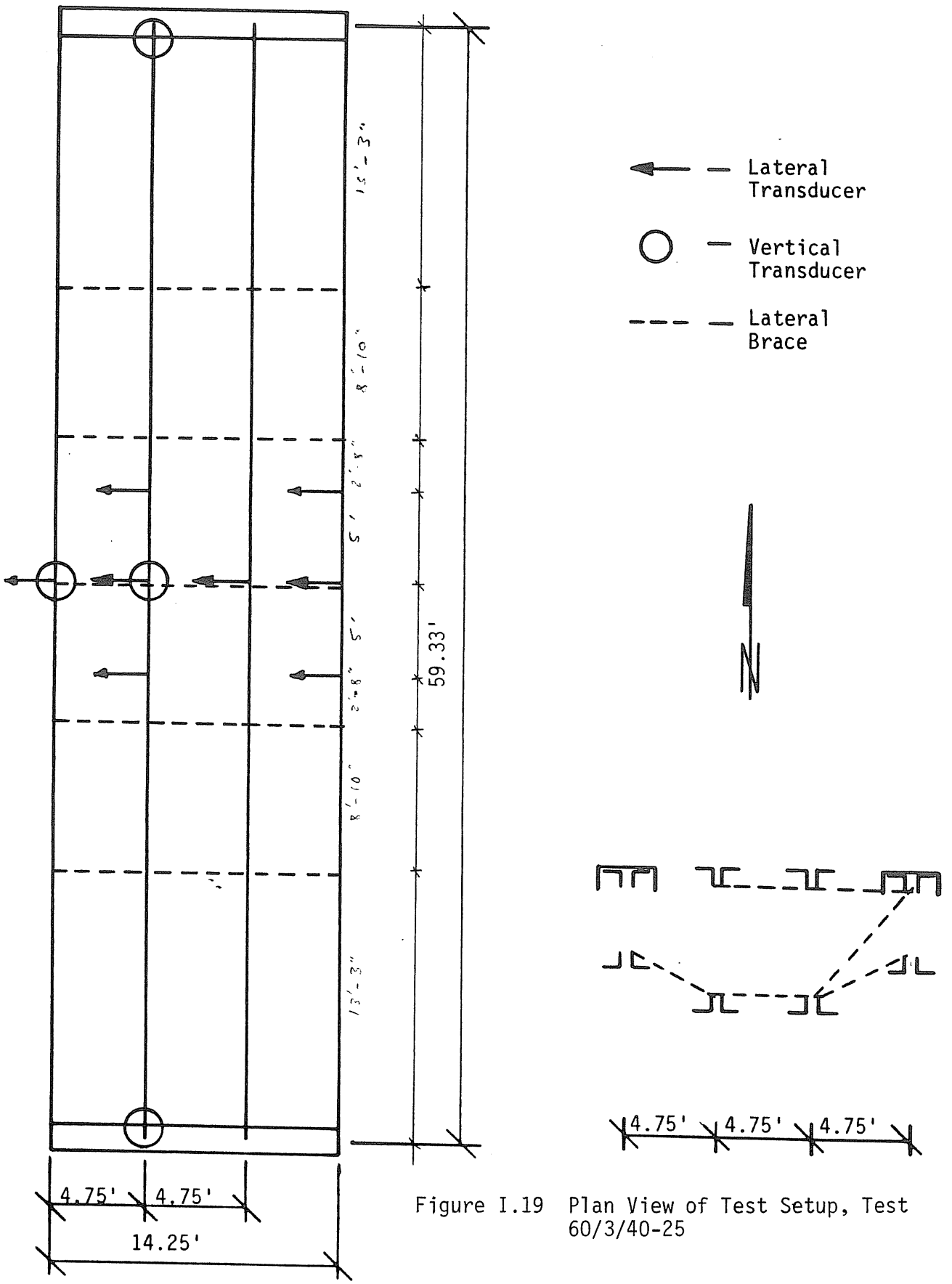
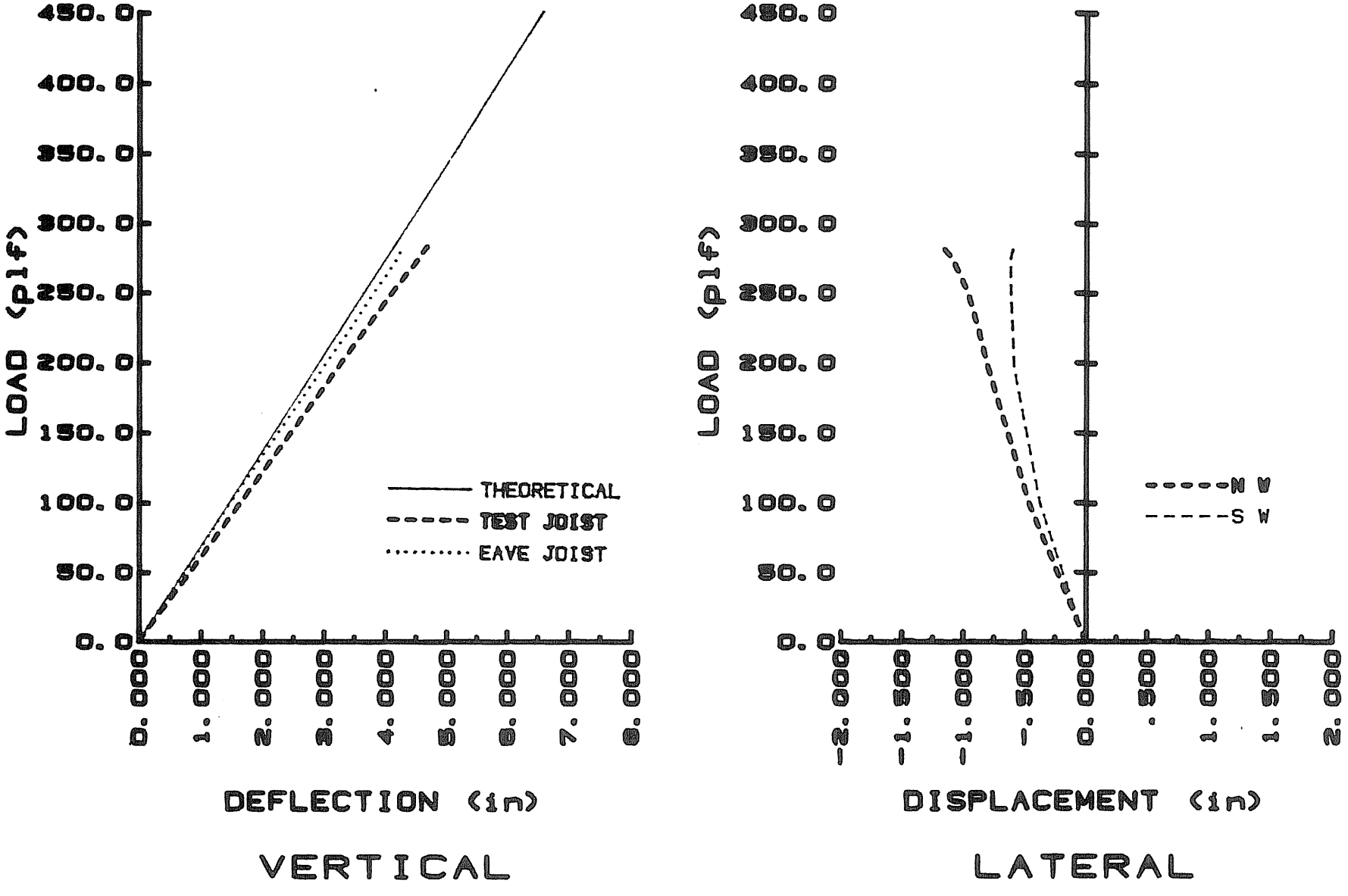


Figure I.19 Plan View of Test Setup, Test 60/3/40-25



60/3/40-25

Figure I.20 Applied Load vs. Vertical and Lateral Displacements

APPENDIX J

CONNECTION RESTRAINT TEST RESULTS

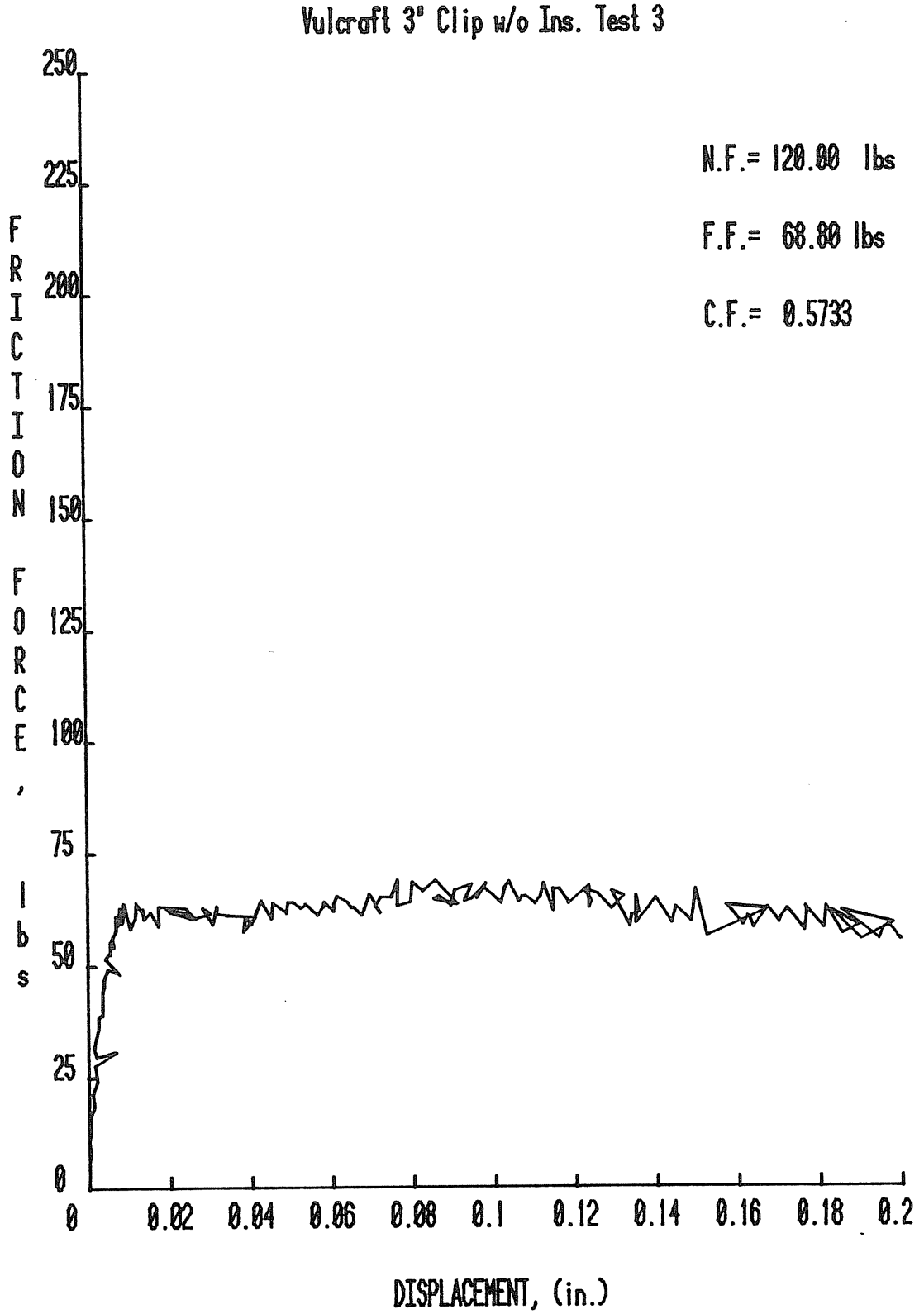


Figure J.1 3 in. Clip without Insulation, 12 psf

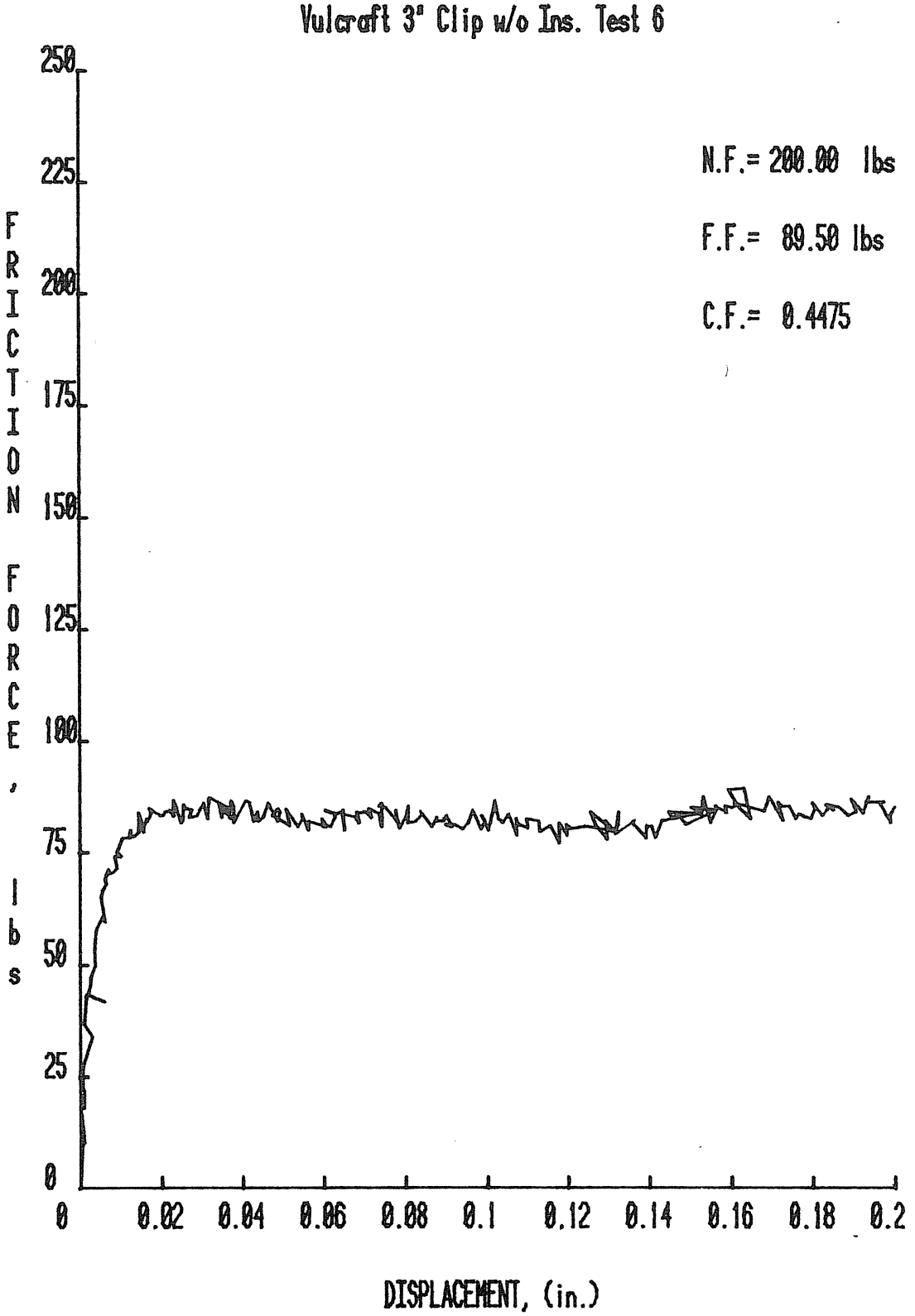


Figure J.2 3 in. Clip without Insulation, 20 psf

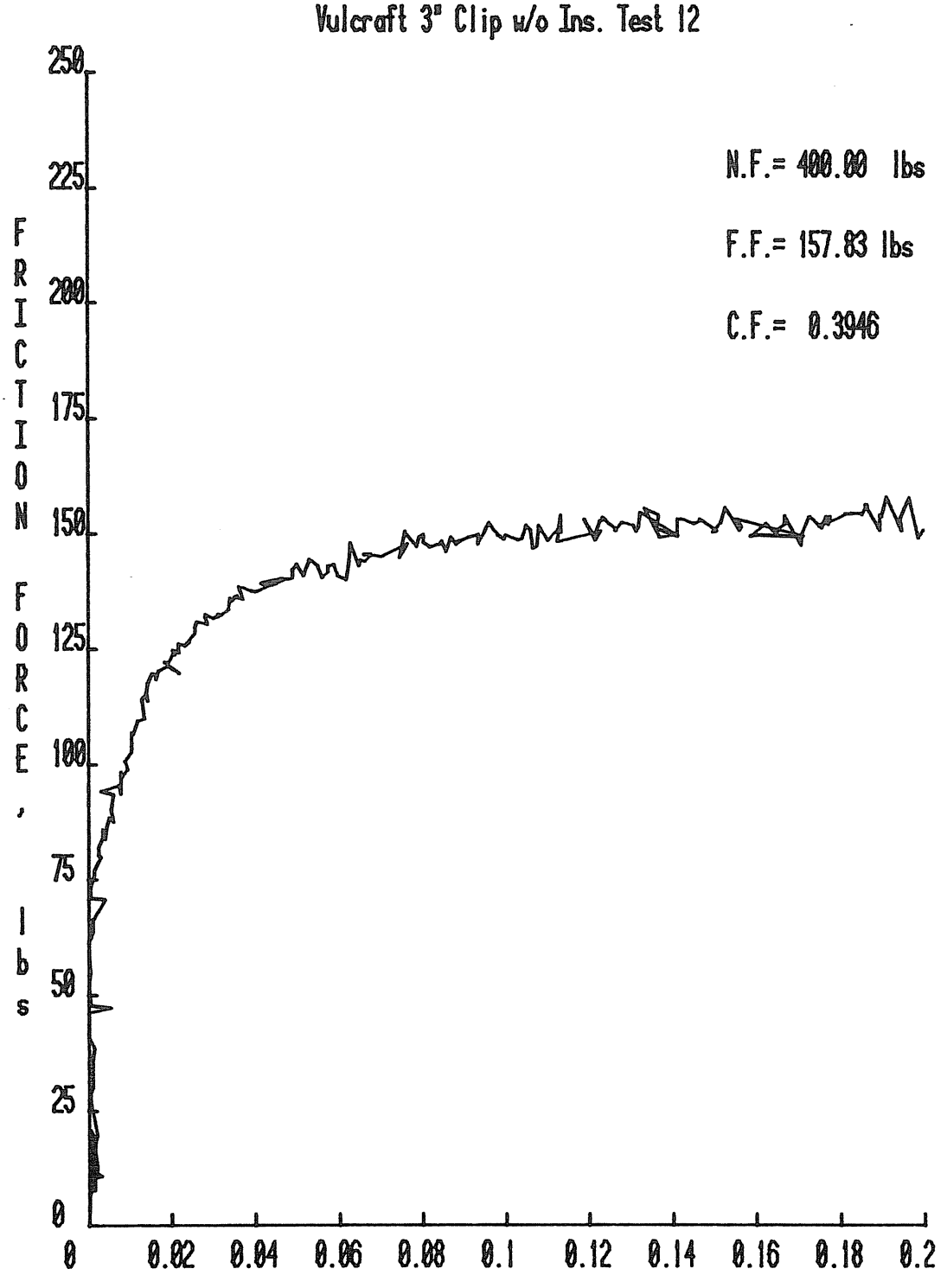


Figure J.3 3 in. Clip without Insulation, 40 psf

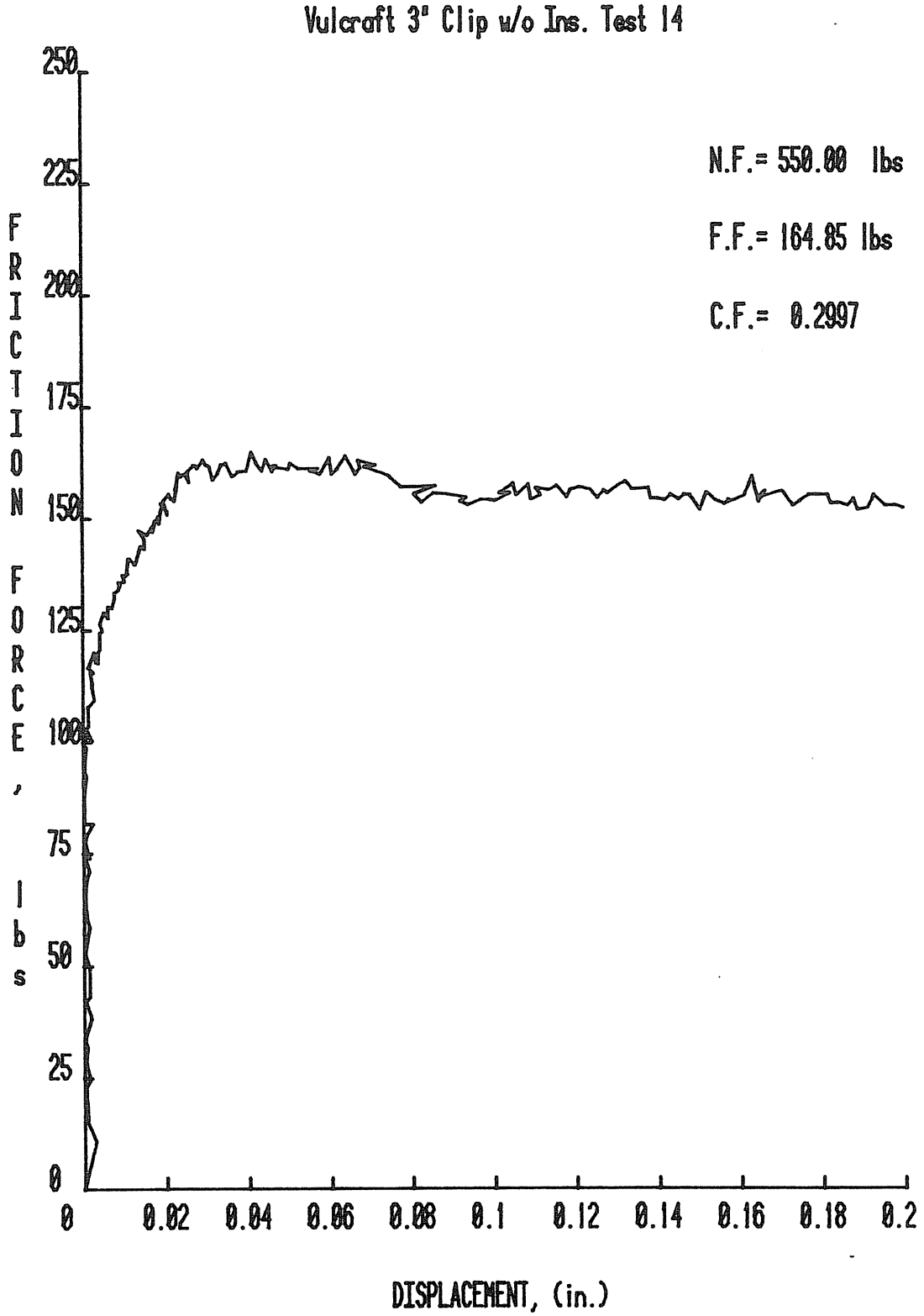


Figure J.4 3 in. Clip without Insulation, 55 psf

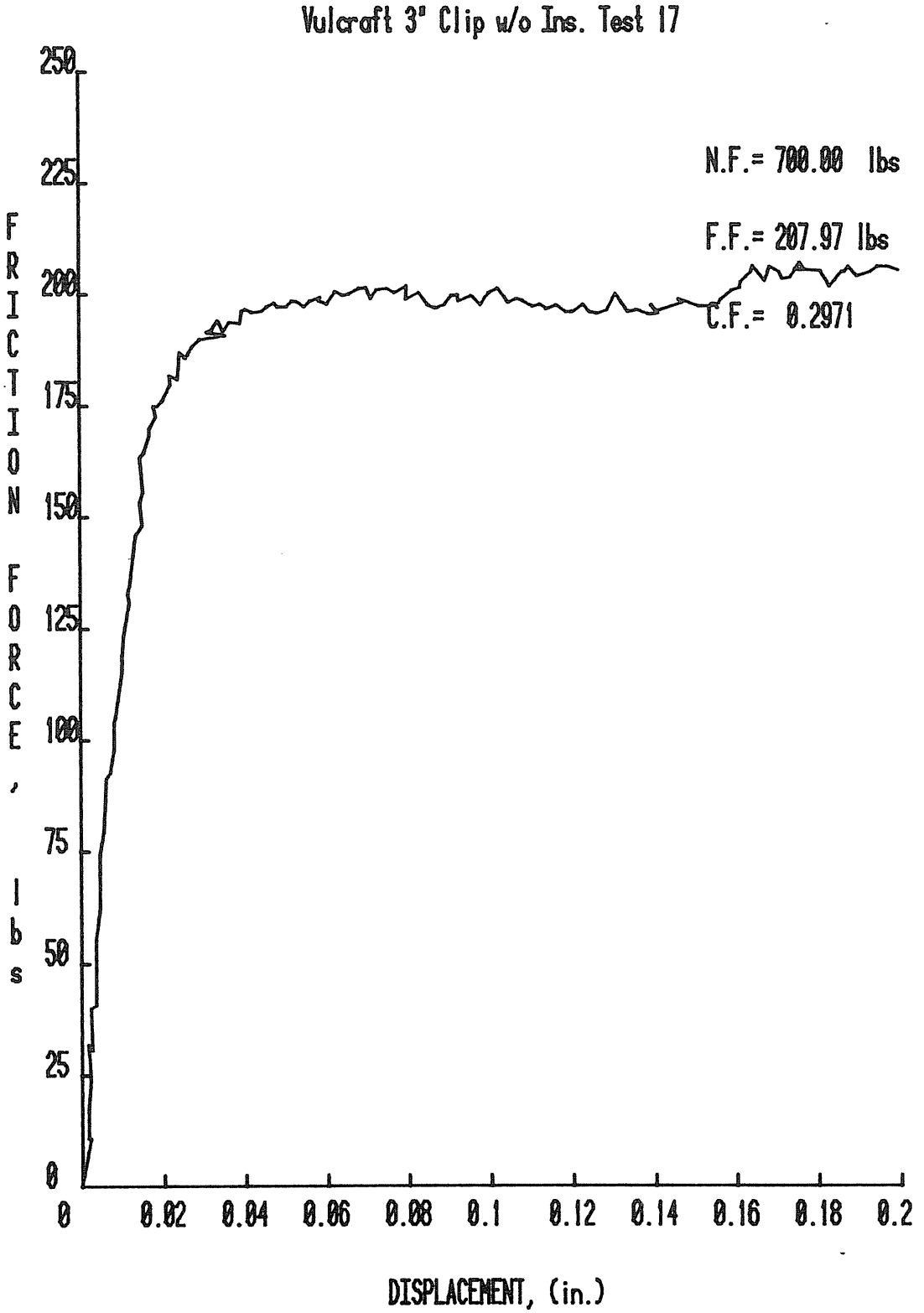


Figure J.5 3 in. Clip without Insulation, 70 psf

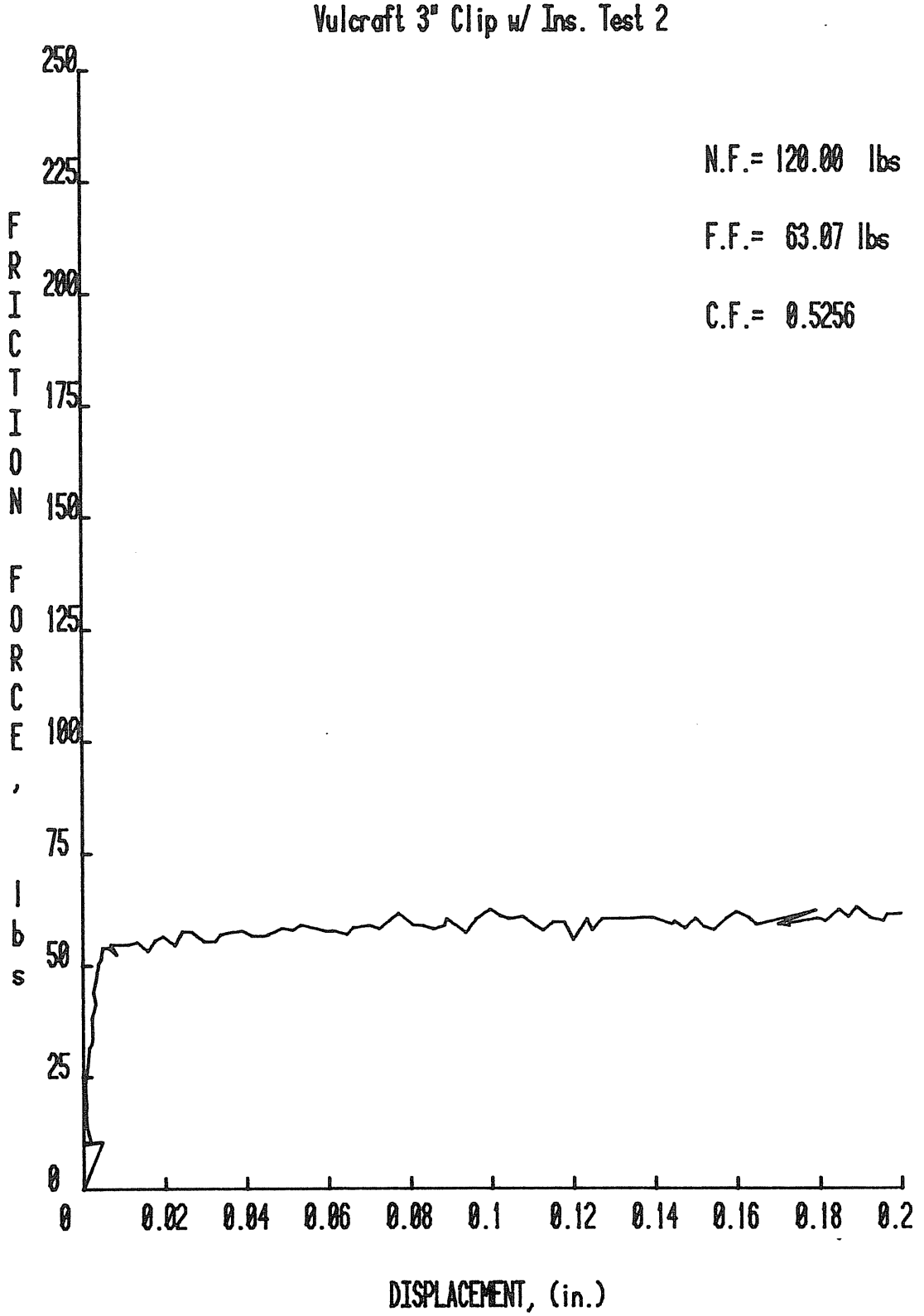


Figure J.6 3 in. Clip with Insulation, 12 psf

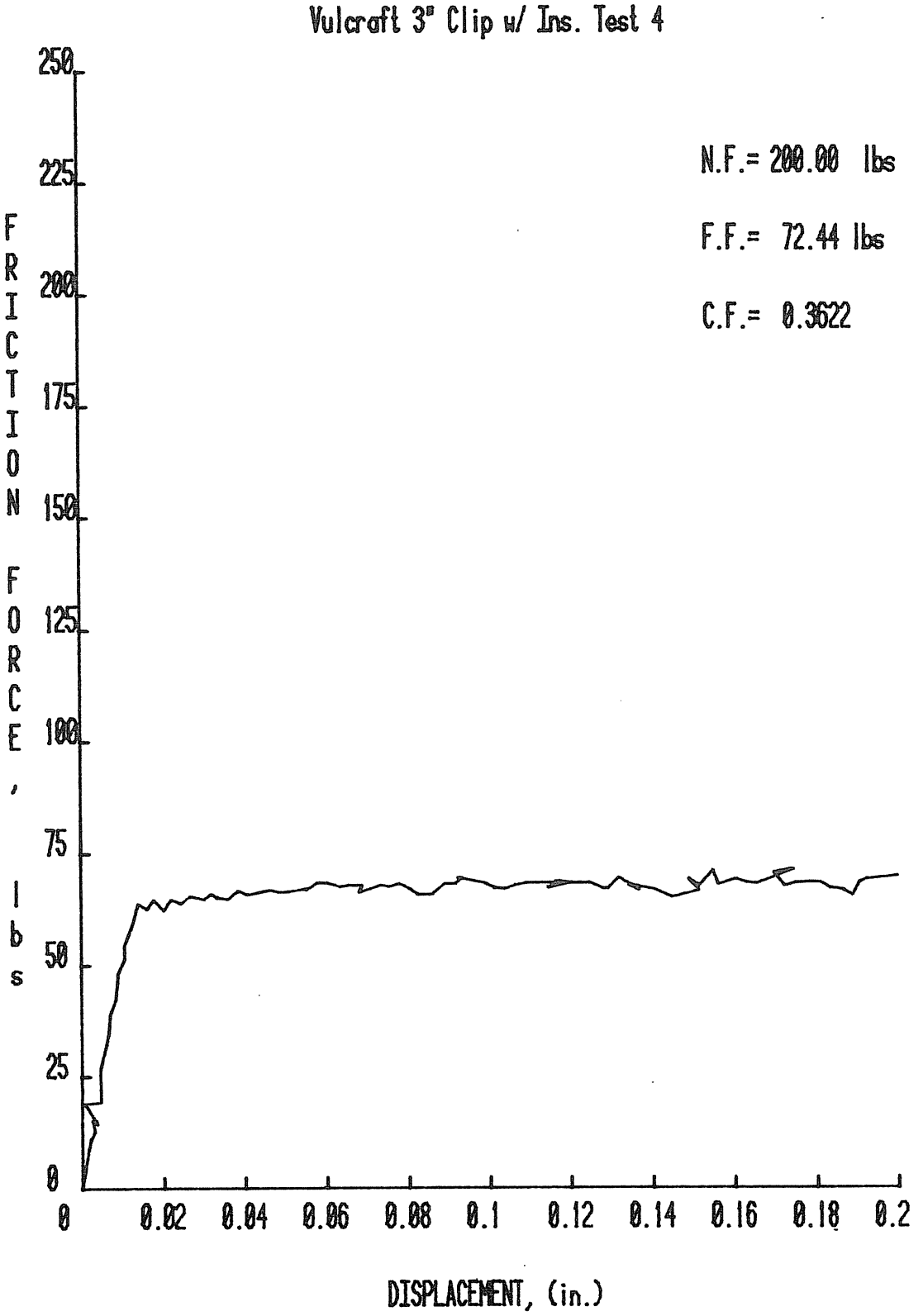


Figure J.7 3 in. Clip with Insulation, 20 psf

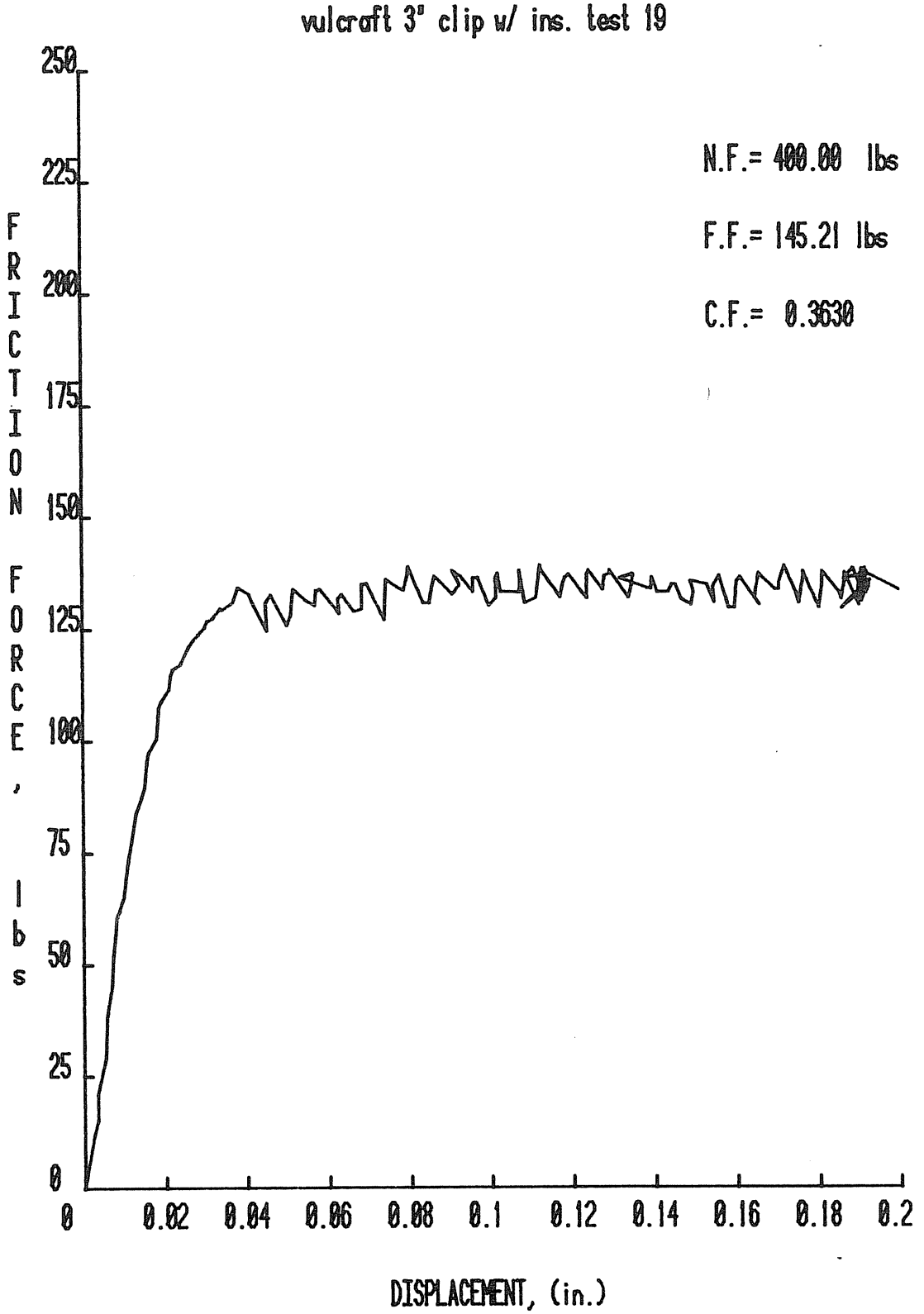


Figure J.8 3 in. Clip with Insulation, 40 psf

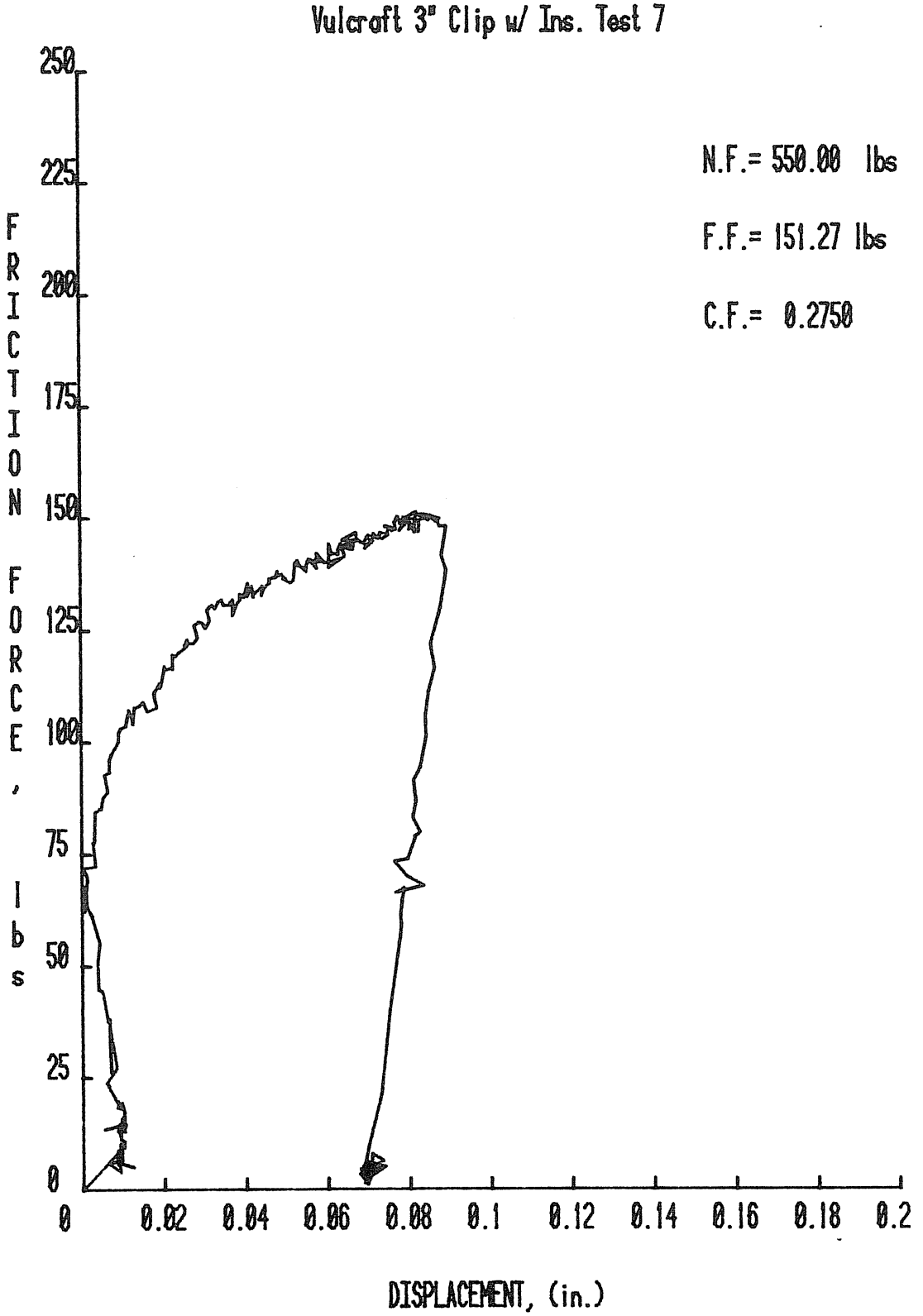


Figure J.9 3 in. Clip with Insulation, 55 psf

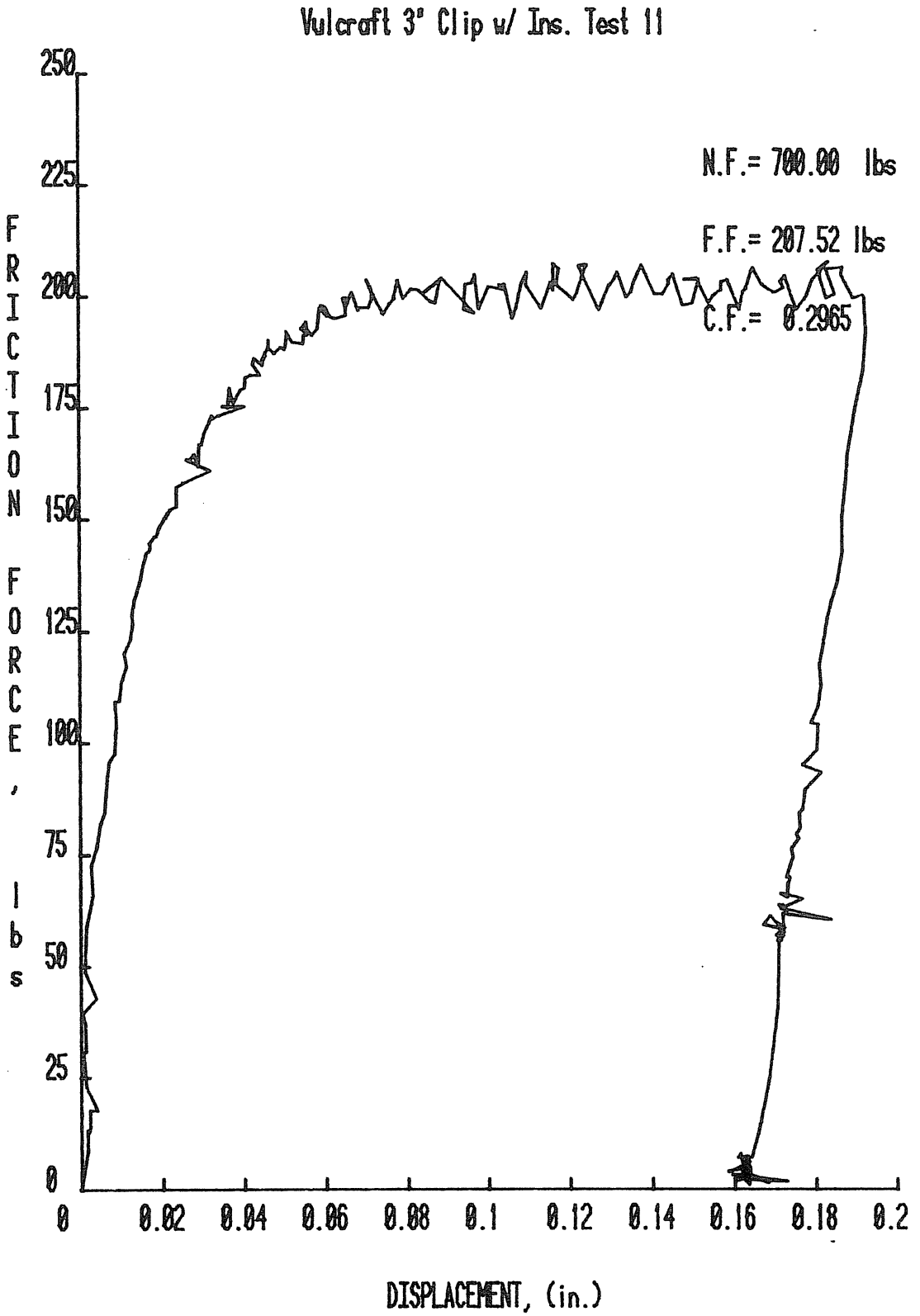


Figure J.10 3 in. Clip with Insulation, 70 psf

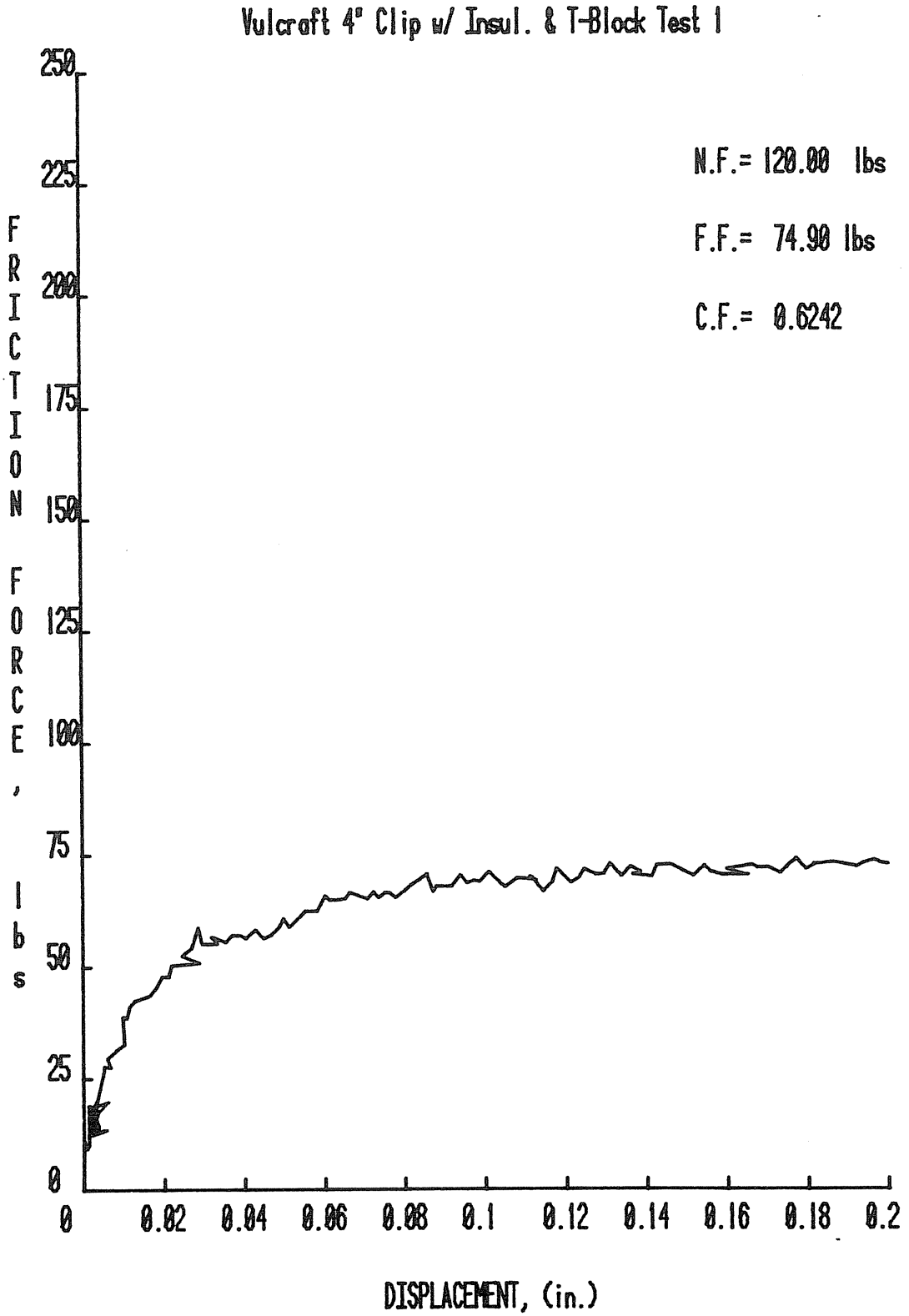


Figure J.11 4 in. Clip with Insulation and Thermal Block, 12 psf

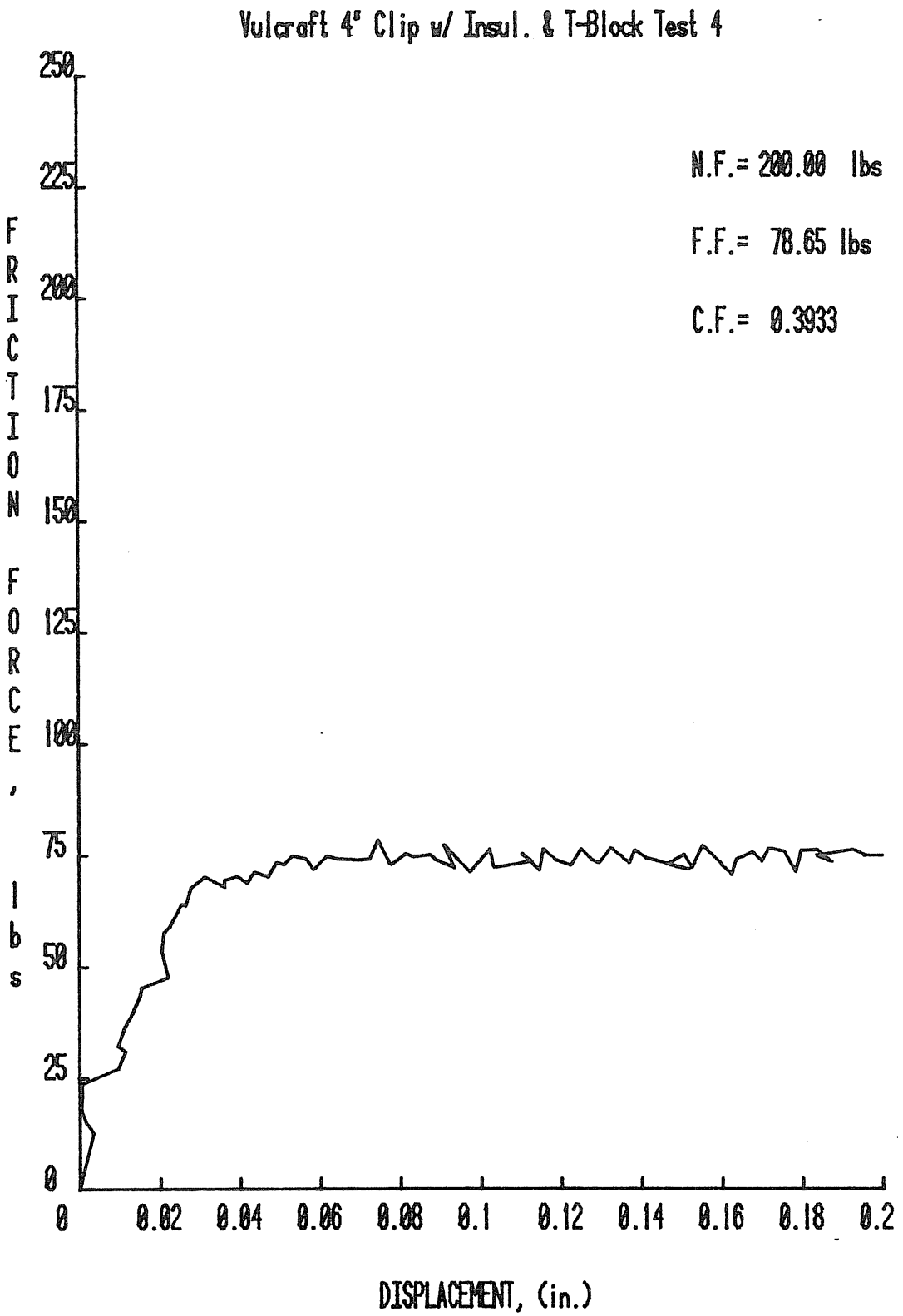


Figure J.12 4 in. Clip with Insulation and Thermal Block, 20 psf

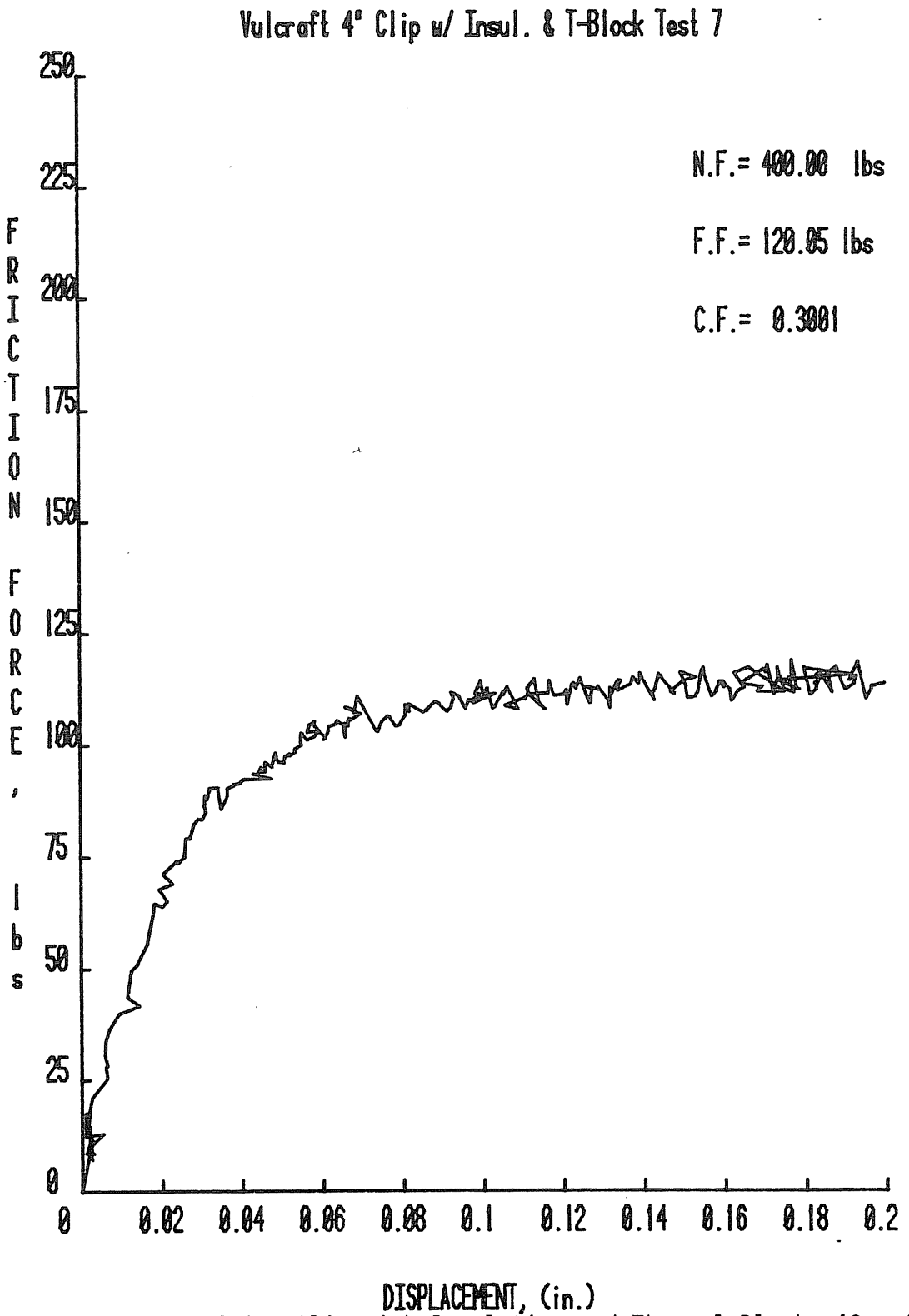


Figure J.13 4 in. Clip with Insulation and Thermal Block, 40 psf

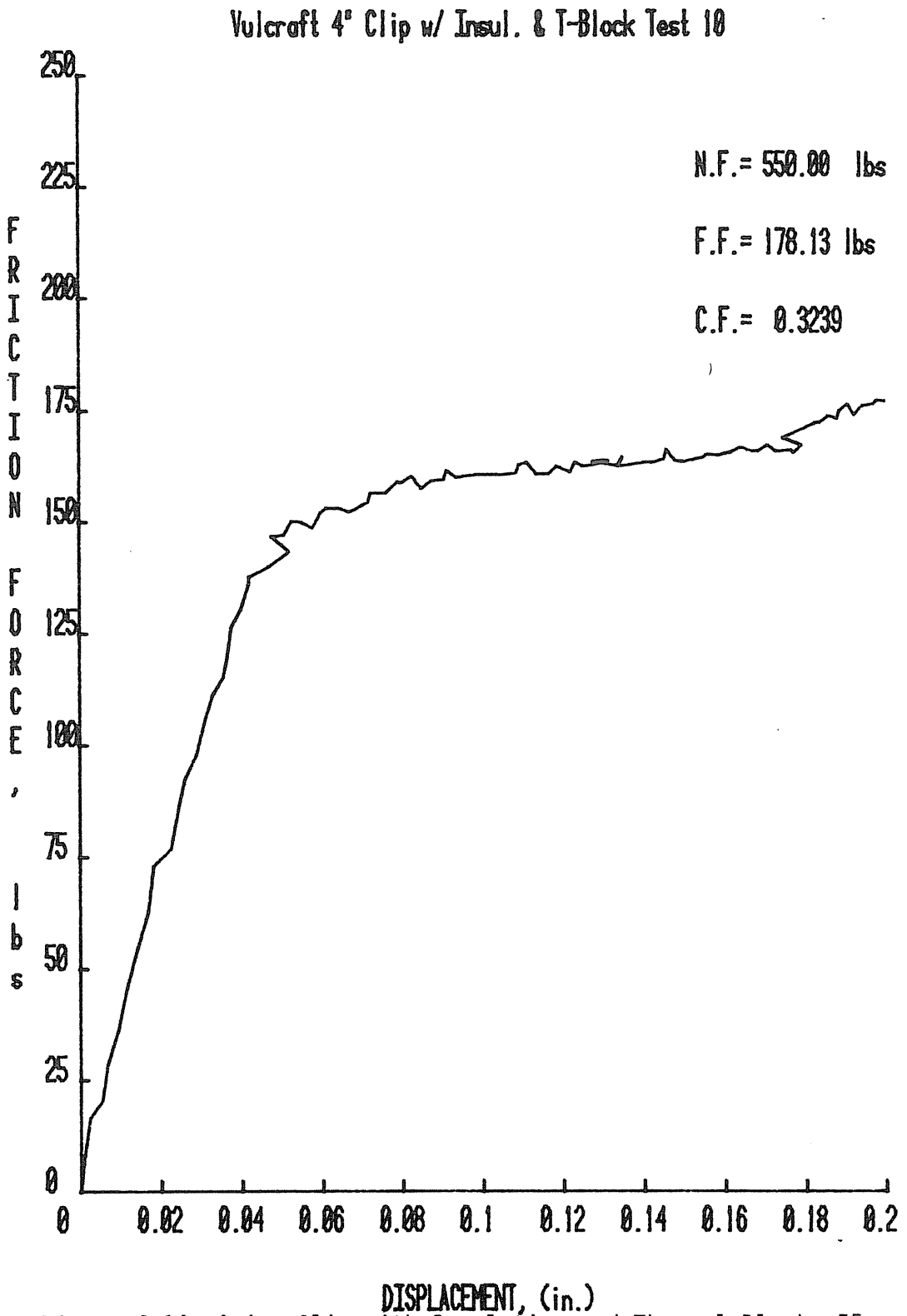


Figure J.14 4 in. Clip with Insulation and Thermal Block, 55 psf

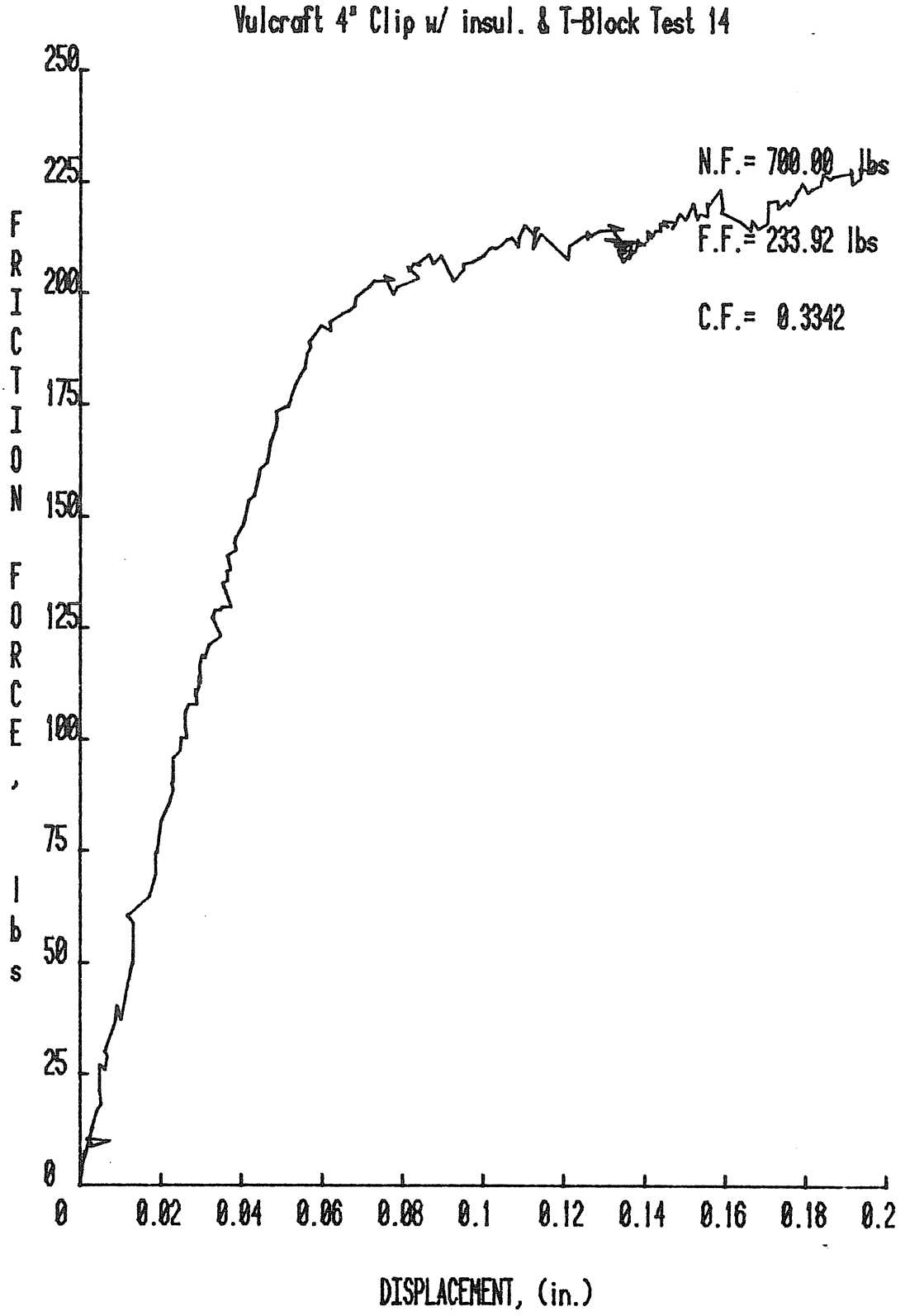


Figure J.15 4 in. Clip with Insulation and Thermal Block, 70 psf