2000-1 Addison Circle

Sub Base Opinion – Stantech - 1996

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8 May 1996
Job No. 1596-0026

Mr. John Baumgartner, P.E.
Public Works Director
Town of Addison
16801 Westgrove
PO Box 144
Addison, TX 75001

Re: Addison Circle Subbase

Dear Mr. Baumgartner:

In accordance with your request, we are pleased to provide this opinion letter concerning the proposed alternate subbase at the referenced project. The main question is whether or not the proposed alternate would be equal in quality to the originally-specified subbase. The proposed alternate is to substitute either *in situ* or processed Austin Chalk for lime stabilized soil as subbase for concrete pavements. We understand that this proposal was made because street grading exposed the firm, tan weathered Austin Chalk in most areas. This weathered chalk is rock-like in appearance, much harder than soil, and would be difficult to process for lime stabilization. Since it has the appearance of rock, and crushed rock or gravel can often serve excellently as subbase, the substitution was suggested. It is our opinion that over time the chalk will probably react more like soil and therefore generally be an unsuitable subbase. This opinion is discussed in the following paragraphs.

The project may be described as a dense residential and/or light commercial development. It is obviously intended to be a high-quality development compatible with other area construction. We understand that the Town of Addison shares construction costs with the developer, Columbus Realty Trust. Huitt-Zollars is the civil engineer, Fugro-

McClelland (Southwest), Inc., the engineering laboratory, Gibson the prime contractor, and Drew Excavating a subcontractor. Original plans and specifications were for construction of a six-inch concrete pavement on a six-inch subbase of lime-stabilized subgrade soil. As described in the preceding paragraph, an alternate was proposed when the weathered Austin Chalk, rather than soil, was exposed by grading. The contractor excavated down only to rough grade in those areas with the firmest weathered chalk, and down to a depth of eight inches below rough grade in other areas. The contractor has since segregated excavated soil from chalk, obtaining the chalk primarily from on-site utility trenches and other below-grade excavations, placed it over a portion of the over-excavated areas, and processed it in-place with a high speed mixer.

Our first contact on the project was April 29th in a telephone call from Mr. Baumgartner. One or both of the undersigned visited the site soon thereafter and again May 6th. Mr. Baumgartner was present during the first site visit. Present during the second were Mr. Saad Hincidi, P.E., and Mr. Pat Nichols of Fugro-McClelland (Southwest), Inc., and Mr. Bryant Nail of Columbus Realty Trust. In between these visits, one of our technicians visited the site and obtained three samples of the possible or proposed alternate materials. During the second site visit, at which time some of the chalk had been processed, we obtained two more samples of the chalk material. While at the site, we examined the pulverized material and found it to have the properties of clay.

We believe that the question of subbase suitability should be examined first by considering the purpose of the subbase, how the originally-proposed material would satisfy this purpose, and then compare how the proposed alternate would perform. Since by far the most common type of pavement failure in this area is pothole formation or deflection caused by loss of subgrade support due to pumping, the main purpose of the subbase is to provide a non-pumping material beneath the pavement. Common pavement design and analysis procedures assume the presence of a non-pumping subbase. The second-most common type of failure is pothole formation or deflection caused by loss of support over volumetrically unstable soils such as expansive soils or poorly compacted fill. Therefore, the secondary purpose of the subbase is to provide uniform support as compared to

natural soils and/or subgrade which may dissected by utility trenches. Lime stabilized soil, when constructed properly, has proven to be suitable for these purposes.

The weathered chalk in its current condition is a relatively strong material. In fact, good non-pumping subbases generally provide better support for the pavement than the pumping clay subgrade soils common in the area. However, for concrete pavements, strength variations between support media can provide only minimal improvement to overall pavement life and load-carrying capacity. For this reason, we are of the opinion that the strength of the finally-selected subbase material is much less important than whether or not it will possess the characteristic of a non-pumping material.

One of our concerns with the proposed alternate is derived from our experience. The chalk appears hard and rock-like when first exposed, but weathers and degrades into clay over time. We have observed this more than once and have even seen very good quality Austin Chalk weather completely into clay during the normal life of a pavement. Our laboratory tests, attached, illustrate that the chalk possesses clay properties which will become evident during weathering. Additionally, it should be noted that the samples of crushed chalk that were placed in pans of water in our laboratory last week have already started to slake into clay. We are of the opinion that this would occur at the site.

With respect to the areas where harder tan weathered chalk is exposed at rough grade, we are of the opinion that these materials should weather more slowly. Good support may be provided in many areas for the full design life of the pavements. However, we feel that some areas, probably less than a majority, will weather into clay during the design life of the pavement and that there will be failures due to pumping and loss of support. This would be an obvious disadvantage to using the exposed chalk as subbase. Another disadvantage would be that utility trenches and natural variations in support will not have the ameliorating benefit of a constructed subbase. The main advantage of using the alternate in these areas would be the cost savings from omitting stabilization.

In summary, it is our opinion that the proposed alternate will not provide an equal subbase to the original design. In the over-excavated areas, at least, we believe that the

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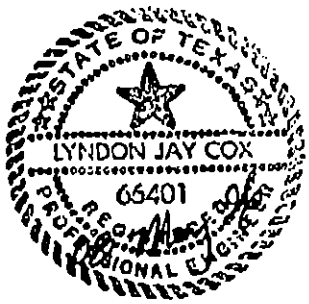
original specifications, modified as needed to account for the removal and replacement procedure that is being followed in lieu of processing in place, should be followed. In the other areas, those with the firmest exposed chalk, an evaluation can be made considering the cost savings. The cost savings due to use of the proposed alternate can be calculated; however, we know of no method to predict the cost of increased maintenance or reduced service life due to gradual weathering of the chalk into pumping subbase. In view of these uncertainties, we would be inclined to use the original specifications for the entire project.

We trust that these tests and opinions will meet your needs at this time. If there are any questions, or if we may be of additional assistance, please contact us at 631-4372.

Yours sincerely,
StanTech Engineering Co.



Lyndon J. Cox, P.E., Manager
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Client: Mr. John Baumgartner, P.E.
Public Works Director
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P.O. Box 144
Addison, Tx. 75001

Project: Addison Circle

Date: 8 May 96
ST Job No.: 1596-0028
Report No.: 01

SOIL/LIMESTONE ANALYSES SUMMARY

U.S. STD. Sieve Sizes (Total % Passing) ASTM C 136				Rec'd 05-03-96 Lab # 9039	Rec'd 05-03-96 Lab # 9040	Rec'd 05-03-96 Lab # 9041
2"				100	100	100
No. 4				27	26	32
No. 40				6	4	10
No. 200				0.7	0.6	1.3
No. 200	Decantation - ASTM C 117 (After 24 hours soaking)			35	47	20
Liquid Limit (LL) - ASTM D 4318				36	44	32
Plastic Limit (PL) - ASTM D 4318				17	18	16
Plasticity Index (PI) - ASTM D 4318				19	26	16

Sample Descriptions:

Lab Number 9039 - Tan Weathered Limestone
Lab Number 9040 - Tan Weathered Limestone with Very Dark Brown Clay
Lab Number 9041 - Gray Limestone

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