

OFFICE MEMORANDUM



MICHIGAN

STATE HIGHWAY DEPARTMENT

June 29, 1965

To: E. A. Finney, Director
Research Laboratory Division

From: C. J. Arnold

Subject: "Adjus-To-Grade" Manhole Casting (National Utility Products Co.).
Research Project 65 NM-143. Research Report No. R-534.

The National Utility Products Co. has submitted literature on its manhole adapters. The attached assembly drawing shows the method of adjustment, using dovetail-shaped inserts in sawtooth grooves in base channels, with stud bolt expanders for proper fit in existing manhole castings. Height of assembly is adjustable in 3/8-in. steps from minimum height of 1-1/2-in. through a maximum height of 4-3/8-in. The adapters are available to fit manhole castings from 19-1/2 through 38 in. diam. Use of these adapters eliminates the cost of raising manhole castings to grade by removal and resetting in concrete. Installation of the adapters reportedly can be done by one man in 15 to 30 minutes. The company reports trial installations in the cities of Akron and Cleveland, Ohio, with over 100 units furnished to the City of Akron for last year's re-surfacing program.

The company submitted a report prepared by John L. Fuller and Associates, the consulting engineering firm that coordinated tests conducted on the adapters by the Pittsburgh Testing Laboratories and Herron Testing Laboratories. A copy of the test report is attached. In the PTL test, load was applied to the assembly through a 1-1/4 in. thick cast-iron manhole cover by a 1,200,000-lb capacity testing machine. Tests were reportedly discontinued at 106,000 lb, when the manhole cover fractured. Herron Laboratories used a mount simulating a rusted manhole casting to support the assembly, and applied load with a testing machine through a steel disc 1-1/4 in. thick. The Herron tests were discontinued at 116,000 lb with only minor cracking of the sawtooth grooves of the assembly.

For a 25 in. diam adapter, assuming an ultimate shear stress for the Class 30 cast iron of 10,000 psi, and that at least 75 percent of the available area is engaged, the total shear area would be about 40 sq. in., and the theoretical ultimate supporting load would be about 400,000 lb. Of course, normal stresses due to bending will exist in addition to the shear stress and irregularities in the castings which would cause some

E. A. Finney

- 2 -

June 29, 1965

localized stress concentrations, accounting for the minor cracking reported in the Herron Laboratories tests. The reported 116,000-lb capacity without failure sounds quite reasonable when compared to the computed value of 400,000 lb.

The unit costs range from \$29.80 for the 19-1/2 through 22-in. size, to \$39.80 for the 32 through 34-in. size. Freight is allowed on orders of 100 units or more, and delivery is quoted from stock to three weeks. The company price list and a letter from Harold M. Bowman, President, are included in the attachments for reference.

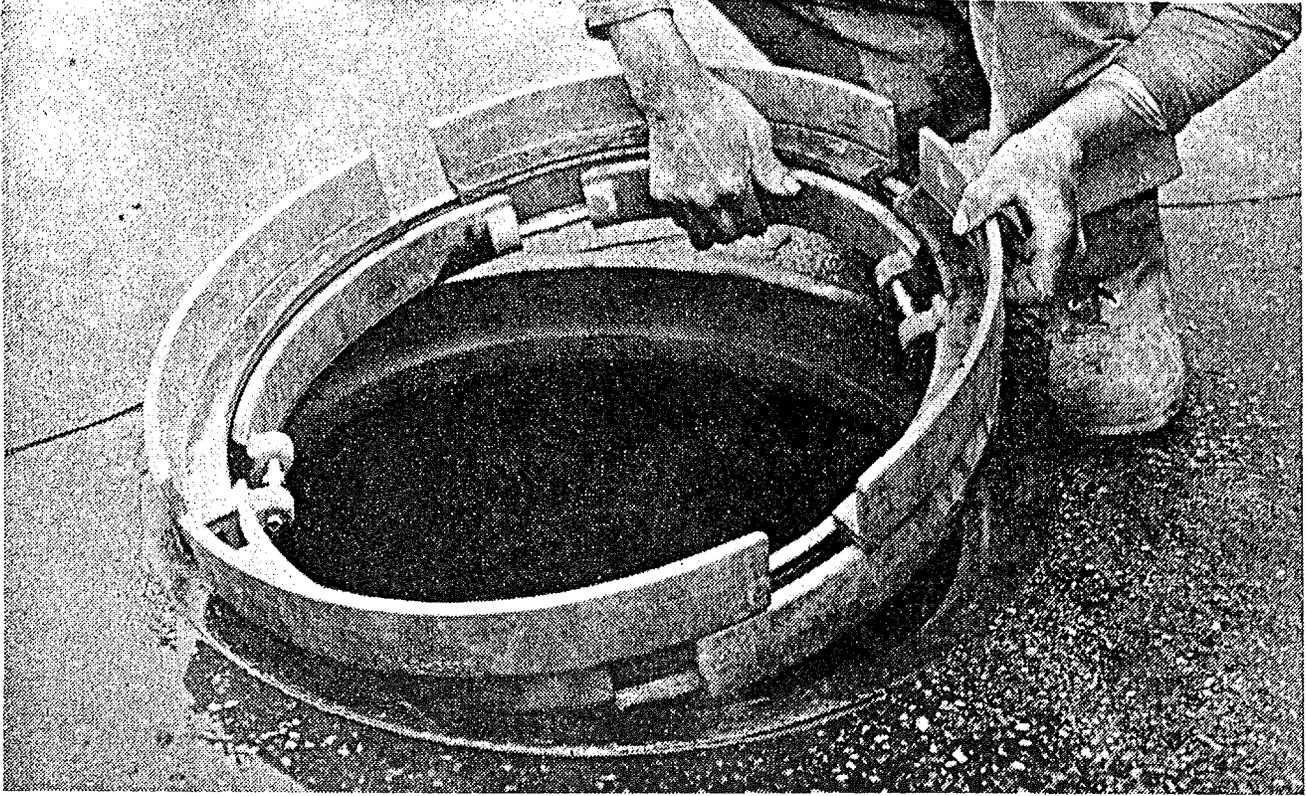
The old method of raising manhole castings to grade by removal and replacement of masonry is expensive and time consuming, and causes considerable disruption of traffic over a period of several days. The Adjus-To-Grade Adapter seems to provide a means of accomplishing the adjustment with minimum time, cost, and inconvenience. We recommend that the adapters be accepted by the Department, at least on a trial basis. If there is sufficient interest within the Department, the installations in Ohio could be inspected to see if any problems have arisen since the installations were made.

OFFICE OF TESTING AND RESEARCH

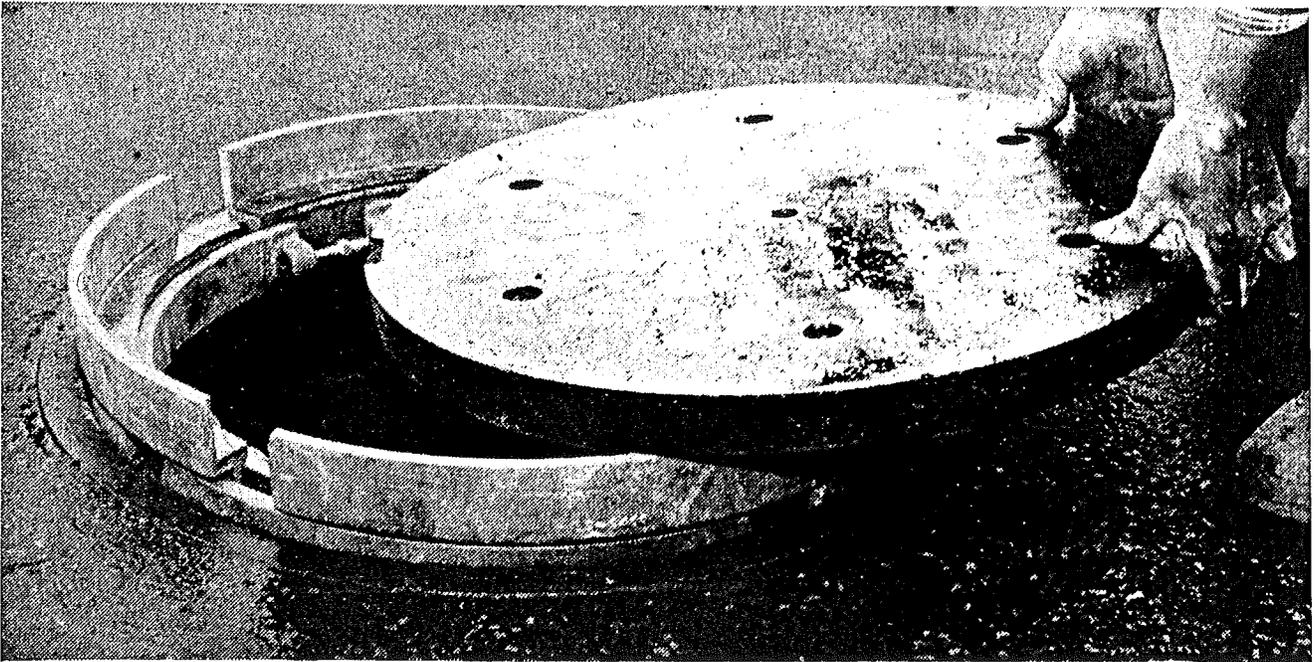


C. J. Arnold, Supervisor
Structures Unit

CJA:jk

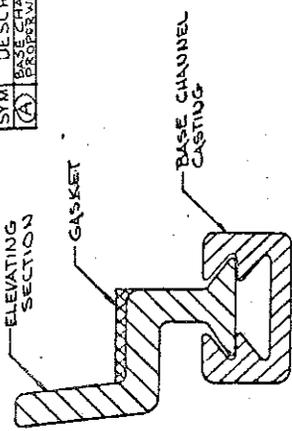


Cast iron, adjustable adapter locks into existing manhole . . .

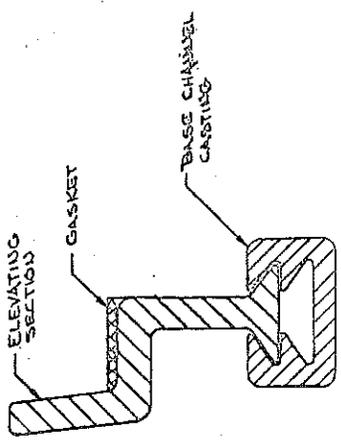


. . . eliminating manhole resetting on resurfacing projects.

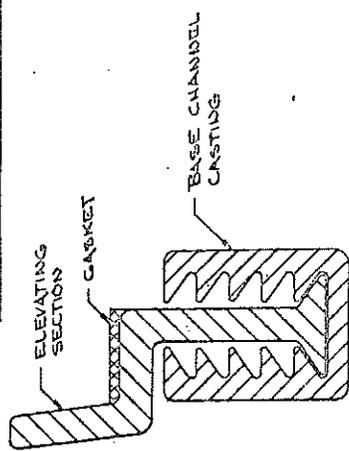
REVISIONS	
SYM	DESCRIPTION
(A)	BASE CHANNEL WAS NOT PROPER WITH LB-SERIES ASS'Y
DATE	APPROV
15-22-64	JLG



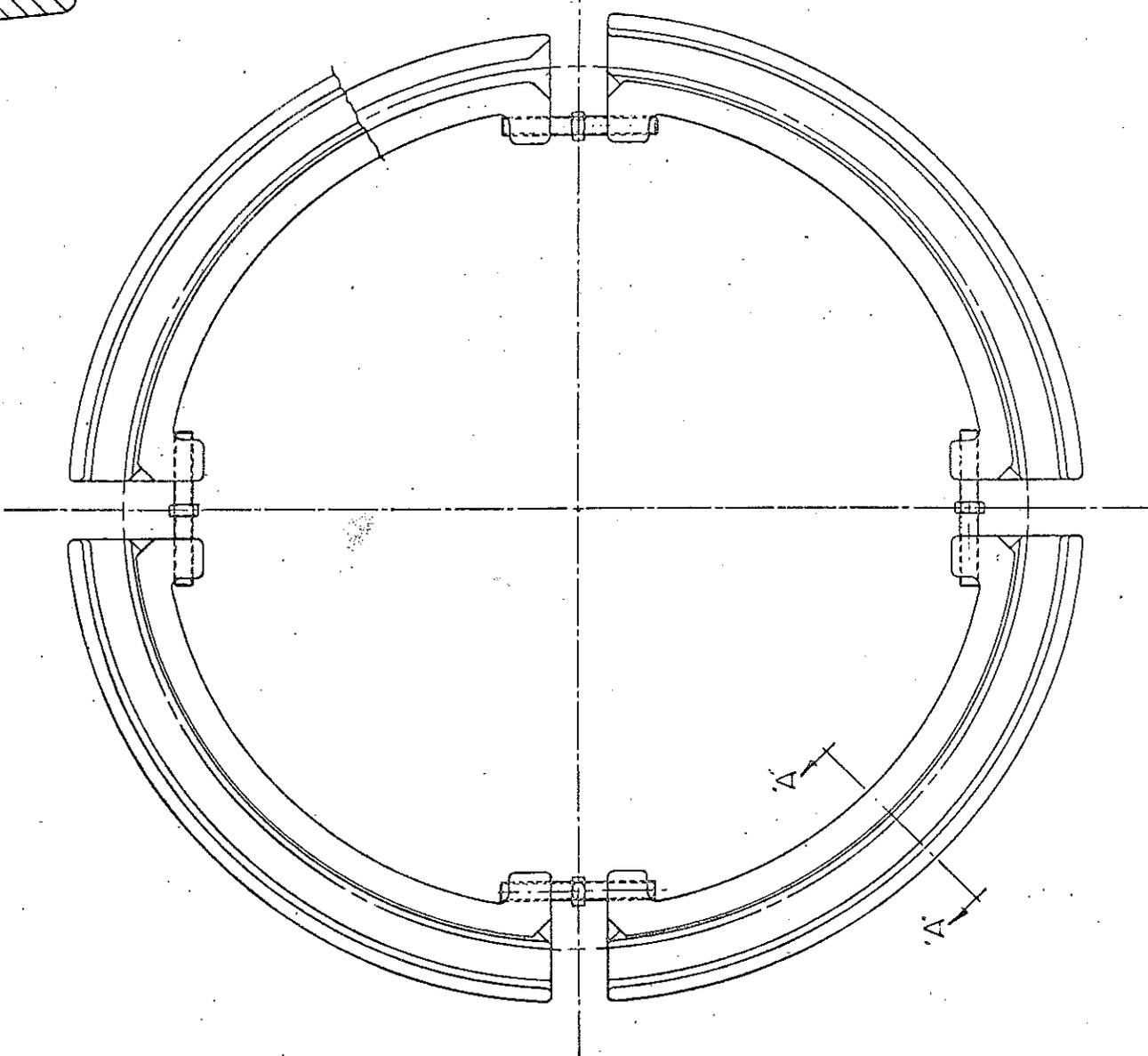
SECTION-AA SB-SERIES



SECTION-AA LB-SERIES (A)



SECTION-AA LS-SERIES



THE NATIONAL UTILITY PRODUCTS CO.			
ADJUS-TO-GRADE ASS'Y			
SCALE	BY	DATE	DRAWING NO.
	S.A.D.	3-18-65	C-1007
CHECKED	JLG	4-12-65	
RELEASED			
			SHEET NO. SHEETS

Ref: I-234
May, 1965

NUPCO TECHNICAL BULLETIN NO. 1

TESTING "ADJUS-TO-GRADE" COMPONENTS AND ASSEMBLIES

A. Summary:

To assure adequate strength of ADJUS-TO-GRADE components and assemblies, engineering testing has been conducted by independent Testing Laboratories, simulating loading modes occurring in field service. The testing was performed on various sizes of typical, randomly selected gray iron castings manufactured to ASTM A48 Class 30.

Compression test results of quarter-ring components demonstrated an average load carrying capacity per quarter-ring in excess of 50,000 lbs.

Compression tests of complete assemblies loaded through a man-hole cover were discontinued when no significant damage occurred to the ADJUS-TO-GRADE assemblies at 116,000 lbs.

B. Method of Testing:

1. Quarter-ring components.

Testing of quarter-ring components was conducted by two Testing Laboratories in essentially the same manner.

The Pittsburgh Testing Laboratory tested a quarter-ring assembly made up of a 25-2125U Channel Section and an LS-2500 Elevating Section, wherein the Elevating Section was installed on the highest support ledges of the channel. A loading pad of 1-1/4" steel plate burned to a radius to fit the man-hole cover seat of the Elevating Section, was placed on the vinyl gasket seat provided. The assembly was positioned for test under the 10 inch compression head of a 300,000-pound capacity Baldwin Universal Testing Machine.

Loading was applied until a sound indicated fracture of the assembly. Initial fracture was found to occur at the edge of the interlocking dovetail of the Elevating Section at about the center of the arc. Loading was resumed and continued to destruction of the assembly. Test results are summarized below:

Ref: 1-234
May, 1965

NUPCO TECHNICAL BULLETIN NO. 1

Page 3.

2. Complete ADJUS-TO-GRADE Assemblies (continued).

The testing conducted by Herron Laboratories was similar in nature to that performed by PTL, except that the support of the ADJUS-TO-GRADE assembly was changed and a 1-1/4" steel disc was used in place of a standard cast-iron man-hole cover.

To more nearly simulate the possible mounting condition of a badly rusted man-hole casting, in which the ADJUS-TO-GRADE assembly would be mounted on a narrow ledge at the outside diameter of the Channel Sections, the test mounting fixture was designed to provide only 1/4" mounting ledge at the outside diameter of the channels.

The test fixture and the complete ADJUS-TO-GRADE assembly made up of 24-2125U Channel Section and LS-2400 Elevating Sections, were placed in the 300,000-pound capacity Riehle Testing Machine and loaded by means of the 1-1/4" thick steel disc made to simulate a man-hole cover. The complete test assembly was then centered under the 10" ram of the testing machine. The load was applied until there was a noise indication of fracture, which occurred at 48,600 pounds. On examination, no damage was visible so the test was continued. Audible cracking noises were heard at 53,500 pounds and 69,750 pounds; however, since no damage was visible, the test was continued. With no further damage indicated, when a load of 116,000 pounds was reached, the test was considered more than adequate and was discontinued.

On disassembly, it was determined that minor fracturing had occurred at the edges of the dovetail of the Elevating Sections; however, in no sense had the ADJUS-TO-GRADE assembly even approached failure.

C. Conclusions:

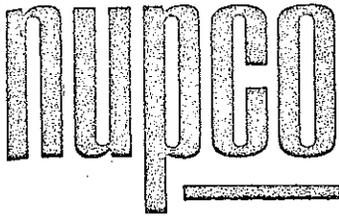
Based on the testing reported in the foregoing, it can be concluded that for any anticipated usage and loading of the ADJUS-TO-GRADE assembly, adequate strength with substantial safety factor is provided in accordance with good engineering practice.

Prepared by:

JOHN L. FULLER AND ASSOCIATES

R. R. Hayes, Partner
Ohio Reg. No. 26011

RRH:jsp



NATIONAL UTILITY PRODUCTS COMPANY • 10410 BEREA ROAD • CLEVELAND, OHIO 44102

PHONE: A/C 216 961-4720

PRICE LIST

<u>MANHOLE CASTING DIAMETER RANGE</u>	<u>MODEL NO.</u>	<u>PRICE EACH UNIT</u>
18½" thru 22"	LS-2100	\$29.80
	LB-2100	29.80
	SB-2100	29.80
22" thru 24"	LS-2300	29.80
	LB-2300	29.80
	SB-2300	29.80
24" thru 26"	LS-2500	29.80
	LB-2500	29.80
	SB-2500	29.80
26" thru 29"	LS-2700	36.80
	LB-2700	36.80
	SB-2700	36.80
28" thru 30"	LS-2900	36.80
	LB-2900	36.80
	SB-2900	36.80
30" thru 32"	LS-3100	39.80
	LB-3100	39.80
	SB-3100	39.80
32" thru 34"	LS-3300	39.80
	LB-3300	39.80
	SB-3300	39.80
34" thru 36"	LS-3500	Prices
	LB-3500	on
	SB-3500	request
36" thru 38"	LS-3700	Prices
	LB-3700	on
	SB-3700	request

F.O.B. Cleveland, Ohio

Freight allowed on orders with totals of 100 units or more

Terms: 1% - 10 days, net 30

Delivery: From stock to 3 weeks

Effective Date: December 31, 1964

CONDITIONS OF SALE

1. Delivery: F.O.B. our Factory, Cleveland, Ohio. Title to goods passes to purchaser on delivery to carrier at our factory, Cleveland, Ohio.
2. Acknowledgment of Orders: All orders should be addressed to our offices at Cleveland, Ohio, where they will be subject to acceptance and formal acknowledgment.
3. Terms: (a) 1% 10 days, net cash 30 days from date of shipment, subject to credit approval.
(b) Freight allowed on orders totalling 100 units or more.
(c) Prices are subject to change without notice and to be confirmed by us at time of placing the order.
4. Cancellation: Orders placed with and accepted by us are entered with the definite understanding that same are not subject to cancellation except by our written consent, regardless of whether, through causes beyond our control, delivery is delayed beyond original estimated date.
5. Defective Material and Workmanship: We shall replace without charge any Product sold by us which proves upon examination by us to be defective either in material or workmanship within a period of one (1) year from the date of shipment. This warranty shall not apply however if such Product has not been used under normal conditions, or if it has been altered or repaired by persons other than those authorized by us to service our products. This warranty is subject to our right at any time to make changes in, or discontinue any Product. We further warrant that the Products shall be fit and sufficient for the purposes for which we sell them. We shall not be liable to you or to any other person for liability for loss of time, or for any other consequential or contingent damages arising from the use or resale of the Products. You shall not deduct any charges for Products covered by these warranties from your balance due us until proper credit is received from us. We authorize no one to extend or alter the terms of these warranties, and they are in lieu of any and all other warranties, express, implied, statutory or otherwise.
6. Shipping Date: The shipping date named herein is based on present information, subject to change when order with complete specifications is received and accepted. The right is reserved by us to defer and postpone date of shipment on account of procedures or priorities set up by the United States Government or its agencies, because of production failures, or because of other conditions beyond our control.
7. Taxes: Prices quoted are subject to all applicable state and federal taxes.

Mr. C. J. Arnold

-2-

June 16, 1965

In addition to this, there were other tests conducted here with the City of Cleveland, Ohio. Five castings were put in for test and evaluation and we have been cleared with the City of Cleveland for use of the Adjus-To-Grade manhole casting for asphalt resurfacing work. This acceptance exists primarily in two ways: first, we are approved to sell to paving contractors who do the work for the city; and second, we are approved for the City of Cleveland itself in the work that they do with their own asphalt resurfacing crews.

We have contacted the State Highway Department of the State of Ohio in Columbus, Ohio, and have received two forms of acceptance of our Adjus-To-Grade casting. The first form of acceptance came last year in August of 1964 when our casting was approved by Mr. Willis Gibbony, who is the State Superintendent in charge of asphalt resurfacing. Secondly, Mr. Harold Krauser, Chief of Construction for the State of Ohio Department of Highways has also approved the use of our casting. This first approval was rendered that our product would be available for use if the contractor desired and petitioned the state for its use. The second approval has been secured on the basis that the State Highway Department inspected the test installations here in Cleveland and Akron, Ohio, and formal approval is being petitioned by the representative districts of the State Highway Department. In other words, we are hopeful that in the next one or two weeks we will have written authorization incorporated into the specifications of the State Highway Department of the State of Ohio for the use of our Adjus-To-Grade manhole casting. Our casting will not be spelled out by name; however, it will be referred to as a variable height adjusting paving device capable of diameter adjustment as well as vertical height adjustment.

In addition to this, Mr. Arnold, we have been quite successful during the 1964 and 1965 paving season in the sale of our Adjus-To-Grade manhole casting and we can assure you that all of the installations that have been put in so far have been warmly received. This work has taken us to Winter Haven, Florida; Paris, Tennessee; Rochester, New York; Niagara Falls, New York; and a number of other cities that, should you require, we can provide you with a list of our customers to date. We have closely followed all of these 1965 paving jobs to determine the effectiveness of our Adjus-To-Grade manhole casting and we can honestly and truthfully say that we are being written into the specifications after the first usage by all of the above-mentioned cities as well as other cities that have used our casting.

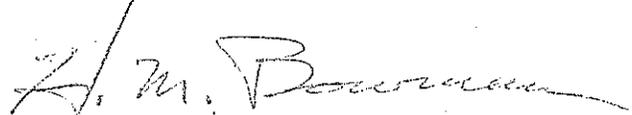
Mr. C. J. Arnold

-3-

June 16, 1965

We are of course, delighted that our product has merited this attention by the State of Michigan Highway Department and we hope that you will find our product to your liking and that we may be of service to you during this 1965 paving season. We can absolutely guarantee you that our product will continue to merit your interest. After you have had a chance to study our literature it will be my pleasure to personally contact you to see if we can serve you in any capacity. We wish to thank you again and should you require any additional information or if we can be of any help to you in any way, we would appreciate your contacting us.

Very truly yours,



Harold M. Bowman, President
National Utility Products Co.

HMB:by

Encl.