RESEARCH

2007-19

Precast Concrete Pavement Panels on Minnesota Trunk Highway 62 - First Year Performance Report

MnROAD
Office of Materials

Take the steps... Research...Knowledge...Innovative Solutions!

Transportation Research

Technical Report Documentation Page

1. Report No. MN/RD – 2007-19	2.	3. Recipient's Accession No.
4. Title and Subtitle PRECAST CONCRETE PAVEMENT PANELS ON MINNESOTA TRUNK HIGHWAY 62 – FIRST YEAR PERFORMANCE REPORT		5. Report Date April 2007 6.
7. Author(s) Thomas R. Burnham		8. Performing Organization Report No. T9RC0500
9. Performing Organization Name and Address Minnesota Department of Transportation Office of Materials and Road Research 1400 Gervais Avenue Maplewood, MN 55109		10. Project/Task/Work Unit No. 11. Contract © or (G)rant No.
12. Sponsoring Organization Name and Address Minnesota Department of Transportation 395 John Ireland Boulevard Mail Stop 330 St. Paul,, MN 55155		13. Type of Report and Period Covered Interim Report, 1-Year Performance 14. Sponsoring Agency Code
15. Supplementary Notes http://www.lrrb.org/PDF/200719.pdf		

16. Abstract (Limit: 200 words)

In June 2005, precast concrete pavement panels were installed during a trunk highway pavement rehabilitation project in Minneapolis, Minnesota. The panels were installed to evaluate the use of precast panels toward reducing construction time. Since it was the first precast concrete pavement panel project to be installed in Minnesota, it was deemed important to monitor the early and long-term performance of the system. This report describes the general condition of the precast pavement system after 1.5 years of service. The report also presents results from non-destructive testing conducted both immediately following construction and after one year of service. Finally, the report describes the condition of typical concrete pavement rehabilitation repairs conducted adjacent to the installed panels. A visual distress survey after 1.5 years of service revealed virtually no distress for both the precast panel sections and nearby conventional concrete pavement rehabilitation repairs. The ride quality of both the precast and conventional repair sections at 10 months of service was very smooth, with an International Roughness Index (IRI) value of approximately 50 inches per mile. The load transfer efficiencies of the precast panel joints were found to be over 90 percent after 1 year of service.

17. Documentation Analysis/Descriptors Pavements, Concrete Joints, Precast Concrete Panels		18. Availability Statement No restrictions. Document available from: National Technical Information Services, Springfield, VA 22161	
19. Security Class (this report) Unclassified	20. Security Class (this page) Unclassified	21. No. Of Pages 110	22. Price

PRECAST CONCRETE PAVEMENT PANELS ON MINNESOTA TRUNK HIGHWAY 62 – FIRST YEAR PERFORMANCE REPORT

Interim Report

Prepared by

Thomas R. Burnham, P.E.

Minnesota Department of Transportation
Office of Materials and Road Research
1400 Gervais Avenue
Maplewood, MN 55109-2043

April 2007

Published by

Minnesota Department of Transportation
Office of Investment Management
Research Services Section
395 John Ireland Boulevard, MS 330
St. Paul, MN 55155

ACKNOWLEDGMENTS

The author would like to acknowledge the efforts of Ted Snyder and Beverly Baron from the Minnesota Department of Transportation, whose safe and brave efforts during non-destructive testing were instrumental in providing information for this report.

The author would also like to acknowledge the use of portions of the report "Installation Of Precast Concrete Pavement Panels On TH 62", written by Jay Hietpas in the Mn/DOT Office of Construction and Innovative Contracting." Thanks also to the Mn/DOT Pavement Management Section for the ride quality data.

Finally, the author would like to acknowledge Ben Timerson with the Mn/DOT Metro District, for his leadership in developing the first highway project in Minnesota using precast concrete pavement technology.

TABLE OF CONTENTS

LIST OF FIGURES AND PHOTOS

LIST OF FIGURES

LIST OF PHOTOS

EXECUTIVE SUMMARY

The Minnesota Department of Transportation constructed a demonstration project containing precast concrete pavement panels in June 2005. The panels were installed as part of a pavement rehabilitation project on Trunk Highway 62 in the southern part of Minneapolis, Minnesota. The panels were installed to evaluate the potential reduction in construction time that might be accomplished using precast panels for pavement rehabilitation. Since the application of this technology was new to Minnesota, a five-year performance monitoring program was developed to increase knowledge of the performance and maintenance issues that may arise under the harsh climate conditions of Minnesota. This report summarized the early performance of the precast panels with regards to surface distress, ride quality, and joint load transfer efficiency. It also discussed the performance of nearby conventional concrete pavement rehabilitation (CPR) repairs constructed at the same time as the precast panels.

A visual distress survey after 1.5 years of service revealed virtually no distress for both the precast panel sections and nearby conventional concrete pavement rehabilitation repairs. The mortar in the dowel grouting holes appeared to be intact, and the condition of the transverse joint seals was very good. The overall visual surface condition for the CPR repair section was also rated as very good.

The ride quality of the precast panel section was conducted three times after construction. The most recent measurements, taken after 10 months of service, revealed very good ride quality, with an IRI value near 50 inches per mile. One interesting trend discovered was that the ride quality improved 6 months after the sections were diamond ground. Possible reasons include settling of the panels into a stable position, or the result of snow-plow blades scraping off minor imperfections that contribute to IRI measurements. While not measured with equipment, a seat-of-the-pants evaluation of the ride quality of the CPR section rated it to be as smooth as the precast section.

Joint load transfer efficiency (LTE) and midpanel deflections were measured twice since construction. LTE was found to be over 90%, with deflections averaging 11 mils. There was found to be little difference between the LTE or deflection whether the load was placed on the approach or leave side of the joint. This indicates the performance of the grouted end of the dowels is behaving similar to the embedded side after 1.5 years of service. Peak midpanel deflections were approximately 4 mills for a 9000 lb FWD load. There were only slightly lower deflections measured after 1 year of service.

This report serves as the first report on the performance of precast concrete pavement panels in Minnesota. Additional reports will be created for the 3-year and 5-year performance of both the precast panel section and the conventional concrete pavement rehabilitation (CPR) section. Design and maintenance recommendations for precast concrete pavement will be made according to the findings of these reports.

CHAPTER 1
INTRODUCTION

Introduction

With the current trends toward significantly increasing traffic demand, but less available funding, the need for the rehabilitation of in-service pavements continues to grow. Often, the pavement rehabilitation projects are located in congested urban areas, or in rural areas with very long distance detours, therefore the methods to accomplish the rehabilitation need to be continually examined to ensure efficiency and safety for the traveling public and construction workers.

Traditional and proven methods for concrete pavement rehabilitation in Minnesota have included full and partial-depth slab repair, retrofit dowel bars, and surface restoration (ex. diamond grinding). More recently, however, the use of precast concrete panels for concrete pavement rehabilitation has been gaining interest, predominantly due to its increasing popularity and promotion within the U.S. The use of precast concrete panels provides many beneficial solutions to rehabilitation problems, but at the same time presents other issues, such as high initial construction cost. There are certain situations, however, where the use of precast concrete panels may be the most economical and safe solution for pavement rehabilitation.

Given their rising popularity on a national level, the Minnesota Department of Transportation decided the time was right for a demonstration project using precast concrete pavement panels during concrete pavement rehabilitation. In June 2005, precast concrete pavement panels were installed as part of a pavement rehabilitation project on Trunk Highway 62 in the southern part of Minneapolis, Minnesota. The panels were installed to evaluate the potential reduction in construction time that might be accomplished using precast panels for pavement rehabilitation.

Since it was the first precast concrete pavement panel project constructed in Minnesota, it was deemed important to monitor the early and long-term performance of the system. An unpublished construction report was completed in the fall of 2005 by Hietpas (see Appendix A). That report described the installation process, performed an initial cost analysis, and discussed construction zone safety as it related to the project.

This report describes the general condition and performance of the precast pavement system after one year of service. The report also describes the 1-year service condition of the traditional concrete pavement rehabilitation repairs conducted adjacent to the installed panels. Finally, results from non-destructive testing of the precast panels both immediately following construction and after one year of service are presented.

Additional monitoring, testing, and reporting on this project will be completed following the third and fifth year of service.

TH 62 Project Description

Trunk Highway 62 (TH 62) is a major east-west urban highway, located on the southern edge of the city of Minneapolis, immediately north of the Minneapolis-St. Paul International Airport. The portion of TH 62 involved in this study was originally constructed of 8 inches of jointed reinforced concrete pavement in 1965. Joint repairs were applied to this section in 1986. The wear and tear from another 19 years of traffic and harsh Minnesota weather resulted in the need to rehabilitate this section again, to keep it a safe and comfortable stretch of pavement for the traveling public. The pavement distresses that were present ranged from corner cracks to severely deteriorated transverse joints.

The test segment containing the precast concrete pavement panels is located in the outside lane of eastbound TH 62 near 40th Avenue. The precast panel project area was 216 feet long by 12 feet wide, located between stations 197+50 and 199+66. Concrete rehabilitation repairs were made in adjacent areas following typical Mn/DOT specifications.

Precast Concrete Pavement Panels

The precast concrete pavement panels used in this project were designed and fabricated locally following the Fort Miller Company's "Super-Slab®" system. Eighteen panels were installed on June 21, 2005, in the outside (driving) lane of TH 62, each with the dimensions of 12 feet long, by 12 feet wide, by 9.25 inches thick. Each unit was doubly reinforced, and included eight (4 in each wheelpath) 1.5 inch diameter dowel bars on one end (transverse joint), and 8 corresponding dovetail receiving slots on the other end. Due to different transverse joint spacing, the precast panels were not tied to the adjacent lane.

Additional details on the internal reinforcement and panel design can be found in Appendix B. Special provision specifications on the mix design and placement can be found in Appendix C. Photo 1.1 shows an overhead view of the panels in place.

Photo 1.1 Overhead view of TH 62 precast concrete pavement panels.

Research Objectives

The original objectives of this project were to evaluate the fabrication and installation methods of precast concrete pavement panels in Minnesota, and to determine the potential reduction in construction time using the precast system compared to conventional concrete pavement rehabilitation techniques. Since this was the first project of this type in Minnesota, interest also grew in monitoring the long-term performance of the panels in the field.

To monitor the early and long-term performance of precast pavement panels in Minnesota, the following research objectives were formulated for service years 1,3, and 5:

1. Monitor the surface condition of the panels, and compare it to the condition of conventional concrete rehabilitation repairs constructed at the same time.
2. Measure and compare the ride quality of the precast panel area to original concrete pavement areas containing conventional concrete rehabilitation repairs constructed at the same time.
3. Measure and analyze the joint load transfer efficiency and deflection of the precast concrete panel section.

Interim reports will be produced following service years 1 and 3. A final report will be written following year 5. This test section will be entered into the research project tracking system, so that information can be extracted well into the future.

CHAPTER 2
EARLY PERFORMANCE RESULTS

Surface Condition

Precast Concrete Pavement Panels

The surface condition of the precast concrete pavement panels will be monitored for four types of distress: panel cracks, missing or shrunken mortar in grout holes, surface spalling/scaling, and joint seal failure. These will be determined by visual inspection during periodic visits to the test site.

For this report, site visits were conducted on July 21 and December 1, 2006. During both visits, visual surveys revealed very little surface distress. Some hairline cracks were evident radiating from one of the panel lifting holes. See Photo 2.1. No determination of the depth of the hairline cracks was made at the time of the survey. Otherwise, the mortar in the dowel grouting holes appeared to be intact, with minimal shrinkage of the material from the edges. Photos 2.2 and 2.3 show the condition of several dowel grouting holes. The condition of the transverse joint seals was very good. Photo 2.4 shows an overall view of the precast panels after 1.5 years of service.

Photo 2.1 Closeup view showing hairline cracks radiating from panel lifting hole.


Photo 2.2 Overall view showing condition of mortar in grout holes after 1 year of service.

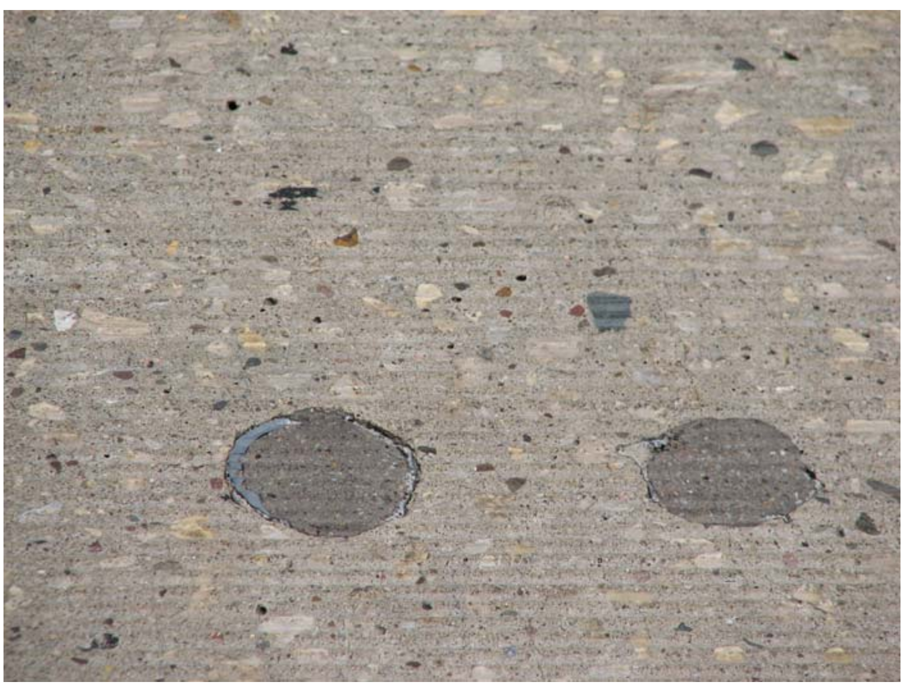


Photo 2.3 Closeup view showing condition of mortar in grout holes after 1 year of service.

Photo 2.4 Overall view showing surface condition of precast panel section on 12-10-2006 (approx. 1. 5 years of service). Adjacent lane (right side) shows conventional concrete pavement rehabilitation repairs.

Conventional CPR Repairs

The surface condition of the concrete pavement rehabilitation repairs will be monitored for three types of distress: cracks within repair, loss of bond with original pavement and joint seal failure. These will be determined by visual inspection during periodic visits to the test site.

For this report, a site visit was conducted on December 1, 2006. During the visit, overall visual surface condition for the CPR repair section was rated as very good. Photos 2.4 and 2.5

Photo 2.5 View of conventional full-depth concrete pavement joint repair on 12-01-2006 (approx. 1.5 years of service).

show the location and condition of the CPR repairs.

Joint Seals
The condition of the joint seals was very good for both the precast panel and conventional repair sections as of December 1, 2006.

Ride Quality
Even though the precast concrete panels were installed on a precision graded base, manufacturing tolerances resulted in the necessity to diamond grind the riding surface shortly after placement. To develop a history of the ride quality of this test section, the Mn/DOT pavement management measurement van (Pathways) traveled over the test section area four times to date. Test times included: 1) before removal of old slabs, 2) shortly after placement of the precast slabs (before diamond grinding, 3) shortly after diamond grinding, 4) after approximately 6 months of traffic loading. Figure 2.1 depicts the results of the ride quality history up to May 2006.

The ride quality history of the precast panel section shows some interesting trends. First, the data clearly demonstrated the need to diamond grind the surface of the panels after placement.

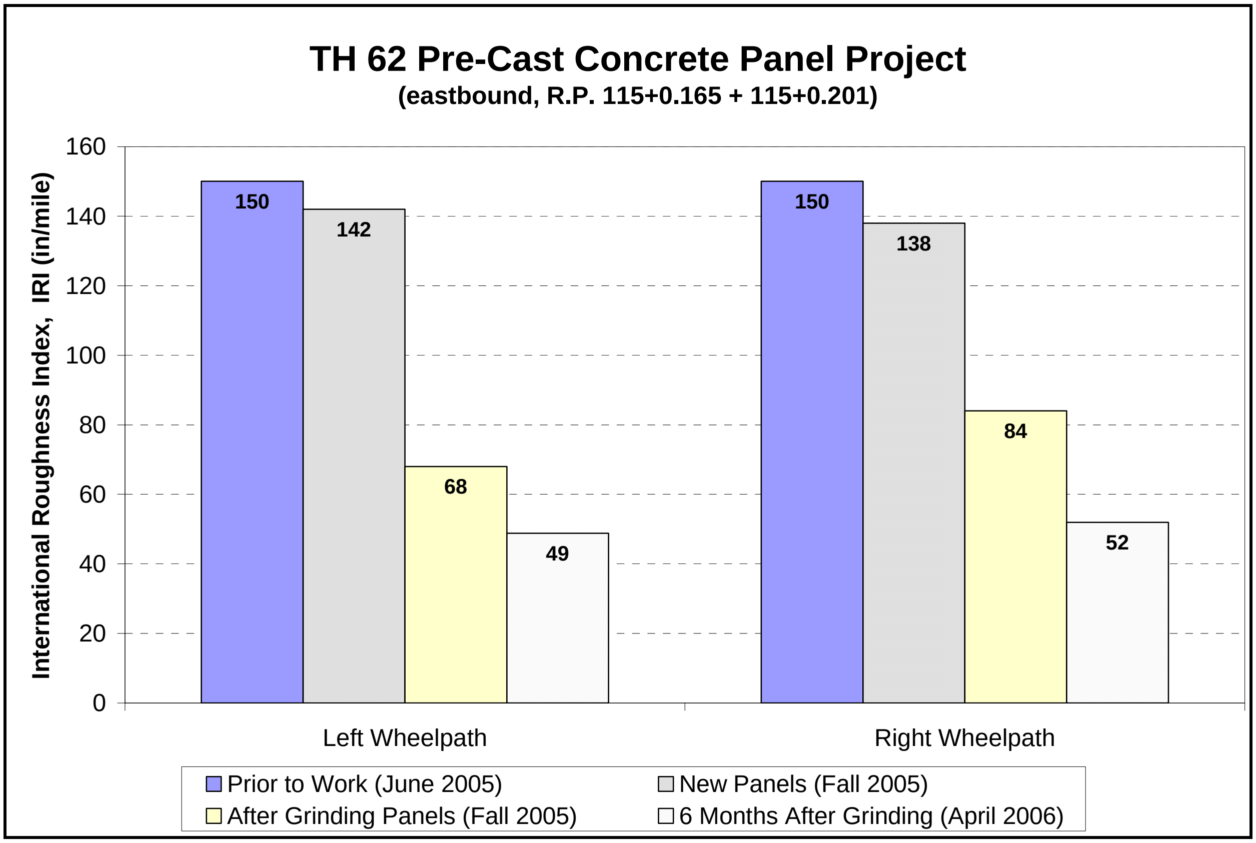


Figure 2.1 TH62 precast panel ride quality history (courtesy of Mn/DOT Pavement Management Section).

Construction tolerances for precast panels are such that it is very difficult to achieve a smooth enough ride for high-speed traffic applications. What is more interesting, however, is the improvement in ride quality 6 months after construction. It could be that the panels take time to settle into a stable position, or that snow-plow blades scrape off minor imperfections that contribute to increased IRI measurements.

Ride quality measurements have not been performed yet on the lane with conventional concrete repairs, however it is the opinion of the author that the seat-of-the-pants ride quality was very smooth on December 1, 2006. Measurement of the ride quality on the CPR section will begin in 2007.

Joint Load Transfer Efficiency

An important aspect of the long-term performance of the precast concrete pavement panel system will be the efficacy of transverse joint load transfer efficiency (LTE). While standard Mn/DOT jointed concrete pavements are constructed with 12 dowels in each lane, the precast panels only contained eight dowels. In addition, standard Mn/DOT concrete pavement designs contain dowels embedded into the slabs, whereas for precast systems, one end of the dowels is grouted into preformed pockets. Interest lies in the long–term performance history of the grouted dowels subject to highway traffic loads in the harsh Minnesota climate.

To monitor the long-term joint load transfer efficiency of the TH62 precast section, FWD (falling weight deflectometer) testing will be conducted periodically. FWD testing was first conducted on the precast test section on September 8, 2005. Another series of FWD tests were performed on June 9, 2006. The testing locations can be found in Figure 2.2.

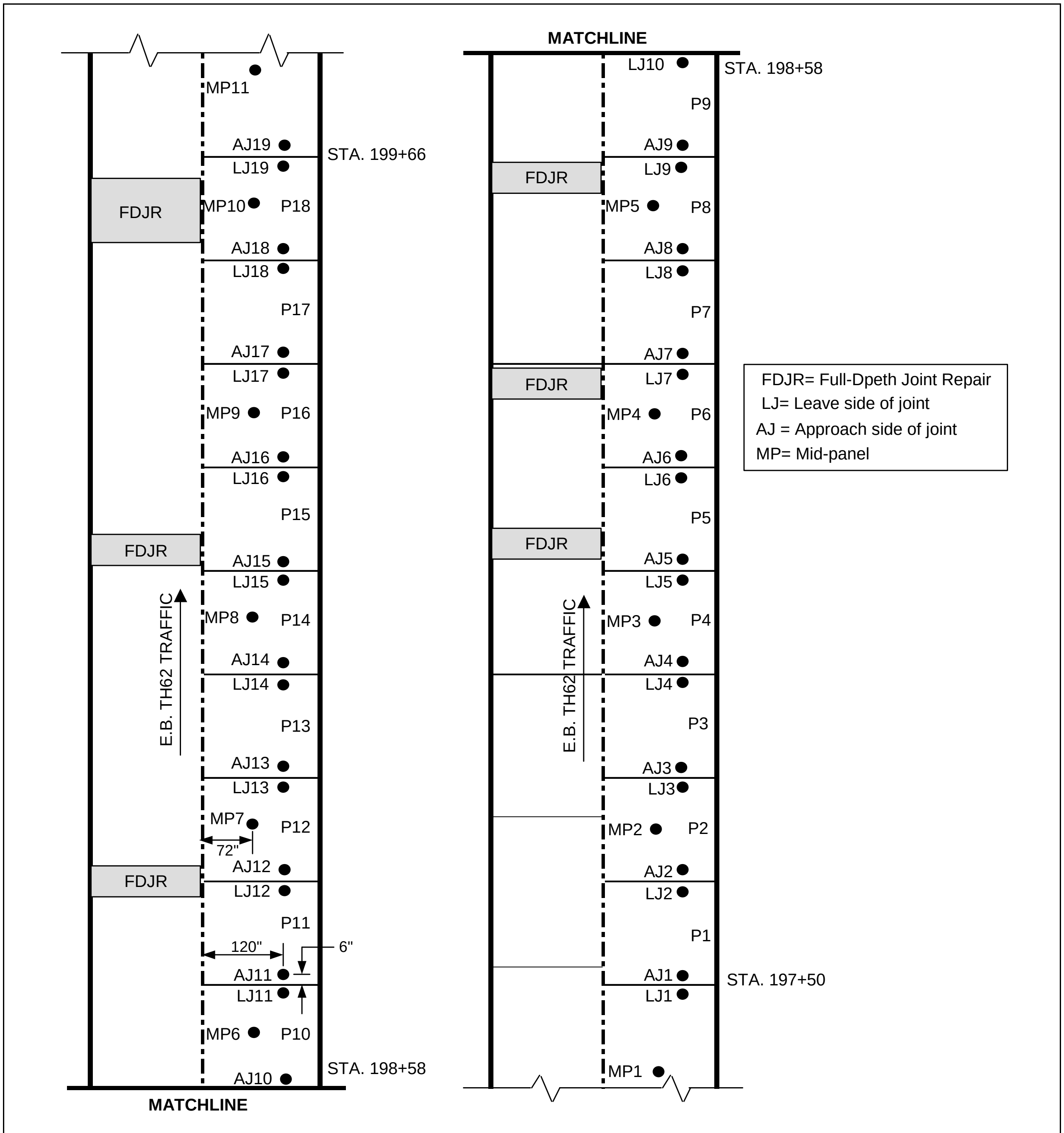


Figure 2.2 FWD testing pattern for TH62 precast concrete test section.

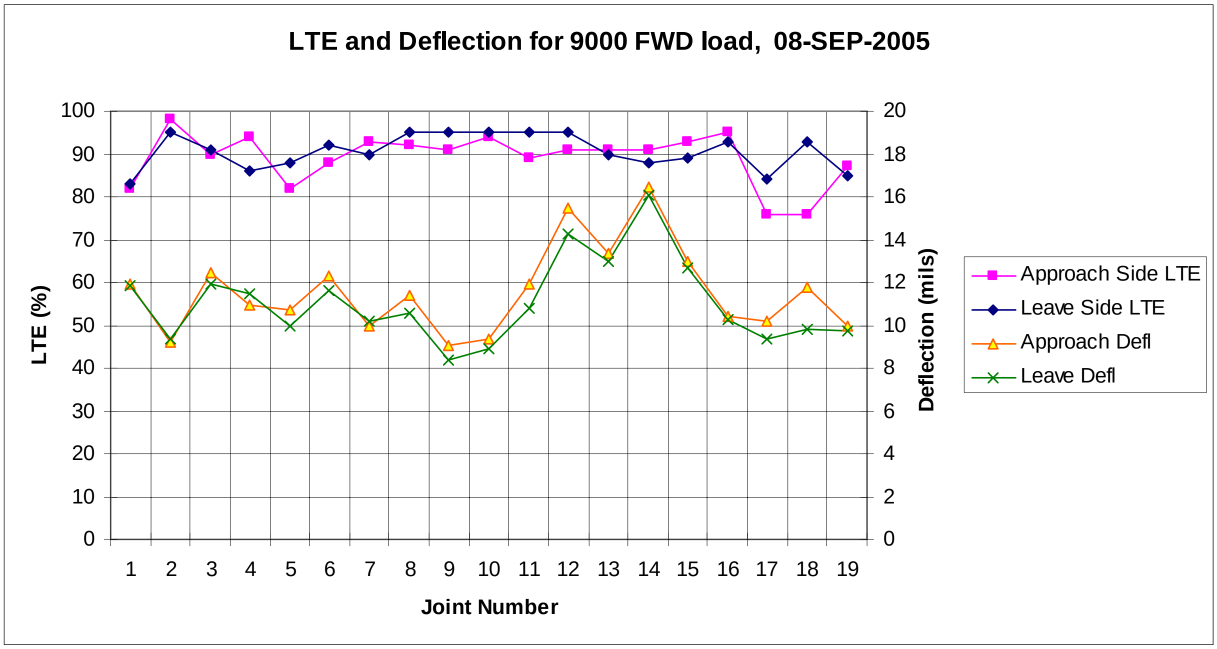


Figure 2.3 LTE and deflection test results from FWD testing 3 months after construction.

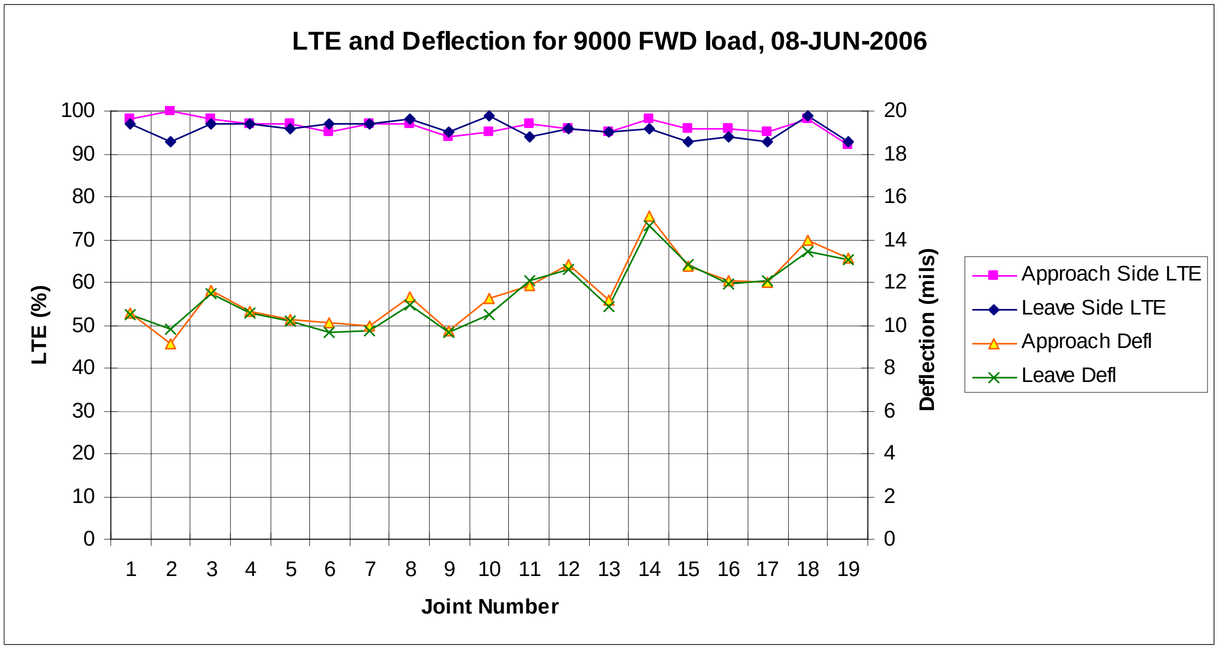


Figure 2.4 LTE and deflection test results from FWD testing 1 year after construction. Note that the surface temperature of the pavement was approximately 82ºF.

Results from FWD testing can be seen in Figures 2.3 and 2.4 for September 2005 and June 2006, respectively. The joint load transfer efficiency (LTE) and joint deflection is shown for both sides of the transverse joint for a 9000 lb FWD load. The data used to create these plots can be found in Appendix D.

FWD testing 3 months after construction showed more than 90% LTE, except near slabs 18 and

19. Joint deflections averaged 11 mils. One year after construction, FWD testing showed LTE levels near 95%. Even though the testing was done during the night, it is suspected that the joints were “locked up” due to surface temperatures over 80ºF. Joint deflections were comparable to levels measured in September 2005.

The FWD test results demonstrate that the joint load transfer efficiency started and continues to be very good. The similarity of LTE and deflection between the approach and leave sides of a joint indicates that the embedded and grouted ends of the dowels are of near equal strength. The continued monitoring of this behavior will be key to understanding the effects traffic and weather have on the joints.

Midpanel Deflection Behavior

In addition to monitoring the transverse joints for load transfer efficiency, there is also interest in understanding the behavior of the precast slabs. The precast slabs used on this project were heavily reinforced, containing two layers of longitudinal and transverse reinforcing steel. See Appendix B for panel design details. To monitor the more rigid behavior of the precast slabs compared to standard concrete pavement placed using slip-form construction, FWD testing was also performed on mid-panel locations as shown in Figure 2.2.

Midpanel FWD deflection basins are shown in Figures 2.5 and 2.6 for September 2005 and June 2006, respectively. Test points MP1 and MP11 were located in original concrete panels, while test points MP2 thru MP10 were in precast slabs. A comparison of the figures shows that the deflection basins were very similar in shape for both testing instances, but the magnitude of the deflections were slightly lower for the June 2006 measurements. Midpanel deflections for the original (non precast) panels were not remarkably different than those for the precast slab panels.

Periodic monitoring of both the joint load transfer efficiency and midpanel deflections will continue for as long as these panels are in service.

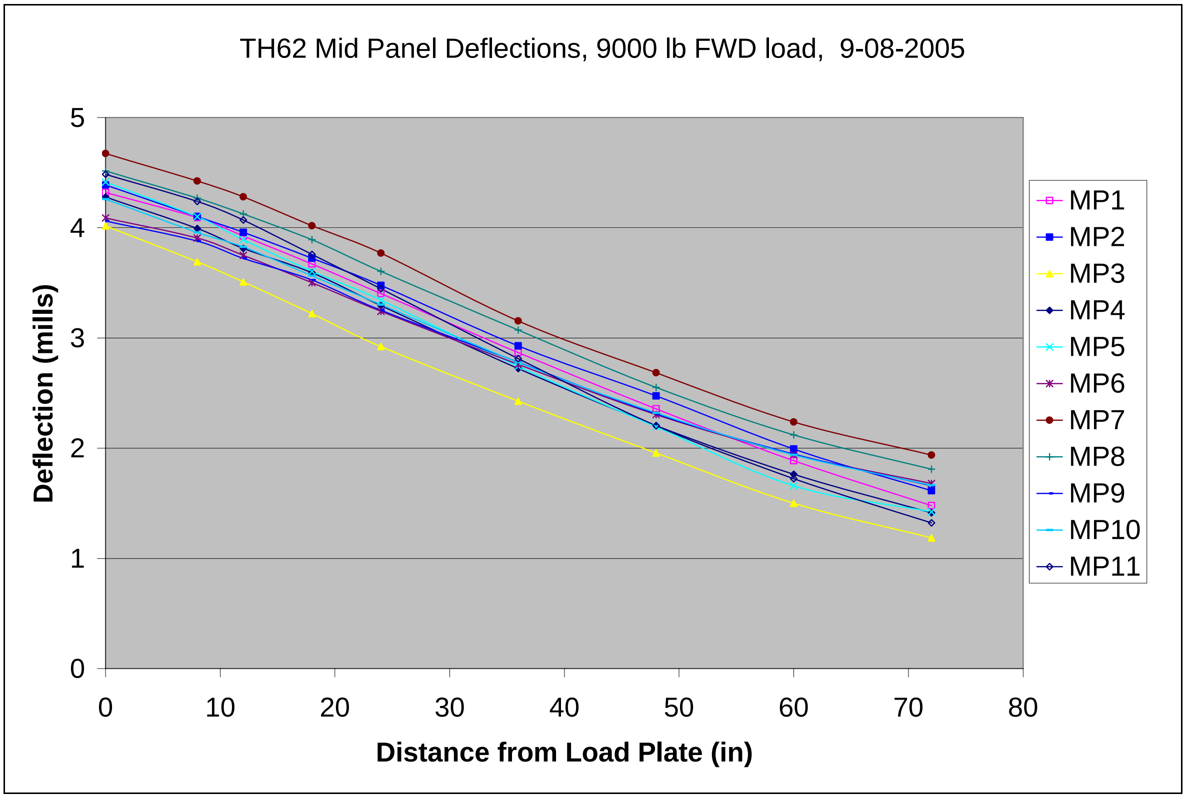


Figure 2.5 Midpanel deflection basin test results from FWD testing 3 months after construction.

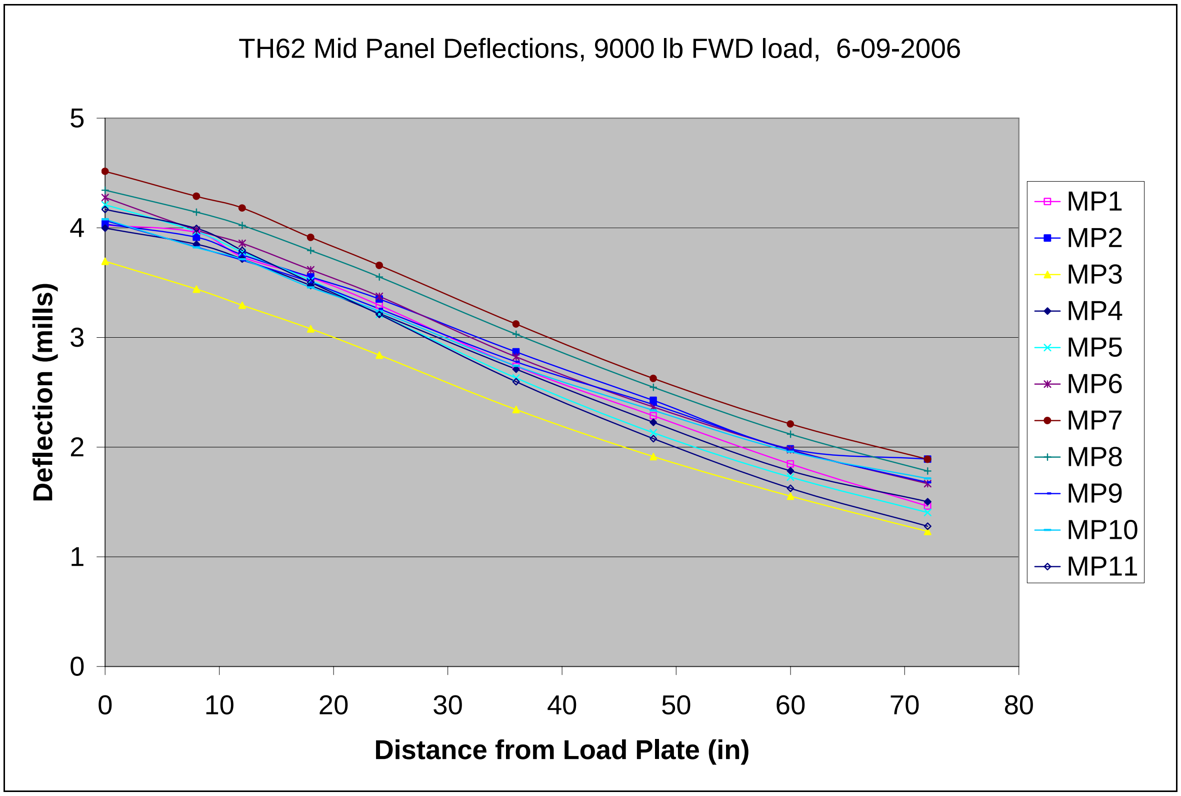


Figure 2.6 Midpanel deflection basin test results from FWD testing 1 year after construction.

CHAPTER 3
CONCLUSIONS

The Minnesota Department of Transportation constructed a demonstration project containing precast concrete pavement panels in June 2005. The panels were installed as part of a pavement rehabilitation project on Trunk Highway 62 in the southern part of Minneapolis, Minnesota. Since the application of this technology was new to Minnesota, a five-year performance monitoring program was developed to increase knowledge of the performance and maintenance issues that may arise under the harsh climate conditions of Minnesota. This report summarized the early performance of the precast panels with regards to surface distress, ride quality, and joint load transfer efficiency. It also discussed the performance of more conventional concrete pavement rehabilitation (CPR) repairs constructed at the same time near the precast panels.

The overall visual surface condition for the precast panel section was rated as very good after 1.5 years of service. The mortar in the dowel grouting holes appeared to be intact, and the condition of the transverse joint seals was very good. The overall visual surface condition for the CPR repair section was also rated as very good. Ride quality testing of the precast panel section after 10 months of service, revealed very good ride quality, with an IRI value near 50 inches per mile. One interesting trend discovered was that the ride quality improved 6 months after the sections were diamond ground. The ride quality of the CPR section was rated to be as smooth as the precast section. Joint load transfer efficiency (LTE) was measured to be over 90% after 1 year of service. Little difference could be found between the LTE or deflection whether the load was placed on the approach or leave side of the joint. This indicates the performance of the grouted end of the dowels is behaving similar to the embedded side after 1.5 years of service.

This report serves as the first report on the performance of precast concrete pavement panels in Minnesota. Additional reports will be created for the 3-year and 5-year performance of both the precast panel section and the conventional concrete pavement rehabilitation (CPR) section. Design and maintenance recommendations for precast concrete pavement will be made according to the findings of these reports.

REFERENCES

1. Hietpas, J. "*Installation Of Precast Concrete Pavement Panels On TH 62*". Unpublished report. Mn/DOT Office of Construction and Innovative Contracting. June, 2005.

APPENDIX A

TH 62 Precast Concrete Panel Construction Report

Written by Jay Hietpas

Mn/DOT Office of Construction and Innovative Contracting

INSTALLATION OF PRECAST CONCRETE PAVEMENT PANELS ON TH 62

Construction Project Engineer:	Kevin Hagness Mn/DOT Metro
Designer:	Victoria Nill MnDOT Metro
Report Prepared by:	Mn/DOT Office of Construction and Innovative Contracting (OCIC)

State Project 2775-12

PROJECT PURPOSE

On Tuesday, June 21, 2005, a test project involving the installation of precast concrete pavement panels was conducted on a pavement rehabilitation project on TH 62 between I-35W and TH 55 in the southeast metro (SP 2775-12). The purpose of this test project was to evaluate the use of precast pavement panels to reduce construction time.

TEST LOCATION

The test segment included installation of 18 precast pavement panels on the outside lane of eastbound TH 62 near 40th Avenue. The repair segment included a continuous 218' stretch of pavement 12' wide.

PRECAST UNITS

The panels were fabricated at Wieser Concrete in Maiden Rock Wisconsin and stamped with Mn/DOT certification at the plant. These panels are part of the Super-Slab system developed by Fort Miller Company, Inc. of Schuylerville, New York.

Eighteen (18) precast pavement units were installed on this project. Each precast unit was 12'x12' with a depth of 9-¼" in. The units include top and bottom reinforcement mats with #13 bars spaced at 6" O.C. transversely and 36" O.C. longitudinally. The units also included 1 ½" diameter dowel bars (18-inch epoxy) spaced at 12-inches in the wheel paths.

A typical panel consisted of a male end (with dowel bars extruding) and a female end (to accept the adjacent dowels bars).

The concrete mixtures for the panels conform to Mn/DOT 3W36 mix with a minimum compressive strength of 3900 psi and 28 days.

The panels were cast with lifting hooks installed as per the manufacturer recommendations.

CONSTRUCTION

The construction sequence for this operation generally consists of removing the old concrete pavement, fine grading the base, placement of the precast panels, grouting the panels, and sealing the joints.

On Monday, June 20th, the existing concrete pavement was removed using conventional methods. Since the precast panel depth was 9 ¼" in depth and the existing pavement was approximately 8", existing base had to be excavated to account for the difference. Following removal, a fine graded crushed limestone (stone dust) was installed as a level pad. Heavy rains on the afternoon of the 20th prevented the contractor from finishing the fine grading.

On Tuesday, June, 21st, the fine grade crushed limestone (stone dust) was re-worked and compacted with a small vibratory roller. A leveling screed was mobilized by the manufacturer to meet the required tolerance of 1/10 inch difference between the base depth and precast unit depth. The screed traveled along rails on the adjacent pavement section to obtain a consistent depth. The elevations of the rails were set using a survey level.

Leveling the stone dust required several passes of the screed. This process appeared to be somewhat time consuming, beginning at 7:30 am and ending at around 12:30 pm. In speaking with Mn/DOT staff involved with this project, other more efficient pieces of equipment exist for this type of work. However, it was not cost effective for the manufacturer to mobilize the larger piece of equipment to this location due to the small repair quantity on this project.

Prior to placing the first precast panel, the stone dust was dampened with a fine spray of water to facilitate subsequent grouting of the slabs. Dowel bars were drilled and grouted into the adjacent concrete slab at the west termini.

The precast panels were not tied to the adjacent 12 foot lane. The adjacent concrete lane had joint spacing longer than the precast panel lengths of 12 feet. Instead, the two lanes with "float" next to each other, with a 1" maximum contraction joint sealed with an approved grout, backer-rod at a depth of 2", and a highway joint sealer near the surface.

Placement of the Panels

The first 3 panels were delivered on a truck at approximately 12:45 pm and placement began at approximately 1:15 pm.

Installation generally consisted of picking the panels from the truck and sequentially placing them together progressing to the east. The female end of the panel was placed over the male end and moved into place carefully to limit cracking/spalling of the panel end.

The units were separated from each other by a bond breaker. A small piece of foam separated the units to prevent damage when sliding the panels together.

As panel placement continued, measurements were taken to identify the exact location to saw-cut the existing concrete pavement at the east termination point. It was important to properly measure the saw cut location in order to achieve a tight-fit when matching the existing concrete pavement section.

The termination point was saw-cut and dowel bars are drilled and grouted into the adjacent slab. The final slab had female connections at both ends, slipping over the dowels on the adjoining precast and existing concrete slabs. Placement of the precast slabs concluded at approximately 5:30 pm, with an average placement time of approximately 14 minutes per panel.

Grouting the Panels

Following placement of the final panel, the joints slots (dowel bar openings) were grouted with a fast setting grout. The grout had a set-time of approximately 10 minutes. Specification required that this grout obtain a compressive strength of 2,500 psi within 8 hours or prior to opening to traffic.

The grout was pumped into a dowel slot until it extruded from the second grout hole in the same slot. Dowel grouting occurred at a rate of approximately 2 panels/hour. However, as the contractor becomes more familiar with this procedure, it is expected that this production rate could significantly increase.

Following joint grouting, bedding grout was added through the injection ports located along the longitudinal edges of the slab. The grout was pumped under the slab until it extruded from the vent hole on the opposite side of the slab. During this process, the grout needed to be injected slowly to eliminate lifting of the slab. Bedding grouting occurred at a rate of approximately 4 panels/hour.

Additional construction activities performed the following day included sealing the joints and placing bituminous patch material in the shoulder adjacent to the precast slabs.

TIMELINE COMPARISON

The installation of the precast panels was not the controlling operation for this project. Since there was no incentive or sense of urgency for the contractor to finish this operation as quickly as possible, the total process for replacing these panels was approximately 4 days (Day 1 - Set Barrier, Day 2 - Removals and Stone Dust Placement, Day 3 - Place Panels and Grout, Day 4 - Seal Joints and Shoulder Repairs). Comparatively, a standard Type D-1 repair with high early strength concrete would be open to traffic in amount the same timeline, assuming a 3 day cure.

If replacing the panels was the controlling operation, it is anticipated that this timeline could be significantly reduced. It would be reasonable to assume that the contractor could set barrier and perform removals in one day, set and grout panels the next day, open to traffic, and seal the joints and repair the shoulders at night.

On a smaller repair type application, it is possible that the precast system could be open to open to traffic within one day. Smaller areas may not require installing precast barrier to protect the work zone. For example, a single panel could be removed and re-placed with a precast panel during the day, the lane could then be open to rush hour traffic, and the joints and shoulder could be sealed at night.

COST ANALYSIS

The cost of the precast panels was compared to a typical D-1 repair for which would have occurred under "normal" rehabilitation procedures at this location. The unit costs were derived from the low bid contractor. The cost analysis compares just the items related to pavement rehabilitation. Items such as traffic control (use of barrier and attenuator), diamond grinding, and striping were not included in this analysis. Listed below is a cost breakdown based on a length of 216 feet and a width of 12 feet. A more detailed breakdown can be seen in Appendix A.

Repair Type	Cost
Precast Panels	$165,805
Type D-1 Repair	$ 21,656

This analysis assumes that the contractor includes the costs associated with having the manufacturer on-site during construction and at the pre-construction meeting (as required by special provision). The engineers estimate per panel was $5,760, the low bid was $9,040, and the second bidder bid $8,000 per panel.

As shown above, the cost of the precast panels is substantially more than a typical D-1 repair. With such a large discrepancy in costs, the use of precast panels should be weighed carefully versus the time and cost saving associated with user delay.

The above analysis does not consider a life-cycle cost analysis. It is recommended that the durability of these panels be evaluated versus the standard C and D repairs being performed concurrently along the corridor.

DAMAGED PANELS

Following placement of the panels, a couple of hairline cracks were identified in the 14th panel placed. The crack extended from a dowel slot to a pick-hole in the slab. The crack appeared near the crane legs. The contractor elected to use a 35 ton crane to place 8 tons panels. Although the contractor did provide pads for the crane legs, it is possible that the weight of the crane near the slab corner may have contributed to the crack.

According to the special provision, cracked panels were to be removed and replaced at no cost to the department. On a time-sensitive project, it may not be practical to remove a crack panel if a "spare" panel is not available.

It is anticipated that this crack will be held together fairly tightly due to the reinforcement mats in these slabs. In consultation with Mn/DOT's Concrete Unit, the cracked slab was allowed to remain in-place as per Mn/DOT Specification 1503.

Guidance for repairing damaged/cracked panels may want to be included in future specifications.

CONSTRUCTION ZONE / SAFETY ANALYSIS

Construction Zone

The space requirements for construction vehicles of this project were similar to those of a conventional repair project. The wide outside shoulder allowed ample room for panel delivery trucks and the crane to operate safely away from traffic.

On projects with narrow shoulders, special consideration should be given to delivery of panels. Long stretches of repair may pose potential issues for unloading the slabs from the trucks.

Safety Analysis

At the precast panel installation area, temporary precast concrete barrier was installed to protect the workers from the adjacent traffic lanes. The other standard Mn/DOT repairs (e.g. Type C or Type D) on this project were constructed with only barrels separating traffic from the travel lanes.

When compared to a standard C or D repair, the precast panel repair required more time and manpower to prepare the base. Workers were required to set, level and survey the rails for the screed. Approximately 3 or more workers were required to fine-grade the base material with the equipment provided. Workers were consistently against the barrier when fine grading and setting rails.

.

On a smaller type repair (one to two panel replacement), the safety risks to workers for a precast panel system would probably be similar to those of a standard D repair. Both repairs would likely be performed with just barrels protecting the workers from traffic.

- With the precast operation, workers will be adjacent to traffic for longer periods of time during the stone dust grading process, but would likely be protected by the crane during the panel placement process. Workers are also exposed to traffic during the grouting procedures.

- On a D repair, workers would be more exposed to traffic during the concrete placement and finishing process compared to the placing precast panels.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Although the costs of pre-fabricated concrete pavement panels are substantially higher than standard DOT repairs, the elimination of cure time can significantly reduce lane closure time and reduce traffic impacts. User-costs need to be carefully considered when selecting this type of rehabilitation strategy.

2. Work zone safety needs to be considered when using this type of rehabilitation. On a project-by-project basis, the project engineer should carefully weigh the safety measures of using barrier versus the time factor involved with opening the lane to traffic.

3. The production rates on this project may not necessarily reflect the production rates on projects that require rapid turn around. This operation was not on the critical project path. In addition, the contractor had a learning curve with installing this new system.

4. It is possible that on a smaller repair area, a precast repair could be made during the day or night, and re-opened to traffic before the next rush hour. This would involve opening the lane to traffic before the joints were sealed and shoulder repaired. A subsequent "off-peak" lane closure would be required to complete this work.

Recommendations

1. To reduce grading time of the stone dust, the pre-fabricated panels may want to be constructed with a depth slightly less than the depth of the existing slab.

2. The special provisions may want to include additional guidelines and/or flexibility for the project engineer to address cracked or damaged panels. Guidance on how to address non-conformance to specification on special items such as grout strength and stone dust gradations may want to be added.

3. Continue to monitor the long range durability of these precast panels versus the type C and type D repairs performed on this project.

ATTACHMENTS

APPENDIX A Cost Breakdown
APPENDIX B Precast Concrete Pavement Panel Details (3 Sheets)
APPENDIX C Precast Concrete Pavement Panel Special Provisions

APPENDIX A
COST COMPARISON

TYPE D-1 REPAIR

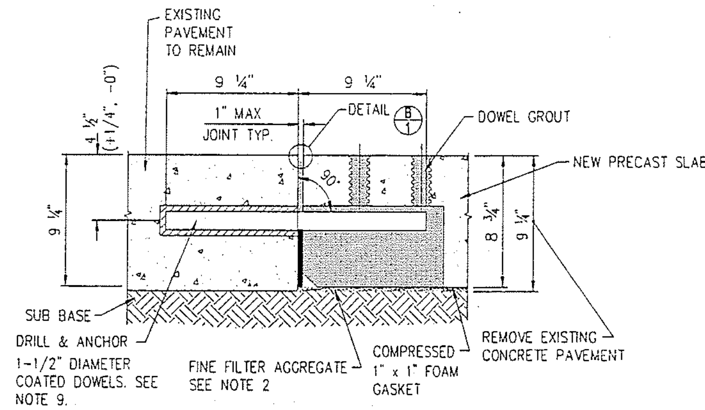
Item	Qty	Unit	Unit Price	COST
TYPE C-3D REPAIR	12	LF	$ 45.55	$ 546.60
TYPE D REPAIR	283	SY	$ 69.20	$ 19,583.60
REINFORCEMENT BARS	90	LB	$ 6.00	$ 552.00
DOWEL BARS	96	EACH	$ 5.00	$ 480.00
SEAL CONC PAVMT JTS	15	LB	$ 3.80	$ 57.00
JOINT REPAIR (A-1H) + (A-5H)	336	LF	$ 1.30	$ 436.80
TOTAL TYPE D-1 REPAIR				**$ 21,656.00**

PRE-CAST CONCRETE PAVEMENT PANELS

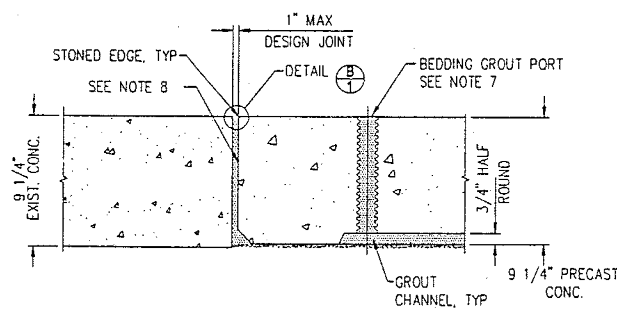
Item	Qty	Unit	Unit Price	COST
REMOVAL CONCRETE PAVEMENT	2592	SF	$1.00	$ 2,592.00
PRECAST CONCRETE PANEL	18	EACH	$9,040.00	$ 162,720.00
SEAL CONC PAVMT JTS	15	LB	$ 3.80	$ 57.00
JOINT REPAIR (A-1H) + (A-5H)	336	LF	$ 1.30	$ 436.80
TOTAL PRE-CAST REPAIR				**$ 165,805.80**

APPENDIX B

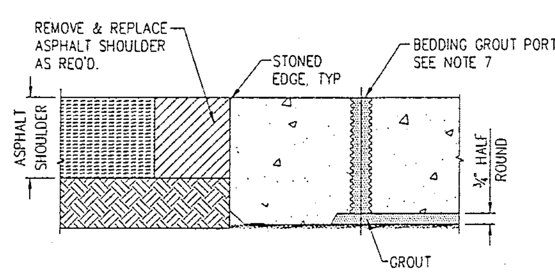
Precast Panel Design Details



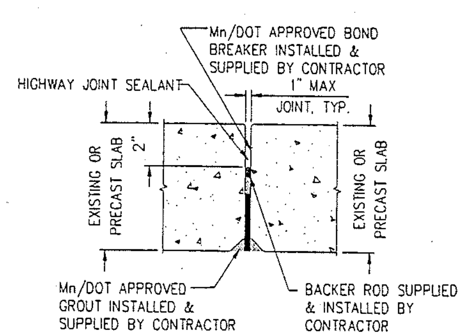
SECTION A-A
EXISTING CONCRETE TO PRECAST



SECTION C-C
PRECAST TO EXISTING LANE



SECTION E-E
PRECAST TO ASPHALT SHOULDER



DETAIL B/1

PRECAST PANEL REPLACEMENT NOTES:

1. DO NOT LEAVE LESS THAN 12' OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.

2. FINE FILTER AGGREGATE WITH EXCEPTION OF:

THE SURFACE TOLERANCE IS +/- 2.0mm
AND
THE CUSHION SAND SHALL BE CRUSHER RUN LIMESTONE (STONE DUST) MEETING THE FOLLOWING GRADATION. ALL MATERIALS FURNISHED SHALL BE WELL GRADED AND FREE FROM UNSUITABLE MATERIALS. ALL PROCESSING SHALL BE COMPLETED AT THE SOURCE. FINE FILTER AGGREGATE SHALL BE INCIDENTAL.

GRADATION:

SIEVE SIZE DESIGNATION	PERCENT PASSING BY WEIGHT
1/2" MAX	100
NO. 4	80-100
NO. 10	55-75
NO. 40	10-40
NO. 200	0-20

3. JUST PRIOR TO PLACING SLABS DAMPEN THE SUBGRADE WITH WATER (AOBE) TO FACILITATE SUBSEQUENT BEDDING GROUT INSTALLATION.

4. IN MULTIPLE PRECAST PANEL INSTALLATIONS PLACE SLABS WITH MALE ENDS FIRST. ADJACENT SLABS WITH FEMALE ENDS ARE PLACED OVER THE MALE EDGES.

5. PLACE SPRAY FOAM GROUT DAMS AT THE TERMINUS OF ALL OPEN JOINTS PRIOR TO GROUTING.

6. INSTALL DOWEL GROUT MATERIAL IN THE BACK PORT OF EACH SLOT UNTIL THE GROUT LEVEL IN THE ADJACENT JOINT IS WITHIN 2" OF THE TOP OF THE SLAB. INSTALL DOWEL GROUT WITHIN 24 HOURS AFTER SLAB PLACEMENT IN STRICT ACCORDANCE WITH THE SPECIFICATION.
7. STARTING AT THE LOWEST PORT IN EACH SLAB PUMP BEDDING GROUT UNTIL IT COMES OUT THE CORRESPONDING PORT AT THE OTHER END OF THE SLAB. INSTALL BEDDING GROUT WITHIN 48 HOURS AFTER SLAB PLACEMENT IN STRICT ACCORDANCE WITH THE SPECIFICATION.

8. BOND BREAKER NOTES
   A) PRECAST PANELS NEXT TO EXISTING CONCRETE TO REMAIN:
      BOND BREAKER/RELEASE AGENT SHALL BE APPLIED TO VERTICAL SURFACE OF EXISTING PAVEMENT.
   B) PRECAST PANELS NEXT TO EXISTING CONCRETE TO BE REMOVED:
      BOND BREAKER/RELEASE AGENT SHALL BE APPLIED TO VERTICAL SURFACE OF PRECAST PANELS.
   C) PRECAST PANELS NEXT TO PRECAST PANELS:
      BOND BREAKER/RELEASE AGENT SHALL BE APPLIED TO VERTICAL SURFACE OF FIRST PANEL PLACED.
   D) PRECAST PANELS NEXT TO ASPHALT:
      BOND BREAKER/RELEASE AGENT IS NOT REQUIRED AT THIS LOCATION.
9. DOWEL LAYOUT VARIES PER EACH PANEL WIDTH. LAYOUT DOWELS FOR DRILLING ACCORDINGLY. DOWELS MUST BE WITHIN 1/4" OF PLAN LOCATION TO FIT INVERTED DOVETAIL SLOT (MOUSEHOLE) IN ADJACENT SLAB.

NOTICE

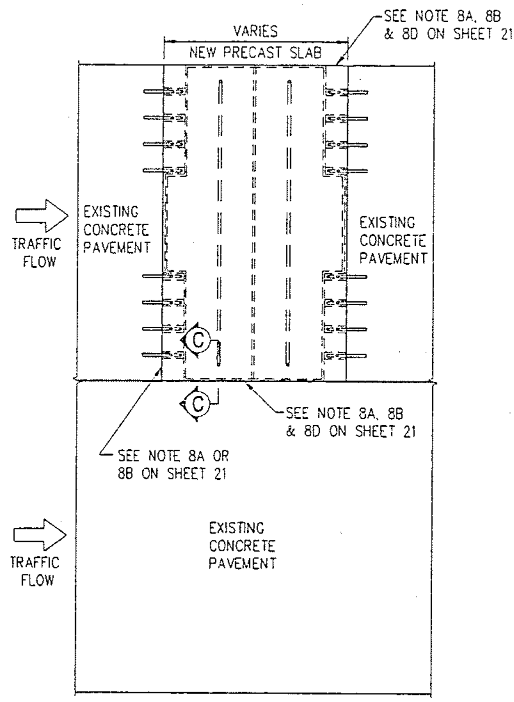
*SUPER-SLAB® IS A PROPRIETARY PRODUCT PROTECTED UNDER AT LEAST ONE OF US PATENT NUMBERS; (6,607,329), (6,663,315), (6,709,192), (6,899,489), (6,962,462) AND (7,004,674) AND OTHER U.S. AND FOREIGN PATENTS PENDING. SUPER-SLAB® IS A REGISTERED US TRADEMARK OWNED BY THE FORT MILLER CO. INC.

PLOTTED/REVISED: 10-FEB-2005 10:53

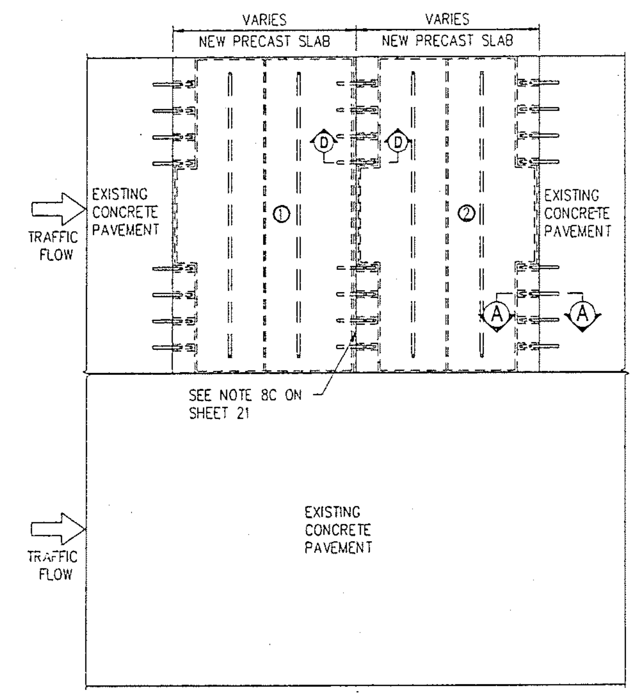
DISTRICT *: $@DISTRICT@$
IPLOT NAME: EXPORT
PATH & FILENAME: S:\DESIGN\062\2775\012\final\sheets\EXPORT.dgn

DRAWN BY: DJW	CHECKED BY: VAN	CERTIFIED BY Victoria Nill (LICENSED PROFESSIONAL ENGINEER)	LIC. NO. 41667 DATE 2-10-05	PRECAST CONCRETE PAVEMENT PANEL DETAILS STATE PROJ. NO. 2775-12 (T.H. 62) SHEET NO. 21 OF 170 SHEETS

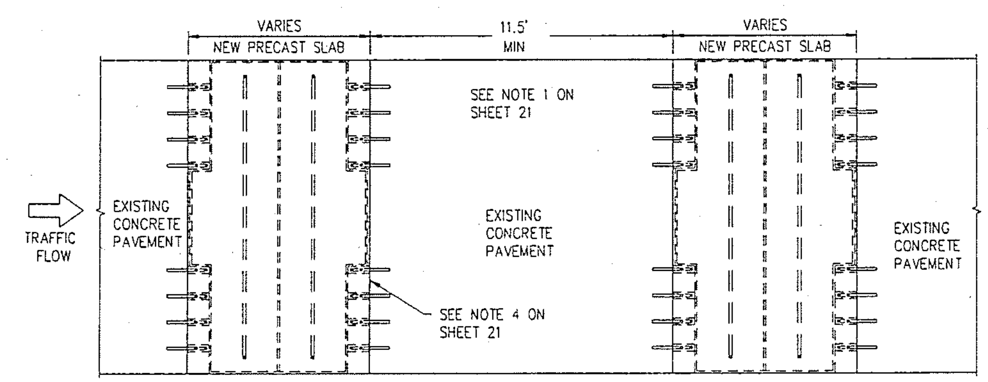
PLOTTED/REVISED: 10-FEB-2005 10:53
DISTRICT *: $@DISTRICT@$
IPLOT NAME: D27751Z_s2_dtl
PATH & FILENAME: S:\DESIGN\062\2775\012\final\sheets\D27751Z_dtl.dgn



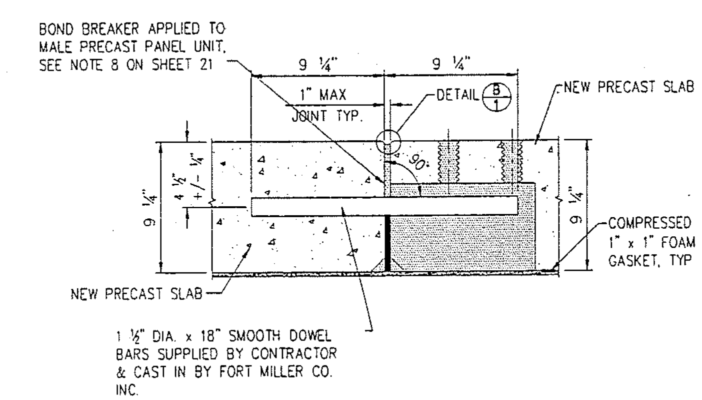
PLAN VIEW
SINGLE LANE REPLACEMENT



PLAN VIEW
MULTIPLE SLAB REPLACEMENT (SINGLE LANE)
- DENOTES SETTING SEQUENCE



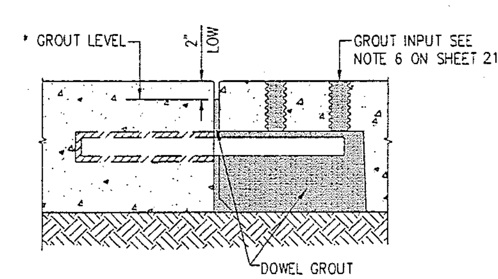
PLAN VIEW
SINGLE LANE REPLACEMENT



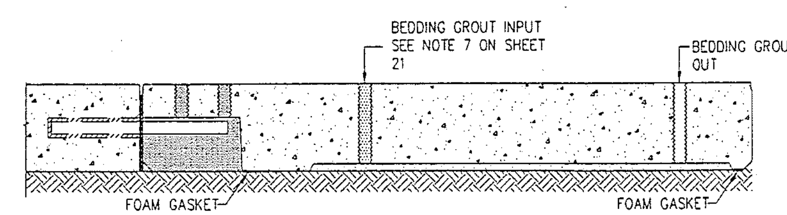
SECTION D-D
PRECAST TO PRECAST

NOTICE

*SUPER–SLAB® IS A PROPRIETARY PRODUCT PROTECTED UNDER AT LEAST ONE OF US PATENT NUMBERS; (6,607,329), (6,663,315), (6,709,192), (6,899,489), (6,962,462) AND (7,004,674) AND OTHER U.S. AND FOREIGN PATENTS PENDING. SUPER–SLAB® IS A REGISTERED US TRADEMARK OWNED BY THE FORT MILLER CO. INC.

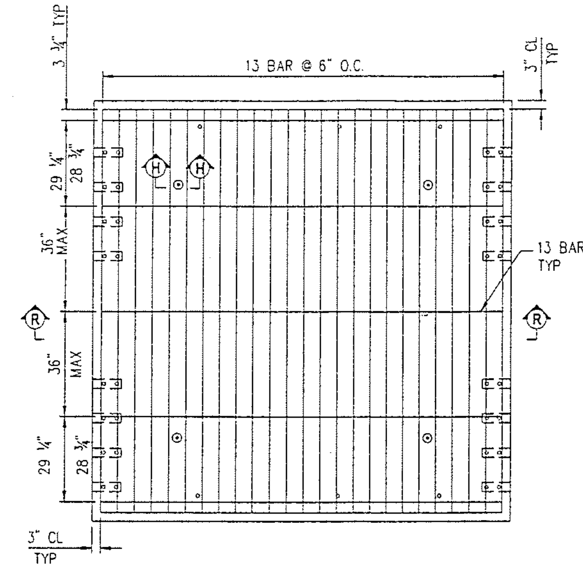


DOWEL BAR GROUTING DETAIL
* THIS DETAIL REQ'D, SEE DETAIL B/1



BEDDING GROUT DETAIL

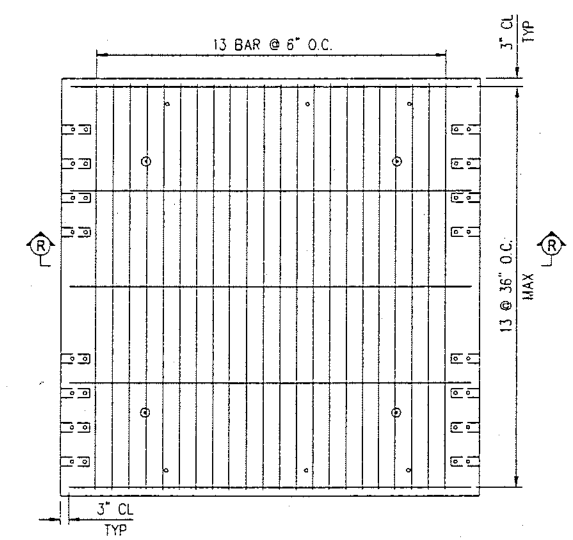
DRAWN BY: DJW	CHECKED BY: VAN	CERTIFIED BY Victoria Nill LICENSED PROFESSIONAL ENGINEER	LIC. NO. 41667 DATE 2-10-05	PRECAST CONCRETE PAVEMENT PANEL DETAILS STATE PROJ. NO. 2775-12 (T.H. 62) SHEET NO. 22 OF 170 SHEETS



TOP MAT REINFORCEMENT

REINFORCEMENT SCHEDULE		
BAR MARK	QTY	LENGTH
13	47	11 ½'
13	12	11 ½'

TRIM AS REQ'D

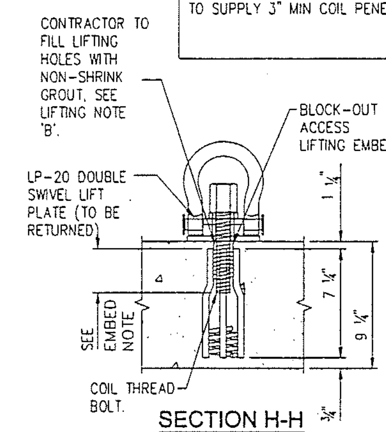


BOTTOM MAT REINFORCEMENT

REINFORCEMENT SCHEDULE		
BAR MARK	QTY	LENGTH
13	47	11 ½'
13	12	11 ½'

TRIM AS REQ'D

EMBED NOTE:
1" DIA.COIL BOLT ONLY REQUIRES 2 ½" MIN COIL PENETRATION, FORT MILLER TO SUPPLY 3" MIN COIL PENETRATION.



SECTION H-H

LIFTING INSERT DETAIL 'B'

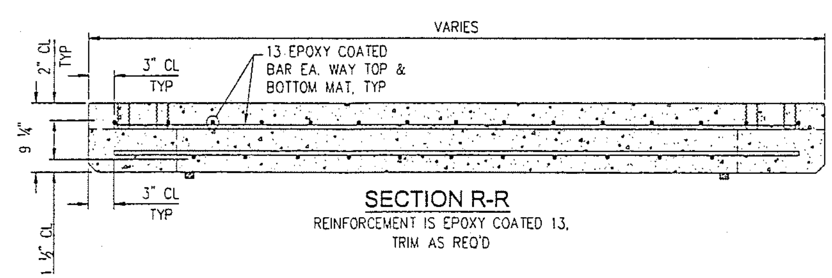
1" DIA. x 7 ½" L MEADOW BURKE CX-51 GALV. OPEN COIL INSERT

LIFTING NOTE 'B':
BEFORE PATCHING CONTRACTOR TO CLEAN LIFTING HOLE OF ALL DEBRIS & ACCUMULATED WATER. LIFTING HOLE SHALL BE FILLED IN SUCH A MANNER AS NOT TO ALLOW AIR TO BECOME TRAPPED UNDER THE GROUT MATERIAL

BAR MARK No. LEGEND
"E" - DENOTES EPOXY COATED REINFORCEMENT.
FIRST TWO NUMERICAL DIGITS INDICATE BAR SIZE.

NOTICE

*SUPER-SLAB® IS A PROPRIETARY PRODUCT PROTECTED UNDER AT LEAST ONE OF US PATENT NUMBERS; (6,607,329), (6,663,315), (6,709,192), (6,899,489), (6,962,462) AND (7,004,674) AND OTHER U.S. AND FOREIGN PATENTS PENDING. SUPER-SLAB® IS A REGISTERED US TRADEMARK OWNED BY THE FORT MILLER CO. INC.



SECTION R-R

REINFORCEMENT IS EPOXY COATED 13, TRIM AS REQ'D

ALL REINFORMENT BARS SHALL BE EPOXY COATED STEEL

PRECAST CONCRETE PAVEMENT PANEL DETAILS

DRAWN BY: FM | CHECKED BY: VAN | CERTIFIED BY Victoria Nill (LICENSED PROFESSIONAL ENGINEER) | LIC. NO. 41667 | DATE 2-10-05

APPENDIX C

Special Provision Specifications

(Includes Concrete Mix Design)

S-1 (2301) FABRICATION AND PLACEMENT OF PRECAST CONCRETE PAVEMENT PANELS

This work consists of furnishing and installing reinforced precast concrete highway pavement slabs as shown on the Plans and in accordance with the following:

S-1.1 DESCRIPTION

These special provisions apply to removal of the existing portland cement concrete pavement as shown on the Plans, replacement and construction, as shown on the Plans, requires construction of the Super-Slab™ precast pavement system. The Super-Slab™ system consists of reinforced precast concrete panels with cast-in features for establishing load transfer, lane-to-lane ties, and uniform support under the panels. The method of panel placement as described in these Special Provisions is a vital feature of the Super-Slab™ paving system, for which no proposal for alternate construction method will be accepted. "Or equal" systems are not allowed in this Contract.

S-1.2 PRE-PLACEMENT MEETING

Supervisory personnel of the Contractor, technical representative of the Super-Slab™ System, precast panel fabricator, and any subcontractor who will be involved in the precast pavement construction work shall meet with the Engineer at a preconstruction conference, at a mutually agreed time and location, to discuss the methods of accomplishing the work and the contingency plan.

The Contractor shall provide a facility for the conference. The facility shall be at a location agreed to by the Engineer and Contractor. The conference will be conducted by the Engineer. All conference attendees shall sign an attendance sheet provided by the Engineer. Fabrication and placement of the precast concrete panels or any of the preparatory work shall not proceed until the above-mentioned personnel have attended the preconstruction conference.

In addition to the preconstruction conference, the technical representative for the Super-Slab™ System shall conduct training on the installation techniques and requirements of the Super-Slab™ system. Attendance at this training is mandatory for the Project superintendent, construction foreman, the Project surveyor, grout suppliers, grout installers, equipment operators involved in operating the SUPERGRADER™ (or other specialized grading equipment) and setting the panels, any subcontractors involved in installation of the panels, and the Engineer or his designated representative(s). The training shall be in addition to the preconstruction conference and shall be scheduled no more than 2 weeks prior to the placement of the panels. The training shall be held during normal working hours.

The Contractor shall present a detailed schedule breakdown of each task required to place the precast pavement within the allotted time. Schedule backup including equipment type, quantity and production rates shall also be provided.

S-1.3 MATERIALS

(A) Portland Cement Concrete shall conform to the requirements of Mn/DOT 3126, 3137, and 2461. The Mix Design shall be 3W36 and have a minimum compressive strength of 3900 psi at 28 days. The Precast Fabricator shall submit a mix design to the Engineer for approval.

(B) Reinforcing and Tie Bars shall conform to the requirements of Mn/DOT 3301 unless otherwise shown on the Contract Drawings.

(C) Cement Bedding Grout shall meet the following requirements:

1. Compressive Strength - When tested in accordance with ASTM C 109, a minimum of 500 pounds per square inch in 24 hours.
2. Shrinkage - When tested in accordance with ASTM C157, the dry shrinkage shall be less 0.04% at 28 days.

3. Flowability - When tested in accordance with ASTM C939 using a ½ inch flow cone, the flowability shall be 30 seconds or less.

(D) Miscellaneous Materials

1. Chairs, Bolsters and other metal supporting devices - All chairs, bolsters, and other metal supporting devices shall be ASTM A666 Stainless Steel Type 316L, or carbon steel with 1/2 inch long plastic coated leg ends.
2. Foam Gaskets - Two pound polyester foam gasket material meeting the requirements of ASTM D3574 installed as shown on the Plan sheets to create discrete grout chambers.

(E) Joints

1. Preformed bituminous joint filler shall conform to the requirements of Mn/DOT 3702 and shall be punched to admit dowels. Filler for each joint shall be furnished in a single piece for the full depth and width required for the joint.
2. Dowels shall be 1 ½ inch diameter, 18 inches long, epoxy coated, spaced 12 inches on center and shall conform to the requirements of Mn/DOT 3302.
3. Precast forms shall be capable of maintaining dowels and slot formers in proper position and alignment both before and during concrete placement in plant. Embed dowels as shown on the Contract Drawings.
4. Longitudinal and transverse joints shall be sealed according to Section S-95 (JOINT AND CRACK SEALANT (HOT POURED, EXTRA LOW MODULUS, ELASTIC TYPE)) of these Special Provisions and in accordance with standard Plans and plates.

(F) Grout for Dowel Slots shall meet the following requirements:

1. Compressive Strength - When tested in accordance with ASTM C 109, a minimum of 2500 pounds per square inch in eight hours, or prior to opening to traffic, whichever results in the shorter curing period.
2. Shrinkage - When tested in accordance with ASTM C157, the dry shrinkage shall be less 0.04% at 28 days.
3. Freeze-Thaw Resistance – Maximum of 1.0% loss
4. Flowability - As required to completely fill the slots under the weather conditions expected at the time of grouting.
5. Twenty-one days prior to installation of the precast pavement mix a trial batch of the grout for dowel slots to demonstrate to the Engineer the flowability and compressive required strength can be achieved. The Engineer will test the trial batch in accordance with ASTM C 109.

(G) Cushion Sand for the Setting Bed

The cushion sand shall be crusher run limestone (stone dust) free of unsuitable materials. All processing shall be completed at the source and the gradation shall meet the following:

Sieve Size Designation	Percent Passing By Weight
½ inch	100
No. 4	80 – 100
No. 10	55 – 75
No. 40	10 – 40
No. 200	0 - 20

S-1.4 <u>DESIGN</u>

(A) Connections - Design, detail and provide anchors, dowels, bolts, steel inserts, connecting plates and any additional reinforcement as required in connection with the fabrication and placing of precast concrete units to be held in position rigidly to prevent displacement while concrete is being placed and cured. All welding shall be in accordance with applicable sections of AWS D 1.4 and AWS D1.5.

(B) The concrete slabs shall be cast to the following tolerances:

Length	+/- ¼ inch
Width	+/- ¼ inch
Thickness	+/- 1/8 inch
Difference in diagonals	not to exceed ¼ inch
Edge Squareness	1/8 inch in 10 inches (in relation to top and bottom surfaces)

(C) Dowel Bars, dowel slots and assemblies shall be checked for position and alignment. The maximum permissible tolerance on dowel bar alignment in each plane, horizontal and vertical, shall not exceed 2 percent or ¼ inch per foot of dowel bar. Dowel position shall meet the following:

1. Horizontally, within plus or minus ½ inch of specified spacing.
2. Vertically, within plus or minus ½ inch at mid-depth of slab.
3. Midpoint of the dowel relative to the center of the joint, within one inch.
4. Dowel Slot centers shall horizontally align within ¼ inch of the matching dowel bar.

(D) In-Place Pavement Requirements

1. Pavement Alignment
   a. Lateral and longitudinal deviation from the alignment of the pavement edge shown on the Contract Drawings shall not exceed plus or minus 0.04 foot.
   b. Vertical deviation from the grade shown on the Contract Drawings shall not exceed plus or minus 0.04 foot.
2. The surface planes of the newly placed adjacent panels shall be within plus or minus 1/8 inch of each other vertically.
3. Edge Elevation Differential - The difference in elevation across a joint between slabs shall not exceed 0.02 foot.
4. No cracks or spalls.
5. Finished surface shall be smooth, even textured, uniform in color and free of surface defects and blemishes.

S-1.5 FABRICATION

(A) All concrete shall be cast in forms at a plant before delivery to the construction site.

(B) Fabricate precast concrete pavement slabs to conform to the shape and size shown on the Contract drawings. The Contractor is advised that certain elements and/or processes contained in the Plans and this specification for Precast Concrete Highway Pavement Slabs (Super-Slab™) may be patented or subject to patents pending by the Fort Miller Company, Inc. of Schuylerville, NY (518) 695-5000.

(C) Cast pavement slabs to the length and width indicated on the Plans. Cast slabs as single planed or warped planed as shown on the shop drawings and provide drawings for Engineers review. Label each slab clearly showing the mark number, date of manufacture, fabricator and the Mn/DOT Project number.

(D) Fabrication shall be governed by the provisions of Mn/DOT 3238 unless superceded by any additional requirements contained herein.

(E) Formwork

1. Construct forms to withstand all casting, stripping and handling operations.
2. Construct forms to maintain units within the tolerances specified in Section S-45.4B.
3. Securely attach anchorage devices to formwork in locations not affecting position of main reinforcement or placing of concrete.
4. Forms shall be made of steel.
5. Forms shall remain in place until a lifting and stripping strength requirement of 3000 pounds per square inch compressive strength is achieved.
6. All forms and beds shall be thoroughly cleaned after each use.

(F) Reinforcement

1. Fabricate and place concrete reinforcement as shown on Contract Drawings and on approved shop drawings in accordance with Mn/DOT 2472.
2. Bend all concrete reinforcement cold. Heating of bars or steel wire is prohibited.
3. Clean concrete reinforcement of loose rust, mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
4. Additional reinforcing, if required, shall be provided to resist all tensile stresses incurred during handling and placement.
5. Reinforcing Bar Accessories and Reinforcing Bar Couplers shall be of a non-corrosive type to suit the condition, or as specified on the Contract Drawings.
6. All reinforcement in precast concrete units shall be epoxy coated unless otherwise noted on the Contract Drawings.

(G) Dowels

1. Place dowels of required size and type, at locations shown on the Contract Drawings.
2. Set all dowels accurately, parallel to the pavement surface and perpendicular to the pavement joint to within tolerance of the dimensions shown on the Contract Drawings.
3. Support dowels rigidly using approved assemblies capable of holding dowels in position during the entire fabrication.
4. After fabrication, protect dowels against damage during lifting, handling and transporting.

(H) Casting

1. Place concrete in continuous operation.
2. Provide block-outs for openings as required.
3. Provide permanent markings on precast units to identify pickup points and location in pavement.
4. Curing of precast concrete shall be by either in accordance with Mn/DOT 2405. Requirements of Mn/DOT 2405.3F3 shall apply when any external source of heat is used.

(I) Surface Texturing

1. Fill all air pockets and holes over 1/2 inch in diameter using a sand-cement paste. Sand-cement paste shall be taken from concrete mix being used after being screened from a 3/8 inch sieve. For exposed areas, form offsets or fins over 1/8 inch shall be ground smooth.

2. Provide smooth surfaces on the bottom and side surfaces of each slab; provide an astroturf carpet or broom type finish to the top surface of the slab by dragging the carpet transversely to the traffic direction, or as ordered by the Engineer.
3. Provide two identical samples (minimum 0.6-m by 0.6-m [**2 feet by 2 feet**] size) of the specified finish and submit them to the Engineer for approval. The Engineer will return one sample to the precast plant where it will be kept throughout the production process for quality assurance purposes. Match the texture of the production precast slabs to the finish of the approved texture samples.

(J) Top Edges - Round the top edges of all panels with a hand stone to prevent chipping during handling and installation. No Chamfering on the top edge will be allowed.

(K) Unless approved by the Engineer, do not drill or cut holes or install sleeves in precast concrete units larger than size permitted by precast concrete manufacturer for pipe, conduits duct or other penetrations after fabrication.

(L) Do not cut reinforcing without written approval of the manufacturer and as acceptable to the Engineer.

(M) Quality Control/Quality Assurance

<u>Contractor's Quality Control</u>

1. Precast Plant
   a. The Precast manufacturer's production facility shall be certified through either NPCA or PCI.
   b. The plant quality control and engineering shall be under the direction of an engineer with at least five years experience in this field.
2. Precast Concrete Installer Qualifications
   The entity performing installation of precast concrete pavement can demonstrate the abilities required under this Contract. The qualifications include:
   a. Ability to lift, handle and transport precast concrete units of similar size and weight.
   b. Ability to install precast concrete units to within the same or stricter tolerances required in Section S-45.4D.

<u>Engineer's Quality Assurance Inspections</u>

1. At the Precast Plant
   a. Prior to shipment the Engineer will approve each precast concrete unit, subject to the following:
   b. Each unit shall be free of cracks and spalls.
   c. Dimensions shall meet the tolerance requirements of Section S-45.4B.
   d. Concrete will be tested in accordance with and meet the requirements of Mn/DOT 2461.
   e. Dowel bars and slots shall meet the requirements of Section S-45.4C.
   f. Surface finish shall meet the requirements of Section S-45.5I.

2. At the Storage Area
   a. Upon delivery to the storage area and as precast units are stacked, they will be inspected by the Engineer for any damage due to handling and transport. All repairs to the precast units shall be performed according to a written repair plan submitted and approved by the Engineer.

b. Any units which are cracked, have more than one dowel bar bent out of tolerance or are spalled greater than 6 inches in any dimension shall be removed and replaced with a new precast unit at no cost to the Agency.
c. Spalls less than 6 inches shall be repaired as approved by the Engineer.
d. When a single dowel is bent out of tolerance, it shall be cut off flush with the face of the edge of the precast unit.

3. Acceptability of precast concrete units is at the sole discretion of the Engineer. Any remedial work ordered by the Engineer shall be at no additional cost to the Agency.

(N) Delivery, Storage and Handling

1. The manufacturer's instructions for handling and transportation of precast concrete units shall be followed.
2. Lift units at designated points only, using approved lifting inserts.
3. Do not place units in positions that will cause overstress, warp, or twist.
4. Protect units from dirt, damage and staining at all times.
5. Place stored units so that identification marks are discernible.
6. Stacked members shall be separated and supported by dunnage placed as shown on the approved shop drawings. Dunnage shall be arranged in vertical planes at a distance not greater than the depth of the member from designated pickup points. Dunnage shall not be continuous over more than one stack of precast units. Stacking of members shall be such that lifting devices will be accessible and undamaged. The upper members of a stacked tier shall not be used as storage areas for shorter units or equipment.
7. Prior to installation, the Contractor shall inspect all panels for missing or damaged gasket material. The Contractor in the field shall replace any gasket material that has been displaced or will otherwise compromise the grouting operation.

S-1.6 CONSTRUCTION

(A) Application of Pavement Joints

1. The type, size, shape and location of joints, shall be as shown on the Contract Drawings.
2. Break bond at all joints by coating the entire length of the exposed portion of the dowel with a thin even film of lubricating oil.

(B) Removals and Surface Preparation

1. Sawcut and Remove existing concrete pavement.
2. Install fine graded stone dust setting bed in accordance with Contract Drawings, and the precast manufacturer’s instructions and technical specifications. Specialized grading equipment provided by the Precast Manufacturer shall be used. Verify elevation of the stone dust base is within a tolerance of plus or minus 1/10 inch prior to proceeding with placement of precast units.

(C) Placement of Precast Concrete Units

1. A representative of the precast manufacturer shall be present at the construction site to advise the Engineer and the Contractor on the proper handling and placement of the precast units at no additional cost to the Agency.
2. Mark out leading ends and leading edges of all slabs to ensure proper placement and fit. Allow for the joint width shown on the Contract Drawings. Do not disturb the graded stone dust setting bed during mark out.

3. Uniformly dampen stone dust surface with a fine spray of water, care should be taken not to disturb the surface grade, or placement markings.
4. Place precast units in accordance with the precast manufacturers placing instructions and the placement mark out lines.
5. Set the precast units in a manner such that the slab contacts the setting bed uniformly to avoid disturbing the finished fine graded stone dust setting bed and to avoid damaging the edges of the slab. Insure the inverted slots on the bottom of the slab properly align with the embedded dowels protruding from previously placed slabs.
6. Use tie off ropes to avoid chipping or spalling edges of the precast units. Use wood wedges or similar devices to guide the slab in to the correct position. The use of steel pry bars that chip edges should be avoided. Repair chipped or spalled areas as required by the Engineer.
7. Verify that slab grades and edge elevation differentials are within the tolerances specified in Section S-45.4B, reset slabs if required.
8. Fill lifting insert holes with grout for dowel slots.

(D) Dowel Slot Grouting

1. Provide sufficient mixing and pumping equipment to meet the production requirements of the Project.
2. Install spray foam grout dams at the free ends of joints to prevent grout from escaping.
3. Mix dowel bar grout in strict accordance with the manufactures directions and to meet the requirements of Section S-45.3F.
4. Pump dowel grout into one grout port in each dowel slot until it exudes from the second grout port in the same slot. Avoid or minimize spilling of grout on the surface of the precast slabs.
5. While the grout is plastic, monitor the grout ports and add material if settlement occurs.

(E) Cement Grout Bed

1. Begin installation of cement grout bed once the joint slots units have been properly grouted.
2. Mix cement grout in accordance with the manufacturer's recommendation.
3. The pump shall be capable of moving the grout from the injection port to the vent hole at the other end of the slab without lifting the slab.
4. Commence grout pumping at the downhill chamber at the lowest port. Pump the grout until it exudes from the corresponding port at the other end of the slab insuring full bedding of the slab in that chamber. Complete the grouting operation, chamber by chamber until all remaining chambers are filled.
5. Grout pressure shall be continually monitored for pressure build up.
6. Monitor vent port to ensure that the cement grout is being properly distributed. If the grout does not exude from the port at the other end of the slab, check the flowability of the mix using the flow cone. Modify the mix design or operations accordingly.

(F) Field Tests

1. When the precast slab is being set, the Engineer and Contractor shall jointly test the pavement surface for conformance to the smoothness requirements of Section S-45.4 D. If the slabs are not in conformance with Section S-45.4D, the slab shall be removed and corrected until requirements are met. Any other deficiencies shall be corrected as specified in Section S-45.6G.

(G) Correction of Deficiencies as specified herein shall be made at no cost to the Agency.

1. Remove and Replace Precast Concrete Units
   Precast concrete units shall be removed and replaced in a manner approved by the Engineer and at no additional cost to the Agency if any of the following deficiencies exist in the finished pavement:
   a. Units exhibiting any cracks, due to installation.
2. Spall Repairs - Any slabs that spall during installation shall be repaired as approved by the Engineer.

S-1.7 MEASUREMENT AND PAYMENT

The work for the installation of precast concrete highway pavement slabs will be measured as the number of precast panels satisfactorily furnished and installed.

Payment for precast concrete highway pavement slabs will be made in accordance with the schedule set forth below at the appropriate Contract bid price for the specified unit of measure. Such payment shall be compensation in full for all costs incidental thereto.

Item	Description	Unit
2301.602	Precast Concrete Pavement Panel	Each

APPENDIX D

Joint Load Transfer Efficiency and Midpanel Deflection Test Data

The following pages contain the data from falling weight deflectometer (FWD) testing conducted on the TH 62 precast concrete panel test section. The data can be used as a basis for the development of long term joint and midpanel performance models for precast concrete pavement.

Test locations can be referenced to Figure 2.2 in the main report. Midpanel locations MP1 and MP11 were tests conducted on original concrete pavement panels immediately before and after the precast slabs.

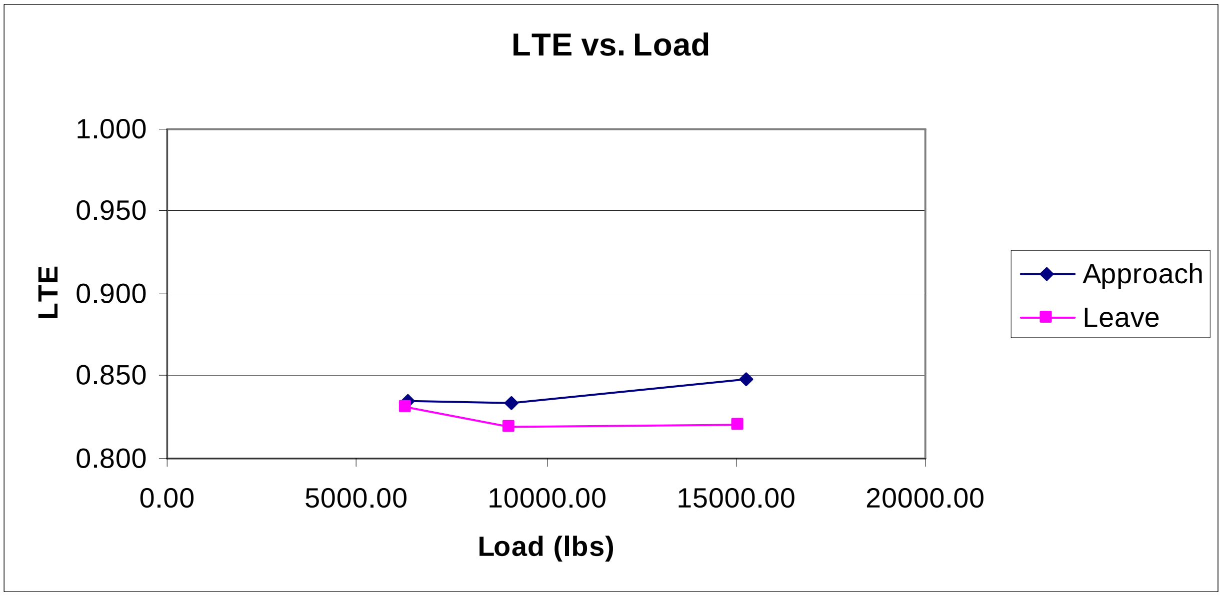
The data summaries are sorted first by test date, then by type (joint load transfer efficiency, midpanel deflection). Each summary page contains three elements: 1) FWD test and deflection data, 2) joint load transfer efficiency or deflection analysis, and 3) a plot. For the joint load transfer efficiency (LTE) summaries, the plot can be used to observe the change in LTE versus load applied. Differences in LTE when the load is placed on the approach or leave side of the joint can also be observed. For the midpanel deflection summaries, the plot can be used to observe the presence of voids (trendline crosses the vertical axis above zero).

Data from FWD Testing on September 8, 2005

Joint 1 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ1	1.0	08-Sep-05	0:18	1	3	398	220	175	183
62J25005	LJ1	1.0	08-Sep-05	0:18	1	4	402	219	177	183
62J25005	LJ1	1.0	08-Sep-05	0:18	1	5	400	219	174	183
62J25005	LJ1	1.0	08-Sep-05	0:18	1	6	572	303	241	253
62J25005	LJ1	1.0	08-Sep-05	0:18	1	7	572	303	240	253
62J25005	LJ1	1.0	08-Sep-05	0:18	1	8	572	305	241	253
62J25005	LJ1	1.0	08-Sep-05	0:18	1	9	961	478	378	404
62J25005	LJ1	1.0	08-Sep-05	0:18	1	10	962	479	378	406
62J25005	LJ1	1.0	08-Sep-05	0:18	1	11	960	479	379	408
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	3	396	219	183	179
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	4	396	219	182	179
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	5	396	219	181	178
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	6	566	303	245	246
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	7	566	304	250	247
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	8	568	303	250	247
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	9	949	480	393	391
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	10	949	481	395	392
62J25005	AJ1	1.1	08-Sep-05	0:20	1.1	11	948	482	396	393

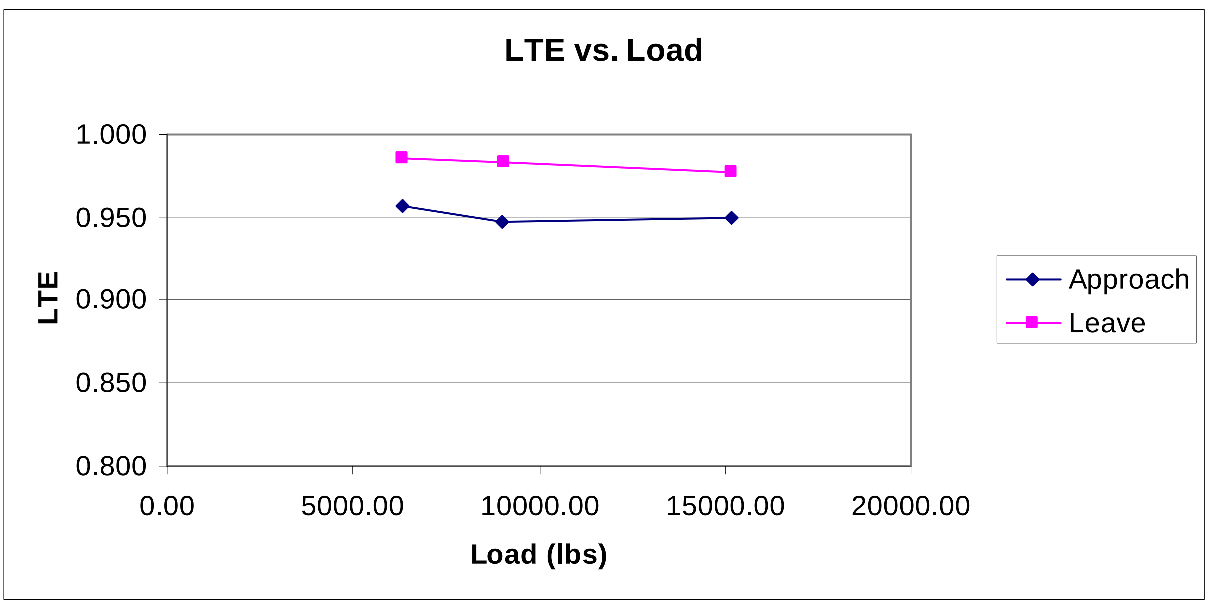
Surface Temp (^{o}C)			16.9	16.9		
Surface Temp (^{o}F)			62.4	62.4		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	A	A	A	A	A	A
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6360.00	6296.4	9094.8	9010	15279.9	15083.8
Normalized Deflections	0.943	0.953	0.990	0.999	0.982	0.994
D1 Deflection (mills)	8.14	8.21	11.83	11.93	18.50	18.83
D2 Deflection (mills)		6.83		9.76		15.45
D3 Deflection (mills)	6.80		9.85		15.69	
Load Transfer (%)	0.834	0.831	0.833	0.819	0.848	0.821
Differential Deflection	1.35	1.39	1.97	2.16	2.81	3.38



Joint 2 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ2	1.0	08-Sep-05	0:24	2	3	399	170	142	164
62J25005	LJ2	1.0	08-Sep-05	0:24	2	4	399	170	139	162
62J25005	LJ2	1.0	08-Sep-05	0:24	2	5	397	171	139	163
62J25005	LJ2	1.0	08-Sep-05	0:24	2	6	567	238	194	226
62J25005	LJ2	1.0	08-Sep-05	0:24	2	7	569	240	195	226
62J25005	LJ2	1.0	08-Sep-05	0:24	2	8	567	239	195	227
62J25005	LJ2	1.0	08-Sep-05	0:24	2	9	954	386	318	367
62J25005	LJ2	1.0	08-Sep-05	0:24	2	10	953	389	319	369
62J25005	LJ2	1.0	08-Sep-05	0:24	2	11	955	391	320	371
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	3	399	169	166	139
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	4	397	168	166	139
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	5	399	169	167	139
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	6	568	233	230	190
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	7	567	236	231	191
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	8	570	235	231	191
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	9	951	379	370	307
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	10	954	380	371	309
62J25005	AJ2	1.1	08-Sep-05	0:26	2.1	11	954	380	372	309

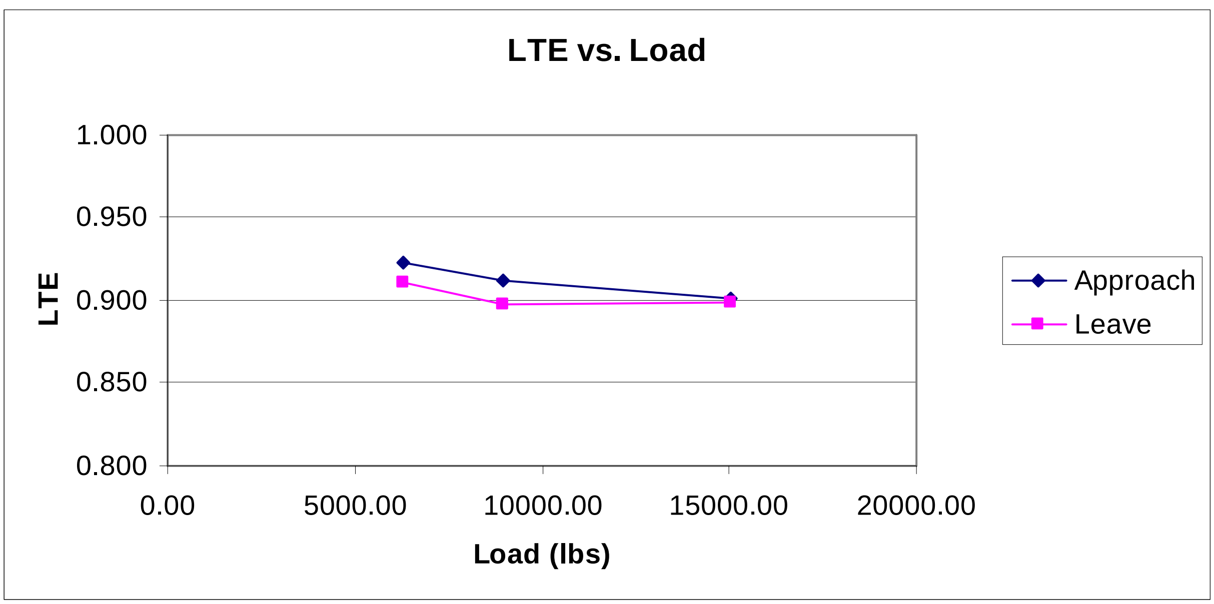
Surface Temp (^{o}C)			17.9	18		
Surface Temp (^{o}F)			64.2	64.4		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	B	B	B	B	B	B
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6333.50	6333.5	9025.9	9036.5	15168.6	15152.7
Normalized Deflections	0.947	0.947	0.997	0.996	0.989	0.990
D1 Deflection (mills)	6.35	6.29	9.38	9.20	15.13	14.79
D2 Deflection (mills)		6.20		9.04		14.46
D3 Deflection (mills)	6.08		8.88		14.36	
Load Transfer (%)	0.957	0.986	0.947	0.983	0.949	0.977
Differential Deflection	0.27	0.09	0.50	0.16	0.77	0.34



Joint 3 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ3	1.0	08-Sep-05	0:29	3	3	398	220	176	203
62J25005	LJ3	1.0	08-Sep-05	0:29	3	4	395	219	177	202
62J25005	LJ3	1.0	08-Sep-05	0:29	3	5	397	220	177	203
62J25005	LJ3	1.0	08-Sep-05	0:29	3	6	564	299	239	272
62J25005	LJ3	1.0	08-Sep-05	0:29	3	7	564	303	243	276
62J25005	LJ3	1.0	08-Sep-05	0:29	3	8	565	302	242	276
62J25005	LJ3	1.0	08-Sep-05	0:29	3	9	945	474	379	427
62J25005	LJ3	1.0	08-Sep-05	0:29	3	10	948	477	383	430
62J25005	LJ3	1.0	08-Sep-05	0:29	3	11	946	479	384	432
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	3	396	232	212	192
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	4	396	232	212	193
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	5	398	233	211	193
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	6	564	312	280	256
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	7	561	314	282	258
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	8	564	317	284	260
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	9	943	484	435	397
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	10	948	486	437	400
62J25005	AJ3	1.1	08-Sep-05	0:32	3.1	11	947	488	438	401

Surface Temp (^oC)				17.5	17.1		
Surface Temp (^oF)				63.5	62.8		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		C	C	C	C	C	C
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6307.00	6307	8972.9	8951.7	15046.7	15041.4
Normalized Deflections		0.951	0.951	1.003	1.005	0.997	0.997
D1 Deflection (mills)		8.23	8.70	11.90	12.44	18.70	19.08
D2 Deflection (mills)			7.93		11.16		17.14
D3 Deflection (mills)		7.59		10.84		16.86	
Load Transfer (%)		0.923	0.911	0.912	0.897	0.901	0.898
Differential Deflection		0.64	0.77	1.05	1.28	1.84	1.94

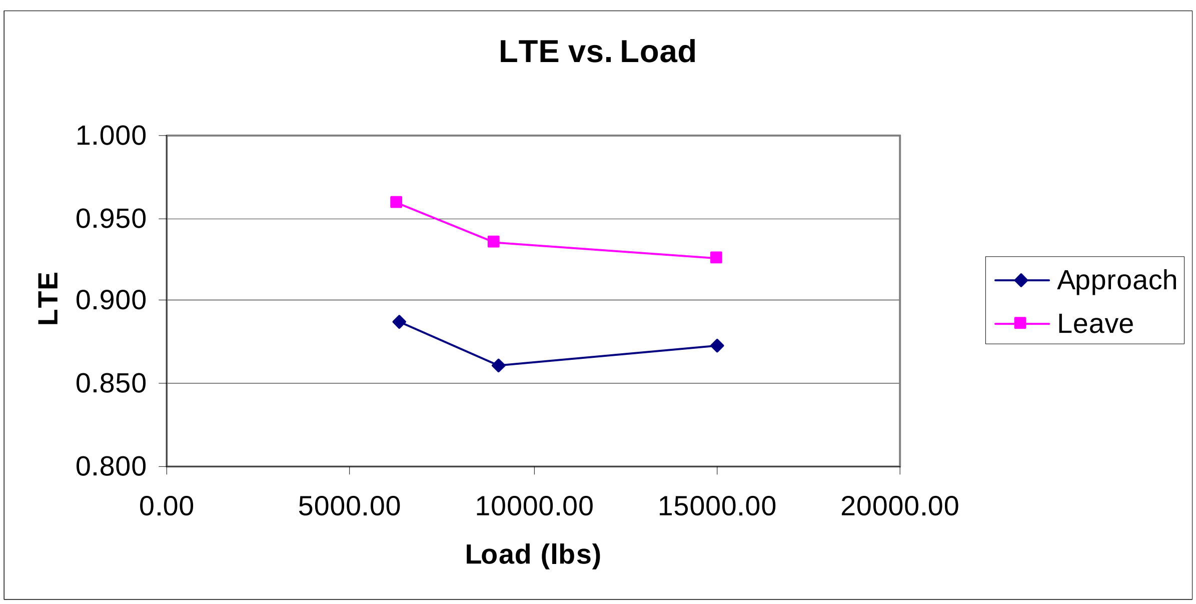


Joint 4 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ4	1.0	08-Sep-05	0:35	4	3	401	206	170	182
62J25005	LJ4	1.0	08-Sep-05	0:35	4	4	400	203	171	181
62J25005	LJ4	1.0	08-Sep-05	0:35	4	5	397	205	171	182
62J25005	LJ4	1.0	08-Sep-05	0:35	4	6	567	289	236	250
62J25005	LJ4	1.0	08-Sep-05	0:35	4	7	569	294	237	252
62J25005	LJ4	1.0	08-Sep-05	0:35	4	8	568	293	238	252
62J25005	LJ4	1.0	08-Sep-05	0:35	4	9	942	457	379	400
62J25005	LJ4	1.0	08-Sep-05	0:35	4	10	944	460	382	402
62J25005	LJ4	1.0	08-Sep-05	0:35	4	11	944	463	383	403
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	3	395	200	189	166
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	4	397	197	191	165
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	5	397	197	190	165
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	6	560	272	255	225
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	7	563	278	260	229
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	8	564	280	261	230
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	9	943	439	408	360
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	10	945	443	410	364
62J25005	AJ4	1.1	08-Sep-05	0:37	4.1	11	947	445	411	366

Surface Temp (°C)				17.6	17.3		
Surface Temp (°F)				63.7	63.1		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		D	D	D	D	D	D
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6349.40	6301.7	9031.2	8941.1	14999	15025.5
Normalized Deflections		0.945	0.952	0.997	1.007	1.000	0.998
D1 Deflection (mills)		7.61	7.42	11.45	10.96	18.11	17.38
D2 Deflection (mills)			7.12		10.25		16.10
D3 Deflection (mills)		6.76		9.86		15.81	
Load Transfer (%)		0.888	0.960	0.861	0.935	0.873	0.926

Differential Deflection	0.86	0.30	1.60	0.71	2.30	1.28

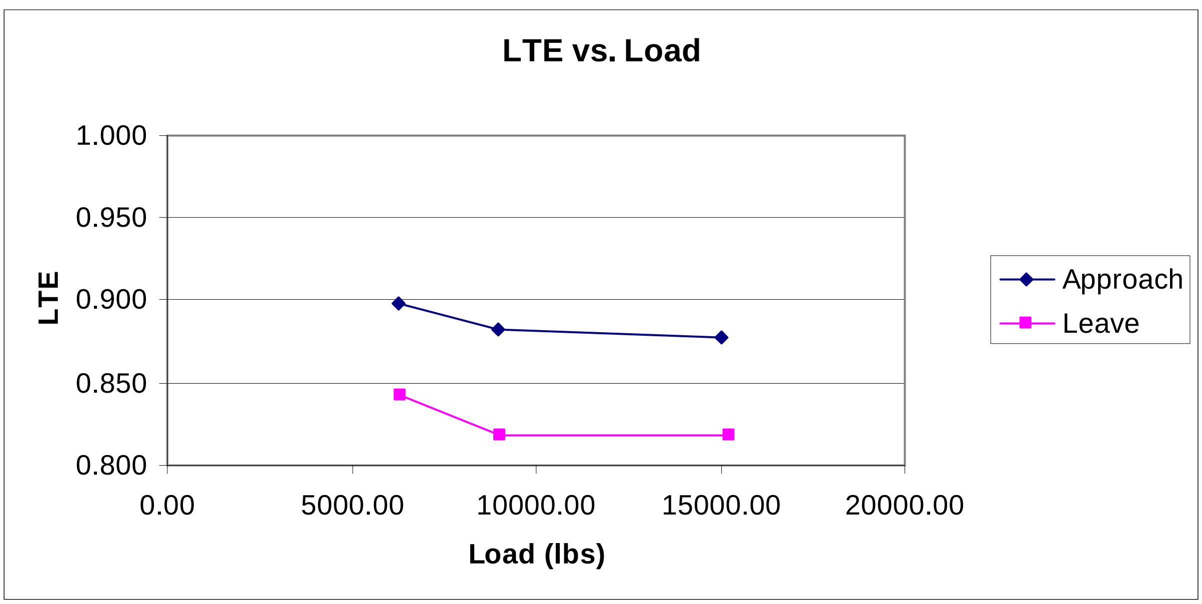


Joint 5 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ5	1.0	08-Sep-05	0:40	5	3	394	180	150	161
62J25005	LJ5	1.0	08-Sep-05	0:40	5	4	396	180	151	162
62J25005	LJ5	1.0	08-Sep-05	0:40	5	5	394	180	150	162
62J25005	LJ5	1.0	08-Sep-05	0:40	5	6	564	252	206	222
62J25005	LJ5	1.0	08-Sep-05	0:40	5	7	564	254	207	224
62J25005	LJ5	1.0	08-Sep-05	0:40	5	8	566	254	208	225
62J25005	LJ5	1.0	08-Sep-05	0:40	5	9	943	406	332	356
62J25005	LJ5	1.0	08-Sep-05	0:40	5	10	946	408	334	358
62J25005	LJ5	1.0	08-Sep-05	0:40	5	11	947	409	335	360
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	3	398	195	165	164
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	4	398	196	165	164
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	5	399	198	166	165
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	6	569	271	222	221
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	7	569	273	224	224
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	8	570	275	224	224
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	9	953	432	356	355
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	10	958	437	357	358
62J25005	AJ5	1.1	08-Sep-05	0:42	5.1	11	960	438	357	359

Surface Temp (^oC)				17.5	16.9		
Surface Temp (^oF)				63.5	62.4		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		E	E	E	E	E	E
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6275.20	6333.5	8978.2	9052.4	15030.8	15216.3
Normalized Deflections		0.956	0.947	1.002	0.994	0.998	0.986
D1 Deflection (mills)		6.77	7.32	10.00	10.68	16.01	16.90
D2 Deflection (mills)			6.16		8.74		13.84
D3 Deflection (mills)		6.08		8.82		14.06	
Load Transfer (%)		0.898	0.842	0.883	0.818	0.878	0.819

Differential Deflection		0.69	1.16	1.17	1.94	1.95	3.07

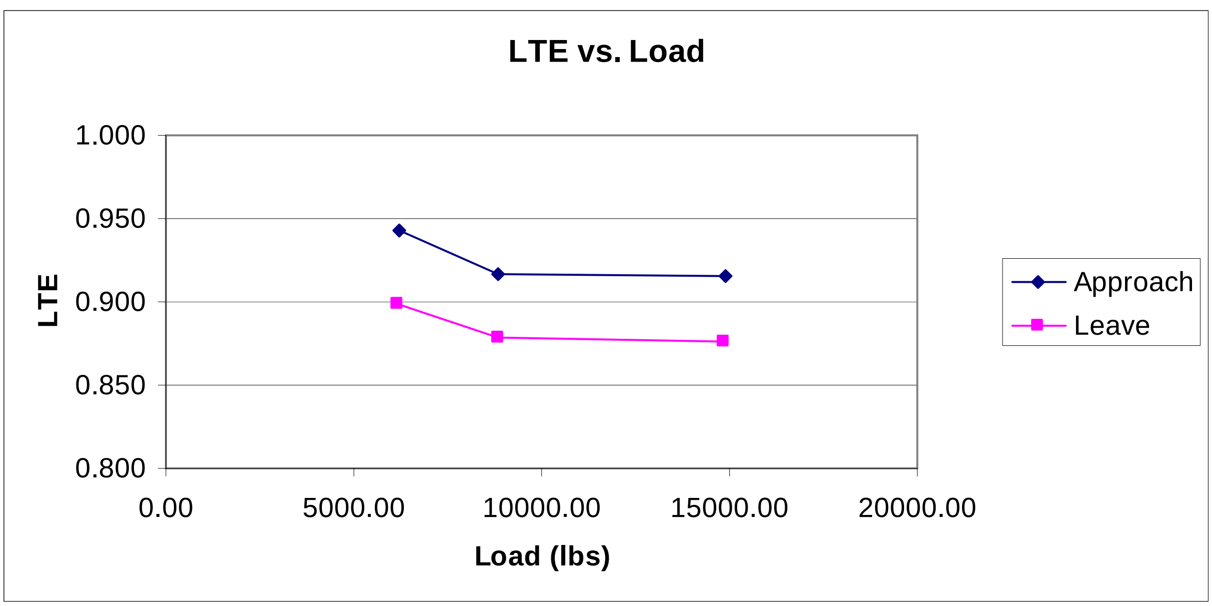


Joint 6 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ6	1.0	08-Sep-05	0:47	6	3	388	210	175	197
62J25005	LJ6	1.0	08-Sep-05	0:47	6	4	390	210	174	198
62J25005	LJ6	1.0	08-Sep-05	0:47	6	5	390	209	175	198
62J25005	LJ6	1.0	08-Sep-05	0:47	6	6	556	288	235	264
62J25005	LJ6	1.0	08-Sep-05	0:47	6	7	558	291	239	267
62J25005	LJ6	1.0	08-Sep-05	0:47	6	8	558	292	238	267
62J25005	LJ6	1.0	08-Sep-05	0:47	6	9	935	448	367	411
62J25005	LJ6	1.0	08-Sep-05	0:47	6	10	939	452	369	413
62J25005	LJ6	1.0	08-Sep-05	0:47	6	11	939	452	369	414
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	3	388	223	200	188
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	4	388	224	201	187
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	5	387	223	201	188
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	6	552	304	266	249
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	7	555	307	271	252
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	8	557	307	270	253
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	9	931	469	413	387
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	10	934	476	415	390
62J25005	AJ6	1.1	08-Sep-05	0:50	6.1	11	934	476	417	392

Surface Temp (^{o}C)				17	16.9		
Surface Temp (^{o}F)				62.6	62.4		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		F	F	F	F	F	F
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6190.40	6163.9	8861.6	8819.2	14908.9	14834.7
Normalized Deflections		0.969	0.973	1.016	1.021	1.006	1.011
D1 Deflection (mills)		8.00	8.56	11.61	12.29	17.85	18.85
D2 Deflection (mills)			7.69		10.80		16.52
D3 Deflection (mills)		7.54		10.63		16.34	
Load Transfer (%)		0.943	0.899	0.916	0.879	0.916	0.876

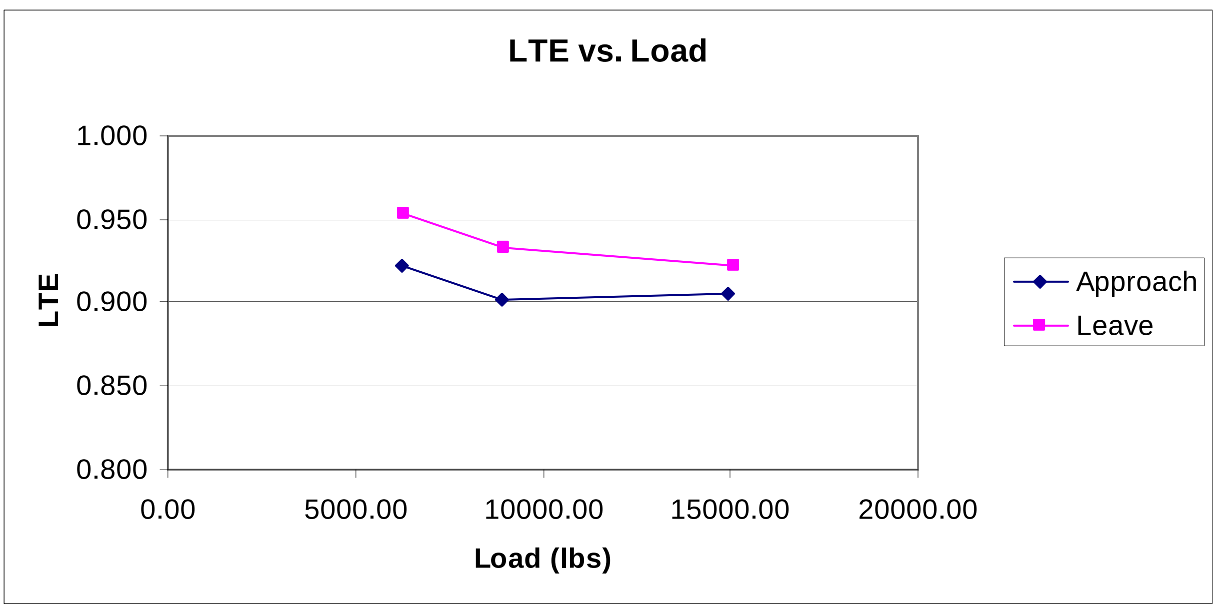
Differential Deflection	0.46	0.87	0.97	1.49	1.50	2.33



Joint 7 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ7	1.0	08-Sep-05	0:52	7	3	393	185	153	169
62J25005	LJ7	1.0	08-Sep-05	0:52	7	4	392	183	153	170
62J25005	LJ7	1.0	08-Sep-05	0:52	7	5	394	185	154	171
62J25005	LJ7	1.0	08-Sep-05	0:52	7	6	560	254	209	229
62J25005	LJ7	1.0	08-Sep-05	0:52	7	7	561	258	211	232
62J25005	LJ7	1.0	08-Sep-05	0:52	7	8	563	258	210	233
62J25005	LJ7	1.0	08-Sep-05	0:52	7	9	939	410	336	371
62J25005	LJ7	1.0	08-Sep-05	0:52	7	10	941	413	339	374
62J25005	LJ7	1.0	08-Sep-05	0:52	7	11	941	414	339	375
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	3	394	184	175	151
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	4	396	184	176	151
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	5	396	184	175	151
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	6	561	252	233	204
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	7	566	254	238	206
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	8	567	254	238	207
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	9	945	406	374	330
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	10	951	406	375	331
62J25005	AJ7	1.1	08-Sep-05	0:55	7.1	11	953	409	377	333

Surface Temp (°C)			17.3	17.2		
Surface Temp (°F)			63.1	63.0		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	G	G	G	G	G	G
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6248.70	6285.8	8925.2	8978.2	14951.3	15099.7
Normalized Deflections	0.960	0.955	1.008	1.002	1.003	0.993
D1 Deflection (mills)	6.97	6.91	10.19	10.00	16.28	15.91
D2 Deflection (mills)		6.59		9.32		14.68
D3 Deflection (mills)	6.42		9.18		14.74	
Load Transfer (%)	0.922	0.953	0.901	0.933	0.905	0.922
Differential Deflection	0.54	0.33	1.01	0.67	1.54	1.24

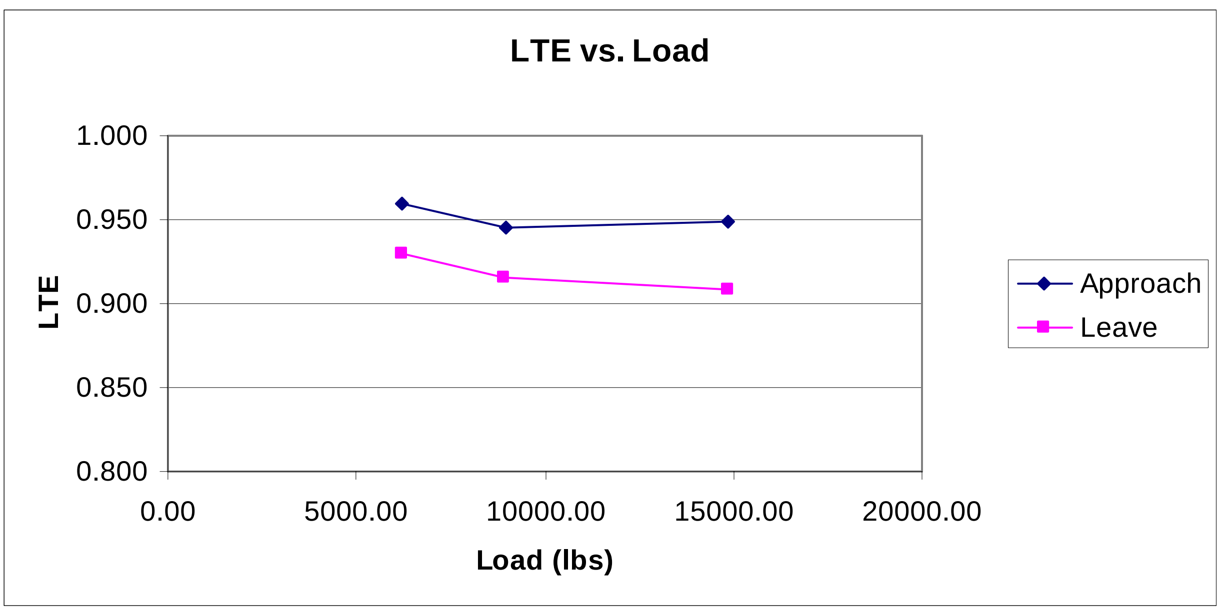


Joint 8 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ8	1.0	08-Sep-05	0:58	8	3	392	191	153	183
62J25005	LJ8	1.0	08-Sep-05	0:58	8	4	391	189	153	182
62J25005	LJ8	1.0	08-Sep-05	0:58	8	5	392	191	154	183
62J25005	LJ8	1.0	08-Sep-05	0:58	8	6	563	265	212	250
62J25005	LJ8	1.0	08-Sep-05	0:58	8	7	563	268	213	253
62J25005	LJ8	1.0	08-Sep-05	0:58	8	8	563	267	213	253
62J25005	LJ8	1.0	08-Sep-05	0:58	8	9	934	422	340	402
62J25005	LJ8	1.0	08-Sep-05	0:58	8	10	937	426	342	406
62J25005	LJ8	1.0	08-Sep-05	0:58	8	11	936	429	344	404
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	3	390	208	192	170
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	4	390	207	192	170
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	5	390	207	194	171
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	6	558	285	260	230
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	7	558	285	262	231
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	8	563	287	263	233
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	9	932	445	406	362
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	10	937	453	411	367
62J25005	AJ8	1.1	08-Sep-05	1:00	8.1	11	935	453	410	367

Surface Temp (^oC)				17.1	16.9		
Surface Temp (^oF)				62.8	62.4		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		H	H	H	H	H	H
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6227.50	6201	8951.7	8898.7	14877.1	14861.2
Normalized Deflections		0.963	0.968	1.005	1.011	1.008	1.009
D1 Deflection (mills)		7.22	7.90	10.55	11.37	16.89	17.89
D2 Deflection (mills)			7.34		10.42		16.25
D3 Deflection (mills)		6.93		9.97		16.03	
Load Transfer (%)		0.960	0.929	0.945	0.916	0.949	0.908

Differential Deflection		0.29	0.56	0.58	0.96	0.86	1.64

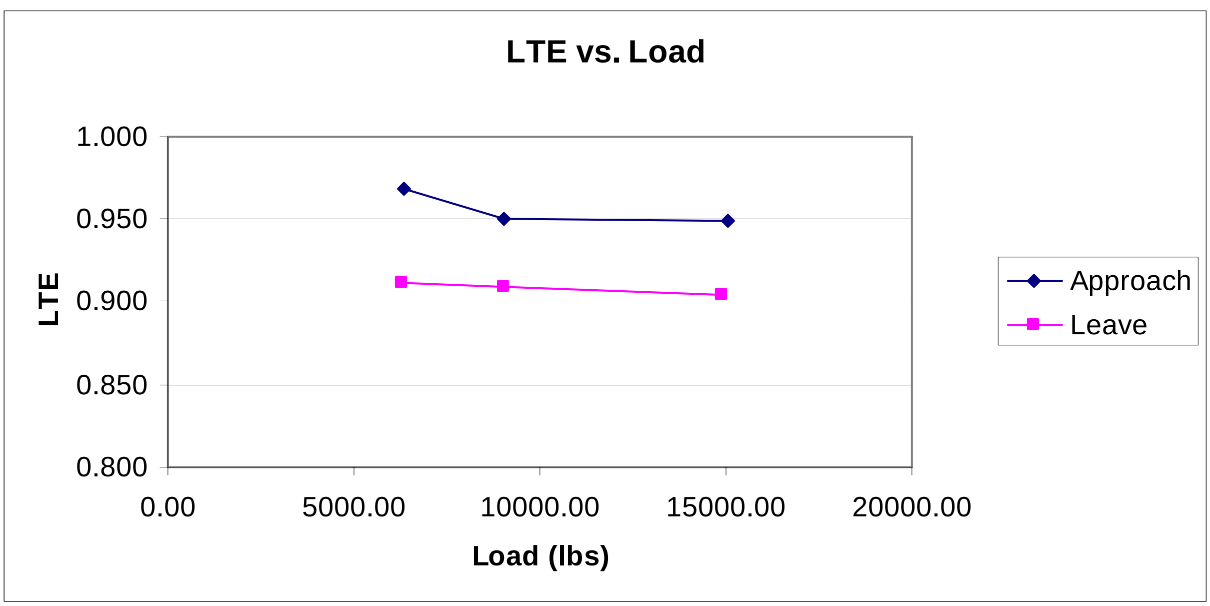


Joint 9 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ9	1.0	08-Sep-05	1:04	9	3	398	149	121	145
62J25005	LJ9	1.0	08-Sep-05	1:04	9	4	397	150	121	145
62J25005	LJ9	1.0	08-Sep-05	1:04	9	5	402	152	122	147
62J25005	LJ9	1.0	08-Sep-05	1:04	9	6	566	212	169	201
62J25005	LJ9	1.0	08-Sep-05	1:04	9	7	567	213	169	203
62J25005	LJ9	1.0	08-Sep-05	1:04	9	8	569	215	171	204
62J25005	LJ9	1.0	08-Sep-05	1:04	9	9	943	350	278	331
62J25005	LJ9	1.0	08-Sep-05	1:04	9	10	947	351	280	334
62J25005	LJ9	1.0	08-Sep-05	1:04	9	11	949	353	280	335
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	3	394	166	150	133
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	4	396	165	151	133
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	5	392	165	151	133
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	6	567	232	209	185
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	7	566	229	209	184
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	8	567	228	208	184
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	9	936	370	335	298
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	10	940	373	337	300
62J25005	AJ9	1.1	08-Sep-05	1:07	9.1	11	938	373	337	300

Surface Temp (^{o}C)				17.1	17		
Surface Temp (^{o}F)				62.8	62.6		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		I	I	I	I	I	I
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6344.10	6264.6	9020.6	9010	15046.7	14914.2
Normalized Deflections		0.946	0.958	0.998	0.999	0.997	1.006
D1 Deflection (mills)		5.60	6.23	8.38	9.03	13.79	14.73
D2 Deflection (mills)			5.68		8.20		13.31
D3 Deflection (mills)		5.42		7.96		13.08	
Load Transfer (%)		0.969	0.911	0.950	0.909	0.949	0.904

Differential Deflection		0.17	0.55	0.42	0.83	0.71	1.41

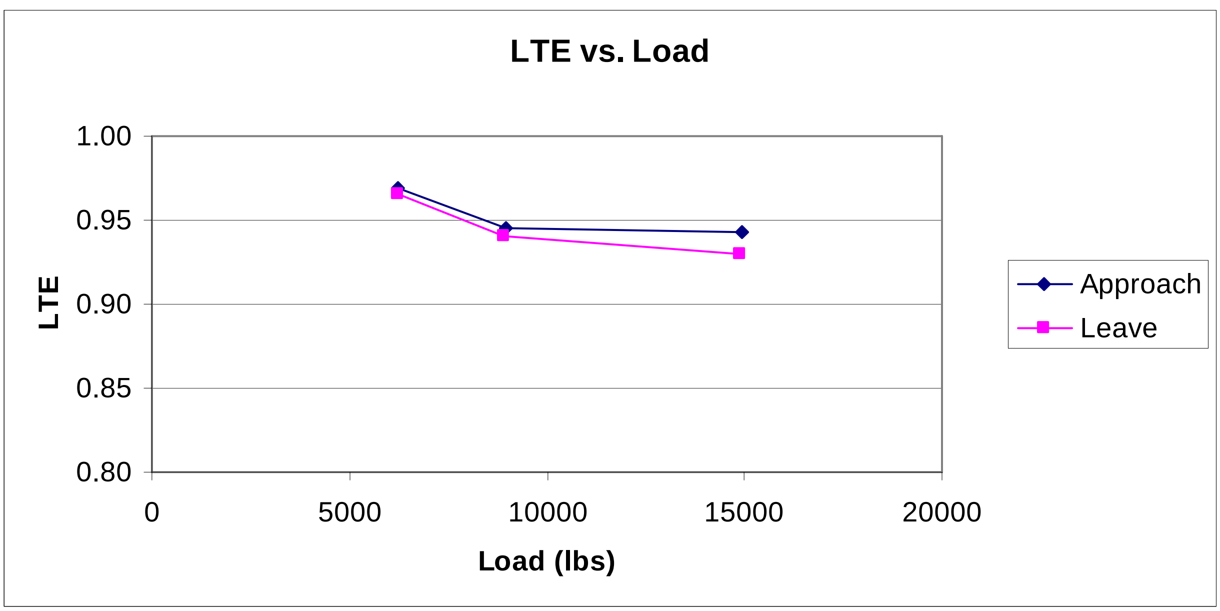


Joint 10 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ10	1.0	08-Sep-05	1:09	10	3	395	160	132	154
62J25005	LJ10	1.0	08-Sep-05	1:09	10	4	390	158	131	154
62J25005	LJ10	1.0	08-Sep-05	1:09	10	5	393	160	132	155
62J25005	LJ10	1.0	08-Sep-05	1:09	10	6	564	224	183	212
62J25005	LJ10	1.0	08-Sep-05	1:09	10	7	561	225	184	213
62J25005	LJ10	1.0	08-Sep-05	1:09	10	8	563	227	186	214
62J25005	LJ10	1.0	08-Sep-05	1:09	10	9	936	362	296	342
62J25005	LJ10	1.0	08-Sep-05	1:09	10	10	940	365	298	344
62J25005	LJ10	1.0	08-Sep-05	1:09	10	11	939	367	299	345
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	3	393	165	160	138
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	4	388	167	160	138
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	5	391	166	161	139
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	6	558	234	220	190
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	7	560	236	223	193
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	8	562	237	222	191
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	9	932	375	348	305
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	10	938	377	351	307
62J25005	AJ10	1.1	08-Sep-05	1:12	10.1	11	937	380	353	308

Surface Temp (°C)			17	16.6		
Surface Temp (°F)			62.6	61.9		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	J	J	J	J	J	J
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6243.40	6211.6	8946.4	8904	14919.5	14877.1
Normalized Deflections	0.961	0.966	1.006	1.011	1.005	1.008
D1 Deflection (mills)	6.03	6.31	8.92	9.38	14.43	14.97
D2 Deflection (mills)		6.10		8.82		13.92
D3 Deflection (mills)	5.84		8.43		13.60	
Load Transfer (%)	0.969	0.966	0.945	0.941	0.942	0.929

Differential Deflection	0.19	0.22	0.49	0.56	0.83	1.06

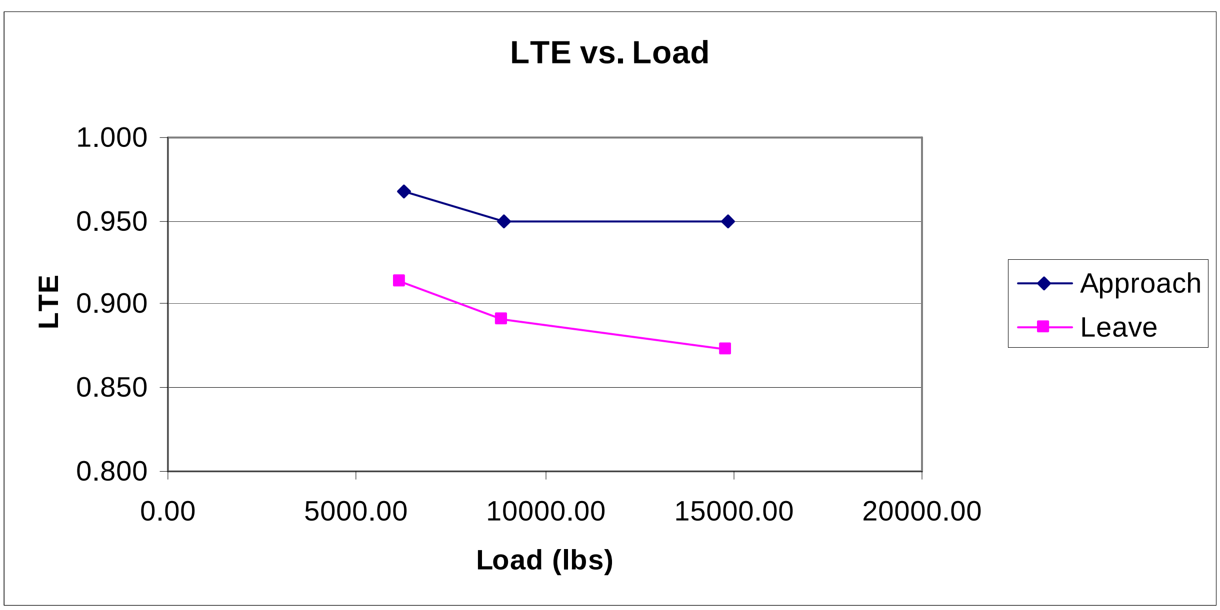


Joint 11 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ11	1.0	08-Sep-05	1:14	11	3	395	194	157	188
62J25005	LJ11	1.0	08-Sep-05	1:14	11	4	392	195	159	189
62J25005	LJ11	1.0	08-Sep-05	1:14	11	5	391	196	160	189
62J25005	LJ11	1.0	08-Sep-05	1:14	11	6	558	268	218	255
62J25005	LJ11	1.0	08-Sep-05	1:14	11	7	564	272	222	259
62J25005	LJ11	1.0	08-Sep-05	1:14	11	8	562	274	221	259
62J25005	LJ11	1.0	08-Sep-05	1:14	11	9	932	430	349	410
62J25005	LJ11	1.0	08-Sep-05	1:14	11	10	936	438	353	415
62J25005	LJ11	1.0	08-Sep-05	1:14	11	11	935	439	353	417
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	3	392	217	200	182
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	4	388	216	197	182
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	5	386	217	197	181
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	6	556	297	264	245
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	7	559	299	267	247
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	8	559	300	267	247
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	9	925	469	410	389
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	10	934	475	414	392
62J25005	AJ11	1.1	08-Sep-05	1:17	11.1	11	933	476	416	394

Surface Temp (^{o}C)			16.8	16.6		
Surface Temp (^{o}F)			62.2	61.9		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	K	K	K	K	K	K
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6243.40	6179.8	8925.2	8872.2	14855.9	14797.6
Normalized Deflections	0.961	0.971	1.008	1.014	1.010	1.014
D1 Deflection (mills)	7.38	8.28	10.77	11.92	17.31	18.89
D2 Deflection (mills)		7.57		10.62		16.49
D3 Deflection (mills)	7.14		10.23		16.45	
Load Transfer (%)	0.968	0.914	0.950	0.891	0.950	0.873

Differential Deflection	0.24	0.71	0.54	1.30	0.86	2.39

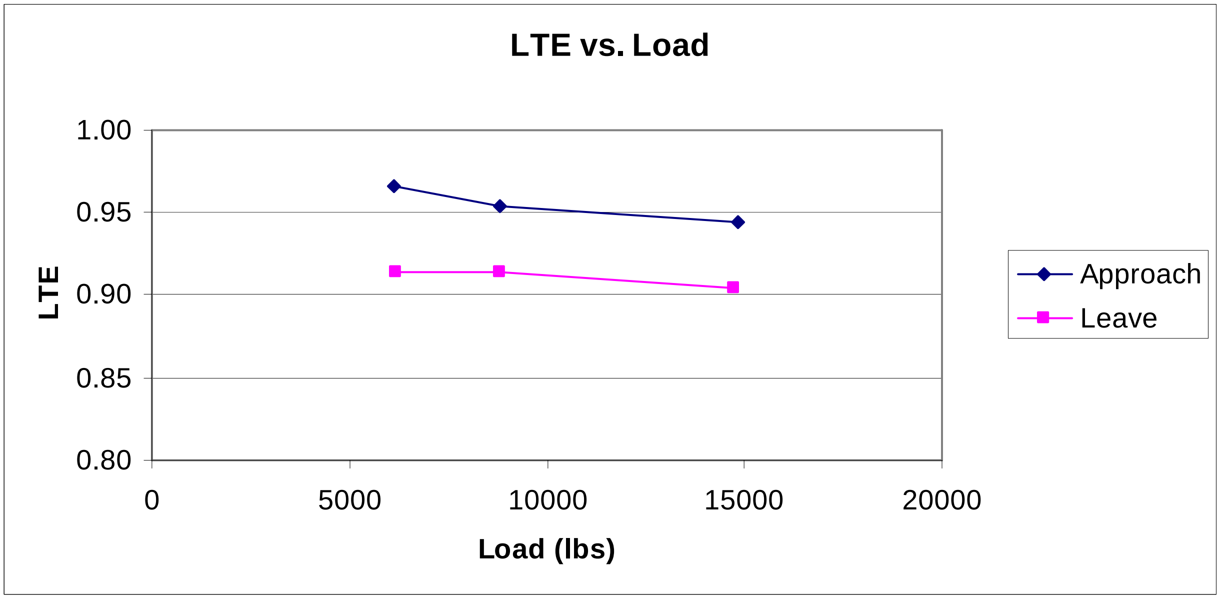


Joint 12 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ12	1.0	08-Sep-05	1:20	12	3	388	255	210	246
62J25005	LJ12	1.0	08-Sep-05	1:20	12	4	386	256	212	247
62J25005	LJ12	1.0	08-Sep-05	1:20	12	5	385	255	212	247
62J25005	LJ12	1.0	08-Sep-05	1:20	12	6	553	350	287	333
62J25005	LJ12	1.0	08-Sep-05	1:20	12	7	555	355	290	339
62J25005	LJ12	1.0	08-Sep-05	1:20	12	8	554	357	292	341
62J25005	LJ12	1.0	08-Sep-05	1:20	12	9	929	567	462	535
62J25005	LJ12	1.0	08-Sep-05	1:20	12	10	933	575	468	542
62J25005	LJ12	1.0	08-Sep-05	1:20	12	11	934	578	472	547
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	3	389	285	260	238
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	4	390	286	262	238
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	5	389	285	260	238
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	6	554	385	350	320
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	7	556	385	352	322
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	8	557	386	354	324
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	9	924	601	544	501
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	10	927	608	551	507
62J25005	AJ12	1.1	08-Sep-05	1:22	12.1	11	929	614	554	510

Surface Temp (^oC)			16.5	16.5		
Surface Temp (^oF)			61.7	61.7		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	L	L	L	L	L	L
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6142.70	6190.4	8808.6	8835.1	14818.8	14734
Normalized Deflections	0.977	0.969	1.022	1.019	1.012	1.018
D1 Deflection (mills)	9.82	10.89	14.24	15.45	22.84	24.35
D2 Deflection (mills)		9.94		14.11		22.03
D3 Deflection (mills)	9.48		13.58		21.57	
Load Transfer (%)	0.966	0.914	0.954	0.913	0.944	0.905

Differential Deflection	0.33	0.94	0.66	1.34	1.27	2.32

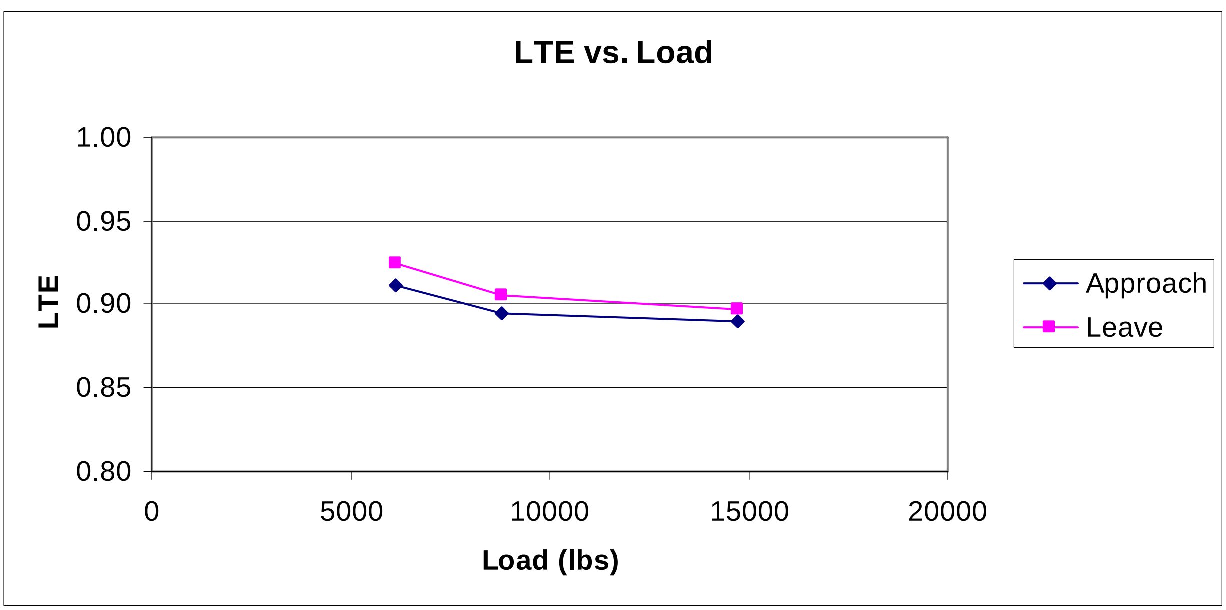


Joint 13 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ13	1.0	08-Sep-05	1:25	13	3	386	229	190	208
62J25005	LJ13	1.0	08-Sep-05	1:25	13	4	387	230	193	211
62J25005	LJ13	1.0	08-Sep-05	1:25	13	5	386	231	193	210
62J25005	LJ13	1.0	08-Sep-05	1:25	13	6	551	319	262	286
62J25005	LJ13	1.0	08-Sep-05	1:25	13	7	556	323	264	289
62J25005	LJ13	1.0	08-Sep-05	1:25	13	8	555	327	268	292
62J25005	LJ13	1.0	08-Sep-05	1:25	13	9	924	516	424	459
62J25005	LJ13	1.0	08-Sep-05	1:25	13	10	929	523	426	465
62J25005	LJ13	1.0	08-Sep-05	1:25	13	11	929	525	428	467
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	3	387	241	222	201
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	4	385	239	221	201
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	5	386	239	222	201
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	6	554	331	300	272
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	7	553	333	300	274
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	8	555	331	301	275
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	9	924	525	471	433
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	10	928	530	475	437
62J25005	AJ13	1.1	08-Sep-05	1:28	13.1	11	928	533	478	438

Surface Temp (^{o}C)			16.4	16.3		
Surface Temp (^{o}F)			61.5	61.3		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	M	M	M	M	M	M
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6142.70	6137.4	8808.6	8808.6	14744.6	14734
Normalized Deflections	0.977	0.978	1.022	1.022	1.017	1.018
D1 Deflection (mills)	8.84	9.22	12.99	13.34	20.88	21.21
D2 Deflection (mills)		8.53		12.08		19.02
D3 Deflection (mills)	8.06		11.62		18.57	
Load Transfer (%)	0.912	0.925	0.895	0.906	0.889	0.897

Differential Deflection	0.78	0.69	1.37	1.26	2.31	2.19

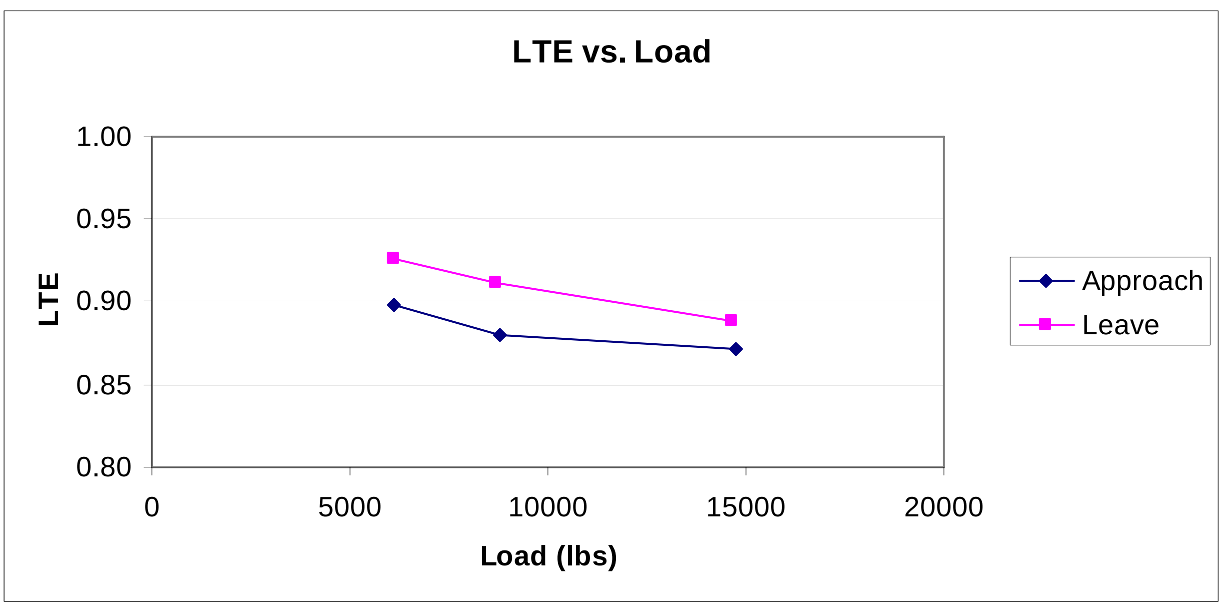


Joint 14 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ14	1.0	08-Sep-05	1:30	14	3	385	285	238	256
62J25005	LJ14	1.0	08-Sep-05	1:30	14	4	385	288	241	259
62J25005	LJ14	1.0	08-Sep-05	1:30	14	5	383	287	241	257
62J25005	LJ14	1.0	08-Sep-05	1:30	14	6	549	394	325	347
62J25005	LJ14	1.0	08-Sep-05	1:30	14	7	554	399	329	351
62J25005	LJ14	1.0	08-Sep-05	1:30	14	8	554	402	332	354
62J25005	LJ14	1.0	08-Sep-05	1:30	14	9	924	626	511	545
62J25005	LJ14	1.0	08-Sep-05	1:30	14	10	927	632	519	552
62J25005	LJ14	1.0	08-Sep-05	1:30	14	11	928	638	524	556
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	3	385	302	279	249
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	4	382	302	281	249
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	5	384	303	280	249
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	6	545	403	366	328
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	7	547	406	370	332
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	8	549	405	370	332
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	9	921	622	553	507
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	10	924	627	558	511
62J25005	AJ14	1.1	08-Sep-05	1:33	14.1	11	922	632	561	515

Surface Temp (^{o}C)			16.8	16.6		
Surface Temp (^{o}F)			62.2	61.9		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	N	N	N	N	N	N
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6110.90	6100.3	8782.1	8697.3	14728.7	14665.1
Normalized Deflections	0.982	0.984	1.025	1.035	1.018	1.023
D1 Deflection (mills)	11.08	11.70	16.07	16.48	25.33	25.24
D2 Deflection (mills)		10.84		15.02		22.44
D3 Deflection (mills)	9.94		14.14		22.09	
Load Transfer (%)	0.898	0.926	0.880	0.911	0.872	0.889

Differential Deflection	1.13	0.86	1.92	1.47	3.25	2.80

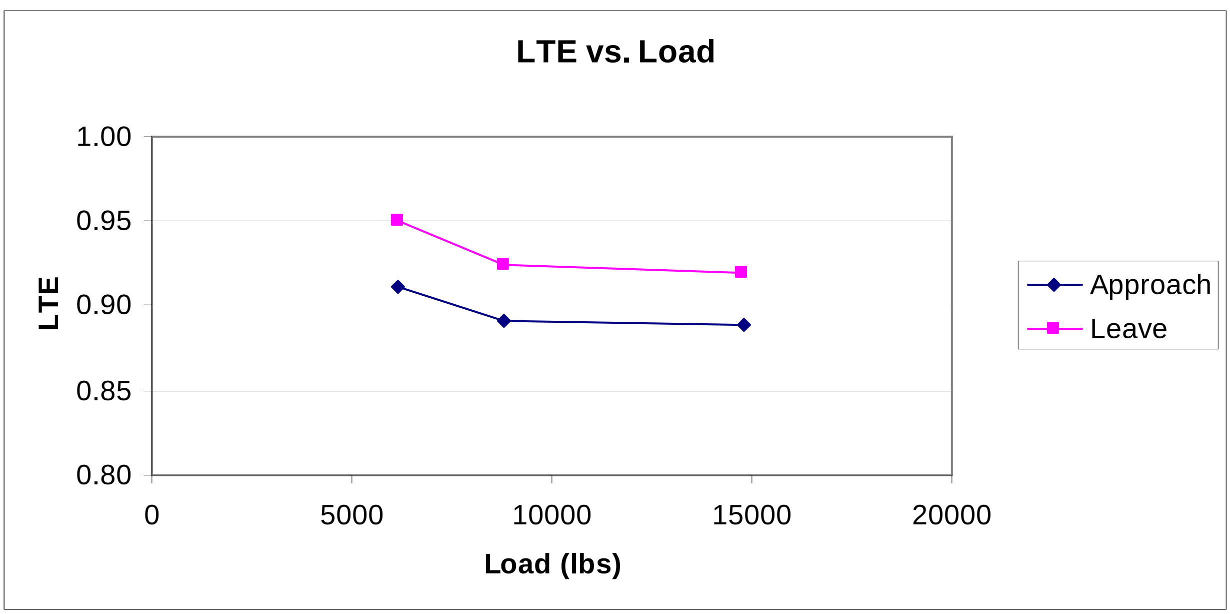


Joint 15 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ15	1.0	08-Sep-05	1:36	15	3	387	223	181	203
62J25005	LJ15	1.0	08-Sep-05	1:36	15	4	390	225	183	205
62J25005	LJ15	1.0	08-Sep-05	1:36	15	5	387	225	181	205
62J25005	LJ15	1.0	08-Sep-05	1:36	15	6	552	313	249	279
62J25005	LJ15	1.0	08-Sep-05	1:36	15	7	557	316	253	282
62J25005	LJ15	1.0	08-Sep-05	1:36	15	8	556	318	252	283
62J25005	LJ15	1.0	08-Sep-05	1:36	15	9	926	502	400	445
62J25005	LJ15	1.0	08-Sep-05	1:36	15	10	931	508	405	451
62J25005	LJ15	1.0	08-Sep-05	1:36	15	11	931	511	407	455
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	3	387	233	221	192
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	4	388	232	221	192
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	5	384	234	222	192
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	6	554	322	298	261
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	7	555	324	300	262
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	8	555	324	299	263
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	9	928	502	461	407
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	10	929	508	469	414
62J25005	AJ15	1.1	08-Sep-05	1:38	15.1	11	929	509	467	413

Surface Temp (^oC)			17.2	17		
Surface Temp (^oF)			63.0	62.6		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	P	P	P	P	P	P
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6169.20	6142.7	8824.5	8819.2	14776.4	14765.8
Normalized Deflections	0.973	0.977	1.020	1.021	1.015	1.016
D1 Deflection (mills)	8.59	8.96	12.67	12.99	20.26	20.25
D2 Deflection (mills)		8.51		12.01		18.62
D3 Deflection (mills)	7.82		11.29		17.99	
Load Transfer (%)	0.911	0.950	0.891	0.925	0.888	0.920

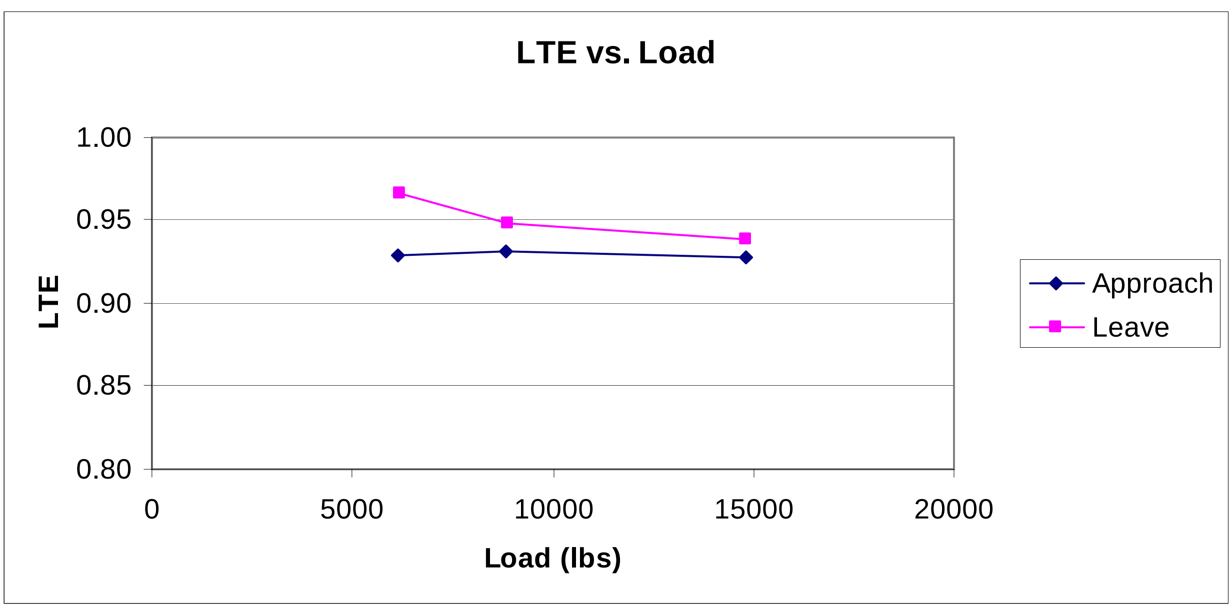
Differential Deflection	0.77	0.45	1.38	0.98	2.26	1.63



Joint 16 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ16	1.0	08-Sep-05	1:41	16	3	386	183	151	170
62J25005	LJ16	1.0	08-Sep-05	1:41	16	4	388	183	150	170
62J25005	LJ16	1.0	08-Sep-05	1:41	16	5	385	183	150	170
62J25005	LJ16	1.0	08-Sep-05	1:41	16	6	552	255	207	237
62J25005	LJ16	1.0	08-Sep-05	1:41	16	7	560	258	210	240
62J25005	LJ16	1.0	08-Sep-05	1:41	16	8	556	258	210	241
62J25005	LJ16	1.0	08-Sep-05	1:41	16	9	928	418	338	387
62J25005	LJ16	1.0	08-Sep-05	1:41	16	10	931	420	341	390
62J25005	LJ16	1.0	08-Sep-05	1:41	16	11	932	422	344	392
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	3	388	187	180	151
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	4	387	186	179	150
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	5	388	185	180	151
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	6	555	261	247	209
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	7	559	263	248	210
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	8	558	260	248	209
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	9	929	418	393	337
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	10	932	422	396	338
62J25005	AJ16	1.1	08-Sep-05	1:43	16.1	11	930	422	396	339

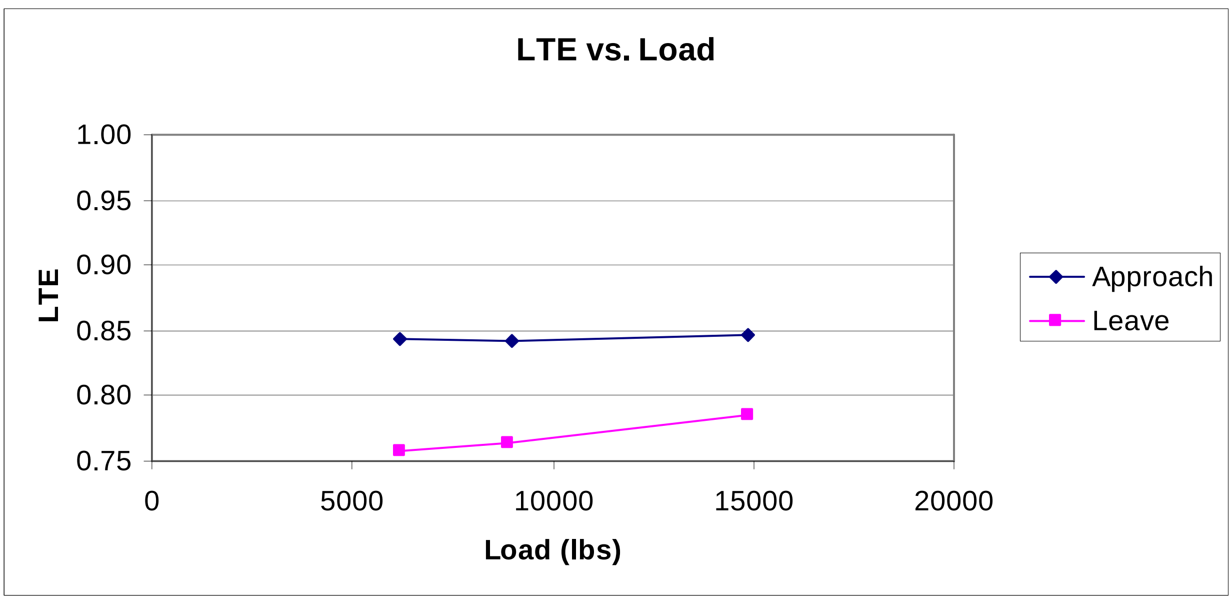
Surface Temp (^{o}C)			17.2	16.9		
Surface Temp (^{o}F)			63.0	62.4		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	Q	Q	Q	Q	Q	Q
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6142.70	6163.9	8840.4	8861.6	14792.3	14792.3
Normalized Deflections	0.977	0.973	1.018	1.016	1.014	1.014
D1 Deflection (mills)	7.04	7.13	10.30	10.45	16.76	16.79
D2 Deflection (mills)		6.88		9.90		15.77
D3 Deflection (mills)	6.54		9.59		15.55	
Load Transfer (%)	0.929	0.966	0.931	0.948	0.928	0.939
Differential Deflection	0.50	0.24	0.71	0.55	1.21	1.02



Joint 17 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ17	1.0	08-Sep-05	1:47	17	3	391	167	136	141
62J25005	LJ17	1.0	08-Sep-05	1:47	17	4	390	167	136	141
62J25005	LJ17	1.0	08-Sep-05	1:47	17	5	390	167	136	141
62J25005	LJ17	1.0	08-Sep-05	1:47	17	6	561	237	190	199
62J25005	LJ17	1.0	08-Sep-05	1:47	17	7	565	238	191	200
62J25005	LJ17	1.0	08-Sep-05	1:47	17	8	566	238	191	201
62J25005	LJ17	1.0	08-Sep-05	1:47	17	9	933	387	312	328
62J25005	LJ17	1.0	08-Sep-05	1:47	17	10	937	391	313	331
62J25005	LJ17	1.0	08-Sep-05	1:47	17	11	936	392	313	331
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	3	388	184	140	151
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	4	390	185	140	151
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	5	392	185	140	151
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	6	557	254	194	204
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	7	561	256	195	206
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	8	561	256	196	206
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	9	932	405	318	326
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	10	936	408	320	329
62J25005	AJ17	1.1	08-Sep-05	1:49	17.1	11	938	408	320	330

Surface Temp (°C)			17.2	16.7		
Surface Temp (°F)			63.0	62.1		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	R	R	R	R	R	R
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6206.30	6201	8967.6	8898.7	14871.8	14871.8
Normalized Deflections	0.967	0.968	1.004	1.011	1.009	1.009
D1 Deflection (mills)	6.35	7.03	9.39	10.16	15.48	16.16
D2 Deflection (mills)		5.33		7.76		12.68
D3 Deflection (mills)	5.37		7.90		13.10	
Load Transfer (%)	0.844	0.758	0.842	0.764	0.846	0.785
Differential Deflection (mills)	0.99	1.70	1.49	2.40	2.38	3.48

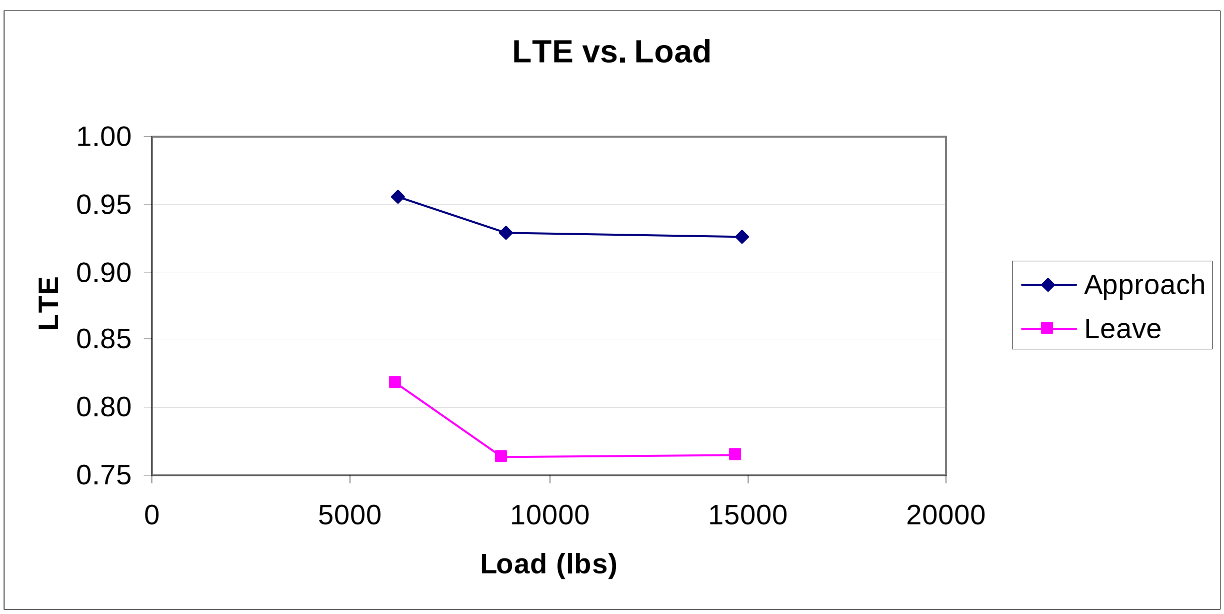


Joint 18 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ18	1.0	08-Sep-05	1:52	18	3	387	172	143	164
62J25005	LJ18	1.0	08-Sep-05	1:52	18	4	388	172	142	164
62J25005	LJ18	1.0	08-Sep-05	1:52	18	5	390	172	144	165
62J25005	LJ18	1.0	08-Sep-05	1:52	18	6	556	245	198	227
62J25005	LJ18	1.0	08-Sep-05	1:52	18	7	563	246	198	229
62J25005	LJ18	1.0	08-Sep-05	1:52	18	8	561	248	200	231
62J25005	LJ18	1.0	08-Sep-05	1:52	18	9	935	398	321	368
62J25005	LJ18	1.0	08-Sep-05	1:52	18	10	936	401	322	371
62J25005	LJ18	1.0	08-Sep-05	1:52	18	11	937	402	323	373
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	3	388	203	166	166
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	4	386	204	167	166
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	5	386	204	167	166
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	6	552	292	222	229
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	7	556	294	225	231
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	8	555	294	225	231
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	9	923	459	352	365
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	10	929	463	354	368
62J25005	AJ18	1.1	08-Sep-05	1:54	18.1	11	928	465	355	370

Surface Temp (^{o}C)				17.7	17.5		
Surface Temp (^{o}F)				63.9	63.5		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		S	S	S	S	S	S
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6174.50	6148	8904	8813.9	14882.4	14734
Normalized Deflections		0.972	0.976	1.011	1.021	1.008	1.018
D1 Deflection (mills)		6.58	7.82	9.80	11.79	15.88	18.53
D2 Deflection (mills)			6.40		9.00		14.17
D3 Deflection (mills)		6.29		9.11		14.70	
Load Transfer (%)		0.955	0.818	0.930	0.764	0.926	0.765

Differential Deflection (mills)	0.29	1.42	0.69	2.79	1.18	4.35

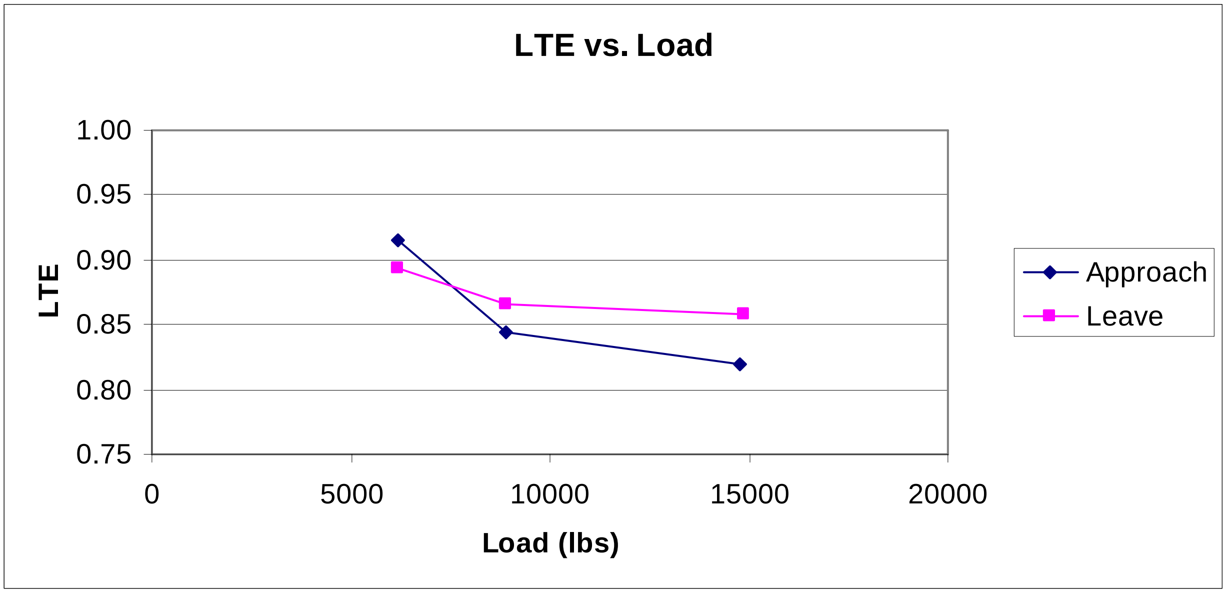


Joint 19 LTE Analysis, 9-8-2005

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J25005	LJ19	1.0	08-Sep-05	1:57	19	3	386	164	136	150
62J25005	LJ19	1.0	08-Sep-05	1:57	19	4	389	165	134	150
62J25005	LJ19	1.0	08-Sep-05	1:57	19	5	390	164	135	151
62J25005	LJ19	1.0	08-Sep-05	1:57	19	6	556	247	198	204
62J25005	LJ19	1.0	08-Sep-05	1:57	19	7	561	244	194	208
62J25005	LJ19	1.0	08-Sep-05	1:57	19	8	560	244	193	209
62J25005	LJ19	1.0	08-Sep-05	1:57	19	9	927	408	325	334
62J25005	LJ19	1.0	08-Sep-05	1:57	19	10	934	409	324	336
62J25005	LJ19	1.0	08-Sep-05	1:57	19	11	931	410	324	336
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	3	390	172	154	142
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	4	388	172	153	142
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	5	389	172	154	142
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	6	557	251	215	201
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	7	560	251	217	201
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	8	560	249	218	201
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	9	930	414	354	331
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	10	937	414	355	331
62J25005	AJ19	1.1	08-Sep-05	2:01	19.1	11	936	415	357	332

Surface Temp (^{o}C)			16.9	16.6		
Surface Temp (^{o}F)			62.4	61.9		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	T	T	T	T	T	T
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6174.50	6185.1	8888.1	8888.1	14797.6	14855.9
Normalized Deflections	0.972	0.970	1.013	1.013	1.014	1.010
D1 Deflection (mills)	6.29	6.57	9.76	9.98	16.32	16.47
D2 Deflection (mills)		5.87		8.64		14.12
D3 Deflection (mills)	5.75		8.25		13.38	
Load Transfer (%)	0.915	0.893	0.845	0.866	0.820	0.858

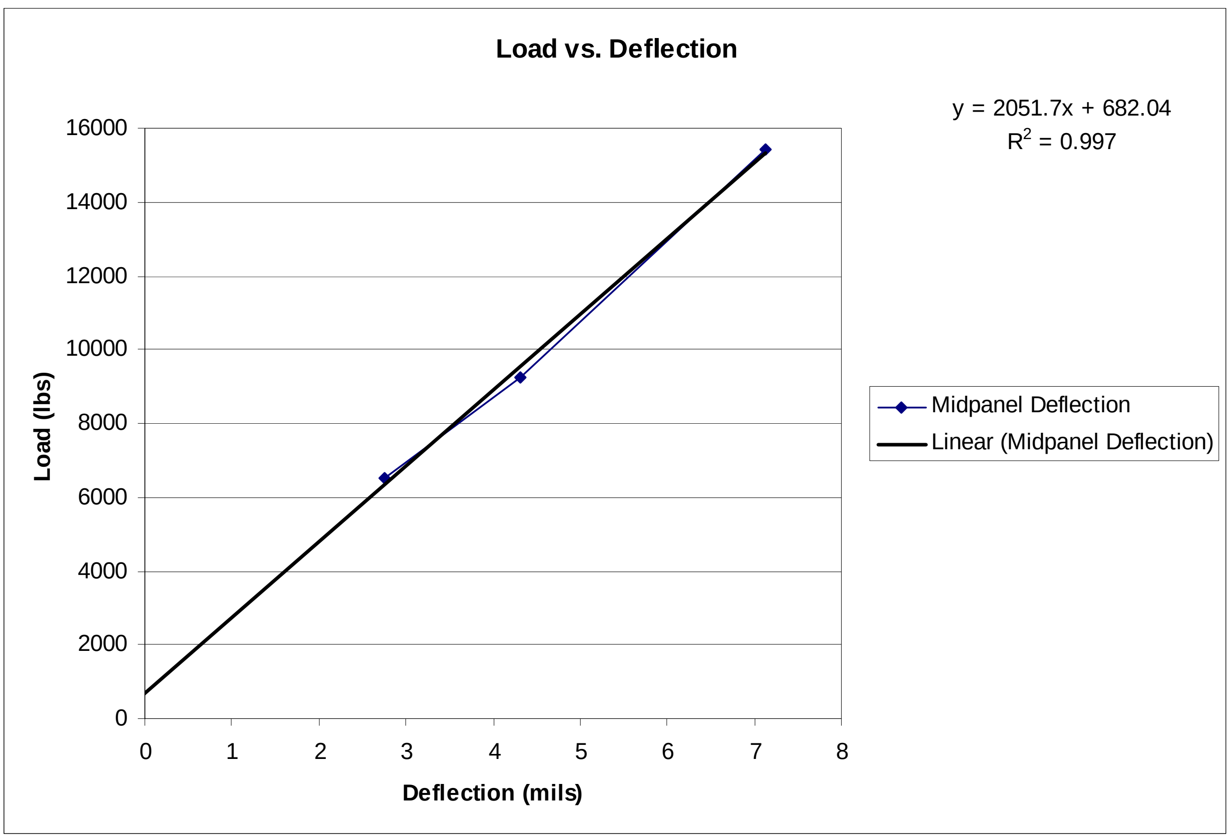
Differential Deflection (mills)	0.54	0.70	1.51	1.34	2.94	2.34



Midpanel 1 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP1	08-Sep-05	2:32	4	409	76	74	71
62MIDP05	MP1	08-Sep-05	2:32	5	408	75	73	71
62MIDP05	MP1	08-Sep-05	2:32	6	585	113	107	103
62MIDP05	MP1	08-Sep-05	2:32	7	582	112	107	102
62MIDP05	MP1	08-Sep-05	2:32	8	581	114	107	103
62MIDP05	MP1	08-Sep-05	2:32	9	970	184	177	170
62MIDP05	MP1	08-Sep-05	2:32	10	969	186	178	171
62MIDP05	MP1	08-Sep-05	2:32	11	968	188	178	172

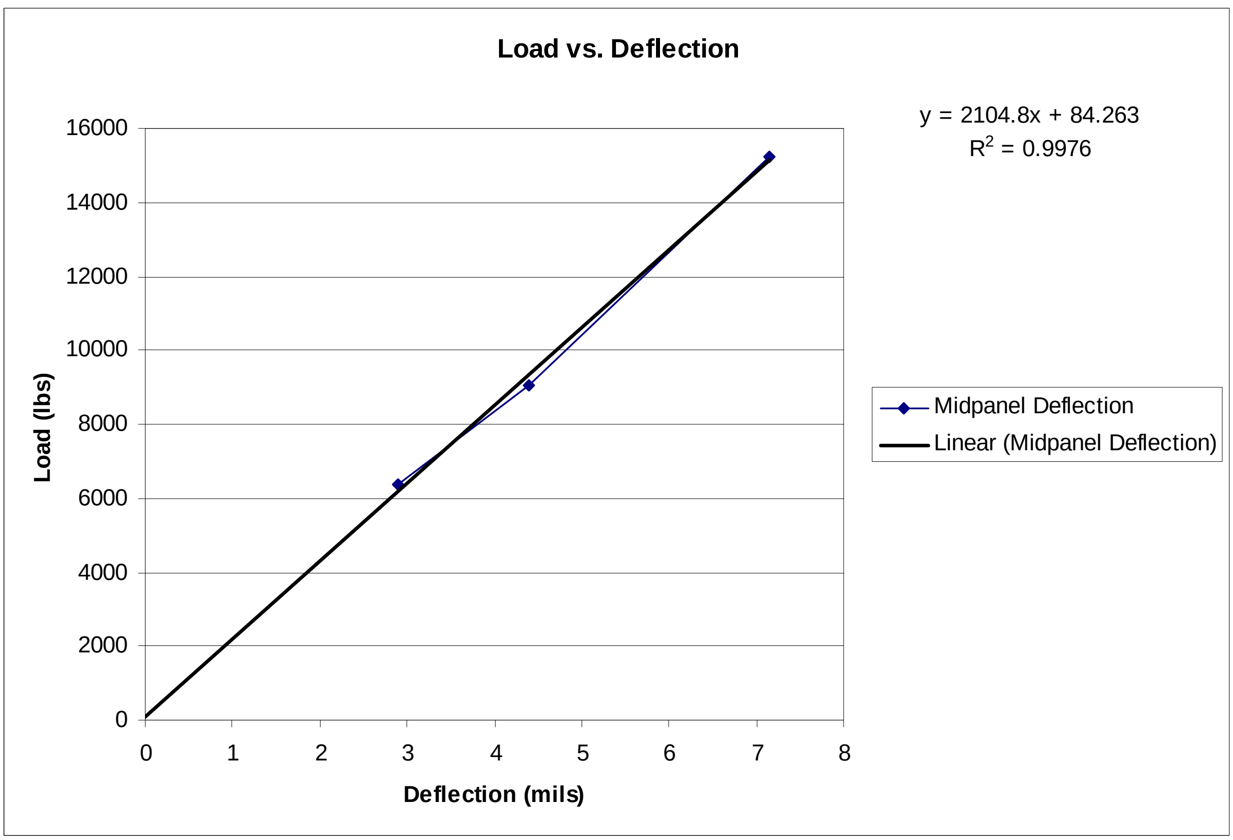
Surface Temp (^{o}C)		16.9	
Surface Temp (^{o}F)		62.4	
Cell	TH 62	TH 62	TH 62
Panel	MP1	MP1	MP1
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6495.15	9264.4	15407.1
Normalized Deflections	0.924	0.971	0.974
D1 Deflection (mills)	2.75	4.32	7.13



Midpanel 2 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP2	08-Sep-05	2:36	4	400	78	74	71
62MIDP05	MP2	08-Sep-05	2:36	5	399	78	74	72
62MIDP05	MP2	08-Sep-05	2:36	6	568	112	104	101
62MIDP05	MP2	08-Sep-05	2:36	7	572	112	105	101
62MIDP05	MP2	08-Sep-05	2:36	8	571	113	106	102
62MIDP05	MP2	08-Sep-05	2:36	9	956	184	179	170
62MIDP05	MP2	08-Sep-05	2:36	10	958	185	179	171
62MIDP05	MP2	08-Sep-05	2:36	11	958	184	179	171

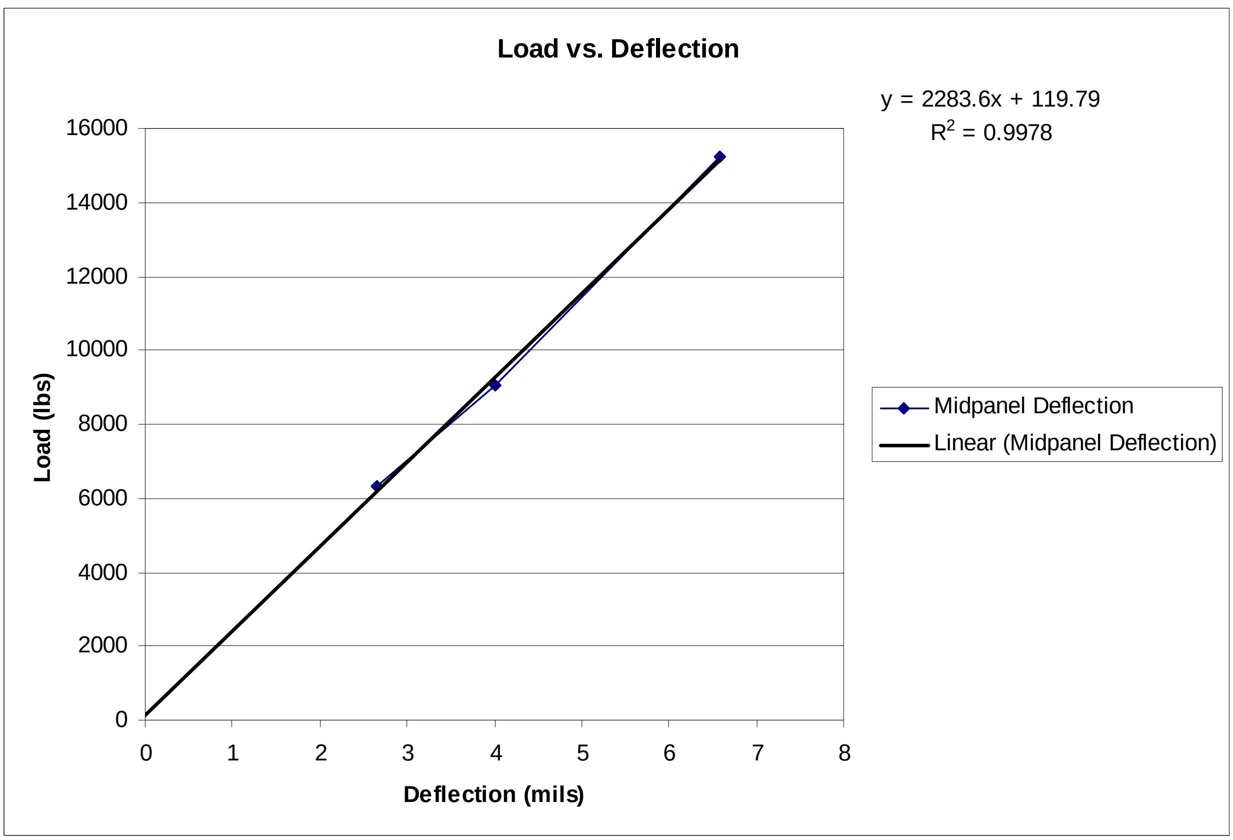
Surface Temp (^oC)		16.7	
Surface Temp (^oF)		62.1	
Cell	TH 62	TH 62	TH 62
Panel	MP2	MP2	MP2
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6352.05	9068.3	15221.6
Normalized Deflections	0.945	0.992	0.985
D1 Deflection (mills)	2.90	4.39	7.15



Midpanel 3 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP3	08-Sep-05	2:39	4	397	71	66	62
62MIDP05	MP3	08-Sep-05	2:39	5	399	71	66	63
62MIDP05	MP3	08-Sep-05	2:39	6	568	101	93	88
62MIDP05	MP3	08-Sep-05	2:39	7	569	103	94	90
62MIDP05	MP3	08-Sep-05	2:39	8	571	104	96	91
62MIDP05	MP3	08-Sep-05	2:39	9	956	169	158	150
62MIDP05	MP3	08-Sep-05	2:39	10	958	170	158	151
62MIDP05	MP3	08-Sep-05	2:39	11	959	170	159	151

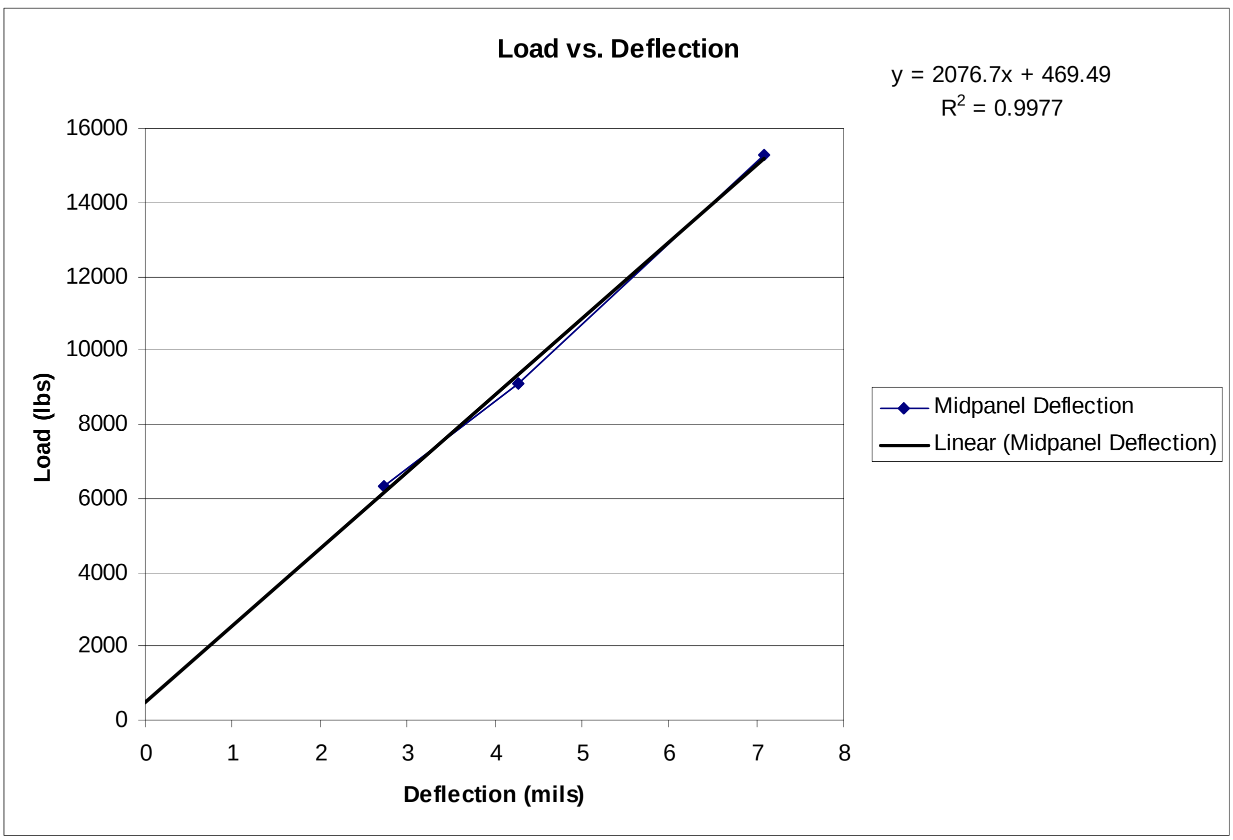
Surface Temp (°C)		17.8	
Surface Temp (°F)		64.0	
Cell	TH 62	TH 62	TH 62
Panel	MP3	MP3	MP3
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6328.20	9052.4	15226.9
Normalized Deflections	0.948	0.994	0.985
D1 Deflection (mills)	2.65	4.02	6.58



Midpanel 4 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP4	08-Sep-05	2:42	4	398	74	72	68
62MIDP05	MP4	08-Sep-05	2:42	5	398	73	70	68
62MIDP05	MP4	08-Sep-05	2:42	6	570	110	101	97
62MIDP05	MP4	08-Sep-05	2:42	7	574	109	104	98
62MIDP05	MP4	08-Sep-05	2:42	8	574	111	103	99
62MIDP05	MP4	08-Sep-05	2:42	9	958	183	175	167
62MIDP05	MP4	08-Sep-05	2:42	10	962	183	175	168
62MIDP05	MP4	08-Sep-05	2:42	11	962	184	176	168

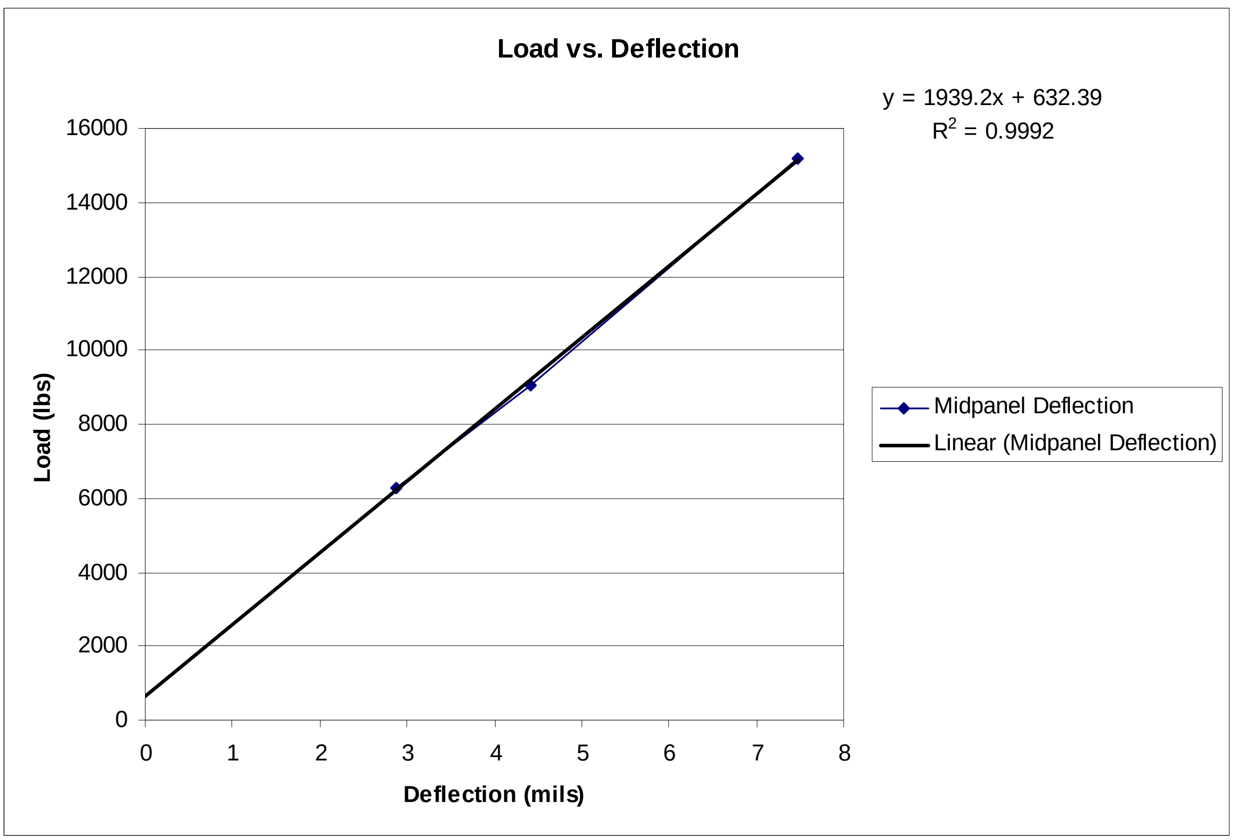
Surface Temp (^{o}C)		18	
Surface Temp (^{o}F)		64.4	
Cell	TH 62	TH 62	TH 62
Panel	MP4	MP4	MP4
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6328.20	9105.4	15274.6
Normalized Deflections	0.948	0.988	0.982
D1 Deflection (mills)	2.74	4.28	7.09



Midpanel 5 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP5	08-Sep-05	2:44	4	395	78	73	69
62MIDP05	MP5	08-Sep-05	2:44	5	397	75	73	69
62MIDP05	MP5	08-Sep-05	2:44	6	566	112	104	98
62MIDP05	MP5	08-Sep-05	2:44	7	570	113	105	100
62MIDP05	MP5	08-Sep-05	2:44	8	570	113	105	100
62MIDP05	MP5	08-Sep-05	2:44	9	953	191	180	171
62MIDP05	MP5	08-Sep-05	2:44	10	957	192	181	172
62MIDP05	MP5	08-Sep-05	2:44	11	955	194	182	172

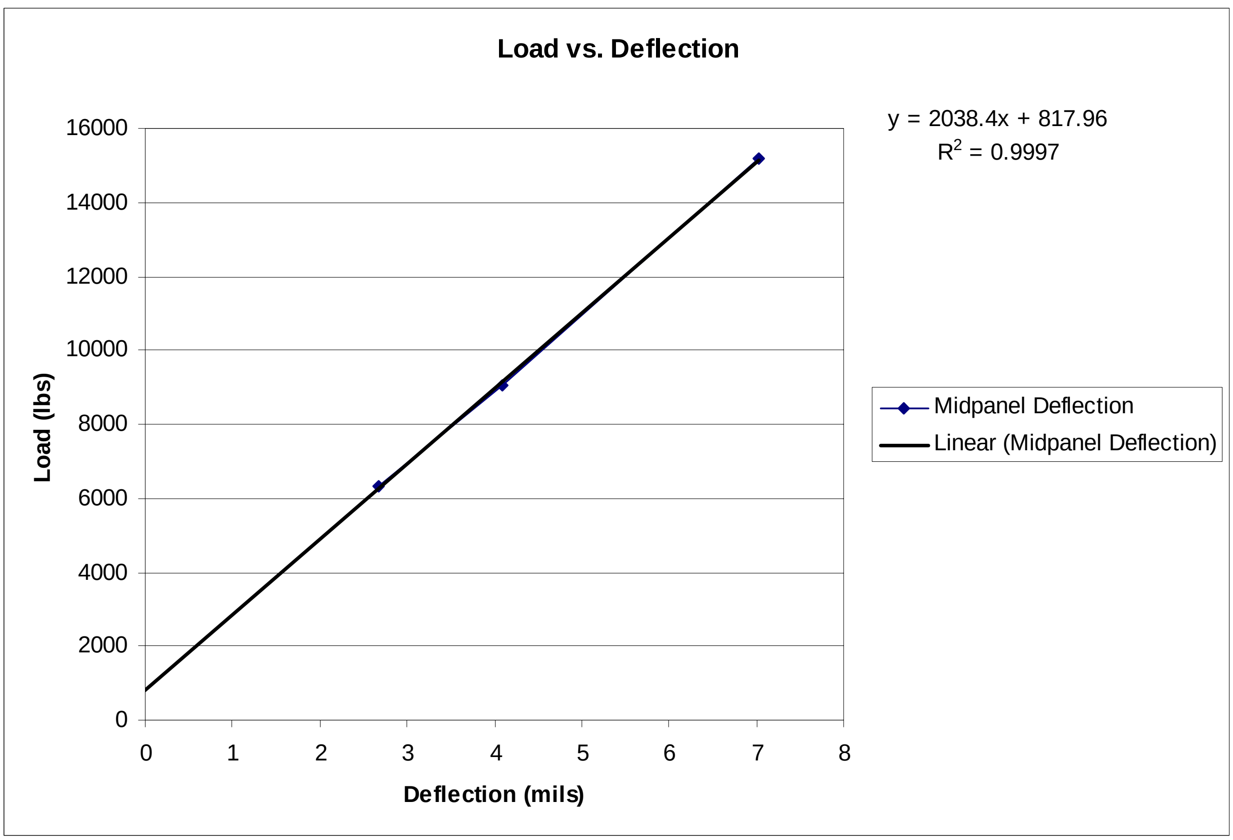
Surface Temp (^{o}C)		17.3	
Surface Temp (^{o}F)		63.1	
Cell	TH 62	TH 62	TH 62
Panel	MP5	MP5	MP5
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6296.40	9041.8	15184.5
Normalized Deflections	0.953	0.995	0.988
D1 Deflection (mills)	2.87	4.41	7.48



Midpanel 6 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP6	08-Sep-05	2:47	4	399	72	69	68
62MIDP05	MP6	08-Sep-05	2:47	5	396	71	68	67
62MIDP05	MP6	08-Sep-05	2:47	6	567	104	99	95
62MIDP05	MP6	08-Sep-05	2:47	7	573	105	101	97
62MIDP05	MP6	08-Sep-05	2:47	8	571	105	100	96
62MIDP05	MP6	08-Sep-05	2:47	9	951	180	172	165
62MIDP05	MP6	08-Sep-05	2:47	10	956	180	173	166
62MIDP05	MP6	08-Sep-05	2:47	11	956	182	174	166

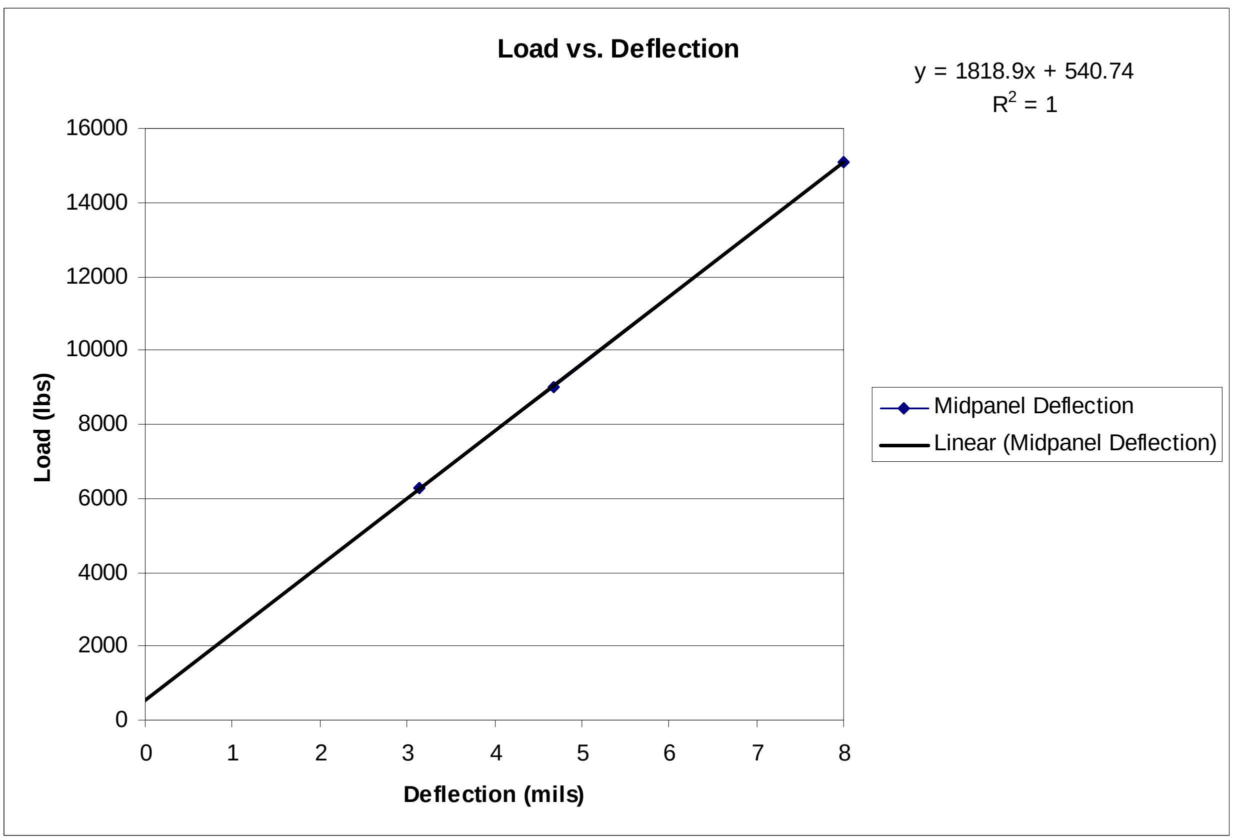
Surface Temp (°C)		16.9	
Surface Temp (°F)		62.4	
Cell	TH 62	TH 62	TH 62
Panel	MP6	MP6	MP6
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6320.25	9068.3	15173.9
Normalized Deflections	0.949	0.992	0.989
D1 Deflection (mills)	2.67	4.09	7.03



Midpanel 7 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP7	08-Sep-05	2:50	4	394	84	78	77
62MIDP05	MP7	08-Sep-05	2:50	5	395	83	78	77
62MIDP05	MP7	08-Sep-05	2:50	6	565	119	111	109
62MIDP05	MP7	08-Sep-05	2:50	7	569	119	113	109
62MIDP05	MP7	08-Sep-05	2:50	8	568	119	114	109
62MIDP05	MP7	08-Sep-05	2:50	9	946	204	192	186
62MIDP05	MP7	08-Sep-05	2:50	10	951	204	194	186
62MIDP05	MP7	08-Sep-05	2:50	11	950	205	193	187

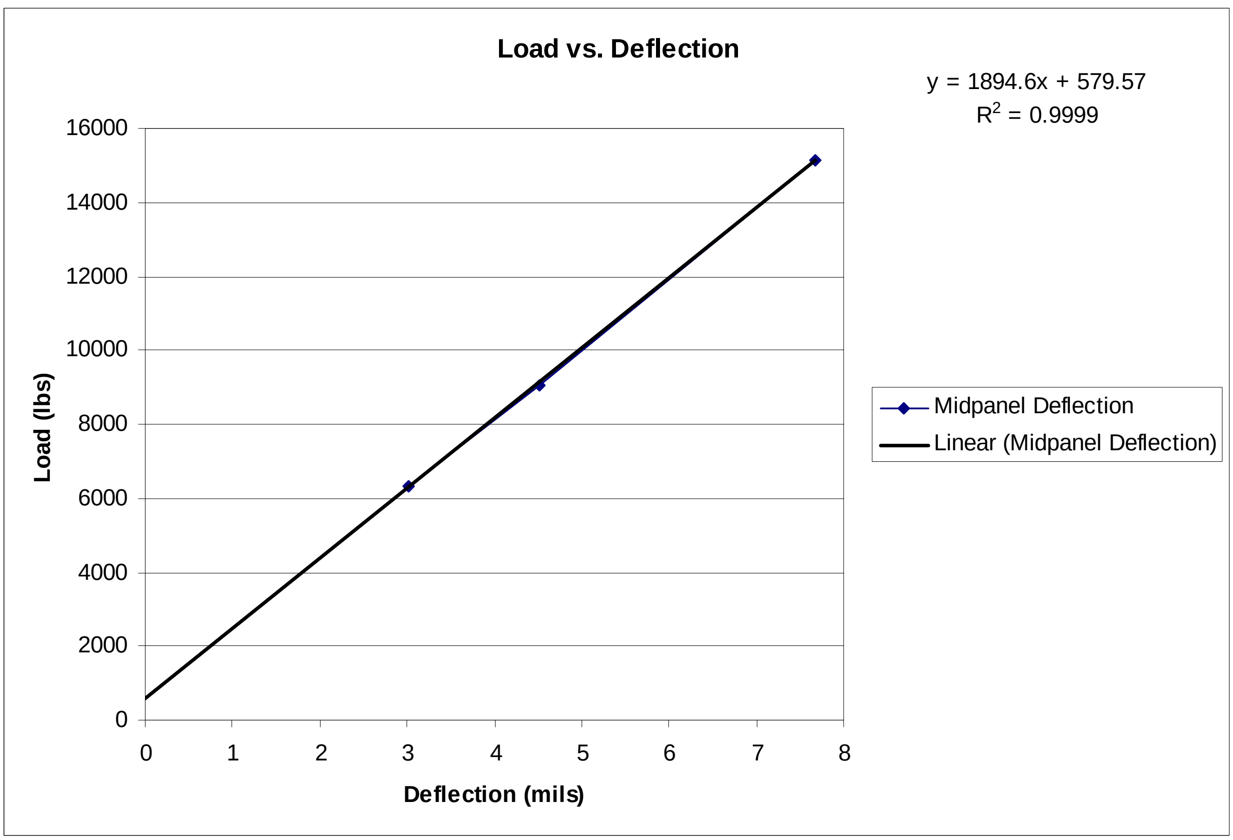
Surface Temp (^oC)		16.5	
Surface Temp (^oF)		61.7	
Cell	TH 62	TH 62	TH 62
Panel	MP7	MP7	MP7
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6272.55	9020.6	15089.1
Normalized Deflections	0.957	0.998	0.994
D1 Deflection (mills)	3.14	4.67	8.00



Midpanel 8 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP8	08-Sep-05	2:53	4	397	80	77	74
62MIDP05	MP8	08-Sep-05	2:53	5	398	81	76	75
62MIDP05	MP8	08-Sep-05	2:53	6	568	115	110	106
62MIDP05	MP8	08-Sep-05	2:53	7	573	117	109	106
62MIDP05	MP8	08-Sep-05	2:53	8	571	115	109	105
62MIDP05	MP8	08-Sep-05	2:53	9	950	197	187	181
62MIDP05	MP8	08-Sep-05	2:53	10	954	197	188	182
62MIDP05	MP8	08-Sep-05	2:53	11	954	197	190	182

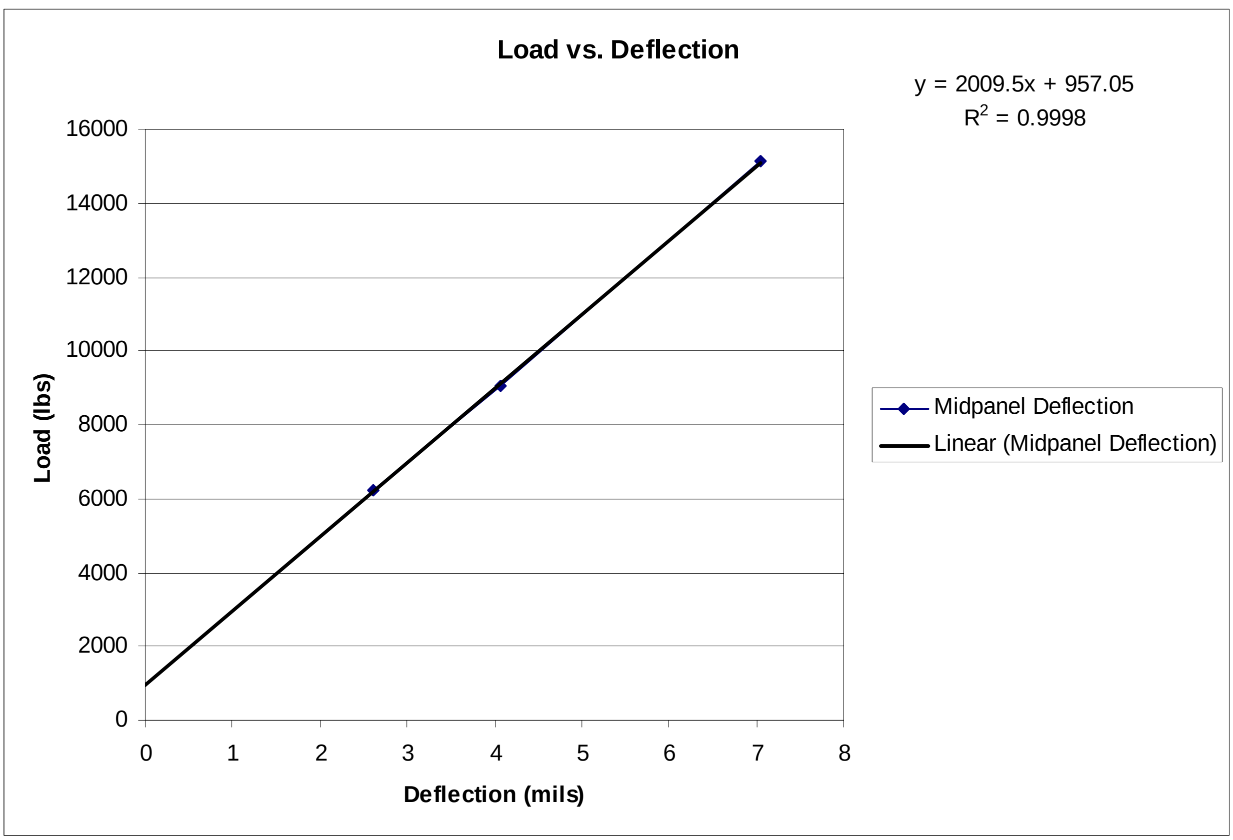
Surface Temp (^{o}C)		16.5	
Surface Temp (^{o}F)		61.7	
Cell	TH 62	TH 62	TH 62
Panel	MP8	MP8	MP8
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6320.25	9073.6	15147.4
Normalized Deflections	0.949	0.992	0.990
D1 Deflection (mills)	3.01	4.52	7.68



Midpanel 9 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP9	08-Sep-05	2:56	4	394	69	69	66
62MIDP05	MP9	08-Sep-05	2:56	5	392	69	70	67
62MIDP05	MP9	08-Sep-05	2:56	6	567	102	99	95
62MIDP05	MP9	08-Sep-05	2:56	7	570	105	99	95
62MIDP05	MP9	08-Sep-05	2:56	8	569	104	99	95
62MIDP05	MP9	08-Sep-05	2:56	9	949	179	169	162
62MIDP05	MP9	08-Sep-05	2:56	10	953	181	170	162
62MIDP05	MP9	08-Sep-05	2:56	11	952	181	171	163

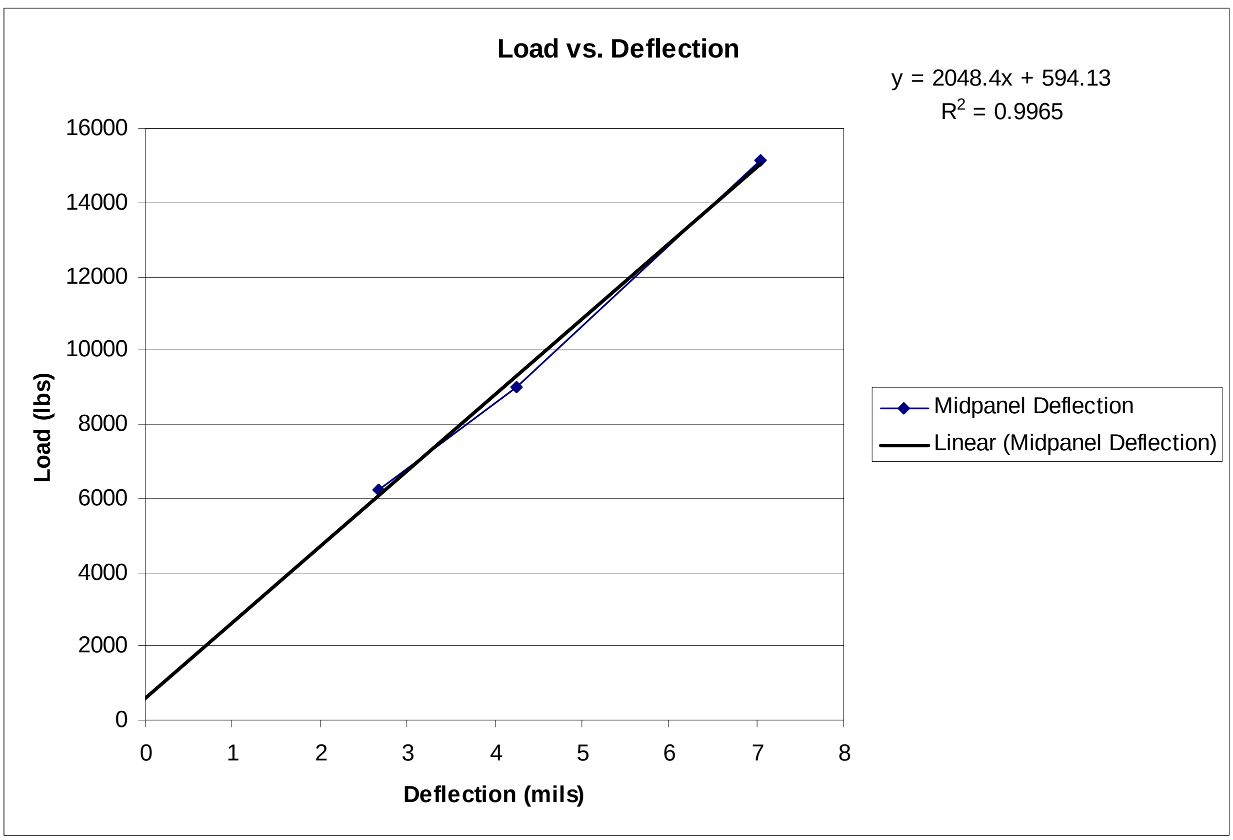
Surface Temp (°C)		17	
Surface Temp (°F)		62.6	
Cell	TH 62	TH 62	TH 62
Panel	MP9	MP9	MP9
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6248.70	9041.8	15126.2
Normalized Deflections	0.960	0.995	0.992
D1 Deflection (mills)	2.61	4.06	7.04



Midpanel 10 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP10	08-Sep-05	2:59	4	394	73	71	69
62MIDP05	MP10	08-Sep-05	2:59	5	392	68	72	68
62MIDP05	MP10	08-Sep-05	2:59	6	563	107	100	97
62MIDP05	MP10	08-Sep-05	2:59	7	569	109	101	98
62MIDP05	MP10	08-Sep-05	2:59	8	568	109	101	97
62MIDP05	MP10	08-Sep-05	2:59	9	951	180	173	165
62MIDP05	MP10	08-Sep-05	2:59	10	954	181	174	166
62MIDP05	MP10	08-Sep-05	2:59	11	954	182	173	166

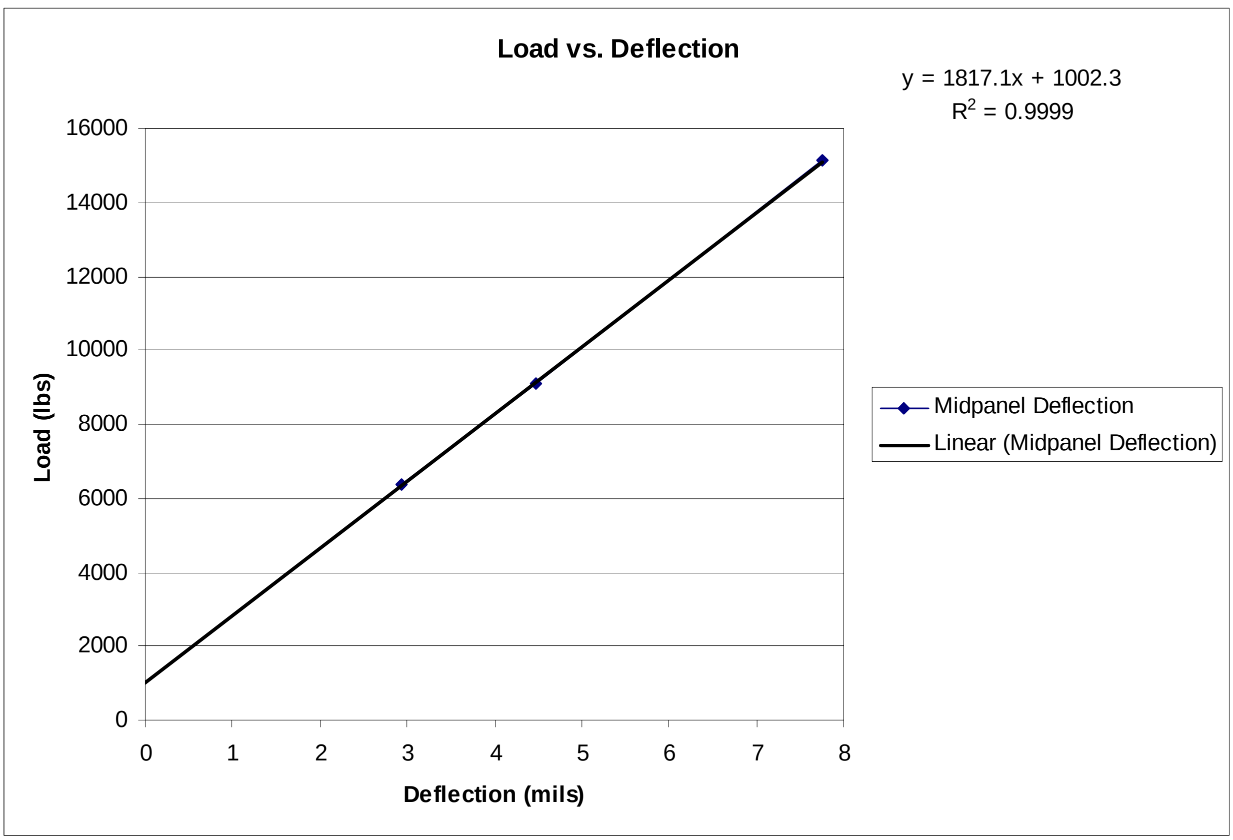
Surface Temp (^oC)		17.7	
Surface Temp (^oF)		63.9	
Cell	TH 62	TH 62	TH 62
Panel	MP10	MP10	MP10
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6248.70	9010	15152.7
Normalized Deflections	0.960	0.999	0.990
D1 Deflection (mills)	2.66	4.26	7.05



Midpanel 11 Deflection Analysis, 9-8-2005

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62MIDP05	MP11	08-Sep-05	3:02	4	400	79	76	73
62MIDP05	MP11	08-Sep-05	3:02	5	400	79	76	73
62MIDP05	MP11	08-Sep-05	3:02	6	571	116	108	104
62MIDP05	MP11	08-Sep-05	3:02	7	573	115	109	105
62MIDP05	MP11	08-Sep-05	3:02	8	575	115	110	105
62MIDP05	MP11	08-Sep-05	3:02	9	948	197	189	180
62MIDP05	MP11	08-Sep-05	3:02	10	953	200	190	182
62MIDP05	MP11	08-Sep-05	3:02	11	951	199	190	182

Surface Temp (^oC)		16.7	
Surface Temp (^oF)		62.1	
Cell	TH 62	TH 62	TH 62
Panel	MP11	MP11	MP11
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6360.00	9110.7	15115.6
Normalized Deflections	0.943	0.988	0.992
D1 Deflection (mills)	2.93	4.48	7.76



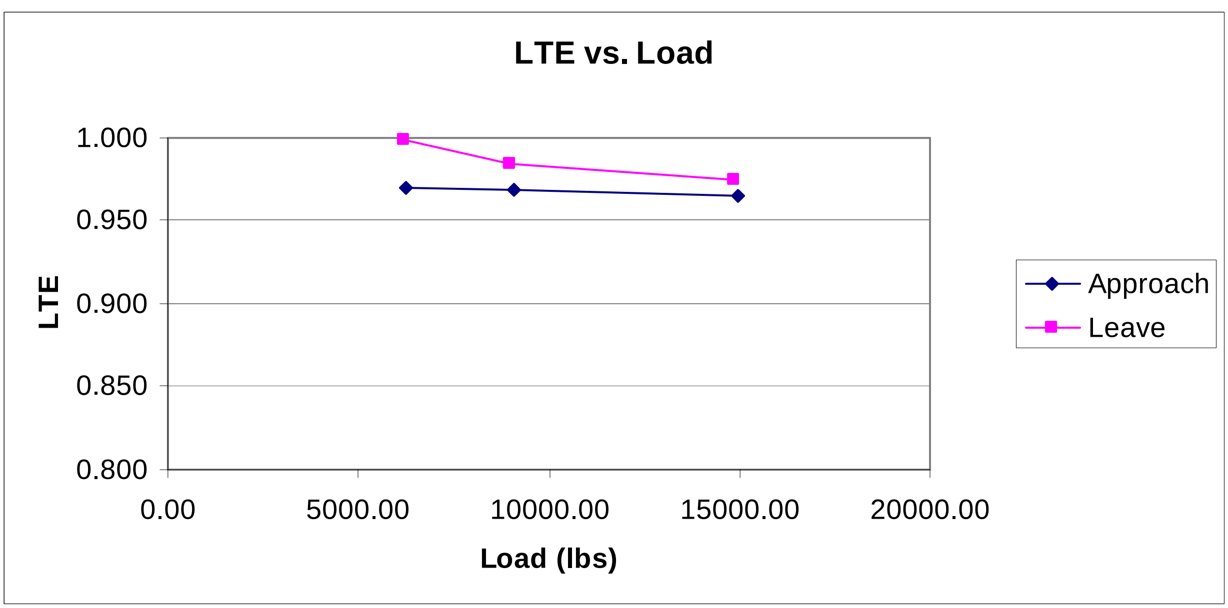
Data from FWD Testing on June 9, 2006

Joint 1 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ1	1.0	08-Jun-06	23:05	1	3	391	185	154	179
62J15906	LJ1	1.0	08-Jun-06	23:05	1	4	394	186	156	181
62J15906	LJ1	1.0	08-Jun-06	23:05	1	5	389	185	156	179
62J15906	LJ1	1.0	08-Jun-06	23:05	1	6	572	269	226	260
62J15906	LJ1	1.0	08-Jun-06	23:05	1	7	572	269	228	261
62J15906	LJ1	1.0	08-Jun-06	23:05	1	8	571	267	226	259
62J15906	LJ1	1.0	08-Jun-06	23:05	1	9	943	431	362	412
62J15906	LJ1	1.0	08-Jun-06	23:05	1	10	940	428	362	416
62J15906	LJ1	1.0	08-Jun-06	23:05	1	11	939	431	363	417
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	3	391	188	189	161
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	4	388	185	184	158
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	5	391	187	186	160
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	6	564	267	260	227
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	7	565	268	265	228
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	8	565	268	265	228
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	9	934	428	415	363
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	10	935	429	419	364
62J15906	AJ1	1.1	08-Jun-06	23:08	1.1	11	935	430	420	364

Surface Temp (^oC)				28.1	28.9		
Surface Temp (^oF)				82.6	84.0		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		A	A	A	A	A	A
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6222.20	6201	9089.5	8978.2	14956.6	14861.2
Normalized Deflections		0.964	0.968	0.990	1.002	1.003	1.009
D1 Deflection (mills)		7.03	7.11	10.46	10.56	16.97	17.04
D2 Deflection (mills)			7.10		10.39		16.61
D3 Deflection (mills)		6.82		10.13		16.38	
Load Transfer (%)		0.969	0.998	0.969	0.984	0.965	0.974

Differential Deflection		0.22	0.01	0.32	0.17	0.59	0.44

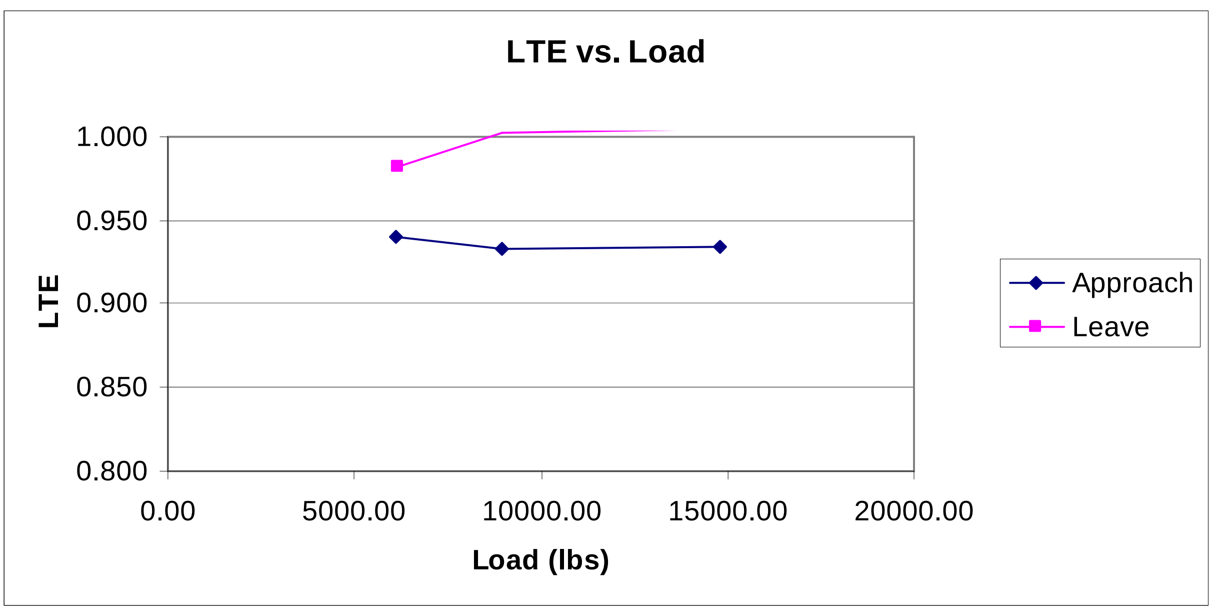


Joint 2 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ2	1.0	08-Jun-06	23:11	2	3	384	166	148	156
62J15906	LJ2	1.0	08-Jun-06	23:11	2	4	384	168	147	158
62J15906	LJ2	1.0	08-Jun-06	23:11	2	5	382	167	149	157
62J15906	LJ2	1.0	08-Jun-06	23:11	2	6	561	244	218	228
62J15906	LJ2	1.0	08-Jun-06	23:11	2	7	561	248	221	231
62J15906	LJ2	1.0	08-Jun-06	23:11	2	8	563	248	222	231
62J15906	LJ2	1.0	08-Jun-06	23:11	2	9	931	404	359	377
62J15906	LJ2	1.0	08-Jun-06	23:11	2	10	932	406	362	380
62J15906	LJ2	1.0	08-Jun-06	23:11	2	11	931	408	363	381
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	3	388	162	160	143
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	4	387	162	158	143
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	5	386	162	159	142
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	6	563	229	228	203
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	7	562	233	235	205
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	8	565	233	234	206
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	9	929	375	377	329
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	10	932	379	381	333
62J15906	AJ2	1.1	08-Jun-06	23:14	2.1	11	932	380	382	333

Surface Temp (^oC)				28.9	28.9		
Surface Temp (^oF)				84.0			
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		B	B	B	B	B	B
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6095.00	6153.3	8930.5	8957	14808.2	14802.9
Normalized Deflections		0.984	0.975	1.008	1.005	1.013	1.013
D1 Deflection (mills)		6.47	6.22	9.78	9.16	16.19	15.08
D2 Deflection (mills)			6.10		9.19		15.16
D3 Deflection (mills)		6.08		9.12		15.12	
Load Transfer (%)		0.940	0.981	0.932	1.003	0.934	1.005

Differential Deflection	0.39	0.12	0.66	-0.03	1.06	-0.08

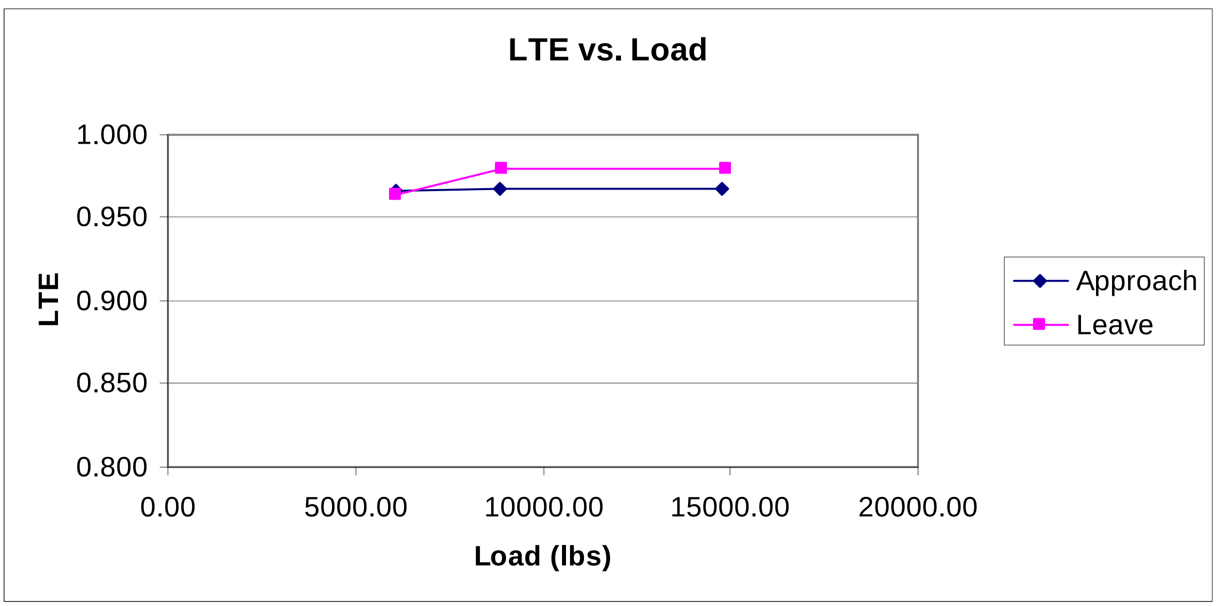


Joint 3 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ3	1.0	08-Jun-06	23:16	3	3	383	197	172	190
62J15906	LJ3	1.0	08-Jun-06	23:16	3	4	383	195	171	189
62J15906	LJ3	1.0	08-Jun-06	23:16	3	5	381	199	175	192
62J15906	LJ3	1.0	08-Jun-06	23:16	3	6	555	283	248	274
62J15906	LJ3	1.0	08-Jun-06	23:16	3	7	558	288	253	278
62J15906	LJ3	1.0	08-Jun-06	23:16	3	8	558	288	253	279
62J15906	LJ3	1.0	08-Jun-06	23:16	3	9	926	473	407	457
62J15906	LJ3	1.0	08-Jun-06	23:16	3	10	931	472	409	457
62J15906	LJ3	1.0	08-Jun-06	23:16	3	11	932	475	412	459
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	3	381	203	196	180
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	4	383	204	197	179
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	5	383	202	194	178
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	6	560	290	283	253
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	7	560	291	286	255
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	8	561	294	288	257
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	9	934	465	454	403
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	10	940	471	461	407
62J15906	AJ3	1.1	08-Jun-06	23:19	3.1	11	938	471	463	408

Surface Temp (°C)			28.9	28.6		
Surface Temp (°F)			84.0	83.5		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	C	C	C	C	C	C
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6079.10	6079.1	8856.3	8909.3	14781.7	14903.6
Normalized Deflections	0.987	0.987	1.016	1.010	1.015	1.006
D1 Deflection (mills)	7.65	7.89	11.45	11.60	18.91	18.58
D2 Deflection (mills)		7.60		11.36		18.20
D3 Deflection (mills)	7.39		11.08		18.28	
Load Transfer (%)	0.966	0.964	0.967	0.979	0.967	0.979

Differential Deflection	0.26	0.28	0.37	0.24	0.63	0.38

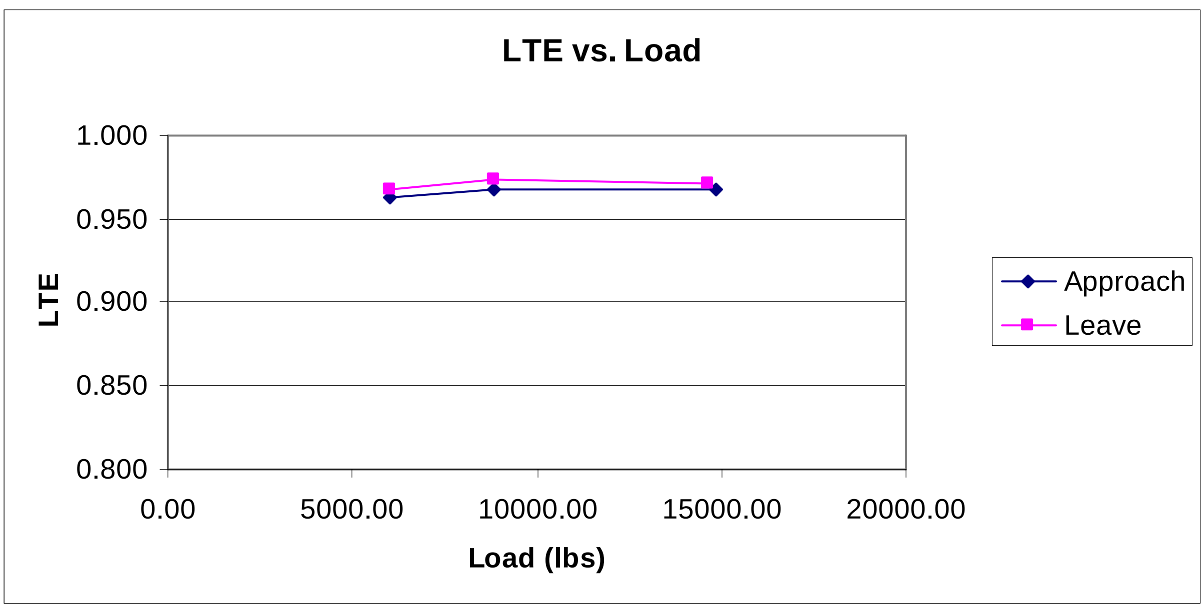


Joint 4 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ4	1.0	08-Jun-06	23:22	4	3	378	181	159	174
62J15906	LJ4	1.0	08-Jun-06	23:22	4	4	383	183	162	176
62J15906	LJ4	1.0	08-Jun-06	23:22	4	5	379	182	161	176
62J15906	LJ4	1.0	08-Jun-06	23:22	4	6	555	262	235	253
62J15906	LJ4	1.0	08-Jun-06	23:22	4	7	559	266	237	257
62J15906	LJ4	1.0	08-Jun-06	23:22	4	8	558	266	238	258
62J15906	LJ4	1.0	08-Jun-06	23:22	4	9	930	431	382	417
62J15906	LJ4	1.0	08-Jun-06	23:22	4	10	936	432	385	418
62J15906	LJ4	1.0	08-Jun-06	23:22	4	11	935	433	386	419
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	3	378	185	179	162
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	4	376	183	178	160
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	5	377	183	176	159
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	6	552	263	255	228
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	7	556	267	261	233
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	8	556	267	260	233
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	9	919	428	415	370
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	10	921	430	418	372
62J15906	AJ4	1.1	08-Jun-06	23:25	4.1	11	922	431	419	372

Surface Temp (^{o}C)			28.6	28.8		
Surface Temp (^{o}F)			83.5	83.8		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	D	D	D	D	D	D
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6042.00	5994.3	8861.6	8819.2	14845.3	14638.6
Normalized Deflections	0.993	1.001	1.016	1.021	1.010	1.025
D1 Deflection (mills)	7.11	7.24	10.58	10.67	17.18	17.33
D2 Deflection (mills)		7.00		10.39		16.83
D3 Deflection (mills)	6.85		10.23		16.62	
Load Transfer (%)	0.963	0.967	0.967	0.974	0.968	0.971

Differential Deflection	0.26	0.24	0.35	0.28	0.56	0.50

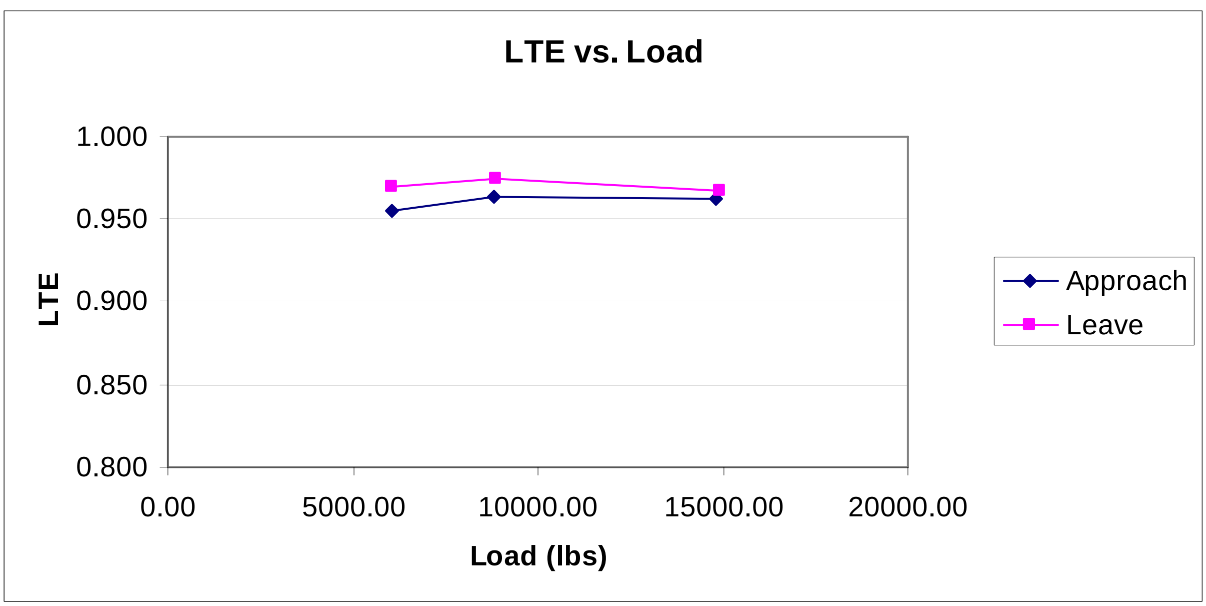


Joint 5 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ5	1.0	08-Jun-06	23:27	5	3	380	173	150	165
62J15906	LJ5	1.0	08-Jun-06	23:27	5	4	381	173	150	165
62J15906	LJ5	1.0	08-Jun-06	23:27	5	5	379	173	151	166
62J15906	LJ5	1.0	08-Jun-06	23:27	5	6	551	249	219	240
62J15906	LJ5	1.0	08-Jun-06	23:27	5	7	554	254	225	245
62J15906	LJ5	1.0	08-Jun-06	23:27	5	8	556	256	227	246
62J15906	LJ5	1.0	08-Jun-06	23:27	5	9	928	418	366	402
62J15906	LJ5	1.0	08-Jun-06	23:27	5	10	932	420	368	405
62J15906	LJ5	1.0	08-Jun-06	23:27	5	11	931	422	369	406
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	3	379	177	172	156
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	4	382	177	172	156
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	5	381	178	172	155
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	6	553	254	247	221
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	7	559	259	252	227
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	8	559	259	253	227
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	9	935	419	404	363
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	10	941	423	409	368
62J15906	AJ5	1.1	08-Jun-06	23:30	5.1	11	940	424	411	368

Surface Temp (^{o}C)			28.7	28.6		
Surface Temp (^{o}F)			83.7	83.5		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	E	E	E	E	E	E
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6042.00	6052.6	8803.3	8856.3	14792.3	14924.8
Normalized Deflections	0.993	0.991	1.022	1.016	1.014	1.005
D1 Deflection (mills)	6.76	6.92	10.18	10.29	16.76	16.69
D2 Deflection (mills)		6.71		10.03		16.14
D3 Deflection (mills)	6.46		9.81		16.14	
Load Transfer (%)	0.956	0.970	0.963	0.974	0.963	0.967

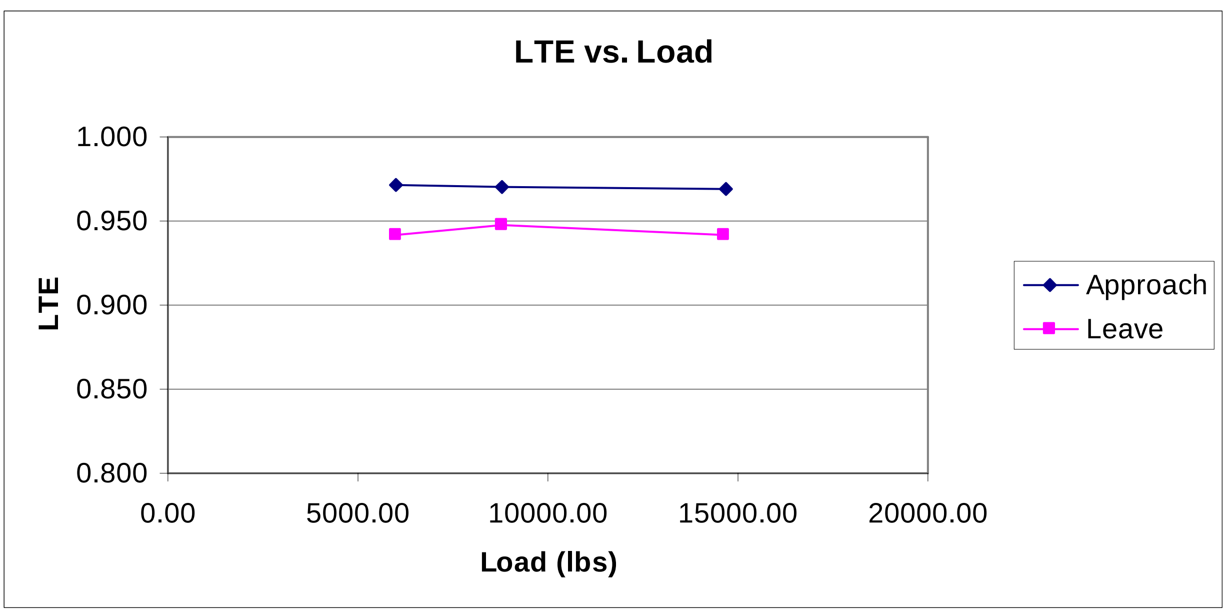
Differential Deflection	0.30	0.21	0.38	0.27	0.63	0.55



Joint 6 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ6	1.0	08-Jun-06	23:33	6	3	379	162	141	157
62J15906	LJ6	1.0	08-Jun-06	23:33	6	4	379	161	140	157
62J15906	LJ6	1.0	08-Jun-06	23:33	6	5	376	161	141	156
62J15906	LJ6	1.0	08-Jun-06	23:33	6	6	551	236	206	229
62J15906	LJ6	1.0	08-Jun-06	23:33	6	7	555	241	213	234
62J15906	LJ6	1.0	08-Jun-06	23:33	6	8	556	242	215	235
62J15906	LJ6	1.0	08-Jun-06	23:33	6	9	920	398	348	386
62J15906	LJ6	1.0	08-Jun-06	23:33	6	10	924	403	352	390
62J15906	LJ6	1.0	08-Jun-06	23:33	6	11	924	405	354	392
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	3	377	173	161	154
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	4	376	173	164	154
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	5	376	171	162	153
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	6	551	249	235	222
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	7	555	253	240	225
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	8	555	255	242	227
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	9	917	411	388	365
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	10	924	417	392	370
62J15906	AJ6	1.1	08-Jun-06	23:35	6.1	11	923	418	393	372

Surface Temp (°C)			28.3	28.6		
Surface Temp (°F)			82.9	83.5		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	F	F	F	F	F	F
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6010.20	5983.7	8808.6	8803.3	14670.4	14649.2
Normalized Deflections	0.998	1.003	1.022	1.022	1.022	1.024
D1 Deflection (mills)	6.34	6.80	9.64	10.15	16.18	16.74
D2 Deflection (mills)		6.41		9.62		15.76
D3 Deflection (mills)	6.16		9.36		15.67	
Load Transfer (%)	0.971	0.942	0.971	0.947	0.968	0.941
Differential Deflection	0.18	0.39	0.28	0.54	0.51	0.98

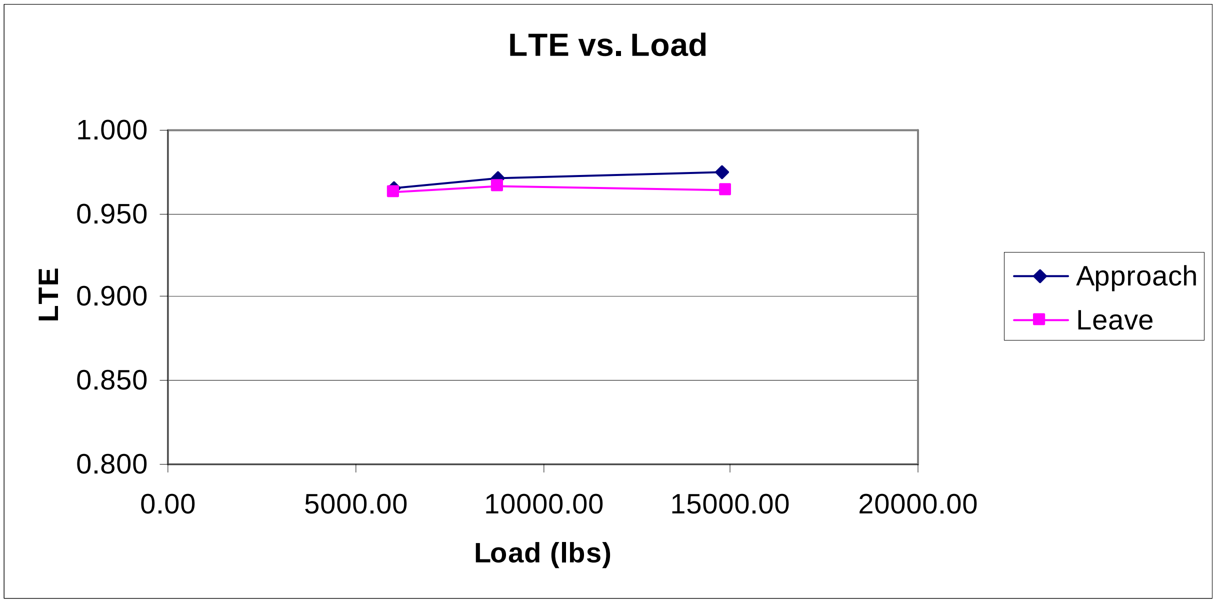


Joint 7 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ7	1.0	08-Jun-06	23:38	7	3	379	163	142	157
62J15906	LJ7	1.0	08-Jun-06	23:38	7	4	378	164	142	158
62J15906	LJ7	1.0	08-Jun-06	23:38	7	5	378	161	140	156
62J15906	LJ7	1.0	08-Jun-06	23:38	7	6	549	238	207	231
62J15906	LJ7	1.0	08-Jun-06	23:38	7	7	554	243	213	236
62J15906	LJ7	1.0	08-Jun-06	23:38	7	8	554	244	215	237
62J15906	LJ7	1.0	08-Jun-06	23:38	7	9	926	403	350	393
62J15906	LJ7	1.0	08-Jun-06	23:38	7	10	933	405	353	395
62J15906	LJ7	1.0	08-Jun-06	23:38	7	11	932	407	355	397
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	3	379	170	164	149
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	4	378	170	164	148
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	5	376	170	163	148
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	6	550	245	237	213
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	7	557	249	240	217
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	8	556	250	242	218
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	9	932	406	391	352
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	10	938	409	394	356
62J15906	AJ7	1.1	08-Jun-06	23:40	7.1	11	937	410	396	356

Surface Temp (^oC)				28.3	28.2		
Surface Temp (^oF)				82.9	82.8		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		G	G	G	G	G	G
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6015.50	6004.9	8782.1	8813.9	14792.3	14877.1
Normalized Deflections		0.997	0.999	1.025	1.021	1.014	1.008
D1 Deflection (mills)		6.39	6.69	9.75	9.97	16.16	16.20
D2 Deflection (mills)			6.44		9.63		15.62
D3 Deflection (mills)		6.16		9.47		15.77	
Load Transfer (%)		0.965	0.963	0.971	0.966	0.975	0.964

Differential Deflection	0.22	0.25	0.28	0.33	0.40	0.58

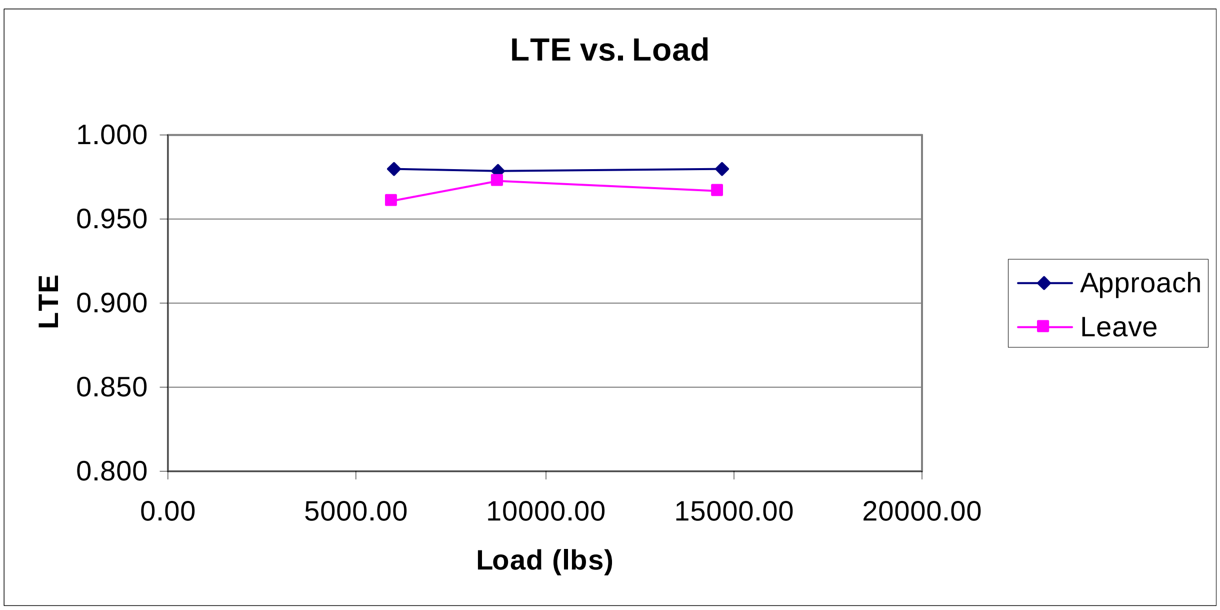


Joint 8 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ8	1.0	08-Jun-06	23:43	8	3	377	184	159	180
62J15906	LJ8	1.0	08-Jun-06	23:43	8	4	379	185	160	181
62J15906	LJ8	1.0	08-Jun-06	23:43	8	5	378	185	160	182
62J15906	LJ8	1.0	08-Jun-06	23:43	8	6	548	267	231	262
62J15906	LJ8	1.0	08-Jun-06	23:43	8	7	551	272	238	266
62J15906	LJ8	1.0	08-Jun-06	23:43	8	8	549	273	239	267
62J15906	LJ8	1.0	08-Jun-06	23:43	8	9	921	439	381	431
62J15906	LJ8	1.0	08-Jun-06	23:43	8	10	929	441	383	432
62J15906	LJ8	1.0	08-Jun-06	23:43	8	11	927	442	384	433
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	3	374	195	187	173
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	4	377	196	188	174
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	5	375	196	189	174
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	6	547	275	266	245
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	7	550	279	272	250
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	8	550	281	274	251
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	9	915	444	430	394
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	10	920	448	433	397
62J15906	AJ8	1.1	08-Jun-06	23:45	8.1	11	920	451	435	399

Surface Temp (^oC)				28	27.9		
Surface Temp (^oF)				82.4	82.2		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		H	H	H	H	H	H
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		6010.20	5967.8	8734.4	8729.1	14718.1	14601.5
Normalized Deflections		0.998	1.005	1.030	1.031	1.019	1.027
D1 Deflection (mills)		7.26	7.74	10.98	11.30	17.68	18.10
D2 Deflection (mills)			7.44		10.98		17.49
D3 Deflection (mills)		7.11		10.75		17.33	
Load Transfer (%)		0.980	0.961	0.979	0.972	0.980	0.966

Differential Deflection	0.14	0.30	0.23	0.31	0.35	0.61

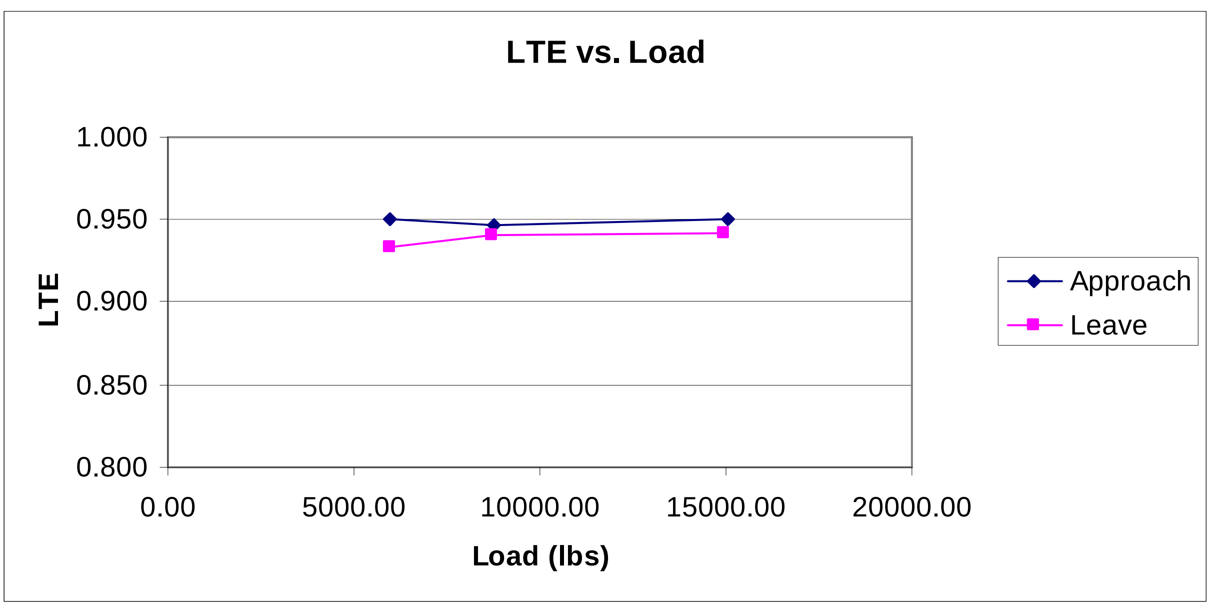


Joint 9 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ9	1.0	08-Jun-06	23:48	9	3	377	161	142	153
62J15906	LJ9	1.0	08-Jun-06	23:48	9	4	376	161	142	153
62J15906	LJ9	1.0	08-Jun-06	23:48	9	5	375	160	142	152
62J15906	LJ9	1.0	08-Jun-06	23:48	9	6	547	237	209	224
62J15906	LJ9	1.0	08-Jun-06	23:48	9	7	550	239	212	227
62J15906	LJ9	1.0	08-Jun-06	23:48	9	8	553	241	214	228
62J15906	LJ9	1.0	08-Jun-06	23:48	9	9	941	406	355	385
62J15906	LJ9	1.0	08-Jun-06	23:48	9	10	949	406	356	386
62J15906	LJ9	1.0	08-Jun-06	23:48	9	11	949	408	358	388
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	3	374	165	153	144
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	4	377	167	156	146
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	5	375	164	154	143
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	6	548	237	222	208
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	7	549	241	227	211
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	8	550	242	228	210
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	9	933	400	377	346
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	10	940	404	380	349
62J15906	AJ9	1.1	08-Jun-06	23:51	9.1	11	943	406	382	350

Surface Temp (^{o}C)			27.9	27.8		
Surface Temp (^{o}F)			82.2	82.0		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	I	I	I	I	I	I
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5978.40	5967.8	8745	8729.1	15046.7	14924.8
Normalized Deflections	1.004	1.005	1.029	1.031	0.997	1.005
D1 Deflection (mills)	6.35	6.54	9.68	9.74	15.96	15.96
D2 Deflection (mills)		6.11		9.16		15.02
D3 Deflection (mills)	6.03		9.17		15.16	
Load Transfer (%)	0.950	0.933	0.947	0.940	0.950	0.941

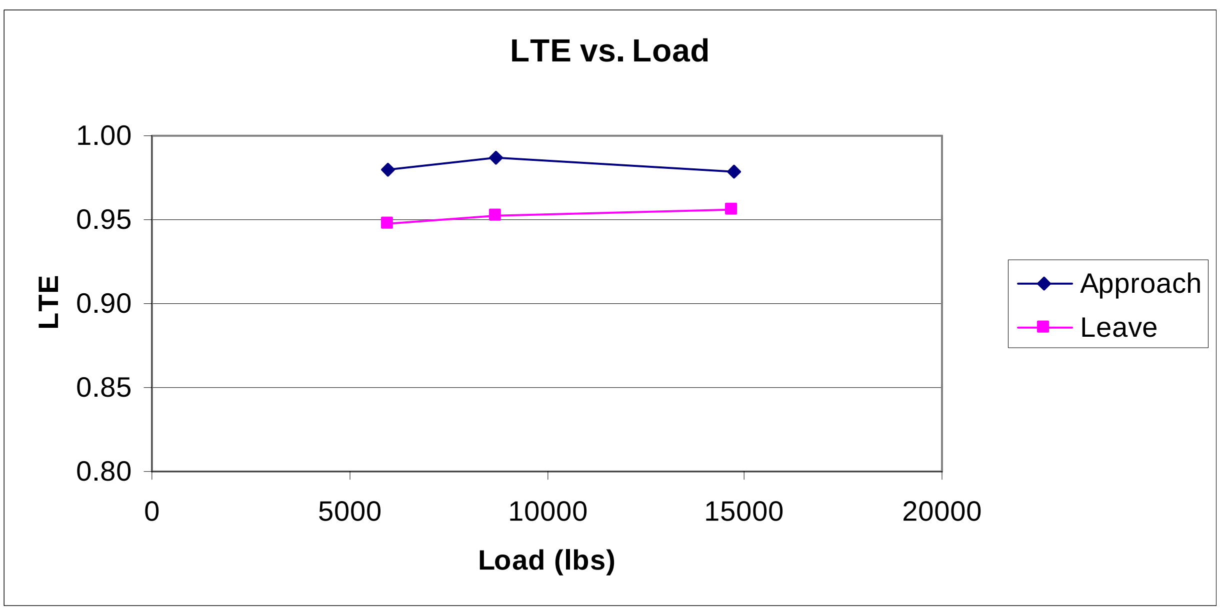
Differential Deflection	0.32	0.44	0.51	0.58	0.80	0.94



Joint 10 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ10	1.0	08-Jun-06	23:54	10	3	379	178	155	174
62J15906	LJ10	1.0	08-Jun-06	23:54	10	4	374	176	154	173
62J15906	LJ10	1.0	08-Jun-06	23:54	10	5	374	177	154	173
62J15906	LJ10	1.0	08-Jun-06	23:54	10	6	546	256	223	252
62J15906	LJ10	1.0	08-Jun-06	23:54	10	7	550	259	227	256
62J15906	LJ10	1.0	08-Jun-06	23:54	10	8	549	261	230	258
62J15906	LJ10	1.0	08-Jun-06	23:54	10	9	923	431	374	423
62J15906	LJ10	1.0	08-Jun-06	23:54	10	10	929	434	379	425
62J15906	LJ10	1.0	08-Jun-06	23:54	10	11	929	436	379	425
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	3	375	192	181	171
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	4	374	191	180	169
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	5	374	190	182	172
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	6	547	275	259	245
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	7	550	277	265	247
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	8	549	279	267	250
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	9	920	446	426	394
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	10	926	450	429	398
62J15906	AJ10	1.1	08-Jun-06	23:57	10.1	11	928	450	431	399

Surface Temp (°C)			28.1	28		
Surface Temp (°F)			82.6	82.4		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	J	J	J	J	J	J
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5973.10	5951.9	8718.5	8723.8	14739.3	14702.2
Normalized Deflections	1.005	1.008	1.032	1.032	1.018	1.020
D1 Deflection (mills)	7.00	7.58	10.51	11.25	17.37	18.02
D2 Deflection (mills)		7.18		10.71		17.21
D3 Deflection (mills)	6.85		10.37		17.00	
Load Transfer (%)	0.979	0.948	0.987	0.952	0.978	0.955
Differential Deflection	0.14	0.40	0.14	0.54	0.37	0.80

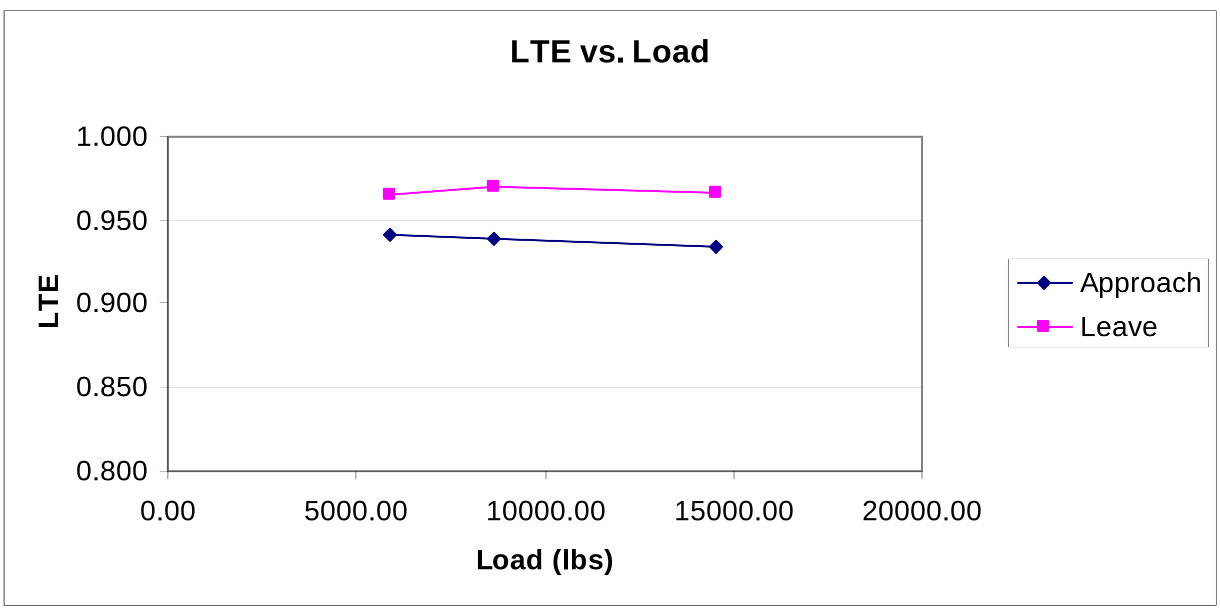


Joint 11 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ11	1.0	09-Jun-06	0:00	11	3	371	200	175	189
62J15906	LJ11	1.0	09-Jun-06	0:00	11	4	370	200	175	188
62J15906	LJ11	1.0	09-Jun-06	0:00	11	5	371	201	176	189
62J15906	LJ11	1.0	09-Jun-06	0:00	11	6	541	293	255	274
62J15906	LJ11	1.0	09-Jun-06	0:00	11	7	546	295	258	278
62J15906	LJ11	1.0	09-Jun-06	0:00	11	8	547	297	259	279
62J15906	LJ11	1.0	09-Jun-06	0:00	11	9	909	486	421	454
62J15906	LJ11	1.0	09-Jun-06	0:00	11	10	916	487	423	455
62J15906	LJ11	1.0	09-Jun-06	0:00	11	11	915	489	425	457
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	3	372	201	195	181
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	4	373	202	195	181
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	5	369	201	193	179
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	6	542	287	277	255
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	7	548	293	284	260
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	8	546	292	285	260
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	9	910	470	454	414
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	10	916	474	458	418
62J15906	AJ11	1.1	09-Jun-06	0:02	11.1	11	917	475	459	418

Surface Temp (°C)			28.2	28.1		
Surface Temp (°F)			82.8	82.6		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	K	K	K	K	K	K
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5893.60	5904.2	8660.2	8670.8	14522	14537.9
Normalized Deflections	1.018	1.016	1.039	1.038	1.033	1.032
D1 Deflection (mills)	8.03	8.05	12.07	11.88	19.81	19.21
D2 Deflection (mills)		7.77		11.52		18.56
D3 Deflection (mills)	7.56		11.33		18.51	
Load Transfer (%)	0.942	0.965	0.939	0.970	0.934	0.966

Differential Deflection	0.47	0.28	0.74	0.35	1.30	0.65

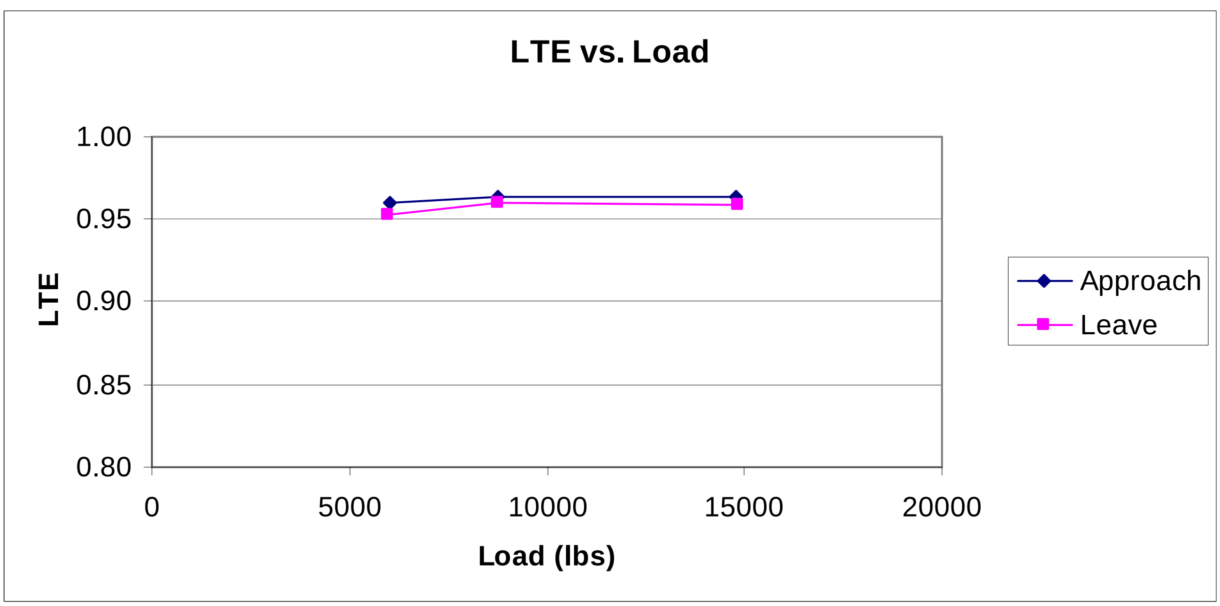


Joint 12 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ12	1.0	09-Jun-06	0:09	12	3	379	217	191	209
62J15906	LJ12	1.0	09-Jun-06	0:09	12	4	378	218	192	209
62J15906	LJ12	1.0	09-Jun-06	0:09	12	5	377	217	191	208
62J15906	LJ12	1.0	09-Jun-06	0:09	12	6	547	309	272	297
62J15906	LJ12	1.0	09-Jun-06	0:09	12	7	551	312	277	301
62J15906	LJ12	1.0	09-Jun-06	0:09	12	8	552	313	278	302
62J15906	LJ12	1.0	09-Jun-06	0:09	12	9	923	506	445	488
62J15906	LJ12	1.0	09-Jun-06	0:09	12	10	931	507	447	488
62J15906	LJ12	1.0	09-Jun-06	0:09	12	11	932	509	448	490
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	3	374	222	212	195
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	4	376	222	211	195
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	5	375	220	210	193
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	6	549	312	298	274
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	7	553	320	308	281
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	8	552	318	306	280
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	9	929	504	483	441
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	10	935	509	489	445
62J15906	AJ12	1.1	09-Jun-06	0:11	12.1	11	933	511	489	446

Surface Temp (^oC)			27.6	27.7		
Surface Temp (^oF)			81.7	81.9		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	L	L	L	L	L	L
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	6010.20	5962.5	8745	8766.2	14765.8	14824.1
Normalized Deflections	0.998	1.006	1.029	1.027	1.016	1.012
D1 Deflection (mills)	8.54	8.77	12.61	12.80	20.29	20.23
D2 Deflection (mills)		8.36		12.28		19.40
D3 Deflection (mills)	8.20		12.15		19.54	
Load Transfer (%)	0.960	0.953	0.964	0.960	0.963	0.959

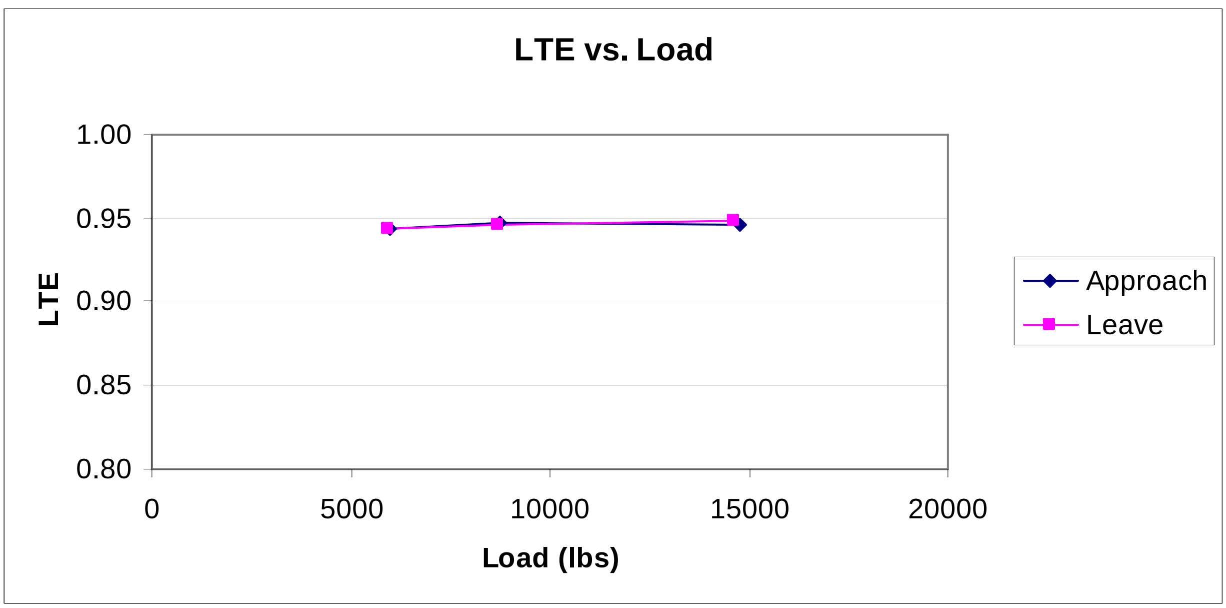
Differential Deflection	0.34	0.41	0.46	0.51	0.75	0.84



Joint 13 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ13	1.0	09-Jun-06	0:14	13	3	377	184	161	173
62J15906	LJ13	1.0	09-Jun-06	0:14	13	4	375	183	161	173
62J15906	LJ13	1.0	09-Jun-06	0:14	13	5	374	184	161	174
62J15906	LJ13	1.0	09-Jun-06	0:14	13	6	548	267	234	252
62J15906	LJ13	1.0	09-Jun-06	0:14	13	7	553	270	239	256
62J15906	LJ13	1.0	09-Jun-06	0:14	13	8	553	271	241	257
62J15906	LJ13	1.0	09-Jun-06	0:14	13	9	925	446	390	422
62J15906	LJ13	1.0	09-Jun-06	0:14	13	10	933	446	392	422
62J15906	LJ13	1.0	09-Jun-06	0:14	13	11	932	448	394	424
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	3	374	190	180	168
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	4	372	190	179	168
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	5	374	191	180	169
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	6	544	272	256	240
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	7	551	276	262	244
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	8	550	277	263	246
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	9	916	443	421	390
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	10	924	448	424	395
62J15906	AJ13	1.1	09-Jun-06	0:16	13.1	11	922	449	426	395

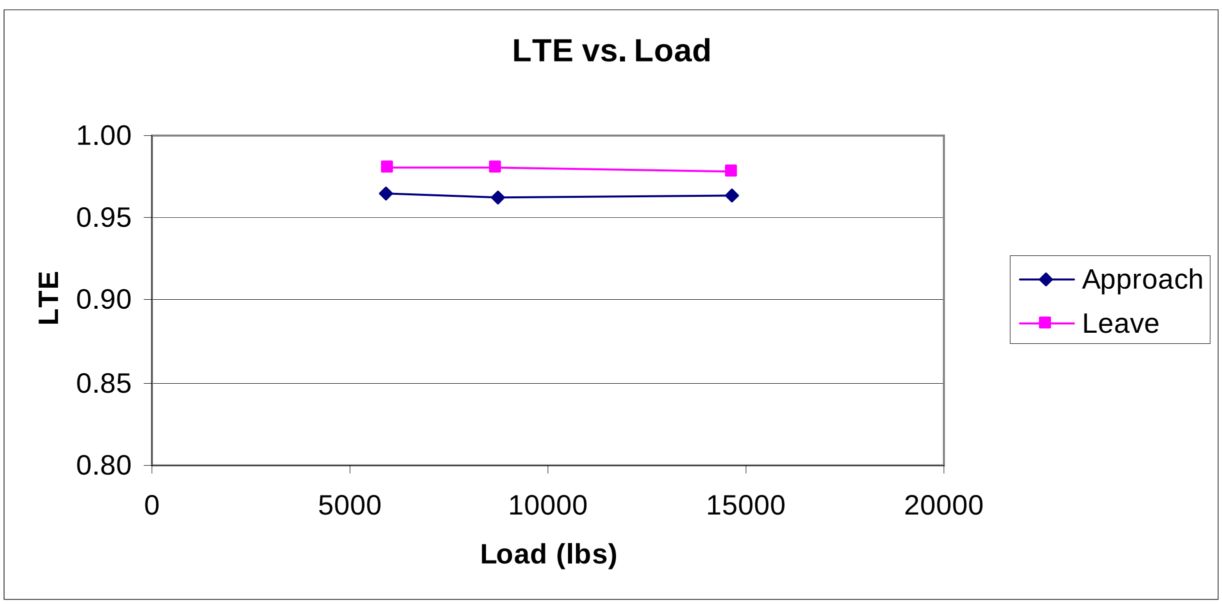
Surface Temp (°C)			28	28.1		
Surface Temp (°F)			82.4	82.6		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	M	M	M	M	M	M
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5967.80	5936	8766.2	8718.5	14787	14638.6
Normalized Deflections	1.005	1.011	1.027	1.032	1.014	1.025
D1 Deflection (mills)	7.27	7.57	10.88	11.17	17.83	18.01
D2 Deflection (mills)		7.15		10.58		17.09
D3 Deflection (mills)	6.86		10.30		16.88	
Load Transfer (%)	0.944	0.944	0.947	0.947	0.946	0.949
Differential Deflection	0.41	0.42	0.58	0.60	0.96	0.93



Joint 14 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ14	1.0	09-Jun-06	0:19	14	3	374	253	223	244
62J15906	LJ14	1.0	09-Jun-06	0:19	14	4	372	253	224	244
62J15906	LJ14	1.0	09-Jun-06	0:19	14	5	372	255	226	246
62J15906	LJ14	1.0	09-Jun-06	0:19	14	6	547	358	313	344
62J15906	LJ14	1.0	09-Jun-06	0:19	14	7	552	363	321	350
62J15906	LJ14	1.0	09-Jun-06	0:19	14	8	552	366	322	352
62J15906	LJ14	1.0	09-Jun-06	0:19	14	9	918	566	492	546
62J15906	LJ14	1.0	09-Jun-06	0:19	14	10	924	567	495	547
62J15906	LJ14	1.0	09-Jun-06	0:19	14	11	925	571	497	549
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	3	373	269	264	236
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	4	374	271	265	238
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	5	373	269	264	237
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	6	546	368	361	323
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	7	547	374	367	329
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	8	550	374	367	329
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	9	917	563	550	491
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	10	923	567	555	495
62J15906	AJ14	1.1	09-Jun-06	0:22	14.1	11	923	570	557	497

Surface Temp (^oC)				27.7	27.5		
Surface Temp (^oF)				81.9	81.5		
Cell		TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel		N	N	N	N	N	N
Lane		R	R	R	R	R	R
Test Location		0	1	0	1	0	1
Ave. Load (lbf)		5925.40	5936	8750.3	8707.9	14665.1	14643.9
Normalized Deflections		1.013	1.011	1.029	1.034	1.023	1.024
D1 Deflection (mills)		10.11	10.73	14.67	15.13	22.87	22.85
D2 Deflection (mills)			10.52		14.85		22.34
D3 Deflection (mills)		9.75		14.12		22.04	
Load Transfer (%)		0.965	0.980	0.962	0.981	0.964	0.978
Differential Deflection		0.36	0.21	0.55	0.28	0.83	0.51

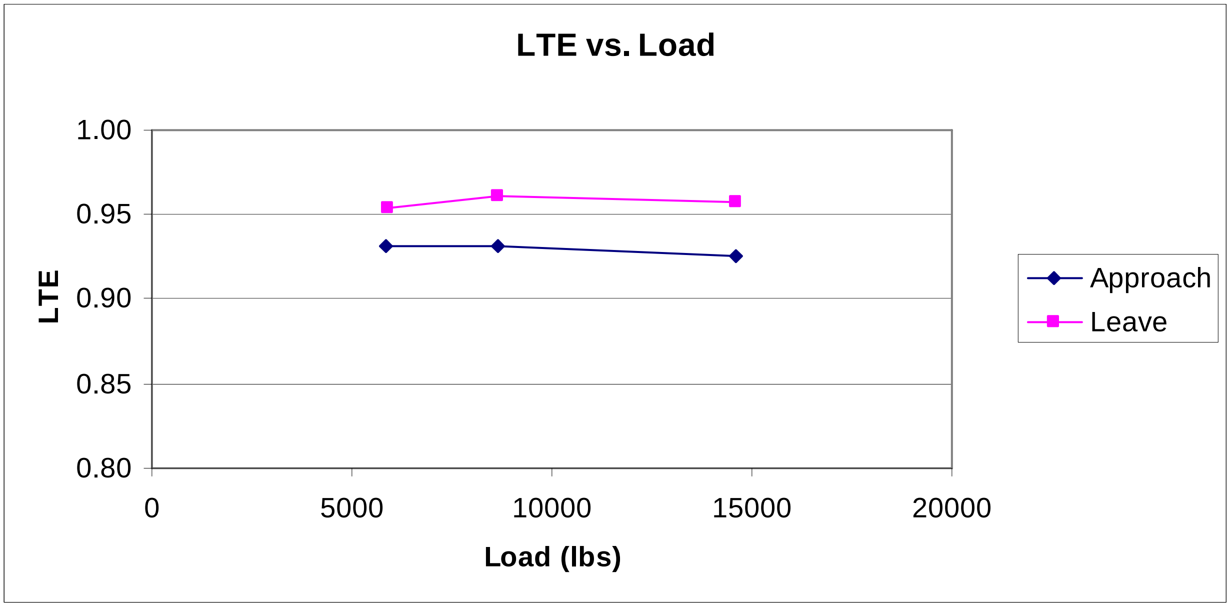


Joint 15 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ15	1.0	09-Jun-06	0:24	15	3	367	212	182	198
62J15906	LJ15	1.0	09-Jun-06	0:24	15	4	371	214	183	199
62J15906	LJ15	1.0	09-Jun-06	0:24	15	5	368	214	182	199
62J15906	LJ15	1.0	09-Jun-06	0:24	15	6	539	311	264	288
62J15906	LJ15	1.0	09-Jun-06	0:24	15	7	546	315	271	294
62J15906	LJ15	1.0	09-Jun-06	0:24	15	8	546	315	273	294
62J15906	LJ15	1.0	09-Jun-06	0:24	15	9	913	506	431	469
62J15906	LJ15	1.0	09-Jun-06	0:24	15	10	921	509	435	470
62J15906	LJ15	1.0	09-Jun-06	0:24	15	11	922	511	435	473
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	3	371	216	205	189
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	4	369	216	206	190
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	5	370	216	207	189
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	6	542	308	294	268
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	7	547	313	301	273
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	8	545	313	302	273
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	9	915	491	470	425
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	10	919	494	474	428
62J15906	AJ15	1.1	09-Jun-06	0:27	15.1	11	920	498	475	430

Surface Temp (^oC)			27.6	27.2		
Surface Temp (^oF)			81.7	81.0		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	P	P	P	P	P	P
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5861.80	5883	8644.3	8660.2	14606.8	14596.2
Normalized Deflections	1.024	1.020	1.041	1.039	1.027	1.028
D1 Deflection (mills)	8.59	8.67	12.85	12.73	20.56	20.00
D2 Deflection (mills)		8.27		12.23		19.13
D3 Deflection (mills)	8.00		11.97		19.02	
Load Transfer (%)	0.931	0.954	0.931	0.960	0.925	0.957

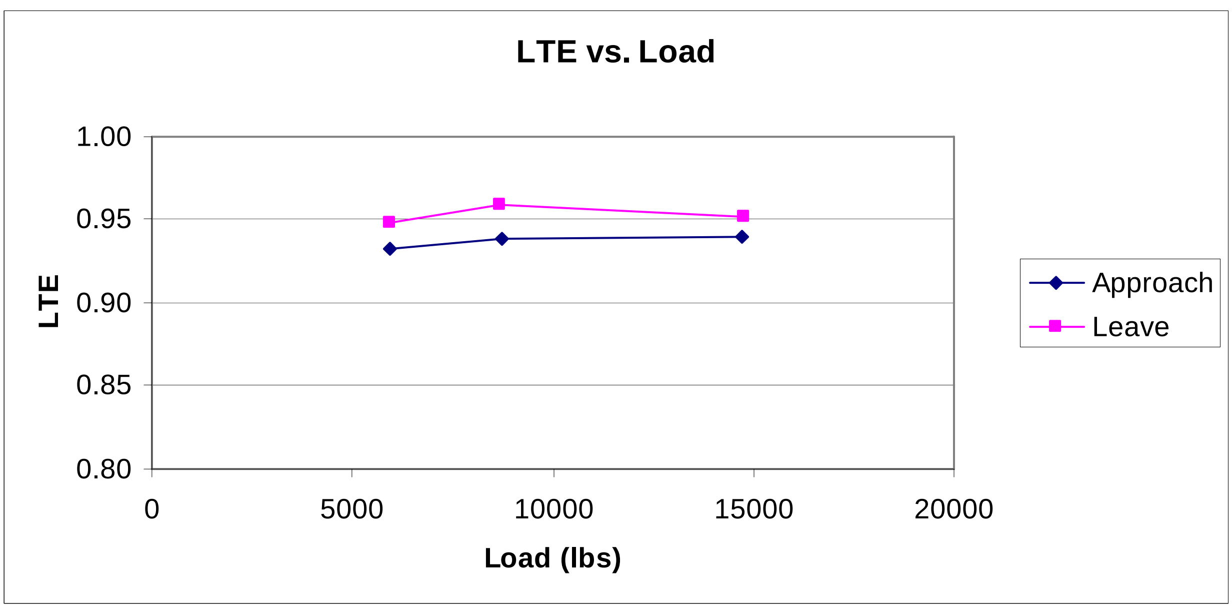
Differential Deflection	0.59	0.40	0.89	0.50	1.54	0.86



Joint 16 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ16	1.0	09-Jun-06	0:30	16	3	372	199	176	186
62J15906	LJ16	1.0	09-Jun-06	0:30	16	4	372	199	175	185
62J15906	LJ16	1.0	09-Jun-06	0:30	16	5	372	198	176	185
62J15906	LJ16	1.0	09-Jun-06	0:30	16	6	543	288	256	271
62J15906	LJ16	1.0	09-Jun-06	0:30	16	7	550	294	262	276
62J15906	LJ16	1.0	09-Jun-06	0:30	16	8	551	297	265	278
62J15906	LJ16	1.0	09-Jun-06	0:30	16	9	921	486	426	457
62J15906	LJ16	1.0	09-Jun-06	0:30	16	10	927	481	424	452
62J15906	LJ16	1.0	09-Jun-06	0:30	16	11	928	483	426	454
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	3	374	205	195	178
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	4	371	204	194	177
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	5	374	204	192	177
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	6	545	294	282	256
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	7	548	298	285	258
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	8	549	299	288	260
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	9	926	479	454	411
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	10	931	483	462	414
62J15906	AJ16	1.1	09-Jun-06	0:32	16.1	11	930	485	462	415

Surface Temp (°C)			27.2	27.1		
Surface Temp (°F)			81.0	80.8		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	Q	Q	Q	Q	Q	Q
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5914.80	5930.7	8713.2	8702.6	14712.8	14771.1
Normalized Deflections	1.014	1.012	1.033	1.034	1.020	1.015
D1 Deflection (mills)	7.93	8.14	11.91	12.09	19.40	19.28
D2 Deflection (mills)		7.71		11.60		18.36
D3 Deflection (mills)	7.40		11.18		18.23	
Load Transfer (%)	0.933	0.948	0.939	0.960	0.940	0.952
Differential Deflection	0.53	0.42	0.73	0.49	1.16	0.92

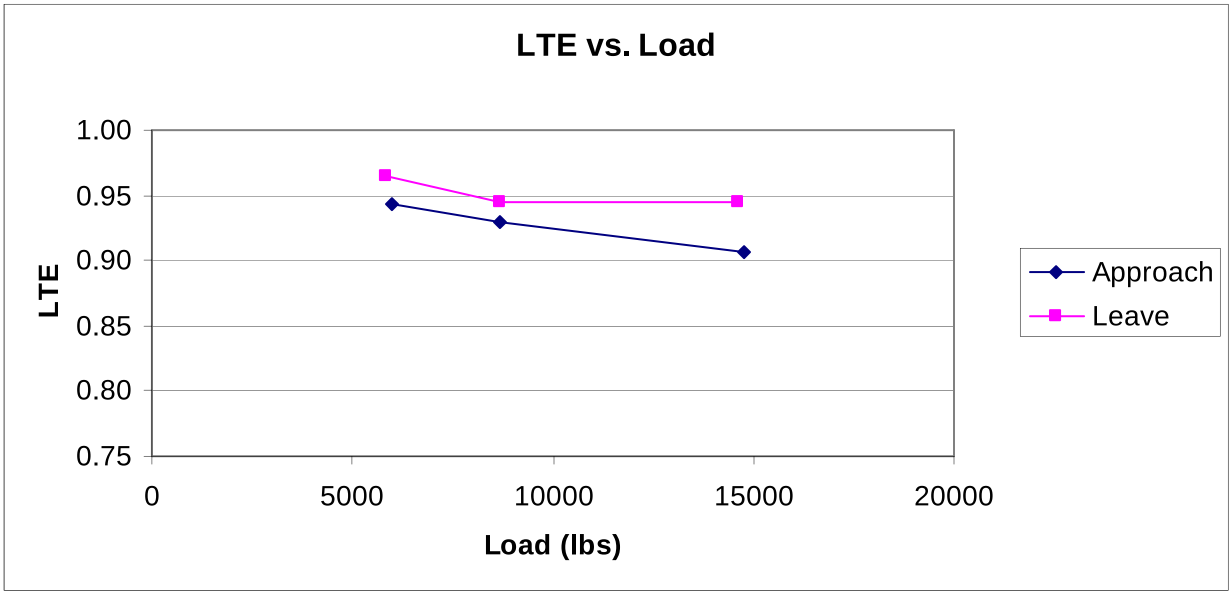


Joint 17 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ17	1.0	09-Jun-06	0:35	17	3	378	201	172	190
62J15906	LJ17	1.0	09-Jun-06	0:35	17	4	375	201	173	190
62J15906	LJ17	1.0	09-Jun-06	0:35	17	5	374	201	174	189
62J15906	LJ17	1.0	09-Jun-06	0:35	17	6	542	292	247	269
62J15906	LJ17	1.0	09-Jun-06	0:35	17	7	546	297	252	278
62J15906	LJ17	1.0	09-Jun-06	0:35	17	8	548	299	255	279
62J15906	LJ17	1.0	09-Jun-06	0:35	17	9	922	494	417	425
62J15906	LJ17	1.0	09-Jun-06	0:35	17	10	931	482	404	447
62J15906	LJ17	1.0	09-Jun-06	0:35	17	11	931	482	404	449
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	3	370	200	193	173
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	4	365	198	191	172
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	5	369	197	190	170
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	6	540	297	269	253
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	7	546	290	280	248
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	8	547	290	280	248
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	9	916	475	440	403
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	10	922	469	447	400
62J15906	AJ17	1.1	09-Jun-06	0:38	17.1	11	923	471	449	401

Surface Temp (^{o}C)			27.2	27.3		
Surface Temp (^{o}F)			81.0	81.1		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	R	R	R	R	R	R
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5973.10	5851.2	8670.8	8654.9	14755.2	14633.3
Normalized Deflections	1.005	1.025	1.038	1.040	1.017	1.025
D1 Deflection (mills)	7.95	8.00	12.09	11.97	19.45	19.03
D2 Deflection (mills)		7.72		11.31		17.97
D3 Deflection (mills)	7.50		11.25		17.62	
Load Transfer (%)	0.944	0.965	0.930	0.945	0.906	0.944

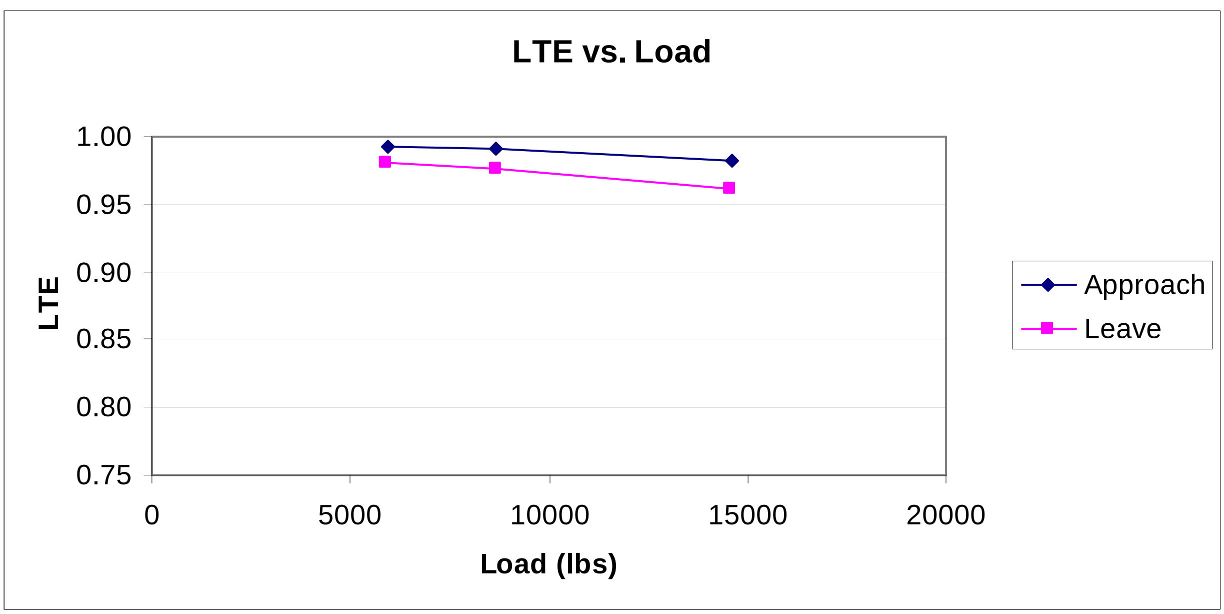
Differential Deflection (mills)	0.45	0.28	0.84	0.65	1.83	1.06



Joint 18 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ18	1.0	09-Jun-06	0:40	18	3	372	223	187	221
62J15906	LJ18	1.0	09-Jun-06	0:40	18	4	373	222	187	221
62J15906	LJ18	1.0	09-Jun-06	0:40	18	5	372	223	187	221
62J15906	LJ18	1.0	09-Jun-06	0:40	18	6	540	326	274	321
62J15906	LJ18	1.0	09-Jun-06	0:40	18	7	544	328	279	326
62J15906	LJ18	1.0	09-Jun-06	0:40	18	8	547	330	279	328
62J15906	LJ18	1.0	09-Jun-06	0:40	18	9	914	529	443	510
62J15906	LJ18	1.0	09-Jun-06	0:40	18	10	922	526	439	521
62J15906	LJ18	1.0	09-Jun-06	0:40	18	11	921	525	440	522
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	3	369	231	227	193
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	4	371	230	226	192
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	5	373	232	227	193
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	6	542	342	329	284
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	7	546	341	335	284
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	8	546	341	336	284
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	9	913	552	516	455
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	10	918	545	531	449
62J15906	AJ18	1.1	09-Jun-06	0:43	18.1	11	919	544	530	448

Surface Temp (°C)			27.6	27.8		
Surface Temp (°F)			81.7	82.0		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	S	S	S	S	S	S
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5920.10	5898.9	8644.3	8660.2	14612.1	14575
Normalized Deflections	1.013	1.017	1.041	1.039	1.027	1.029
D1 Deflection (mills)	8.88	9.25	13.44	13.96	21.28	22.16
D2 Deflection (mills)		9.07		13.63		21.29
D3 Deflection (mills)	8.82		13.32		20.92	
Load Transfer (%)	0.993	0.981	0.991	0.977	0.983	0.961
Differential Deflection (mills)	0.07	0.17	0.12	0.33	0.36	0.86

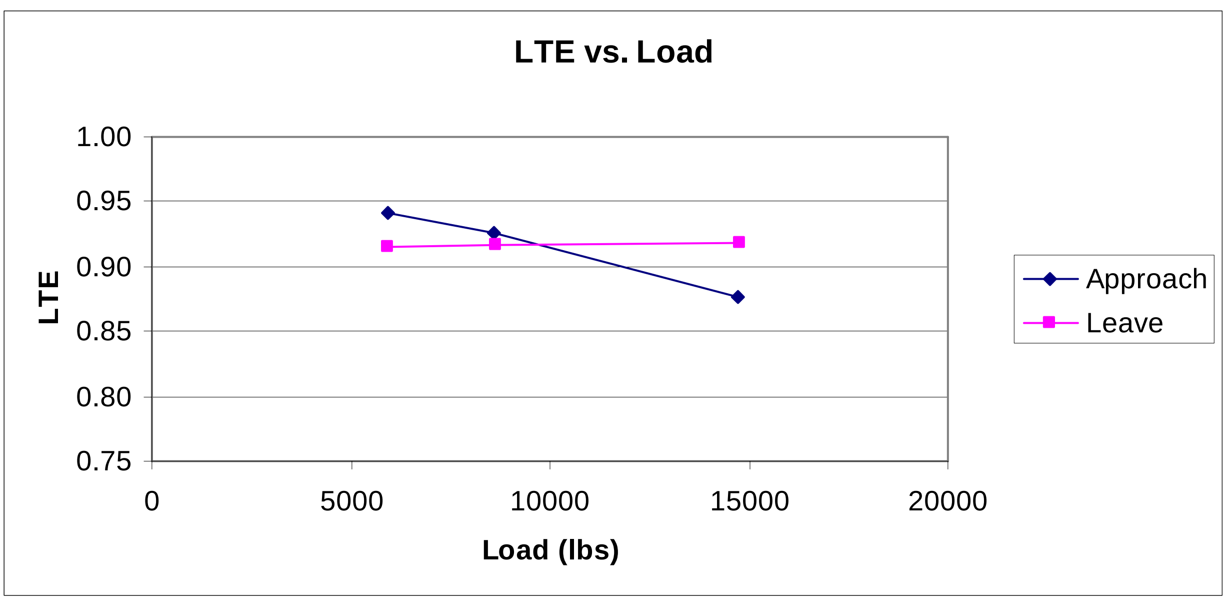


Joint 19 LTE Analysis, 6-9-2006

FWD File	Joint ID	Test Point	Test Date	Test Time	FWD Joint ID	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62J15906	LJ19	1.0	09-Jun-06	0:46	19	3	371	214	171	201
62J15906	LJ19	1.0	09-Jun-06	0:46	19	4	372	215	173	202
62J15906	LJ19	1.0	09-Jun-06	0:46	19	5	372	214	174	202
62J15906	LJ19	1.0	09-Jun-06	0:46	19	6	537	315	257	287
62J15906	LJ19	1.0	09-Jun-06	0:46	19	7	542	317	257	295
62J15906	LJ19	1.0	09-Jun-06	0:46	19	8	545	318	257	297
62J15906	LJ19	1.0	09-Jun-06	0:46	19	9	920	527	424	449
62J15906	LJ19	1.0	09-Jun-06	0:46	19	10	927	521	421	462
62J15906	LJ19	1.0	09-Jun-06	0:46	19	11	927	522	422	464
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	3	371	222	203	180
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	4	372	222	203	180
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	5	374	224	205	181
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	6	542	323	292	260
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	7	547	321	296	260
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	8	546	321	297	260
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	9	924	508	461	406
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	10	931	508	468	406
62J15906	AJ19	1.1	09-Jun-06	0:49	19.1	11	931	508	470	406

Surface Temp (^oC)			27.1	27.2		
Surface Temp (^oF)			80.8	81.0		
Cell	TH 62	TH 62	TH 62	TH 62	TH 62	TH 62
Panel	T	T	T	T	T	T
Lane	R	R	R	R	R	R
Test Location	0	1	0	1	0	1
Ave. Load (lbf)	5909.50	5920.1	8607.2	8665.5	14702.2	14765.8
Normalized Deflections	1.015	1.013	1.046	1.039	1.020	1.016
D1 Deflection (mills)	8.57	8.88	13.03	13.15	21.02	20.31
D2 Deflection (mills)		8.12		12.06		18.65
D3 Deflection (mills)	8.06		12.06		18.41	
Load Transfer (%)	0.941	0.915	0.925	0.917	0.876	0.918

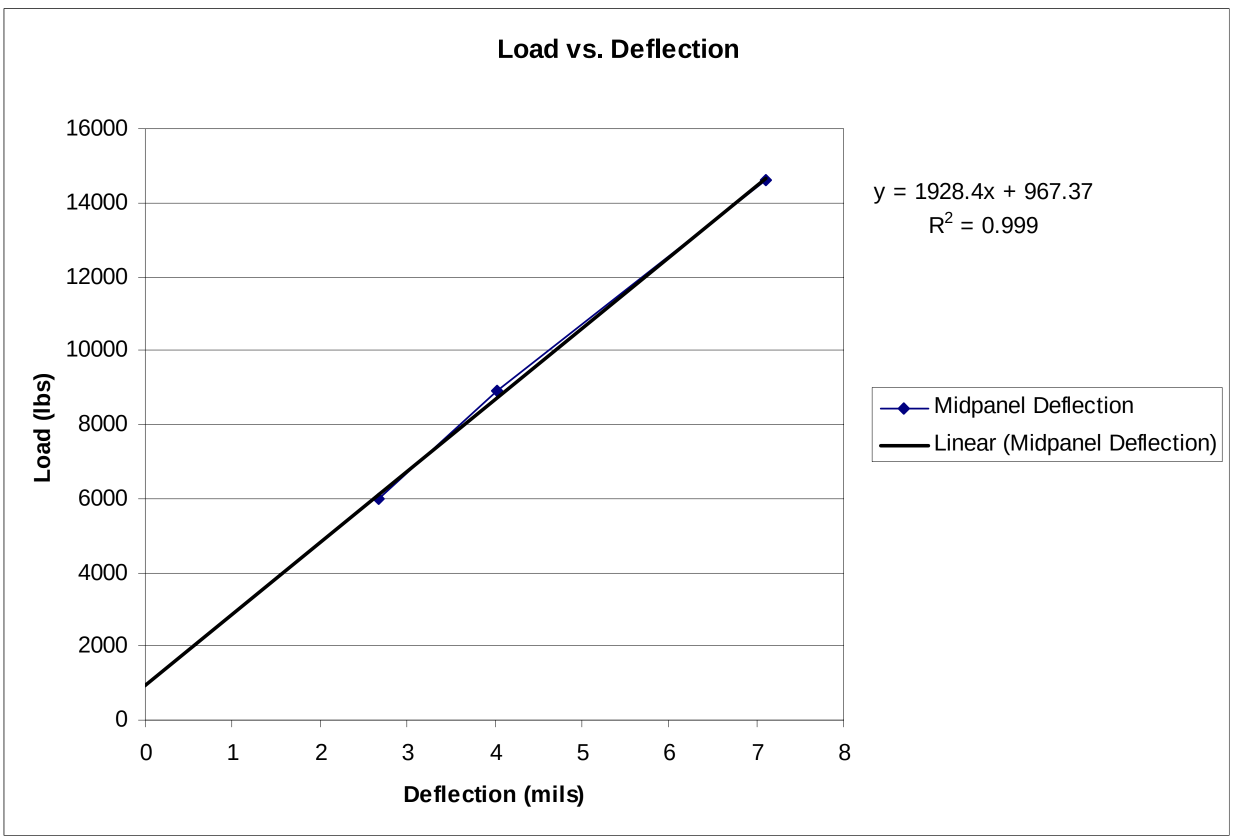
Differential Deflection (mills)	0.51	0.76	0.97	1.09	2.61	1.67



Midpanel 1 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP1	09-Jun-06	0:59	3	378	68	61	63
62315906	MP1	09-Jun-06	0:59	4	380	68	61	63
62315906	MP1	09-Jun-06	0:59	5	376	68	62	63
62315906	MP1	09-Jun-06	0:59	6	557	100	98	93
62315906	MP1	09-Jun-06	0:59	7	559	101	101	93
62315906	MP1	09-Jun-06	0:59	8	561	102	99	95
62315906	MP1	09-Jun-06	0:59	9	918	176	169	163
62315906	MP1	09-Jun-06	0:59	10	920	176	167	164
62315906	MP1	09-Jun-06	0:59	11	921	176	168	164

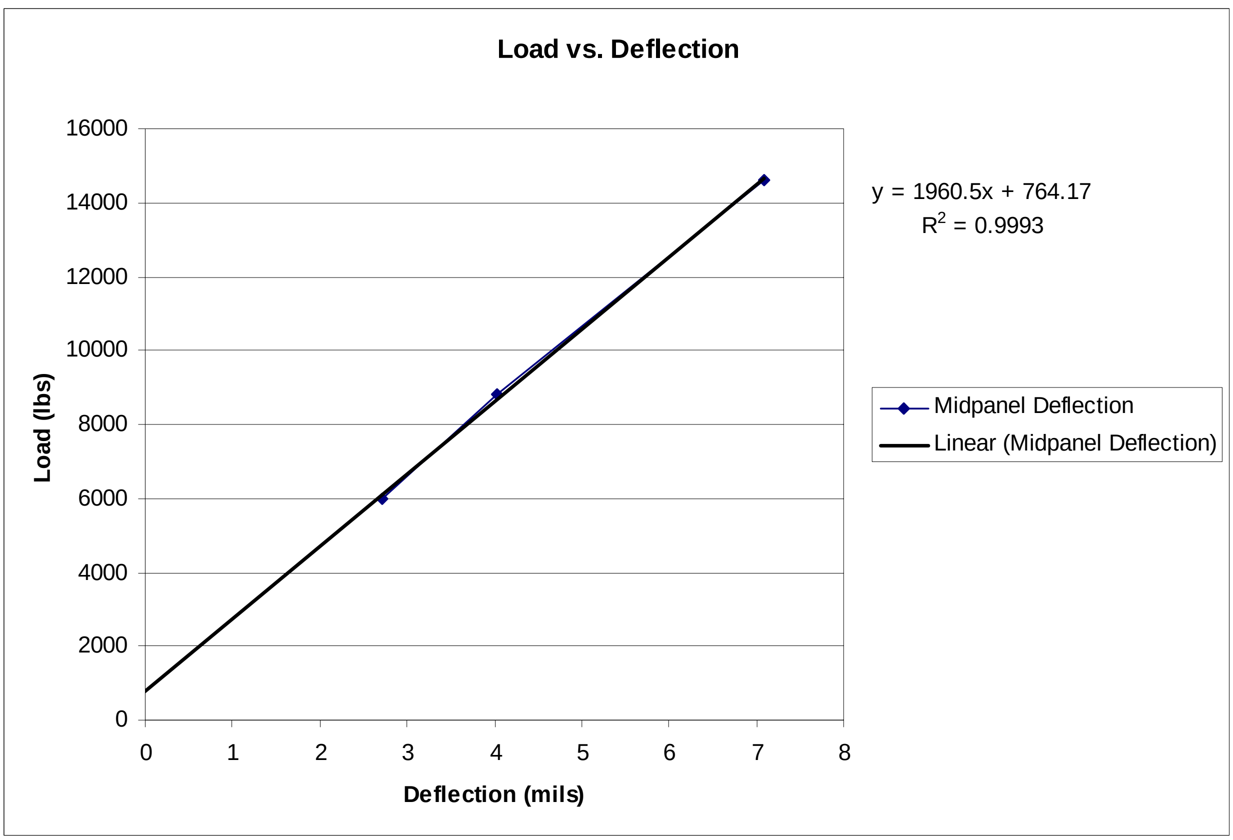
Surface Temp (^{o}C)		26.5	
Surface Temp (^{o}F)		79.7	
Cell	TH 62	TH 62	TH 62
Panel	MP1	MP1	MP1
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6010.20	8888.1	14622.7
Normalized Deflections	0.998	1.013	1.026
D1 Deflection (mills)	2.67	4.03	7.11



Midpanel 2 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP2	09-Jun-06	1:02	3	377	68	66	64
62315906	MP2	09-Jun-06	1:02	4	374	69	65	64
62315906	MP2	09-Jun-06	1:02	5	378	69	65	63
62315906	MP2	09-Jun-06	1:02	6	551	99	96	92
62315906	MP2	09-Jun-06	1:02	7	557	101	98	94
62315906	MP2	09-Jun-06	1:02	8	554	101	98	94
62315906	MP2	09-Jun-06	1:02	9	916	175	168	163
62315906	MP2	09-Jun-06	1:02	10	920	175	168	163
62315906	MP2	09-Jun-06	1:02	11	921	176	168	163

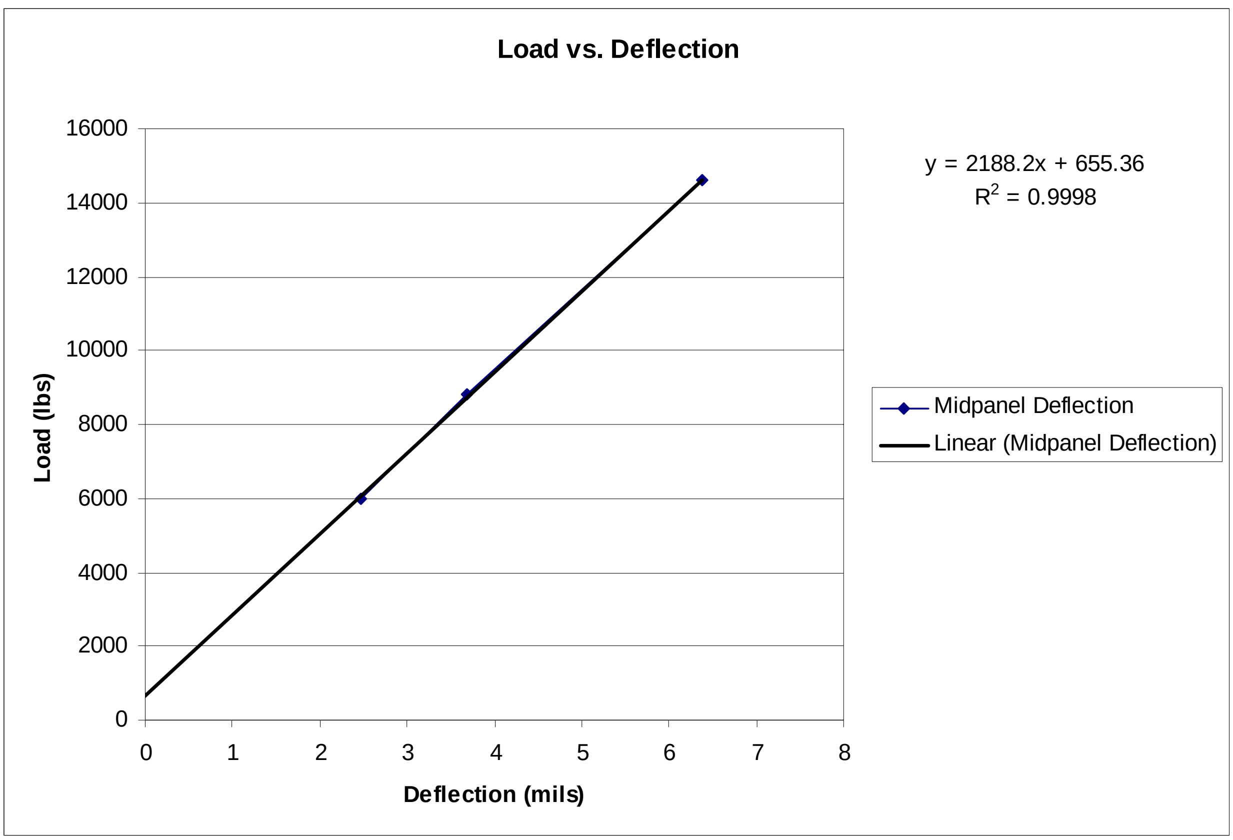
Surface Temp (^oC)		26.9	
Surface Temp (^oF)		80.4	
Cell	TH 62	TH 62	TH 62
Panel	MP2	MP2	MP2
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5983.70	8808.6	14612.1
Normalized Deflections	1.003	1.022	1.027
D1 Deflection (mills)	2.71	4.03	7.08



Midpanel 3 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP3	09-Jun-06	1:05	3	376	63	58	56
62315906	MP3	09-Jun-06	1:05	4	378	62	58	56
62315906	MP3	09-Jun-06	1:05	5	378	63	58	56
62315906	MP3	09-Jun-06	1:05	6	554	91	85	81
62315906	MP3	09-Jun-06	1:05	7	554	92	86	82
62315906	MP3	09-Jun-06	1:05	8	556	93	86	83
62315906	MP3	09-Jun-06	1:05	9	915	157	147	140
62315906	MP3	09-Jun-06	1:05	10	920	158	148	141
62315906	MP3	09-Jun-06	1:05	11	918	158	148	142

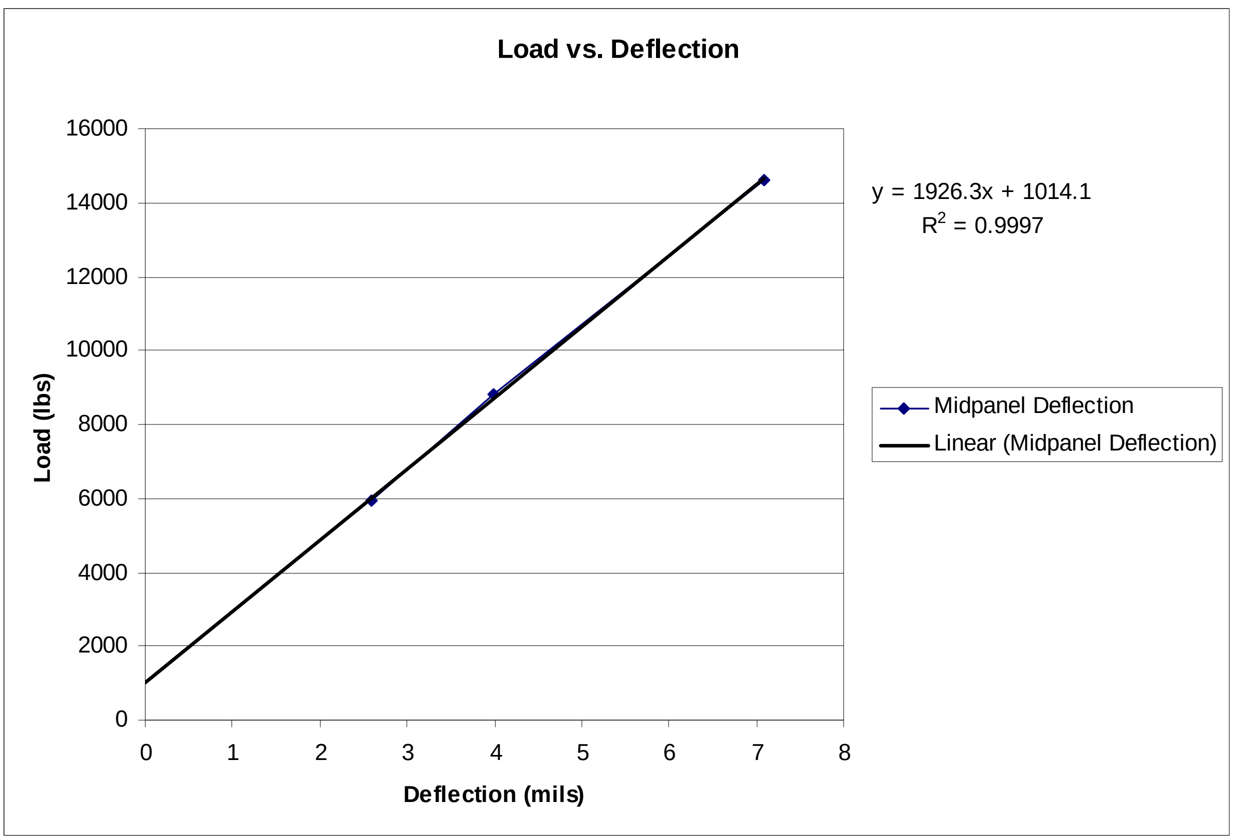
Surface Temp (^oC)		26.7	
Surface Temp (^oF)		80.1	
Cell	TH 62	TH 62	TH 62
Panel	MP3	MP3	MP3
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5999.60	8819.2	14590.9
Normalized Deflections	1.000	1.021	1.028
D1 Deflection (mills)	2.47	3.70	6.38



Midpanel 4 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP4	09-Jun-06	1:08	3	375	66	63	62
62315906	MP4	09-Jun-06	1:08	4	376	65	62	61
62315906	MP4	09-Jun-06	1:08	5	374	66	61	61
62315906	MP4	09-Jun-06	1:08	6	552	98	95	91
62315906	MP4	09-Jun-06	1:08	7	554	100	96	93
62315906	MP4	09-Jun-06	1:08	8	555	100	96	93
62315906	MP4	09-Jun-06	1:08	9	916	175	167	161
62315906	MP4	09-Jun-06	1:08	10	922	175	167	161
62315906	MP4	09-Jun-06	1:08	11	921	176	168	162

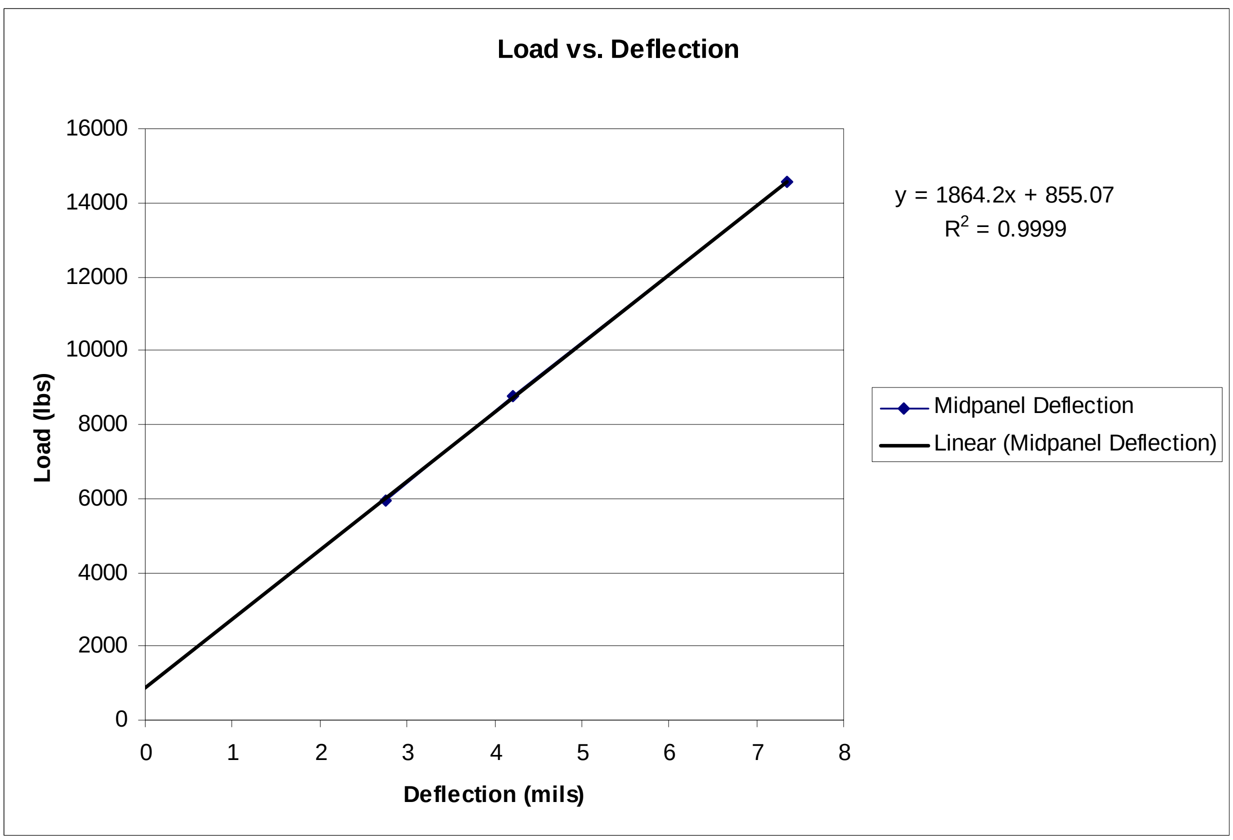
Surface Temp (^{o}C)		26.8	
Surface Temp (^{o}F)		80.2	
Cell	TH 62	TH 62	TH 62
Panel	MP4	MP4	MP4
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5962.50	8803.3	14622.7
Normalized Deflections	1.006	1.022	1.026
D1 Deflection (mills)	2.60	4.00	7.08



Midpanel 5 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP5	09-Jun-06	1:10	3	373	70	65	63
62315906	MP5	09-Jun-06	1:10	4	376	69	65	63
62315906	MP5	09-Jun-06	1:10	5	374	69	65	63
62315906	MP5	09-Jun-06	1:10	6	547	102	97	92
62315906	MP5	09-Jun-06	1:10	7	552	105	99	94
62315906	MP5	09-Jun-06	1:10	8	552	105	98	94
62315906	MP5	09-Jun-06	1:10	9	912	182	170	163
62315906	MP5	09-Jun-06	1:10	10	917	181	171	163
62315906	MP5	09-Jun-06	1:10	11	917	181	170	163

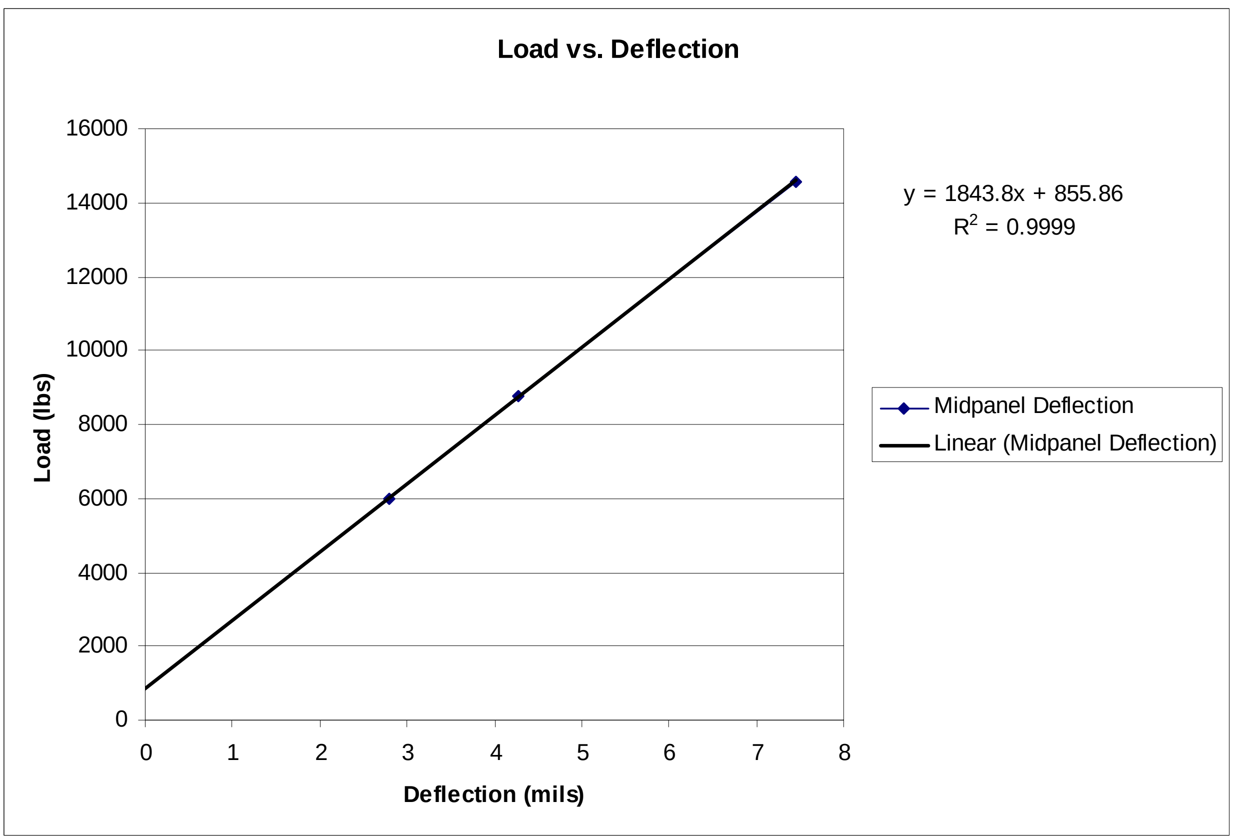
Surface Temp (°C)		26.7	
Surface Temp (°F)		80.1	
Cell	TH 62	TH 62	TH 62
Panel	MP5	MP5	MP5
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5951.90	8750.3	14553.8
Normalized Deflections	1.008	1.029	1.031
D1 Deflection (mills)	2.75	4.21	7.36



Midpanel 6 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP6	09-Jun-06	1:13	3	378	71	67	64
62315906	MP6	09-Jun-06	1:13	4	377	71	68	65
62315906	MP6	09-Jun-06	1:13	5	375	71	68	64
62315906	MP6	09-Jun-06	1:13	6	549	106	98	94
62315906	MP6	09-Jun-06	1:13	7	553	106	99	96
62315906	MP6	09-Jun-06	1:13	8	555	106	99	97
62315906	MP6	09-Jun-06	1:13	9	913	185	174	167
62315906	MP6	09-Jun-06	1:13	10	919	184	172	167
62315906	MP6	09-Jun-06	1:13	11	919	183	173	167

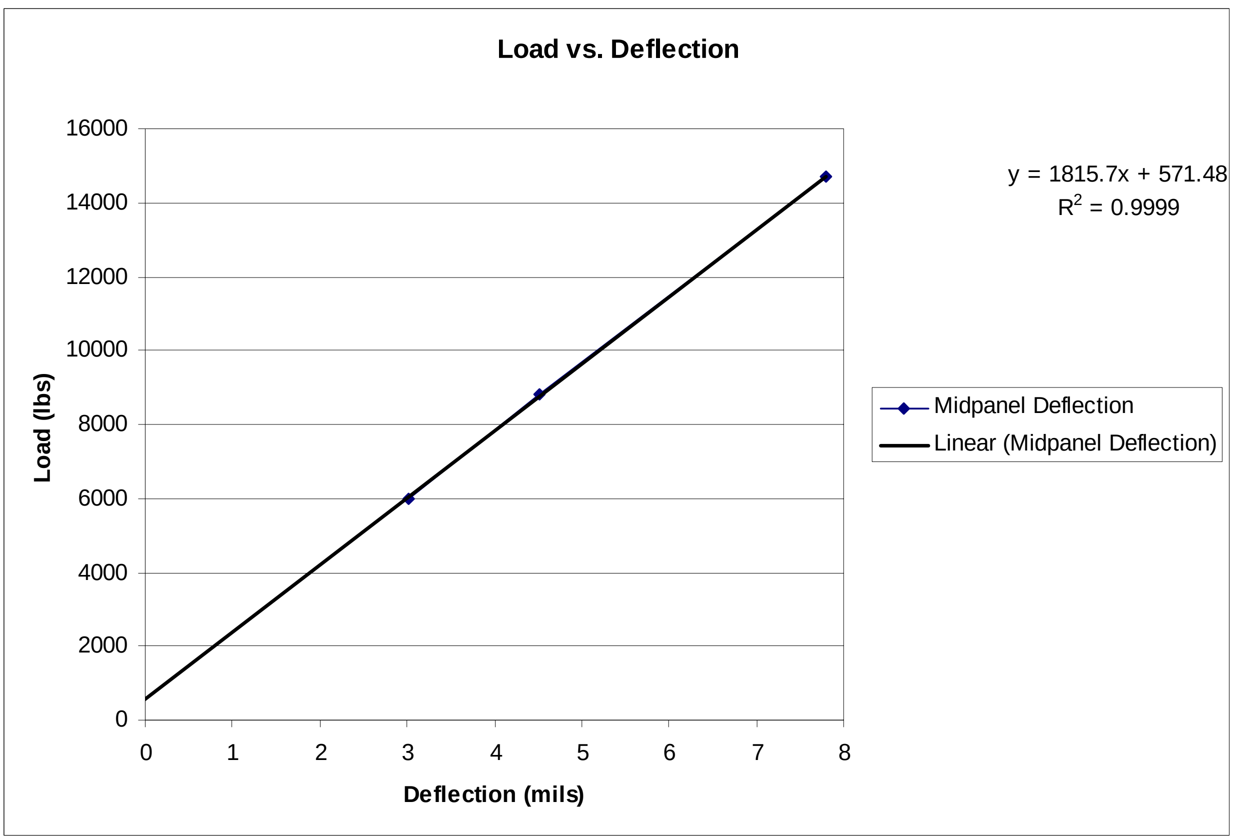
Surface Temp (^{o}C)		27	
Surface Temp (^{o}F)		80.6	
Cell	TH 62	TH 62	TH 62
Panel	MP6	MP6	MP6
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5989.00	8782.1	14580.3
Normalized Deflections	1.002	1.025	1.029
D1 Deflection (mills)	2.80	4.28	7.45



Midpanel 7 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP7	09-Jun-06	1:16	3	376	76	72	70
62315906	MP7	09-Jun-06	1:16	4	380	77	72	70
62315906	MP7	09-Jun-06	1:16	5	378	77	72	71
62315906	MP7	09-Jun-06	1:16	6	552	111	106	103
62315906	MP7	09-Jun-06	1:16	7	556	112	106	104
62315906	MP7	09-Jun-06	1:16	8	555	114	108	105
62315906	MP7	09-Jun-06	1:16	9	921	194	183	178
62315906	MP7	09-Jun-06	1:16	10	926	194	183	178
62315906	MP7	09-Jun-06	1:16	11	927	194	183	178

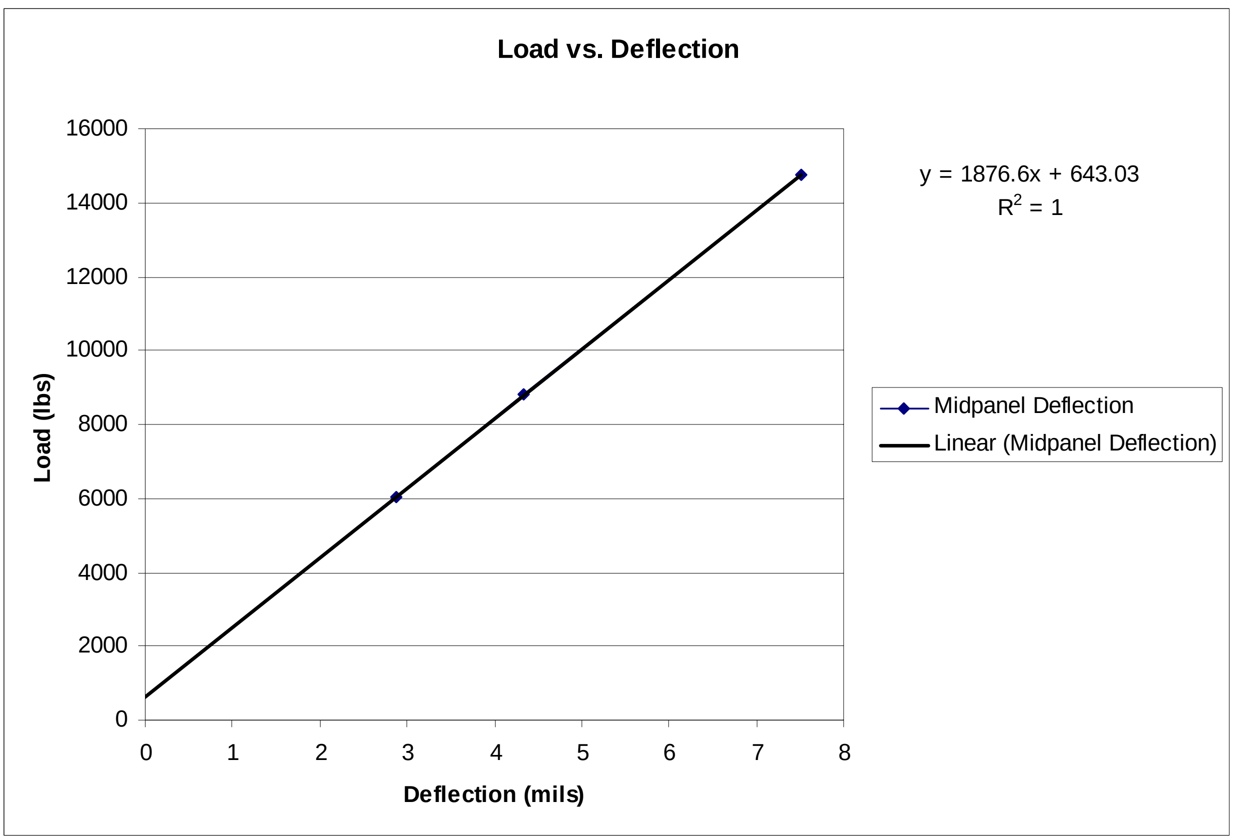
Surface Temp (^oC)		26.7	
Surface Temp (^oF)		80.1	
Cell	TH 62	TH 62	TH 62
Panel	MP7	MP7	MP7
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6010.20	8813.9	14702.2
Normalized Deflections	0.998	1.021	1.020
D1 Deflection (mills)	3.01	4.51	7.79



Midpanel 8 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP8	09-Jun-06	1:18	3	380	73	69	67
62315906	MP8	09-Jun-06	1:18	4	378	73	69	67
62315906	MP8	09-Jun-06	1:18	5	379	74	69	68
62315906	MP8	09-Jun-06	1:18	6	552	106	102	99
62315906	MP8	09-Jun-06	1:18	7	555	109	103	101
62315906	MP8	09-Jun-06	1:18	8	555	109	104	100
62315906	MP8	09-Jun-06	1:18	9	923	188	179	173
62315906	MP8	09-Jun-06	1:18	10	930	187	179	173
62315906	MP8	09-Jun-06	1:18	11	931	189	178	173

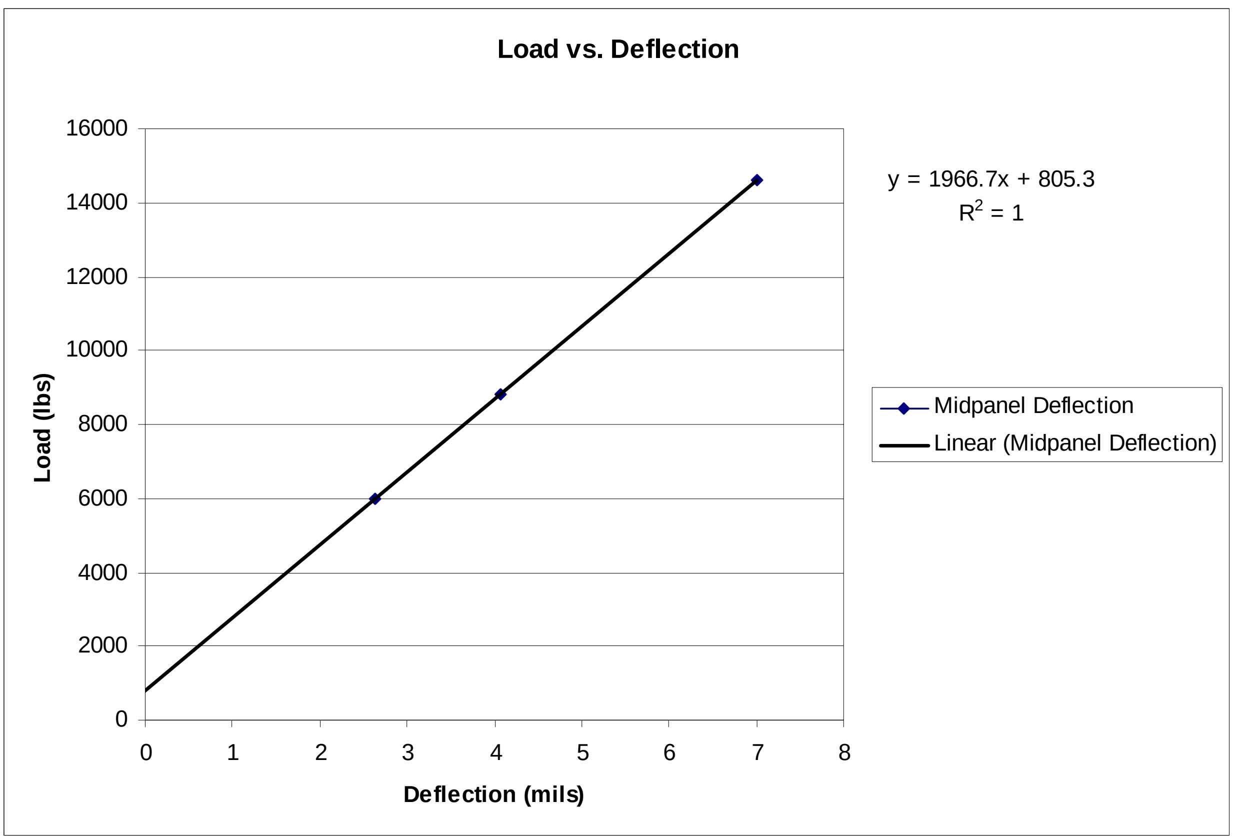
Surface Temp (^oC)		26.2	
Surface Temp (^oF)		79.2	
Cell	TH 62	TH 62	TH 62
Panel	MP8	MP8	MP8
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	6026.10	8808.6	14755.2
Normalized Deflections	0.996	1.022	1.017
D1 Deflection (mills)	2.87	4.34	7.52



Midpanel 9 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP9	09-Jun-06	1:21	3	378	67	63	62
62315906	MP9	09-Jun-06	1:21	4	376	67	63	62
62315906	MP9	09-Jun-06	1:21	5	375	66	63	62
62315906	MP9	09-Jun-06	1:21	6	551	100	95	92
62315906	MP9	09-Jun-06	1:21	7	555	102	95	92
62315906	MP9	09-Jun-06	1:21	8	554	101	95	92
62315906	MP9	09-Jun-06	1:21	9	915	174	166	159
62315906	MP9	09-Jun-06	1:21	10	918	173	164	157
62315906	MP9	09-Jun-06	1:21	11	921	173	164	158

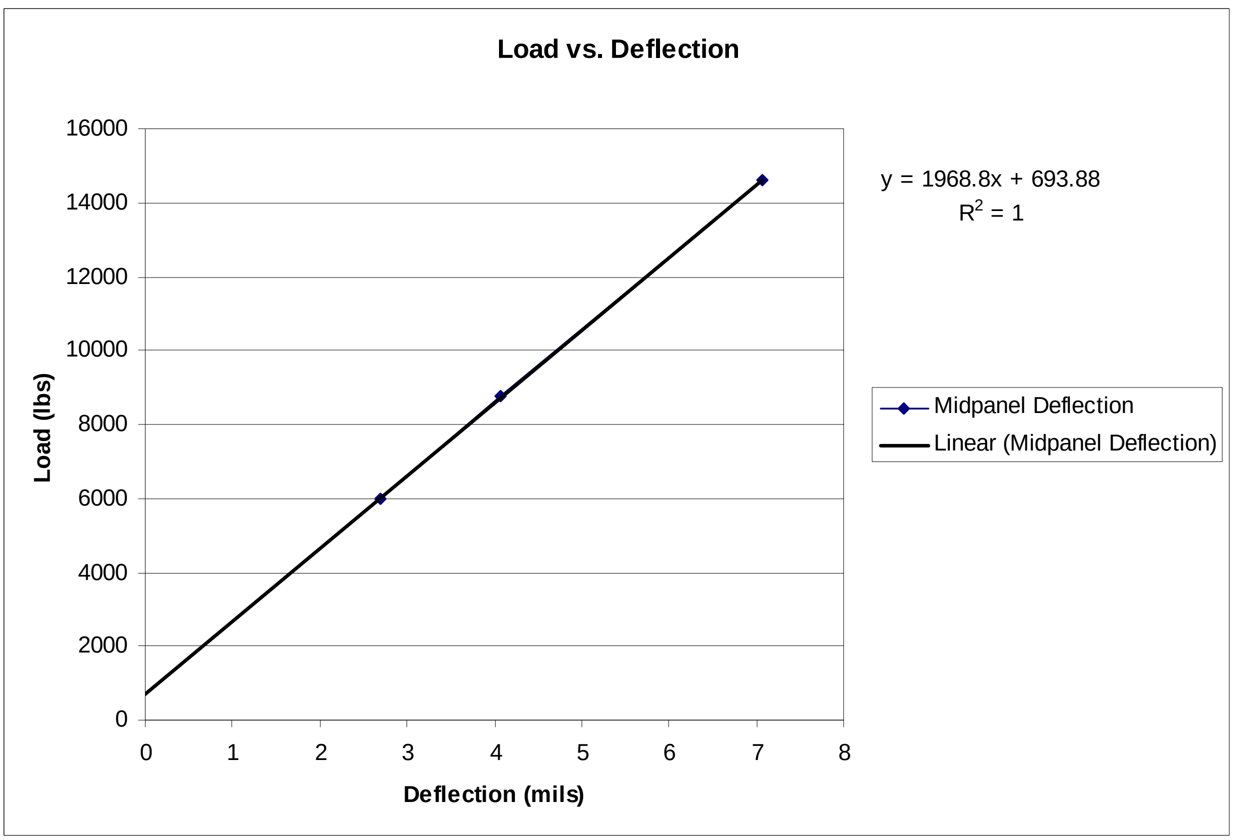
Surface Temp (^oC)		26	
Surface Temp (^oF)		78.8	
Cell	TH 62	TH 62	TH 62
Panel	MP9	MP9	MP9
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5983.70	8798	14596.2
Normalized Deflections	1.003	1.023	1.028
D1 Deflection (mills)	2.63	4.07	7.01



Midpanel 10 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP10	09-Jun-06	1:23	3	377	68	63	62
62315906	MP10	09-Jun-06	1:23	4	378	69	63	63
62315906	MP10	09-Jun-06	1:23	5	377	69	63	62
62315906	MP10	09-Jun-06	1:23	6	544	99	93	91
62315906	MP10	09-Jun-06	1:23	7	551	101	95	92
62315906	MP10	09-Jun-06	1:23	8	555	102	95	92
62315906	MP10	09-Jun-06	1:23	9	915	174	164	159
62315906	MP10	09-Jun-06	1:23	10	919	175	163	158
62315906	MP10	09-Jun-06	1:23	11	920	175	164	159

Surface Temp (^oC)		25.9	
Surface Temp (^oF)		78.6	
Cell	TH 62	TH 62	TH 62
Panel	MP10	MP10	MP10
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5999.60	8745	14596.2
Normalized Deflections	1.000	1.029	1.028
D1 Deflection (mills)	2.70	4.08	7.07



Midpanel 11 Deflection Analysis, 6-9-2006

FWD File	Panel ID	Test Date	Test Time	FWD Drop Number	Load	D1 Deflection (microns)	D2 Deflection (microns)	D3 Deflection (microns)
62315906	MP11	09-Jun-06	1:26	3	376	70	66	63
62315906	MP11	09-Jun-06	1:26	4	376	70	66	63
62315906	MP11	09-Jun-06	1:26	5	375	70	66	63
62315906	MP11	09-Jun-06	1:26	6	555	104	100	95
62315906	MP11	09-Jun-06	1:26	7	559	104	100	95
62315906	MP11	09-Jun-06	1:26	8	559	105	100	95
62315906	MP11	09-Jun-06	1:26	9	917	185	175	168
62315906	MP11	09-Jun-06	1:26	10	923	186	176	169
62315906	MP11	09-Jun-06	1:26	11	922	186	176	169

Surface Temp (^oC)		26.2	
Surface Temp (^oF)		79.2	
Cell	TH 62	TH 62	TH 62
Panel	MP11	MP11	MP11
Lane	R	R	R
Test Location	0	0	0
Ave. Load (lbf)	5973.10	8866.9	14638.6
Normalized Deflections	1.005	1.015	1.025
D1 Deflection (mills)	2.77	4.17	7.49