VLA Test Memo # 214

Holland Company Track Survey
Gauge Restraint Measurement System (GRMS)
February 2, 1998

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Contents

Abstract/Overview

On February 2, 1998 the Holland Company inspected the VLA track system. They used a High Rail Track Vehicle equipped with a prototype Gauge Restraint Measurement System (GRMS) which operates on standard gauge track. The GRMS equipment provides a non-destructive method for checking track gauge strength. To avoid causing any damage to an existing track system applied loads are based on an index, Projected Loaded Gage (PLG), developed through research. Using the test load data for loaded and unloaded gauge the PLG index is used to project (extrapolate) track gauge at severe loads.

With the information gathered from a survey a Tie Planning Report is generated. Included in a typical report is a strip chart reading of the track by tenths of a mile, listing and locating exceptions which exceed preset threshold limits and a Tie Planning Report prioritizing which areas to work on first. In addition we asked for a foot by foot readout of our track system. The data were converted into Excel files so we could review areas more closely.

VLA Track Class

The Federal Railroad Administration (FRA) publishes minimum guidelines for construction and maintenance of track. The FRA maintains guidelines for six classes of track Class 1 being 10mph and below and Class 6 for high speed. NRAO construction drawings correspond more closely to threshold limits established for a Class 6 track (high speed) while our speeds are less than 5mph. The NRAO Construction Specification draws heavily from the American Railroad Engineering Association (AREA) standards.

FRA thresholds are as follows:

	Class 1	Class 6	NRAO Construction Spec.
Unloaded Gage Wide	1.500"	.750"	To Gage 4'-8-1/2" (<.250")
Unloaded Gage Tight	.500"	.500"	To Gage 4'-8-1/2" (<.250")
Cross Level Max.	3.000"	.500"	<.250" individual track <.500" track to track

Industry Guidelines using GRMS are as follows:

	Class 1	Class 6	
Loaded Gage Wide	1.800"	.900"	--
Projected Loaded gage	2.250"	1.125"	--
Delta Gage	.900"	.250"	--

The FRA guidelines allow for some variation while the NRAO Specification holds a tighter tolerance. Eventually the FRA may incorporate GRMS testing into their standards.

GRMS Equipment

(References Attached: 1) Donald E. Gray and Daniel Stone, Nondestructive Evaluation of Aging Railroads, The International Society for Optical Engineering (SPIE), Oakland, California, June

1995. 2) A.B. Perlman, P. Tong, A. Kish, M. Coltman, and D.P.McConnell, Structural Characterization of rail strength capacity for track gage widening, Rail International, April 1986.)

The GRMS equipment was developed by the Federal Railway Administration (FRA) in co-operation with the Railroad Industry. Its purpose is to measure a tracks ability to support gage widening forces marking locations where there is a risk for derailment.

Rail gage is maintained by ties and fasteners. The loads applied by a track vehicle or train are distributed through the rail and ties to the track foundation. When the holding capacity of the ties and fasteners are exceeded the rails tend to spread eventually causing a derailment.

The intent is to develop a performance based evaluation of a track structure. GRMS allows a more objective approach. This non-destructive evaluation is based on an index, projected loaded gage (PLG). PLG was developed to extrapolate the response of a track to heavy loads based on gage measurements at lighter loads. Test loads have been designed to locate weak track without damaging the track.

Inspection/Survey

The inspection of the VLA's track system took two days to complete. Holland Company started on 2/2/98 and finished on 2/3/98.

Work progressed as follows:
DE1 inside track to AE9 inside.
AE9 outside track to DE1 outside.
DW1 outside track to AW9 outside.
AW9 inside track to DW1 inside.
DN2 inside track to AN9 inside.
AN9 outside track to DN2 outside.

Before starting the on board equipment were calibrated. The datum for track gage was set at approximately 56-1/2". The Software allowed for continuous collection of the data as the vehicle proceeded along the track. From the data strip chart recordings of unloaded gauge, loaded gauge and delta gauge (calculated) were generated. Based on plus or minus (+/-) threshold limits, exceptions reports were also generated. Locations exceeding the threshold limits were marked with paint. A threshold limit of +/-.5" (a range of 56"- 57") was set initially. We monitored the spray painting of track over the first mile and quickly realized that +/-.5" was too tight a threshold. We were spraying much of the track so we increased the limit to +/-.75" and held this threshold level throughout the system.

Some minor concerns with Hollands' equipment: 1) Spray painting was hindered by brush in between the rail. We had to reset the spray nozzle many times. 2) Elevation differences at the rail joints caused the load axle to derail (3) times. There was no apparent damage caused. 3) Mile markers and other location information had to be manually entered. Although minimal there was a real time lag when spray painting and entering track identification symbols. When symbols were

entered incorrectly they could not be edited. 4) Holland is still in the development stages with their software. 5) A review of the foot by foot data compared to the Tie Planning Report indicate some discrepancies in the number of clusters found especially on the East Arm Inside. This is being reviewed with Holland. 6) The software does not allow for easy manipulation of data. In order to accomplish this the Holland contact had to transfer all data to an Excel file.

Results of Inspection

The Report provides a Tie Statistics Sheet and a Tie Planning Sheet. The Tie Statistics sheets lists the total number of ties exceeding a threshold limit as compared to the total number of ties in the section of track. The Tie Planning sheets lists ties in four categories establishing a priority sequence. Using three threshold levels a listing of Safety Ties, Priority Ties and Warning Ties are generated. An additional list of Tie Clusters is also generated. A tie cluster is any grouping of more than 5 ties exceeding the threshold limit. The tie planning reports are also accompanied with an exceptions list locating all areas exceeding the threshold.

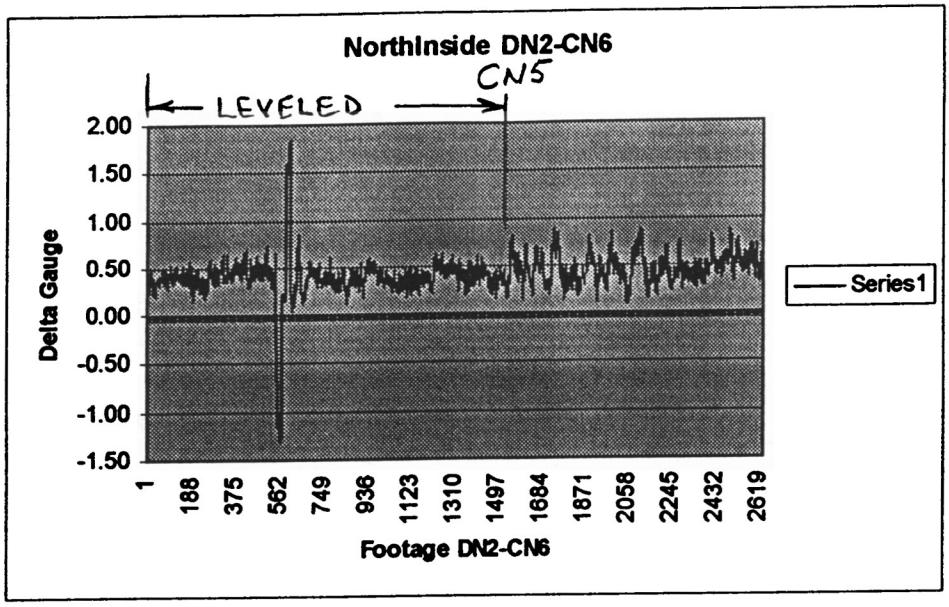
The Tie Planning Report provided by Holland projects bad ties with a delta gauge of .5" or greater and .75" or greater. Delta is the difference between the Loaded and Unloaded axles.

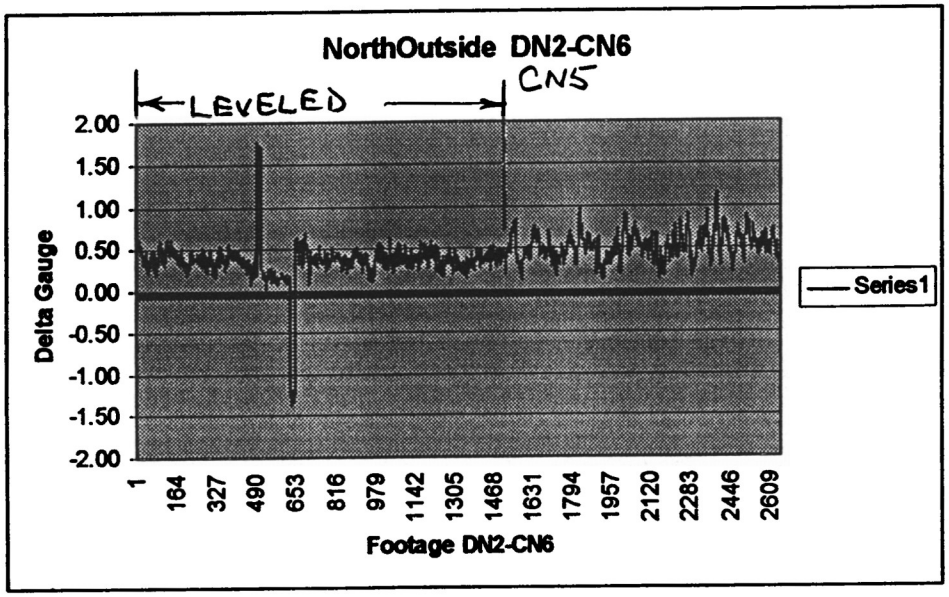
	Delta>.5	Delta >.75	Delta >.90
West Arm Inside Track	5542	421	34
West Arm Outside Track	6280	691	47
East Arm Inside Track	9618	642	81
East Arm Outside Track	9543	891	71
North Arm Inside Track	10145	785	43
North Arm Outside Track	10957	945	200

Using the excel files a separate clusters report was generated in-house. This report will be used along with the Holland report to identify and repair bad areas. The in-house report identifies three or more consecutive bad ties where Holland's report only indicates groupings of 5 or more bad ties.

Some areas of track had been leveled and tamped prior to the Holland survey. One area leveled was DN2 to CN6 on the North Arm. When the delta results are graphed (shown page 4) for this area the track leveled and tamped is seen to be consistently within tolerance (<.75") where adjacent track is out of tolerance (@Approx. 1600'). The large spike at about 500 feet is the load axle being disengaged at a switch.

NORTH ARM DELTA GAUGE PLOT DN2-CN6





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1) Donald E. Gray and Daniel Stone, Nondestructive Evaluation of Aging Railroads, The International Society for Optical Engineering (SPIE), Oakland, California, June 1995.
2) A.B. Perlman, P. Tong, A. Kish, M. Coltman, and D.P.McConnell, Structural Characterization of rail strength capacity for track gage widening, Rail International, April 1986.)

PROCEEDINGS
SPIE—The International Society for Optical Engineering

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Performance Based Tie / Fastener Inspection Technique using the Gage Restraint Measurement System

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ABSTRACT

To improve detection of railroad track defects that cause derailments, the Federal Railroad Administration Office of Research and Development with joint cooperation of the Railroad industry developed the Gage Restraint Measurement System (GRMS). This system measures the track's ability to support gage widening forces and marks the locations at risk for derailment. This paper describes the GRMS design, calculated safety indices, and application for use in maintenance planning.

1.0 BACKGROUND

The GRMS is a performance-based track strength evaluation system designed to improve railroad safety and maintenance efficiency. The system was developed under a joint effort by the federal government and the railroad industry. The agencies involved included the Federal Railroad Administration's Office of Research and Development, The Volpe National Transportation Systems Center, with the help of the American Railway Engineering Association and supporting contractors. Several railroads and private organizations contributed to the development by supplying equipment, personnel and track usage. ENSCO Inc., the current FRA instrumentation contractor, operates and maintains the prototype system. The GRMS has surveyed over 14,000 miles and is currently being used by several Class 1 and Short Line railroads to evaluate track gage strength under a cooperative cost-sharing arrangement with the FRA.

Since railroads were first used to move heavy equipment, maintaining the established distance between the rails (gage) has been a problem. The track gage is maintained by ties and fasteners. Ties are typically made of wood, concrete, or steel and perform three major functions. They hold the rails at the correct gage, distribute the loads applied by the train to the track foundation, and anchor the track against movement. The fasteners attach the ties to the rail and are typically cut spikes, screw spikes, or some type of spring clip. When the rail holding capacity of the ties and fasteners is exceeded by the forces generated by the train as it travels, the rails separate

sufficiently to allow the wheels to drop between them, a phenomenon known as "gage widening derailment." When no loads are applied, the gage of most track is within tolerable limits. Not until a train applies a high lateral load do the rails move enough to cause a derailment. Thus, the potential for gage widening derailment cannot always be detected during even the most rigorous and thorough visual inspections or by automated geometry inspections.

Since the Federal Railroad Administration (FRA) began monitoring railroad accident statistics, in the late 1960's, gage widening has been one of the top five causes of track-related accidents. Between 1984 and 1990, 1,838 gage widening accidents were reported, 93 percent of which were caused by missing or defective ties and fasteners. The total number of gage widening accidents reported during that period cost the railroads $45.6 million not including disruption and delays. These accidents can also be very costly to the surrounding communities, especially when the cargo is passengers or hazardous materials.

The current safety standards for rail restraint capacity specify limits on tie condition based on visual inspections of the track structure. These inspections rely on simple procedures such as thumping ties, kicking spikes, and looking for plate cutting or splits. Moreover, they require that a trained track inspector frequently walk every mile of assigned territory--a time-consuming and expensive process that is subjective and not always accurate. Although most inspectors correctly assess track strength when ties and fasteners are clearly missing and when they are new, evaluation is very difficult when track is partially degraded. If all of the ties look alike, the decision of which ties to replace becomes nearly random. Consequently, often there maybe replacement of ties that are in good condition--an additional, unnecessary expense to the railroads--and ties that should be replaced may not be recognized, thereby creating a potential for derailment.

A performance-based evaluation of ties and fasteners, such as the GRMS, allows a more objective inspection. The GRMS research program intent was to develop performance-based rail restraint criteria that eliminates the "worst case" scenarios of the applied train loads and local track conditions that would lead to rail restraint failure. This non-destructive evaluation (NDE) technique is based on an index, projected loaded gage (PLG), which has been developed to extrapolate the response of track to the heaviest credible loads from measurements of gage using lighter test loads. The test load was designed to reveal weak track that allows gage to widen without damaging the track and derailing the test car. A computer system applies the PLG index to the test measurements at each test location along the track. An automatic marking system highlights locations where the extrapolated measurements exceed acceptable limits for the type of track tested.

Under this program two prototype devices were developed that provide quantitative measurements of rail restraint capacity: the Gage Restraint Measurement System (GRMS) and the Lightweight Track Loading Fixture (LTLF). Both of these devices physically measure the rail

restraint capacity and record this information for future reference.[1] The GRMS uses a gage spreading (telescoping) split axle to continuously measure change in gage while a known lateral force is applied. The LTLF is a hand-held system that loads the rail at the shear center (center of rail twist) to evaluate the lateral stiffness of the track. This device is intended to be used as a spot checking device to verify acceptable rail restraint capacity at selected locations. This NDE technology is now at a stage where it can be viably deployed as a performance-based alternative for track safety standards against wide gage derailments.

The ability of the GRMS to measure track strength for extensive segments, the ability of the LTLF to verify effectiveness of corrective actions, and a reliable index of PLG will provide the performance criteria needed to determine the track strength and indicate a level of safety against gage widening derailment. Additionally, this database of track strength can be used by the railroad for maintenance planning purposes.

2.0 GRMS TECHNICAL DESCRIPTION

The GRMS utilizes a hydraulically driven split axle to apply a relatively constant lateral load to the rails over which it is operating. Sensors measure the lateral load, the loaded gage at the point of loading, and the unloaded gage away from the loaded point. These measurements are recorded using a PC-based data acquisition system.

The components of the GRMS are located in two test cars: a 100-ton hopper car, and an instrumentation car. The mechanical subsystems are mounted on the hopper car. The computer and signal processing subsystems are in the instrumentation car. The cars are pulled by a locomotive that is supplied by the railroad sponsoring the survey. The GRMS consist is depicted in Figure 1. Intended as a proof of concept system, the GRMS was designed for a 500-mile life cycle, which was surpassed years ago.

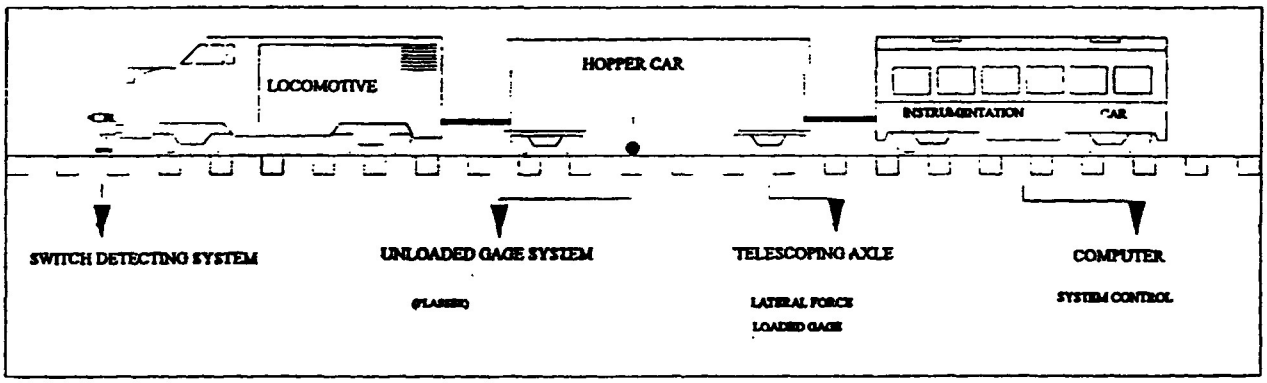

Figure 1 - Gage Restraint Measurement System Overview

[1]See "Gage Restraint Measurement System," a brochure prepared by the FRA, 1994.

The mechanical assembly that applies lateral and vertical loads is a split axle shown in Figure2, is mounted on a standard three-piece truck in the rear of the hopper car. The split axle applies the loads through its steel wheels and houses the sensors that detect the reactions of the track. The hopper car also contains cement ballast to establish the vertical loading on each wheel of the split axle; the systems that measure unloaded gage, mark track for further monitoring or repairs, and lubricate GRMS wheel flanges; and the hydraulic power supply.

The system is controlled by a personal computer (PC) located in the instrumentation car--a converted FRA car (DOTX206) that was previously used to measure track geometry. The GRMS computer is equipped with data acquisition cards, hard disk data storage, and video and paper strip chart data display. The computer is located in the center vestibule, and receives electrical power from two on-board diesel generators. The center vestibule is used as the crew operations room for system control. Two observation cameras are mounted along each side of the instrumentation car for viewing track identification markers. A forward facing camera for viewing track and an automatic location detector (ALD) are mounted on the front coupler of the locomotive to detect switches. The rear section of the car has large observation windows and outside lighting for use by track personnel to view painted track defects. The car also has storage space for the equipment and supplies.

The GRMS does not use high loads during testing in order to avoid damaging the track structure. A lateral load of 14,000 pounds was determined through experience and testing, to be adequate to overcome the inertia and friction inherent in the rail/tie plate/fastener/tie mechanical system and to

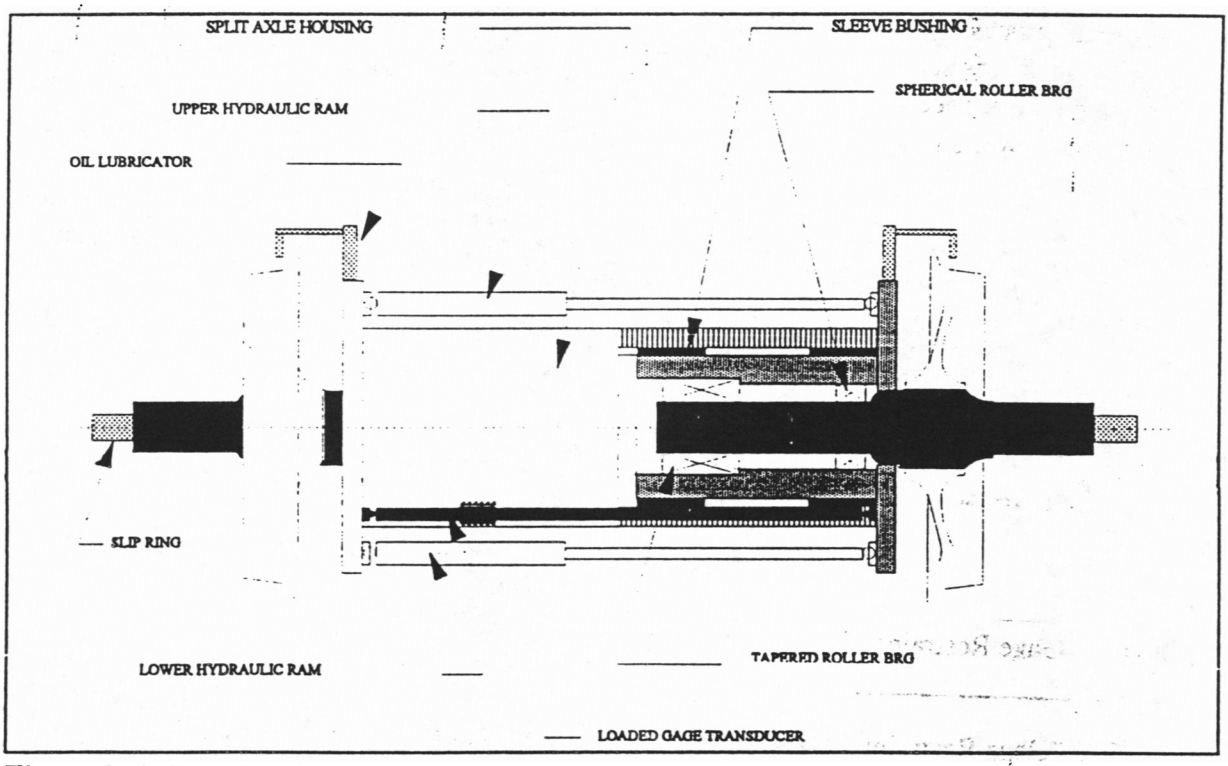

Figure 2- Split Axle Assembly of the GRMS

fully and rapidly load the track structure. A vertical load of 20,000 pounds was selected to yield an overall lateral-to-vertical ratio (L/V) of 0.7. As a safety device, the data acquisition computer triggers an axle retraction (removal of applied load) if the L/V ratio exceeds 1.25 at either wheel.

The prototype GRMS system has now operated over approximately 14,000 miles of track and can survey approximately 125 miles of track per day at operating speeds up to 29 mph. These test runs have demonstrated that the system is capable of repeatedly finding and marking weak locations in the track structure, and can quantify the effect of track maintenance.

2.1 TRACK STRENGTH INDICES

The simplest and most accurate method to measure track deflection and performance is destructive testing. An automated rail restraint measurement system would merely apply the critical load, and the weak and failed locations would be apparent. However, such a method would necessitate immediate repair of any location that failed, and it would permanently damage the track that did not fail. Instead, more moderate test loads are used by the GRMS, and the projected loaded gage (PLG) index is applied to the load-deflection characteristics obtained during testing to extrapolate the measurements under the critical loads and, in turn, to determine the risk for gage widening derailment.

This section discusses the development and application of the PLG index and the gage widening (GWR) index. Both indices were developed by the Volpe Center based on the research on load environments and minimum strength criteria established for rail restraint. PLG is used as a safety and maintenance index that was developed to estimate a margin of safety before gage widening derailment. PLG estimates peak gage widening under severe train loads assuming minimally adequate track strength. The GWR index measures only the change in gage caused by an applied load, and normalizes the amount of deflection to a constant load. The normalization process is used to eliminate changes in gage caused by variations in the applied loads. For example, if track is treated as a spring with a constant stiffness, the deflection measured is directly proportional to the load applied. An increase in deflection only indicates a higher load was applied not a change in stiffness. Since GRMS loads are not constant (15% variations), the measured deflections are divided by the instantaneous lateral load and multiplied by a constant load to correct for load variations. The GWR index indicates lateral rail restraint availability, while the PLG index identifies the risk for derailment.

Projected Loaded Gage

The PLG index uses known[2] minimum rail restraint criteria and measurements of loaded gage, unloaded gage, and wheel forces to estimate gage in specific track locations, and to identify

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[2]Source: American Railway Engineering Association Adhoc Committee on Performance-Based Track Safety Standards, 1984

locations that would allow wheel drop if subjected to severe loads. The index is formulated as:

$$PLG = GAGE_{UNLOADED} + A_{FACTOR} \times (\delta_{MEASURED})$$

where:

PLG is the estimated gage under a designated severe lateral load,

$GAGE_{UNLOADED}$ is the gage of the track with no loads applied,

A_{FACTOR} is the factor used to extrapolate from test loads to severe loading conditions,

$\delta_{MEASURED}$ is difference between the unloaded gage and the gage where a test load is applied.

The PLG extrapolation factor A_{FACTOR} scales the deflection measured under test loads to a severe loading configuration. The A_{FACTOR} for PLG24 assumes severe lateral loading where the flanging wheel on the leading axle has a lateral force of 24 kips and a vertical force of 32 kips, while the non-flanging wheel has a lateral force of 16 kips and a vertical force of 32 kips. Based on the minimum strength characteristic shown in Figure 3, this loading scenario would produce total gage widening of 1.5 inches on minimally adequate track, i.e.,1.0 inch of deflection caused by the 24-kip load on the high rail and .5-inch of deflection caused by the 16-kip load on the low rail. The lower lateral load on, and the resultant deflection produced by, the non-flanging wheel is attributed to friction between the tread of that wheel and the rail head. However, this loading condition is only a representation of a variety of severe loading conditions that can occur due to

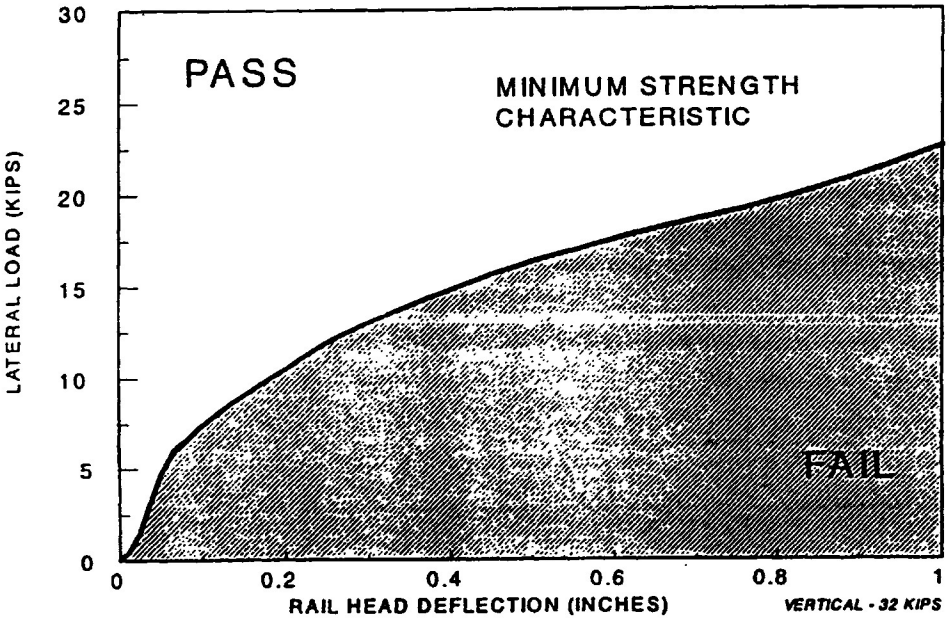

Figure 3 - Minimum Lateral Restraint Characteristic
(Source: American Railway Engineering Association Adhoc Committee on Performance-Based Track Safety Standards, 1984)

combinations of local variations in gage, alignment, curvature, and crosslevel. Because of uncertainties in the measurement and the limitation that only gage widening (and not individual rail head deflection) can be measured, the severe train load extrapolation factor is determined assuming twice the measured deflection of the flanged rail. This leads to a conservative formulation, which will slightly over estimate PLG.

If the actual strength characteristic is stronger than the minimum characteristic, the index will be conservative, as it will also over estimate PLG. Conversely, if the actual strength characteristic is less than the minimum characteristic, the index will under estimate the PLG. The minimum strength characteristic was chosen instead of the average strength between weak and strong track to reduce the chances of under estimating the PLG and allowing dangerously weak locations to go undetected.

A track location with an extrapolated gage of 59.0 inches suggests a high risk for a gage widening derailment, requiring immediate corrective action . Locations having an extrapolated exception of 58.0 inches are considered maintenance areas, as they would grow to an exception of 59.0 inches without corrective action. Presently, the rate of track degradation is currently unknown, but is being studied.

Gage Widening Ratio

The gage widening equation used with the GRMS was developed based on the mechanical concept of track compliance, which is a measure of the spring rate which the track exhibits as it deflects outward under an applied lateral load. At any given location, the measured compliance equals the difference between the loaded and unloaded gage divided by the instantaneous lateral load applied to cause the deflection; its units are inches of deflection per pound of applied force. The values expressed in these terms are extremely small in normal railroad terms: the critical maximum value agreed by consensus during the development program was only 0.065 inches of deflection per 1,000 lbs. of applied lateral load. Numbers measured in thousandths of an inch are not meaningful for typical discussions of track quality and the concept was accordingly difficult to convey to field forces of railroads, suppliers, and the FRA.

The GRMS quantity now used to express the track compliance was derived by normalizing the total deflection amount to indicate the expected deflection if 16,000 lbs. had been the actual test load. This numerical conversion results in a deflection in inches called the Gage Widening Ratio (at 16000 lbs)(GW). The term "Ratio" is used to remind everyone that the normalization operation has been performed and the actual deflection which occurred in the field may have been greater or lesser than the reported GWR number, depending on the actual applied test load at the reported location. The equation is as follows:

$$GWR = \frac{\delta_{MEASURED}}{L_{GRMS}} \times 16000$$

where:

GWR is the estimated gage widening under a 16,000 lb. lateral load,

$\delta_{MEASURED}$ is difference between the unloaded gage and the gage where a test load is applied.

L_{GRMS} is the lateral load applied by the GRMS,

16000 is the normalizing load.

The GWR index or an earlier predecessor - Deflection Rate -have been used in over 14,000 miles of testing and consistently have indicated weak tie and/or poor fastener conditions. Experience has demonstrated that a GWR value of 1 inch typically indicates three or more consecutive ties or missing tie locations each allowing over .5 inches of rail lateral movement. This is most often caused by spike killed ties and degraded tie condition but may also be caused by unspiked or missing ties.

This GWR is a direct measure of the rail restraint capacity available at the location tested. Applying this technique on a continuous basis allows large track segments to be structurally mapped and evaluated for maintenance planning purposes.

2.2 GRMS OUTPUTS

The following items are currently displayed during test operations and/or delivered to the participating railroad at the conclusion of each test day.

1.) Real-time, analog, paper strip chart recordings and video representations of the following track measurements and calculated values:

A) Unloaded Gage
B) Loaded Gage
C) Projected Loaded Gage 24 (PLG24)
D) Gage Widening Ratio (GWR)
E) Curvature
F) Crosslevel

2.) Real-time video and paper presentation of track locations which exceed preset exception thresholds for the above parameters (Note: No exception thresholds are currently available for Curvature and Crosslevel. Exception thresholds for the other parameters can be adjusted to satisfy each railroad's needs.)

3.) Real-time paint marking of track locations exceeding maintenance and/or safety thresholds.

The GRMS system marks one rail with yellow paint and the other rail with white paint at each track location where a set threshold is exceeded (specific paint combinations depend on which

threshold is exceeded). During testing, an exception "location' is a single one-foot sample which exceeds any of the thresholds. The GRMS system paints the rail at the exception locations and continues painting as long as a threshold is exceeded. A minimum of three feet is painted for each exception to assure adequate marking.

Locations painted with yellow paint, or with both white and yellow paint, should receive immediate attention to determine appropriate corrective action. The rail is marked with yellow paint where any of the following occurs:

1.) Projected Loaded Gage 24 (PLG24) exceeds 59 inches, or
2.) Gage Widening Ratio exceeds 1.00 inches, or
3.) Actual loaded gage equals or exceeds 58 inches.

Locations painted only with white paint indicate that the Projected Loaded Gage (PLG24) at that point exceeded 58 inches and/or GWR exceeds 0.75 inches. These locations should be inspected within 30 days and monitored to prevent further deterioration.

The telescoping axle reaches mechanical safety stops at slightly over 58 inches of actual loaded gage. PLG 24 and GWR calculations are not valid after the mechanical stops are reached, so the rail is painted yellow at these locations to assure that no weak locations are missed.

PLG24 is formulated so that a value over 59 inches indicates an area of weak track, where the risk of wide-gage derailment is high if a 24,000 pound lateral load were applied. The track is painted yellow at these locations to facilitate immediate inspection and consideration of corrective action either during or shortly after the operation of the GRMS.

The Gage Widening Ratio parameter is calculated by multiplying the deflection rate of the track by a constant 16,000 lbs. This yields projected lateral rail movement, under a given lateral force (16 Kips), in inches. Past experience and testing have confirmed that a GWR value over 1.00 inches indicates track which has excessively low lateral restraint. Locations exceeding this limit commonly trip several of the exception thresholds and are often painted both yellow and white.

4.) One additional copy of the real-time analog strip chart and copies of the real-time exception report, as required. (Note: Additional copies of the strip chart can be ordered)

5.) Exception Reports and Statistical Analysis Package. The following reports and charts will be prepared at the conclusion of each test day:

A) Location-by Location Exception Report (identical to real-time report)
B) PLG24 Exceedance Report
C) Loaded Gage Exceedance Report
D) Gage Widening Exceedance Report

E) PLG24 Mile-by Mile 95th Percentage Analysis
F) Gage Widening Ratio Mile-by-Mile Mean Value Analysis
G) Gage Widening Ratio Mile-by-Mile 95th Percentile Analysis
H) Gage Widening Ratio Estimated Tie Replacement Analysis (estimate of member of cross-ties required to hold GWR values below predetermined values.)
I) PLG24 Population Distribution (PLG24 value distribution over each day's testing zone)

6.) IBM-PC formatted copy of raw and processed data (delivered upon request)

The basic testing program includes the routine system outputs described above. Additional data analysis, such as year-to-year comparison of GRMS results or ranking of track segments on a basis other than mile-by-mile, can be performed and will be quoted at the railroad's request.

3.0 LIGHT-WEIGHT TRACK LOADING FIXTURE

The portable, manually operated LTLF (depicted in Figure 4) applies a lateral load through the theoretical shear center of the rail and measures the change in gage. The LTLF uses a manual hydraulic pump and cylinder to produce a test load of 4 kips. The highly loaded components are steel, and the other components are aluminum. The LTLF was designed by Volpe Center, Battelle Inc. and constructed by Scientific Models Inc.

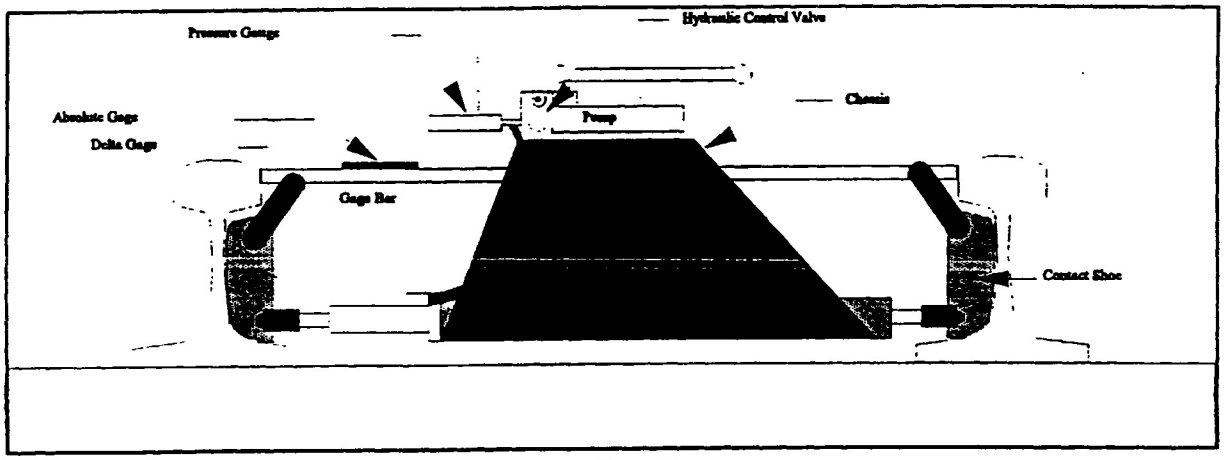

Figure 4 - Diagram of Lightweight Track Loading Fixture

The LTLF applies a 4000 lb. lateral load to the shear center of the rail section and is used to measure the effectiveness of corrective actions taken as a result of an inspection. The change in gage between a loading of 1000 and 4000 lb., measured at the gaging point, is considered a measure of rail restraint capacity. If the change in gage between 1000 lb. and 4000 lb. is less than 0.4 inches or the total change in gage (from zero load) is less than 0.6 inches, the restraint

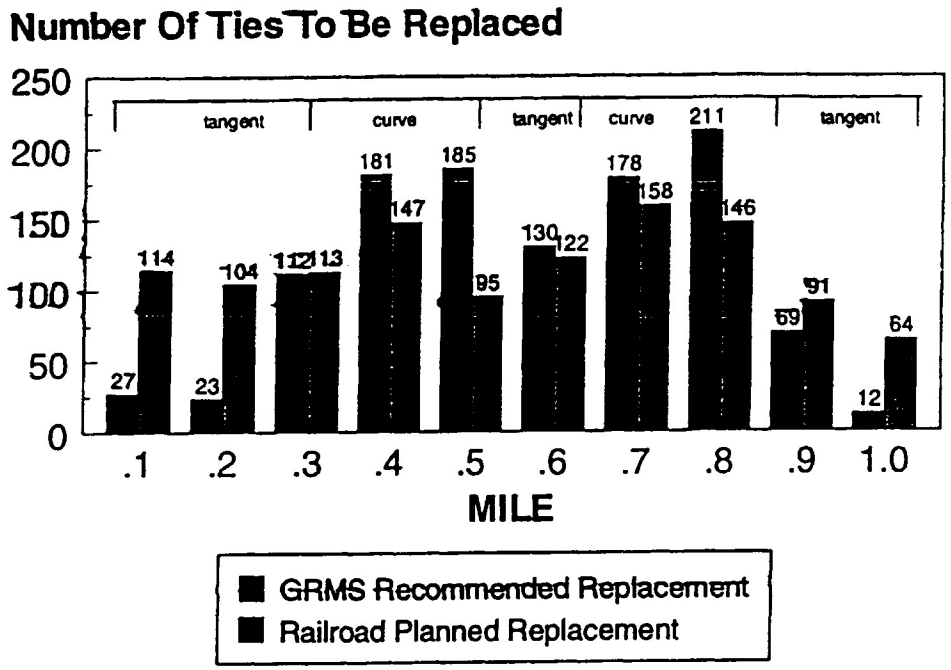

Figure 5. Comparison Between GRMS Tie Allocation and Conventional Methods.

capacity is considered adequate for class 1 through class 3 track. If the change in gage between 1000 lb. and 4000 lb. is less than 0.3 inches or the total change in gage is less than 0.4 inches, the restraint capacity is considered adequate for class 1 through 6 track.

4.0 MAINTENANCE PLANNING USING GRMS

Within the next year, the Class 1 railroads will install 11,294,495 new ties at a cost of approximately 40 dollars each installed. This results in a cost to the railroads of 450 million dollars per year. A small improvement in maintenance efficiency of 1% can save the railroads 4.5 million dollars yearly. The GRMS will increase maintenance efficiency by allowing visually worn ties to remain in track longer with a reasonable confidence level of safety against wide gage derailment.

The GRMS measures and records the effectiveness of ties and fasteners. Storing the data allows post-processing for track evaluation and maintenance planning. A history of track strength can be developed, after a period time, for a line segment. Segment degradation rates can be determined and used for future tie renewal program planning.

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Structural characterization of rail strength capacity for track gage widening

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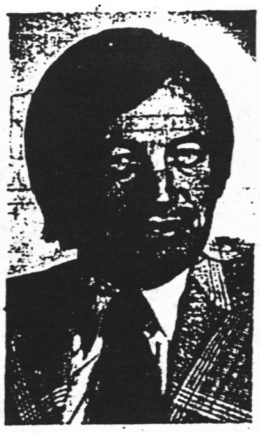

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SUMMARY

This paper presents results of an analytical and experimental investigation of track gage widening, a major derailment inducing failure mode. A definition of rail restraint capacity is developed in terms of allowable rail displacement and train induced loads. Field and laboratory experimental results on minimum rail restraint characteristics are used to establish lower bound lateral load versus deflection behavior for minimally acceptable rail strength. The experimental results were used to validate a nonlinear rail response analysis. The model was used to assess the parametric influence of truck and wheel loads, rail size and rail support on rail strength. Based on these results, safety limits on allowable rail restraint degradation for low speed track are presented.

Introduction

A loss of adequate rail restraint, resulting in gage widening, is a major track failure mode and the cause of a large number of derailments on U.S. track. Accident statistics indicate that approximately 20-25 percent of all track induced accidents are attributable to rail restraint failure, and that they occur predominantly on low speed track. Such track is characterized by a 0-25 mph speed regime of operation, substantial geometric and structural imperfections, and missing or poorly functioning ties. High vehicle induced loads on such a weakened rail tie fastener system can cause sufficient spreading of the rails to allow the wheels to drop through resulting in a derailment. The reduction of these derailments through improved maintenance practices and better safety standards has been a strong concern to the railroad community.

The mechanics of gage widening, or rail rollover, have not been well understood. Although factors contributing to rail rotation and lateral translation have received considerable attention, analytical studies of the problem [1, 2, 3] have been largely exploratory in nature. Axial load, nonlinear support and vehicle track interaction loads have been examined in an attempt to account for what has been viewed as unexpectedly weak track. While roll over has been observed at all speed ranges, the low speed occurrence has been interpreted as surprising. In the past, lateral loads have been assumed to be proportional to vertical wheel loads. Since vertical loads were viewed as dependent on vehicle

speed [4], low speed lateral loads were expected to be small.

Recent studies of vehicle loading on track [5] have provided important new information that forms the basis of a new view of the gage widening failure mechanism. Using an analytical model of a 100-ton hopper car, typical vehicle loads for low speed track were studied. It was observed that:

Track curvature, alignment, and gage irregularities in geometry determine the level of lateral loads applied to the track. Crosslevel was not considered.

Maximum lateral loads on opposite rails tend to cause the gage to spread.

The level of these lateral loads is insensitive to speed in the range 0-25 mph. The loads are essentially as large at very low speed as at 20 to 25 mph.

Maximum lateral loads do not occur at locations where unloaded track has a maximum gage. Lateral loads are largest a short distance past such cusps.

These conclusions turn the focus of attention for rail rollover to track that is structurally weak in response to the application of substantial lateral load. Consideration of extreme combinations of weak rail support and high lateral load requires experimental characterization of lateral rail response and an analytical representation of rail head movement as a function of vehicle applied loads.

Rail Restraint Capacity

As indicated by Figure 1, application of a set of lateral spreading loads L_l and L_r, causes each of the rails to move outward. The corresponding deflections,

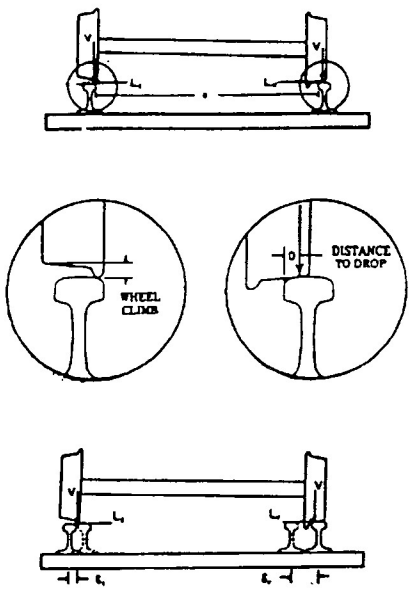


Fig. 1: Gage Widening.

δ_l and δ_r, that increase the gage, g, depend on the vertical load and the lateral restraint provided to the rails. If the lateral support is not sufficient, the total outward deflection, $\delta_l + \delta_r$, can exceed the available tread width (distance to drop, D_o) that would remain on undeformed rails. In practice, the condition, $g + \delta_r + \delta_l \geq 59''$, is considered to be unsafe. A safety criterion for rail restraint capacity can, therefore, be defined as,

$$D \geq \delta_l + \delta_r \qquad (1)$$

Since rail geometry and stiffness vary along the track, D, δ_l, and δ_r resulting from wheel-rail interaction are functions of their location. Critical sites for rail restraint capacity can be identified by the condition:

$$D - (\delta_l + \delta_r) = \text{minimum} \qquad (2)$$

A location satisfying equation (2) generally occurs close to the maximum truck or axle load but not at minimum D. It would, therefore, be too conservative to define minimum requirements for rail restraint on the basis of maximum loads (in terms of δ_l and δ_r) expected anywhere on the track and the minimum allowable total head movement, D, on the entire track. A rail restraint criterion may be defined based on:

$$D_{allow} - (\delta_l + \delta_r)_{max} \geq 0$$

where D_{allow} is the allowable head deflection at the maximum load location. It is convenient to consider a single rail and adopt a conservative criterion,

$$\bar{D}_{allow} - \delta_{max} > 0$$

where δ_{max} is the larger value of δ_l and δ_r and the subscript refers to the maximum values along the track. $\bar{D}_{allow}$ is the critical, allowable, single rail head deflection associated with a specif type of track geometry variation [5]. It is a fraction of $\bar{D}_{allow}$, the rat dependent on the ratio of loads applied to the opposite rails. $\bar{D}_{allow}$ the allowable single rail head deflection will be used to define th requirement for minimum rail restraint.

A distinction must be made between rail deflections and the lateral movement of the axle. Lateral axle loads depend on the type, amplitude and combination c gage and alignment variation encountered on a track. Since the weel rail contact point as well as the rails can move laterally, some loading conditions can be ignored i terms of restraint capacity. These conditions would lead to wheel climb or wide gage failure even on absolutely rigid track. The rail deviations that cause such respons are designated as geometrically inadmissible [5].

Figure 2 is a schematic definition o restraint capacity. Each point represents a maximum load and corresponding $\bar{D}_{allow}$ of a track witl a given type of admissible variatio in track geometry. Safe operation i assured if the minimum strength (L vs^4) curve lies above all the points of admissible geometry and load.

In the last ten years, several attempts have been made at experimental determination of rail restraint strength [6, 7, 8]. All of these studies observed that lateral strength is dependent on the level

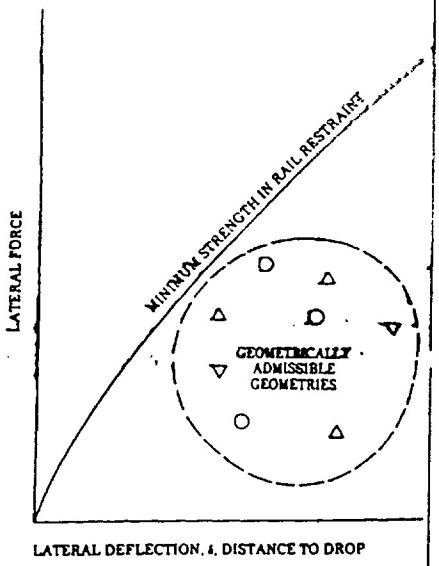


Fig. 2: Schematic Representation of Restraint Capacity.

of vertical load. However, since each of these sets of tests was conducted with some specific features of interest such as means of load application or artificially degraded track, none of them is representative of or can be readily interpreted as characteristic of weak or poor track. In order to develop the quantitative relationship between loads and degraded track characteristics typical of low speed operation, a set of experimental and analytic investigations were conducted. Field and laboratory experimental results on minimum acceptable rail restraint capacities were used to establish minimally acceptable rail strength limits. The results were used to validate a nonlinear rail response analysis. The model was then applied to extrapolate these results to the assessment of the parametric influence of such factors as track load, rail size and rail support. These analytical and experimental results are the basis for the safety limits on allowable rail restraint degradation for low speed track that are presented in this paper.

Track Component and Field Tests

To address the deficiency in data characterizing the structure of weak track, a sequence of tests was conducted by the Transportation Systems Center* in the summer of 1980. It was anticipated that a principal feature of poor track is a degraded state of rail support components such as spikes, ties and tie plates. Identification of the specific role of each component in track system response requires detailed measurement of load-deformation behavior of the individual components as well as track that is representative of minimum support conditions.

The initial phase of the testing was a set of controlled laboratory experiments that focused on the characteristics of rail fastener components. These experiments were intended to relate physical features of the fasteners to their responses to load and to determine those factors that reduce the load capacity of the components. The detailed test procedures and a complete summary of the results is reported in Reference 9.

A typical result for a test of a spike pulled out of a tie is shown in Figure 3. The force required to permanently move the spike a finite distance out of the tie, P_{max}, is the peak of each cycle. As more of the spike protrudes, causing an

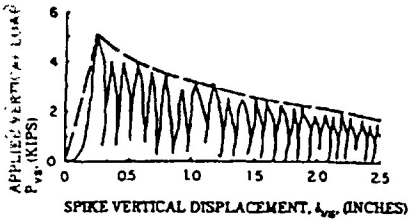


Fig. 3: Typical Spike Pull-out Resistance for a New Spike/New Tie Configuration.

increasing gap above the base of the rail, P_{max} for successive pulls decreased in magnitude. An envelope denoting this characteristic is indicated by the dotted lines. P_{max} is strongly dependent on the condition of the tie. For a badly worn or damaged tie, a spike may be lifted out by hand.

The factors influencing lateral tie plate response are represented in Figure 4. As shown in Figure 4a, the maximum lateral load as well as the load for which the lateral stiffness decreases is determined by the number of spikes in the plate. For a given number of spikes, increasing the vertical load on the plate (Figure 4b) increases the maximum lateral load as well as the breakpoint in the stiffness. This behavior can be attributed to

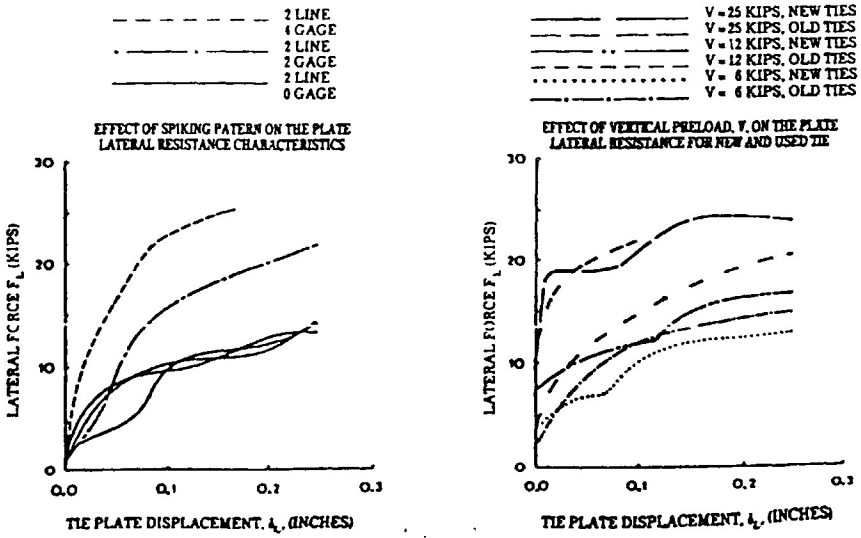


Fig. 4: Lateral Tie Plate Resistance

* Tests were performed by Battelle Columbus Laboratories.

friction between the plate and tie. The resistance to any lateral movement increases with vertical load. Once the friction has been overcome, the displacements become very large for small increases in load. Overall, there is a reduction in lateral load capacity for similarly spiked, similarly loaded plates as the condition of the tie worsens. Small vertical load, fewer spikes and poor tie condition all serve to reduce the restraint provided by the fastener system.

The second phase of the test program was a series of field measurements intended to characterize the lateral capacity of track typical of low speed (Class 1 or Class 2) FRA Classifications. These experiments were intended to:

Provide comparative data for spike pull out and tie plate resistance component characteristics

Obtain large displacement load-deflection data for minimally adequate in-service track over a range of track characteristics.

The specific site chosen was the Hocking Division, Pomeroy Subdivision of the Chessie System, near Logan, Ohio between mile-posts 55, and 57 near Union Furnace. This site has the following characteristics:

- Tangent track
- 100 lb rail (not badly worn)
- Single shouldered tie plates
- Two line spikes/plate
- Tie spacing: 20-22 inches
- Typical Speeds: 10 mph (although speed limit was 25 mph)
- Ties: good and bad mixed
- Ballast: cinder-gravel
- Gauge and alignment: excellent

A special device was built to apply simultaneous vertical and lateral load to the rail head. The corresponding lateral displacements of the rail head and rail base were measured. A more detailed description of the specific test procedures and the results of each test are reported in Reference 10.

The most conspicuous result of the tests was a large variation in rail head displacement response that depended on the local tie and fastener condition. Figure 5 illustrates the difference in load capacity of typical good and bad support test ties. This variation interacts with the influence of other factors. The strengthening effect of vertical load is clearly shown in Figure 6. For example, at one inch of head deflection, the lateral load ranged from roughly 20 to 35 kips with a vertical load of 15 kips and from 25 to 42 kips when the vertical load was 30 kips. The overlap in response, however, indicates the need to know both load and restraint conditions to distinguish their response in aggregate results.

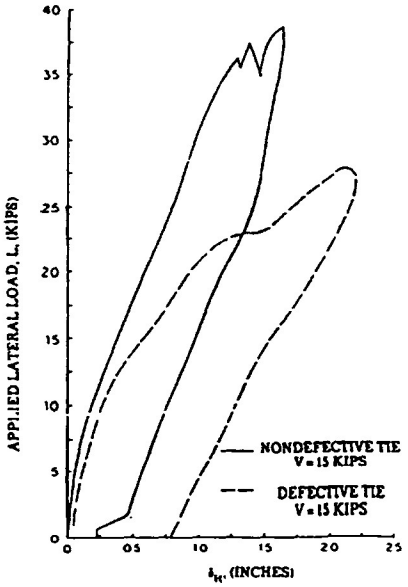


Fig. 5: Typical Load-Deflection Characteristics.

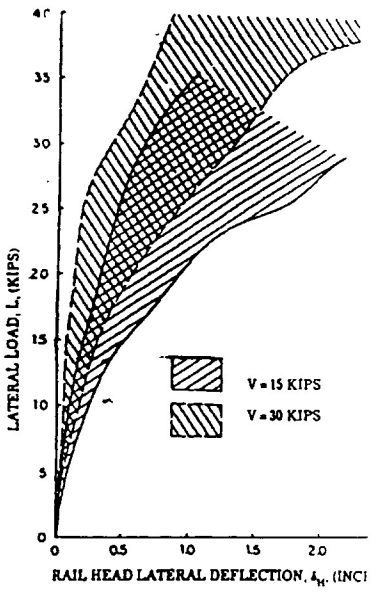


Fig. 6: Aggregate Rail Head Response.

Test results for displacement of th rail base showed generally larger base movement than those previously reported for tests in laboratory conditions [7]. The base displacements were 70 to 90 percen of the head displacement for low lateral load (<15 kips) and 30 to 50 percent of the head displacement for high lateral loads (25 to 35 kips The typical failure mode was substantial rotation of the rail accompanied by lateral shift. For conditions of poor restraint, the tie plate tended to dig into the tie, causing crushing of the tie surface, spike bending and spike hole elongation.

The wave length or load influence zone is also controlled by the restraint conditions. For a good section of track, it is 6 to 7 ties; but extends to 10 to 12 ties for a poor section.

Visual appearance of ties and fasteners may indicate potentially weak capacity. However, the tests showed that appearance did not consistently correlate with measured lateral restraint capacity

Nonlinear Structural Model of a Discretely Supported Rail

To understand, evaluate and interpret the results of the field tests, a finite element analytical model of the track was formulated. As indicated in Figure 7, the model represents a rail as a beam supported at tie spacings by restraining springs equivalent to the support provided by the fastener-tie combination. For the field tests and for anticipated critical vehicle loading, the displacements of the rail cross section relative to the tie are the dominant system movements in response to spreading loads.

Each rail segment between ties is treated as a linear beam element subjected to a combination of vertical, lateral and torsional loads applied at the shear center of the cross section. Since the rail has an unsymmetric section, St. Venant torsion and constrained warping result when twisting is applied. Furthermore, lateral bending and twist are coupled since the tie-fastener support, shown schematically in Figure 7b, operates at the rail base. This coupling has been discussed by Timoshenko and Langer [11] for continuously supported rail. McConnell and Perlman [12] have extended this approach to coupling with vertical bending for discretely supported rail subject to flanging loads.

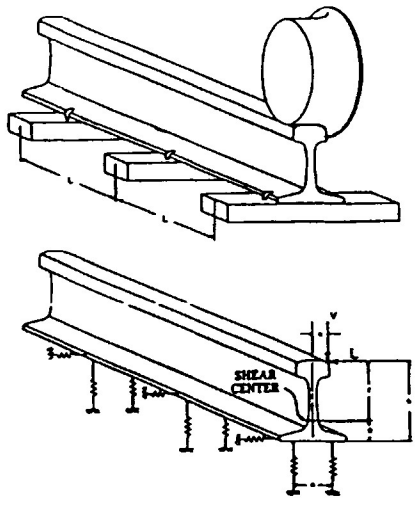


Fig. 7: Model of Discretely Supported Rail.

The stiffness of such a rail element can be characterized in terms of vertical and lateral bending rigidities, EI_v, and, EI_L, a torsional rigidity, C, a warping constant, D, and the geometric dimensions that locate the gage corner, rail base and shear center, e, h, c, and g, respectively. Numerical values of the necessary cross sectional and dimensional parameters have been tabulated for a range of common rail sizes in Reference 13.

A decisive aspect in the model is the nonlinear representation of the support provided by the ties and fasteners to the rail. Nonlinear system response behavior can mask some of the details of the component nonlinearities. In addition, spacial variation in support can have a strong influence. Results of the component laboratory tests, coupled with estimates suggested by linear track models [12] provided the basis for selecting the detailed characteristics of the support springs. To simplify the approach, frictional resistances are represented by equivalent elastic elements.

The vertical springs model the spike pull-out response for tensile loads and vertical tie-foundation resistance for compressive loads. As shown in Figure 8a, characterization of the gap between the spike head and rail base provides for a loss mechanism. The deadband distance, D_o, will increase if a load as large as F_o is applied so that successive cycles will follow a different load path.

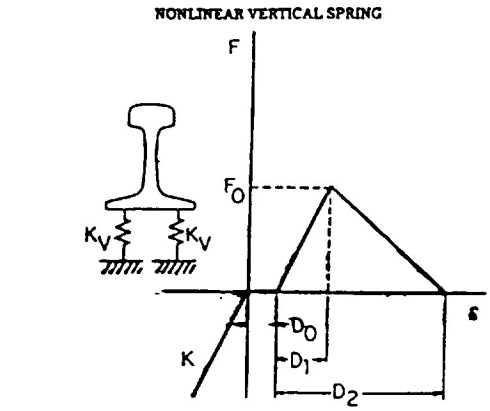
Figure 8b shows three distinct regions with corresponding linear slopes used to represent the lateral fastener stiffness K_L. The magnitude of each slope is related to an assumed physical characteristic of the fastener system. K_{L1} is very large to approximate Coulomb friction between the tie plate and tie surface. The load break point defining the limit of this region is μ, the coefficient of friction, times N, the vertical load on the tie. This lateral resistance is, therefore, strongly dependent on the proximity of a given tie to any wheel loads. K_{L2} is related to elastic behavior of the spikes in bending while K_{L3} corresponds to the very large, nearly sliding displacement tie plate behavior. For badly worn ties, the K_{L2} region represents the tie plate cutting into the tie, a key parameter to distinguish restraint of relatively weak track from that of relatively strong track.

A finite element computer program using an iterative approach to the solution of the nonlinear equations was developed by K. Kobomura to implement this model. Cubic interpolation functions were used to represent vertical bending, lateral bending and twist displacements within each element. The program allows distinct spring characteristics at each tie so that axially variable, nonuniform tie conditions can be simulated. Representation of missing ties or broken rail conditions can also be carried out in a routine manner using this feature.

Results

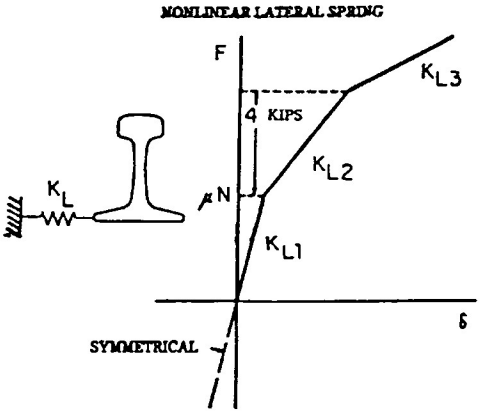
Figure 9 compares the model prediction with the extreme responses of the field tests for a vertical load of 15 kips. The parameter values in Figure 8 were used to represent the fastener, tie and foundation support. The lower bound curve of experimental results is a composite of test values made up of the lowest load in any test for a given displacement. Basic agreement of the model with the bounding results is excellent.

The analytical results have been referenced to a displacement origin corresponding to application of lateral load after all vertical load has been applied. With the full



	SOFT	STIFF
F_0	2 KIPS	4 KIPS
D_0	0.0 INCHES	0.2 INCHES
D_1	0.2 INCHES	0.2 INCHES
D_2	1.5 INCHES	1.5 INCHES
K	25 KIPS/INCHES	60 KIPS/INCHES

F_0 = PEAK SPIKE PULL OUT FORCE
D_0 = GAP BETWEEN SPIKE HEAD AND RAIL BASE SURFACE



	SOFT	STIFF
K_{L1}	40 KIPS/INCHES	80 KIPS/INCHES
K_{L2}	6 KIPS/INCHES	18 KIPS/INCHES
K_{L3}	0.8 KIPS/INCHES	5 KIPS/INCHES

N = VERTICAL FORCE ON TIE PLATE
μ = 0.4

Fig. 8: Characteristics of Vertical and Lateral Rail Support.

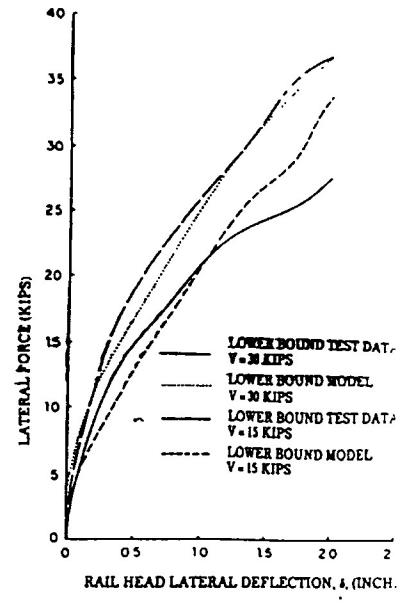


Fig. 9: Comparison of Test and Model Load-Deflection Behavior

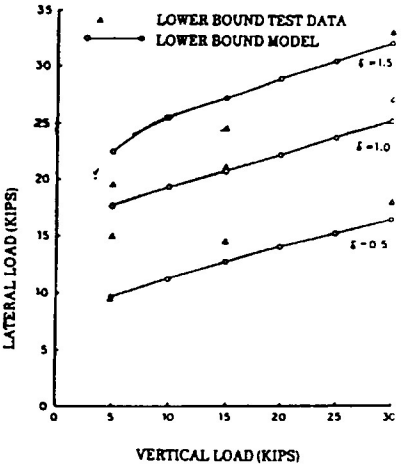


Fig. 10: Lateral-Vertical Load Effect on Head Displacement.

vertical load at the gage corner, the rail section will rotate to cause a small inward head displacement relative to an unloaded equilibrium position. This shifted origin facilitates comparison with the appropriate conditions for the recorded test data.

Figure 9 also compares the prediction and corresponding test results for a vertical load of 30 kips, using the stiffness parameters chosen for V = 15 kips. While not as closely coincident as those for V = 15 kips, the agreement is quite reasonable.

The constant displacement loci shown in Figure 10 indicate the nature of the stiffness parameter extrapolation. With all of the parameters in the model except vertical load fixed, the loci are nearly linear functions of vertical load. The experimental values represent a composite lower bound. The measured results may correspond to different stiffnesses in that different sites were used when applying the various vertical loading conditions.

The model was used to define a minimum strength curve for examination of parametric influence. The effect of rail weight on predicted response is indicated in Figure 11. In the initial, roughly linear region up to 1 inch, there are relatively small differences among all the rails. This range is controlled

by the high stiffness portion of the fastener characteristics and the height to width ratio of the rail. At higher loads the fastener stiffnesses are softer so that the rail rigidities can have a larger influence on the interaction of wavelength and stiffness.

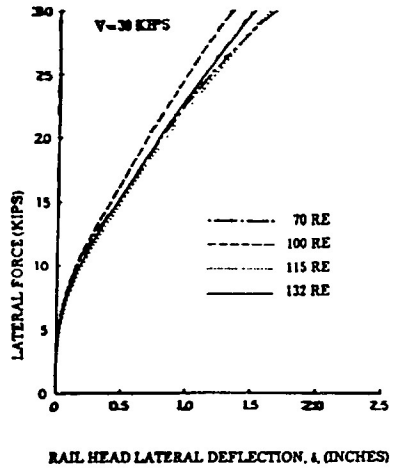


Fig. 11: Influence of Rail Size.

Local weaknesses or anomalies in track structure can reduce rail restraint below the capacity defined by the lower bound of the field tests. Figure 12 compares the results of the model using the lower bound stiffness parameters with predictions for track with such anomalies as missing ties or broken

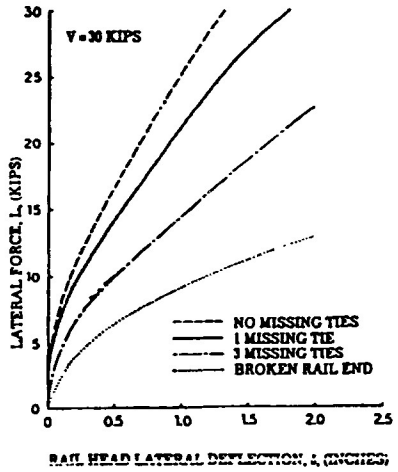


Fig. 12: Effect of Support Anomalies.

joint bars. Figure 13 shows that extreme conditions of such anomalies (e.g., a long unsupported span) cannot be adequately compensated by good support

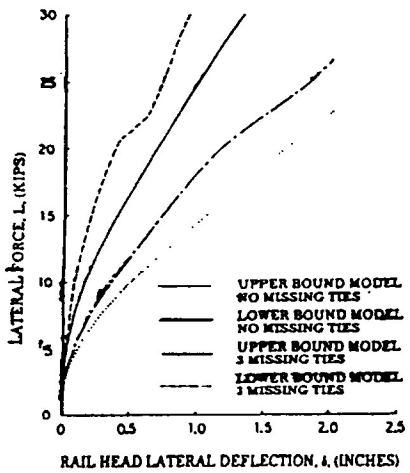


Fig. 13: Tie Support-Restraint Trade-off.

represented by stiffer springs at the good ties. An interesting subfeature of these results is the distinction between the monotonically softening response for low stiffness parameters in contrast with the S shaped response of stiffer springs interacting with a spike head to rail base gap. This change in response behavior is indicative of a change in the failure mode of the rollover displacement. With soft restraint, the tie plate shifts laterally as it digs into a soft or worn tie with most of the plate surface in contact with the tie as the rail rotates and translates. With strong fastener tie restraint there is little base displacement and rotation occurs pivoting around the field corner of the railbase with little or no penetration of the tie surface.

This distinction was clearly apparent in the typical test results for worn ties at Logan (softening) and the "S" behavior characteristic of the AAR Laboratory tests [7] using new ties with substantial gaps induced by cyclic loading of the track. The intermediate region of low stiffness occurs when the base gage corner lifts from the surface of the tie so that all the torsional resistance is provided by the rail alone. As the rotation increases, the rail base encounters the gage spike head and increases the resistance to additional rotation.

To relate the track capacity defined by tests conducted with a single set of spreading loads to the strength required by vehicle loading, truck load conditions must be taken into consideration. One measure of the total truck load applied to a rail is the average of the wheel loads, L_1, and L_2, on the leading and trailing axles. With the same vertical load on each axle and a typical truck wheelbase, a given total truck load is more severe when all of it is applied at one axle than when the same total load is divided between two axles. The maximum displacement becomes less severe as the load is more evenly shared between the axles. For gage widening considerations, the worst case truck loading for a given vehicle can be a combination of axle loads or the maximum found at any single axle. Figure 14 shows the load deflection behavior of a rail loaded by a single axle and by a truck with equal axle loads. In terms of the capacity definition of Figure 2, truck and axle maximum loads for specific geometry and speed conditions must be compared to their corresponding lateral restraint curves to determine the maximum demand for a specific vehicle. In practice, the axle loads are either so different that the critical gage widening condition can be established by examining the axle load or nearly equal so that it can be found by the $L_1 = L_2$ truck

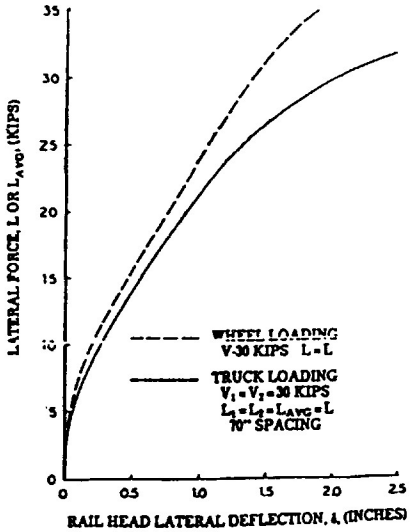


Fig. 14: Comparison of Truck and Axle Load Restraint Capacity.

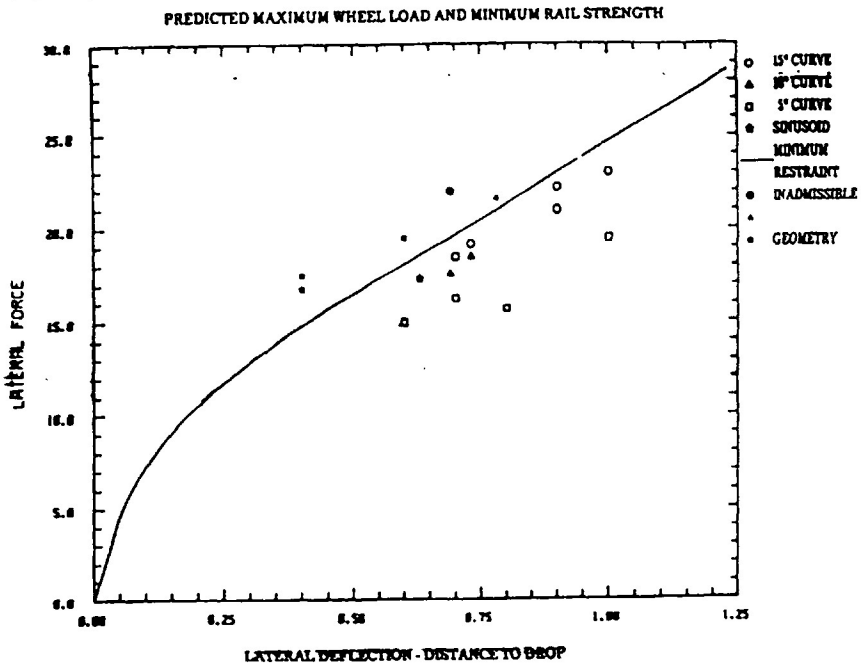


Fig. 15: Lateral Restraint Capacity.

load case. A rail capacity requirement can then be determined as either the solid or dotted line in Figure 14 depending on the vehicle response.

For low speed North American track, 100-ton hopper cars are the vehicles that are considered to define the worst loading conditions. On curved track, it is their axle loads that are the critical values. The data in Figure 15 show the pairing of maximum lateral load and distance to drop for the types, amplitudes and combinations of gage and alignment variations used to represent the track geometry [5]. The points with filled symbols denote conditions that are unacceptable on the basis of geometry conditions alone.

The remaining admissible maximum load conditions can then be compared with the curve describing the minimum measured capacity of the track. The dynamic loads are assumed to have the load deflection behavior of Figure 14. The solid line represents the axle loads for this comparison. A corresponding comparison of this form for truck load values shows that these are the critical conditions. Geometry conditions corresponding to points above this curve must not be allowed to take place if gage spreading is to be prevented. The minimum distance from the capacity curve to any of the remaining points represents the margin of safety for failure by gage spreading. The reduction in track capacity of the anomalous conditions shown in Figure 12 can be assessed by superposition of those curves on Figure 15.

Conclusions

This study has defined the means for determining the capacity of low speed track necessary to provide adequate lateral restraint to prevent gage widening failure. By considering the interaction of vehicle load and restraint stiffness, limits on track geometry variation and tie fastener condition have been identified. These limits can be used to qualitatively evaluate track to augment any visual examination that is insufficient to indicate the rail restraint capacity.

This combination of analytic and experimental procedures has identified the key parameters that describe the ability of restrained rail to resist lateral load and the failure mechanism associated with widening of gauge. With this method, field data defines a single load deflection curve to characterize rail restraint capacity for all acceptable track geometries.

These results are based on field conditions for the most severe conditions of geometry and support. Therefore, the same procedure can be used to extrapolate the requirements for cases of rail support appropriate to high speed track.

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TIE CLUSTERS 3 OR MORE

IN-HOUSE COMPILATION

G. A. Stanzione
September 1998

Note! Clusters are blocked.
Hatched blocks are non clusters.
Load axle was dis-engaged in these areas.

HOLLAND REPORT 1998
DELTA AREAS > .9"

WEST ARM
DW2-BW9 INSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
730.00	-0.09	0.81	0.90
1615.00	-0.73	0.36	1.08
1646.00	-1.41	-0.35	-1.76
1647.00	-1.40	-0.34	-1.74
1648.00	-1.38	-0.37	-1.75
1649.00	-1.40	-0.35	-1.75
1650.00	-1.40	-0.32	-1.71
1651.00	-1.26	-0.26	-1.52
1652.00	-1.39	-0.20	-1.59
1653.00	-1.40	-0.11	-1.51
1654.00	-1.37	-0.05	-1.42
1655.00	-1.32	-0.01	-1.33
1656.00	-1.38	-0.01	-1.38
1657.00	-1.38	-0.01	-1.38
1658.00	-1.40	-0.07	-1.33
1659.00	-1.40	-0.07	-1.33
1660.00	-1.48	-0.06	-1.42
1661.00	-1.39	-0.17	-1.22
1662.00	-1.38	-0.44	-0.94
2060.00	-1.26	-0.21	-1.46
2061.00	-1.40	-0.21	-1.61
2062.00	-1.38	-0.22	-1.61
2063.00	-1.38	-0.15	-1.53
2064.00	-1.39	-0.13	-1.53
2065.00	-1.38	-0.10	-1.48
2066.00	-1.38	-0.11	-1.49
2067.00	-1.39	-0.10	-1.50
2068.00	-1.40	-0.11	-1.50
2069.00	-1.37	-0.11	-1.48
2070.00	-1.39	-0.11	-1.50
2071.00	-1.50	-0.09	-1.58
2072.00	-1.43	-0.11	-1.54
2073.00	-1.39	-0.05	-1.44
2074.00	-1.48	-0.19	-1.28
2075.00	-1.39	-0.47	-0.92
2903.00	-1.38	-0.17	-1.21
2904.00	-1.37	-0.18	-1.20
2905.00	-1.40	-0.17	-1.23
2906.00	-1.39	-0.18	-1.21
2907.00	-1.37	-0.16	-1.22
2908.00	-1.39	-0.18	-1.21
2909.00	-1.39	-0.23	-1.16
2910.00	-1.36	-0.25	-1.11
2911.00	-1.39	-0.23	-1.16
2912.00	-1.41	-0.24	-1.17

CONT'D
WEST ARM
DW2-BW9 INSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
2913.00	-1.41	-0.24	-1.17
2914.00	-1.38	-0.14	-1.23
2915.00	-1.39	-0.24	-1.15
2916.00	-1.38	-0.24	-1.14
2917.00	-1.39	-0.25	-1.14
2918.00	-1.38	-0.25	-1.12
2919.00	-1.39	-0.31	-1.08
2920.00	-1.38	-0.34	-1.04
6441.00	-0.69	0.27	0.96
7069.00	-0.60	0.30	0.91
7839.00	-0.73	0.29	1.02
8169.00	-0.57	0.33	0.90
8170.00	-0.60	0.34	0.94
8173.00	-0.56	0.34	0.90
8456.00	-0.57	0.36	0.94
8605.00	-1.00	-0.03	0.96
8606.00	-1.10	-0.02	1.08
8607.00	-1.08	-0.05	1.01
8608.00	-1.15	0.03	1.18
8609.00	-0.87	0.12	1.00
8610.00	-0.85	0.14	0.99
8611.00	-0.84	0.14	0.98
8619.00	-0.68	0.25	0.93
8620.00	-0.69	0.32	1.01
8622.00	-0.65	0.41	1.06
8874.00	-0.53	0.43	0.96
11464.00	-0.74	0.29	1.03
11826.00	-0.45	0.47	0.91
12155.00	-0.63	0.32	0.95
12617.00	-0.59	0.33	0.93
13181.00	-0.48	0.45	0.93
14017.00	-0.80	0.12	0.92

WEST ARM
BW9-AW7 INSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
20999.00	-0.95	0.00	0.94
21000.00	-1.37	-0.02	1.39
21001.00	-1.38	-0.01	1.39
21002.00	-1.40	-0.10	1.51
21003.00	-1.40	-0.06	1.34
21004.00	-1.38	-0.02	1.41
21005.00	-1.38	-0.02	1.39
21006.00	-1.37	-0.02	1.39
21007.00	-1.41	-0.01	1.42
21008.00	-1.40	-0.01	1.41
21009.00	-1.39	-0.00	1.39
21040.00	-1.40	-0.01	1.41
21041.00	-1.34	-0.15	1.18
21042.00	-1.39	-0.40	0.99
22122.00	-0.64	0.36	1.00
22215.00	-0.59	0.32	0.91
24557.00	-0.61	0.31	0.91
24558.00	-0.62	0.32	0.94
24559.00	-0.53	0.40	0.92
24560.00	-0.52	0.41	0.93
27366.00	-0.72	0.22	0.94
27390.00	-0.73	0.19	0.92
27394.00	-0.70	0.20	0.90
34053.00	-0.67	0.24	0.91
34054.00	-0.71	0.20	0.91
34055.00	-0.84	0.21	1.05
34056.00	-0.83	0.20	1.03
34057.00	-0.72	0.21	0.93
34088.00	-1.25	-0.07	1.32
34089.00	-1.38	-0.04	1.42
34090.00	-1.38	-0.03	1.41
34091.00	-1.29	-0.02	1.31
34092.00	-1.39	-0.02	1.41
34093.00	-1.39	-0.02	1.41
34094.00	-1.50	-0.02	1.52
34095.00	-1.38	-0.02	1.40
34096.00	-1.39	-0.03	1.36
34097.00	-1.39	-0.01	1.38
34098.00	-1.38	-0.12	1.27
34099.00	-1.38	-0.15	1.23
34100.00	-1.40	-0.17	1.22
34101.00	-1.39	-0.19	1.20
34102.00	-1.39	-0.18	1.22
34103.00	-1.42	-0.29	1.13
34104.00	-1.47	-0.50	0.97

CONT'D
WEST ARM
BW9-AW7 INSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
34285.00	-0.67	0.27	0.94
34551.00	-0.68	0.24	0.93
34552.00	-0.70	0.26	0.97
34553.00	-0.72	0.26	0.99
34555.00	-0.59	0.35	0.94
34556.00	-0.68	0.40	1.09
34557.00	-0.63	0.46	1.09
34558.00	-0.52	0.57	1.09
34559.00	-0.41	0.56	0.97
34560.00	-0.45	0.56	1.01
34561.00	-0.55	0.62	1.16
34562.00	-0.28	0.63	0.91
34942.00	-0.73	0.26	0.99
35070.00	-0.54	0.40	0.94
35071.00	-0.62	0.39	1.02
35073.00	-0.56	0.43	0.98
35074.00	-0.67	0.47	1.14
35075.00	-0.69	0.43	1.12
35076.00	-0.68	0.45	1.13
35077.00	-0.55	0.48	1.03
35078.00	-0.63	0.46	1.09
35079.00	-0.49	0.47	0.96
35289.00	-0.36	0.56	0.93
35291.00	-0.39	0.56	0.95
35292.00	-0.40	0.58	0.98
35293.00	-0.35	0.55	0.90
35295.00	-0.36	0.56	0.93
35296.00	-0.38	0.57	0.95
35805.00	-0.50	0.42	0.92
36323.00	-0.61	0.37	0.98
36324.00	-0.59	0.32	0.91
36326.00	-0.59	0.38	0.97
36678.00	-0.52	0.39	0.91
36692.00	-0.55	0.37	0.92
37256.00	-0.74	0.22	0.96
37257.00	-0.69	0.23	0.92
37315.00	-0.56	0.35	0.91
37426.00	-0.56	0.35	0.91
37427.00	-0.53	0.45	0.98
37685.00	-0.33	0.60	0.93
37687.00	-0.29	0.63	0.92
37688.00	-0.33	0.59	0.92
37689.00	-0.36	0.61	0.98
37692.00	-0.32	0.61	0.93
37726.00	-0.16	0.74	0.91
37728.00	-0.24	0.72	0.96
37729.00	-0.33	0.72	1.05

CONT'D
WEST ARM
BW9-AW7 INSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
38204.00	-0.56	0.37	0.93
38205.00	-0.54	0.38	0.92
38206.00	-0.47	0.46	0.93
38407.00	-0.52	0.45	0.97
38408.00	-0.51	0.44	0.95
38570.00	-0.62	0.33	0.96
38571.00	-0.74	0.34	1.08
38572.00	-0.69	0.34	1.04
38573.00	-0.67	0.34	1.01
38574.00	-0.70	0.38	1.08
38575.00	-0.66	0.33	1.00
38576.00	-0.61	0.32	0.93
39029.00	-0.50	0.44	0.95
39061.00	-0.60	0.40	1.00
39062.00	-0.73	0.38	1.11
39065.00	-0.52	0.40	0.92
39139.00	-0.38	0.57	0.95
39140.00	-0.54	0.48	1.02
39178.00	-0.39	0.52	0.91
39362.00	-0.39	0.51	0.90
39366.00	-0.41	0.54	0.95
39497.00	-0.32	0.60	0.92
39777.00	-0.69	0.22	0.91
39972.00	-0.61	0.30	0.91
39973.00	-0.77	0.29	1.05
40025.00	-0.76	0.17	0.94
40577.00	-0.71	0.27	0.99
40610.00	-0.65	0.27	0.92
41217.00	-0.73	0.20	0.92
41749.00	-0.67	0.34	1.01
41750.00	-0.69	0.34	1.02
41751.00	-0.74	0.33	1.07
41752.00	-0.71	0.34	1.05
41753.00	-0.84	0.36	1.01
41755.00	-0.58	0.38	0.95
41756.00	-0.56	0.39	0.95

WEST ARM
AW7-AW9 INSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
48757.00	-0.48	0.43	0.92
49078.00	0.18	2.20	2.03
50000.00	-0.63	0.27	0.91
50001.00	-0.64	0.28	0.92
59142.00	-0.80	0.23	1.03
59143.00	-0.87	0.22	1.08
59144.00	-0.75	0.18	0.93
59184.00	-0.88	0.16	1.04
59185.00	-0.92	0.06	0.98
86620.00	-0.78	0.17	0.95
86624.00	-0.68	0.23	0.91
86716.00	-0.78	0.12	0.90
86721.00	-0.79	0.15	0.93
86723.00	-0.72	0.19	0.91
86724.00	-0.72	0.20	0.91
86725.00	-0.75	0.20	0.95
86726.00	-0.72	0.20	0.91

WEST ARM
DW2-BW9 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
130.00	-0.03	0.87	0.90
132.00	-0.14	0.81	0.94
133.00	-0.17	0.81	0.98
1046.00	-0.45	0.48	0.92
1047.00	-0.41	0.52	0.93
1757.00	1.48	0.11	1.37
1758.00	1.39	0.04	1.43
1759.00	1.38	0.04	1.42
1760.00	1.40	0.02	1.42
1761.00	1.39	0.04	1.43
1762.00	1.39	0.05	1.44
1763.00	1.40	0.04	1.44
1764.00	1.38	0.04	1.42
1765.00	1.40	0.04	1.44
1766.00	1.39	0.05	1.45
1767.00	1.39	0.05	1.44
1768.00	1.38	0.04	1.43
1769.00	1.38	0.05	1.44
1770.00	1.39	0.06	1.45
1771.00	1.39	0.04	1.44
1772.00	1.40	0.04	1.44
1773.00	1.40	0.07	1.47
1774.00	1.29	0.05	1.34
3748.00	1.37	0.03	1.40
3749.00	1.40	0.04	1.44
3760.00	1.40	0.00	1.41
3761.00	1.37	0.04	1.33
3762.00	1.40	0.03	1.43
3763.00	1.39	0.02	1.41
3764.00	1.41	0.03	1.43
3766.00	1.40	0.03	1.43
3768.00	1.40	0.04	1.44
3767.00	1.39	0.04	1.43
8305.00	-0.61	0.33	0.94
8477.00	-0.29	0.65	0.94
8478.00	-0.31	0.64	0.95
8562.00	-0.42	0.52	0.94
8565.00	-0.39	0.54	0.93
8566.00	-0.42	0.52	0.95
8570.00	-0.40	0.53	0.92
8645.00	-0.48	0.47	0.96
8646.00	-0.45	0.52	0.97
8647.00	-0.54	0.52	1.06
8648.00	-0.40	0.51	0.91
8649.00	-0.45	0.54	0.99
8812.00	-0.41	0.52	0.93

CONT'D
WEST ARM
DW2-BW9 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
8813.00	-0.42	0.51	0.93
10301.00	-0.29	0.63	0.92
10309.00	-0.36	0.57	0.93
11449.00	-0.52	0.39	0.91
11453.00	-0.52	0.39	0.91
11737.00	-0.58	0.40	0.99
11738.00	-0.52	0.40	0.92
12123.00	-0.44	0.47	0.91
12127.00	-0.62	0.49	1.10
12128.00	-0.67	0.46	1.13
12129.00	-0.62	0.47	1.09
12130.00	-0.56	0.52	1.08
12131.00	-0.64	0.47	1.11
12182.00	-0.51	0.47	0.97
12186.00	-0.47	0.47	0.94
12225.00	-0.66	0.44	1.09
12226.00	-0.59	0.46	1.05
12227.00	-0.51	0.46	0.97
12229.00	-0.53	0.38	0.90
12341.00	-0.51	0.55	1.05
12724.00	-0.48	0.43	0.91
14009.00	-0.48	0.44	0.91
14120.00	-0.52	0.46	0.98
14137.00	-0.57	0.37	0.94
16380.00	-0.81	0.12	0.93
16383.00	-0.74	0.21	0.95
16384.00	-0.83	0.13	0.96
16247.00	-0.64	0.29	0.93
16248.00	-0.77	0.17	0.94
16249.00	-0.74	0.17	0.90

WEST ARM
BW9-AW7 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
21693.00	-1.36	0.23	1.13
21694.00	-1.38	0.18	1.21
21696.00	-1.38	0.15	1.23
21696.00	-1.38	0.14	1.24
21697.00	-1.43	0.14	1.29
21698.00	-1.43	0.13	1.31
21699.00	-1.39	0.12	1.28
21690.00	-1.39	0.04	1.35
21691.00	-1.38	0.03	1.35
21692.00	-1.37	0.01	1.39
21693.00	-1.37	0.01	1.38
21694.00	-1.40	0.01	1.41
21695.00	-1.39	0.03	1.41
21696.00	-1.41	0.09	1.49
21697.00	-1.38	0.12	1.50
21698.00	-1.39	0.10	1.48
21699.00	-1.38	0.11	1.48
24686.00	-0.76	0.28	1.04
28194.00	-0.60	0.33	0.92
28219.00	-0.78	0.17	0.95
28220.00	-0.77	0.15	0.92
28439.00	-0.97	0.04	1.00
32161.00	-0.44	0.47	0.92
32163.00	-0.58	0.47	1.05
32164.00	-0.61	0.47	1.09
32165.00	-0.66	0.42	1.08
32166.00	-0.58	0.39	0.96
32167.00	-0.54	0.47	1.01
32168.00	-0.54	0.46	1.00
32169.00	-0.48	0.46	0.94
34131.00	-1.41	-0.47	0.94
34132.00	-1.44	0.03	1.47
34133.00	-1.39	0.12	1.50
34134.00	-1.39	0.12	1.51
34135.00	-1.37	0.11	1.48
34136.00	-1.38	0 09	1.47
34137.00	-1.39	0.05	1.44
34138.00	-1.41	0.06	1.47
34139.00	-1.38	0.03	1 41
34140.00	-1.44	0.05	1.49
34141.00	-1.39	0.04	1.44
34142.00	-1.38	0.04	1.42
34143.00	-1.39	0.05	1.44
34144.00	-1.57	0.06	1.62
34145.00	-1.38	-0 02	1.36
34146.00	-1.27	0.05	1.31
39027.00	-0.68	0.24	0.93
39030.00	-0.67	0.25	0.92
39031.00	-0.68	0.24	0.92
39032.00	-0.68	0.26	0.94
39033.00	-0.69	0.24	0.93
39034.00	-0.76	0.20	0.96
39037.00	-0.77	0.19	0.96

WEST ARM
AW7-AW9 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
45345.00	-0.81	0.13	0.95
45346.00	-0.98	0.17	1.15
45347.00	-1.13	0.11	1.24
45348.00	-1.03	0.10	1.13
45349.00	-0.85	0.09	0.94
45350.00	-0.83	0.09	0.92
45485.00	-0.84	0.10	0.93
45686.00	-0.73	0.17	0.91
46026.00	-0.63	0.34	0.97
46028.00	-0.55	0.42	0.96
46029.00	-0.61	0.31	0.92
46030.00	-0.66	0.33	0.99
46117.00	-0.51	0.40	0.91
46196.00	-0.47	0.43	0.91
46510.00	-0.45	0.54	0.99
46511.00	-0.59	0.58	1.17
46512.00	-0.38	0.59	0.97
46712.00	-0.48	0.54	1.03
46715.00	-0.53	0.41	0.94
46716.00	-0.64	0.41	1.06
46717.00	-0.55	0.42	0.98
46778.00	-0.82	0.08	0.90
47048.00	-0.27	0.68	0.96
47050.00	-0.48	0.45	0.93
47051.00	-0.62	0.36	0.98
47053 00	-0.63	0.36	0.99
47054.00	-0.69	0.35	1.04
47055.00	-0.81	0.30	1.11
47056.00	-0.79	0.28	1.07
47057.00	-0.74	0.22	0.96
47091.00	-0.38	0.66	1.03
47092.00	-0.48	0.61	1.09
47093 00	-0.46	0.61	1.07
47096.00	-0.34	0.61	0.95
47097.00	-0.39	0.63	1.02
47101 00	-0.40	0.52	0 92
47120.00	-0.41	0.56	0.97
47121 00	-0.60	0.48	1.08
47122.00	-0.69	0.49	1.17
47123.00	-0.62	0.45	1.07
47124 00	-0.69	0.40	1.09
47125.00	-0.82	0.33	1.15
47126 00	-0.92	0.26	1.18
47127.00	-0.72	0.27	0.99
47255.00	-0.17	0.74	0.91
47256.00	-0.29	0.76	1.05
47257.00	-0.42	0.76	1.18

CONT'D
WEST ARM
AW7-AW9 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
47258.00	-0.43	0.74	1.17
47259.00	-0.51	0.74	1.24
47260.00	-0.66	0.75	1.41
47261.00	-0.80	0.75	1.55
47262.00	-0.69	0.74	1.43
47263.00	-0.47	0.75	1.22
47264.00	-0.43	0.76	1.19
47265.00	-0.36	0.67	1.03
47366.00	-0.49	0.47	0.95
47367.00	-0.48	0.44	0.92
47368.00	-0.67	0.46	1.13
47369.00	-0.76	0.46	1.22
47370.00	-0.55	0.43	0.98
47371.00	-0.64	0.32	0 96
47372.00	-0.79	0.47	1.26
47373.00	-0.69	0.26	1.14
47427.00	-0.68	0.29	0.97
47435.00	-0.77	0.29	1.06
47527.00	-0.71	0.21	0.92
47670.00	-0.63	0.28	0 91
47707.00	-0.78	0.22	0.98
47708.00	-0.70	0.22	0.91
47710.00	-0.75	0.22	0.97
47777.00	-0.67	0.26	0.94
47781.00	-0.78	0.27	1.05
47782.00	-0.71	0.22	0.92
47888.00	-0.56	0.36	0 92
47921.00	-0.77	0.21	0.98
48783.00	-0.07	0 84	0.91
48840 00	-0.42	0.49	0.91
48841.00	-0.47	0 50	0 97
48842.00	-0.41	0.50	0 91
48997.00	-0.36	0.61	0.97
48998.00	-0.46	0.54	1.00
49185.00	-0.31	0.77	1 08
49186 00	-0.28	0.76	1.04
49187.00	-0.25	0.78	1 03
49189.00	-0.36	0.71	1.07
49190.00	-0 47	0 62	1.09
49191.00	-0.37	0.54	0.91
49194.00	-0.63	0.44	1 07
49195.00	-0.50	0 43	0 93
49197.00	-0.52	0.44	0 96
49198.00	-0.59	0.43	1.02
49210.00	-0.72	0.28	1.00
49235.00	-0.77	0.13	0.90
49236.00	-0.82	0.12	0.93

CONT'D
WEST ARM
AW7-AW9 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
49326.00	-0 65	0 26	0.92
49327.00	-0.72	0.25	0.97
49328.00	-0 69	0.24	0.93
49329.00	-0.68	0.25	0.92
49466 00	-0.71	0.26	0.97
49512.00	-0 65	0.27	0.92
49653 00	-0 54	0.37	0.90
49977.00	-0.80	0.17	0.97
50104.00	-0 57	0.50	1.06
50105.00	-0.72	0 53	1.25
50106.00	-0.71	0.54	1.25
50107.00	-0.66	0.53	1.18
50108.00	-0.73	0 44	1.17
50109.00	-0.72	0 34	1.06
50110.00	-0.71	0.20	0.91
50263.00	-0.61	0.33	0 94
50290 00	-0 76	0 19	0.95
50291.00	-0.78	0.13	0.91
50294.00	-0.85	0.15	1.00
50470.00	-0.58	0.34	0.92
50471.00	-0.65	0.34	0.99
50717.00	-0 63	0 39	1.02
50718.00	-0.60	0.36	0.96
51315.00	-0.47	0 58	1 05
51316.00	-0.32	0 58	0 90
51317.00	-0.36	0 57	0 94
51318.00	-0 40	0 58	0.98
51319.00	-0.45	0 58	1.02
51320 00	-0 45	0 55	1 00
51321.00	-0 38	0 53	0 92
51322 00	-0 37	0 54	0 92
51323.00	-0 39	0 53	0.92
51325 00	-0 39	0 52	0 91
51327 00	-0.39	0 54	0.93
51328.00	-0 42	0 53	0.95
51329 00	-0.38	0.54	0.92
51354 00	-0 34	0 59	0.93
51355 00	-0.43	0 51	0.94
51356 00	-0.43	0 52	0 95
51483.00	-0 77	0 16	0 92
51484 00	-0 79	0 18	0 97
51697.00	-0 83	0 12	0 95
51794.00	-0 95	-0 04	0 91
51797.00	-0 90	0 04	0 94
51835.00	-0.59	0 40	1 00
52115 00	-0.53	0 46	0 99
52116.00	-0.69	0 46	1.15

CONT'D
WEST ARM
AW7-AW9 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
52117.00	-0.57	0.47	1.03
52118.00	-0.50	0.48	0.98
52119.00	-0.60	0.45	1.04
52120.00	-0.70	0.48	1.18
52121.00	-0.63	0.47	1.10
52122.00	-0.51	0.42	0.93
52346.00	-0.73	0.29	1.01
52347.00	-0.62	0.29	0.91
52350.00	-0.77	0.15	0.92
52354.00	-0.81	0.16	0.97
52355.00	-0.81	0.15	0.95
52661.00	-0.33	0.63	0.96
52662.00	-0.38	0.61	0.98
52663.00	-0.38	0.60	0.98
52664.00	-0.38	0.62	0.99
52665.00	-0.32	0.60	0.92
52666.00	-0.39	0.60	0.98
52743.00	-0.56	0.41	0.97
52744.00	-0.68	0.41	1.08
52745.00	-0.67	0.39	1.06
52746.00	-0.71	0.40	1.11
52747.00	-0.83	0.40	1.23
52748.00	-0.83	0.40	1.22
52749.00	-0.66	0.40	1.07
52750.00	-0.55	0.44	0.98
52751.00	-0.61	0.41	1.02
52752.00	-0.65	0.40	1.05
53381.00	-0.57	0.37	0.94
53383.00	-0.66	0.32	0.98
53384.00	-0.60	0.31	0.91
53459.00	-0.40	0.61	1.01
53460.00	-0.58	0.60	1.18
53461.00	-0.32	0.61	0.93
53631.00	-0.31	0.63	0.94
54686.00	-0.72	0.31	1.03
54687.00	-0.59	0.31	0.90
54688.00	-0.57	0.34	0.91
64131.00	-0.59	0.32	0.92
64134.00	-0.71	0.30	1.01
64135.00	-0.82	0.14	0.96
64302.00	-0.59	0.32	0.91
64303.00	-0.60	0.33	0.93
64306.00	-0.73	0.30	1.02
64307.00	-0.84	0.26	1.10
64339.00	-0.18	0.75	0.94
64340.00	-0.23	0.70	0.93
64376.00	-0.70	0.24	0.94

CONT'D
WEST ARM
AW7-AW9 OUTSIDE
DELTA > .9

FOOTAGE	UNLOADED	LOADED	DELTA
65295.00	-0.63	0.36	0.98
65938.00	-0.66	0.31	0.97
65939.00	-0.67	0.30	0.97
65940.00	-0.66	0.29	0.95
65943.00	-0.61	0.30	0.90
65965.00	-0.64	0.29	0.94
65966.00	-0.72	0.28	1.00
65967.00	-0.84	0.23	1.07
65968.00	-0.90	0.38	1.28
65969.00	-0.62	0.28	0.90
65971.00	-0.62	0.28	0.90
66132.00	-0.73	0.17	0.91
66723.00	-0.74	0.24	0.97
66724.00	-0.80	0.13	0.93
66725.00	-0.80	0.22	1.02
66726.00	-0.92	0.14	1.06
66727.00	-0.94	0.02	0.96
66893.00	-0.87	0.04	0.90
66894.00	-0.97	0.00	0.97
66898.00	-1.13	-0.22	0.91
66900.00	-1.15	-0.16	0.99
67027.00	-1.11	-0.19	0.91

HOLLAND REPORT 1998
DELTA AREAS > .9"

DE1-BE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
15613.00	-0.45	0.46	0.91
15616.00	-0.60	0.30	0.91
15617.00	-0.66	0.34	0.99
15618.00	-0.60	0.32	0.92
15974.00	-0.71	0.23	0.94
16488.00	-0.50	0.43	0.93
16715.00	-0.51	0.41	0.92
17133.00	-0.53	0.38	0.91
17134.00	-0.66	0.28	0.94
20029.00	-0.71	0.22	0.92
20030.00	-0.61	0.31	0.92
20123.00	-1.40	0.50	0.90
20124.00	-1.40	0.37	1.03
20125.00	-1.39	0.25	1.14
20126.00	-1.39	0.13	1.52
20127.00	-1.39	0.13	1.52
20128.00	-1.32	0.15	1.46
20129.00	-1.39	0.11	1.50
20130.00	-1.38	0.12	1.50
20131.00	-1.52	0.12	1.64
20132.00	-1.38	0.11	1.49
20133.00	-1.38	0.12	1.50
20134.00	-1.39	0.11	1.50
20135.00	-1.33	0.12	1.45
20136.00	-1.38	0.12	1.50
20137.00	-1.39	0.13	1.53
20138.00	-1.36	0.13	1.49
20979.00	-0.73	0.22	0.95

BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
21789.00	-0.58	0.33	0.91
22598.00	-0.53	0.42	0.95
28302.00	-0.39	0.57	0.96
28303.00	-0.38	0.54	0.92
28304.00	-0.38	0.56	0.94
28897.00	-1.39	0.37	1.02
28898.00	-1.38	0.27	1.12
28899.00	-1.40	0.44	1.84
28840.00	-1.40	0.43	1.82
28841.00	-1.38	0.43	1.81
28842.00	-1.39	0.43	1.82
28843.00	-1.39	0.42	1.82
28844.00	-1.40	0.43	1.83
28845.00	-1.40	0.43	1.83
28846.00	-1.39	0.44	1.83
28847.00	-1.39	0.42	1.82
28848.00	-1.40	0.43	1.83
28849.00	-1.39	0.43	1.82
28850.00	-1.39	0.42	1.82
28851.00	-1.39	0.43	1.82
28852.00	-1.41	0.43	1.85
30626.00	-0.77	0.13	0.91
30728.00	-0.52	0.44	0.95
32808.00	-0.51	0.41	0.93
32954.00	-0.54	0.36	0.90
32955.00	-0.57	0.41	0.97
33034.00	-0.36	0.61	0.97
33035.00	-0.45	0.54	0.99
33036.00	-0.40	0.59	0.99
33037.00	-0.60	0.61	1.21
33038.00	-0.60	0.60	1.20
33039.00	-0.51	0.59	1.11
33040.00	-0.57	0.63	1.21
33041.00	-0.70	0.58	1.28
33042.00	-0.70	0.59	1.29
33043.00	-0.58	0.60	1.18
33044.00	-0.50	0.59	1.09
33045.00	-0.77	0.56	1.33
33046.00	-0.65	0.42	1.08
33050.00	-0.70	0.28	0.98
33054.00	-0.67	0.28	0.95
33055.00	-0.67	0.31	0.97
33058.00	-0.59	0.36	0.95
33230.00	-0.48	0.51	0.98

CONT'D
BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
33233.00	-0.47	0.48	0.94
33234.00	-0.67	0.47	1.14
33235.00	-0.50	0.49	0.99
33236.00	-0.52	0.47	0.99
33237.00	-0.53	0.47	1.00
33238.00	-0.66	0.46	1.13
33239.00	-0.62	0.47	1.09
33240.00	-0.54	0.47	1.01
33241.00	-0.60	0.44	1.04
33242.00	-0.69	0.45	1.15
33243.00	-0.67	0.40	1.06
33244.00	-0.55	0.43	0.98
33564.00	-0.36	0.66	1.02
33565.00	-0.34	0.66	1.00
33566.00	-0.36	0.62	0.98
33567.00	-0.47	0.67	1.14
33568.00	-0.49	0.66	1.15
33569.00	-0.44	0.64	1.09
33570.00	-0.57	0.56	1.14
33571.00	-0.51	0.64	1.15
33572.00	-0.51	0.59	1.11
33573.00	-0.60	0.61	1.21
33574.00	-0.51	0.53	1.04
33670.00	-0.49	0.44	0.93
33673.00	-0.53	0.48	1.01
33674.00	-0.53	0.46	0.99
33677.00	-0.51	0.40	0.91
33816.00	-0.80	0.20	1.00
33817.00	-0.98	0.23	1.22
33818.00	-0.92	0.23	1.15
33819.00	-0.81	0.23	1.04
33820.00	-0.87	0.23	1.10
33821.00	-0.93	0.22	1.15
33934.00	-0.44	0.55	0.99
33938.00	-0.51	0.44	0.95
33939.00	-0.66	0.45	1.11
33941.00	-0.56	0.43	0.99
33942.00	-0.56	0.44	1.00
33943.00	-0.57	0.35	0.92
34219.00	-0.64	0.39	1.03
34220.00	-0.65	0.40	1.06
34221.00	-0.57	0.42	0.99
34222.00	-0.53	0.39	0.92
34223.00	-0.65	0.38	1.03
34224.00	-0.58	0.40	0.97
34225.00	-0.53	0.39	0.92
34227.00	-0.59	0.38	0.97
34228.00	-0.69	0.38	1.07
34229.00	-0.50	0.40	0.91
34232.00	-0.48	0.42	0.91
34251.00	-0.54	0.40	0.93

CONT'D
BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
34252.00	-0.62	0.35	0.97
34253.00	-0.72	0.36	1.07
34254.00	-0.68	0.34	1.02
34255.00	-0.77	0.33	1.10
34256.00	-0.90	0.33	1.23
34257.00	-0.88	0.33	1.20
34258.00	-0.85	0.29	1.14
34259.00	-0.83	0.29	1.12
34260.00	-0.89	0.29	1.17
34261.00	-0.83	0.35	1.18
34264.00	-0.81	0.19	1.01
34307.00	-1.06	0.63	1.69
34308.00	-1.25	0.73	1.99
34309.00	-1.49	0.79	2.28
34310.00	-1.38	0.79	2.17
34311.00	-1.39	0.79	2.18
34312.00	-1.38	0.80	2.18
34313.00	-1.38	0.77	2.16
34314.00	-1.38	0.77	2.15
34315.00	-1.39	0.71	2.10
34316.00	-1.38	0.70	2.09
34317.00	-1.39	0.68	2.07
34318.00	-1.35	0.47	1.83
34319.00	-1.38	0.37	1.75
34320.00	-1.39	0.28	1.67
34321.00	-1.35	0.27	1.62
34322.00	-1.38	0.22	1.59
34323.00	-1.33	0.21	1.55
34324.00	-1.38	0.33	1.71
34325.00	-1.38	0.14	1.52
34326.00	-1.39	0.20	1.59
34327.00	-1.39	-0.30	1.09
34485.00	-0.17	0.74	0.91
34486.00	-0.27	0.75	1.02
34487.00	-0.25	0.76	1.00
34488.00	-0.19	0.75	0.94
34489.00	-0.22	0.75	0.97
34490.00	-0.34	0.76	1.10
34491.00	-0.30	0.76	1.06
34492.00	-0.19	0.75	0.94
34493.00	-0.16	0.76	0.91
34494.00	-0.36	0.75	1.11
34495.00	-0.22	0.74	0.96
34496.00	-0.18	0.75	0.93
34497.00	-0.20	0.75	0.95
34498.00	-0.34	0.75	1.09
34499.00	-0.36	0.74	1.10
34500.00	-0.28	0.75	1.03
34501.00	-0.30	0.74	1.04
34502.00	-0.53	0.74	1.27
34503.00	-0.48	0.76	1.24

CONT'D
BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
34504.00	-0.44	0.75	1.19
34505.00	-0.40	0.67	1.07
34506.00	-0.45	0.75	1.19
34507.00	-0.63	0.75	1.38
34508.00	-0.48	0.79	1.27
34509.00	-0.39	0.84	1.23
34510.00	-0.45	0.75	1.20
34511.00	-0.49	0.75	1.24
34512.00	-0.43	0.77	1.19
34513.00	-0.36	0.76	1.12
34514.00	-0.39	0.74	1.14
34515.00	-0.49	0.72	1.22
34516.00	-0.46	0.74	1.20
34517.00	-0.41	0.74	1.15
34518.00	-0.47	0.73	1.20
34519.00	-0.58	0.73	1.31
34520.00	-0.53	0.78	1.31
34581.00	-0.17	0.75	0.92
34582.00	-0.18	0.83	1.01
34583.00	-0.10	0.95	1.05
34584.00	-0.20	0.88	1.08
34585.00	-0.22	0.87	1.09
34586.00	-0.16	0.82	0.98
34587.00	-0.10	0.86	0.96
34588.00	-0.11	0.83	0.94
34596.00	-0.31	0.61	0.92
34597.00	-0.36	0.62	0.97
34598.00	-0.37	0.58	0.95
34599.00	-0.38	0.62	0.99
34600.00	-0.38	0.61	0.99
34601.00	-0.44	0.61	1.06
34602.00	-0.46	0.62	1.08
34603.00	-0.44	0.63	1.07
34604.00	-0.53	0.63	1.16
34605.00	-0.47	0.64	1.11
34606.00	-0.57	0.63	1.19
34607.00	-0.49	0.59	1.08
34608.00	-0.46	0.64	1.10
34609.00	-0.49	0.65	1.14
34610.00	-0.47	0.58	1.05
34611.00	-0.37	0.64	1.01
34612.00	-0.41	0.63	1.04
34613.00	-0.46	0.64	1.10
34614.00	-0.39	0.63	1.02
34615.00	-0.29	0.63	0.91
34617.00	-0.28	0.62	0.90
34687.00	-0.25	0.66	0.91
34688.00	-0.45	0.69	1.14

CONT'D
BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
34705.00	-0.28	0.64	0.92
34804.00	-0.55	0.39	0.94
34806.00	-0.57	0.33	0.90
34812.00	-0.58	0.34	0.93
34813.00	-0.66	0.33	0.99
34814.00	-0.57	0.36	0.94
34815.00	-0.60	0.35	0.95
34816.00	-0.63	0.36	0.98
34817.00	-0.48	0.46	0.94
34818.00	-0.69	0.35	1.04
34819.00	-0.58	0.37	0.95
35269.00	-0.37	0.56	0.93
35272.00	-0.35	0.66	1.01
35273.00	-0.43	0.56	0.99
35277.00	-0.37	0.56	0.94
35278.00	-0.34	0.57	0.91
35281.00	-0.34	0.57	0.91
35282.00	-0.35	0.57	0.92
35365.00	-0.49	0.45	0.94
35366.00	-0.63	0.38	1.02
35367.00	-0.58	0.38	0.97
35370.00	-0.51	0.39	0.90
35892.00	-0.77	0.26	1.02
35893.00	-0.84	0.25	1.09
35894.00	-0.86	0.26	1.12
35895.00	-0.80	0.24	1.05
35896.00	-0.92	0.22	1.14
35897.00	-0.97	0.25	1.22
35898.00	-0.87	0.26	1.13
35899.00	-0.72	0.26	0.98
35900.00	-0.85	0.25	1.10
35901.00	-0.78	0.22	1.00
35902.00	-0.66	0.25	0.91
36152.00	-0.15	0.83	0.97
36153.00	-0.12	0.81	0.93
36216.00	-0.42	0.51	0.93
36217.00	-0.44	0.50	0.94
36220.00	-0.44	0.51	0.96
36221.00	-0.46	0.49	0.96
36232.00	-0.46	0.50	0.96
36233.00	-0.49	0.50	0.99
36234.00	-0.40	0.52	0.92
36236.00	-0.40	0.58	0.98
36241.00	-0.38	0.56	0.94
36245.00	-0.44	0.50	0.94

CONT'D
BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
36248.00	-0.48	0.49	0.97
36249.00	-0.56	0.50	1.06
36577.00	-0.60	0.35	0.95
36634.00	-0.62	0.29	0.91
37108.00	-0.15	0.76	0.91
37112.00	-0.29	0.68	0.97
37177.00	-0.38	0.53	0.91
37178.00	-0.45	0.55	1.00
37179.00	-0.42	0.54	0.96
37180.00	-0.40	0.55	0.95
37181.00	-0.53	0.54	1.07
37182.00	-0.56	0.54	1.10
37183.00	-0.50	0.55	1.05
37185.00	-0.44	0.54	0.98
37225.00	-0.53	0.52	1.05
37226.00	-0.36	0.56	0.93
37227.00	-0.33	0.57	0.90
37311.00	-0.48	0.42	0.90
37312.00	-0.58	0.39	0.97
37313.00	-0.52	0.43	0.94
37316.00	-0.59	0.41	1.01
37697.00	-0.60	0.47	1.07
37701.00	-0.38	0.53	0.91
38507.00	-0.19	0.73	0.92
38508.00	-0.20	0.74	0.94
38576.00	-0.24	0.72	0.96
38602.00	-0.19	0.79	0.97
38605.00	-0.29	0.67	0.97
38606.00	-0.38	0.74	1.12
38607.00	-0.31	0.60	0.91
38609.00	-0.28	0.68	0.96
38610.00	-0.38	0.58	0.97
38737.00	-0.50	0.58	1.08
38738.00	-0.32	0.63	0.96
38739.00	-0.33	0.59	0.92
38740.00	-0.42	0.58	1.00
38741.00	-0.42	0.58	0.99
38742.00	-0.35	0.58	0.93
38744.00	-0.37	0.67	1.04
38745.00	-0.36	0.55	0.91
38812.00	-0.60	0.34	0.93
38941.00	-0.74	0.19	0.93
38944.00	-0.72	0.20	0.92
38945.00	-0.81	0.18	1.00
38946.00	-0.72	0.19	0.91
39050.00	-0.68	0.24	0.92
39051.00	-0.79	0.23	1.02
39052.00	-0.72	0.23	0.95
39053.00	-0.83	0.24	1.06
39137.00	-0.68	0.23	0.91

CONT'D
BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
39372.00	-0.55	0.41	0.96
39373.00	-0.61	0.33	0.94
39376.00	-0.71	0.36	1.06
39377.00	-0.75	0.30	1.05
39378.00	-0.67	0.31	0.97
39381.00	-0.64	0.32	0.95
39544.00	-0.40	0.63	1.03
39545.00	-0.27	0.65	0.93
39546.00	-0.41	0.63	1.03
39547.00	-0.35	0.62	0.97
39548.00	-0.28	0.63	0.91
39682.00	-0.53	0.40	0.93
39683.00	-0.61	0.42	1.03
39684.00	-0.56	0.41	0.97
39685.00	-0.57	0.41	0.99
39686.00	-0.68	0.42	1.10
39687.00	-0.60	0.40	1.00
39688.00	-0.48	0.44	0.92
39690.00	-0.57	0.38	0.96
39691.00	-0.49	0.42	0.90
39933.00	-0.59	0.34	0.93
39936.00	-0.55	0.36	0.92
39937.00	-0.64	0.36	0.99
40163.00	-0.48	0.47	0.95
40165.00	-0.20	0.71	0.91
40188.00	-0.27	0.65	0.92
40192.00	-0.26	0.66	0.92
40242.00	-0.57	0.40	0.97
40243.00	-0.53	0.40	0.93
40246.00	-0.61	0.35	0.96
40247.00	-0.60	0.42	1.02
40250.00	-0.61	0.40	1.01
40251.00	-0.53	0.56	1.09
40275.00	-0.49	0.42	0.90
40279.00	-0.54	0.42	0.96
40280.00	-0.55	0.50	1.05
40338.00	-0.38	0.57	0.95
40339.00	-0.36	0.57	0.93
40340.00	-0.32	0.62	0.94
40342.00	-0.52	0.56	1.07
40343.00	-0.46	0.59	1.05
40344.00	-0.44	0.53	0.97
40345.00	-0.42	0.47	0.89
40346.00	-0.37	0.55	0.92
40347.00	-0.53	0.56	1.09
40348.00	-0.41	0.64	1.05
40350.00	-0.48	0.55	1.03
40351.00	-0.43	0.53	0.96
40352.00	-0.42	0.51	0.92

CONT'D
BE9-AE7 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
40355.00	-0.35	0.56	0.91
40490.00	-0.66	0.28	0.94
40495.00	-0.61	0.30	0.91
41010.00	-0.37	0.62	0.99
41015.00	-0.29	0.62	0.90
41019.00	-0.40	0.63	1.03
41020.00	-0.28	0.66	0.94
41156.00	-0.51	0.46	0.97
41158.00	-0.43	0.56	0.99
41159.00	-0.60	0.46	1.06
41160.00	-0.65	0.45	1.11
41161.00	-0.63	0.45	1.08
41162.00	-0.57	0.42	0.99
41163.00	-0.68	0.47	1.14
41164.00	-0.70	0.45	1.15
41165.00	-0.68	0.50	1.18
41166.00	-0.46	0.46	0.91
41167.00	-0.57	0.45	1.01
41168.00	-0.58	0.46	1.04
41169.00	-0.47	0.46	0.93
41506.00	-0.57	0.37	0.94
41794.00	-0.52	0.40	0.92
42143.00	-0.68	0.28	0.95
42387.00	-0.78	0.18	0.96
42389.00	-0.80	0.18	0.97
42390.00	-0.93	0.17	1.11
42391.00	-0.97	0.27	1.25
42392.00	-0.91	0.17	1.09
42393.00	-0.90	0.19	1.09
42394.00	-0.90	0.16	1.06
42395.00	-0.89	0.17	1.06
42911.00	-0.52	0.41	0.94
42914.00	-0.58	0.39	0.97
42915.00	-0.65	0.40	1.06
42916.00	-0.58	0.40	0.98
42917.00	-0.61	0.43	1.04
42918.00	-0.74	0.40	1.14
42919.00	-0.78	0.41	1.19
42920.00	-0.66	0.41	1.07
42921.00	-0.61	0.40	1.01
42922.00	-0.70	0.42	1.12
42923.00	-0.70	0.33	1.02
42924.00	-0.61	0.40	1.02
42927.00	-0.56	0.42	0.97
42939.00	-0.56	0.41	0.97
43480.00	-0.58	0.42	1.00
43481.00	-0.67	0.29	0.96
43482.00	-0.63	0.46	1.09
43483.00	-0.69	0.41	1.10
43484.00	-0.71	0.45	1.16
43485.00	-0.70	0.41	1.12
43486.00	-0.68	0.45	1.13
43487.00	-0.66	0.36	1.02
43488.00	-0.66	0.40	1.06
43489.00	-0.56	0.39	0.94

AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
43582.00	-0.50	0.47	0.98
43583.00	-0.50	0.47	0.97
43584.00	-0.45	0.48	0.93
43586.00	-0.46	0.47	0.94
43587.00	-0.46	0.46	0.92
45308.00	-0.09	0.91	1.00
45309.00	-0.03	0.93	0.96
45310.00	0.00	0.92	0.93
45312.00	-0.15	0.93	1.08
45313.00	-0.10	0.92	1.03
45315.00	-0.08	0.84	0.92
45316.00	-0.15	0.80	0.95
45376.00	-0.59	0.41	1.00
45583.00	-0.51	0.39	0.90
45808.00	-0.55	0.40	0.95
46112.00	-0.60	0.35	0.94
46113.00	-0.50	0.45	0.95
46114.00	-0.56	0.34	0.90
46115.00	-0.61	0.36	0.97
46116.00	-0.63	0.35	0.97
46118.00	-0.55	0.36	0.92
46119.00	-0.61	0.35	0.96
46120.00	-0.59	0.36	0.95
46538.00	-0.48	0.47	0.96
46539.00	-0.56	0.45	1.01
46540.00	-0.48	0.49	0.97
46541.00	-0.46	0.47	0.93
46542.00	-0.58	0.48	1.05
46543.00	-0.68	0.47	1.15
46544.00	-0.58	0.41	0.99
46545.00	-0.53	0.45	0.98
46546.00	-0.54	0.46	1.00
46547.00	-0.67	0.46	1.13
46548.00	-0.56	0.46	1.02
46555.00	-0.43	0.47	0.90
46944.00	-0.73	0.33	1.05
47193.00	-0.50	0.46	0.96
47194.00	-0.43	0.51	0.94
47197.00	-0.50	0.40	0.90
47579.00	-0.77	0.19	0.96
47580.00	-0.73	0.19	0.92
47582.00	-0.74	0.18	0.93
47583.00	-0.79	0.16	0.95
47584.00	-0.78	0.20	0.98
47585.00	-0.88	0.21	1.09
47587.00	-0.81	0.20	1.01
47588.00	-0.79	0.22	1.01
47590.00	-0.69	0.21	0.90
47946.00	-0.71	0.21	0.92
47950.00	-0.70	0.22	0.92
47958.00	-0.64	0.29	0.93
47979.00	-0.78	0.21	0.99

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
48628.00	-0.52	0.41	0.93
49495.00	-0.64	0.33	0.97
49790.00	-0.69	0.24	0.93
50198.00	-0.62	0.30	0.92
50411.00	-0.46	0.52	0.98
50415.00	-0.59	0.45	1.04
50416.00	-0.53	0.48	1.01
50418.00	-0.49	0.47	0.96
50419.00	-0.56	0.56	1.12
50420.00	-0.55	0.54	1.09
50421.00	-0.41	0.65	1.06
50422.00	-0.49	0.69	1.18
50423.00	-0.57	0.76	1.33
50424.00	-0.57	0.75	1.32
50425.00	-0.42	0.77	1.19
50426.00	-0.41	0.75	1.16
50427.00	-0.50	0.76	1.26
50428.00	-0.47	0.76	1.23
50429.00	-0.38	0.76	1.13
50430.00	-0.36	0.69	1.04
50431.00	-0.42	0.73	1.15
50432.00	-0.43	0.77	1.20
50433.00	-0.32	0.75	1.07
50434.00	-0.26	0.75	1.01
50435.00	-0.35	0.75	1.10
50436.00	-0.37	0.83	1.20
50437.00	-0.27	0.74	1.01
50439.00	-0.36	0.74	1.09
50440.00	-0.44	0.73	1.17
50441.00	-0.26	0.74	0.99
50442.00	-0.21	0.72	0.93
50443.00	-0.25	0.72	0.97
50444.00	-0.26	0.66	0.92
50459.00	-0.51	0.40	0.90
50570.00	-0.39	0.61	1.00
50571.00	-0.44	0.58	1.02
50572.00	-0.37	0.57	0.95
50573.00	-0.40	0.56	0.97
50574.00	-0.45	0.57	1.02
50575.00	-0.47	0.57	1.04
50576.00	-0.41	0.57	0.98
50599.00	-0.39	0.56	0.94
50600.00	-0.36	0.56	0.92
50604.00	-0.33	0.57	0.90
50632.00	-0.52	0.38	0.91
51355.00	-0.66	0.41	1.07
51356.00	-0.57	0.46	1.02

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
51357.00	-0.60	0.45	1.05
51358.00	-0.76	0.44	1.20
51359.00	-0.77	0.48	1.25
51360.00	-0.50	0.47	0.97
51361.00	-0.56	0.39	0.95
51362.00	-0.66	0.48	1.15
51363.00	-0.59	0.46	1.05
51364.00	-0.51	0.47	0.98
51366.00	-0.51	0.46	0.97
51367.00	-0.57	0.45	1.02
51368.00	-0.45	0.47	0.92
51370.00	-0.49	0.45	0.94
51371.00	-0.49	0.50	0.99
51372.00	-0.38	0.54	0.91
51373.00	-0.31	0.62	0.93
51374.00	-0.33	0.60	0.94
51375.00	-0.36	0.58	0.95
51387.00	-0.46	0.45	0.90
51561.00	-0.43	0.49	0.92
51562.00	-0.46	0.55	1.01
51563.00	-0.52	0.45	0.96
51565.00	-0.57	0.45	1.01
51566.00	-0.48	0.44	0.92
51567.00	-0.47	0.43	0.91
51684.00	-0.44	0.56	1.00
51685.00	-0.50	0.56	1.06
51686.00	-0.42	0.52	0.94
51687.00	-0.49	0.59	1.08
51688.00	-0.64	0.55	1.19
51689.00	-0.64	0.56	1.20
51690.00	-0.62	0.56	1.19
51691.00	-0.48	0.57	1.06
51692.00	-0.52	0.57	1.09
51848.00	-0.25	0.69	0.94
51851.00	-0.39	0.54	0.93
51852.00	-0.43	0.66	1.09
51853.00	-0.35	0.67	1.02
51854.00	-0.29	0.74	1.03
51855.00	-0.57	0.66	1.23
51856.00	-0.52	0.66	1.18
51857.00	-0.23	0.70	0.93
51975.00	-0.56	0.38	0.94
51976.00	-0.53	0.38	0.91
51977.00	-0.52	0.44	0.95
51980.00	-0.52	0.42	0.94
51981.00	-0.51	0.44	0.95
51984.00	-0.42	0.59	1.00

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
51985.00	-0.44	0.65	1.09
51986.00	-0.45	0.68	1.13
51987.00	-0.44	0.67	1.11
51988.00	-0.48	0.67	1.15
51989.00	-0.40	0.67	1.08
51990.00	-0.42	0.66	1.08
51991.00	-0.50	0.69	1.19
51992.00	-0.46	0.69	1.15
51993.00	-0.40	0.69	1.09
51994.00	-0.34	0.65	0.99
51995.00	-0.47	0.65	1.13
51996.00	-0.48	0.65	1.12
51997.00	-0.42	0.63	1.05
51998.00	-0.46	0.64	1.10
51999.00	-0.49	0.64	1.13
52000.00	-0.51	0.60	1.11
52001.00	-0.42	0.54	0.96
52002.00	-0.41	0.50	0.91
52129.00	-0.39	0.54	0.93
52149.00	-0.37	0.54	0.91
52150.00	-0.47	0.57	1.04
52151.00	-0.49	0.53	1.02
52152.00	-0.51	0.55	1.06
52153.00	-0.55	0.59	1.14
52154.00	-0.57	0.59	1.16
52155.00	-0.65	0.65	1.30
52156.00	-0.76	0.58	1.34
52157.00	-0.60	0.59	1.20
52158.00	-0.56	0.58	1.14
52159.00	-0.41	0.60	1.01
52160.00	-0.39	0.60	0.99
52249.00	-0.27	0.65	0.92
52278.00	-0.08	0.87	0.95
52279.00	-0.01	1.02	1.02
52280.00	0.04	1.14	1.10
52281.00	0.00	1.13	1.13
52282.00	-0.05	1.11	1.15
52283.00	-0.06	0.96	1.02
52375.00	-0.59	0.40	0.99
52376.00	-0.68	0.40	1.07
52377.00	-0.62	0.41	1.04
52378.00	-0.63	0.39	1.03
52379.00	-0.71	0.39	1.10
52380.00	-0.73	0.40	1.13
52382.00	-0.58	0.38	0.96
52383.00	-0.72	0.40	1.13
52384.00	-0.75	0.40	1.15

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
52386.00	-0.53	0.41	0.93
52387.00	-0.55	0.40	0.94
52388.00	-0.55	0.39	0.94
52543.00	-0.66	0.24	0.90
52544.00	-0.71	0.23	0.94
52572.00	-0.74	0.25	0.98
52573.00	-0.74	0.24	0.98
52575.00	-0.68	0.24	0.93
52576.00	-0.77	0.27	1.04
52577.00	-0.75	0.23	0.98
52579.00	-0.68	0.24	0.92
52580.00	-0.71	0.25	0.96
52581.00	-0.71	0.24	0.95
52629.00	-0.38	0.59	0.96
52630.00	-0.43	0.59	1.03
52631.00	-0.39	0.58	0.96
52634.00	-0.45	0.60	1.04
52635.00	-0.35	0.59	0.95
52658.00	-0.39	0.55	0.94
52659.00	-0.38	0.54	0.92
52662.00	-0.37	0.56	0.93
52663.00	-0.41	0.55	0.96
52664.00	-0.43	0.56	0.98
52665.00	-0.36	0.55	0.90
52666.00	-0.37	0.55	0.92
52807.00	-0.55	0.37	0.92
52808.00	-0.62	0.38	1.00
52809.00	-0.60	0.39	0.99
52810.00	-0.53	0.40	0.93
52951.00	-0.28	0.67	0.96
52955.00	-0.38	0.55	0.93
52956.00	-0.43	0.59	1.01
52957.00	-0.45	0.56	1.01
52958.00	-0.52	0.56	1.08
52959.00	-0.64	0.57	1.21
52960.00	-0.71	0.56	1.27
52961.00	-0.69	0.55	1.24
52962.00	-0.78	0.55	1.33
52963.00	-0.87	0.53	1.40
52964.00	-0.90	0.52	1.42
52965.00	-0.97	0.50	1.47
52966.00	-0.76	0.49	1.25
52967.00	-0.70	0.48	1.18
52968.00	-0.64	0.49	1.13
52969.00	-0.48	0.49	0.97
53028.00	-0.45	0.51	0.95
53029.00	-0.47	0.50	0.96

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
53033.00	-0.41	0.50	0.91
53098.00	-0.64	0.30	0.95
53099.00	-0.63	0.31	0.94
53106.00	-0.22	0.69	0.91
53107.00	-0.27	0.68	0.95
53108.00	-0.29	0.66	0.95
53179.00	-0.63	0.46	1.09
53180.00	-0.71	0.43	1.14
53181.00	-0.67	0.45	1.11
53182.00	-0.68	0.44	1.12
53183.00	-0.82	0.47	1.29
53184.00	-0.80	0.46	1.26
53185.00	-0.65	0.46	1.11
53186.00	-0.61	0.48	1.08
53187.00	-0.82	0.46	1.28
53188.00	-0.72	0.47	1.19
53189.00	-0.55	0.47	1.01
53190.00	-0.48	0.54	1.01
53192.00	-0.47	0.46	0.93
53433.00	-0.60	0.32	0.92
53571.00	-0.72	0.23	0.95
53572.00	-0.68	0.23	0.91
53575.00	-0.58	0.34	0.92
53577.00	-0.70	0.26	0.96
53579.00	-0.66	0.24	0.90
53580.00	-0.76	0.24	1.00
53581.00	-0.79	0.24	1.03
53582.00	-0.67	0.27	0.93
53584.00	-0.70	0.24	0.94
53585.00	-0.79	0.23	1.03
53588.00	-0.63	0.33	0.96
53593.00	-0.67	0.24	0.91
53596.00	-0.66	0.27	0.93
53597.00	-0.67	0.24	0.91
53830.00	-0.66	0.56	1.23
53831.00	-0.80	0.56	1.35
53832.00	-0.82	0.56	1.38
53833.00	-0.81	0.53	1.34
53834.00	-0.95	0.56	1.51
53835.00	-1.05	0.51	1.56
53836.00	-1.00	0.54	1.55
53837.00	-0.97	0.49	1.46
53838.00	-0.93	0.48	1.41
53839.00	-0.95	0.47	1.42
53840.00	-0.88	0.46	1.34
53841.00	-0.59	0.45	1.03
53842.00	-0.63	0.45	1.07

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
53843.00	-0.57	0.41	0.98
53844.00	-0.48	0.43	0.91
54019.00	-0.04	0.90	0.95
54020.00	-0.07	1.11	1.18
54021.00	0.00	1.14	1.14
54022.00	0.01	1.02	1.00
54023.00	-0.15	1.14	1.29
54024.00	-0.14	1.15	1.29
54025.00	-0.16	1.14	1.30
54026.00	-0.18	1.14	1.31
54027.00	-0.26	1.21	1.47
54028.00	-0.33	1.14	1.47
54029.00	-0.32	1.12	1.43
54030.00	-0.28	1.08	1.36
54031.00	-0.26	1.11	1.37
54032.00	-0.22	1.08	1.30
54033.00	-0.18	1.01	1.19
54034.00	-0.27	0.93	1.20
54035.00	-0.20	0.93	1.13
54036.00	-0.10	0.92	1.03
54037.00	-0.11	0.85	0.97
54067.00	-0.52	0.47	0.99
54068.00	-0.66	0.50	1.16
54069.00	-0.59	0.47	1.06
54070.00	-0.55	0.43	0.98
54071.00	-0.49	0.48	0.97
54072.00	-0.54	0.51	1.05
54075.00	-0.45	0.47	0.92
54076.00	-0.43	0.47	0.90
54139.00	-0.51	0.47	0.98
54140.00	-0.48	0.42	0.90
54142.00	-0.44	0.47	0.90
54291.00	-0.64	0.28	0.92
54292.00	-0.70	0.31	1.00
54293.00	-0.64	0.29	0.93
54295.00	-0.78	0.26	1.03
54296.00	-0.83	0.29	1.12
54297.00	-0.72	0.31	1.02
54299.00	-0.64	0.28	0.92
54300.00	-0.68	0.29	0.97
54304.00	-0.76	0.24	1.01
54647.00	-0.52	0.42	0.93
54648.00	-0.53	0.40	0.93
54679.00	-0.30	0.60	0.91
54680.00	-0.45	0.45	0.91
54683.00	-0.53	0.40	0.93
54684.00	-0.55	0.40	0.95

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
54685.00	-0.57	0.39	0.96
54686.00	-0.60	0.39	0.99
54687.00	-0.69	0.40	1.09
54688.00	-0.68	0.40	1.08
54690.00	-0.58	0.37	0.95
54691.00	-0.57	0.39	0.96
54695.00	-0.48	0.47	0.95
54740.00	-0.75	0.15	0.91
54741.00	-0.77	0.16	0.93
54744.00	-0.77	0.19	0.96
54745.00	-0.76	0.16	0.92
54749.00	-0.71	0.24	0.96
54815.00	-0.41	0.49	0.90
54864.00	-0.54	0.41	0.95
54869.00	-0.49	0.41	0.90
54871.00	-0.51	0.41	0.93
54874.00	-0.50	0.42	0.92
54875.00	-0.56	0.42	0.98
54876.00	-0.60	0.42	1.02
54877.00	-0.58	0.41	0.99
54878.00	-0.69	0.44	1.13
54879.00	-0.65	0.40	1.05
54880.00	-0.68	0.41	1.09
54881.00	-0.58	0.40	0.99
54882.00	-0.70	0.39	1.09
54883.00	-0.61	0.42	1.03
54884.00	-0.61	0.35	0.95
54885.00	-0.55	0.40	0.95
54886.00	-0.57	0.39	0.96
54887.00	-0.64	0.39	1.03
54888.00	-0.69	0.39	1.08
54889.00	-0.58	0.39	0.97
54892.00	-0.56	0.40	0.96
54895.00	-0.54	0.39	0.93
54896.00	-0.52	0.40	0.92
54899.00	-0.42	0.51	0.93
55142.00	-0.56	0.35	0.93
55147.00	-0.60	0.40	1.00
55148.00	-0.61	0.39	1.00
55149.00	-0.65	0.40	1.04
55150.00	-0.72	0.40	1.12
55151.00	-0.72	0.35	1.07
55152.00	-0.62	0.40	1.03
55155.00	-0.54	0.40	0.94
55176.00	-0.53	0.42	0.95
55177.00	-0.50	0.42	0.92
55179.00	-0.68	0.35	1.03

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
55180.00	-0.81	0.22	1.03
55570.00	-0.52	0.51	1.03
55572.00	-0.48	0.43	0.91
55573.00	-0.53	0.47	1.00
55574.00	-0.51	0.46	0.96
56125.00	-0.69	0.22	0.91
56127.00	-0.71	0.22	0.93
56128.00	-0.74	0.22	0.96
56129.00	-0.73	0.25	0.98
56131.00	-0.67	0.30	0.97
56132.00	-0.68	0.29	0.96
56133.00	-0.60	0.37	0.97
56243.00	-0.56	0.37	0.94
56260.00	-0.56	0.35	0.90
56276.00	-0.78	0.35	1.12
56277.00	-0.80	0.37	1.17
56278.00	-0.81	0.36	1.18
56279.00	-0.61	0.36	0.96
56280.00	-0.73	0.36	1.08
56281.00	-0.88	0.37	1.24
56282.00	-0.73	0.37	1.09
56283.00	-0.64	0.36	1.00
56284.00	-0.63	0.46	1.09
56285.00	-0.67	0.35	1.02
56342.00	-0.43	0.52	0.95
56344.00	-0.50	0.44	0.94
56347.00	-0.50	0.42	0.92
56348.00	-0.60	0.41	1.01
56349.00	-0.54	0.41	0.96
56350.00	-0.60	0.38	0.98
56351.00	-0.79	0.32	1.11
56352.00	-0.68	0.25	0.93
56354.00	-0.55	0.35	0.90
56356.00	-0.56	0.35	0.90
56359.00	-0.64	0.34	0.99
56360.00	-0.78	0.35	1.12
56361.00	-0.77	0.33	1.10
56362.00	-0.79	0.33	1.12
56363.00	-0.88	0.34	1.22
56364.00	-1.02	0.29	1.32
56365.00	-0.73	0.25	0.98
56368.00	-0.69	0.24	0.92
56619.00	-0.64	0.29	0.94
56620.00	-0.65	0.29	0.94
56621.00	-0.64	0.29	0.93
56622.00	-0.66	0.28	0.94
56623.00	-0.67	0.32	1.00

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
56624.00	-0.66	0.30	0.97
56712.00	-0.30	0.65	0.95
56713.00	-0.33	0.85	1.19
56714.00	-0.37	0.90	1.27
56715.00	-0.47	0.93	1.39
56716.00	-0.60	0.92	1.52
56717.00	-0.39	0.90	1.28
56718.00	-0.40	0.92	1.32
56719.00	-0.31	0.92	1.23
56720.00	-0.40	0.91	1.32
56721.00	-0.36	0.88	1.23
56722.00	-0.36	0.69	1.06
56724.00	-0.43	0.53	0.96
56798.00	-0.56	0.34	0.90
56799.00	-0.73	0.36	1.09
56800.00	-0.72	0.34	1.06
56801.00	-0.65	0.36	1.01
56802.00	-0.67	0.31	0.98
56803.00	-0.78	0.34	1.12
56804.00	-0.77	0.33	1.10
56805.00	-0.68	0.34	1.02
56806.00	-0.65	0.34	0.99
56807.00	-0.81	0.34	1.15
56808.00	-0.85	0.40	1.25
56809.00	-0.74	0.33	1.07
56810.00	-0.69	0.34	1.03
56811.00	-0.74	0.32	1.06
56812.00	-0.73	0.33	1.06
56813.00	-0.63	0.36	0.99
56815.00	-0.61	0.36	0.97
56816.00	-0.67	0.46	1.13
56817.00	-0.55	0.68	1.23
56818.00	-0.51	0.64	1.15
56819.00	-0.59	0.63	1.21
56820.00	-0.62	0.64	1.26
56821.00	-0.49	0.68	1.17
56822.00	-0.39	0.62	1.01
56823.00	-0.44	0.63	1.07
56824.00	-0.38	0.65	1.04
56825.00	-0.30	0.68	0.98
57083.00	-0.56	0.40	0.96
57084.00	-0.90	0.41	1.31
57085.00	-0.74	0.41	1.15
57086.00	-0.63	0.41	1.04
57087.00	-0.52	0.49	1.01
57088.00	-0.53	0.40	0.93

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
57151.00	-0.49	0.47	0.97
57152.00	-0.44	0.48	0.91
57155.00	-0.43	0.49	0.92
57217.00	-0.64	0.26	0.90
57218.00	-0.65	0.36	1.01
57219.00	-0.72	0.35	1.07
57220.00	-0.64	0.36	1.00
57221.00	-0.64	0.36	1.00
57222.00	-0.72	0.36	1.08
57223.00	-0.71	0.36	1.08
57224.00	-0.58	0.35	0.93
57287.00	-0.32	0.65	0.98
57288.00	-0.42	0.65	1.07
57289.00	-0.35	0.65	1.01
57290.00	-0.28	0.67	0.95
57291.00	-0.34	0.64	0.99
57300.00	-0.38	0.53	0.91
57301.00	-0.37	0.55	0.92
57302.00	-0.35	0.55	0.90
57312.00	-0.29	0.65	0.95
57531.00	-0.55	0.41	0.96
57532.00	-0.57	0.38	0.95
57533.00	-0.59	0.36	0.95
57534.00	-0.61	0.36	0.98
57535.00	-0.62	0.36	0.98
57662.00	-0.68	0.25	0.93
57667.00	-0.61	0.33	0.95
57669.00	-0.59	0.39	0.98
57670.00	-0.60	0.49	1.09
57671.00	-0.52	0.41	0.94
57673.00	-0.51	0.44	0.95
57682.00	-0.49	0.42	0.91
57681.00	-0.48	0.48	0.97
57685.00	-0.51	0.43	0.94
57980.00	-0.33	0.66	0.99
57981.00	-0.35	0.72	1.07
57982.00	-0.28	0.69	0.97
57983.00	-0.34	0.70	1.05
57984.00	-0.45	0.69	1.13
57985.00	-0.43	0.70	1.13
57986.00	-0.36	0.69	1.06
57987.00	-0.41	0.69	1.10
57988.00	-0.50	0.69	1.19
57989.00	-0.42	0.68	1.10
57990.00	-0.28	0.63	0.91
57991.00	-0.27	0.68	0.95
57992.00	-0.31	0.67	0.98

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
57993.00	-0.28	0.66	0.94
58021.00	-0.55	0.40	0.95
58023.00	-0.58	0.39	0.97
58024.00	-0.60	0.39	0.99
58025.00	-0.58	0.35	0.92
58492.00	-0.29	0.82	1.11
58493.00	-0.18	1.05	1.23
58494.00	-0.28	0.98	1.26
58495.00	-0.39	0.95	1.33
58496.00	-0.43	0.91	1.34
58497.00	-0.25	0.87	1.12
58498.00	-0.26	0.83	1.08
58499.00	-0.29	0.64	0.93
58576.00	-0.79	0.13	0.93
58580.00	-0.73	0.21	0.94
58672.00	-0.42	0.49	0.90
58675.00	-0.50	0.49	1.00
58676.00	-0.47	0.58	1.06
58677.00	-0.44	0.56	1.01
58679.00	-0.40	0.57	0.97
58680.00	-0.58	0.57	1.15
58681.00	-0.48	0.58	1.06
58682.00	-0.48	0.58	1.05
58683.00	-0.61	0.56	1.18
58684.00	-0.68	0.63	1.31
58685.00	-0.52	0.45	0.97
58739.00	-0.30	0.60	0.91
58741.00	-0.32	0.64	0.97
58742.00	-0.36	0.67	1.03
58745.00	-0.24	0.70	0.94
58756.00	-0.67	0.24	0.90
58757.00	-0.77	0.27	1.04
58758.00	-0.87	0.26	1.13
58759.00	-0.79	0.26	1.06
58760.00	-0.73	0.28	1.01
58761.00	-0.78	0.26	1.04
58762.00	-0.83	0.27	1.10
58763.00	-0.78	0.26	1.05
58764.00	-0.76	0.26	1.02
58787.00	-0.66	0.32	0.98
58788.00	-0.68	0.28	0.95
58789.00	-0.64	0.29	0.92
58790.00	-0.69	0.30	0.99
58791.00	-0.71	0.28	0.99
58926.00	-0.39	0.68	1.08
58927.00	-0.34	0.75	1.09
58928.00	-0.30	0.67	0.97

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
58930.00	-0.32	0.67	0.98
58931.00	-0.32	0.66	0.98
58934.00	-0.26	0.66	0.92
58935.00	-0.35	0.66	1.01
58937.00	-0.26	0.67	0.93
58938.00	-0.28	0.67	0.95
58939.00	-0.38	0.66	1.04
58940.00	-0.27	0.68	0.95
58943.00	-0.32	0.65	0.97
58944.00	-0.25	0.68	0.93
58947.00	-0.28	0.67	0.95
58948.00	-0.22	0.74	0.96
58960.00	-0.38	0.62	1.00
58964.00	-0.33	0.59	0.92
59378.00	-0.63	0.35	0.98
59379.00	-0.61	0.39	1.00
59380.00	-0.53	0.41	0.94
59381.00	-0.56	0.38	0.94
59382.00	-0.70	0.37	1.07
59383.00	-0.67	0.40	1.07
59386.00	-0.59	0.34	0.93
59387.00	-0.71	0.30	1.01
59389.00	-0.52	0.39	0.91
59390.00	-0.63	0.39	1.02
59391.00	-0.68	0.38	1.06
59392.00	-0.60	0.38	0.97
59393.00	-0.56	0.39	0.95
59394.00	-0.61	0.40	1.00
59395.00	-0.77	0.39	1.16
59396.00	-0.68	0.39	1.07
59397.00	-0.59	0.38	0.96
59398.00	-0.55	0.40	0.95
59399.00	-0.58	0.41	0.99
59400.00	-0.63	0.38	1.01
59404.00	-0.65	0.27	0.92
59408.00	-0.76	0.17	0.93
59593.00	-0.31	0.63	0.93
59594.00	-0.30	0.66	0.96
59596.00	-0.26	0.65	0.91
59597.00	-0.39	0.62	1.01
59598.00	-0.43	0.58	1.01
59599.00	-0.38	0.65	1.03
59600.00	-0.39	0.59	0.97
59601.00	-0.45	0.57	1.02
59602.00	-0.50	0.55	1.05
59606.00	-0.35	0.56	0.91
59693.00	-0.38	0.58	0.97

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
59694.00	-0.24	0.72	0.97
59695.00	-0.27	0.77	1.03
59696.00	-0.39	0.84	1.23
59697.00	-0.42	0.84	1.26
59698.00	-0.36	0.84	1.20
59699.00	-0.29	0.83	1.12
59700.00	-0.34	0.65	0.99
60270.00	-0.71	0.29	1.00
60271.00	-0.74	0.27	1.01
60547.00	-0.48	0.47	0.95
60626.00	-0.62	0.31	0.93
60630.00	-0.60	0.31	0.91
60631.00	-0.61	0.33	0.94
60705.00	-0.52	0.45	0.97
60706.00	-0.48	0.46	0.94
60708.00	-0.47	0.43	0.90
60709.00	-0.64	0.45	1.09
60710.00	-0.62	0.47	1.09
60711.00	-0.60	0.44	1.04
60712.00	-0.61	0.46	1.07
60713.00	-0.73	0.45	1.18
60714.00	-0.62	0.51	1.14
60715.00	-0.59	0.53	1.12
60716.00	-0.59	0.45	1.04
60717.00	-0.59	0.45	1.05
60718.00	-0.52	0.47	0.99
60733.00	-0.39	0.53	0.92
60846.00	-0.23	0.77	1.00
60847.00	-0.27	0.71	0.97
60848.00	-0.19	0.72	0.91
60851.00	-0.10	0.83	0.92
60854.00	-0.20	0.72	0.92
60855.00	-0.28	0.78	1.06
60856.00	-0.28	0.66	0.94
60857.00	-0.26	0.70	0.96
60858.00	-0.26	0.68	0.94
60859.00	-0.40	0.68	1.08
60860.00	-0.41	0.66	1.07
60861.00	-0.38	0.64	1.02
60862.00	-0.48	0.64	1.12
60863.00	-0.46	0.53	0.99
60864.00	-0.47	0.61	1.08
60865.00	-0.42	0.60	1.02
60866.00	-0.41	0.60	1.01
60867.00	-0.41	0.62	1.03
60868.00	-0.41	0.62	1.03
60869.00	-0.37	0.60	0.96

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
60871.00	-0.32	0.60	0.93
60873.00	-0.29	0.61	0.91
60874.00	-0.34	0.62	0.96
60875.00	-0.30	0.60	0.90
60876.00	-0.28	0.64	0.92
60877.00	-0.27	0.63	0.90
60915.00	-0.54	0.37	0.91
60920.00	-0.52	0.40	0.91
60927.00	-0.53	0.38	0.90
60928.00	-0.67	0.49	1.16
60929.00	-0.70	0.44	1.14
60930.00	-0.67	0.44	1.10
60931.00	-0.69	0.45	1.13
60932.00	-0.84	0.43	1.27
60933.00	-0.67	0.37	1.04
60936.00	-0.65	0.29	0.94
60965.00	-0.61	0.30	0.91
60966.00	-0.66	0.25	0.91
60974.00	-0.61	0.33	0.94
60978.00	-0.65	0.26	0.91
61036.00	-0.49	0.46	0.95
61037.00	-0.48	0.45	0.93
61040.00	-0.54	0.45	0.98
61258.00	-0.42	0.48	0.90
61316.00	-0.47	0.43	0.91
61317.00	-0.48	0.44	0.92
61320.00	-0.64	0.44	1.08
61321.00	-0.57	0.44	1.01
61322.00	-0.47	0.44	0.91
61323.00	-0.51	0.45	0.95
61324.00	-0.61	0.39	1.00
61325.00	-0.45	0.51	0.96
61377.00	-0.63	0.32	0.95
61378.00	-0.78	0.34	1.12
61379.00	-0.71	0.56	1.26
61380.00	-0.74	0.66	1.40
61381.00	-0.76	0.75	1.51
61382.00	-0.81	0.77	1.58
61383.00	-0.66	0.99	1.65
61384.00	-0.67	0.98	1.65
61385.00	-0.58	1.02	1.79
61386.00	-0.58	1.03	1.61
61387.00	-0.56	1.02	1.58
61388.00	-0.55	1.02	1.57
61389.00	-0.56	1.03	1.60
61390.00	-0.49	0.88	1.37
61391.00	-0.39	0.58	0.98

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
61392.00	-0.44	0.49	0.93
61498.00	-0.75	0.20	0.95
61499.00	-0.75	0.16	0.91
61500.00	-0.77	0.16	0.94
61501.00	-0.85	0.16	1.01
61502.00	-0.93	0.16	1.09
61503.00	-0.75	0.16	0.91
61504.00	-0.77	0.16	0.93
61505.00	-0.81	0.17	0.98
61506.00	-0.84	0.17	1.01
61507.00	-0.78	0.16	0.94
61699.00	-0.93	0.04	0.97
61701.00	-0.87	0.05	0.91
61703.00	-0.93	0.04	0.98
61704.00	-0.88	0.03	0.92
61705.00	-0.87	0.04	0.90
61706.00	-0.88	0.04	0.92
61707.00	-0.94	0.04	0.98
61708.00	-0.94	0.04	0.99
61709.00	-0.92	0.05	0.96
61711.00	-0.88	0.05	0.93
62046.00	-0.21	0.78	0.99
62050.00	-0.21	0.80	1.01
62051.00	-0.13	0.80	0.93
62058.00	-0.29	0.69	0.98
62059.00	-0.44	0.68	1.12
62062.00	-0.36	0.68	1.04
62063.00	-0.39	0.67	1.07
62180.00	-0.63	0.32	0.95
62181.00	-0.64	0.32	0.96
62347.00	-0.64	0.29	0.92
62348.00	-0.69	0.32	1.00
62351.00	-0.63	0.29	0.92
62352.00	-0.67	0.28	0.95
62471.00	-0.78	0.27	1.05
62472.00	-0.82	0.29	1.11
62473.00	-0.90	0.38	1.27
62474.00	-0.78	0.38	1.16
62475.00	-0.79	0.43	1.22
62476.00	-0.93	0.31	1.24
62477.00	-0.87	0.38	1.25
62478.00	-0.77	0.37	1.14
62479.00	-0.70	0.40	1.09
62480.00	-0.71	0.38	1.09
62481.00	-0.64	0.40	1.04
62606.00	-0.55	0.38	0.94
62607.00	-0.58	0.39	0.97

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
62611.00	-0.58	0.42	0.99
62615.00	-0.57	0.41	0.98
62616.00	-0.52	0.41	0.92
62619.00	-0.59	0.37	0.96
62677.00	-0.68	0.35	1.02
62706.00	-0.57	0.36	0.93
62707.00	-0.64	0.35	0.99
62708.00	-0.65	0.32	0.97
62709.00	-0.79	0.35	1.14
62710.00	-0.82	0.34	1.15
62711.00	-0.71	0.34	1.05
62840.00	-0.66	0.40	1.06
62841.00	-0.55	0.37	0.91
62842.00	-0.58	0.37	0.95
62843.00	-0.55	0.37	0.92
62844.00	-0.52	0.42	0.95
62846.00	-0.57	0.38	0.95
62868.00	-0.54	0.39	0.93
62869.00	-0.57	0.40	0.97
62870.00	-0.57	0.39	0.96
62871.00	-0.72	0.38	1.10
62872.00	-0.77	0.37	1.14
62873.00	-0.64	0.34	0.97
62874.00	-0.60	0.31	0.91
63028.00	-0.72	0.19	0.91
63030.00	-0.69	0.21	0.90
63031.00	-0.85	0.21	1.07
63032.00	-0.95	0.17	1.12
63033.00	-0.99	0.18	1.17
63034.00	-0.86	0.22	1.07
63035.00	-0.83	0.21	1.04
63036.00	-0.83	0.22	1.04
63037.00	-0.66	0.26	0.92
63065.00	-0.75	0.19	0.94
63066.00	-0.75	0.16	0.91
63130.00	-0.73	0.19	0.92
63131.00	-0.73	0.18	0.91
63326.00	-0.59	0.35	0.94
63327.00	-0.60	0.35	0.95
63328.00	-0.57	0.34	0.91
63329.00	-0.69	0.34	1.03
63330.00	-0.83	0.29	1.12
63516.00	-0.57	0.39	0.96
63518.00	-0.53	0.38	0.91
63519.00	-0.66	0.31	0.97
63520.00	-0.66	0.30	0.96
63767.00	-0.87	0.08	0.96

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
63768.00	-0.85	0.12	0.97
63769.00	-0.78	0.12	0.90
63770.00	-0.85	0.08	0.93
63771.00	-0.98	0.13	1.10
64429.00	-0.50	0.43	0.93
64430.00	-0.64	0.45	1.08
64431.00	-0.62	0.43	1.05
64432.00	-0.60	0.40	1.00
64433.00	-0.59	0.42	1.02
64434.00	-0.58	0.38	0.96
64477.00	-0.56	0.42	0.98
64478.00	-0.71	0.42	1.12
64479.00	-0.71	0.43	1.14
64480.00	-0.67	0.42	1.09
64481.00	-0.76	0.43	1.19
64482.00	-0.88	0.40	1.28
64483.00	-0.87	0.42	1.29
64484.00	-0.80	0.42	1.22
64485.00	-0.76	0.39	1.15
64486.00	-0.86	0.38	1.23
64487.00	-0.83	0.38	1.20
64488.00	-0.65	0.44	1.09
64489.00	-0.64	0.37	1.00
64490.00	-0.71	0.34	1.05
64491.00	-0.60	0.33	0.93
64610.00	-0.61	0.33	0.94
64611.00	-0.63	0.31	0.94
64612.00	-0.61	0.31	0.93
64615.00	-0.68	0.32	1.00
64742.00	-0.55	0.38	0.93
65073.00	-0.56	0.36	0.92
65075.00	-0.55	0.37	0.92
65076.00	-0.76	0.36	1.13
65077.00	-0.78	0.37	1.15
65080.00	-0.59	0.34	0.93
65081.00	-0.58	0.36	0.93
65215.00	-0.54	0.38	0.92
65218.00	-0.64	0.33	0.97
65352.00	-0.84	0.12	0.96
65353.00	-0.90	0.13	1.04
65355.00	-0.79	0.14	0.93
65356.00	-0.93	0.11	1.05
65357.00	-0.83	0.14	0.97
65511.00	-0.71	0.28	0.98
65512.00	-0.70	0.26	0.96
65513.00	-0.59	0.37	0.96
65696.00	-0.64	0.26	0.90
65700.00	-0.62	0.29	0.91

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
65791.00	-0.85	0.11	0.96
65792.00	-0.97	0.09	1.06
65793.00	-0.99	0.09	1.08
65794.00	-0.98	0.09	1.06
65795.00	-1.06	0.11	1.17
65796.00	-1.03	0.05	1.08
65797.00	-0.94	0.10	1.04
65798.00	-0.80	0.10	0.90
65799.00	-0.90	0.11	1.01
65800.00	-0.89	0.11	1.00
65801.00	-0.78	0.12	0.90
65985.00	-0.79	0.17	0.96
65986.00	-0.74	0.22	0.96
65987.00	-0.74	0.22	0.96
65988.00	-0.82	0.22	1.05
65989.00	-0.90	0.23	1.13
65990.00	-0.76	0.21	0.97
65993.00	-0.79	0.20	0.99
66090.00	-0.66	0.36	1.02
66091.00	-0.72	0.25	0.97
66092.00	-0.76	0.37	1.13
66093.00	-0.84	0.35	1.19
66094.00	-0.82	0.38	1.20
66095.00	-0.84	0.34	1.18
66096.00	-0.82	0.36	1.19
66124.00	-0.77	0.17	0.94
66125.00	-0.74	0.17	0.92
66127.00	-0.84	0.25	1.09
66128.00	-0.91	0.17	1.08
66129.00	-0.89	0.17	1.06
66130.00	-0.85	0.15	1.00
66131.00	-0.93	0.12	1.05
66242.00	-0.67	0.37	1.04
66243.00	-0.72	0.33	1.06
66244.00	-0.85	0.32	1.17
66245.00	-0.88	0.33	1.22
66246.00	-0.90	0.33	1.24
66247.00	-0.82	0.35	1.17
66248.00	-0.67	0.32	0.99
66249.00	-0.57	0.35	0.92
66274.00	-0.68	0.37	1.05
66275.00	-0.65	0.33	0.98
66276.00	-0.68	0.33	1.01
66277.00	-0.69	0.35	1.04
66278.00	-0.83	0.35	1.18
66279.00	-0.91	0.30	1.21
66280.00	-0.91	0.32	1.23

CONT'D
AE7-AE9 INSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
66281.00	-0.79	0.22	1.01
66370.00	-0.71	0.25	0.96
66371.00	-0.71	0.29	1.00
66373.00	-0.80	0.27	1.07
66374.00	-0.84	0.28	1.12
66375.00	-0.80	0.29	1.09
66376.00	-0.62	0.29	0.91
66377.00	-0.62	0.29	0.91
66378.00	-0.69	0.39	1.08
66379.00	-0.68	0.28	0.96
66566.00	-0.50	0.65	1.15
66567.00	-0.33	0.66	0.99
66568.00	-0.37	0.66	1.03
66569.00	-0.39	0.57	0.96
66570.00	-0.38	0.69	1.07
66571.00	-0.39	0.67	1.06
66572.00	-0.40	0.67	1.07
66573.00	-0.41	0.63	1.04
66574.00	-0.38	0.66	1.04
66726.00	-0.67	0.26	0.93
66846.00	-0.85	0.13	0.98
66847.00	-0.90	0.12	1.02
66848.00	-1.03	0.13	1.15
66849.00	-0.80	0.13	0.92
66853.00	-0.65	0.32	0.97
66854.00	-0.52	0.41	0.93
66855.00	-0.48	0.56	1.03
66856.00	-0.54	0.55	1.09
66857.00	-0.55	0.77	1.32
66858.00	-0.35	0.76	1.11
66859.00	-0.36	0.76	1.12
66860.00	-0.49	0.74	1.24
66861.00	-0.53	0.72	1.25
66862.00	-0.42	0.74	1.17
66863.00	-0.48	0.73	1.21
66864.00	-0.65	0.72	1.37
66865.00	-0.62	0.74	1.36
66866.00	-0.47	0.67	1.14
66867.00	-0.45	0.59	1.03
66880.00	-0.51	0.45	0.95
66881.00	-0.50	0.43	0.93
67052.00	-0.71	0.19	0.90
67053.00	-0.78	0.19	0.97
67054.00	-0.75	0.20	0.95
67055.00	-0.73	0.17	0.90

DE1-BE9 OUTSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
370.00	1.12	0.26	1.38
371.00	1.41	0.26	1.67
372.00	1.51	0.25	1.75
373.00	1.40	0.26	1.66
374.00	1.39	0.25	1.64
375.00	1.39	0.25	1.64
376.00	1.40	0.26	1.67
377.00	1.38	0.26	1.64
378.00	1.40	0.27	1.67
379.00	1.38	0.27	1.65
380.00	1.38	0.24	1.63
381.00	1.39	0.24	1.64
382.00	1.39	0.24	1.64
383.00	1.40	0.25	1.65
384.00	1.40	0.24	1.16
484.00	1.22	0.02	1.24
485.00	1.39	0.02	1.41
486.00	1.39	0.01	1.40
487.00	1.38	0.02	1.41
488.00	1.39	0.02	1.40
489.00	1.37	0.02	1.39
470.00	1.38	0.02	1.41
471.00	1.38	0.03	1.34
472.00	1.38	0.05	1.34
473.00	1.38	0.05	1.33
474.00	1.39	0.06	1.33
475.00	1.38	0.07	1.32
476.00	1.39	0.08	1.32
477.00	1.38	0.07	1.31
478.00	1.39	0.05	1.34
479.00	1.38	0.06	1.32
480.00	1.39	0.08	1.32
481.00	1.37	0.18	1.19
6506.00	1.38	0.11	1.49
6507.00	1.39	0.13	1.51
6508.00	1.38	0.11	1.49
6509.00	1.41	0.13	1.53
6800.00	1.38	0.11	1.49
6801.00	1.37	0.10	1.47
6802.00	1.38	0.02	1.40
6803.00	1.56	0.06	1.50
6804.00	1.38	0.07	1.32
6805.00	1.39	0.07	1.32
6806.00	1.37	0.06	1.31
6807.00	1.39	0.05	1.33
6808.00	1.38	0.07	1.31
6809.00	1.39	0.09	1.30
6840.00	1.49	0.15	1.34
6841.00	1.37	0.17	1.20
6842.00	1.39	0.16	1.23
6843.00	1.38	0.44	0.94

CONT'D
DE1-BE9 OUTSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
7885.00	-0.88	0.04	0.92
7955.00	-0.74	0.16	0.90
8026.00	-0.63	0.29	0.92
8474.00	-0.53	0.38	0.91
8576.00	-0.52	0.39	0.91
8579.00	-0.52	0.40	0.92
8663.00	-0.45	0.48	0.93
8997.00	-0.77	0.19	0.96
8998.00	-0.78	0.21	0.98
10396.00	-0.77	0.18	0.95
10397.00	-0.75	0.16	0.91
10410.00	-0.65	0.27	0.92
10825.00	-0.28	0.63	0.91
11039.00	-0.45	0.48	0.93
11040.00	-0.49	0.47	0.96
11041.00	-0.43	0.47	0.90
11042.00	-0.44	0.48	0.92
11043.00	-0.49	0.47	0.96
11044.00	-0.65	0.47	1.12
11045.00	-0.51	0.47	0.98
11049.00	-0.42	0.51	0.93
11185.00	-0.65	0.28	0.92
11187.00	-0.67	0.28	0.95
11233.00	-0.55	0.39	0.94
11291.00	-0.36	0.54	0.90
11559.00	-0.61	0.31	0.92
11858.00	-0.51	0.41	0.92
11939.00	-0.49	0.42	0.91
11940.00	-0.51	0.41	0.92
12086.00	-0.52	0.51	1.03
12087.00	-0.44	0.49	0.92
12088.00	-0.48	0.56	1.04
12089.00	-0.39	0.56	0.95
12090.00	-0.38	0.58	0.95
12091.00	-0.33	0.58	0.91
12725.00	-0.50	0.41	0.91
12727.00	-0.55	0.36	0.91
12728.00	-0.54	0.37	0.90
12729.00	-0.54	0.37	0.91
13192.00	-0.35	0.56	0.91
13547.00	-0.39	0.57	0.95
13548.00	-0.36	0.60	0.96
14058.00	-0.56	0.34	0.90

CONT'D
DE1-BE9 OUTSIDE
DELTA >.9"

	UNLOADED	LOADED	DELTA
14294.00	-0.67	0.31	0.97
14871.00	-0.49	0.42	0.91
14872.00	-0.58	0.41	0.99
15411.00	-0.94	0.07	1.02
15412.00	-0.91	0.08	1.00
15413.00	-0.84	0.11	0.95
15415.00	-0.85	0.17	1.02
15416.00	-0.97	0.33	1.30
15417.00	-0.66	0.34	1.00
15418.00	-0.56	0.38	0.95
15419.00	-0.61	0.38	0.99
15420.00	-0.62	0.43	1.05
15568.00	-0.44	0.46	0.90
15637.00	-0.51	0.48	0.99
15638.00	-0.61	0.48	1.09
15640.00	-0.44	0.49	0.93
15641.00	-0.52	0.47	0.98
15642.00	-0.46	0.48	0.94
16257.00	-0.84	0.15	1.00
16259.00	-0.78	0.15	0.93
16260.00	-0.77	0.17	0.94
16261.00	-0.86	0.19	1.05
16262.00	-0.84	0.09	0.93
16263.00	-0.77	0.16	0.93
16264.00	-0.78	0.15	0.93
16265.00	-0.93	0.16	1.08
16266.00	-0.88	0.16	1.04
16267.00	-0.71	0.20	0.91
16268.00	-0.71	0.22	0.92
16269.00	-0.74	0.29	1.02
16349.00	-0.64	0.27	0.91
16395.00	-0.68	0.23	0.91
16399.00	-0.67	0.25	0.92
16592.00	-0.77	0.17	0.94
16683.00	-0.58	0.32	0.91
18823.00	-0.75	0.28	1.03
20108.00	-0.95	0.38	1.33
20109.00	1.38	0.34	1.72
20140.00	1.39	0.35	1.74
20141.00	1.41	0.30	1.70
20142.00	1.39	0.04	1.43
20143.00	1.39	0.04	1.43
20144.00	1.39	0.04	1.43
20145.00	1.38	0.02	1.39
20146.00	1.37	0.01	1.36
20147.00	1.39	0.09	1.30
20148.00	1.50	0.02	1.48
20149.00	1.39	0.01	1.38
20190.00	1.38	0.00	1.39
20191.00	1.39	0.30	1.09
20203.00	-0.58	0.33	0.91
20204.00	-0.69	0.33	1.01
20205.00	-0.63	0.29	0.92

BE9-AE7 OUTSIDE
DELTA >.9"

	UNLOADED	LOADED	DELTA
22025.00	-0.66	0.29	0.95
34446.00	1.19	0.06	1.13
34447.00	1.38	0.05	1.34
34448.00	1.40	0.03	1.43
34449.00	1.40	0.05	1.35
34430.00	1.40	0.05	1.35
34431.00	1.40	0.05	1.35
34432.00	1.40	0.06	1.34
34433.00	1.39	0.03	1.36
34434.00	1.39	0.02	1.37
34435.00	1.45	0.01	1.45
34436.00	1.38	0.01	1.38
34437.00	1.42	0.00	1.41
34438.00	1.41	0.02	1.43
34439.00	1.39	0.01	1.37
34440.00	1.43	0.01	1.42
34441.00	1.39	0.11	1.28
34442.00	1.39	0.46	0.93
34560.00	-0.63	0.31	0.93
35019.00	-0.56	0.40	0.96
35061.00	-0.20	0.71	0.91
35065.00	-0.38	0.61	0.99
35066.00	-0.33	0.60	0.94
35405.00	-0.78	0.19	0.97
35406.00	-0.68	0.23	0.92
35408.00	-0.42	0.49	0.92
35409.00	-0.47	0.48	0.95
35753.00	-0.83	0.18	1.02
36147.00	-0.66	0.25	0.92
36339.00	-0.71	0.20	0.90
36738.00	-0.53	0.38	0.91
36942.00	-0.36	0.55	0.91
36945.00	-0.39	0.52	0.91
37082.00	-0.60	0.31	0.90
38503.00	-0.51	0.46	0.97
40076.00	-0.83	0.15	0.98
40113.00	-0.75	0.15	0.90
40207.00	-0.65	0.28	0.93
40208.00	-0.74	0.29	1.03
40209.00	-0.55	0.36	0.91
40395.00	-0.70	0.21	0.92
42677.00	-0.60	0.36	0.95
43047.00	-0.71	0.19	0.90
43536.00	-0.59	0.32	0.92

AE7-AE9 OUTSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
45353.00	-1.39	0.16	1.55
45354.00	-1.38	0.16	1.54
45355.00	-1.39	0.07	1.47
45356.00	-1.39	0.03	1.41
45357.00	-1.38	-0.04	1.34
45358.00	-1.35	-0.06	1.29
45735.00	-0.25	0.67	0.92
47373.00	-0.28	0.64	0.92
47374.00	-0.24	0.66	0.90
47406.00	-0.66	0.29	0.96
47407.00	-0.66	0.31	0.97
48636.00	-0.10	2.78	2.88
48637.00	-0.12	2.76	2.64
48638.00	0.07	2.79	2.72
48639.00	0.01	2.79	2.80
48640.00	-0.11	2.78	2.67
48641.00	-0.16	2.76	2.62
48642.00	-0.18	2.78	2.60
48643.00	-0.13	2.77	2.65
48644.00	-0.36	2.68	2.32
48645.00	-0.29	2.76	2.47
48646.00	-0.16	2.77	2.61
48647.00	-0.17	2.79	2.62
48648.00	-0.13	2.77	2.65
48649.00	-0.15	2.77	2.62
48650.00	-0.07	2.78	2.70
48651.00	-0.07	2.78	2.85
48652.00	-0.10	2.89	2.99
48653.00	0.01	2.80	2.79
48654.00	-0.15	2.79	2.94
48655.00	-0.26	2.77	3.02
48656.00	-0.31	2.78	3.09
48657.00	-0.34	2.79	3.13
48658.00	-0.31	2.79	3.10
48659.00	-0.54	2.82	3.36
48660.00	-0.55	2.77	3.31
48661.00	-0.45	2.77	3.22
48662.00	-0.45	2.70	3.15
48663.00	-0.43	2.79	3.23
48664.00	-0.45	2.77	3.23
48665.00	-0.29	2.94	3.23
48666.00	-0.17	2.76	2.93
48667.00	-0.27	2.78	3.05
48668.00	-0.23	2.83	3.06
48669.00	-0.13	2.78	2.91
48670.00	0.02	2.78	2.80

CONT'D
AE7-AE9 OUTSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
48671.00	0.02	2.77	2.75
48672.00	0.10	2.77	2.87
48673.00	0.15	2.78	2.93
48674.00	0.11	2.76	2.64
48675.00	0.20	2.78	2.57
48676.00	0.10	2.79	2.88
48677.00	0.02	2.77	2.75
48678.00	0.14	2.78	2.64
48679.00	0.14	2.76	2.63
48680.00	0.06	2.79	2.72
48681.00	0.09	2.76	2.67
48682.00	0.16	2.79	2.63
48683.00	0.09	2.77	2.68
48684.00	0.07	2.86	2.79
48685.00	0.08	2.76	2.84
48686.00	0.06	2.77	2.82
48687.00	0.12	2.76	2.88
48688.00	0.57	2.78	3.34
48689.00	0.56	2.77	3.33
48690.00	0.13	2.78	2.91
48691.00	0.14	2.79	2.93
48692.00	0.23	2.75	2.98
48693.00	0.40	2.79	3.19
48694.00	0.07	2.79	2.85
48695.00	0.00	2.89	2.89
48696.00	0.21	2.79	3.00
48697.00	0.26	2.77	3.04
48698.00	0.26	2.78	3.04
48699.00	0.15	2.79	2.94
48700.00	0.28	2.80	3.09
48701.00	0.41	2.70	3.12
48702.00	0.36	2.78	3.14
48703.00	0.19	2.77	2.96
48704.00	0.23	2.79	3.03
48706.00	0.40	2.78	3.19
48708.00	0.33	2.78	3.10
48707.00	0.26	2.76	3.02
48708.00	0.31	2.71	3.02
48709.00	0.28	2.13	2.41
48710.00	0.03	0.99	0.95
48795.00	-0.43	0.47	0.90
50109.00	-0.82	0.13	0.96
50117.00	-0.80	0.13	0.93
51255.00	-0.71	0.22	0.94
51256.00	-0.66	0.28	0.94
52343.00	-0.55	0.36	0.91
53404.00	-0.68	0.23	0.91
53405.00	-0.75	0.20	0.95

CONT'D
AE7-AE9 OUTSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
53406.00	-0.78	0.22	1.00
53407.00	-0.74	0.22	0.96
53410.00	-0.61	0.31	0.92
53411.00	-0.71	0.25	0.96
54211.00	-0.61	0.33	0.94
54538.00	-0.66	0.24	0.90
54571.00	-0.52	0.45	0.98
54668.00	-0.62	0.40	1.02
54669.00	-0.56	0.44	0.99
54670.00	-0.54	0.42	0.97
54671.00	-0.54	0.52	1.06
54673.00	-0.54	0.41	0.95
54674.00	-0.58	0.43	1.01
54675.00	-0.62	0.47	1.09
54677.00	-0.63	0.43	1.06
54678.00	-0.74	0.37	1.11
54679.00	-0.60	0.41	1.01
54680.00	-0.54	0.44	0.98
54681.00	-0.52	0.43	0.95
54682.00	-0.58	0.43	1.00
54880.00	-0.83	0.28	1.11
54881.00	-0.66	0.35	1.01
55015.00	-0.66	0.38	1.04
55018.00	-0.56	0.38	0.94
55361.00	-0.73	0.18	0.91
55365.00	-0.70	0.20	0.90
55370.00	-0.69	0.33	1.02
55374.00	-0.50	0.41	0.92
55442.00	-0.49	0.41	0.90
55859.00	-0.38	0.53	0.91
55863.00	-0.44	0.48	0.92
55867.00	-0.46	0.46	0.92
55868.00	-0.50	0.46	0.97
55870.00	-0.46	0.51	0.97
55871.00	-0.47	0.49	0.96
55872.00	-0.47	0.47	0.94
56250.00	-0.73	0.23	0.96
56251.00	-0.75	0.23	0.98
56252.00	-0.75	0.21	0.95
56253.00	-0.74	0.28	1.01
56254.00	-0.67	0.28	0.95
56997.00	-0.36	0.61	0.97
57071.00	-0.35	0.55	0.90
57262.00	-0.33	0.58	0.91
57355.00	-0.68	0.40	1.07
57356.00	-0.69	0.40	1.09

CONT'D
AE7-AE9 OUTSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
57357.00	-0.74	0.42	1.15
57358.00	-0.81	0.45	1.26
57359.00	-1.03	0.39	1.42
57360.00	-0.90	0.45	1.36
57361.00	-0.85	0.37	1.22
57362.00	-0.87	0.41	1.28
57363.00	-0.79	0.42	1.21
57364.00	-0.87	0.40	1.26
57365.00	-0.70	0.42	1.11
57366.00	-0.63	0.47	1.10
57367.00	-0.58	0.45	1.04
57368.00	-0.49	0.45	0.94
57513.00	-0.24	0.68	0.92
57591.00	-0.36	0.57	0.93
58350.00	-0.56	0.44	0.99
58351.00	-0.53	0.45	0.98
58352.00	-0.42	0.51	0.92
58353.00	-0.45	0.51	0.95
58354.00	-0.39	0.52	0.92
58355.00	-0.42	0.53	0.95
58925.00	-0.73	0.29	1.02
59142.00	-0.62	0.35	0.97
59418.00	-0.71	0.23	0.94
59811.00	-0.34	0.64	0.98
59812.00	-0.27	0.65	0.92
59912.00	-0.43	0.48	0.92
59913.00	-0.52	0.58	1.10
59914.00	-0.56	0.49	1.05
59915.00	-0.54	0.50	1.04
59916.00	-0.44	0.49	0.93
59918.00	-0.38	0.54	0.92
59994.00	-0.55	0.37	0.91
59995.00	-0.77	0.35	1.12
59996.00	-0.72	0.36	1.08
59997.00	-0.55	0.42	0.97
60090.00	-0.39	0.55	0.93
60091.00	-0.35	0.57	0.92
62940.00	-0.64	0.26	0.90
62941.00	-0.71	0.26	0.96
62942.00	-0.73	0.26	0.99
63027.00	-0.43	0.52	0.95
63373.00	-0.07	0.83	0.91
63756.00	-0.62	0.32	0.94
63758.00	-0.64	0.40	1.05
63811.00	-0.89	0.03	0.92
64035.00	-0.96	0.06	1.03
64036.00	-0.91	0.13	1.05
64037.00	-0.85	0.16	1.01

CONT'D
AE7-AE9 OUTSIDE
DELTA >.9"

FOOTAGE	UNLOADED	LOADED	DELTA
64038.00	-0.79	0.18	0.97
64129.00	-0.51	0.42	0.93
64130.00	-0.57	0.48	1.05
64131.00	-0.61	0.48	1.09
64195.00	-0.76	0.20	0.96
64196.00	-0.60	0.37	0.97
64253.00	-0.47	0.44	0.91
64990.00	-0.26	0.69	0.96
64991.00	-0.38	0.71	1.09
65280.00	-0.38	0.57	0.95
65631.00	-0.65	0.27	0.92
66582.00	-0.88	0.02	0.90
67016.00	-0.66	0.25	0.91
67020.00	-0.68	0.22	0.91
67029.00	-0.55	0.53	1.08
67054.00	-0.39	0.54	0.92
67125.00	-0.51	0.45	0.96
67126.00	-0.52	0.43	0.95
67127.00	-0.50	0.43	0.93
67128.00	-0.49	0.43	0.92
67129.00	-0.49	0.44	0.94
67130.00	-0.48	0.42	0 91

DN2-BN9 INSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
588.00	0.04	1.47	1.43
589.00	0.11	1.47	1.58
590.00	0.13	1.47	1.60
591.00	0.11	1.38	1.49
592.00	0.14	1.46	1.60
593.00	0.18	1.47	1.65
594.00	0.25	1.56	1.81
595.00	0.32	1.46	1.78
596.00	0.27	1.46	1.74
597.00	0.29	1.47	1.76
598.00	0.31	1.46	1.77
599.00	0.34	1.45	1.79
600.00	0.33	1.46	1.79
601.00	0.32	1.46	1.78
602.00	0.33	1.47	1.80
603.00	0.32	1.46	1.78
604.00	0.32	1.47	1.78
605.00	0.33	1.49	1.83
606.00	0.34	1.46	1.80
607.00	0.33	1.09	1.42
2,718.00	0.50	-0.40	0.90
3,644.00	0.36	-0.55	0.90
3,808.00	0.33	-0.58	0.91
3,878.00	0.25	-0.70	0.95
4,192.00	0.28	-0.63	0.91
4,200.00	0.30	-0.64	0.94
4,993.00	0.22	-0.71	0.92
5,565.00	0.30	-0.69	0.99
6,291.00	0.38	1.47	1.09
6,292.00	0.13	1.46	1.59
6,293.00	0.29	1.48	1.77
6,294.00	0.42	1.46	1.87
6,295.00	0.32	1.46	1.78
6,296.00	0.33	1.48	1.81
6,297.00	0.34	1.48	1.81
6,298.00	0.34	1.54	1.88
6,299.00	0.34	1.43	1.77
6,300.00	0.36	1.44	1.80
6,301.00	0.38	1.47	1.85
6,302.00	0.41	1.40	1.82
6,303.00	0.39	1.47	1.86
6,304.00	0.40	1.45	1.85

CONT'D
DN2-BN9 INSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
6,235.00	0.38	1.43	1.82
6,236.00	0.38	1.45	1.84
6,237.00	0.39	1.51	1.90
6,238.00	0.38	1.49	1.86
6,239.00	0.40	1.45	1.86
6,240.00	0.39	1.45	1.84
6,241.00	0.43	-0.55	0.98
8,060.00	0.58	-0.40	0.98
8,061.00	0.59	-0.34	0.93
8,063.00	0.43	-0.52	0.95
8,064.00	0.41	-0.52	0.93
8,360.00	0.52	-0.43	0.95
8,896.00	0.52	-0.38	0.91
8,897.00	0.52	-0.39	0.91
9,761.00	0.43	-0.48	0.91
10,380.00	0.34	-0.62	0.96
11,158.00	0.09	-0.83	0.92
13,013.00	0.73	-0.18	0.91
14,515.00	0.03	-0.91	0.95
16,233.00	0.56	-0.41	0.97
16,241.00	0.53	-0.43	0.96
16,245.00	0.52	-0.43	0.95
16,784.00	0.55	-0.37	0.92
17,120.00	0.47	-0.47	0.95
17,681.00	0.33	-0.65	0.99
18,490.00	0.34	1.46	1.13
18,491.00	0.11	1.46	1.35
18,492.00	0.11	1.48	1.37
18,493.00	0.12	1.46	1.34
18,494.00	0.09	1.45	1.37
18,495.00	0.02	1.46	1.44
18,496.00	0.02	1.47	1.49
18,497.00	0.04	1.47	1.51
18,498.00	0.06	1.46	1.52
18,499.00	0.07	1.47	1.54
18,500.00	0.05	1.46	1.51
18,501.00	0.04	1.46	1.51
18,502.00	0.07	1.47	1.53
18,503.00	0.05	1.46	1.51
18,504.00	0.05	1.46	1.51
18,505.00	0.06	1.47	1.52
18,506.00	0.05	1.47	1.52
18,507.00	0.13	1.46	1.60
18,508.00	0.13	1.44	1.57
18,509.00	0.19	0.97	1.16

BN9-AN7 INSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
19536.00	0.49	-0.46	0.94
23005.00	0.23	-0.75	0.98
23006.00	0.20	-0.73	0.92
24776.00	0.41	-0.52	0.93
24780.00	0.39	-0.56	0.95
25932.00	0.35	-0.61	0.96
30934.00	0.46	1.63	1.17
30935.00	0.39	1.45	1.06
30936.00	0.36	1.46	1.11
30937.00	0.31	1.46	1.15
30938.00	0.26	1.48	1.21
30939.00	0.25	1.46	1.21
30940.00	0.17	1.44	1.27
30941.00	0.15	1.49	1.33
30942.00	0.04	1.46	1.42
30943.00	0.08	1.50	1.58
30944.00	0.08	1.48	1.56
30945.00	0.10	1.46	1.56
30946.00	0.09	1.47	1.56
30947.00	0.10	1.47	1.56
30948.00	0.25	1.47	1.73
30949.00	0.32	1.46	1.78
30950.00	0.30	1.56	1.86
30951.00	0.29	1.55	1.84
30952.00	0.28	1.45	1.73
30953.00	0.29	1.08	1.38
30375.00	0.36	-0.60	0.96
30378.00	0.23	-0.70	0.93
30680.00	0.41	-0.50	0.91
30726.00	0.40	-0.54	0.93
31382.00	0.21	-0.71	0.92
31383.00	0.20	-0.74	0.93
31904.00	0.57	-0.37	0.94
31906.00	0.43	-0.47	0.90
31907.00	0.41	-0.61	1.01
31908.00	0.40	-0.63	1.03
32014.00	0.41	-0.50	0.91
32116.00	0.52	-0.39	0.90
32117.00	0.43	-0.51	0.93
34406.00	0.14	-0.82	0.96
35063.00	0.09	-0.83	0.92
36080.00	0.64	-0.34	0.98
36663.00	0.43	-0.48	0.90
36664.00	0.41	-0.56	0.98
37753.00	0.45	-0.48	0.93
37754.00	0.42	-0.59	1.01
37755.00	0.31	-0.60	0.91
37759.00	0.19	-0.73	0.92
38939.00	0.15	-0.90	1.05

AN7-AN9 INSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
43886.00	0.25	-0.26	0.91
43972.00	0.14	-0.22	0.94
43975.00	0.02	-0.33	0.95
44406.00	0.17	-0.47	0.91
44410.00	0.05	-0.55	0.90
45126.00	0.06	-0.22	0.90
45327.00	0.11	-0.25	0.94
45372.00	0.13	-0.11	0.96
45499.00	0.08	-0.21	0.92
45500.00	0.09	-0.25	0.91
45501.00	0.08	-0.16	0.96
45502.00	-0.01	-0.07	0.95
45503.00	0.00	0.07	0.99
45507.00	-0.08	0.06	1.00
45540.00	0.06	-0.01	1.01
45541.00	0.05	-0.04	1.05
45542.00	-0.01	-0.03	0.98
45543.00	-0.06	0.02	1.01
45544.00	-0.11	-0.11	0.97
45681.00	0.00	-0.28	0.98
45682.00	0.00	-0.42	1.04
45683.00	-0.01	-0.56	1.05
45684.00	0.00	-0.56	1.08
45685.00	0.01	-0.56	1.12
45686.00	0.01	-0.63	0.95
45739.00	0.09	-0.18	0.90
45740.00	0.08	-0.20	0.93
45741.00	0.07	-0.23	0.91
45814.00	0.09	-0.28	0.92
45815.00	0.01	-0.24	0.90
45871.00	0.19	-0.60	0.98
45872.00	0.18	-0.48	0.99
46031.00	0.16	-0.41	1.08
46056.00	0.25	-0.19	0.93
46145.00	0.29	-0.16	0.92
46165.00	0.27	-0.16	0.95
46186.00	0.13	0.11	0.92
46190.00	0.22	-0.12	0.97
46193.00	0.13	-0.38	1.00
46194.00	0.12	-0.31	0.91
46415.00	0.25	0.14	0.94
46544.00	-0.02	-0.06	0.92
46562.00	-0.04	-0.12	0.91

CONT'D
AN7-AN8 INSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
46840.00	0.22	-0.04	0.93
46935.00	0.12	-0.62	0.98
46997.00	0.07	-0.26	0.94
47002.00	-0.01	-0 31	1 07
47187.00	0.13	-0.22	0.94
47188.00	0.13	-0.21	1.05
47189.00	0.13	-0.26	1.10
47459.00	0.13	0.20	0.91
47557.00	-0.02	0.07	0.91
47558.00	-0.03	-0.01	1.01
47943.00	-0.06	-0.44	0.91
48449.00	0.22	-0.02	0.91
48450.00	0.22	0.01	0.98
48676.00	0.43	0.10	0.92
48695.00	0.49	0.26	0.92
48696.00	0.50	0 22	0.94
49163.00	0.37	-0.18	0.99
49164.00	0.36	-0.17	0.97
49165.00	0.34	-0.03	0.94
49216.00	0.13	-0.11	0.91
49694.00	0.46	-0.57	0.94
49727.00	0.40	-0.31	0.90
49728.00	0.38	-0.32	0.96
49729.00	0.35	-0 20	0.93
49733.00	0.38	-0.13	0.91
49734.00	0.36	-0.07	1.00
50399.00	0.29	-0.10	0.93
51005.00	0.38	-0.04	0.90
51143.00	0.37	-0.08	0.95
51144.00	0.36	-0.17	0.92
51280.00	0.25	-0.26	0 94
51611.00	0.57	-0.20	0.90
51615.00	0.65	-0.10	0 92
51715.00	0.60	0.19	0.99
51716.00	0.59	0.16	0.90
51719.00	0.61	0.04	0.92
51720.00	0.60	-0.07	0.95
52123.00	0.35	0.02	0 91
52426.00	0.14	-0.04	0.92
54293.00	0.46	-0 09	0.91
54475.00	0.39	-0 13	0 92
54478.00	0.42	0.02	0 94
54951.00	0.34	-0.06	0.98

DN2-CN8 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
402.00	1.44	0.25	1.68
403.00	1.46	0.23	1.69
404.00	1.46	0.31	1.77
405.00	1.46	0.25	1.71
406.00	1.46	0.24	1.70
407.00	1.47	0.24	1.71
408.00	1.46	0.25	1.71
409.00	1.48	0.25	1.73
500.00	1.47	0.25	1.72
501.00	1.46	0.25	1.71
502.00	1.47	0.24	1.70
503.00	1.46	0.24	1.70
504.00	1.30	0.23	1.54
505.00	1.47	0.24	1.71
506.00	1.46	0.22	1.68
507.00	1.47	0.17	1.64
508.00	1.47	0.09	1.56
509.00	1.46	0.02	1.48
1824.00	-0.60	0.32	0.92
1827.00	-0.59	0.38	0.98
2011.00	-0.58	0.32	0.90
2012.00	-0.59	0.32	0.91
2273.00	-0.35	0.55	0.90
2347.00	-0.30	0.64	0.94
2384.00	-0.47	0.53	1.00
2385.00	-0.42	0.53	0.95
2387.00	-0.52	0.53	1.06
2388.00	-0.64	0.53	1.17
2389.00	-0.59	0.53	1.12
2390 00	-0.44	0.52	0.96
2392 00	-0.58	0.55	1.14
2393.00	-0 44	0 51	0 95
2815.00	-0.17	0.79	0.96
2816.00	-0.16	0.81	0.97
2819.00	-0.12	0.81	0.93
2820.00	-0.19	0.86	1.04
2821.00	-0.10	0.80	0.91
2822.00	-0.14	0.80	0.94
2823.00	-0.19	0.80	0.99
2824.00	-0.24	0.84	1.08
2825.00	-0.11	0 81	0.92
3764.00	-0.26	0.66	0.92
4022.00	-0.35	0.56	0.91
4024.00	-0.41	0.59	1.00
4025.00	-0.50	0.59	1.09
4026.00	-0.43	0.57	1.00
4027.00	-0.37	0.60	0.97
4028.00	-0.43	0.65	1.09
4029.00	-0.56	0.58	1.14
4030.00	-0.47	0.58	1.05
4031.00	-0.35	0.60	0.95
4032.00	-0.37	0.60	0.97
4033.00	-0.43	0.60	1.03
4034.00	-0.36	0.60	0.96
4035 00	-0.36	0.63	0.99
4037 00	-0.36	0.61	0.96
4038.00	-0.31	0.61	0.92
4054.00	-0.24	0.66	0.90
4058 00	-0.30	0 66	0.96

CN8-BN8 OUTSIDE
DELTA GAGE > 9

FOOTAGE	UNLOADED	LOADED	DELTA
4,794 00	-0 38	0 53	0 92
4,795 00	-0.46	0.55	1.01
4,796.00	-0.39	0.53	0 92
4,848.00	-0.35	0.58	0 93
4,849.00	-0.40	0 53	0.93
4,853 00	-0.42	0.49	0 91
4,854 00	-0.41	0 52	0 93
4,857.00	-0.38	0.52	0 90
5,256.00	-0.48	0.47	0 95
5,257.00	-0.50	0.50	1.00
5,258.00	-0.44	0.48	0.92
5,259.00	-0.47	0.48	0.95
5,260.00	-0.61	0.48	1.09
5,261.00	-0.47	0.49	0 96
5,352.00	-0 42	0.50	0.92
5,353.00	-0.43	0.48	0 91
5,355.00	-0.43	0.54	0 97
5,356.00	-0.46	0.50	0.96
5,469 00	-0.27	0.66	0 93
5,641.00	-1.00	-0.06	0 94
5,642 00	-1.02	0.03	1.05
5,643.00	-1.07	0.08	1.15
5,644.00	-1.01	0.11	1.13
5,645.00	-0.99	0.16	1.15
5,646.00	-0.92	0 15	1 07
5,647.00	-0 91	0.16	1.06
5,648 00	-0.91	0.18	1.09
5,649.00	-0.81	0.27	1.08
5,650.00	-0.73	0.18	0 91
5,651.00	-0.70	0.31	1 01
5,652.00	-0.71	0.32	1 03
5,653.00	-0 68	0.34	1.02
5,654.00	-0 59	0.39	0 98
5,656.00	-0.60	0.32	0.92
5,657.00	-0.61	0.32	0 93
6,343.00	-0.50	0.43	0.93
6,344.00	-0.71	0.48	1 19
6,345.00	-0 57	0.45	1 03
6,346.00	-0 50	0 44	0 94
6,347.00	-0.54	0.45	0.99
6,348.00	-0 63	0 45	1.08
6,349.00	-0.59	0.48	1 05
6,350.00	-0 48	0.52	0 99

CONT'D
CN8-BN8 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
6,351.00	-0 46	0.45	0 91
6,352.00	-0 52	0.49	1.02
6,353 00	-0 46	0 47	0.93
6,354 00	-0 41	0.52	0.93
6,364.00	1.20	0.48	1.68
6,365.00	1.44	0.20	1.64
6,366.00	1.46	0.20	1.65
6,367.00	1.47	0.17	1.64
6,368.00	1.45	0.15	1.60
6,369.00	1.46	0.08	1.54
6,370.00	1.46	0.04	1.51
6,371.00	1.48	0.04	1.52
6,372.00	1.56	0.02	1.57
6,373.00	1.43	0.02	1.41
6,374.00	1.45	0.02	1.43
6,375.00	1.47	0.04	1.43
6,376.00	1.45	0.02	1.43
6,377.00	1.46	0.06	1.41
6,378.00	1.46	0.09	1.36
6,379.00	1.47	0.11	1.36
6,380.00	1.47	0.16	1.31
6,381.00	1.46	0.18	1.28
6,448.00	-0 43	0.59	1.02
6,449.00	-0 53	0.60	1.13
6,450.00	-0 46	0.61	1.07
6,451.00	-0 40	0 70	1.10
6,452.00	-0.41	0 71	1.12
6,453.00	-0 42	0.70	1.12
6,454.00	-0 28	0.70	0.98
7,533.00	-0.37	0.59	0 96
8,053 00	-0.28	0.62	0.91
8,054.00	-0 33	0 62	0.94
8,127.00	-0 30	0.61	0 92
8,129.00	-0 42	0.63	1.05
8,130 00	-0 59	0.63	1.22
8,131 00	-0 68	0 68	1 36
8,132 00	-0 65	0 62	1.27
8,133.00	-0 55	0 57	1 12
8,134.00	-0 52	0.61	1.13
8,135.00	-0 48	0.61	1 09
8,136 00	-0 36	0.61	0 97
8,137.00	-0 29	0.65	0 94
8,138 00	-0 31	0.68	0.99
8,140 00	-0 24	0.70	0.93
8,147 00	-0 11	0.79	0.90

CONT'D
CN8-BN8 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
8,227.00	-0.31	0.70	1.01
8,228.00	-0.23	0.70	0.93
8229.00	-0.28	0.69	0.97
8230.00	-0.32	0.69	1.01
8231.00	-0.30	0.68	0.99
8232.00	-0.30	0.66	0.96
8233.00	-0.32	0.69	1.01
8234.00	-0.40	0.69	1.09
8235.00	-0.45	0.69	1.14
8236.00	-0.45	0.68	1.13
8237.00	-0.46	0.69	1.16
8238.00	-0.34	0.74	1.09
8239.00	-0.29	0.78	1.07
8240.00	-0.21	0.76	0.97
8241.00	-0.17	0.78	0.94
8242.00	-0.14	0.79	0.93
8345.00	-0.08	0.83	0.91
8462.00	-0.36	0.58	0 93
8466.00	-0.35	0.58	0 93
8469.00	-0.33	0.59	0.92
9144.00	-0.36	0.62	0 98
9146.00	-0.33	0.69	1.02
9147.00	-0.36	0.61	0 97
9148.00	-0.36	0.61	0.98
9149.00	-0.34	0.62	0.96
9150.00	-0.37	0.61	0.98
9151.00	-0.40	0.61	1.01
9152.00	-0.43	0.62	1.05
9807.00	-0.62	0.36	0.98
10304.00	-0.61	0.32	0.93
10305.00	-0.52	0.39	0.91
10307.00	-0.56	0.38	0.94
10308.00	-0.54	0 38	0.92
11208.00	-0.32	0.60	0.92
11386.00	-0.34	0.63	0 97
11655.00	-0.35	0 57	0.91
14238.00	-0.64	0.28	0.92
14240.00	-0.76	0.29	1.05
14241.00	-0.81	0.30	1.11
14242.00	-0.84	0.30	1.15
14243.00	-0.79	0.30	1.09
14244.00	-0.81	0 32	1.12
14245.00	-0.76	0.32	1.08
14246.00	-0.78	0.30	1.08
14247.00	-0.72	0 31	1.03

CONT'D
CN8-BN8 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
14248.00	-0.68	0.32	1.00
14249.00	-0.70	0.33	1.03
14250.00	-0.58	0.33	0 91
14251.00	-0.61	0.32	0.93
14301.00	-0.70	0.23	0.93
14305.00	-0.68	0.23	0.91
14307.00	-0.63	0.27	0.90
14506.00	-0.58	0.35	0.92
14507.00	-0.63	0.34	0.97
14508.00	-0.56	0.35	0.91
14510.00	-0.62	0.45	1.07
14511.00	-0.66	0.50	1.16
14512.00	-0.50	0.53	1.03
14513.00	-0.44	0.62	1.07
14514.00	-0.48	0.64	1.12
14515.00	-0.44	0.64	1.08
14516.00	-0.32	0.61	0.93
14517.00	-0.38	0.64	1.02
14518.00	-0.51	0.68	1 18
14519.00	-0.39	0.66	1.05
14520.00	-0.27	0 67	0.94
14635.00	-0.19	0.73	0.92
14851.00	-0.27	0.65	0 93

BN8-AN5 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
15,676.00	-0.37	0.55	0 92
16,509.00	-0.23	0.67	0.90
17,075.00	-0.30	0.61	0 92
17,216.00	-0.07	0.88	0.94
17,217.00	-0 09	0.91	0 99
17,218.00	0.04	0.96	0.92
17,219.00	0.10	1.03	0.93
17,220.00	0.13	1.07	0.94
17,221.00	0.18	1.09	0.91
17,697.00	-0.44	0.48	0.91
17,698.00	-0.41	0.52	0.93
18,213.00	-0.43	0.52	0.95
18,579.00	0.75	0.37	1.12
18,580.00	1.44	0.37	1.82
18,581.00	1.48	0.37	1.85
18,582.00	1.47	0.35	1.83
18,583.00	1.45	0.34	1.79
18,584.00	1.46	0.35	1.81
18,585.00	1.48	0.27	1.75
18,586.00	1.46	0.34	1.80
18,587.00	1.52	0.43	1.96
18,588.00	1.45	0.33	1.78
18,589.00	1.46	0.34	1.81
18,590.00	1.44	0.34	1.79
18,591.00	1.48	0.35	1.83
18,592.00	1.46	0.34	1.81
18,593.00	1.47	0.31	1.78
18,594.00	1.44	0.34	1.78
18,595.00	1.45	0.38	1.83
18,596.00	1.45	0.36	1.80
18,597.00	1.46	0.34	1.80
18,598.00	1.45	0.33	1.12
18,682.00	-0.38	0.59	0.97
18,933.00	-0.84	0 06	0 91
18,937 00	-0 79	0.13	0 93
21,143 00	-0.42	0 51	0 93
21,144.00	-0.49	0.43	0 91
21,147.00	-0.44	0.50	0 94
21,148.00	-0.43	0 47	0.90
21,381.00	-0.53	0 46	0 99
21,385 00	-0.56	0 34	0 90
21,887.00	-0 87	0.03	0 90
21,888 00	-0 93	0 02	0 95
21,889 00	-0 82	0 11	0 93

AN5-AN6 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
22840.00	-0 98	0 72	1.71
22841.00	1.48	0.72	2.20
22842.00	1.48	0.72	2.19
22843.00	1.47	0.72	2.19
22844.00	1.47	0.72	2.19
22845.00	1.46	0.72	2.18
22846.00	1.47	0.73	2.20
22847.00	1.46	0.72	2.18
22848.00	1.47	0.72	2.19
22849.00	1.45	0.73	2.18
22850.00	1.46	0.73	2.19
22851.00	1.48	0.72	2.20
22852.00	1.47	0.74	2.21
22853.00	1.46	0.70	2.16
22854.00	1.46	0.60	2.06
22855.00	1.45	0.49	1.94
22856.00	1.44	0.41	1.85
22857.00	1.44	0.36	1.80
22858.00	1.49	0.05	1.43
22859.00	1.46	0.32	1.14
22987.00	-0 55	0.43	0.99
24469.00	-0 62	0.41	1.03
25091.00	-0 53	0 38	0.91
27616.00	-0 32	0 61	0.93
27617.00	-0 36	0 61	0.97

AN6-AN7 OUTSIDE
DELTA GAGE >.9

30529.00	1.29	0.20	1.48
30530.00	1.45	0.14	1.60
30531.00	1.38	0.13	1.51
30532.00	1.46	0.20	1.67
30533.00	1.45	0.14	1.59
30534.00	1.45	0.13	1.58
30535.00	1.45	0.13	1.58
30536.00	1.47	0.13	1.60
30537.00	1.45	0.10	1.55
30538.00	1.45	0.04	1.50
30539.00	1.44	0.05	1.49
30540.00	1.45	0.05	1.50
30541.00	1.46	0.05	1.51
30542.00	1.45	0.02	1.43
30543.00	1.47	0.07	1.40
30544.00	1.45	0.04	1.42
30545.00	1.45	0.06	1.39
30546.00	1.46	0.09	1.37
30547.00	1.47	0.10	1.37
30548.00	1.47	0.42	1.05
36302 00	-0 21	0.69	0.90
36776 00	-0.59	0.33	0.91
38880 00	-0 62	0.29	0.90
38901.00	-0.66	0.25	0.94
39567.00	-0 41	0 51	0.92

AN7-AN8 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
40508.00	-0.76	0.35	1.11
40512.00	-0.58	0.34	0.92
40524.00	-0.45	0.52	0.97
40801.00	-0.78	0.13	0.92
40802.00	-0.74	0.21	0.95
40806.00	-0.62	0.28	0.90
42078.00	-0.60	0.35	0.95
42079.00	-0.64	0.34	0.98
44330.00	-0.64	0.26	0.90
44339.00	-0.77	0.16	0.92
44471.00	-0.66	0.30	0.96
44476.00	-0.64	0.32	0.95
44477.00	-0.62	0.29	0.91
44478.00	-0.63	0.30	0.93
44543.00	-0.49	0.42	0.91
44585.00	-0.58	0.33	0.91
44587.00	-0.66	0.38	1.05
44588.00	-0.66	0.30	0.96
44589.00	-0.73	0.29	1.02
44590.00	-0.73	0.31	1.04
44591.00	-0.68	0.33	1.01
44614.00	-0.62	0.31	0.93
44667.00	-0.66	0.30	0.96
44668.00	-0.68	0.30	0.98
44669.00	-0.65	0.34	0.99
44670.00	-0.78	0.31	1.09
44671.00	-0.78	0.31	1.09
44672.00	-0.70	0.30	1.00
44673.00	-0.61	0.34	0.95
44674.00	-0.61	0.32	0.93
44675.00	-0.57	0.36	0.93
44754.00	-0.58	0.34	0.92
44757.00	-0.59	0.34	0.93
44758.00	-0.61	0.42	1.03
44979.00	-0.54	0.36	0.90
44982.00	-0.59	0.34	0.93
45218.00	-0.77	0.19	0.97
46131.00	-0.79	0.16	0.94
46315.00	-0.50	0.43	0.93
47436.00	-0.63	0.27	0.90

AN8-AN9 OUTSIDE
DELTA GAGE >.9

FOOTAGE	UNLOADED	LOADED	DELTA
49941.00	-0.87	0.23	1.10
49942.00	-0.74	0.22	0.96
49943.00	-0.68	0.22	0.90
50619.00	-0.60	0.36	0.96
50624.00	-0.43	0.47	0.90
52971.00	-0.69	0.22	0.91
52975.00	-0.91	0.16	1.06
52976.00	-0.86	0.18	1.04
52977.00	-0.75	0.21	0.96
53063.00	-0.71	0.24	0.94
53064.00	-0.68	0.25	0.93
53126.00	-0.34	0.62	0.96
53127.00	-0.26	0.64	0.91
54320.00	-0.75	0.20	0.94
58070.00	-0.78	0.15	0.94
58074.00	-0.41	0.51	0.92
58220.00	-0.61	0.32	0.93
59036.00	-0.48	0.43	0.91
59037.00	-0.65	0.41	1.07
59038.00	-0.64	0.40	1.04
59506.00	-0.69	0.26	0.95
59559.00	-0.63	0.38	1.02
59560.00	-0.65	0.35	1.00
60585.00	-0.57	0.35	0.92
60589.00	-0.46	0.48	0.94

HOLLAND TIE PLANNING SHEETS

CLUSTERS 0F 5 OR MORE

Holland Company
Februaury 1998

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-6 to An-5
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.55	1	4,061	112	1,127	796	2,201	Capital				

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: An-5 To AN-4
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.34	1	3,503	143	1,303	1,076	1,663	Capital				

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN -4 to AN-2
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	2.00	1	5,227	262	1,723	990	1,853	Capital				

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-9 Center
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	2.10	1	5,475	153	1,626	847	2,074	Capital				

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-8 to AN-7
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.92	1	5,019	204	1,745	1,013	1,954	Capital				

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-7 to AN-6
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.75	1	4,574	67	1,385	828	2,557	Capital				

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-2 to DN-2
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	0.84	1	2,207	31	128	188	707	Maintenance				
									0.08	0.08	7	1
									0.75	0.75	8	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-6 to An-5
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.55	1	4,061	13	99	72	1,127	Maintenance				
									1.42	1.42	9	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: An-5 To AN-4
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.34	1	3,503	23	120	106	1,303	Maintenance				
									0.67	0.67	9	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN -4 to AN-2
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	2.00	1	5,227	81	292	186	2,214	Maintenance				
									0.10	0.10	7	1
									0.15	0.15	5	1
									1.29	1.29	8	1
									1.31	1.31	5	1
									1.64	1.64	8	1
									1.65	1.65	5	1
									1.78	1.78	7	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-9 Center
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	2.10	1	5,475	16	178	92	2,173	Maintenance				

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-8 to AN-7
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.92	1	5,019	22	209	120	2,017	Maintenance				
									0.97	0.97	5	1

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: North Arm Outside
Sub-Division: AN-7 to AN-6
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.75	1	4,574	14	62	43	1,408	Maintenance				
									1.72	1.72	9	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: N. Arm Inside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.46	1	29,883	193	1,440	142	2,616	Maintenance				
									0.11	0.12	9	1
									0.59	0.59	5	1
									0.95	0.95	7	1
									1.05	1.06	5	1
									1.18	1.18	10	2

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division: N. Arm Inside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	1.46	1	29,883	43	268	27	2,813	Maintenance				
									0.11	0.12	9	1
									1.18	1.18	10	2

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: West Inside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.72	1	33,237	61	956	80	2,533	Maintenance				
									0.11	0.11	9	1

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: West Inside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.72	1	33,237	34	185	17	2,657	Maintenance				

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: West Outside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.71	1	33,142	47	243	23	2,768	Maintenance				
									0.34	0.34	8	1
									0.71	0.71	5	1
									3.98	3.98	8	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: West Outside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Loaded Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.71	1	33,142	72	105	14	1,918	Maintenance				
									0.01	0.01	27	5
									0.02	0.02	9	1
									0.16	0.16	21	4
									0.16	0.16	5	1
									0.66	0.66	6	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: West Outside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.71	1	33,142	147	1,114	99	2,855	Maintenance				
									0.15	0.15	5	1
									0.34	0.34	8	1
									0.71	0.71	5	1
									1.60	1.60	6	1
									1.62	1.62	6	1
									1.67	1.67	5	1
									1.95	1.95	6	1
									2.17	2.17	7	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: East Inside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.69	1	33,195	37	136	14	2,646	Maintenance				
									0.13	0.13	9	1
									1.29	1.29	9	1
									1.30	1.30	6	1

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STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: East Inside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.69	1	33,195	81	980	83	2,765	Maintenance				
									0.13	0.13	9	1
									1.29	1.29	9	1
									1.30	1.30	6	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: East Outside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.74	1	33,302	71	371	35	2,673	Maintenance				
									1.87	1.87	7	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: East Outside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Loaded Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.90, 0.75, 0.50

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.74	1	33,302	112	174	22	3,359	Maintenance				
									3.52	3.52	37	7
									4.06	4.06	8	1
									12.72	12.72	8	1
									12.72	12.72	11	2
									12.73	12.73	7	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/2/1998

Division: East Outside
Sub-Division:
MP Inc/Dec: Inc
Parameter: Delta Gage

Class: 1
Operator: D Teel/ D Otto/ S Thom
RR Personnel:
Threshold: 0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	12.74	1	33,302	222	1,377	125	2,093	Maintenance				
									0.51	0.51	5	1
									0.59	0.59	6	1
									0.60	0.61	5	1
									0.73	0.73	5	1
									0.81	0.81	5	1
									1.38	1.38	6	1
									1.68	1.68	7	1

STAR Tie Planning Report for National Radio Astronomy Observatory

2/3/1998

Division:	North Arm Outside	Class:	1
Sub-Division:	AN-2 to DN-2	Operator:	D Teel/ D Otto/ S Thom
MP Inc/Dec:	Inc	RR Personnel:	
Parameter:	Delta Gage	Threshold:	0.75, 0.50, 0.25

MP From	MP To	Track	Total Ties	Safety Ties	Priority Ties	Saf.+Pri. per mile	Warning Ties	Cap. or Maint. (> 750)	MP Start	MP Stop	Cluster Ties (5)	Maint Ties
0.00	0.84	1	2,207	160	707	1,024	1,176	Capital				