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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

RELEASED

DOT

MAY 21 1970

B-118653

Dear Mr. Vanik:

Reference is made to your letter of July 14, 1969, in which you requested our Office to review the circumstances concerning the construction of a section of Interstate Highway Route 71 in Cleveland, Ohio. In your letter you expressed concern relative to the increased cost on this project and raised questions on several specific items related to the project.

Although we have not completed our review, we have developed certain information related to the questions raised in your letter, and, as agreed with your Administrative Assistant, we are furnishing this information to you as an enclosure to this letter. Also, as discussed with you previously, we anticipate that, after our review is completed, we shall prepare a report on our observations. If so, a copy will be provided to you.

Our inquiries have shown that there have been significant construction problems, lengthy delays, and increased costs associated with this project. Although the project was fully opened to traffic in December 1968 and the Ohio Department of Highways had paid the contractor nearly all the monies due under the contract, there were a number of items still under consideration by the Federal Highway Administration with respect to the amount of Federal funds that ultimately would be provided to the State of Ohio as the Federal share of the project costs.

The enclosure was prepared from information obtained from records of the various organizations involved and from discussions with representatives of these organizations. Your attention is invited to the fact that these organizations, including the Federal Highway

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Administration, have not been given an opportunity to formally examine and comment on its contents.

We trust that this information will be of assistance to you.

Sincerely yours,

Comptroller General
of the United States

Enclosure

The Honorable Charles A. Vanik
House of Representatives

INFORMATION SUMMARY

RELATING TO THE CONSTRUCTION OF

A PORTION OF INTERSTATE HIGHWAY 71

IN THE CITY OF CLEVELAND, OHIO

INTRODUCTION

In May 1965, the Ohio State Highway Department--with the concurrence on the Federal Highway Administration (FHWA)--awarded a contract in the amount of about $14.5 million to the Arcole Midwest Corporation of Evanston, Illinois, for the construction of Ohio Project 79-65. This project provided for constructing a 0.713-mile section of Interstate Highway Route 71 (I-71), a 0.389-mile section of State Route 176, and a 1.1-mile embankment and drainage project on the right-of-way for a proposed section of Interstate Highway Route 80 (I-80) in Cleveland, Ohio. The contract provided that a segment of the main lines[1] was to be completed and opened to traffic by October 31, 1966, and that the project would be entirely completed by November 30, 1967.

The construction plans for the sections of I-71 and State Route 176 included in this project were prepared by Howard, Needles, Tammen & Bergendoff, Consulting Engineers, Cleveland, under a contract awarded by the city of Cleveland.

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[1]The main lines are the lanes and structures necessary to permit I-71 traffic to travel through the project area rather than detour around the project.

The plans pertaining to the embankment and drainage on I-80 were prepared by Alden E. Stilson & Associates, Ltd., also of Cleveland.

At the time of award, the construction contract was the largest dollar value contract ever awarded in Ohio for a highway project. The project itself was very complex in design, and much of the construction was confined to a relatively narrow and steep area between a hospital on the west and a large steel plant on the east. The narrow construction area (and conforming project design) resulted primarily from a decision not to take some portions of the steel plant or the hospital property for highway construction because of the substantial right-of-way costs that would be involved. (See app. II for a sketch of the project.)

Within the framework of the Federal-aid highway program, the States are responsible for initiating and carrying out highway construction projects and FHWA is responsible for reviewing and approving the actions of the States. The major State responsibilities include:

1. Preparing detailed plans, specifications, and estimates for construction of the projects.

2. Requesting bids and awarding contracts for the work.

3. Administering the contracts.

4. Continually inspecting the work of contractors during construction.

FHWA's major responsibilities include:

1. Reviewing and approving the plans, specifications, and estimates.

2. Concurring in the contract award.

3. Maintaining surveillance of the States' contract administration.

4. Making periodic inspections of the work during construction.

FHWA's responsibilities are carried out principally by its division offices located in each State. These offices receive advice and assistance from FHWA's regional and Washington offices.

In late June and early July 1969, a Cleveland newspaper published a series of articles on Ohio Project 79-65. The articles made certain assertions and concluded that the construction activities summarized below had resulted in additional costs and had substantially delayed the opening of the project.

--Commercial slag was purchased and used to complete an embankment rather than complete the embankment with material from the project.

--Certain piers supporting a double-decked bridge moved and cracked, necessitating substantial repairs.

--A one-lane haul road was constructed down the tree and lawn area of a city street (Willowdale Avenue) because residents objected to the use of the street itself for hauling earth from the project.

--Excess earth material planned to be hauled to another interstate highway construction site was discovered to contain too much moisture to be usable.

--A school and certain hospital coal silos adjacent to the project were damaged during construction of the project.

--The contractor claimed, and was paid for, extra costs arising from idle personnel and equipment and increased material and labor costs occasioned by various delays during construction.

Several major events which occurred during construction of Project 79-65 delayed the completion of the project and increased the total construction contract costs from about $14.5 million to about $20.2 million. The final cost of this project will be even higher than the contract costs because of (1) unresolved claims by the Cleveland School Board and the Cleveland Metropolitan General Hospital totaling about $800,000 and $469,000, respectively, (2) additional State costs estimated at approximately $584,000, and (3) costs of additional engineering studies by consultants totaling about $317,000. (See app. I.)

According to a State official, the State neither has taken nor plans to take any actions against the consulting engineers or the contractor with respect to any of the problems encountered in constructing the project. Generally, the State's basis for this decision is that there are no major errors in the plans developed by the consulting engineers and that the construction contractor has proceeded in accordance with the plans, using normal construction procedures. However, as discussed in more detail in this summary, there are a number of items still under consideration by FHWA with respect to the amount of Federal funds that ultimately will be provided to the State of Ohio as the Federal share of project costs.

The following sections of this summary contain information relative to the assertions set forth in the newspaper articles.

USE OF COMMERCIAL SLAG

Project records show that commercial slag was used to complete one of the embankments on this project at an estimated cost of about $333,000. The authority to use slag and the cost of the slag were added to the construction contract by change orders. The embankment on which the slag was used is about 73 feet high at its highest point and is situated on the north side of the project. (See app. II.) After completion, the embankment provided the earthen support for the north abutments[1] and for certain piers for a double-decked bridge and other structures.

Prior to the preparation of plans for this project, State tests of subsoils in the area on which the 73-foot embankment was to be placed revealed the presence of an extensive peat bog. Consequently, the project consulting engineer studied the area and the possible effects the soil might have on the embankment and the structures to be placed thereon. On the basis of this study, the consulting engineer concluded that the embankment would settle about 26 inches in a 9-year period and that most of the settlement would occur in the first 5 years.

In the final project construction plans, the consulting engineer therefore included a requirement that the embankment be placed and compacted 1 year prior to the start of construction of certain structures to be built in the embankment. This waiting period was subsequently reduced to 10 months for those structures associated with the main lines.

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[1]An abutment is that part of a bridge which supports one end of the bridge deck.

Work on this project began May 3, 1965, and the contract required that a segment of the main lines be completed and opened to traffic by October 31, 1966. In view of the 10-month waiting period for the embankment to settle and the relationship of the structures to be built in the embankment to the project main lines, it is apparent that, if the main-lines segment was to be completed by October 31, 1966, the 73-foot embankment had to be constructed at an early date. Apparently the contractor recognized the need for early completion and actually intended to complete this embankment prior to mid-November 1965, inasmuch as his proposed progress schedule showed that no earthwork operations were planned for the winter period--about November 15 1965, through April 15, 1966.

In September and October 1965, however, project material being excavated for use as embankment material was found to contain moisture in excess of specification limitations and was therefore unsuitable for use in the embankment. Because of the condition of the material excavated, much of the remaining project material was analyzed by the State during September and October 1965 to ascertain its suitability for the embankment. On the basis of these analyses, the State ultimately concluded that a minimum of 108,000 cubic yards of borrow[1] would be required to complete the embankment.

In order to meet the October 31, 1966, main-lines completion date, the State requested and FHWA approved the use

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[1]Embankment material brought to the project from an offsite location.

of borrow by the contractor to complete this embankment. From November 1965 through February 1966, representatives of the State, the contractor, and FHWA discussed the use of various methods and materials for completing the embankment. These parties decided that granulated slag[1] would be used. Pertinent project records show that slag was chosen as borrow because it would provide an embankment of unquestioned stability which could be placed during the winter months.

During February and March 1966, 111,000 tons of slag was purchased from a supplier in Lordstown, Ohio; hauled to the project site; and used to complete the top portion of the 73-foot embankment. The purchase and placement of the slag were estimated to cost $333,000, and the contract price was increased by this amount by change orders 11 and 16 dated March 28 and August 28, 1966, respectively. The State's basis for adding this cost to the contract was generally covered in the narrative section of change order 11 as follows:

> "*** The construction of the embankment *** critically affects the completion of the project. Due to anticipated settlement of the 40 to 80 foot high embankment, the plans provided for settlement platforms and piezeometers so that the settlement may be observed during construction and for a maximum term of ten months after completion of the embankment. In order to complete the embankment at the earliest possible date, it was deemed advisable to construct the embankment of granulated slag during the winter months. Since much of the soil available from plan excavation contains moisture in excess of the *** Specification limitation, and borrow is anticipated, it was determined necessary

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[1]A blast-furnace material consisting of silicates and aluminosilicates of lime cooled by steam or a jet of water.

to construct this vital embankment with unquestionable material."

Pertinent records show no evidence of any additional need for borrow material elsewhere on the project.

As of March 31, 1970, FHWA had not reached a decision as to the degree of Federal participation that may be allowed in the costs associated with the use of slag, pending resolution of certain questions raised by FHWA dealing with earthwork operations elsewhere within the project limits. These questions involve unresolved issues pertaining to earthwork operations on this project and resolution of the quantities of slag to be used and final prices to be paid for the slag.

In May 1966, the State requested FHWA's permission to waive the full 10-month settlement period for the 73-foot embankment because of the State's desire to expedite the project and open the main lines to traffic by October 31, 1966. FHWA did not agree that the settlement period should be shortened; however, it gave the State permission to shorten the period with the conditions that the State would assume the risks of this action and that FHWA would not participate in any added costs that might result from shortening the settlement period. The State accepted these conditions and started construction work before the conclusion of the 10-month waiting period.

DAMAGE TO BRIDGE PIERS

Project 79-65 included five bridges of various lengths and complexities. The longest and most complex of the five bridges--bridge 21--has two decks and is supported in the middle section by common piers.[1]

In order to bridge the Cuyahoga Valley, two large embankments were placed. An embankment 30 feet high at its highest point was placed in an area immediately west of bridge 21. This embankment is parallel to the double-decked structure and supports sections of the I-71 southbound lanes and other roadways. An embankment 73 feet high at its highest point provides support for the north abutments and certain piers for bridge 21 and other structures. This 73-foot embankment, discussed on pages 5 to 8, is northeast of and contiguous to the 30-foot embankment. (See app. II.)

Project records show that on May 31, 1966--about 1 year after the award of the contract--damage and/or movement of certain piers supporting bridge 21 was detected. Subsequent observations by State, contractor, and FHWA personnel disclosed that seven piers had cracked and/or moved.

Shortly after the damage occurred, the State engaged the project consulting engineer to make a study of the damaged piers to determine the extent of damage and the probable cause and to recommend appropriate corrective measures. In a report dated July 1, 1966, the consulting engineer stated that the probable cause of the damage was that placement of the 30-foot embankment for the I-71 southbound lanes

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[1]Piers that carry both decks of the bridge.

consolidated[1] the underlying subsoils and produced an underground eastward lateral movement that acted against the structures. See page 11 for a sketch of the relative positions of the embankment and piers.

In this same report the consulting engineer stated, in essence, that the subsurface investigations and the stability and settlement studies made during the design phase did not disclose any instability in the area where the 30-foot embankment was to be placed. The report also pointed out that, despite the absence of instability, normal precautions were taken by the consulting engineer by specifying in the plans that construction be performed in a predetermined sequence in which the embankment would be placed first so as to consolidate any underlying compressible materials before the bridge piers and retaining walls were built.

The report indicated that, although this sequence was normally followed on all Ohio Highway Department projects, it had not been followed on this embankment and that, if it had been followed, the subsoil movement would have probably been the same but the distortion of the structure would have been lessened or eliminated. The report stated that the reasons for the departure from the desired construction sequence were related to problems of location of utilities, earthwork availability, and the expedited construction schedule.

The project records showed that piers 10 through 18 were constructed prior to the placement of the 30-foot embankment

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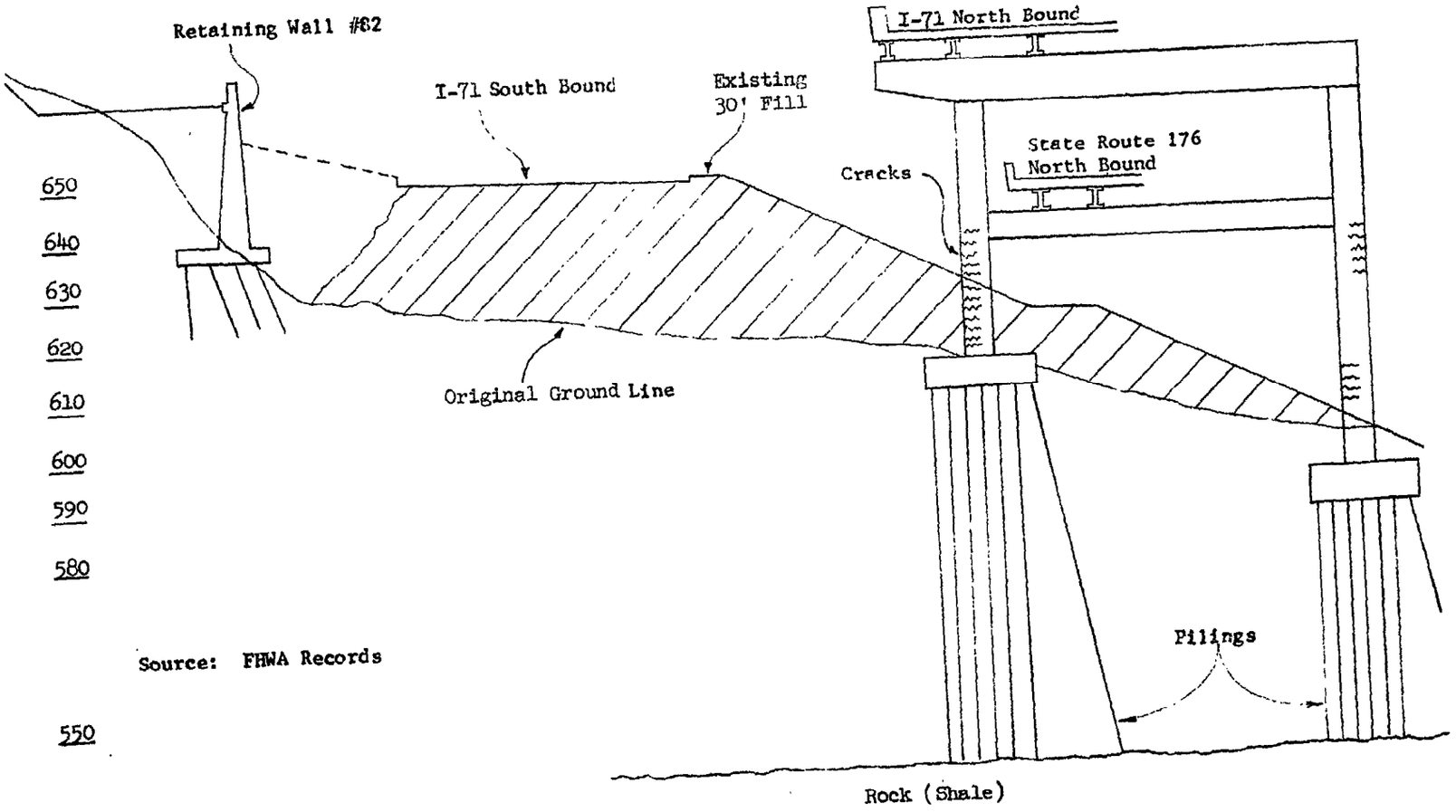
[1]Consolidation is the process whereby soil undergoes compression, expelling water as a result of weight applied to the soil.

Cross-Sectional Sketch Showing

Proximity of Piers and Embankment (at Pier 16)



Source: FHWA Records

ENCLOSURE
Page 11

and that pier 19 and the 30-foot embankment were constructed concurrently.

The State has established criteria, known as design regulations, to be followed in reviewing plans prepared by consultants. With regard to the sequence of constructing piers and embankments, the following State criterion was in existence and applicable to this project:

> "The embankment shall be placed and compacted up to the finished spill-thru slope and to the level of the subgrade for a distance of 200 feet back of the abutments after which excavation shall be made for the abutments and piers."

Concerning the same matter, the consulting engineer included in the construction specifications, as General Plan Note 6, the following requirements:

> "The embankment shall be placed and compacted to the finished spill-thru slope to the level of the subgrade as shown on the plans, after which the excavation shall be made for the abutments, piers and retaining walls that are set in the embankment material.
>
> "The embankment of Bridge No. 19, and at the north end of Bridges Nos. 21A and 21B, shall be placed and compacted one year prior to making the excavation for Piers 19AW, 20AW, 21AW, 20AE, 21AE, 22AE, and the north abutments of Bridge No. 21A, for Piers 20BW, 21BE through 28BE and the north abutments of Bridge No. 21B; for Piers 1, 2, 3 and the East Abutment of Bridge No. 19; and for retaining walls numbered 81, 81A and 81B within the limits of the embankment. Periodic reading of engineering control devices shall be made by the Engineer to ascertain the feasibility of decreasing the waiting period. In the event that all settlement of the embankment has ceased, the waiting period may be reduced. ***"

* * * * *

"Ten months for Piers 19AW, 20AW and 21 AW. Abutment AW and the portions of retaining walls numbered 81 and 81A that are set within the limits of the embankment."

The first paragraph of note 6 embodies most of the requirements of the State regulation and applies to project embankments in general, including both the 30-foot and 73-foot embankments. This paragraph is also related to comments addressed to the consulting engineer by the State Bridge Bureau following the latter's review of the consulting engineer's bridge foundation design recommendations. By letter to the consulting engineer dated July 9, 1964, the Bridge Bureau advised that the plans should indicate that the construction of any piers in an embankment area not be started until after the proposed embankment had been completed to the finished grades. As can be seen, the plan note states "in the embankment material," rather than "in an embankment area."

The second paragraph in note 6 contains specific cautionary language with respect to the 73-foot embankment and certain structures to be built in and on this embankment. The specific cautions of the note originated in an August 21, 1964, Embankment-Foundation Stability and Settlement Study performed by the consulting engineer. The Study, which preceded the contract award date by about 7 months, was occasioned by the discovery of an extensive peat bog located in and near the 73-foot embankment area. The consulting engineer predicted that the 73-foot embankment would experience a 26-inch settlement over a 9-year period, most of which would occur within the first 5 years.

After the damage to the piers, the interpretation of note 6 became the subject of much discussion during the period June through December 1966 between the State Highway Department, the consulting engineer, and the FHWA.

By letter to the FHWA Division Engineer dated January 26, 1967, the State Highway Department extensively detailed its position with respect to the damaged piers. Basically, the State's principal views were as follows:

--The consulting engineer's final plans did not incorporate the suggestion offered in the Bridge Bureau letter of July 9, 1964. Since the plans included a note having a different meaning, it was believed that foundation conditions were such as to permit construction without special control methods other than where the footings were in the embankment.

--The specific delineation of certain structures in note 6, which were not to be started in the completed embankment until after a waiting period, was interpreted by the contractor and the State engineer as meaning that there were no restrictions on starting substructures which did not require placement of footers or piling in new embankment material.

--Had the consulting engineer intended not to permit the start of construction of the piers until all work had been performed on the slope above the piers, a specific statement to this effect would have been included in the plans.

--All phases of the design as shown in the plans were approved by the State and FHWA.

--At no time during the inspections of the project from July 1965 to June 1966 by representatives of FHWA or the consulting engineer were any questions raised with respect to the sequence of construction.

In summary, the State took the position that construction tion proceeded according to the plans and under the constant supervision of State and FHWA personnel and that there were

no significant deviations from the procedures provided in the plans. Therefore, the State concluded that the cost of the modified methods required to correct the damage and to complete the facility must be a project cost eligible for full Federal participation. The State indicated agreement with the consulting engineer as to the forces which caused the damage to the piers.

The consulting engineer in his July 1966 report stated that the cautionary advice contained in note 6 relative to the 73-foot embankment and related structures did not, by their existence, preclude the same or similar treatment of other structures in or adjacent to any embankment. He stated also that the existing State design regulation required the placement of embankments before the construction of structures. With respect to the difference between the wording in the Bridge Bureau's recommendation of July 9, 1964, and the wording of note 6, the consulting engineer stated that the Bridge Bureau was only communicating a concept and that there was no requirement that the Bridge Bureau's exact words be used in the plans. Moreover, the consulting engineer stated that embankments should be placed before beginning work on adjacent structures and that the intention was that this sequence should be followed with respect to the 30-foot embankment as well as to the 73-foot embankment. The consulting engineer stated also that, in view of the foregoing conditions, any additional caveats would have been unnecessary.

FHWA initially was of the opinion that the costs to correct the damaged piers were not eligible for Federal participation. This view was apparent in internal FHWA correspondence concerning the State's request for FHWA approval of

change order 21 to the contract which provided for increased costs due to controlled placement of the 30-foot embankment which became necessary after discovery of the damage to the piers.

In a letter dated October 18, 1966, to the Director of FHWA's Office of Engineering and Operations in Washington, D.C., relative to change order 21, the FHWA Regional Administrator expressed the belief that the plan notes were self-explanatory and that good construction procedure dictated the placement of an embankment prior to erecting structures. He pointed out that the piers were not designed to take a horizontal load, such as the one that damaged the piers, and that it should have been obvious that the construction procedure followed was not sound and involved some risk. Moreover, he pointed out that the primary responsibility for, and control of, the project rested with the State Highway Department and that in the fall of 1965 FHWA Regional and Washington representatives visited the site and observed that the soil problems were complex and that project personnel were not exercising adequate control over the construction of embankments.

As a result, the FHWA Regional Administrator advised the FHWA Division Engineer to inform the State that the cost of change order 21 would not be eligible for Federal participation. Later, however, as a result of various meetings and correspondence, including the State's letter of January 26, 1967, FHWA reversed its position, and, in a letter dated March 6, 1967, the Director, Office of Engineering and Operations in Washington, D.C., authorized Federal participation in the cost of repairing the damaged piers. The justification for this decision in the March 6, 1967, letter stated that:

> "*** acceptance is given that the construction operations were performed in the manner intended by the State and in substantial conformity with the State's plans for the project, but that the higher than normal risk assumed by adopting and then following such construction operations was a judgment decision by the State not objected to by Public Roads and probably not recognized or known by Public Roads engineers."

Although this letter specifically authorized Federal participation only in the costs involved in change order 21, the Director, Office of Engineering and Operations, indicated that there would very likely be other change orders submitted for repairs to the damaged piers. He therefore stated in the letter that, having accepted liability for participation in change order 21, there would be little or no basis to withhold participation in other change orders for corrective work occasioned by movements of the piers adjacent to the constructed embankment.

Damaged piers 14 through 19 were subsequently repaired, and the contract price was increased by about $1.4 million to cover the cost of repairing the piers. (It was determined that pier 13 was not sufficiently damaged to require repair.) Included in this amount, but not separately identified, is the cost of repairing pier 19 which the FHWA has not accepted for Federal participation because pier 19 was actually located in the 73-foot embankment and, as mentioned on page 8, the State chose not to wait the required 10 months for the 73-foot embankment to settle before constructing pier 19.

WILLOWDALE AVENUE HAUL ROAD

In acquiring right-of-way for Project 79-65, land owned by the Riverside Cemetery Association was taken by the State. As part of the right-of-way settlement with the Riverside Cemetery Association, the State agreed to have two ravines in the cemetery filled with excess excavation material from the project. This plan was worked out in cooperation with the city of Cleveland and was included in the items of work on which the construction contractors bid. Pertinent records showed that this plan would (1) result in savings in the construction contract costs because an area for placing excess project material would be provided near the project site, (2) enable the ravines to be turned into usable land, and (3) eliminate the ravines which were considered a nuisance.

Willowdale Avenue was considered the only route by which material could be hauled from the project site to the cemetery ravines. Inasmuch as there was no direct access to Willowdale Avenue from the project site, the city of Cleveland provided an outlet across city-owned land which connected the project site to the city street system.

The contractor used Willowdale Avenue as a haul road until July 1965 when the local residents barricaded the street because of their concern for the safety of children and because of the disturbance caused by the trucks. As a result of a petition by the residents, the contractor was prohibited from using the street. Subsequently, the city granted the contractor permission to use an area adjacent to Willowdale Avenue for hauling the material.

By a contract change order initiated in September 1965, the State authorized the contractor to erect a fence along the north curb of Willowdale Avenue and to construct a one-lane slag roadway in the adjacent area between the fence and an existing cemetery fence. This change order also covered the removal of this roadway and the restoration of all disturbed areas to their original condition. The records do not indicate that any improvements were made to Willowdale Avenue as a result of constructing the haul road.

The change order authorizing the work showed a total amount of $64,073 which comprised (1) additional costs of $63,054 to place the cemetery fill, (2) a credit of $7,022 for compaction not required for the cemetery fill, and (3) additional costs of $8,041 for the construction and removal of the haul road.

The State's 1963 Construction and Material Specifications require that all excess material disposed of outside the limits of the right-of-way be at the contractor's responsibility and expense. However, the State considered it necessary to compensate the contractor for the additional costs, inasmuch as they were incurred because of restrictions imposed by the city after the award of the contract and the start of work and not by circumstances controllable by the contractor.

The State did not request Federal participation in the additional costs to place the cemetery fill and to conctruct and remove the haul road. Instead, the costs were borne by the State and the city in the ratio of 95 percent and 5 percent, respectively.

EARTHWORK PROBLEMS

Certain property owned by the Jones & Laughlin Steel Corporation was also taken by the State for Project 79-65 right-of-way. As a part of the negotiated right-of-way settlement with Jones & Laughlin, the State agreed to acquire for Jones & Laughlin an option to buy 10.18 acres which had been severed from lands owned by the Riverside Cemetery Association by the project right-of-way and which abutted Jones & Laughlin property. The 10.18-acre tract was a large hillside, and the State agreed to excavate it to a certain elevation approximating the level of the existing Jones & Laughlin facilities if Jones & Laughlin exercised the option acquired. Jones & Laughlin exercised the option, and the plans show that more than 862,000 cubic yards were to be excavated from the hillside. (See app. II.)

The Director of the State Highway Department proposed that the invitations for bids for the project include alternative methods of accomplishing this work; that is, either (1) excavate the hillside to the specified elevation and waste the material or (2) excavate the hillside to the specified elevation, haul approximately 609,000 cubic yards of the material to another project on I-80 about 10 miles away for use as embankment material, and waste the remainder. The FHWA Division Engineer concurred in this proposal.

The contractor bid $1.35 a cubic yard under the first alternative and $1.85 a cubic yard under the second alternative. The $1.85 bid was to apply to all material excavated from the hillside, although all the material was not to be hauled to the I-80 site. The State's comparison of the bid prices with the estimated costs of constructing the embankment of I-80 by

other means showed that accepting the contractor's proposal would save approximately $330,000. FHWA concurred in the award of the contract on the basis of the second alternative at the $1.85 unit price.

The hillside work was performed by a subcontractor who began work in May 1965. Initially, the subcontractor hauled suitable material to I-80 and unsuitable material to a dump. As work progressed, a high proportion of excessively wet soil was encountered and the contractor employed a consultant to examine the hillside material. On September 21, 1965, the consultant advised the contractor that the hillside was composed of a lacustrine[1] material, high in moisture content, and concluded that the material could not be used as embankment material because of the excessive moisture content. The State tested the hillside in September and October 1965 and concurred in the conclusions of the contractor's consultant. It should be noted that, prior to the tests taken in September and October 1965, the hillside material had not been tested for its suitability as embankment material. The decision to have the material hauled to I-80 was apparently made on the assumption that about 609,000 cubic yards of the material would be suitable for use as embankment material.

In view of the results of the material tests, the State was of the opinion that the contractor should be allowed to waste the hillside material. FHWA stated, however, that it believed that the material should be hauled to the I-80 site with the view that it later could be manipulated and worked to a point where it would be suitable for the embankment.

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[1]Sediment deposited by a lake.

Consequently, the State instructed the contractor to haul the material to I-80 but waived the requirement that the material be compacted. Prior to this decision, the contractor had already wasted substantial quantities of unsuitable material. The exact amounts of material wasted or hauled to the I-80 site had not been determined at March 31, 1970.

With respect to the method of payment to the contractor, the State's 1963 Construction and Material Specifications contain two methods of payment for excavation and embankment. One method (method A) provides for separate payment for excavation and embankment and the other method (method B) provides for the payment of a single unit price for both excavation and embankment as measured by the amount of excavation only. Method B was incorporated in the invitation for bids and in the construction contract.

The State informed FHWA that, under the terms of the contract, the contractor must be paid $1.85 for each cubic yard of material excavated from the hillside area regardless of where it was placed. FHWA's position, however, is that this procedure is not in accord with the intent of the plans and that the $1.85 rate should be paid only for that material hauled to I-80 and compacted. For material hauled to I-80 and not compacted, FHWA has stated that it believes that a deduction should be made for compaction work not performed. For the material wasted and not hauled to I-80 FHWA's position is that payment should be at the $1.35 rate included in the contractor's original bid.

In March 1966, FHWA reduced the project agreement for the I-80 embankment portion by $391,020, pending determination of the actual cost of providing the embankment. The different viewpoints and the degree of Federal participation that would be allowed for the cost of excavation and related work as still unresolved at March 31, 1970.

The newspaper articles discussed on page 3 of this summary made reference to an extra payment to the contractor of $193,000 over and above the $1.85 a cubic yard for handling wet material. The pertinent records do not show a $193,000 payment, although there were additional costs of $181,497 associated with earthwork on the project as shown below.

Grade and level material at I-80	$ 1,555
Lime experiment	15,339
Hauling 28,000 cubic yards of soil to I-80	66,062
Waste 79,000 cubic yards of soil	98,541
Total	$181,497

The contractor graded and leveled wet material previously hauled to I-80 that was too wet for embankment, at a cost of $1,555. The lime experiment consisted of determining if lime could be mixed with wet soil to make it suitable for embankment. The experiment proved that this method was feasible, but the costs of stabilizing soil in this manner were considered prohibitive and the experiment was discontinued.

Project documentation indicates that, as a result of the contractor's (1) using slag for a portion of the 73-foot fill, (2) not performing part of the cemetary fill, and (3) not constructing the retaining walls at the Buhrer School location, there was an excess of about 107,000 cubic yards of excavated earth. The change orders covering this subject

indicate that the above made it necessary for the contractor to waste a larger quantity of material than was originally intended. The State instructed the contractor to haul this material to I-80 and to attempt to use it as embankment material and also to maintain cost records for this operation. The cost of about $66,000 for hauling 28,000 cubic yards of soil to I-80 was not economical and the hauling was discontinued. The contractor wasted the balance of this material--about 79,000 cubic yards at a unit price of $1.25 a cubic yard, or about $98,500.

FHWA agreed to participate in the cost of the lime experiment and the cost of grading and leveling the I-80 material but, at March 31, 1970, the amount of Federal participation, if any, in the remaining costs had not been determined, pending a review of the finalized quantities for earthwork items.

DAMAGE TO PROPERTY

According to the newspaper articles, a school building and certain hospital coal silos located adjacent to the project were damaged during construction of Project 79-65. The school was the Buhrer School; the silos were owned by Cleveland Metropolitan General Hospital.

Buhrer School

Buhrer School was situated on the west side of the northern limits of the project. (See app. II.) The school was originally built in 1883, an additional area was added in 1897, and a gymnasium was added in 1939. In 1965 the building housed a public elementary school accommodating approximately 560 pupils.

The plans for the highway construction near the school were designed to provide a limited effect on the school property. The plans required the construction of two retaining walls (to preserve the school buildings and lands) and a pedestrian bridge over the highway. The contract specified that these structures be completed by September 1965 to coincide with the beginning of the school year.

The plans also called for a temporary easement 7 feet from the east side of the building to provide the contractor with working space in which to build a cofferdam[1] and subsequently construct the retaining walls and bridge abutment. The plans did not indicate, however, the existence of a

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[1]A temporary structure consisting generally of sheeting driven into the ground and braced to resist pressure.

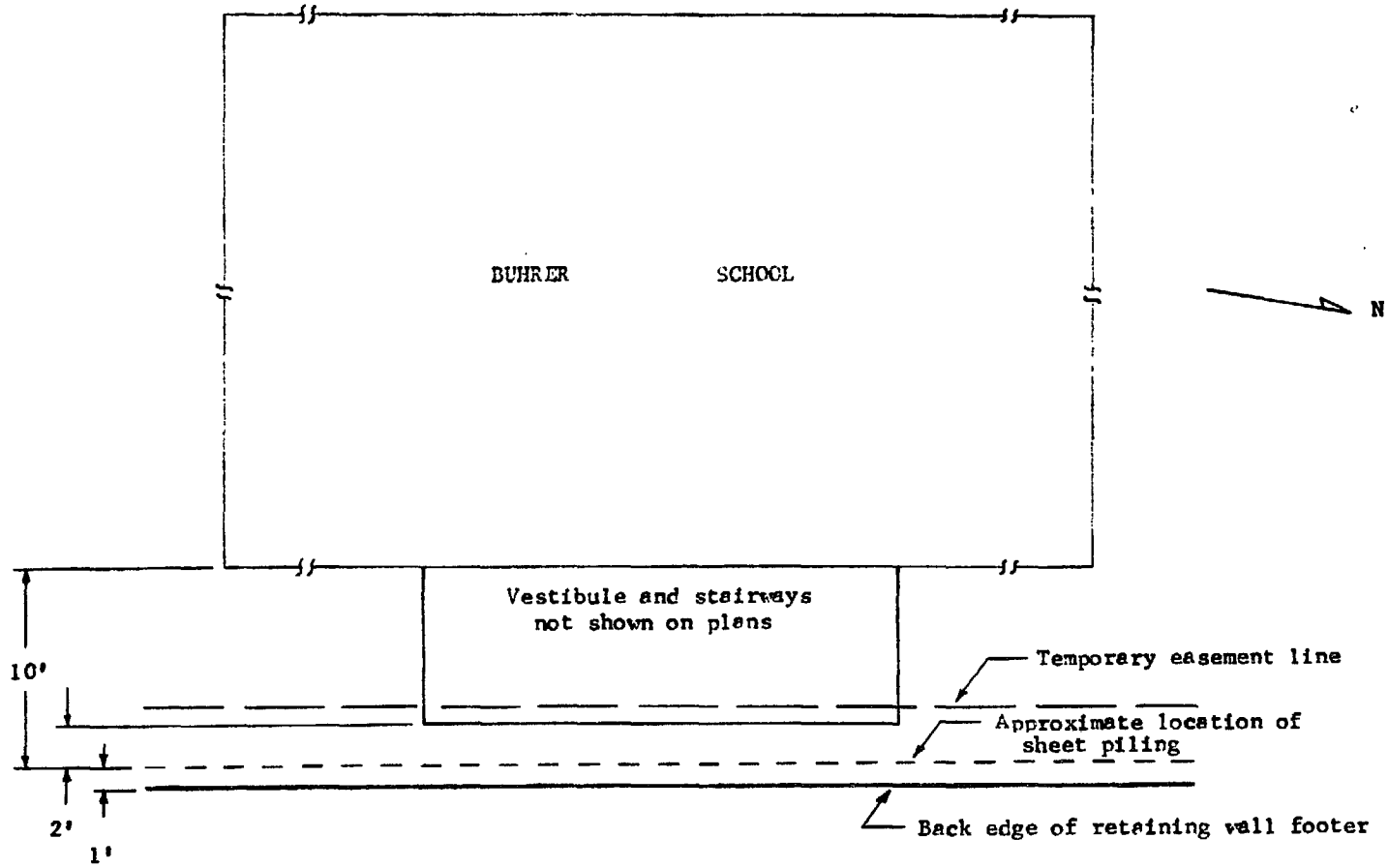
vestibule and stairway which projected about 8 feet from the middle of the building and thereby reduced working space at this point. See the sketch of the school area on page 27.

On July 8, 1965, about 2 months after the contract award, the contractor began constructing a cofferdam by driving sheet piles. The sheet piles were being driven about 2 feet from the vestibule and stairway and about 7 to 10 feet from the rest of the building. On July 20, 1965, the contractor stopped driving sheet piles at the request of the school board because the building showed extensive damage as a result of the operation.

Investigations by the school board and the contractor showed that the main walls of the school were damaged. Subsequently the school board's engineer declared the school to be unsafe, and the school board stated that, because of damage and attendant publicity, the parents would not permit their children to attend the school even if it were determined that there was no structural damage.

The State, by letter dated September 8, 1965, offered the school board the option of (1) permitting the State to continue the construction as planned without assigning responsibility for the damage or (2) paying to the school board the school's appraised value of $172,500 and razing the school. The school board did not agree to the appraised value. The State subsequently acquired some of the school property, had the building razed, and redesigned the construction work in the school area. A new school was subsequently built on the site.

SKETCH SHOWING APPROXIMATE RELATIONSHIP
OF SCHOOL BUILDING, VESTIBULE, SHEET PILING AND
RETAINING WALL FOOTER



Source: Sketch prepered from FHWA records

As a result of the demolition of the school, the retaining walls were no longer needed. Therefore, the planned location for the retaining walls was graded, an additional span was added to the pedestrian bridge, and a chain link fence was installed on the graded slope. The overall effect of these changes was a net decrease in the contract price of about $165,685 (with an appropriate decrease in the amount eligible for Federal participation) and an increase of $6,168 for earthwork.

A final determination has not been made, however, as to the amount that will be paid for the school. The State appraised the value of Buhrer School at $172,500. The school board, however, has claimed $800,000, consisting of $238,000 for property taken and damages to remaining property, $400,000 for bussing of students and rental of facilities, and $162,000 for interest. The condemnation value and the other costs claimed by the school board are presently being adjudicated, and a State official has stated that the State intends to request Federal participation in the final settlement.

Cleveland Metropolitan General Hospital silos

The Cleveland Metropolitan General Hospital is located on the west side of the project. (See app. II.) Four coal-storage silos are located near the construction project. The newest of the silos was constructed in mid-1965. Each of the silos is about 20 feet in diameter and extends about 45 feet above ground and about 20 feet beneath the ground.

The construction plans called for the construction of three retaining walls and a bridge abutment in close proximity to the silos. One of the retaining walls (number 84) was

to be adjacent to the coal silos, and the bases of the other two retaining walls (numbers 82 and 83) and the bridge abutment were to be about 50 feet below the top of retaining wall 84.

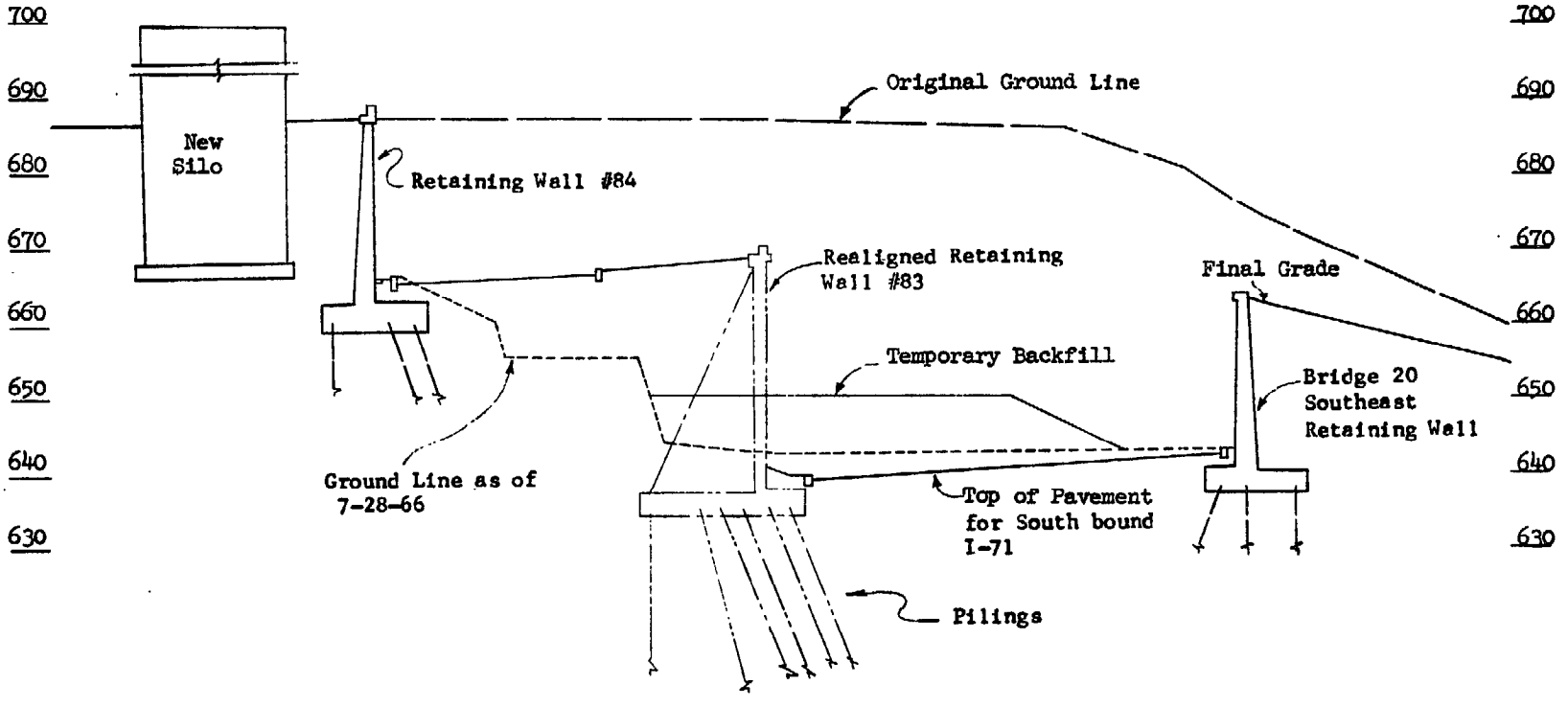
On June 9, 1966, shortly after the pier damage was discovered, lateral movement, settlement, and tilting of the silos were reported. At that time retaining wall 84 had been completed and the contractor was in the process of excavating earth below the wall preparatory to constructing the remaining two walls.

At the request of the State, the project consulting engineer expanded his study of the damaged piers to include an investigation into the movement of the silos. In a report to the State dated August 25, 1966, the consulting engineer reported that the movement of the coal silos was related directly to the excavation below wall 84. The report also stated that tests of the soil in the vicinity of wall 84 indicated that the soil beneath the wall was saturated with moisture and was on the verge of failure during and immediately after the excavation.

In a follow-on report dated September 1, 1966, the consulting engineer recommended, among other things, that (1) the excavated area below wall 84 be backfilled and compacted to prevent further damage, (2) the remaining portion of wall 83 and the bridge abutment be constructed in a double-wall cofferdam using more conservative construction procedures, and (3) the unconstructed portion of wall 83 be realigned to increase the distance between walls 83 and 84 and thereby improve the factor of safety. See the sketch on page 30.

Cross-Sectional Sketch Showing

Proximity of Silo and Retaining Walls



Scale: 0' 10'

Source: Drawing obtained from State Highway Department

ENCLOSURE
Page 30

The State adopted the consulting engineer's recommendations, and the changes were incorporated into the construction contract by various change orders. Additional contract costs of $754,763 have been associated with the implementation of the changes in work and the measures taken to expedite the opening of the project. FHWA has agreed to permit Federal participation in costs of $696,463 but has rejected participation in costs of $31,572 which cover the expediting efforts, purchase of surplus piles, and counterberm[1] construction costs. The extent of Federal participation in costs of $26,728 for removal of the counterberm was unresolved at March 31, 1970.

In addition, the hospital has submitted a claim to the State for about $469,000, consisting of the estimated cost of $432,000 for repairing the silos and "out of pocket" expenses of $37,000. The State agreed to assume the out-of-pocket expenses and offered the hospital $30,000 which was rejected. The State intends to request Federal participation in the final settlement amount.

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Excerpts from the State's applicable construction specifications dealing with damage to property are shown below.

> "*** The Contractor shall be responsible for the preservation of all public and private property, affected by operations within his control. He shall use the precautions necessary to prevent damage or injury thereto. ***"

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[1] An earthen buttress for added support.

"Whenever public or private property is damaged or destroyed as a result of the Contractor's neglect, misconduct or non-execution of The Work, such property shall be restored by the Contractor and at the Contractor's expense. ***"

* * * * *

"*** The Contractor and Surety shall save harmless the State of Ohio and all of its representatives *** from all suits, actions, or claims of any character brought on account of any injuries or damages sustained by any person or property in consequence of any neglect *** or on account of any act or omission, by the Contractor, or his agents.

"*** Neither the inspection by the Engineer; nor by any of his duly authorized agents, nor any order, measurements, or certificate by the Director, or said agents, nor any order by the Director for the payments of money, nor any payment for, nor acceptance of any work by the Director, nor any extension of time, nor any possession taken by the State or its duly authorized agents, shall operate as a waiver of any provision of this Contract, or of any power herein reserved to the State, or any right to damages herein provided; nor shall any waiver of any breach of this Contract be held to be a waiver of any other subsequent breach."

Pertinent records show that shortly after each case of damage (the school in 1965 and the silos in 1966) the State took the position that, under the provisions of its specifications, the damage was the responsibility of the contractor and at one point considered taking action against the contractor's surety. Later, however, the State reversed its view and did not hold the contractor liable. A State official stated that the decision was made not to hold the contractor responsible because the State considered that the contractor had proceeded in accordance with the plans using normal construction procedures.

CONTRACTOR CLAIM FOR EXTRA COSTS DUE TO DELAYS

By letter dated September 21, 1966, about 16 months after work on the project had started, the contractor requested compensation from the State for costs associated with various delays that had occurred on the project. The contractor contended that the delays resulted in idle personnel and equipment which could not be used on those items directly affected by the delays and in inefficient working conditions on items of work outside the areas directly influenced by each delay. This submission, however, was not completely acceptable to the State, and the manner of resolving the claim became the subject of several meetings and correspondence between the State and the contractor.

On August 7 and 8, 1967, the State and the contractor reached agreement on a method, suggested by the contractor, for determining the extra costs. In addition, several change orders were processed that provided the basis for interim payments to the contractor pending resolution of the claim.

The FHWA Division Office questioned the legality of the payments made to the contractor, and the matter ultimately was submitted to FHWA's Chief Counsel. In March 1968, the Chief Counsel also questioned the legality of the payments and requested that the State obtain an opinion from the State's Attorney General.

By letter dated July 17, 1968, the Ohio Director of Highways advised the FHWA Division Engineer that section 5525.14 of the Ohio Highway Code, as amended, effective March 9, 1965, provided him with the authority for settling

claims of this nature and that he had made his determination after consultation with his Legal Counsel. The pertinent portion of section 5525.14 referred to by the Director of Highways is shown below.

> "The extra work referred to in the next two preceding paragraphs of this section includes equitable adjustments or payments necessitated by changed conditions not contemplated in the original contract, changes or alterations in the original plans or specifications, or suspension of work."

The Director of Highways advised the FHWA Division Engineer that the provisions of section 5525.14 were fully applicable to the contract because the amendment became effective March 9, 1965, and the bids for the project were not received until April 4, 1965.

By letter dated July 17, 1968, the State replied that there had been no determination by the State Attorney General's office as to the applicability of the amended code to this particular situation.

In August 1968, the contractor submitted a claim for about $1.8 million which was computed on the basis of a complex formula designed to measure the impact of the delays. Under the formula, the average monthly personnel and equipment costs were determined and this amount was multiplied by the calculated number of months' delay to arrive at the total costs arising from the delays.

The State did not agree with the contractor's formula and proposed another version which the contractor accepted by letter dated October 31, 1968. In applying the revised formula, the State arrived at a smaller average monthly cost but a larger number of months' delay. The overall effect was a

net increase in the total delay costs, resulting in a claim of about $2.1 million. A State official told us that the revised formula was offered to, and accepted by, the contractor before the State knew the amount which would result from the application of the revised formula.

In addition, the contractor contended that, during the delay period, labor and material costs increased and a subcontractor claimed additional costs. Consequently, the contractor requested compensation for these increases. The State agreed to the claim which resulted in a cost increase of about $476,000 and which increased the total amount associated with the delays to about $2.6 million. The $2.6 million was incorporated into the construction contract by a number of change orders, and the State paid these amounts to the contractor.

The State advised us that, prior to the amendment of the code, claims of this nature had to be submitted to the State Sundry Claims Board. According to a State official, in the past FHWA had not allowed Federal participation in amounts adjudicated by the Sundry Claims Board and this consideration was one of the primary reasons for handling this claim through the contract rather than through the Sundry Claims Board. The claim on this contract represents the first time the State has handled a claim in this manner, and the State indicated that FHWA's decision would establish a precedent for similar pending and future claims.

In a decision dated December 19, 1969, FHWA's Chief Counsel stated that Federal funds should not be used to participate in the amount claimed for delays. As a part of this

decision, the Chief Counsel referred to a Comptroller General's decision--9 Comp. Gen. 175 (1929)--which states that, where Federal-aid highway construction is performed on a unit price basis and the work costs more than the estimated costs as set forth in the State contract, there is neither a legal nor an equitable obligation on the part of the Federal Government to pay for more than the work actually done at the fixed unit prices.

In addition, FHWA's Chief Counsel stated that the 1965 amended code did not apply in this instance because the contract incorporated by reference the 1963 Ohio Highway Construction and Material Specifications as they existed prior to the 1965 amendment. In his decision, the Chief Counsel expressed the opinion that the 1963 Specifications did not provide for compensation to a contractor who incurred costs occasioned by a suspension of work or delays in the performance of work required under the contract. Further he pointed out that, although the 1963 Specifications properly allow time extensions for delays beyond the control of the contractor, only extra work made necessary by alteration of the original plans, and for which no compensation is provided in the original contract, may be compensated.

The Chief Counsel also brought out that the 1965 amendment was on the statute books at the time bids were solicited for this project--between March 18 and 22, 1965--but that the State Director of Highways retained the provisions of the 1963 Specifications in the contract. It was the Chief Counsel's view, therefore, that the State decided not to afford the relief offered by the amended code to the contractor for

this project. Further, the Chief Counsel stated that it would not be consistent with competitive bidding to afford a contractor greater rights than were contained in the specifications on which bids were received.

By letter dated February 6, 1970, FHWA informed the State that any rebuttal to the Chief Counsel's opinion should be accompanied by a legal opinion from the Attorney General of the State or from his designated representative for the Highway Department.

SCHEDULE OF COSTS AND STATUS OF
FEDERAL PARTICIPATION ON OHIO
PROJECT 79-65
AS OF MARCH 31, 1970

	Total	Status of Federal participation: Accepted	Not accepted	Unresolved
ORIGINAL CONSTRUCTION CONTRACT	$14,524,635	$14,133,615	$ -	$391,020[a]
CONTRACT CHANGES:				
Major items discussed herein:				
Use of commercial slag (and frost control)	335,891	-	-	335,891
Damage to bridge piers	1,423,622	1,398,556[b]	25,066	-
Willowdale Avenue haul road (note c)	64,073	-7,022	71,095	-
Earthwork problems	181,497	16,894	-	164,603
Damage to school	-165,685	-165,685	-	-
Damage to hospital	754,763	696,463	31,572	26,728
Claims for cost of delays	2,555,713	-	2,555,713	-
Subtotal	5,149,874	$ 1,939,206	$2,683,446	$527,222
Minor items not discussed	565,547[d]			
Total amended contract	20,240,056			
COSTS IN ADDITION TO CONSTRUCTION CONTRACT:				
Additional consulting engineering fees	317,426			
State's appraisal of Buhrer School (note e)	172,500			
State's offer to the hospital (note e)	30,000			
Estimate of State's additional expense	584,416			
Minor work by others	26,721			
Total noncontract costs	1,131,063			
TOTAL ALL COSTS	$21,371,119			

[a]Deducted from project agreement by FHWA pending determination of actual cost of providing the I-80 embankment. (See p. 23.)

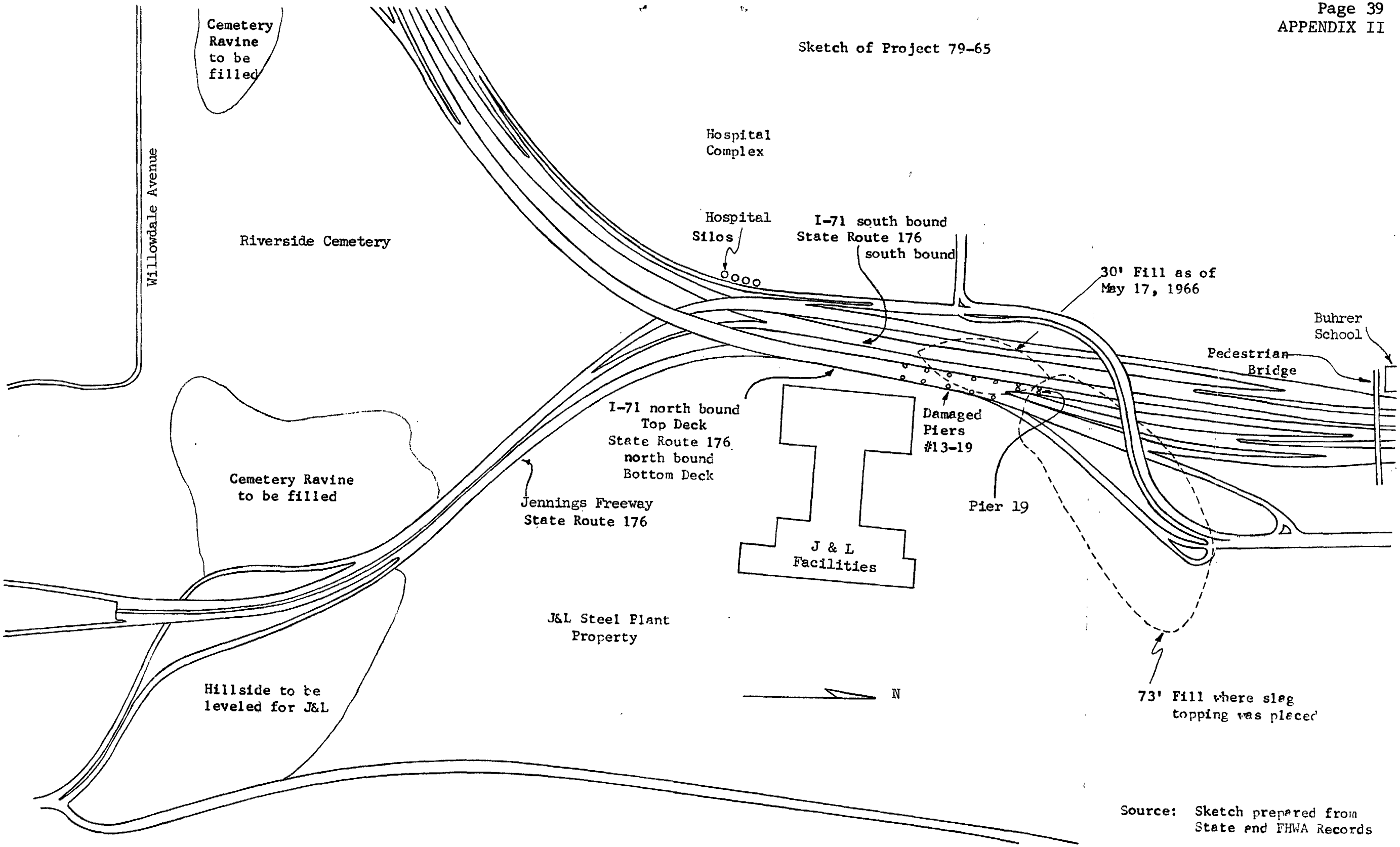
[b]Includes an amount unidentified as the cost of repairs to pier 19 which will not be accepted by FHWA. (See p. 17.)

[c]The $7,022 credit represents contract work not performed. The State has not requested Federal participation in the $71,095. (See p. 19.)

[d]Includes an increase of $277,348 paving costs associated with expediting efforts, which were not accepted for Federal participation. Status of Federal participation has not been determined.

[e]Claims by the school board and the hospital total about $800,000 and $469,000 respectively. (See p. 4.)

Sketch of Project 79-65



Source: Sketch prepared from State and FHWA Records