

EXPERIMENTAL FEATURES PROJECTS

CATEGORY 2

EXPERIMENTAL EXPANSION

BEARING STUDY

FINAL REPORT

OREGON DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION  
Research Section

February, 1977

## EXPERIMENTAL EXPANSION BEARING STUDY

### Final Report

A study to evaluate the effectiveness and serviceability of bridge expansion bearings was undertaken by the Oregon State Highway Division in 1972. The evaluation was conducted under the provisions of the Experimental Features Program of the Federal Highway Administration. Initially, a work plan containing four bearing assemblies and outlining the proposed evaluation method was submitted to the Federal Highway Administration for inclusion in their Experimental Features Program. Subsequently, two additional bearing assemblies were added shortly after the study began.

To accomplish the evaluation, a detailed inspection of each bearing was specified to be performed by the Regional Bridge Inspectors on an annual basis. This inspection frequency was later changed to twice a year and specifically during the months of January and July in order to witness performance during extreme weather conditions. The data requested during each inspection included the following items:

1. Condition of the bearing.
2. Performance of the bearing.
3. Specific repairs to the bearing.
4. Ambient temperature and weather conditions during the inspection.
5. Amount of bearing movement.

An evaluation of each bearing system follows.

Bearing: Uni-Ton manufactured by Fluorocarbon Company, Pine Brook, New Jersey.

Structure: South Santiam River Bridge (Sanderson Bridge) on Highway 211 near Crabtree.  
Bridge #1771-A

Location: Bent 2, Bent 3, and Bent 5

Remarks:

The Fluorocarbon Uni-Ton bearings are functioning satisfactorily. During an inspection, a defect was found in the weld which attached the transverse shear bars to the upper sole plate on each bearing. After conferring with the manufacturer it was concluded a fabrication error had occurred which produced substandard welds. A clamping device which provides lateral restraint at each defective bearing was provided by the manufacturer and accepted by the State. Although these particular bearings had defective welds, the Uni-Ton bearing assembly is recommended for further use.

Bearing: Fluorogold Slide Bearing manufactured by Fluorocarbon Company, Pine Brook, New Jersey.

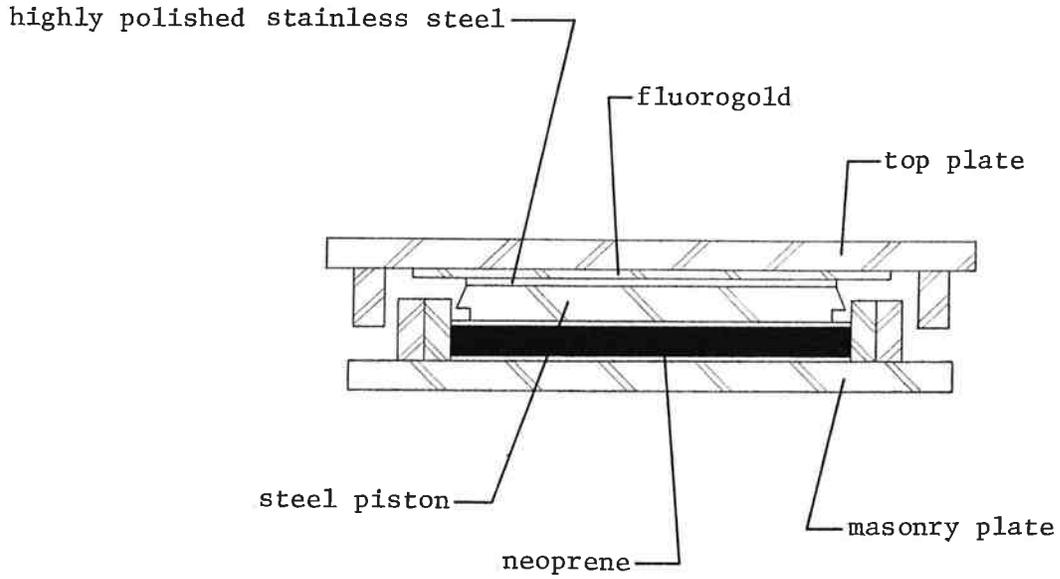
Structure: Santiam River Bridge (Mehama Bridge) on Highway 211 near Lyons.  
Bridge #533B

Location: Bent 1 and Bent 5

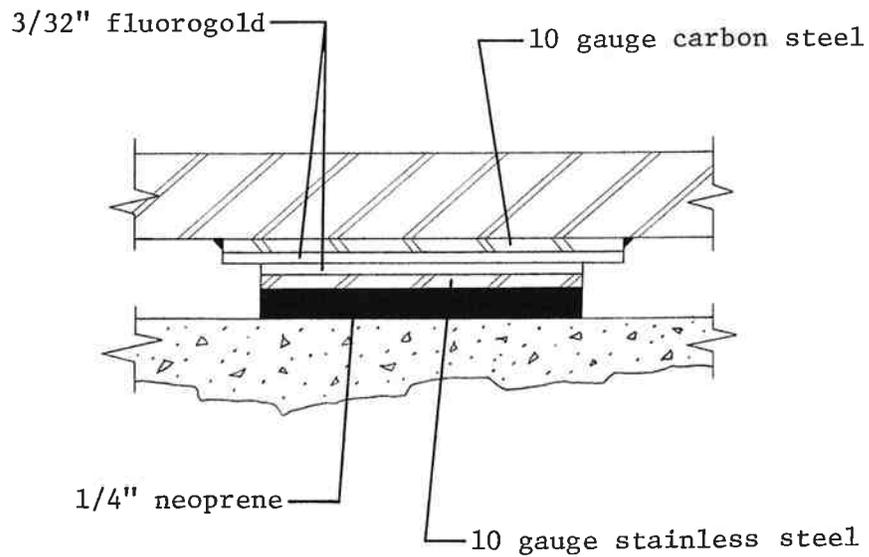
Remarks:

The Fluorogold Slide Bearings are functioning well and appear to be in excellent condition. The bearing movement was reported to be uniform across the width of the bents. Because of the favorable inspection reports, this bearing is recommended for continued use.

LATERALLY-RESTRICTED UNI-TON BEARING  
AASHO TYPE



FLUOROGOLD SLIDE BEARING



Bearing: Rota Bearings were specially designed by Howard, Needles, Tammem and Bergendoff Consulting Engineers and fabricated by Maple Leaf Tool and Die Co., Oshawa, Ontario, Canada.

Structure: West Fremont Approach, I-405 in Portland.  
Bridge #9268

Location: At 22 bents throughout the interchange.

Remarks:

The inspection of the Rota Bearings indicated them to be in like-new condition and functioning well. These bearings were designed for rotation only. The performance of this bearing system is satisfactory.

Bearing: Shortspan Type D manufactured by G. D. Spencer Company Limited, Ontario, Canada.

Structure Undercrossing of McAlister Lane on I-80N near LaGrande.  
Bridge #9634

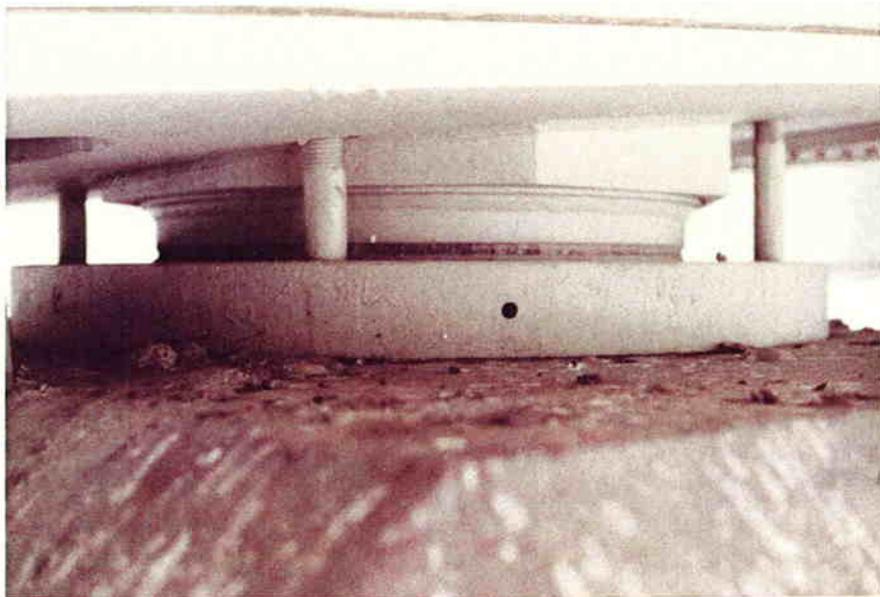
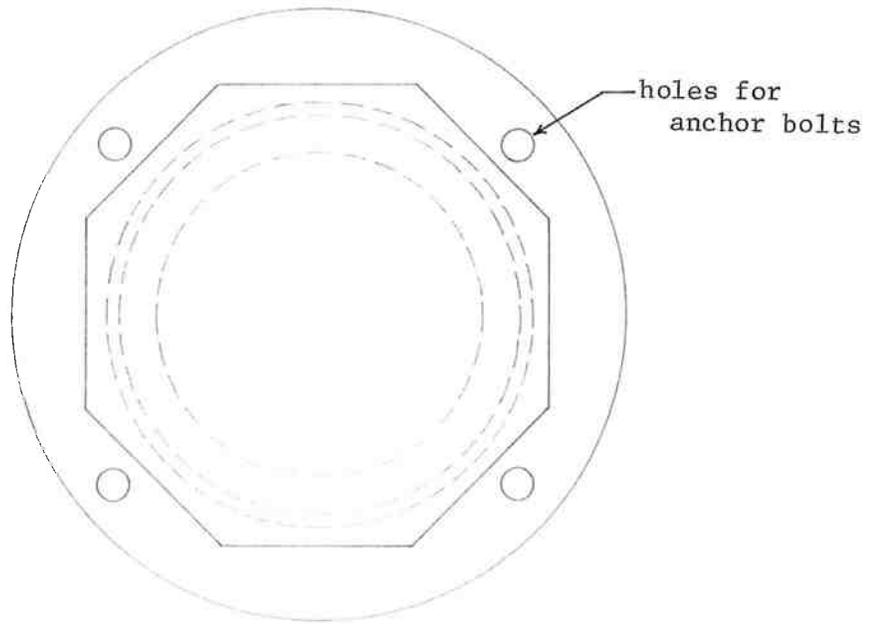
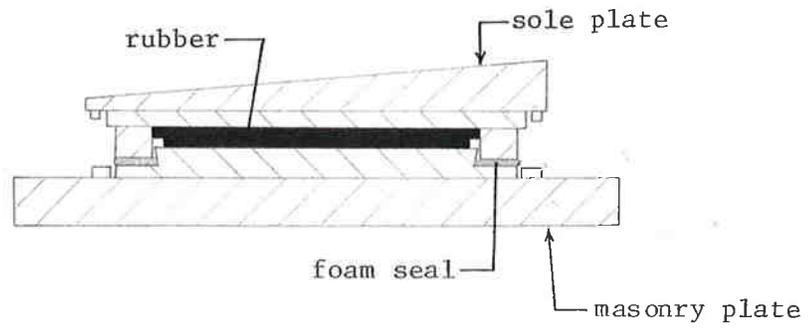
Location: Abutment 1 and Abutment 2

Remarks:

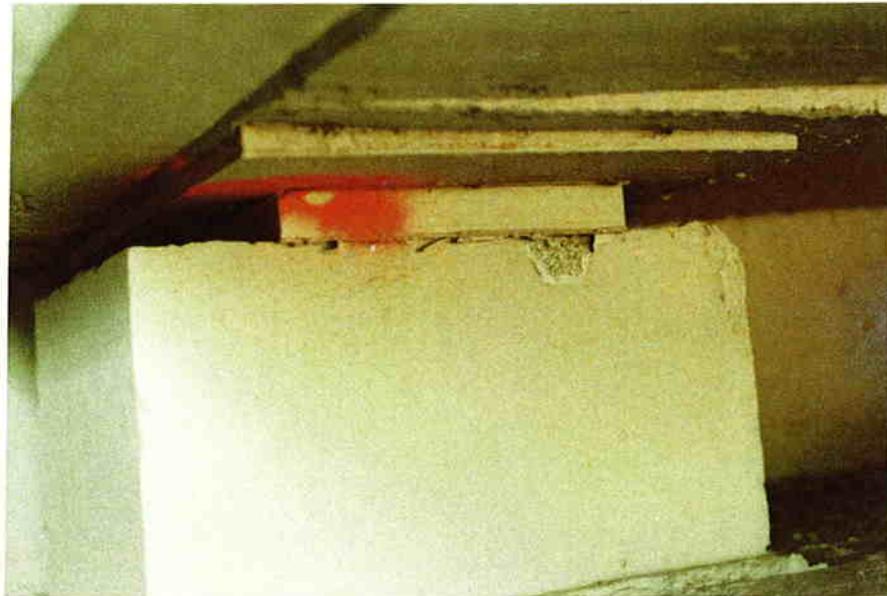
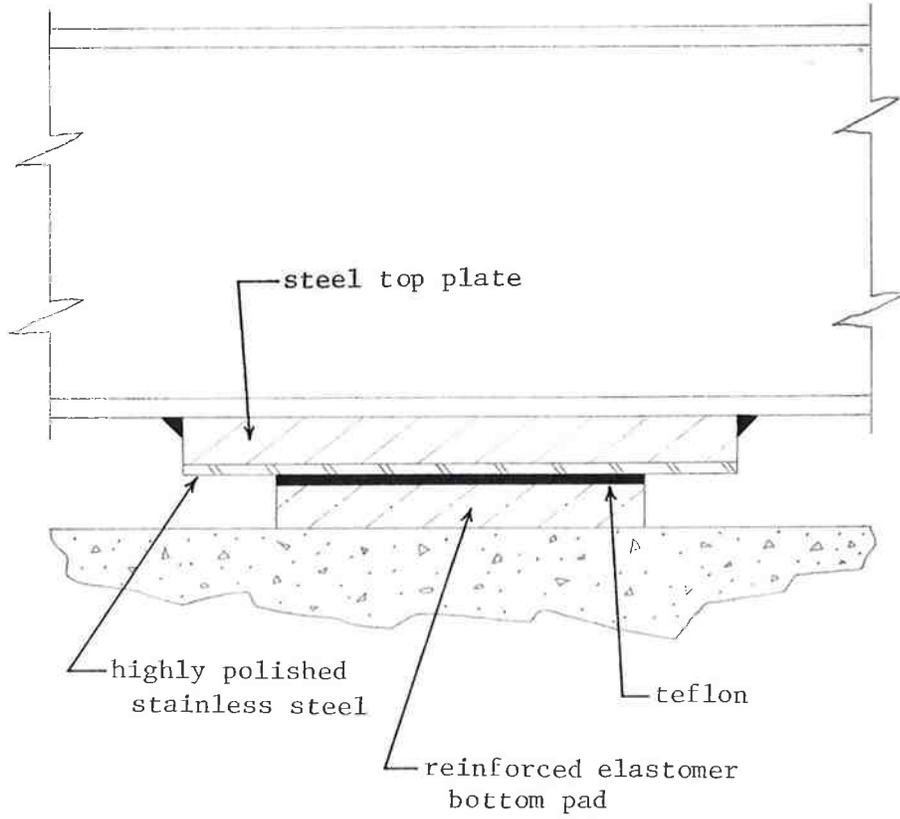
The Shortspan Type D Spencer bearings are not functioning as the design anticipates. The laminated elastomeric bearing pad has moved slightly on the concrete pedestal at several assemblies causing concrete spall. At two pedestals, the bridge has moved partially off the bearing pads due to unanticipated bridge shortening. Continued thermal movements of the structure will in all likelihood worsen this condition and require the bearing to be repaired.

The bearing design concept appears to be sound but a positive method of preventing the pad movement is needed before this bearing can be considered acceptable. This bearing is currently being marketed by Dixon-Spencer Ltd.

ROTA BEARING



SPENCER SHORTSPAN TYPE D BEARING



73  
• AUG

Bearing: LF100 and LE100 manufactured by Conenco International Limited,  
Toronto, Canada.

Structure: Undercrossing of Cove Avenue on I-80N near LaGrande.  
Bridge #9633

Location: Bent 2 and Bent 4

Remarks:

The Conenco expansion bearings are allowing movement as designed but early inspections found the 1/8" teflon slide plate located between the upper sole plate and lower masonry plate moving freely in several bearing assemblies. Although no problems have developed with the teflon plate, the potential for future problems clearly exists. In addition, small movement of the neoprene bearing pads which support the masonry plate has caused the concrete grout pad to crack and spall at several locations. An attempt to study these problems has been made but the manufacturer has not responded to two requests for detail shop drawings of the bearing assembly. Because of the stated problems and potential problem, these bearings are not recommended for use on future construction unless design modifications are made.

Bearing: Lubrite "F" manufactured by Merriman Inc., Hingham, Massachusetts.

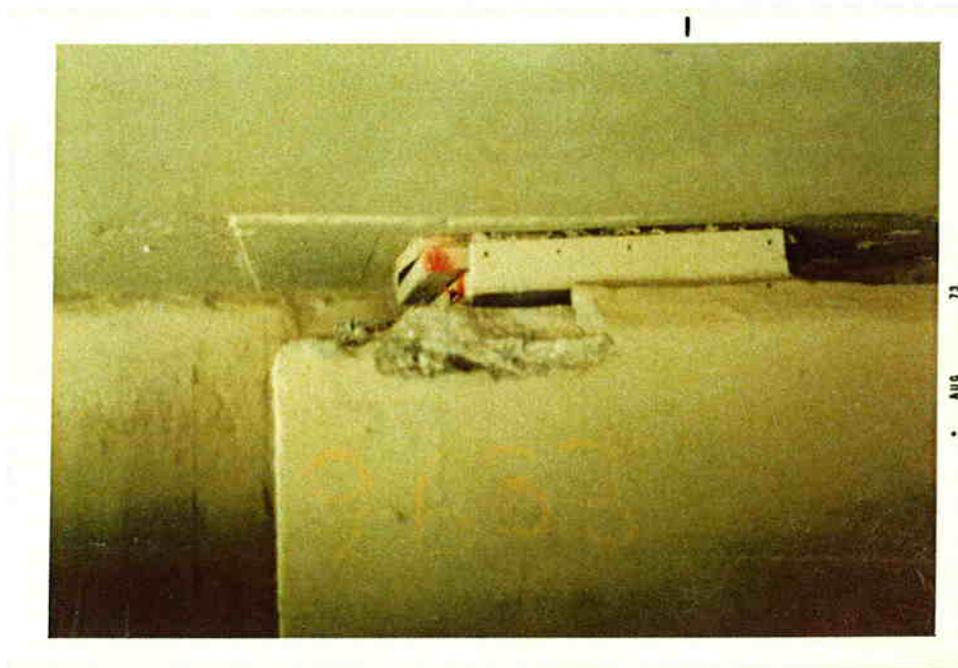
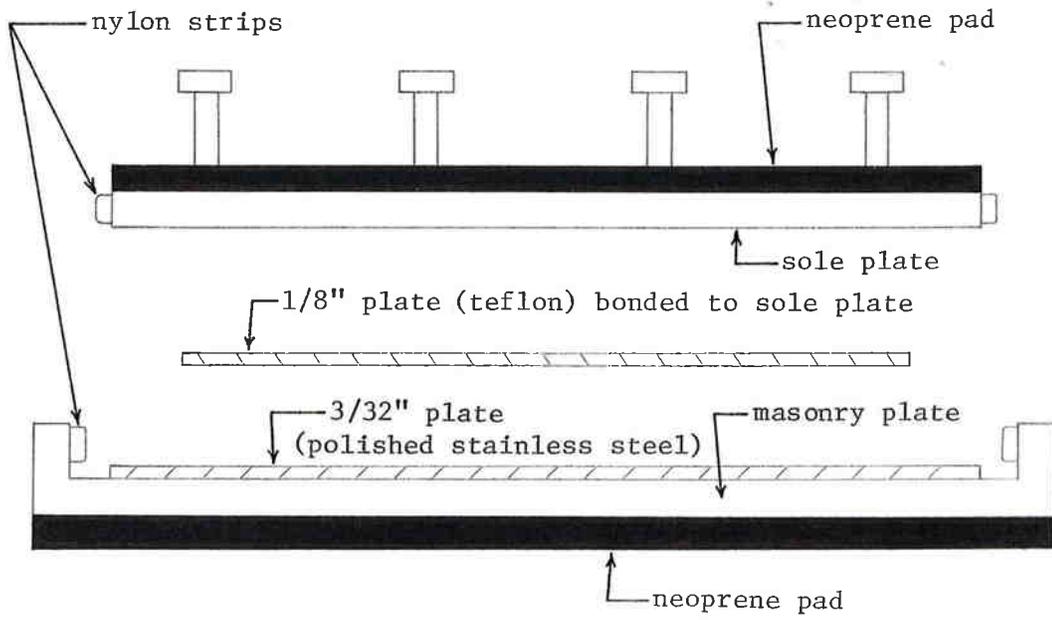
Structure: Overcrossing of Campbell Street EB and WB, on I-80N near Baker.  
Bridge #9515 and Bridge #9515A.

Location: Bent 2

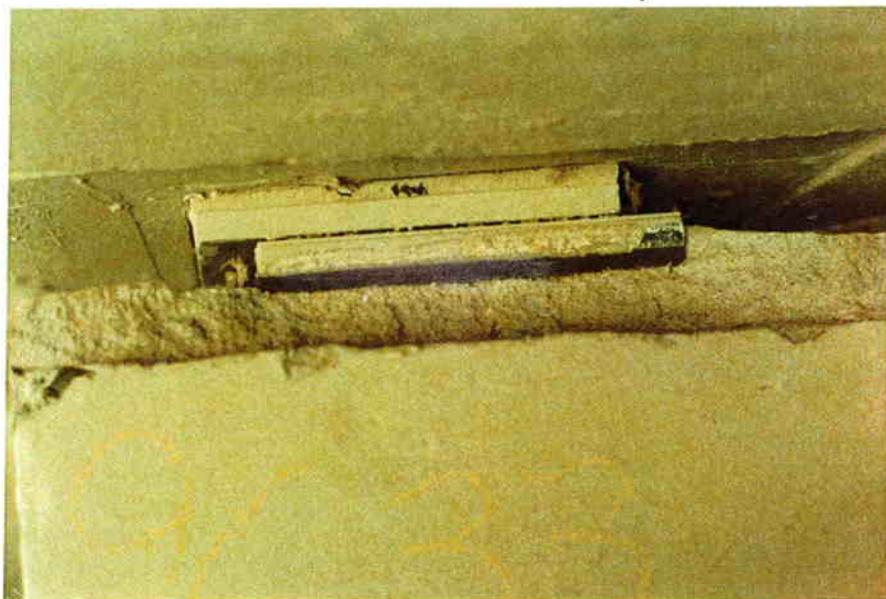
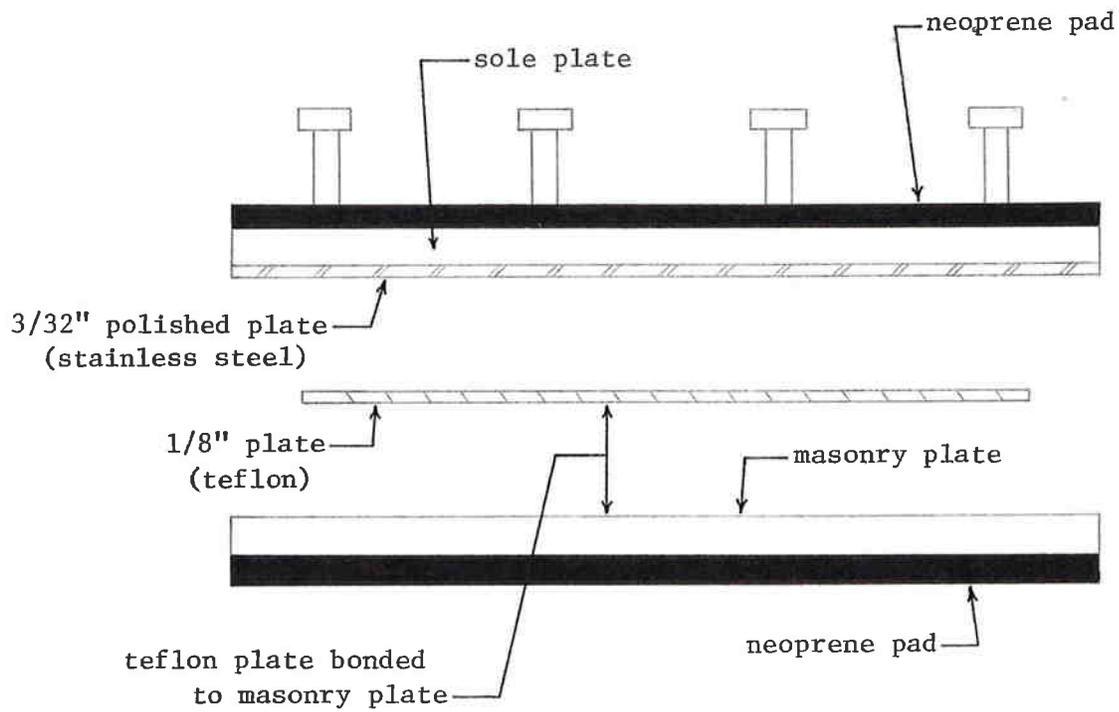
Remarks:

The Lubrite "F" bearings were reported to be in excellent condition and performing as designed. Continued use of this bearing is recommended.

CONENCO END BEARING  
LF - 100

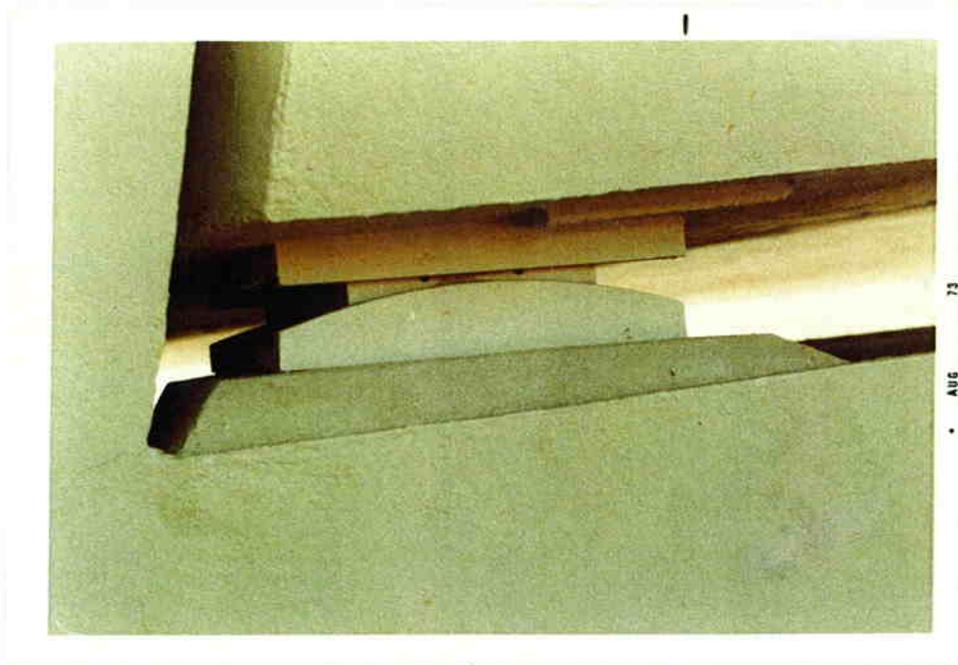
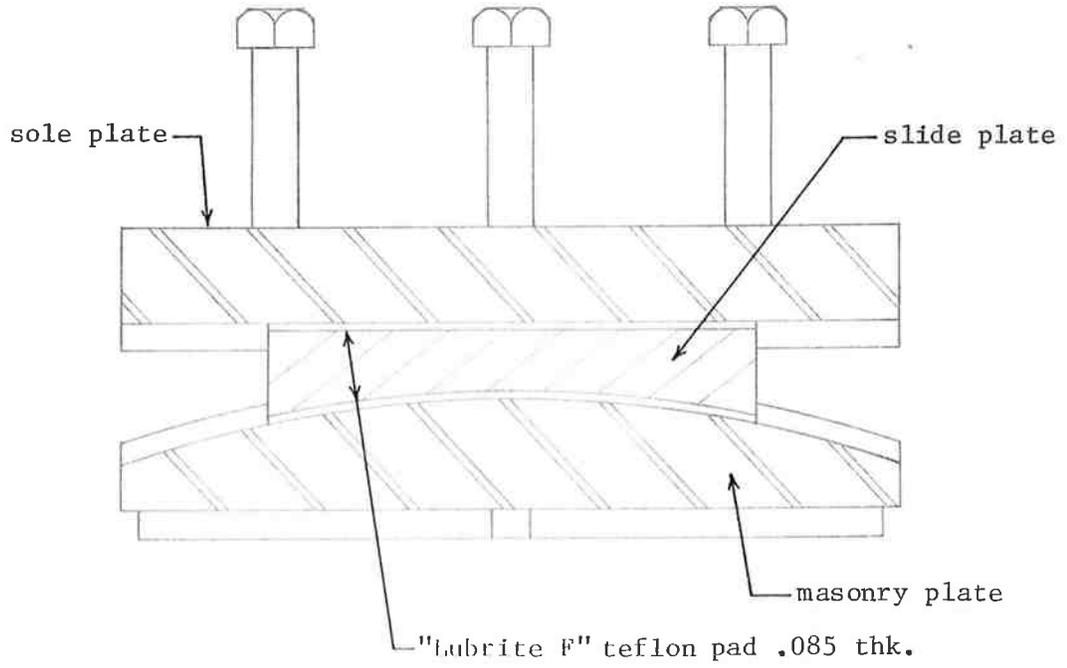


CONENCO INTERIOR BEARING  
LE - 100



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• AUG

"LUBRITE F" TEFLON BEARING



In summation, three bearing assemblies have been rated acceptable and recommended for further use while two bearing assemblies were judged unacceptable and are not recommended for use on future projects unless design modifications are made. One additional bearing studied was specially designed and fabricated and although it was acceptable, it will not be specified in the future. Currently, bridge contracts provide for the contractor to select among approved bearings that meet the design criteria listed on the bridge plans.