September 19, 1962

P.2.1.

MEMORANDUM

TO: S. T. Collier
Engineer of Specifications

FROM: W. B. Drake WBD.
Director of Research

SUBJECT: Proposed Specifications for
Non-Leafing Aluminum Paint for
Guard Rails and Bridges

As you know, Mr. Hopgood has been seeking a specification for a satisfactory, one-coat, non-leafing aluminum paint for guard rails and other uses. He has, as you may recall, been using an aluminum paint on his Bailey bridge sections (some limited experimental use on guard rails) which is manufactured by the Black Diamond Paint and Varnish Works, Cincinnati, and which he regards rather highly. In his memo. of Jan. 3, 1962, he advised that the Black Diamond Company had been invited to submit formulation information which would be suitable for specification purposes. They declined to do so inasmuch as certain portions or ingredients were proprietory. Subsequently, February 26, 1962, (per Mr. Hopgood's memo.) they offered an abbreviated formulation which was not specific enough for our purposes. Alternatively, and perhaps concurrently, consideration has been given to a number of formulations offered from time-to-time by the National Lead Company. Their interest emanates from the development of Special Specification No. 14-56b which, as you know, did not include an aluminum finish-coat as an alternate to the green finish-coat therein. That system of specifications was predicated largely upon the rust-inhibitive features of basic lead silico-chromate pigment as an alternate to red lead primer systems. Its companion specification (Special Specification 15-56) was predicated upon a special proprietory vehicle ingredient (Phenolic Resin Penetrating Liquid), and this specification did include an aluminum finish-coat as an alternate to green.

Aluminum paints of the leafing type, such as AASHO M69-54, possess no rust inhibitive properties; and I believe that it is Mr. Hopgood's opinion that the performance of this paint has not been satisfactory.

It is our understanding that the Black Diamond paint is a non-leafing aluminum containing some basic lead silico-chromate rust-inhibitive pigment and a small amount of phenolic resin in the vehicle. Non-leafing aluminums seem to be able to accommodate a fairly large portion of the basic lead silico-chromate pigment without sacrificing greatly the metallic luster of the aluminum pigment. Of course, non-leafing aluminums do not give as much luster as the leafing types.

Now, and in response to Mr. Hopgood's appeal, we have adapted National Lead Company's Formula No. T-12989 (to which he indicated a preference -- perhaps because of its higher luster) to the style and format of our specifications and are forwarding copies herewith. We have, as you will see, given it the title and status of "Special Provision" rather than "Special Specification No. __" because we have no prior experience or performance record to substantiate its adoption in that way. Although the paint is certainly experimental in this respect and insofar as we are concerned, it would perhaps further complicate its usage from Mr. Hopgood's standpoint if it were labeled as being experimental. You and Mr. Hopgood may have other preferences about that problem and even in regard to style and wording.

This paint should be compatible with the undercoat paints (also oil-alkyds) in Special Specification 14-56b, and we suggest that it might be used as an alternate finish-coat in that system. This paint should provide substantially greater film thickness than the usual aluminums and should adequately cover and hide in one coat; however, one-coat painting should be reserved for re-paint work only. A primer and intermediate coat such as in Special Specification 14-56b, are suggested as being suitable companion paints on new work.

Painting of weathered, galvanized steel, such as guard rails always involves some risk of peeling unless the surface is pre-treated with a wash-primer or etched with an acid zinc phosphate solution. This comment is made merely to call attention to the fact that this aluminum paint is not claimed to be any more immune to this hazard than ordinary paints are. The zinc producers claim certain advantages in painting new galvanized steel before erection and this advantage comes from the fact that the zinc surface can be more suitably prepared. Painting of new, un-treated galvanized surfaces almost invariably results in peeling. The idea of painting new galvanized steel is predicated on some indications that subsequent performance is superior to deferred painting and is more economical, in the long-run, than painting and re-painting un-galvanized steel. We, of course, can not confirm or deny such claims and are merely mentioning them here as a matter of record.

We apologize for the delay in preparing the specifications, but we hope that you will find it to be in good order so that you may proceed expeditiously.

JHH:DL
Encl. Proposed Special Provision for
Non-Leafing Aluminum...
cc: T. J. Hopgood
Director of Maintenance

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Commonwealth of Kentucky
Department of Highways

SPECIAL PROVISIONS

FOR

NON-LEAFING ALUMINUM, BASIC LEAD SILICO-CHROMATE
OIL-ALKYD FINISH-COAT PAINT FOR GUARD RAILS AND BRIDGES

These Special Provisions shall be applicable only when so indicated on plans, proposals, or invitations for bids and when so indicated shall supersede all conflicting requirements of the Department's Standard Specifications...

I. DESCRIPTION

These provisions cover the material requirements for a pre-mixed, non-leafing aluminum, basic lead silico-chromate, oil-alkyd finish-coat paint which is intended for use in one or two finish-coat applications. This paint is considered to be compatible with undercoat paints currently covered by Special Specification No. 14-56b and may be substituted for the green finish-coat, Para. IV, therein, when so indicated by appropriate notations on the plans, proposals, invitations, etc. This paint may be used for either new or re-paint work on bridges, guard rails, and other steel structures as may be designated. Undercoat paints, when required, shall be in accordance with Special Specification No. 14-56b.

II. GENERAL REQUIREMENTS

The paint shall be compounded in accordance with the formulation setforth herein, and it shall be factory-mixed and ready for use as

delivered. It shall not settle badly, gel, or cake in the container; and any sediment occurring shall be easily re-dispersed with a paddle so as to produce a smooth, uniform paint having good spreading characteristics. When brushed onto a clean, smooth, vertical, steel panel, the paint shall dry smooth and shall not sag or streak.

The paint shall be delivered in sealed, substantial containers having well-secured lids or covers. Each container shall be plainly labeled so as to show the name and address of the manufacturer, contract or purchase order number, specification identification, net contents, date of manufacture, and lot or batch number. Unless it is otherwise specified, the paint shall be furnished in containers having nominal volumes of five gallons.

III. SAMPLING AND TESTING

The Department reserves the right to analyze, test, or otherwise acquire information to determine whether or not the paint furnished complies with the respective requirements stated herein. Upon delivery of the paint to its proper destination, a representative of the Department shall obtain a 1-quart sample from each 500 gallons, or portion thereof, comprising each lot, batch or shipment. At least 10 days shall be allowed for tests and analyses. None of the paint shall be used until it has been approved by the Department's Testing Laboratory. Any lot, batch, or shipment which is rejected by the Laboratory shall be isolated and removed from the premises by the contractor.

IV. MATERIAL REQUIREMENTS

A. Composition of Pigment

	Min.	Max.
Aluminum Paste, Non-Leafing, 65% Non-Volatile, Typified by Alcoa No. 221 (Bulking Value - .0820), Percent by Wt., based on Dry Pigment		56.0
Basic Lead Silico-Chromate (ASTM D 1648) % by wt	43.0	
Organo-Montmorillonite, % by wt	0.8	1.2

B. Composition of Vehicle

Alkyd Resin Solution (TT-R-266a, Type I, Class A), 70% N.V., % by wt	50.0	
Raw Linseed Oil (TT-L-215a or ASTM D 234), % by wt	30.0	
Petroleum Spirits (ASTM D 235) % by wt		0.5
Aromatic Solvent (Incorporated in aluminum paste), % by wt	11.7	
Phenyl Mercury Oleate (10% Hg, 48% N.V.), % by wt	2.9	
Zirconium Catalyst (6% Zr), % by wt	1.1	
Cobalt Napthenate (6% Co) (ASTM D 600), % by wt	0.7	
Calcium Napthenate (4% Ca)	2.1	
Ant.-Skinning Agent, % by wt	0.3	
Methanol (for pre-wetting Organo-Montmorillonite), % by wt		0.1
Non-Volatiles, % by wt, of vehicle	71.2	
Phthalic Anhydride, % by wt. of N.V. vehicle	11.8	

C. Composition and Properties of Mixed Paint

	Min.	Max.
Pigment, % by wt.	28.0	
Vehicle, % by wt.		72.0
Non-Volatiles, % by wt. of paint	75.0	80.0
Weight per gallon (lbs.)	9.50	9.65
Coarse Particles & Skins Retained on No. 324 Sieve, % by wt.		1.0
Consistency (Krebs Units)	72.0	80.0
Drying Time:		
To Touch, hrs.		6
Dry Hard, hrs.		24