

**CONTRACT 8**

**NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION  
OF THE  
STATE OF NEW JERSEY**



**Information for Bidders, Form of Proposal, Contract,  
Specifications and Drawings for**

**RELOCATION OF ERIE RAILROAD  
AT  
WANAQUE RESERVOIR**

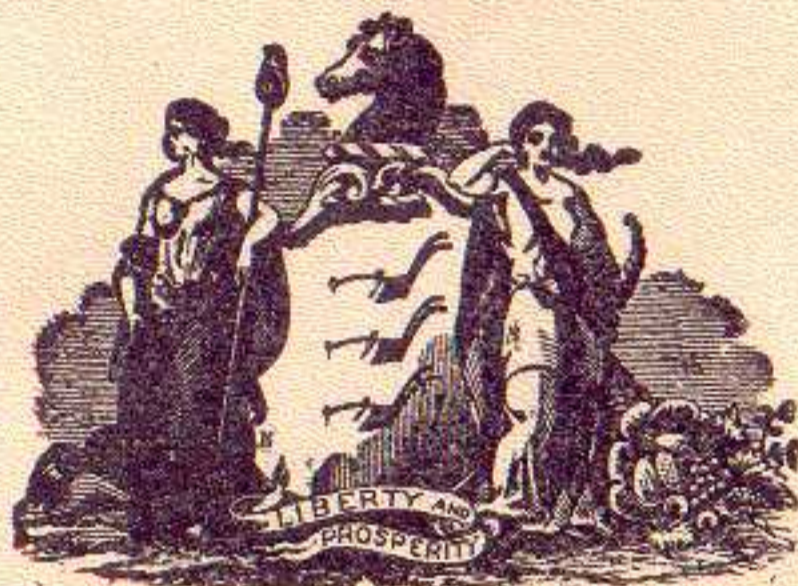
**In the Borough of Ringwood,  
Passaic County, New Jersey**

**OFFICE OF THE COMMISSION  
20 Clinton Street, Newark, N. J.**

**1925**

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STATE OF NEW JERSEY**



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and Specifications for**

**RELOCATION OF ERIE RAILROAD  
AT  
WANAQUE RESERVOIR**

**In the Borough of Ringwood,  
Passaic County, New Jersey**

**BERKELEY W. MOORE, Jr.**  
Chairman

**WOOD McKEE,  
THOMAS L. RAYMOND,  
CHARLES WAGNER**

**Commissioners  
of the  
North Jersey District  
Water Supply Commission**

**OFFICE OF THE COMMISSION  
20 Clinton Street, Newark, N. J.**

**1925**

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# INFORMATION FOR BIDDERS

**Work and Its Location.** The North Jersey District Water Supply Commission of the State of New Jersey, in connection with the construction of Wanaque Reservoir, proposes to relocate a portion of the Greenwood Lake Division of the Erie Railroad. The work is located in the Borough of Ringwood, near the villages of Wanaque and Ringwood, in the County of Passaic, State of New Jersey, and about 11 miles northwest of the City of Paterson. The work is in the vicinity of the Ringwood Junction Station of the Erie Railroad, Greenwood Lake Division. Complete topography of this region may be found on the topographic maps of the Department of Conservation and Development of the State of New Jersey.

**Work Included in Contract.** The work to be done under this contract includes the grading of about 6 miles of single track railroad with necessary culverts, the raising of an existing highway bridge, the construction of about a half-mile of highway and several minor structures and, if required, the furnishing and erecting of one or more steel plate girder bridges.

**Advertisement.** Sealed bids or proposals for performing the work described herein will be received by the Commission and must be made in accordance with the requirements of the following form of advertisement:

20 Clinton St., Newark, N. J.,

April 1, 1925.

Sealed proposals will be received from 11 o'clock A. M. to 11:15 o'clock A. M. (Daylight Saving Time) on May 7, 1925, by the North Jersey District Water Supply Commission of the State of New Jersey, in its office, Room 401, 20 Clinton Street, Newark, New Jersey, and publicly opened and read at the last named hour, for the performing of all necessary work required in the carrying out of the contract for the Relocation of the Erie Railroad at Wanaque Reservoir.

The work will consist of the grading of about 6 miles of single track railroad with necessary culverts, the raising of an existing highway bridge, the construction of about one-half mile of highway and several minor structures, and, if required, the furnishing and erecting of one or more steel plate girder bridges. The principal quantities involved include about 85,000 cubic yards earth excavation, 70,000 cubic yards rock excavation, 520,000 cubic yards borrow and 11,500 cubic yards concrete masonry.

A pamphlet containing the information for bidders, form for proposal, form of contract, specifications and drawings may be examined at the office of the Commission and may be obtained at said office upon deposit of \$10.00, which deposit will be repaid upon the return of the pamphlet within 30 days.

All bids shall be made on the blank form supplied by the Commission, which provides for a detailed statement as to the bidder's experience and resources as well as the unit prices for which he will execute the respective items of work.

Proposals must be accompanied by the consent in writing of a surety company, qualified to do business in New Jersey, binding itself that, if the contract be awarded to the person making the proposal, the said surety company will become surety for the faithful performance of the said contract in an amount equal to 50 per cent of the contract price.

All bids must be accompanied by a certified check for fifty thousand dollars (\$50,000), as a guarantee for the good faith of the bidder. Checks of unsuccessful bidders will be returned within 15 days, that of the successful bidder upon the execution of contract and bond.

The Commission reserves the right to reject all proposals, or any proposal which may be informal or the acceptance of which would be, in the judgment of the Commission for the reasons as suggested in "Information for Bidders" or for any other reason, detrimental to the interests of the municipalities for which the work is to be done.

By order of the North Jersey District Water Supply Commission of the State of New Jersey.

BERKELEY W. MOORE, Jr., Chairman.

Attest: EDMOND TYLER, Secretary.

ARTHUR H. PRATT,  
Chief Engineer.

MORRIS R. SHERRERD,  
Consulting Engineer.

**Printed Form to Be Used.** All bids must be made on the blank form of proposal attached hereto and in accordance with the directions on the form. Each bid must be enclosed in the printed envelope provided for the purpose, sealed and endorsed with the name of the bidder.

**Certified Check.** No bid will be considered unless accompanied by a certified check upon a National or State Bank or Trust Company, drawn and made payable to the order of the North Jersey District Water Supply Commission, in the amount of fifty thousand dollars (\$50,000) as a guarantee for the good faith of the bidder and for the proper execution of the contract and filing of the necessary bonds within one week after the contract is awarded; and the Commission reserves the right to hold said deposit of the contractor to whom the contract is awarded and if said contractor shall refuse or omit to execute such contract the Commission shall be entitled to deduct therefrom the expenses of reletting the contract and any difference between the sum which the said proposer would have been entitled to receive upon the completion of the contract and which the Commission might be obligated to pay to the person or persons by whom the said contract should be finally executed, using the contract quantities as a basis for such comparison.

Such check must not be enclosed in the sealed envelope containing the bid but shall be delivered to the Secretary of the Commission who will give a receipt therefor. All such deposits, except that made by the bidder to whom the contract shall be awarded, will be returned to the person or persons making the same upon the award of contract or within fifteen days after the opening of the bids, in case no award is made before that time.

**Surety's Consent.** Proposals must be accompanied by the consent in writing of a surety company or companies qualified to do business in New Jersey, who shall at the time of putting in such proposal qualify as to its or their responsibility in the amount of such proposal and bind itself or themselves that, if the contract be awarded to the person or persons making the proposal, the said surety company or companies will, upon the awarding of such contract, become surety for the faithful performance of the said contract and to protect all persons performing labor or furnishing materials therefor, as required by law, said contract bond to be in an amount equal to 50 per cent of the contract price.

**Bond.** The contractor or contractors doing the work shall give a bond for 50 per cent of the full amount of the contract price in legal form of a surety company or companies, authorized to do business by and operating in accordance with the laws of the State of New Jersey, and to be approved by the said North Jersey District Water Supply Commission, for the faithful performance of the contract, and for the protection of all persons furnishing material or labor therefor, in the above mentioned form required by Chapter 75 of the Laws of 1918 and amendments and supplements thereto, which bond shall be cancelled and returned upon the payment of the final certificate for the work done under these specifications.

**Experience of Bidder.** Each bidder must submit with his proposal detailed evidence showing that he has a competent organization which has constructed works similar in amount, value, cost, character and proportions, and that he has available for immediate use on the work necessary plant and equipment. The evidence of work done should indicate the relationship of the contractor or organization toward works constructed. The names of all of the officers of the contractor shall be given and also the name of the executive who will give personal attention to the work whenever desired by the Commission.

The Commission in its own discretion may require such guarantees as it may deem necessary to protect its interests and bidders are notified that verification of the statements made in their proposal may be required by the Commission as a condition precedent that the same shall be received as formal and acceptable.

In addition to the statements herein required, any bidder, before the award of the contract, may be otherwise required to establish that he has the necessary facilities, plant, experience, ability and financial resources to perform the work in a satisfactory manner and within the time stipulated, and that he has had experience in constructing works of the same or similar nature.

**Award of Contract.** Proposals which are incomplete, conditional or obscure or which contain additions not called for, erasures, alterations or irregularities of any kind, may be rejected as informal. Failure to name surety company or companies, and to enclose adequate consent therefrom, will be sufficient cause for the rejection of a proposal. If the information required herein is not provided, the proposal



and bid shall be deemed irregular and for such cause may be rejected as informal and not considered. Bids from contractors not experienced in the kind of work required or from unseasoned, new or temporary organizations will not be considered.

The contract will be awarded to the lowest and best qualified bidder to do this work, in the judgment of the Commission; and the Commission reserves the right to reject any or all bids, and to waive informalities.

**Balanced Bidding.** The work has been divided into items in order to enable the bidder to bid for the different portions of the work in accordance with his estimate of their costs, so that in the event of an increase or decrease in the quantities of any particular kind of work the actual quantities executed may be paid for at the price bid for that particular kind of work. A schedule of bid prices which in the opinion of the Commission will not meet this condition will be considered sufficient cause for rejecting any bid.

**Time for Executing Contract.** The person or persons to whom the contract may be awarded will be required to attend at the office of the Commission, with the surety offered by him or them, and execute the contract and bond within one week after the contract has been awarded to such person or persons, and the surety company or companies accepted. In case of failure so to do, he or they will be considered as having abandoned the contract, and the certified check, or the proceeds thereof, shall be held by the Commission to indemnify it against the expenses of reletting the contract and the payment of any difference between the sum which the said proposer would have been entitled to receive upon the completion of the contract and the sum which the Commission might be obligated to pay to the person or persons by whom the contract should be finally executed, using the contract quantities as a basis for such comparison. If the bidder shall execute the contract and furnish the required security within the time aforesaid, the amount of his deposit will be returned forthwith to him.

**Plant and Methods.** It is the purpose of the Commission to build the works under its charge in the shortest time consistent with good construction. To this end, the Contractor will be required to use improved methods and appliances for doing the various parts of the work. Complete and well-designed construction plants and effective organization will be insisted upon.

**Especial Features.** *Attention of bidders is especially directed to the contract requirements as to the time of beginning work, the rate of progress and the date for completion of the whole work, as required by Art. VII of the contract; to the provision in the proposal requiring statements of the experience and facilities of the contractor; to the requirements of the specifications that traffic on the highways and the Erie Railroad be subjected to a minimum of interference and safeguarded to the satisfaction of the County, Borough and Railroad officials; and to the sanitary regulations and the provisions relating thereto in the contract and specifications. The bidder should realize fully that the first-class materials and workmanship specified must be supplied in full measure in order to produce acceptable structures of the kind specified. These structures, moreover, have been designed to give uninterrupted service for a long period.*

**Location of Railroad and Highways.** For the convenience of intending bidders, the lines and limits of the proposed work have been marked on the ground with sufficient clearness to enable a person to find them readily.

**Construction Materials Available.** The country in the vicinity of the proposed work has been explored for material for embankments and concrete aggregate. It is not claimed that the exploration has been exhaustive, but such data as has been obtained indicates that for the most part material for embankments can be obtained only from areas within the proposed Wanaque Reservoir at elevations below the grade of the relocated roadway. The location of some of the deposits of embankment material are shown on the contract drawings.

**Approximate Statement of Quantities.** The following is a statement, based upon the estimate of the Engineer, of the quantities of the various classes of work and of the nature and extent, as nearly as practicable, of the work required; the several bids will be computed, tested and canvassed by the quantities and items of work mentioned in this statement, viz.:

## APPROXIMATE STATEMENT OF QUANTITIES

Item	Description	Quantity	Unit of Measure
GRADING ITEMS			
1	Earth excavation .....	85,000	cubic yards
2	Rock excavation .....	70,000	cubic yards
3	Borrow .....	520,000	cubic yards
4	Riprap .....	90,000	cubic yards
5	Surface dressing and grassing.....	500	cubic yards
MASONRY ITEMS			
6	Concrete masonry .....	9,000	cubic yards
7	Reinforced concrete .....	2,500	cubic yards
8	Paving .....	1,000	cubic yards
9	Sand, gravel and broken stone.....	1,000	cubic yards
10	Gravel road surfacing .....	7,000	square yards
GENERAL ITEMS			
11	Cement .....	16,000	barrels
12	Structural steel .....	20	tons
13	Steel for reinforcing concrete.....	100,000	pounds
14	Six-inch steel pipe .....	3,000	linear feet
15	Cast iron, wrought iron and steel.....	16,000	pounds
16	Timber and lumber.....	150	M. feet B.M.
17	Placing timber and lumber furnished by the Commission .....	50	M. feet B.M.
18	Raising highway bridge at Station O.....		lump sum
19	Erecting structural steel furnished by the Commission .....	60	tons

These quantities are approximate only, being given as a basis for the uniform comparison of bids, and the Commission does not expressly or by implication agree that the actual amount of work will correspond therewith.

Bidders are required to submit their estimates upon the following express conditions, which shall apply to, and become part of, every bid received, viz.:

Bidders must satisfy themselves, by personal examinations of the location of the proposed work and by such other means as they may prefer, as to the actual conditions and requirements of the work and the accuracy of the foregoing estimate of the Engineer, and shall not,

at any time after the submission of a bid, dispute or complain of such statement or estimate of the Engineer nor assert that there was any misunderstanding in regard to the nature or amount of the work to be done.

An increase or decrease in the quantity for any item shall not be regarded as a sufficient ground for an increase or decrease in the prices bid for the respective items nor in the time allowed for the completion of the work, except as provided in the contract.



**Bidder's Declaration.** The party above named, as bidder, declares that the only person or persons interested in this bid or proposal as principal or principals is or are named above, and that no other person than hereinabove named has any interest in this proposal or in the contract proposed to be taken; that this bid or proposal is made without any connection with any other person or persons making a bid or proposal for the same purposes; that the bid or proposal is in all respects fair and without collusion or fraud and that no officer or employee of the North Jersey District Water Supply Commission is, shall be, or become, directly or indirectly, interested as contracting party, partner, stockholder, surety or otherwise in the performance of the contract, or in the supplies, work or business to which it relates, or in any portion of the profits thereof; that he has examined the site of the work, the form of contract and specifications, and the drawings therein referred to, and has read the Information for Bidders hereto attached; and he proposes and agrees, if this proposal be accepted, that he will contract, in the form so approved, to perform all the work mentioned in said form of contract and specifications, and that he will accept in full payment therefor the following sums, to wit:

ITEM 1. For earth excavation, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 2. For rock excavation, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 3. For borrow, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 4. For riprap, the sum of.....  
 .....  
 .....dollars (\$.....) per cubic yard.

ITEM 5. For surface dressing and grassing, the sum of.....  
 .....  
 .....dollars (\$.....) per cubic yard.

ITEM 6. For concrete masonry, the sum of.....  
 .....  
 .....dollars (\$.....) per cubic yard.

ITEM 7. For reinforced concrete, the sum of.....  
 .....  
 .....dollars (\$.....) per cubic yard.

ITEM 8. For paving, the sum of.....  
 .....  
 .....dollars (\$.....) per cubic yard.

ITEM 9. For sand, gravel and broken stone, the sum of.....  
 .....  
 .....dollars (\$.....) per cubic yard.

ITEM 10. For gravel road surfacing, the sum of.....  
 .....  
 .....dollars (\$.....) per square yard.

ITEM 11. For cement, the sum of.....  
 .....  
 .....dollars (\$.....) per barrel.

ITEM 12. For structural steel, the sum of.....

.....dollars (\$.....) per ton.

ITEM 13. For steel for reinforcing concrete, the sum of.....

.....dollars (\$.....) per pound.

ITEM 14. For 6-inch steel pipe, the sum of.....

.....dollars (\$.....) per linear foot.

ITEM 15. For cast iron, wrought iron and steel, the sum of.....

.....dollars (\$.....) per pound.

ITEM 16. For timber and lumber, the sum of.....

.....dollars (\$.....) per M. feet B. M.

ITEM 17. For placing timber and lumber furnished by the Commission, the sum of.....

.....dollars (\$.....) per M. feet B. M.

ITEM 18. For raising highway bridge at Station 0, the lump sum of.....

.....dollars (\$.....).



ITEM 19. For erecting structural steel furnished by the Commission, the sum of.....  
 .....dollars (\$.....) per ton.

**What the Prices Are to Cover.** The prices are to include and cover the furnishing of the necessary machinery, tools, apparatus and other means of construction and all material and labor called for by the said contract and specifications and the drawings for the work, or necessary to complete the work in the manner and within the time set forth in said contract, specifications and drawings.

**Time Within Which Contract Is to Be Executed.** The bidder further agrees to execute the contract and give the required security within one week from the date that said contract has been awarded to him.

**Forfeiture of Deposit.** If this proposal shall be accepted by the said Commission and the bidder shall refuse or neglect, within one week after the contract has been awarded to him, to execute the same and to give bond in the sum and form specified in said Information for Bidders hereto attached, with surety company or companies as therein provided, satisfactory to the Commission, then the Commission may, at its option, determine that the bidder has abandoned the contract, and thereupon the proposal and the acceptance shall be null and void and the Commission shall be entitled to retain the deposit accompanying the proposal and to deduct therefrom the expenses of reletting the contract and any difference between the sum which the said bidder would have been entitled to receive upon the completion of the contract and which the Commission might be obligated to pay to the person or persons by whom the contract shall be finally executed, using the contract quantities as a basis for such comparison; but if the said bidder shall execute the contract, and furnish the said security within the time aforesaid, the amount of his deposit shall be returned to him upon the execution of the contract and bond.





A series of horizontal red dashed lines spanning the width of the page, providing a template for handwriting practice.

NOTE.—Give names of all officers of corporation.

NOTE.—Give name of executive who will give personal attention to work whenever required.

# AFFIDAVIT

**NOTE.**—The person or all persons making this bid must swear to the following affidavit, and in case of a corporation this affidavit must be made by one of its officers as an individual.

State of.....  
County of..... } ss.

.....  
.....  
.....  
.....

being duly sworn, says, each for himself, that the several matters in the above bid are in all respects true.

.....  
.....  
.....  
.....  
.....  
.....  
.....

Subscribed and sworn to before me this.....day of  
.....1925.

Title.

## SURETY'S CONSENT

KNOW ALL MEN BY THESE PRESENTS, That.....

.....a corporation of the State of.....

.....having its principal office at.....

..... and .....

.....a corporation of the State of.....

.....having its principal office at.....

being (a) surety company (ies) qualified to do business in the State of New Jersey, in consideration of the premises, and of One Dollar to it (them) in hand paid by the North Jersey District Water Supply Commission, and of other good and valuable considerations, the receipt whereof is hereby acknowledged, do (es) consent and agree, that if the contract for which the preceding bid or proposal is made be awarded to the person or persons making the same, it (they) will, upon its being so awarded, become bound as his or their or its sureties for the faithful performance of said contract and to protect all persons performing labor or furnishing materials therefor, as required by law, said contract bond to be in an amount equal to 50 per cent of the contract price and in form required by Chapter 75, Laws of 1918 of the State of New Jersey and amendments and supplements thereto; and if the said person or persons shall omit or refuse to execute such contract and give the proper security within ten days after written notice that the same is ready for execution, if so awarded, it (they) will pay, without proof of notice or demand, to the North Jersey District Water Supply Commission, any difference between the sum to which such person or persons would be entitled upon the completion of such contract and the sum which the North Jersey District Water Supply Commission may be obliged to pay to the person or persons to whom

the contract shall be awarded at any subsequent letting; the amount in each case to be calculated upon the estimated quantities of work, labor and materials by which the bids are tested; provided, however, that the estimated amount under the subsequent letting be greater.

IN WITNESS WHEREOF, The said.....

.....  
..... and the said

.....  
has (have) caused its (their) corporate seal(s) to be hereto affixed and these presents to be signed by its (their).....

and attested by its (their)..... this

..... day of..... Nineteen  
Hundred and Twenty-five.

..... Corporate Seal.

By .....

Attest:

.....  
.....

Countersigned by:

..... Corporate Seal.

By .....

Attest:

.....  
.....



**NORTH JERSEY DISTRICT WATER SUPPLY  
COMMISSION**

of the  
**STATE OF NEW JERSEY**

**CONTRACT 8**  
**RELOCATION OF ERIE RAILROAD**  
**AT WANAQUE RESERVOIR**

**NOTE.**—Paragraph headings are intended for convenience of reference only and do not form part of the contract nor specifications.

**Parties.** This agreement, for the relocation of the Erie Railroad at Wanaque Reservoir, made and entered into this.....

day of....., in the year One Thousand Nine Hundred and Twenty-five by and between the North Jersey District Water Supply Commission of the State of New Jersey, party of the first part, and.....

hereinafter designated as the Contractor, party of the second part.

**Covenants.** WITNESSETH, That the parties to these presents each in consideration of the undertakings, promises and agreements on the part of the other herein contained, have undertaken, promised and agreed, and do hereby undertake, promise and agree, the party of the first part for itself, its successors and assigns, and the party of the

second part for..... and..... heirs, executors and administrators, or successors, as follows:

**Article I. Definitions.** Wherever the words defined in this article, or pronouns used in their stead, occur in this contract and the specifications hereto attached they shall have the meanings here given:

*Commission* shall mean the North Jersey District Water Supply Commission or any commission or officer duly authorized to act in its place, in the execution of the work required by this contract.

*Engineer* shall mean the person appointed by resolution of the Commission to be the Engineer of the North Jersey District Water Supply Commission or any Engineer whom the Commission may from time to time designate to act in his place and stead, either directly or acting through properly authorized agents, such agents functioning severally within the scope of the particular duties intrusted to them.

*Contractor* shall mean the party of the second part, above designated, entering into this contract for the performance of the work required by it and the legal representatives of said party, or the agent appointed to act for said party in the performance of the work.

*Railroad* shall mean the Erie Railroad Company, lessee of the New York and Greenwood Lake Railway, or the physical property of said Company, as the sense may indicate.

*Rock*, wherever used as a name of an excavated material, shall mean the ledge-rock removed or to be removed properly by blasting, channeling, wedging or barring; also such boulders as exceed one-half ( $\frac{1}{2}$ ) cubic yard in volume removed or to be removed from the excavations and any excavated masonry in mortar.

*Earth* shall mean all kinds of materials excavated or which are to be excavated, except rock as above defined.

*Ton* shall mean the short ton of 2,000 pounds.

*Directed, required, permitted, ordered, designated, prescribed or words of like import*, wherever used in the specifications or upon the drawings, shall be understood as the direction, requirement, permission, order, designation or prescription of the Engineer and similarly the words approved, acceptable, satisfactory or words of like import shall mean approved by, or acceptable or satisfactory to, the Engineer, subject in each case to the final determination of the Commission, unless otherwise expressly stated.

*Elevation*, wherever used in the contract and specifications or upon the drawings in connection with figures, shall mean distances in feet above the datum assumed for the reservoir surveys.

*Reservoir* shall mean the Wanaque reservoir to be formed by the construction of Wanaque dam.

**Art. II. Engineer to Give Orders, Explain and Decide.** The Engineer shall, subject always to the provisions of Arts. III and IV, give all orders and directions contemplated under the contract; determine in all cases the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for.

**Art. III. Review by Commission.** Notwithstanding anything herein contained, the Contractor shall have the right to appeal to the Commission concerning any matter in dispute and the Commission's decision on such appeal shall be final.

**Art. IV. No Change Without Order of Commission.** Notwithstanding anything herein contained, no departure from or substitution, change or alteration whatsoever in the terms, provisions or requirements of this contract and the specifications and drawings made part thereof, or in the execution of the work thereunder, shall be made without the order in writing of the Commission duly executed by its Chairman and attested by its Secretary, first had and obtained, except that working drawings amplifying the contract drawings and in conformity with the contract and specifications shall not require formal approval of the Commission.

**Art. V. Orders to Foremen.** Whenever the Contractor is not present on any part of the work where it may be desired to give directions, orders may be given by the Engineer and shall be received and obeyed by the superintendent or foreman who may have charge of the particular part of the work in reference to which orders are given.

**Art. VI. Obligations of Contractor.** The Contractor shall do all the work and furnish all the labor, superintendence, materials, tools, appliances and equipment, except as herein otherwise provided, necessary or proper for performing and completing the work required by this contract, in the manner and *within the time* hereinafter specified. He shall furnish, construct, maintain and remove the construction plant, housing facilities and such temporary roads, railroads and other works as may be required. If at any time before the commencement or during the progress of the work or any part of it, the Contractor's methods

or appliances appear to the Engineer to be unsafe, inefficient or inadequate for securing the safety of the workmen or other persons, the quality of work or the rate of progress required, he may order the Contractor to increase their safety and efficiency or to improve their character, and the Contractor shall comply with such orders; but the failure of the Engineer to make such demand shall not relieve the Contractor of his obligation to secure the safe conduct, the quality of work and the rate of progress required by the contract, and the Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, temporary work, appliances and methods. All the work, labor and materials under this contract shall be done and furnished strictly pursuant to, and in conformity with, the attached specifications and the lines and grades and other directions of the Engineer as given from time to time during the progress of the work, under the terms of this contract, and also in accordance with the contract drawings and with working drawings to be furnished from time to time, which said specifications and drawings form parts of this agreement. He shall complete the entire work to the satisfaction of the Engineer and the Commission, and in accordance with the specifications and drawings herein mentioned, at the prices herein agreed upon and fixed therefor. The Information for Bidders hereto attached, the Proposal submitted by the Contractor and the Commission's advertisement inviting bids are also made parts of this contract.

**Art. VII. Time for Beginning and Completing Work.** The Contractor shall commence the work embraced in this contract within 10 days after the service of notice by the Engineer on him instructing him to begin work, and shall complete the same in all respects by November 1, 1926. The various parts of the work shall be begun at such places and times and shall be prosecuted in such order as the Engineer shall direct or approve.

*The time in which this contract and each part thereof is to be performed and the work thereunder is to be completed is of the essence of this agreement.*

**Art. VIII. Extension of Time.** If the said work shall be delayed for the reason that the Commission has not obtained rights to any portion of the land on which the same is to be performed or by any act or omission of the Commission, which shall be determined by the Commission whose determination and certification thereof shall be binding and conclusive upon the Contractor, then, and in each and every such case, the Contractor shall be entitled to so much additional time

wherein to perform and complete this contract, on his part, as the Engineer shall certify in writing to be just.

**Art. IX. No Claim Because Actual Quantities Differ From Preliminary Statement.** The quantities of the various kinds of work to be done and materials to be furnished under this contract, which have been estimated as stated in the Information for Bidders attached hereto, are approximate and only for the purpose of comparing, on a uniform basis, the bids offered for the work under this contract; and the Contractor agrees that neither the Commission nor any member of the Commission, nor any of its employees or agents, is to be held responsible if any of the said estimated quantities shall be found to be not even approximately correct in the construction of the work; and that he will not at any time dispute or complain of such statement nor assert that there was any misunderstanding in regard to the character, size or depth of the excavations to be made or the kind or amount of the materials to be furnished or work to be done; and the Contractor shall make no claim for anticipated profits, or for loss of profit or for other damages because no work is ordered under certain items or because of a difference between the quantities of the various kinds of work actually done or materials actually delivered and the estimated quantities stated in the Information for Bidders.

**Art. X. Stream Control.** The Contractor shall take all the necessary precautions for the control of the normal and flood flow of the Wanaque River and its tributaries and shall indemnify and save harmless the Commission, its officers and agents from all damages and costs which may result from failure to provide for said flows. He shall not be entitled to a second payment for work destroyed or damaged by floods and replaced nor to any damages due to floods passing through or over the partially completed work or the construction plant.

**Art. XI. Contract and Specifications May Be Changed.** If it becomes necessary to modify this contract and the specifications herein contained and the drawings herein referred to in a manner not materially affecting the substance thereof nor materially increasing or decreasing the amount of work to be done hereunder, the Commission may from time to time by an order in writing direct any such modification or change to be made, and they shall be made accordingly, provided, that in cases where such changes increase the cost of the work and payment therefor is not covered by the prices bid for the various items the Contractor shall be remunerated as hereinafter provided; and in case they shall diminish the cost of the work proper deduction from

the contract shall be made; the amount to be paid or deducted to be decided by the Engineer; subject, however, to the approval of the Commission.

**Art. XII. Claim for Work Not Classifiable or for Damage.** If the Contractor claims compensation for work not properly classified under any item of this contract, he shall, within one week after the beginning of any such work, make a written statement of the nature of such work, to the Commission, and shall, on or before the fifteenth day of the month succeeding that in which any such extra work shall have been done, file with the Commission an itemized statement of the details and amount of such work; or if he claims compensation for any damage sustained, he shall within thirty days after the sustaining of any such claimed damage, make a written statement of the nature of such damage to the Commission and shall file, as required above, an itemized statement of the details and amount of such damage; and unless such statements shall be made as so required, his claim for compensation shall be forfeited and he shall not be entitled to payment on account of any such work or damage. Such allowance, if any, as may be granted by the Commission for claims under Art. XII, after due consideration of all the circumstances, is hereby agreed to be accepted by the Contractor in full settlement therefor.

**Art. XIII. Access to Work and Places of Manufacture.** The Commission and its engineers, inspectors, agents and other employees shall, for any purpose which may be required by this contract, have access to the work and the premises used by the Contractor, and the Contractor shall provide safe and proper facilities therefor.

Furthermore, the Commission and its engineers, inspectors and agents shall, at all times, have immediate access to all places of manufacture where materials are being made for use under this contract, and shall have full facilities for determining that all such materials are being made strictly in accordance with the specifications and drawings. The Contractor, whenever so requested, shall give the Engineer or Commission access to the proper invoices, bills of lading, etc., and shall provide scales and assistance for weighing, and assistance for measuring and testing any of the materials.

**Art. XIV. Examination of Work.** The Commission and Engineer shall be furnished with every reasonable facility for ascertaining whether the work is in accordance with the requirements and intention of this contract, even to the extent of uncovering or taking

out portions of finished work. Should the work thus exposed or examined prove satisfactory, the uncovering or taking out and replacing of the covering or the making good of the parts removed shall be paid for at the contract price for the class of work done; but should the work exposed or examined prove unsatisfactory, the uncovering, taking out, replacing and making good shall be at the expense of the Contractor.

**Art. XV. Defective Work.** The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill his contract as herein prescribed, and defective work shall be made good and unsuitable materials may be rejected, notwithstanding that such work and materials have been previously overlooked by the Engineer or Commission and accepted or estimated for payment. If the work, or any part thereof, shall be found defective before the final acceptance of the whole work, the Contractor shall forthwith make good such defect without compensation, in a manner conforming with the specifications, and if any material brought upon the ground for use in the work, or selected for the same, shall be condemned by the Engineer or Commission as unsuitable or not in conformity with the specifications, the Contractor shall forthwith discard and remove such materials. If the Contractor shall fail to replace any defective work or materials after reasonable notice, the Commission may cause such defective work or materials to be replaced and the expense thereof shall be deducted from the amount to be paid the Contractor.

**Art. XVI. Right of Property in Materials.** Nothing in this contract shall be considered as vesting in the Contractor any right of property in materials used or to be used, after they shall have been attached or affixed to the work or the soil, or accepted on delivery and included in any partial estimate, but all such materials shall, upon being so attached, affixed or delivered, become the property of the Commission.

**Art. XVII. Competent Men to Be Employed.** The Contractor shall employ only competent, skilful men to do the work, and whenever the Engineer shall notify the Contractor in writing that any man on the work is, in his opinion, incompetent, unfaithful, disorderly or otherwise unsatisfactory, such men shall be discharged from the work, and shall not again be employed on it, except with the consent of the Engineer, such action of the Engineer to be subject to review by the Commission.

**Art. XVIII. No Store Pay.** The Contractor shall punctually pay his employees who shall be engaged on the work covered by this contract, in cash and not in scrip, commonly known as store money-orders, and he shall not, directly or indirectly, conduct or carry on what is commonly known as a company store if there shall at the time be any store selling supplies within two miles of the place where this contract is being executed.

**Art. XIX. Compensation and Liability Insurance.** The Contractor shall continuously carry such Public Liability and Workmen's Compensation Insurance as is required by law, and upon failure of the Contractor so to do, the Commission is empowered to secure such insurance, and to deduct the cost thereof from any money due or to become due the Contractor.

**Art. XX. Laws and Regulations.** The Contractor shall keep himself fully informed of, and comply with, all laws, ordinances and regulations in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency should be discovered in this contract, or in the drawings or specifications herein referred to, in relation to any such law, ordinance, regulation, order or decree, he shall forthwith report the same in writing to the Commission. The Contractor shall at all times himself observe and comply with, and shall cause all his agents and employees to observe and comply with all such existing laws, ordinances, regulations, orders and decrees; and shall protect, indemnify and save harmless the Commission and its officers and agents against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor or by his employees, agents or servants or any thereof.

**Art. XXI. Legal Address of Contractor.** The address given in the bid or proposal upon which this contract is founded is hereby designated as the place where all notices, letters and other communications to the Contractor shall be mailed or delivered. The delivering at the above-named place or depositing in a post-paid wrapper directed to the above place, in any post-office box regularly maintained by the post-office, of any notice, letter or other communication to the Contractor, shall be deemed sufficient service thereof upon the Contractor and the date of said service shall be the date of such delivery or mailing. Such



address may be changed at any time by an instrument in writing executed and acknowledged by the Contractor and delivered to the Commission. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

**Art. XXII. Personal Attention.** The Contractor shall give his personal attention constantly to the faithful prosecution of the work and shall be present, either in person or by a duly authorized representative, on the site of the work, continually during its progress, to receive directions or instructions from the Engineer. He shall maintain an office on the site of the work, where copies of the contract and of all working drawings shall be kept ready for use at any time.

**Art. XXIII. Assignment.** The Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this contract or his right, title or interest in or to the same or any part thereof, without the previous consent in writing of the Commission indorsed herein or hereto attached; and he shall not assign, by power of attorney or otherwise, any of the moneys to become due and payable under this contract, unless by and with the like consent signified in like manner. If the Contractor shall, without such previous written consent, assign, transfer, convey, sublet or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys to become due under this contract, to any other person, company or other corporation this contract may, at the option of the Commission, be revoked and annulled, and the Commission shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to the Contractor and to his assignee or transferee; and shall be in nowise deprived of or restricted in its right to sue for and recover damages for any breach of this contract.

**Art. XXIV. Indemnification and Defence Against Claims.** The Contractor shall take all responsibility of the work, shall bear all losses resulting to him on account of the amount or character of the work or because the conditions in the locality in which the work is done are different from what are assumed or were expected, or on account of the weather or any other causes; and he shall assume the defense of, and indemnify and save harmless the Commission and each member thereof and their officers and agents, from all claims, actions, suits or proceedings of any kind arising from the performance of this contract, or any work done or attempted in connection therewith.

**Art. XXV. Accidents.** The Contractor, during the performance of the work, shall take all necessary precautions and place proper guards for the prevention of accidents; shall put up and keep suitable and sufficient lights and other signals, and shall indemnify and save harmless the Commission, its officers and agents from all damages and costs to which they may be put by reason of injury to the person or property of another resulting in any manner from the prosecution of the work by the Contractor, his agents, servants and employees, or any of them occasioned by or resulting from negligence or carelessness or any other omission of the Contractor.

The whole, or so much of the moneys due under and by virtue of this contract as shall or may be considered necessary, may, at its option, be retained by the Commission until all suits or claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the Commission.

**Art. XXVI. Patents.** The Contractor shall hold himself responsible for any claims made against the Commission for any infringements of patents by the use of patented articles in the construction and completion of the work, or any process connected with the work agreed to be performed under this contract or of any materials used upon the said work, and shall indemnify and save harmless the Commission for all costs, expenses and damages which the Commission shall be obliged to pay by reason of any infringement of patents used in the construction and completion of the work.

**Art. XXVII. Discontinuance of Work.** If the work to be done under this contract shall be abandoned by the Contractor, or if this contract shall be assigned or the work sublet by him, otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing to the Commission, that the Contractor is not proceeding with the performance of the contract with due and reasonable diligence, or that the Contractor is wilfully violating any of the conditions or covenants of this contract or of the specifications, or is executing the same in bad faith or not in accordance with the terms thereof, or if the work or any part thereof be not fully completed within the time named in this contract for its completion, or within the time to which the completion of the contract may be extended by the Commission, the Commission may notify the Contractor to discontinue all work, or any part thereof, under this contract, by a written notice to be served upon the Contractor as herein provided; and there-

upon the Contractor shall discontinue the work, or such part thereof, and the Commission shall thereupon have the power to contract for the completion of the work in the manner prescribed by law, or to place such and so many persons as it may deem advisable, by contract or otherwise, to work, and complete the work herein described, or such part thereof, to take possession of, without notice, and use any of the materials, plant, tools, equipment, supplies and property of every kind provided by the Contractor for the purposes of his own work and to procure other materials for the completion of the same, and to charge the expense of said labor and materials to the Contractor. The expense so charged shall be deducted and paid by the Commission out of such moneys as may be due or may any time thereafter grow due to the Contractor under and by virtue of this contract, or any part thereof. And in case such expense shall exceed the amount which would have been payable under the contract if the same had been completed by the Contractor, he shall pay the amount of such excess to the Commission; and in case such expense shall be less than the amount which would have been payable under this contract if the same had been completed by the Contractor, he shall forfeit all claim to the difference; and when any particular part of the work is being carried on by the Commission, by contract or otherwise, under the provisions of this article of the contract, the Contractor shall continue the remainder of the work in conformity with the terms of this contract, and in such manner as in nowise to hinder or interfere with the persons or workmen employed, as above provided, by the Commission, by contract or otherwise, to do any part of the work or to complete the same under the provisions of this article of the contract; nothing contained in this section nor any action taken by the Commission thereunder shall in anywise release or relieve the Contractor from any claim for damages which may arise by reason of any breach of this contract.

**Art. XXVIII. Damages or Bonus.** The Contractor shall pay to the Commission all expenses, loss and damages as determined by the Commission, incurred in consequence of any wilful defect, omission or mistake of the Contractor or his employees and shall pay as liquidated damages the sum of one hundred dollars (\$100.00) per day for each and every day, except Sundays and legal holidays, that he shall be in default in completing the entire work to be done under this contract after October 31, 1926.

A bonus of one hundred dollars (\$100.00) per day will be paid for each day, except Sundays and legal holidays, said contract is com-

pleted prior to November 1, 1926, or to such further time to which the contract may be extended by the Commission in accordance with Art. VIII.

In addition to the liquidated damages herein provided for, there will be deducted from the moneys due under the contract the wages, if any, paid by the Commission to any inspector or inspectors necessarily employed on the work for the number of days in excess of the time stated in Arts. VII and VIII for the completion of the work.

The length of time, expressed in days or parts of days, during which the work or any part thereof has been delayed in consequence of any act or omission of the Commission, which shall be determined by the Commission and whose determination and certificate thereof shall be binding and conclusive upon the Contractor, shall be allowed to the Contractor and deducted from the computation of damages to be paid the Commission, but no allowance by way of damages or compensation shall be made for such delay.

The Commission shall have the right to deduct the amount of any such damages from any moneys due or to become due the Contractor under this contract. Permitting the Contractor to continue and finish the work, or any part of it, after the time fixed for its completion shall in nowise operate as a waiver on the part of the Commission of any of its rights under this contract.

**Art. XXIX. Liens.** If at any time before or within thirty days after the whole work herein agreed to be performed, and all the labor and material herein agreed to be delivered, have been performed or delivered or completed and accepted by the Commission, any person or persons claiming to have performed any labor or furnished any materials toward the performance or completion of this contract shall file with the Commission any such notice as is described in the Lien Law, the Commission shall retain until the discharge thereof, from the moneys under its control, so much of such moneys as shall be sufficient to satisfy and discharge the amount in such notice claimed to be due, together with the costs of any action or actions brought to enforce such lien created by the filing of such notice.

**Art. XXX. Money May Be Retained.** The Commission may keep any moneys which would otherwise be payable at any time hereunder, and apply the same, or so much as may be necessary therefor, to the payment of any expenses, losses or damages, as determined by the Engineer, incurred by the Commission pursuant to this contract or

the specifications, and may retain until all claims shall have been settled so much of such moneys as the Commission shall be of the opinion will be required to settle all claims against the Commission and its officers and agents and all claims for labor on the work, and also all those claims for materials for the work, notice of which, signed and sworn to by the claimants, shall have been filed in the office of the Commission; or the Commission may make such settlements and apply thereto any moneys retained under this contract.

**Art. XXXI. Prices for Work.** The Commission will pay, and the Contractor shall receive in full compensation for furnishing all the materials and labor, and for performing and completing all the work which is necessary or proper to be furnished or performed, in order to complete the entire work in this contract described and specified, and in said specifications and drawings described and shown, and also for all loss or damages arising out of the nature of the work aforesaid, or from the action of the elements or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all risks of any description connected with the work, and for all expense incurred by or in consequence of the suspension or discontinuance of the work as herein specified, the following prices, to wit:

ITEM 1. For earth excavation, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 2. For rock excavation, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 3. For borrow, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 4. For riprap, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 5. For surface dressing and grassing, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 6. For concrete masonry, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 7. For reinforced concrete, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 8. For paving, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 9. For sand, gravel and broken stone, the sum of.....

.....dollars (\$.....) per cubic yard.

ITEM 10. For gravel road surfacing, the sum of.....

.....dollars (\$.....) per square yard.

ITEM 11. For cement, the sum of.....

.....dollars (\$.....) per barrel.

ITEM 12. For structural steel, the sum of.....  
 .....  
 .....dollars (\$.....) per ton.

ITEM 13. For steel for reinforcing concrete, the sum of.....  
 .....  
 .....dollars (\$.....) per pound.

ITEM 14. For 6-inch steel pipe, the sum of.....  
 .....  
 .....dollars (\$.....) per linear foot.

ITEM 15. For cast iron, wrought iron and steel, the sum of.....  
 .....  
 .....dollars (\$.....) per pound.

ITEM 16. For timber and lumber, the sum of.....  
 .....  
 .....dollars (\$.....) per M. feet B. M.

ITEM 17. For placing timber and lumber furnished by the Commission, the sum of.....  
 .....  
 .....dollars (\$.....) per M. feet B. M.

ITEM 18. For raising highway bridge at Station 0, the lump sum of.....  
 .....  
 .....dollars (\$.....).

ITEM 19. For erecting structural steel furnished by the Commission, the sum of.....  
 .....  
 .....dollars (\$.....) per ton.

**Art. XXXII. Partial Estimates.** In order to assist the Contractor to prosecute the work advantageously, the Engineer shall, except as otherwise herein provided, from time to time, as the work progresses, but not oftener than once a month, on or about the first day of the month, make in writing an estimate, such as in his opinion shall be just and fair, of the amount and value of the work done and accepted materials incorporated in the work by the Contractor in the performance of this contract. The first such estimate shall be of the amount and value of work done and materials incorporated in the work since the Contractor commenced the performance of this contract on his part, and every subsequent estimate, except the final estimate, shall be made when, in the judgment of the Engineer, the total value of the work done and materials incorporated in the work since the last preceding estimate amounts to more than ten thousand dollars (\$10,000.00). The Engineer shall further include Portland cement delivered on the site of the work but not incorporated in the work at the rate of \$2.00 per barrel.

Any material or work included in a partial estimate which may subsequently be found unsatisfactory shall be deducted from succeeding partial estimates. None of the Contractor's plant or equipment shall be included in partial estimates. Such estimates shall not be required to be made by strict measurement, but they may be made by measurement or by estimation, or partly by one method and partly by the other, and it shall be sufficient if they are approximate only. Such estimates shall be dated as of the first day of the month.

**Art. XXXIII. Partial Payments 90 Per Cent of Estimates.** Upon each such estimate being made and certified in writing by the Engineer, the Commission shall, within 30 days after the date of the estimate, pay to the Contractor 90 per cent of the amount stated in such estimate or certificate to be the value of the work done and materials furnished until the 10 per cent thus retained and reserved shall have amounted to fifty thousand dollars (\$50,000.00), thereafter the Commission shall pay the total amount of each subsequent estimate; provided, however, that the Commission may at all times reserve and retain from said partial payments, or any of them, in addition to the 10 per cent above mentioned to be retained and reserved, any sum or sums which by the terms hereof, or of any law of the State of New Jersey, passed prior to the date hereof, it is or may be authorized to reserve or retain.



**Art. XXXIV. Partial Payments May Be Withheld.** Estimates may at any time be withheld or reduced if, in the opinion of the Commission, the work is not proceeding in accordance with the requirements of this contract.

**Art. XXXV. Commission Not Estopped by Any Certificate From Correcting Errors or Recovering Damages.** The Commission shall not, nor shall any department or officer thereof, be precluded or estopped by any return or certificate made or given by the Commission, any engineer, or other officer, agent or appointee of the Commission under any provision of the contract, from at any time, either before or after the final completion and acceptance of the work and payment therefor pursuant to any such return or certificate, showing the true and correct amount and character of the work done and materials furnished by the Contractor or any other person under this agreement, or from showing at any time that any such return or certificate is untrue and incorrect or improperly made in any particular, or that the work and materials, or any part thereof, do not in fact conform to the specifications; and the Commission shall not be precluded or estopped, notwithstanding any such return or certificate and payment in accordance therewith, from demanding and recovering from the Contractor such damages as it may sustain by reason of his failure to comply with the specifications.

**Art. XXXVI. Acceptance of Work or Extension of Time Not a Waiver.** Neither the acceptance of the work on the part of the Commission or its Engineer or any of its employees, nor any order, measurement or certificate by the Engineer, nor any order by the Commission for payment of money, nor any payment for, nor acceptance of the whole or any part of the work by the Engineer or Commission, nor any extension of time, nor any possession taken by the Commission or its employees, shall operate as a waiver of any portion of this contract or of any power herein reserved to the Commission, 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 or subsequent breach.

**Art. XXXVII. Contractor Entitled to Payment Only in Accordance with Contract.** The Contractor shall not demand nor be entitled to receive payment for the work or materials, or any portion thereof, except in the manner set forth in this contract; nor unless each and every one of the promises and conditions to be performed or

fulfilled by him shall have been fully performed, fulfilled and kept (which fact of performance it shall be the duty of the Engineer to certify) and the Commission shall have accepted the work.

**Art. XXXVIII. Final Estimate and Certificate and Final Payment.** Whenever the Contractor shall have completely performed this contract on his part, the Engineer shall so certify to the Commission and in his certificate shall state the quantity of work done by the Contractor and measured by the Engineer in accordance with the measurement sections of the specifications, and also the value of such work under and according to the terms of this contract. On the expiration of 30 days after the acceptance by the Commission of the work herein agreed to be done by the Contractor, the Commission shall pay to the Contractor in cash the amount remaining after deducting from the amount or value stated in the last-mentioned certificate all such sums as shall theretofore have been paid to the Contractor under any of the provisions of this contract, and also any sum or all such sums of money as by the terms hereof the Commission is or may be authorized to reserve or retain; provided, that nothing herein contained shall be construed to affect the right hereby reserved of the said Commission to reject the whole or any portion of the aforesaid work, should the said certificate be found, or known to be, inconsistent with the terms of this agreement, or otherwise improperly given. All prior certificates upon which partial payments may have been made, being merely estimates, shall be subject to correction in the final certificate, which final certificate may be made without notice thereof to the Contractor, or of the measurements upon which it is based.

In each and every case where by the terms of this contract the order, decision or determination of the Engineer or the Commission is provided for, the obtaining of the same by the Contractor shall be a condition precedent to the right of the Contractor to sue for any moneys due or to grow due under this contract or for any work done or materials furnished thereunder.

**Art. XXXIX. Final Payment to Terminate Liability of Commission.** No person or corporation other than the signer of this contract as Contractor now has any interest hereunder, and no claim shall be made or be filed and neither the Commission nor any member of the Commission, nor any of its agents, shall be liable, or held to pay any money, except as specifically provided herein.

The acceptance by the Contractor of the final payment aforesaid shall operate as, and shall be a release to, the Commission and each member of the Commission and their agents, from all claim and liability to the Contractor for anything done or furnished for, or relating to, the work, or for any act or neglect of the Commission or of any person relating to or affecting the work, except the claim against the Commission for the remainder, if any there be, of the amounts kept or retained as specifically provided herein.

**EXECUTION OF CONTRACT**

IN WITNESS WHEREOF, the parties hereto have caused this contract to be duly and properly executed in duplicate the day and year first above written, one thereof to remain with the Commission and one to be delivered to the Contractor.

NORTH JERSEY DISTRICT WATER SUPPLY COMMISSION.

By .....

ATTEST :

*Chairman.*

.....

*Secretary.*

.....

.....

.....

ATTEST :

*Contractor.*

.....

*Secretary.*

CERTIFICATE OF ACKNOWLEDGMENT  
FOR COMMISSION

STATE OF NEW JERSEY,

COUNTY OF.....

} SS.:

Be It Remembered, That on this.....day of.....

in the year of Our Lord One Thousand Nine Hundred and.....

before me, .....

personally appeared.....

who, being by me duly sworn, doth depose and make proof to my satisfaction, that he well knows the corporate seal of the North Jersey District Water Supply Commission, the party of the first part named in the foregoing contract, that the seal thereto affixed is the proper corporate seal of said Commission, that the same was so affixed thereto

and the said contract signed by.....

who was at the date and execution thereof, the Chairman of the North Jersey District Water Supply Commission, in the presence of the said deponent, as the voluntary act and deed of the said Commission, and that the said deponent thereupon signed the same as subscribing witness.

Sworn and subscribed before me at

.....

..... the date aforesaid.

.....

.....

CERTIFICATE OF ACKNOWLEDGMENT  
FOR CONTRACTOR

STATE OF NEW JERSEY,

COUNTY OF .....

} SS. :

Be It Remembered, That on this..... day of.....

in the year of Our Lord One Thousand Nine Hundred and.....

before me, .....

personally appeared.....

who, being by me duly sworn, doth depose and make proof to my

satisfaction, that he well knows the corporate seal of the.....

.....  
the party of the second part named in the foregoing contract, that  
the seal thereto affixed is the proper corporate seal of said company,  
that the same was so affixed thereto and the said contract signed by

.....  
who was at the date and execution thereof, the.....  
of said company, in the presence of the said deponent, as the volun-  
tary act and deed of the said company, and that the said deponent  
thereupon signed the same as subscribing witness.

.....  
Sworn and subscribed before me at

.....  
..... the date aforesaid.  
.....  
.....

# SPECIFICATIONS

**NOTE.**—In numbering the sections of the specifications, the decimal system is used, the figure before the decimal point indicating the item number and the figure after the decimal point the serial number of the section under the particular item. The general sections have no decimal points. The sections relating to general requirements for a particular group of items have been given the number of the first item of the group, together with the letter G, to distinguish them from the sections of that item, as 1G.1, 1G.2, etc.

## GENERAL SECTIONS

**Section 1. Drawings.** The location and general character of the work are shown upon contract drawings on file in the office of the Commission, entitled "North Jersey District Water Supply Commission, Wanaque Reservoir, Relocation of Erie Railroad," signed by engineers of the staff of the Commission. The drawings consist of a title page and 12 sheets, bearing Accession Numbers 1012 to 1023, inclusive.

The contract drawings show, in general, typical designs and essential details for the various structures; the designs may be modified in the working drawings, but the same varieties of materials and general class of work will be used. The work shall be constructed in accordance with the contract drawings and working drawings to be furnished from time to time by the Engineer.

**Sect. 2. Work Included.** The work under this contract includes grading about 6 miles of single track railroad and about  $\frac{1}{2}$  mile of highway; certain of the fills are to be widened at prescribed points; structures including trestles and standard and special culverts are to be constructed; and a highway bridge is to be raised.

**Sect. 3. Drawings and Specifications Explanatory of Each Other.** The drawings and specifications are intended to be explanatory of each other, but should any discrepancy appear or any misunderstanding arise as to the import of anything contained in either, the explanation of the Engineer, subject to review by the Commission, shall be final and binding on the Contractor. Any correction of errors or omissions in the drawings and specifications may be made by the Engineer when such correction is necessary for the proper fulfillment of their intent as construed by him.

**Sect. 4. Work to Be Done in Accordance With Drawings and Directions.** The work, during its progress and at its completion, shall conform to the lines and grades given by the Engineer, and shall be done in accordance with the drawings and directions given by him from time to time, and in no case will any work in excess of such requirements be paid for.

**Sect. 5. Drawings to Be Furnished by Contractor.** Whenever required, the Contractor shall furnish to the Engineer, for his information, copies of drawings showing in reasonable detail the materials and construction of any construction plants, stream-control works, sewage treatment works, camps, water-supply works, structures, parts of structures or appliances to be furnished or built under this contract, for which detail drawings are not to be issued by the Engineer.

**Sect. 6. Contractor to Check Drawings and Schedules.** The Contractor will be required to check all dimensions and quantities on the drawings or schedules given to him by the Engineer, and shall notify the Engineer of all errors therein which may be discovered by examining and checking the drawings. He will not be allowed to take advantage of any error or omission in these specifications, or in the drawings or schedules, as full instructions will be furnished by the Engineer should such error or omission be discovered.

**Sect. 7. Changes of Stations or Limits Do Not Involve Change of Class.** No change in the designations of survey stations, coordinates, elevations or other survey designations given for the location of structures or parts of structures or for the limits for classes of work or materials, in the specifications, in orders issued thereunder, or on the contract or working drawings, caused by the developments of construction or other reasons, shall be construed as modifying the intent of the contract or the specifications.

**Sect. 8. Land.** Land has been or will be acquired by the Commission to the extent shown on the drawings. Any of this land which is not required for the construction operations under this or any other contract may, with the permission of the Commission, be used by the Contractor for installation of plant, for storage of material and for housing employees subject to the limitations of the sanitary requirements of this contract.



**Sect. 9. Contractor Not to Have Exclusive Occupancy of Territory.** Nothing herein contained, and nothing marked upon the drawings, shall be interpreted as giving the Contractor exclusive occupancy of the territory provided. The Commission and its employees for any purpose, and other contractors of the Commission for any purpose required by their respective contracts, may enter upon or cross this territory, or occupy portions of it, or take materials therefrom, as directed or permitted. In certain cases the abutting owners may be granted the right to cross the taking from one portion of their land to another. When two or more contracts are being executed at one time on the same or adjacent land, in such manner that work on one contract may interfere with that on another, the Engineer shall decide which contractor shall cease work and which shall continue, or whether the work on both contracts shall progress at the same time and in what manner. When the territory of one contract is the necessary or convenient means of access for the execution of another contract, such privilege of access or any other reasonable privilege may be granted to the contractor desiring it, to the extent, amount, in the manner and at the times permitted. Any decisions as to the method or time of conducting the work or the use of territory shall not be made the basis of claims for delay or damage except as otherwise stipulated.

**Sect. 10. Junction With Other Contracts.** The highway grading included under this contract is to be continued under other contracts. Exact limits for grading under this contract will be fixed according to conditions existing when the work is done.

**Sect. 11. Use of Materials From Excavations and Lands.** The Contractor may use, where permitted, in the various parts of the work, without charge therefor, any materials taken from the excavations or from the surface of the lands of the Commission, which are acceptable for the purposes intended. He may, where permitted, open quarries, gravel pits, sand pits and borrow-pits on the lands controlled by the Commission. Wherever required, such openings shall be drained.

**Sect. 12. Use of Buildings.** Certain buildings on the lands of the Commission are available for use by the Contractor; those within the area to be graded shall be demolished when ordered. The right is reserved to revoke permission granted for the use of any building, and, on 30 days' notice, the Contractor shall vacate such building.

All buildings on the land at the date of executing this contract shall remain the property of the Commission.

**Sect. 13. Contractor's Office at the Work.** The Contractor shall maintain, during the performance of this contract, an office at the site of the work, at which he or his authorized agent shall be present at all times while work is in progress. Instructions from the Engineer left at this office shall be considered as delivered to the Contractor. Copies of the contract, the working drawings and the specifications for the work shall be kept at said office, ready for use at any time.

**Sect. 14. Orders.** Whenever the Contractor is not present on any part of the work where it may be desired to give directions, orders may be given by the Engineer and shall be received and obeyed by the superintendent or foreman who may have charge of the particular part of the work in reference to which orders are to be given.

**Sect. 15. Lines and Grades.** All lines and grades shall be given by the Engineer, but the Contractor shall provide such materials and give such assistance as may be required, and the marks given shall be carefully preserved. The Contractor shall keep the Engineer informed, a reasonable time in advance, of the times and places at which he intends to do work, in order that lines and grades may be furnished and necessary measurements for record may be made with the minimum of inconvenience to the Engineer or of delay to the Contractor. Whenever the Engineer finds it necessary to carry on his operations on Sundays, legal holidays, or at other times when the work of the Contractor is not in progress, the Contractor shall furnish all necessary service and assistance.

**Sect. 16. Requirements of Contract Work.** The Contractor shall provide all the labor, superintendence, materials, plant, tools and equipment, except as herein otherwise stated, necessary or desirable for properly performing and completing, within the time stipulated, the work as above described and hereinafter more particularly specified. He shall furnish, erect, maintain and promptly remove, when directed, the construction plant and such temporary works as may be required. These requirements include the providing of suitable quarters for men and animals, and the sanitary regulation of the same; water supplies for men, animals and construction purposes; temporary roads, railroads and ways, together with bridges, guards, lights and sign-posts. In

brief, the Contractor shall furnish and do everything, except as herein otherwise provided, necessary to complete the work in accordance with the terms of this contract and the requirements thereunder.

**Sect. 17. Responsibility of Contractor for Plant and Methods.** The Contractor shall provide and install such construction plants and shall use such methods and appliances for the performance of all the operations connected with the work to be done under this contract as will secure a satisfactory quality of work and a rate of progress which, in the opinion of the Engineer, will insure the completion of the work within the time specified. If at any time before the commencement, or during the progress of the work, or any part of it, such methods or appliances appear to the Engineer to be unsafe, inefficient or inadequate for securing the safety of the workmen, the quality of work, or the rate of progress required, he may order the Contractor to increase their safety and efficiency, or to improve their character, and the Contractor shall comply with such orders; but the failure of the Engineer to make such demand shall not relieve the Contractor from his obligation to secure the safe conduct, the quality of work, and the rate of progress required by the contract, and the Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods.

**Sect. 18. Responsibility for Temporary Works.** The Contractor shall furnish and erect, maintain, and remove, unless otherwise required, all necessary temporary work when and as directed or permitted. He shall rebuild or strengthen any parts or all of them at the times, to the extent and in the manner directed, and he may increase the strength or the capacity of any temporary works in such manner as may be permitted beyond the requirements.

**Sect. 19. No Interference With Erie Railroad.** At the southernly end of this contract the existing highway bridge, carrying the Greenwood Lake highway over the Erie Railroad, is to be raised approximately 2 feet. At three other points the relocated railroad will cross over the present Erie tracks on timber trestles. The Contractor shall so conduct his operations as not to interfere with the operation of the Erie Railroad, and his construction and plans for safeguarding traffic shall be approved by the officials of the Railroad and by the Engineer. Any precautions for the safety of the Railroad which the Railroad may deem necessary shall be paid for by the Contractor. It

is distinctly understood, however, that the providing of watchmen and flagmen and the taking of such precautions shall not in any way relieve the Contractor from the liability and payment of damages caused in whole or in part by his negligence. Any moving of tracks or installation of side-tracks for the convenience of the Contractor shall be arranged for by the Contractor with the Railroad.

**Sect. 20. Care of Highways.** The operations of this contract cross the present Greenwood Lake highway at two points and other existing highways at several points. The Contractor shall so conduct his operations that traffic on the highways will be subjected to a minimum of interference and safeguarded to the satisfaction of the County and Borough officials and the Engineer. No highway shall be closed or obstructed by the Contractor until he first obtains permission to do so from the proper authorities, copies of which permits shall be filed with the Engineer. If any highway shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the authorities having jurisdiction, and to the Engineer. He shall make all arrangements with the local and State authorities, railroads, individuals or corporations necessary for the construction and use by him of temporary railroads and roads across any highway, railroad or private land. Before doing any work near railroad tracks, telephone and telegraph lines, or pipe lines, the Contractor shall make such arrangements for properly securing and protecting them during the progress and until the completion of the work in question as shall be satisfactory to the owners thereof. Proof of such arrangements shall be filed with the Engineer, if required, before the work in question begins.

**Sect. 21. Temporary Roads and Bridges.** Short stretches of existing highways will be buried by the embankment to be built under this contract. At these locations temporary highways shall be built outside the limits of the embankment, the work to be paid for under appropriate items of this contract. The Contractor, without special compensation therefor, shall build and maintain such other temporary roads and bridges as shall be deemed necessary for the accommodation of traffic on the highways interfered with by the Contractor's operations, for convenient access to the various parts of the work and to such adjacent private property as may be cut off by his operations, and for other necessary purposes incidental to the performance of this contract and obtain consent to use any necessary land therefor. He shall build

such temporary fences or guards as may be required to keep live stock on adjacent property, or to render temporary or permanent roads safe by night as well as by day.

**Sect. 22. Preservation of Trees.** Certain trees on the Commission's land are to be preserved as parts of the landscape treatment of the completed works. Only such trees, outside the limits of the grading operations and borrow-pits, as will be permitted from time to time shall be cut down or injured. The Contractor shall satisfactorily protect, until the completion of all operations under this contract, such trees as shall be designated. Trees thus designated shall be conspicuously marked or surrounded by guards, and if any such tree be damaged or destroyed, the Contractor will be required to acceptably replace it.

**Sect. 23. Materials for the Work.** Materials to be used for work under this contract shall be delivered sufficiently in advance of their proposed use to prevent delays, and to provide for inspection and test, and they shall be delivered approximately in the order required. To aid the Engineer in determining the quantities of metal-work, cement, and other materials to be paid for, the Contractor shall, whenever so requested, give him access to the proper invoices, bills-of-lading, etc., and shall provide scales and assistance for weighing, or assistance for measuring, any of the materials.

**Sect. 24. Commission to Furnish Certain Material.** The Commission shall furnish to the Contractor valves and bituminous binder required to be built into or used in the work, timber to be placed under Item 17 and structural steel to be erected under Item 19, and no other material whatever. No special payment shall be made to the Contractor for the installation of the valves or for the application of the bituminous binder, but the cost thereof shall be considered as having been included in the prices stipulated for the appropriate items in connection with which they were used. The placing of the timber and the erecting of the structural steel shall be paid for under Items 17 and 19, respectively.

**Sect. 25. Repair Parts to Be Kept at Site of Work.** The Contractor shall have at the site of the work at all times duplicates, in good condition, of such machines or parts of machines or appliances as are especially likely to wear rapidly, break, or be lost, so that the time lost on account of any part of the plant being out of order may be reduced

to a minimum. For this purpose also he will be required to establish one or more suitable repair shops at or very near the site of the work.

**Sect. 26. Explosives and Blasting.** Explosives in sufficient quantity to prevent delay to the work shall be kept on hand by the Contractor. Such explosives shall be stored, handled and used as prescribed by the laws of the State, County or Municipality relating to same. Blasting shall be conducted so as not to endanger persons or property, and whenever required, the blasts shall be covered or otherwise satisfactorily confined. The Contractor will be held responsible for, and shall make good, any damage caused by blasting or accidental explosion.

**Sect. 27. Pumping and Draining.** The Contractor shall provide all labor, equipment, and materials necessary for the removal and disposal of water from the excavations and other parts of the work and he shall satisfactorily remove the water. In the execution of this work he shall employ only approved methods and means. Whenever directed, he shall provide additional pumps or drains.

**Sect. 28. Plant Water-Supply.** The Contractor shall provide at convenient points ample supplies of water of proper quality for all the operations required under this contract. A proper piping-system shall be installed, maintained and extended from time to time to distribute water to the various portions of the work where it is needed. Wherever necessary the water shall be under sufficient pressure to give an effective stream from a nozzle for cleaning ledge rock or masonry on which masonry is to be built, for washing stones to be used in masonry, for sprinkling masonry, for wetting embankments and for other purposes. For fire protection of all temporary and permanent trestles and other timber structures, a water system shall be provided. Hose connections and hose shall also be provided for fighting fires in these structures, and responsible persons shall be instructed as to the operation of such fire apparatus, so as to prevent or minimize loss of time from fire. Water casks or extinguishers of approved type shall be provided for minor structures.

**Sect. 29. Night-Work.** The Contractor may be required to prosecute the work at night, and to provide suitable and sufficient lights therefor, if at any time the Engineer shall deem it necessary for the proper progress of the work, and the Contractor shall promptly comply with any such requirements made in writing by the Engineer. For

night-work, if any be performed, the Contractor shall receive no extra payment, but compensation shall be considered as having been included in the prices stipulated for the appropriate items.

**Sect. 30. Stream Control.** During the execution of the work to be done under this contract acceptable provision shall be made for safely conveying the ordinary and flood flows of the Wanaque River or any other waters across or around the works under construction in such a manner as to protect, so far as practicable, the work from interruption and the structures from flooding and damage.

**Sect. 31. Payment for Contractor's Plant and Miscellaneous Temporary Works.** For providing plant, tools and equipment and for furnishing, erecting, maintaining and removing the construction plant, construction roads or railroads, temporary roads and bridges, cantonments, hospitals and other buildings, temporary water-supplies, guards, trestles, stream-control and other temporary works, the Contractor shall receive no direct payment, but compensation for them shall be considered as having been included in the prices stipulated for the appropriate items.

**Sect. 32. Planimeter.** For estimating quantities in which the computation of areas by geometric methods would be comparatively laborious, it is stipulated and agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of such areas.

**Sect. 33. Cleaning Up.** On or before the completion of the work, the Contractor shall tear down or otherwise remove such temporary structures built by him, including sanitary structures, as are designated for removal by the Engineer; shall restore the ground occupied to as nearly the original condition as the situation requires; shall remove or acceptably disinfect and cover all organic matter, and materials containing organic matter, in, under and around stables, houses and other buildings used by him, and all rubbish of all kinds from any grounds which he shall have occupied within the limits of the ownership of the Commission; shall remove from the structures or land of the Commission, burn or bury in approved places and acceptably cover all abandoned materials and plant; and shall leave the spoil banks, borrow-pits, sand and gravel pits, quarries, walls, fences and other parts of the grounds owned by the Commission, and the adjacent property which

may have been affected by his operations, in a neat and satisfactory condition. To this end the Contractor shall do such additional small amount of trimming, grading, grassing, moving materials and other work as may be ordered. No direct payment will be made to the Contractor for the work stipulated in this section, but compensation shall be considered as included in the various items.

## SANITARY PRECAUTIONS AND HOUSING

**Sect. 34. General Requirements.** The Contractor and his employees shall promptly and fully carry out the sanitary and medical requirements as hereinafter described or as may from time to time be necessary to the end that the health of his employees, of the local communities and of the people using water from the drainage areas affected by his operations may be safeguarded. The Contractor shall also obey any sanitary regulations and orders of the properly constituted authorities, Municipal and State. The Contractor shall summarily dismiss and shall not again engage, except with the written consent of the Engineer, any employee who violates the sanitary and medical requirements.

**Sect. 35. Inspection by Engineer.** The Engineer shall have the right, in order to determine whether the requirements of this contract as to sanitary and housing matters are being complied with, to enter and inspect any camp or building or any part of the works, and to cause any employee to be examined physically or medically or to be vaccinated or otherwise treated; also to inspect the drinking water and food supplied to the employees. In order to enforce compliance with these regulations and properly to preserve the peace, police or other officers employed by the Commission shall have the right of access to the Contractor's camps and other buildings.

**Sect. 36. Contractor to Provide Housing.** The Contractor shall, if required, provide suitable and satisfactory buildings and equipment for the housing, feeding and sanitary necessities of his workmen. Such equipment shall include adequate bathing and clothes-washing facilities and sufficient water of acceptable quality therefor.

**Sect. 37. Housing and Stables.** All buildings shall be built only in accordance with approved drawings and specifications. Sanitary plumbing and approved methods of heating shall be installed. Rooms



shall be acceptably ventilated and furnish complete protection from the weather. Single sleeping rooms shall be not less than 8 feet by 10 feet by 9 feet in size and all rooms shall have an adequate volume of air. All houses occupied by employees shall be thoroughly screened to exclude mosquitoes and flies. The quarters for the workmen shall be grouped in properly arranged cantonments. The Contractor shall submit the locations proposed for his cantonments and buildings to the Engineer for approval, and no buildings shall be erected until such approval shall have been obtained. Cantonments shall, if ordered, be enclosed by satisfactory man-proof fences, with not more than two entrances. The entire ground within the limits of the various cantonments shall be thoroughly illuminated by electric lamps or other acceptable lights. This illumination shall be maintained from sundown to sunrise every night during the occupation of the cantonment, unless otherwise ordered.

**Sect. 38. Sanitary Conveniences and Disposal of Excreta.**

*Buildings for the sanitary necessities of all persons employed on the work, beginning with the first men employed to build camps or for other preliminary operations, shall be constructed and maintained without nuisance by the Contractor in the number, manner and places ordered. The requirement for sanitariums in any locality shall be on a basis of one seat for each 20 persons who are dependent on the sanitariums in the locality in question; and they shall always be reasonably near the work. Sanitary conveniences within the watershed tributary to the reservoir shall be of the incinerator or tight-can type. Where incinerators are required they shall be sufficient in number in any locality to permit a reasonable proportion to be out of service for incineration of their contents and all excreta shall be incinerated daily. Where the can system is permitted cans shall be hauled away at least once a day and empty cans substituted therefor. No cans shall be emptied within the watershed. The Contractor shall rigorously prohibit the committing of nuisances within the reservoir or other completed or partially completed structure or upon land of the Commission, about the work or upon adjacent private property.*

**Sect. 39. Medical and Surgical Attendance.** The Contractor shall retain the services of an acceptable, qualified medical and surgical practitioner who shall have the supervision of the health of his employees, shall inspect their dwellings, the stables and the sanitariums as often as required and shall supply medical attendance and medicine to

the employees whenever needed. The Engineer shall be notified of the name, address and telephone number of the practitioner and of any changes in address from time to time. The Contractor shall provide, from approved plans, buildings, one of which shall be located, if required, so as to provide isolation, properly fitted for the purposes of a hospital, with facilities for heating and ventilating in cold weather and for screening and ventilating in warm weather. These hospitals shall have an ample number of beds to properly care for sick or injured employees and shall be provided with all necessary medicines and medical appliances for the proper care of the sick and injured. At such places as directed all articles necessary for giving "First Aid to the Injured" shall be provided.

**Sect. 40. Medical Supervision of Employees.** The medical supervision of the Contractor over his employees may be required to include the physical and medical examination of all applicants for employment or persons permitted to remain on the premises, in order to prevent persons having communicable diseases from becoming connected with the work, and the Contractor may be required to employ only persons shown by such examination to be free from communicable diseases. Whenever, in the opinion of the Commission, it is necessary for the protection of the public health or the health of the employees, the Contractor shall remove any employee from the work either to a hospital at or near the works or to a more remote hospital, or shall remove permanently from the work or any camp any employee whose presence is believed to endanger the health of other persons.

**Sect. 41. Health Reports.** The Contractor may be required to give the Engineer periodically, in such detail as may be prescribed from time to time, a written report, signed by the physician in regular attendance, setting forth clearly the health conditions of the camp or cantonments and of the employees.

**Sect. 42. Domestic Water-Supply.** A sufficient supply of drinking water shall be provided by the Contractor both on the work and in the cantonments. This water shall be of acceptable quality and from approved sources. If any water-supply for domestic uses should become contaminated, the Contractor shall promptly provide a new supply from an approved source and abandon the contaminated supply or shall provide works for treating the contaminated water, when and as ordered.

**Sect. 43. Use of Animals.** The use of animals, except where especially permitted, will be forbidden within the reservoir wherever it is practicable to employ railroads, traction engines, cable-ways, power excavators or other mechanical devices to do the same work. Manure will not be permitted to accumulate anywhere within the reservoir, but shall be collected and removed periodically as directed.

**Sect. 44. Drainage from Cantonments to be Treated.** Drainage from kitchens, laundries, sinks, stables and other cantonment buildings and any sewage shall be satisfactorily collected and treated before discharge into any stream. The treatment works and sewers shall be operated by the Contractor as directed and all necessary work done to maintain them in efficient service.

**Sect. 45. Disinfection and Fumigation.** The Contractor shall supply corrosive sublimate, quicklime, chlorinated lime, sulphur and other disinfectants and fumigants in ordered quantities, and perform the labor necessary to apply these materials when and as directed in disinfecting and fumigating cantonment and other buildings and disinfecting stables or grounds.

**Sect. 46. Garbage Disposal.** Garbage, both liquid and solid, shall be promptly and satisfactorily removed from the buildings and immediately placed in approved tight receptacles of sufficient capacity for about one day's ordinary production. At least once in every twenty-four hours all such garbage shall be incinerated or otherwise thoroughly and satisfactorily disposed of in an approved manner.

**Sect. 47. Contractor to Build Sanitary Works.** The Contractor shall build, in accordance with drawings and directions furnished from time to time by the Engineer, such treatment works, sewers, drains and other structures, and shall do such other work, not herein particularly specified, as may be ordered for carrying out the intent of the sanitary requirements of the contract.

**Sect. 48. Contractor to Perform Sanitary Services.** The Contractor shall furnish all materials, buildings, equipment, tools and supplies; employ the necessary medical and surgical practitioner as specified in Sect. 39; perform all the labor necessary to operate and maintain the sanitary conveniences, hospitals, treatment works and other

works of sanitation; and perform all other required sanitary services, to the end that the intent of Sects. 34 to 48, inclusive, may be satisfactorily carried out.

**Sect. 49. Payment for Housing and Sanitary Structures.** For all works of sanitation and housing, together with their necessary equipment and supplies, connected with the Contractor's cantonments; for medical and surgical practitioner; and for sanitary services as specified in Sect. 48, the Contractor shall receive no direct payment, but compensation shall be considered to have been included in the prices bid for the various items of the work.

## ROADWAY GRADING

Items 1, 2, 3 and 4

### GENERAL CONDITIONS AND REQUIREMENTS

**Sect. 1G.1. Definition of Grading.** The term grading in these specifications includes clearing, grubbing and all excavations and embankments for the formation of the roadbed, track and drainage ditches, diversions and raising and lowering of roads and streams, road crossings at grade or otherwise, and all similar works pertaining to the construction of the railway, its side-tracks and station grounds and the highways included in this contract.

**Sect. 1G.2. Classification.** Roadway grading will be measured for payment under four classifications, viz: earth excavation, Item 1; rock excavation, Item 2; borrow, Item 3; and riprap, Item 4.

**Sect. 1G.3. Rock Excavation.** Rock excavation shall be defined as all excavation of rock in solid beds or in compact, stratified masses in their original position, which in the judgment of the Engineer should be removed by blasting, and boulders or detached rock measuring over  $\frac{1}{2}$  cubic yard removed from excavations other than borrow-pits.

**Sect. 1G.4. Earth Excavation.** Earth excavation shall be defined as all other material of every description not classified as rock removed from within the limits of the roadway.

**Sect. 1G.5. Borrow.** Borrow shall be defined as all earth for fill and refill, excepting soil for surface dressing, excavated from borrow-pits.

**Sect. 1G.6. Riprap.** Riprap shall be defined as all rock fill placed upon the outer slopes of embankments within the limits shown on the drawings or ordered.

**Sect. 1G.7. Roadway Alignment and Grade.** The center of the roadway shall conform in alignment to the center stakes. The grade line on the profile denotes ultimate sub-grade on the center line and this term indicates the tops of embankments or the bottoms of excavations ready to receive the ballast. The roadway shall be formed to the sections, slopes and dimensions shown on the drawings, or as may be directed from time to time.

**Sect. 1G.8. Clearing and Grubbing.** The right-of-way and station grounds, except any portions thereof that may be reserved, shall be cleared of all buildings, trees, brush and perishable materials of whatsoever nature. All these materials, except as hereinafter mentioned, shall be burned or otherwise removed from the grounds, as may be directed, and without injury to adjoining property. Where clearing is to be done, stumps shall be cut close to the ground, not higher than the stump-top diameter for trees 12 inches and less in diameter, and not higher than 18 inches for trees whose stump-top diameter exceeds 12 inches, except between slope stakes of embankments, where stumps may be cut so that the depth of filling over them shall not be less than 3 feet. Stumps shall be grubbed entirely from all places where excavation occurs, including ground from which material is to be borrowed, as well as from ditches, new channels for waterways and other places where required. Grubbing shall also be required between the slope stakes of all embankments of less than 3 feet in height. The work of clearing shall be kept at least 1,000 feet and the work of grubbing shall be kept at least 300 feet in advance of grading.

**Sect. 1G.9. Excavation Methods.** Slopes of all excavations shall be cut true and straight and all loose stones in the slopes shall be removed. Undercutting of slopes will not be permitted except upon the consent of the Engineer. Rock excavation shall in all cases be taken out 12 inches below sub-grade and refilled to sub-grade with approved material. Where the material in the bottom of a cut is soft or unsuitable, the Contractor shall, when directed by the Engineer, excavate to a depth below sub-grade as specified by the Engineer and fill said excavation with suitable material. A berm of 4 feet shall be left between the edge of rock excavation and toe of slope of overlying earth, when required by the Engineer. In all cases the surplus material due to

excavation in excess of the authorized cross-section, slides extending beyond the slope lines or otherwise caused shall be removed by the Contractor without delay and the slopes reformed.

**Sect. 1G.10. Blasting.** When explosives are used in rock excavation, the charges shall be so proportioned and placed that they will not loosen the rock outside of the excavation lines called for on the drawings, or as provided for in the specifications. If the rock below the line of the side slopes should be loosened by blasting to such an extent as to render it liable to slide or fall, such loosened rock shall be removed by and at the expense of the Contractor. Where blasting endangers, or is likely to endanger, persons or property, the Engineer shall have the power to prescribe and enforce such rules and regulations as may be necessary, but the prescribing, or failure to prescribe, such rules and regulations shall not relieve the Contractor from any responsibility under the contract.

**Sect. 1G.11. Borrow-Pits, Etc.** Where the quantity of excavation from the cuttings of standard cross-section is insufficient to form the embankments, the deficiency shall be made up by widening earth cuttings on one or both sides of the center line or by excavating suitable material from borrow-pits, as may be directed or permitted. Borrow-pits shall be made on land provided by the Commission at locations indicated on the drawings or directed by the Engineer, which, in general, will be below the elevation of the roadway grade. They shall not be excavated before they have been staked out. Borrowing must be done in a uniform manner, in order to admit of ready and accurate measurement. Borrow-pits shall be drained by ditches to the nearest water course and no depressions shall be left which will hold water. Unless directed, no material shall be borrowed from a depth that will not permit proper drainage. Side slopes of borrow-pits shall be the same as used in the cross-section of the adjoining roadbed. A berm of the original unbroken ground, having a width of not less than one-half of the height of the embankment, shall be left between slope stakes of embankments and edge of borrow-pit, and a berm not less than 6 feet in width shall be left between outside slope of borrow-pit and property line.

**Sect. 1G.12. Reserving Gravel, Etc.** Where gravel, stone, sand or any other material suitable for special use in the work is met within the excavations, the same shall, when required, be reserved and deposited in convenient places on the right-of-way, as directed, and

other suitable material in the vicinity substituted, as required, to complete the embankments.

**Sect. 1G.13. Ditches.** Intercepting ditches, when ordered, shall be made back of the top of the slopes of all cuttings where the adjacent ground falls toward the top of the slope, and they must diverge at their outlet sufficiently to avoid causing erosion of adjoining embankments. The cross-section and location of such ditches shall be as directed and when required they shall be made in advance of the opening of the cutting. Ditches shall be formed at the bottom of the slopes in cuttings according to the cross-sections shown upon the drawings or such modifications thereof as may be directed; they shall be neatly made, clear of obstructions, and at the lower ends must diverge sufficiently to prevent erosion of the adjoining embankments.

**Sect. 1G.14. Embankments.** The materials from excavations incident to the construction of the roadbed, ditches, channels, and roadways, shall, so far as they are suitable, be used in forming the embankments. Frozen or other unsuitable material will not be permitted to enter into the composition of embankments. When directed embankments shall be built in horizontal layers of not over 8 feet in thickness; these layers to be of full width of the embankment and built to the true slope, and not widened with loose material from the top. Riprap shall be placed on the faces of the embankment where directed. The most suitable material shall, in all cases, be reserved for finishing the surfaces not covered with riprap. Large stones will not be permitted within a depth of at least 2 feet below sub-grade. Embankments shall be carried to such heights above sub-grade and to such increased width as may be deemed a necessary provision for shrinkage, compression and erosion. As the embankments become consolidated, their sides shall be carefully trimmed to the proper slopes, and the embankments must be maintained at their proper height, dimensions and shape until the work is finally accepted. Where the embankment is to be placed on sloping ground, the surface shall be deeply plowed or stripped, and, where directed, boggy or unsuitable material shall be excavated so that the embankment shall be on a firm foundation. Where embankments are to be placed on sloping rock surfaces, such surface shall be benched to the limits directed by the Engineer.

**Sect. 1G.15. Snow and Ice.** The Contractor must remove at his own expense all snow and ice from between the slope stakes before beginning grading, as well as during the progress of the work.

**Sect. 1G.16. Filling Temporary Trestles.** In forming embankments by means of temporary trestles, the material shall be thoroughly compacted between the trestle bents and around and under all parts of the structure, and the material shall be uniformly spread in the fill. When temporary wooden trestles are used to make embankments the top of timbers (generally the caps), which are not to be removed after the embankment is completed, shall not be less than 3 feet below ultimate sub-grade; no trestle work shall be allowed where the embankment is less than 6 feet high at sub-grade.

**Sect. 1G.17. Embankments at Permanent Trestles.** Embankments abutting on the ends of trestle bridges shall be brought forward upon both sides of the structure a distance of at least 6 feet at the top, with an increased width of 2 feet in order to form a full roadbed.

**Sect. 1G.18. Finishing Sub-Grade.** The sub-grade shall be compact and finished to true planes and no depression shall be left that will hold water, or lead water along the roadbed.

**Sect. 1G.19. Filling.** In backfilling over or about masonry, the material shall be deposited in layers 6 inches to 12 inches thick, sloping away from the masonry, and each layer carefully tamped. Only the best material will be allowed to be used for this purpose. The back-filling over arches shall be deposited simultaneously from both sides; large stones will not be allowed within 2 feet of the extrados of the arch.

**Sect. 1G.20. Roads.** Whenever required, the Contractor shall open up a safe road for passage on horseback and foot along the whole or any portion of the work under contract.

**Sect. 1G.21. Measurement and Payment.** Grading shall be estimated and paid for by the cubic yard at the prices specified for the respective materials. Measurement shall be made in excavation only, except in cases hereinafter mentioned. The contract prices per cubic yard for excavation and borrow paid for under the appropriate items shall include the excavation of the material by any method whatsoever; the loading, transportation and depositing of same in the manner prescribed by these specifications in the places designated; the plowing or benching of slopes, as well as all other expense incident to the work of grading; and the clearing and grubbing as specified. Measurement of roadway grading shall not include gravel, soil or other materials.



except rock for riprap, paid for under other items of this contract, nor excess excavation and slips as described in Sect. 1G.9 unless due to causes not under the control of the Contractor, in which case the classification of the material shall be in accordance with its condition at the time of removal, regardless of prior conditions. It is to be distinctly understood that the contract prices per cubic yard for various classes of roadway grading cover any haul found necessary, and that there shall be no allowance made for any so termed overhaul. If it be impracticable to measure borrowed material in excavation, it may be measured in cars, or in embankment, using the cross-section notes of the embankment and making a just and reasonable allowance for change in bulk so that the quantities shall equal the excavation quantities as nearly as possible.

## EARTH EXCAVATION

### Item 1

**Sect. 1.1. Work Included.** Under Item 1 shall be included the authorized excavation, for roadway grading and for all structures to be built under this contract, of all material classified as earth in Sect. 1G.4 which is not used and paid for under other items of this contract.

**Sect. 1.2. Measurement and Payment.** The quantity of earth excavation to be paid for under Item 1 shall be the number of cubic yards actually excavated in accordance with the specifications, measured before excavation to the limits shown on the drawings, or ordered, but not including such of this excavated material as is sand or gravel used in concrete, in road surfacing or in any other item for which special payment is made or as is soil used and paid for under Item 5. The price stipulated for Item 1 shall include the cost of clearing and grubbing and placing of excavated material in embankments, the disposal of surplus and unsuitable material, all precautions, labor, draining or pumping away of water, clearing and otherwise preparing surfaces upon which masonry is to be built, and all other operations and all materials used incidental to excavating and disposing of materials excavated and maintaining the excavations, except as otherwise specified.

## ROCK EXCAVATION

### Item 2

**Sect. 2.1. Work Included.** Under Item 2 shall be included all ledge rock and all boulders of greater than  $\frac{1}{2}$  cubic yard volume excavated for the railroad roadway and other structures to be built under this contract. Boulders encountered in borrow-pits and rock excavation for the purpose of the plant or convenience of the Contractor shall not be estimated for payment under this item. The work shall include all incidental pumping, ditching or other required measures for the removal or exclusion of water. As a part of the work under this item, the Contractor shall place rock in embankments and dispose of excavated material. Under Item 2 the Contractor shall also excavate any masonry removed for causes other than defective work, in accordance with Art. XIV.

**Sect. 2.2. Preparation of Rock Foundations for Masonry.** Before any masonry is built on or against the rock it shall be scrupulously freed from all dirt, gravel, boulders, scale, loose fragments and other objectionable substances. Streams of water under sufficient pressure, stiff brushes, hammers or other effective means shall be used to accomplish this cleaning. Steam jets shall be used to thoroughly remove ice or snow, if any be found on the rock, when it is desired to lay masonry.

**Sect. 2.3. Rock Cleared Before Measurement.** Before measuring, the surfaces of ledge rock shall be cleared of earth, boulders and other encumbrances which would interfere with correct measurement. The areas of rock surfaces so cleared at any one place or time shall be of reasonable extent. Whenever any portion of the ledge rock or any boulders are ready for measurement the Contractor shall notify the Engineer, and that rock only which shall have been properly measured shall be included in this item.

**Sect. 2.4. Measurement and Payment.** The quantity of rock excavation to be paid for under Item 2 shall be the number of cubic yards actually removed and disposed of in accordance with the specifications. Rock shall be measured in excavation: (a) in general, to designated measurement lines defining depths, bottom widths and side slopes; (b) where rock is excavated to secure an acceptable foundation, in excavations ordered to be made outside of designated measurement

lines, and in excavations where no measurement lines have been designated, to include the quantities actually removed from within ordered limits. When side slopes are designated they will generally be 4 vertical on 1 horizontal, but if flatter slopes are ordered measurements shall be made to the required slopes. For excavation of rock, including boulders of greater than  $\frac{1}{2}$  cubic yard volume, the Contractor shall receive the price stipulated, and he shall not be entitled to additional payment for any hauling or rehandling of the rock required to finally dispose of it, except when placed as riprap under Item 4. The price stipulated for Item 2 shall include the entire cost of excavating the rock and maintaining the excavation; of any necessary damming, bailing and draining; of preparing the foundations to receive masonry; of hauling the excavated rock to the embankments or spoil banks; of placing excavated rock, other than as riprap, in the embankment; and of all other operations and of all materials used, incidental to the excavation and disposal of the rock excavated, excepting the use of excavated rock in riprap as stated above.

## BORROW

### Item 3

**Sect. 3.1. Work Included.** Under Item 3 shall be included all authorized excavation from borrow-pits of earth for fill and refill exclusive of soil used for surface dressing. As a part of the work under this item, the Contractor shall place the material in embankments. Any material taken from borrow-pits for use in work paid for especially under other items of this contract shall not be included in Item 3.

**Sect. 3.2 Measurement and Payment.** The quantity of borrow to be paid for under Item 3 shall be the number of cubic yards actually removed from borrow-pits and placed in embankments other than as surface dressing. Measurement shall be made in excavation except as specified in Sect. 1G.21, with deduction for materials paid for under other items. The price stipulated for Item 3 shall include the entire cost of excavating the material, of any drainage of borrow-pits, of hauling and placing the material as specified in the embankments and of all other operations and of all materials used, incidental to the excavation of the material and its use in embankments or refills.

## RIPRAP

### Item 4

**Sect. 4.1. Work Included.** Under Item 4, faces of embankments exposed to wave and water action at such times as the future reservoir is full, shall be covered with riprap to the extent shown on the drawings or ordered. This riprap shall be formed of suitable rock obtained from cuttings. Sufficient excavated rock shall be reserved for this work and should the Contractor fail to do so he shall make up the deficit with suitable rock supplied at his own expense. The rock may be dumped into place but shall be trimmed approximately to the limits shown on the drawings and precautions shall be taken to bed each stone sufficiently to prevent the existence of large cavities and, where directed, large stones shall be placed on the outside face.

**Sect. 4.2. Measurement and Payment.** The quantity of riprap to be paid for under Item 4 shall be the number of cubic yards placed within the limits prescribed on the drawings or ordered, measured in place. Stones placed as a part of an embankment adjacent to and continuous with riprap shall not be paid for as riprap under Item 4, but compensation shall be considered as having been included in the prices stipulated for the appropriate items. The price stipulated for Item 4 shall include all costs incidental to the work of loading and transporting the excavated rock to its final location, except such costs as shall be included under Item 2, and the additional work necessary to dump or place the rock on the outer limits of the embankments and to trim it approximately to the limits shown on the drawings.

## SURFACE DRESSING AND GRASSING

### Item 5

**Sect. 5.1. Work Included.** Under Item 5, portions of embankments and any other earth surfaces wherever and as ordered shall be dressed with top-soil to the thickness directed. In general, the thickness of surface dressing shall be 6 inches, measured normal to the surface, but may be varied from 6 to 18 inches. The richer soil shall, so far as possible, be placed at the surface. Top-soil shall be free from large stones, roots, leaves or other material which will interfere with the obtaining of a satisfactory surface. If sufficient acceptable top-soil is not obtained from the areas to be occupied by the excavations the Contractor shall obtain additional top-soil from such borrow areas as permitted.

**Sect. 5.2. Preparation of Surface.** In general, top-soil shall not be deposited until in the opinion of the Engineer any refill or embankment upon which it is to be placed shall have approximately reached its final condition of settlement, or until satisfactory provision shall have been made for possible future settlement. Wherever directed, the surface upon which the top-soil is to be placed shall be raked or otherwise satisfactorily prepared to insure a proper bond. The soil shall then be deposited to the thickness directed and lightly rolled or tamped. Any sliding or settling which may occur before the final acceptance of the work shall be repaired by the Contractor and for the quantity of material required to be placed for this purpose no payment shall be made.

**Sect. 5.3. Seeding and Grassing.** Surfaces prepared in accordance with Sect. 5.2 shall be dressed with an acceptable fertilizer in the proportions directed and shall be sown with first-quality grass seed of an approved mixture and compacted, as directed, by rolling or otherwise. If directed, oats or other grain shall be sown with the grass seed to form a sod to hold embankment until grass has obtained a foothold. Grassing shall be done immediately after the preparation of the earth surface for which it is ordered unless other directions are given. If there be any delay for which the Contractor is responsible and weeds grow during such delay on the surface to be grassed, he shall remove the weeds before doing the grassing, or if any portions of the areas are not thoroughly covered by grass they shall be refertilized and reseeded without additional payment. All areas which have been dressed with top-soil and grassed under this contract shall be cared for by the Contractor and watered at such intervals as directed until the grass is well started and shall be left in an acceptable condition at the end of the contract.

**Sect. 5.4. Sodding.** Wherever required, a strip of sound, healthy sod not less than 1 foot wide shall be placed along the edges of the areas to be seeded or on such other parts of the embankment or graded areas as directed. Each sod shall be well rammed into place and, if directed, be held by a wooden pin. They shall have a uniform thickness of not less than 2½ inches and be cut to rectangular shapes. No poor or broken sods will be accepted. Sodding will not be required in excess of 5 per cent of the area required covered under Item 5.

**Sect. 5.5. Measurement and Payment.** The quantity of surface dressing and grassing to be paid for under Item 5 shall be the

number of cubic yards of material actually deposited and prepared in accordance with directions, of the area and thickness prescribed, measured after compacting and before settlement. The price stipulated for Item 5 shall include the furnishing and placing of the soil, the fertilizing and seeding thereof, the sodding as required and all materials and expenses incidental thereto.

## CONCRETE MASONRY

### Items 6 and 7

#### GENERAL CONDITIONS AND REQUIREMENTS

**Sect. 6G.1. Kinds of Masonry and Where Used.** Concrete masonry will be required for culverts and bridge abutments and elsewhere as shown on the drawings or as ordered. Concrete masonry used in connection with the raising of the highway bridge shall also be included under these items.

**Sect. 6G.2. Preparing the Foundations for Masonry.** Before laying masonry of any class at a given place the rock or other foundation, or the masonry previously laid, shall be properly prepared as herein specified or as directed, and when beginning to place the masonry a bed of fresh mortar of the quality hereinafter specified and of the thickness required shall be spread over the foundation and thoroughly worked into all depressions and crevices. Foundations in earth shall be rolled or tamped as directed. Grillages or platforms of timber shall be built as a part of the foundations, if ordered, the timber to be paid for under Items 16 and 17.

**Sect. 6G.3. Building New Masonry on to That Previously Built.** For the proper bonding of new and old masonry such provision shall be made of steps, dovetails or other devices as may be prescribed. Wherever new masonry is joined to old, the contact surface of the old masonry shall be thoroughly cleaned of laitance, waste mortar or other substances which would prevent complete cohesion, using a stiff brush and a stream of water or a pick or chisel if necessary, and shall be clean and wet at the moment the fresh concrete or mortar is placed. Horizontal construction joints shall be cleaned of all laitance by brushing or scraping before the concrete or mortar becomes hard.

**Sect. 6G.4. Masonry Not to Be Laid in Water.** No concrete or other masonry in mortar shall be deposited under water without explicit direction and then only in strict accordance with directions;

nor shall the Contractor, without explicit permission, allow water to rise on any masonry until the mortar shall have set at least twenty-four hours, unless a shorter interval is expressly directed. A continuous flow of water into the excavation shall be diverted through proper drains or by other approved methods which will avoid washing the freshly deposited concrete.

**Sect. 6G.5. Masonry to Be Kept Moist.** Every precaution shall be taken to prevent concrete from drying until it shall have become so thoroughly set and hardened that there can be no danger of cracking from lack of moisture. Masonry shall be kept moist for at least two weeks or until covered with earth, unless otherwise specified or directed.

**Sect. 6G.6. Protection of Masonry Under Construction.** The erection of forms, derricks and other machinery, or of centering and forms, or the landing or storage of heavy objects upon the surfaces of masonry under construction, or walking or working over them, will not be permitted until an acceptable time has passed for the setting of the concrete or mortar of the masonry. Whenever ordered, or wherever conditions indicate the necessity, the Contractor shall provide timber or other acceptable covers for the protection of fresh masonry and all masonry surfaces which are to be permanently exposed to view, so that they shall not be disfigured by the falling of tools, mortar and other objects, until the final acceptance of the work.

**Sect. 6G.7. Cleaning Exposed Faces.** The Contractor, at any time prior to the final acceptance of the work, may be required to clean carefully all exposed faces of masonry.

**Sect. 6G.8. Reinforcing Masonry With Metal.** Portions of the concrete shall, wherever shown on the drawings, and in other places, if required, be strengthened by embedding in them pieces of steel or iron of the number, shape and sizes directed. Steel or iron dowel-pins, anchors, wires, clamps or dogs shall be placed where required. Such steel or iron, of the quality hereinafter specified, as may be required for strengthening any parts of the masonry, shall be furnished and placed as directed. Measurement shall be made under the appropriate items. In no case shall any masonry be classified as reinforced concrete, although steel or other metal be built into it, unless it is so marked on the drawings or designated as such when ordered.

**Sect. 6G.9. Metal Built Into Concrete.** Besides the metal specified in Sect. 6G.8, there shall be built into or set in or attached to the concrete masonry wherever ordered, metal objects shown on the drawings or ordered, and all necessary precautions shall be taken to prevent any metal work from being displaced, broken or deformed. The concrete shall be tightly packed around reinforcing metal and other metal work, so as to secure perfect adhesion except where the metal is required to be coated to prevent adhesion, and if required, recesses, holes or projections necessary for placing any metal work shall be left or made in the masonry.

**Sect. 6G.10. Working in Freezing Weather.** Masonry containing mortar shall not be built in freezing weather without explicit permission or direction. If directed or permitted to build structures of masonry in cold weather, required or approved precautions shall be taken for removing ice and frost from the materials, including heating the water, sand and ballast, for protecting the newly laid masonry from freezing, and for securing work satisfactory in all respects. Satisfactory covering for the newly laid masonry and such additional appliances and materials as may be required therefor, including steam pipes for keeping the air warm beneath the covering, shall be provided.

**Sect. 6G.11. Models and Test Specimens of Masonry.** If required for test purposes, the Contractor shall make cylinders, cubes, beams, slabs or other shapes of concrete, or shall furnish the Engineer small quantities of mortar or concrete. All quantities actually furnished in accordance with directions shall be measured under the appropriate items.

**Sect. 6G.12. Removing and Replacing Masonry.** If, in accordance with Art. XIV, the Contractor removes, as directed, portions of the masonry, and the work thus exposed for examination is found satisfactory, or if for any other reason he shall be ordered to remove masonry built in full accordance with this contract, such removed material shall be measured as rock excavation, Item 2. If the masonry, upon examination, is found to be of acceptable quality, it shall be included in the measurement of the appropriate items as well as that used to refill the excavation. In connection with the removing and replacing of masonry in accordance with this section, no quantity shall be measured as less than 1 cubic yard.



**Sect. 6G.13. Defective Masonry.** Masonry damaged by freezing or by alternate freezing and thawing, or from any other cause, or any masonry which shall at any time before the completion of this contract be found defective, shall be removed and rebuilt or otherwise made good. Masonry so removed shall not be measured except under the appropriate masonry item and so measured but once. If local repairs be permitted, they shall be made immediately on removal of the forms. No thin patches of plastering will be permitted, but recesses shall be cut of a shape to retain the patches and of a depth to insure their permanency. If required, anchor-bolts shall be set in drilled holes, and these and wire mesh or other suitable device embedded in the patch. No mortar richer than 1 part of cement to  $1\frac{1}{2}$  parts of sand shall be used in repairs, as richer mortar tends to check.

**Sect. 6G.14. Expansion Joints.** Expansion joints shall be formed where and as directed in the culverts and abutments and elsewhere as shown on the drawings or required. Unless otherwise ordered, they shall be made by building smooth faces, acceptably coated with an approved substance to prevent adhesion with the adjacent masonry. If directed to assure water-tight work, joints shall be grooved or otherwise shaped and filled with an acceptable, durable, waterproof and elastic cement to prevent leakage.

**Sect. 6G.15. Composition.** Concrete shall be made of cement and aggregates of the qualities herein specified, in the proportions directed. The fine and coarse aggregate shall be measured separately by volume, in approved receptacles, proper allowance being made for variations due to moisture. In determining the proportions of the ingredients, 94 pounds of cement shall be considered a cubic foot. Concrete shall be the densest and most impermeable that it is possible to make from the accepted materials when mixed in the proportions directed and scrupulous care shall be exercised to obtain such results.

**Sect. 6G.16. Fine Aggregate.** Fine aggregate shall consist of sand, stone screenings or an approved combination thereof, having clean, hard, strong, durable, uncoated grains and free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam or other deleterious substances. Fine aggregate shall contain an acceptable gradation of both fine and coarse particles with no grains larger than will pass a  $\frac{1}{4}$ -inch mesh screen. Fine aggregate

which, in its natural condition, is not acceptable for use in concrete may be screened, washed or mixed with other aggregate as required to produce the desired result.

**Sect. 6G.17. Coarse Aggregate.** Coarse aggregate shall consist of crushed stone, gravel or an approved combination thereof, having clean, hard, strong, durable, uncoated particles free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic or other deleterious matter. It shall be acceptably graded of sizes suited to the various parts of the work; in general it shall be of such sizes that all of it can be passed through a 2-inch ring and be retained on a  $\frac{1}{4}$ -inch mesh screen. Larger maximum sizes may, however, be permitted or required in some parts of the masonry, and in others the maximum may not be permitted to exceed  $\frac{3}{4}$ -inch.

**Sect. 6G.18. "Run" of Crusher or Bank.** If suitable for the purpose, material direct from the crusher or bank without washing, screening and subsequent mixing may be used in concrete, but "run" of crusher or bank shall not be used unless permitted or ordered, and then only in strict accordance with directions.

**Sect. 6G.19. Samples of Aggregate.** Samples of aggregate, which the Contractor proposes to use, shall be submitted to the Engineer at least two weeks before the Contractor commences to deliver the materials at the site of the work. Materials shall not be delivered until the samples shall have been approved and, as delivered, they shall in all respects be equal to the approved samples. Samples of sand and screenings, of about 1 quart, shall be submitted in glass jars with stoppers and samples of not less than 1 cubic foot of coarse aggregate in suitable boxes or other receptacles. All samples shall be plainly and neatly labeled with the place from which taken, where proposed to be used, date and name of collector.

**Sect. 6G.20. Water.** The Contractor shall provide suitable means for controlling and accurately measuring water for mixing concrete. Water for concrete and mortar shall be acceptably clean and shall be used in the quantities directed.

**Sect. 6G.21. Mixing.** Concrete shall be mixed in approved mechanical mixers, of the batch type, driven by power, except that, if permitted, relatively small quantities may be mixed by hand in a satisfactory manner. Gravity mixers shall not be used. Only such mixers

as by long mixing with relatively small quantities of water produce a plastic mass in which every particle of ballast is covered with mortar and in which the cement is well hydrated will be allowed. The mixing of each batch shall continue not less than 1 minute after all the materials are in the mixer, during which time the mixer shall rotate at not less than 15 revolutions or more than 20 revolutions per minute. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer. Concrete shall be of such consistency that when being leveled into place it will quake without tamping and the water shall be kept at a minimum. Any mixture showing an excess of water shall not be placed in the work. No retempering shall be allowed except by express permission and all concrete which has its initial set before placing in the work shall be at once rejected and removed. If any concrete is not wet enough when delivered for placing, it shall be returned to the mixer or else remixed by hand upon a suitable water-tight platform provided for that purpose.

**Sect. 6G.22. Placing Concrete.** After mixing, the concrete shall be deposited in place, in batches of suitable sizes for the various parts of the work, before it shall have time to attain its initial set, to accomplish which, provision shall be made for its rapid transportation from the point of mixing to the work. Care shall be taken to avoid depositing concrete in a manner which will cause segregation of the aggregates. Any concrete which shall have become compacted during transportation shall be satisfactorily remixed just before being deposited in place. Concrete shall be deposited so as to spread out in layers. Ramming and spading shall be thorough for each layer to expel air and surplus water, particularly at exposed faces. In special cases, as where concrete is deposited on slopes, a drier mixture may be used, but great care shall be exercised to spread such concrete evenly in layers about 4 inches in thickness and to ram it thoroughly. In general, the methods shall be such as to give a compact, dense and impervious concrete.

**Sect. 6G.23. Placing Concrete in One Operation.** Wherever ordered, concrete structures or such portions of structures as directed shall be completed in one operation by the continuous laying of concrete, and any interruption of longer duration than 30 minutes may be deemed sufficient cause for rejection.

**Sect. 6G.24. Forms and Molds.** The Contractor shall provide all necessary forms and molds for shaping the concrete, and sup-

ports and braces for holding them in place. Forms shall be true to the required shapes and sizes, strong enough to withstand all operations incidental to placing the concrete and water-tight, and the faces against which the concrete is to be placed shall be satisfactorily smooth. The lumber used in forms for exposed faces shall be seasoned stock and the forms shall be tight. No unsatisfactory forms, molds, supports or braces shall be used and those condemned shall be immediately removed from the work. To obtain tightness, calking with oakum or other suitable material may be required, for which the Contractor shall provide suitable tools and materials. Small rods to hold the forms will be allowed in the walls, provided proper means be used to take out a portion of each of the rods nearest the surface at least 2 inches in length. All holes left after the removal of the rods shall be immediately and completely filled with cement mortar and the surface left smooth and in good condition. Whenever required, forms shall be thoroughly wet just before placing concrete so as to prevent injurious drying of the surface of the concrete by absorption. The surface of all forms against which concrete is to be deposited shall be cleaned and smeared with soap, mineral oil or other suitable substance to prevent the adhesion of the concrete. Whenever faces are not cast against forms they shall be screeded, troweled and rubbed to an acceptable finish by men skilled in such work. Directions as to the time of removing forms, molds, supports and braces shall be strictly followed and the removing shall be done with great care so as to avoid injury to the concrete.

**Sect. 6G.25. Concrete Faces.** Exposed surfaces of concrete shall be made with especial care against forms that are especially smooth and true and shall have a dense and watertight skin, secured by carefully, but judiciously, spading the stone away from the face while depositing the concrete. If, upon removing the forms or molds, any voids or other imperfections be found, such faults shall be corrected by filling with mortar or otherwise, as directed, even to the extent of taking down and replacing unsatisfactory concrete. The invert of culverts and other exposed horizontal surfaces shall be accurately screeded to the required form and floated and troweled by skilled finishers. Sides and arch of inside of culverts, if found necessary, shall be troweled by a skilled man immediately on the removal of forms to fill all voids and remove all unevennesses. Forms shall be removed as soon as it is safe, in order to allow smooth troweling. Exposed faces of culverts and abutments, immediately on removal of forms, shall have all voids in the concrete filled neatly with mortar, ridges tooled off and rubbed

down, faces thoroughly cleaned and a coat of grout, mixed as directed, thoroughly brushed on the area. Or, if ordered, the green concrete shall be scrubbed with a stiff brush or rubbed with a hard burned brick, a mortar block or other acceptable tool, the face being kept wet and sprinkled with cement and the rubbing continued until a smooth, dense face has been obtained. This surface shall be kept moist until thoroughly hardened.

**Sect. 6G.26. Angles and Corners.** All exposed angles and corners in the structures shall be beveled or rounded to a 2-inch radius unless otherwise ordered.

**Sect. 6G.27. Measurement and Payment.** The quantity of concrete to be paid for under Items 6 and 7 shall be that actually deposited in place in accordance with the drawings, specifications or requirements or as ordered. The prices stipulated for Items 6 and 7 shall include all expenses incidental to providing and removing all forms, molds and centres, and all labor and materials necessary to accomplish the completed work, including the finishing of surfaces and the constructing of contraction and other joints where specified; except cement, steel reinforcement, and other metal work, which are to be paid for under other items.

## CONCRETE MASONRY

### Item 6

**Sect. 6.1. Work Included.** Under Item 6 shall be included all concrete masonry in culverts, bridge abutments and other structures built under this contract not specifically indicated as reinforced concrete on the drawings, but not including concrete built for the purposes of the Contractor.

**Sect. 6.2. Measurement and Payment.** The quantity of concrete masonry to be paid for under Item 6 shall be the number of cubic yards actually deposited in place in accordance with the drawings, specifications or requirements. Wherever the structure is of such type that masonry is to be built against the sides of any excavation, the concrete shall be measured as if the excavation were made exactly to the prescribed lines. Concrete that is specifically designated as reinforced concrete in drawings or orders shall not be paid for under Item 6. The price per cubic yard stipulated for Item 6 shall include the cost of

providing all labor and materials, except cement which shall be paid for under Item 11; providing and removing all forms, molds, supports and braces; providing asphaltum or other lubricating substances; finishing surfaces and the proper bonding of new and old masonry; caring for and building into the masonry or setting any metal-work; and any other expenses incidental or necessary to accomplishing and maintaining the completed work.

## REINFORCED CONCRETE

### Item 7

**Sect. 7.1. Work Included.** Under Item 7 shall be included the reinforced concrete in box culverts and all other reinforced concrete, designated on the drawings or ordered specifically as such.

**Sect. 7.2. Placing.** The concrete shall be placed continuously so as not to impair the strength of the structure. All steel reinforcement shall be placed in the exact positions and with the spacing shown on the drawings or as ordered, and shall be so fastened in position as to prevent displacement while the concrete is being deposited.

**Sect. 7.3. Measurement and Payment.** The quantity of reinforced concrete to be paid for under Item 7 shall be the number of cubic yards actually placed in accordance with the drawings or as ordered. The price per cubic yard stipulated for Item 7 shall include all expenses of whatever kind incidental to the placing of the reinforced concrete and in every respect completing it to fulfill the requirements of Item 7 and those of Sects. 6G.1 to 6G.27, both inclusive, which are applicable. Reinforcing steel and cement shall be paid for under the appropriate items.

## PAVING

### Item 8

**Sect. 8.1. Work Included.** Under Item 8 shall be included the paving to be laid at culvert inlets and outlets, in gutters and ditches, and elsewhere as directed.

**Sect. 8.2. Quality.** Paving shall be built of roughly rectangular, sound, durable stones of established weathering qualities, and laid to the thickness and extent shown on the drawings, or otherwise

required for each place. Stones shall have even top faces with approximately straight sides so as to permit laying with as close joints as practicable. For light paving, such as used for gutters, stones shall have a nearly uniform depth. The stones shall be placed by hand close together and thoroughly bedded. Unless otherwise ordered, light paving shall be laid in sand, and joints shall be filled with sand. In the heavier paving all voids shall be filled with ballast, and joints at the face of the paving shall be filled with tightly driven spalls. The whole work shall be done so as to secure a solid paving with firm, true face which will not be displaced by the action of waves or ice.

**Sect. 8.3. Measurement and Payment.** The quantity of paving to be paid for under Item 8 shall be the number of cubic yards actually placed within the limits prescribed, including the ballast. The price stipulated for Item 8 shall include all expenses incidental to preparation of the foundation, the furnishing of the materials and the construction and finishing of the paving.

## **SAND, GRAVEL AND BROKEN STONE**

### **Item 9**

**Sect. 9.1. Work Included.** Under Item 9 shall be included sand, gravel, broken stone or other porous materials, placed and compacted as directed, for drains, filling behind walls, as a foundation for paving, for road surfacing other than that furnished under Item 10 and wherever else required.

**Sect. 9.2. Quality.** Sand, gravel and broken stone shall fulfill the specifications stipulated in Sects. 6G.16 and 6G.17 for aggregate or shall be of such other sizes as may be required, and shall be acceptably screened and graded in size wherever required.

**Sect. 9.3. Foundation.** As a foundation for the heavier paving, and if ordered for the lighter paving, crushed stone, gravel or mass concrete shall be used as directed. If ordered, an upper layer of fine material shall be placed over the crushed stone or gravel foundation.

**Sect. 9.4. Gravel Surfacing.** Gravel for temporary surfacing of highways when ordered and when not required to be constructed under Item 10 shall consist of acceptable natural mixtures of local materials from the excavations or borrow-pits selected in such a manner as to avoid an excess of soil, clay or fine sand, and placed separately

to the required thickness and the widths shown on the drawings or ordered. It shall be free from stones over 4 inches in largest dimensions and the remaining large stones shall be raked from the surface layer and deposited at the bottom. The entire surface including the shoulder shall be suitably wet and rolled with an approved roller until the surface no longer compacts under the roller. During the rolling any depressions shall be brought to grade so as to leave an even surface conforming to the grades and cross-section.

**Sect. 9.5. Measurement and Payment.** The quantity of sand, gravel and broken stone to be paid for under Item 9 shall be the number of cubic yards actually placed in the work, within the designated limits, in accordance with the drawings or directions. Sand, gravel and broken stone used for roadway grading, for concrete aggregate or for other purposes for which provision is made under other items or specifically exempted, shall not be measured under Item 9. The price stipulated for Item 9 shall include all expenses incidental to furnishing, screening and placing these materials as ordered.

## GRAVEL ROAD SURFACING

### Item 10

**Sect. 10.1. Work Included.** Under Item 10 shall be included the furnishing and placing of an 8-inch one course gravel pavement as herein specified at certain points where the proposed railroad grading will make necessary the relocation of short stretches of the Greenwood Lake highway.

**Sect. 10.2. Preparing Subgrade.** Grading for the highway relocations shall be done under Items 1, 2 or 3 to the lines shown on the drawings or ordered. Before any gravel is placed, the subgrade shall be firmly and evenly rolled or otherwise compacted as directed by the Engineer. All places which may settle in the process of rolling shall be brought up to grade and satisfactorily rolled.

**Sect. 10.3. Materials.** Road gravel shall be composed of hard durable gravel mixed with sand and loam in such proportions that it will compact under travel into a hard dense pavement and shall be satisfactory to the Engineer.

**Sect. 10.4. Placing Gravel.** Acceptable road gravel shall be spread in one course over the roadbed to a depth which, after compacting, shall produce a pavement 8 inches thick and to the width



shown on the drawings or ordered. It shall be thoroughly consolidated by rolling with a three wheel power roller weighing not less than 10 tons, until the surface is hard, smooth, free from slight depressions and thoroughly compacted. Depressions or places showing evidence of not being properly consolidated, shall be filled with gravel and recompactd until the surface has a uniform contour, free from depressions or other surface defects. If required, gravel shall be dampened to accomplish compacting.

**Sect. 10.5. Bituminous Seal Coat.** Not sooner than 10 days nor later than 1 month after the road has been open to traffic the surface shall be treated with a seal coat of bituminous binder furnished by the Commission, applied at the rate directed. Small piles of stone chips or sand shall be distributed throughout the road sufficient to cover at the rate of 10 pounds per square yard. Immediately after the bituminous material has been applied it shall be covered with a thin layer of stone chips or sand which shall then be rolled lightly. If required, additional chips or sand shall be used to take up all excess bituminous material. The finished surface shall be uniform and shall conform to the grades and cross-sections shown on the drawings.

**Sect. 10.6. Measurement and Payment.** The quantity of gravel road surfacing to be paid for under Item 10 shall be the number of square yards measured in place after completion to the lines shown on the drawings. All linear surface measurements shall be made along the actual surface of the pavement and not horizontally. The price stipulated for Item 10 shall include the rolling of the pavement subgrade and all materials, equipment, tools, labor and expense incidental to the placing and compacting of the gravel and the application of the bituminous seal coat, except the cost of the bituminous material which will be furnished by the Commission, delivered to such point as the Contractor may designate.

## CEMENT

### Item 11

**Sect. 11.1. Kind of Cement.** Under Item 11 shall be included all cement used in the work. Cement shall be true Portland cement of well-known brands which have been in successful use for large engineering works in America for not less than five years, which have

an established reputation for uniform character and which are manufactured at works which have been in successful operation for at least two years. The brands shall be acceptable to the Commission and to the Railroad and before beginning to furnish cement the Contractor shall inform the Engineer what brands he proposes to use. Unless otherwise permitted, not more than three brands shall be used in the whole work and only one brand shall be used at a time in any section of the work, except as permitted.

**Sect. 11.2. Quality of Cement.** All cement shall be dry, finely ground and free from lumps, caking or water marks. By Portland cement is meant the finely pulverized product resulting from the calcination to incipient fusion of a properly proportioned intimate mixture of argillaceous and calcareous materials, to which no addition greater than 3 per cent has been made subsequent to calcination.

**Sect. 11.3. Packages.** The cement shall be delivered in canvas bags or other strong, well-made packages, each plainly marked with the manufacturer's brand. The weights of such packages shall be uniform. Packages received in broken or damaged condition shall be rejected, or accepted only as fractional packages.

**Sect. 11.4. Quantity on Hand.** The Contractor shall, at the beginning of operations and at all other times while cement is required, have at the site of the work an abundant supply of acceptable cement, and shall carefully guard against possible shortage on account of rejection, irregular delivery or any other cause.

**Sect. 11.5. Inspection and Tests.** The cement will be subject to thorough inspection and tests, and shall meet all requirements prescribed in the "Standard Specifications and Tests for Portland Cement" of the American Society for Testing Materials, Serial C9-21.

No cement will be permitted on the site of the work which has not been accepted as conforming to these specifications, unless permission in writing has been given by the Engineer, and then only upon the conditions as set forth in such permit.

Examination of the cement by the Engineer will be made at the place of manufacture, and suitable samples will be taken by him for laboratory tests.

The Contractor, when placing his orders with manufacturers, must secure from them an agreement to the effect that the Engineer will be permitted to inspect at the mill, in accordance with the terms of these

specifications, all cement for their work. The manufacturer shall furnish at the mill sufficient cement as may be required by the Engineer, and at such times as will permit of all tests herein specified to be completed before shipment of cement to the work.

Provision must be made which will permit the Engineer to secure satisfactory samples, and for him to seal the spouts leading to and from the bins from which such samples have been taken.

The Engineer shall have liberty at all times to inspect the materials, process of manufacture and records of analyses and tests of all bins sampled.

**Sect. 11.6. Acceptance.** Cement may be permitted to be used which shall have passed satisfactorily the tests prescribed for fineness, soundness and setting and 28-day tensile tests, neat and in mortar, in the form of standard briquettes. The Commission may at any time rescind the approval of any brand of cement that develops objectionable qualities.

**Sect. 11.7. Retesting and Rejection.** Cement kept in store may be subjected to repeated tests if required. If the tests prove any cement unsatisfactory which has been delivered at the site of the works, such cement shall be at once plainly marked for identification and promptly removed from the work and its vicinity. Cubes, beams or briquettes shall be made at any time for purposes of tests from concrete or mortar being used in the work, if so directed.

**Sect. 11.8. Storehouses and Scales for Weighing.** The Contractor shall provide several cement storehouses convenient to the work, at approved places. Cement storehouses shall be weather-tight, shall have tight floors a proper distance above the ground, shall be large enough to admit of keeping on hand a sufficient supply of cement to prevent delays or interruptions to the work for lack of cement and shall have sufficient floor space for storing each carload of cement separately and affording convenient access thereto for sampling, counting of packages and removal. Cement in bags shall not be piled to a height exceeding 7 feet. Suitable accurate scales shall be provided by the Contractor for weighing the cement in each storehouse and elsewhere on the work, if required.

**Sect. 11.9. Notice of Delivery of Cement.** When deliveries of cement are to be made, the Contractor shall furnish the Engineer with a copy of all shipping instructions. Such notice shall be given at least

three days before shipments are desired to allow the Engineer to have a representative at the mill to witness loading of all shipments.

**Sect. 11.10. Cement Storekeepers.** The Contractor shall employ competent storekeepers who can speak and understand the English language, who shall have charge of the cement storehouses and keep suitable records of the delivery and use of all cement. Copies of these records shall be furnished the Engineer at the close of each day's work, showing in such detail as he may reasonably require, the quantity of cement used during the day at each part of the work.

**Sect. 11.11. Measurement and Payment.** The quantity of cement to be paid for under Item 11 shall be the number of barrels of cement actually used in the various classes of work except cement used in masonry for filling unauthorized excavations, for replacing condemned work and for purposes of the Contractor. For purposes of estimating for payment, a barrel of cement shall be considered as 376 pounds net of cement. The price stipulated for Item 11 shall include all expenses incidental to delivering and putting cement into the masonry or other parts of the work in which it is to be used.

## STRUCTURAL STEEL

### Item 12

**Sect. 12.1. Work Included.** Under Item 12 shall be included the designing, furnishing, fabricating, erecting and painting of all structural, forged and cast steel or other metal work entering into the construction of or attached to the steel structure of one or more plate girder bridges which may be built under this contract, including anchor-bolts and hand-rails.

**Sect. 12.2. Materials, Inspection and Tests.** The chemical and physical properties of structural steel, rivet steel and steel castings and the inspection and testing of such material shall conform to the Standard Specifications of the American Society for Testing Materials for Structural Steel for Bridges, Serial Designation A7-21.

**Sect. 12.3. Design and Fabrication.** Except as otherwise specified or permitted, the designing, detailing and fabricating of the bridge shall conform to the requirements of the 1921 Edition of the American Railway Engineering Association's General Specifications for Steel Railway Bridges.

**Sect. 12.4. Erection.** The Contractor shall erect, rivet and adjust all metal work in place complete and provide all tools, machinery and appliances necessary for the expeditious handling of the work, including drift pins and fitting-up bolts. The method of erection and plans for falsework and erection equipment shall be subject to the approval of the Engineer. Falsework material of every character shall be provided by the Contractor and removed upon the completion of the erection. Material shall be stored and handled in such a manner as not to be injured and any material damaged in transit or in handling and in erecting shall be satisfactorily repaired or replaced by and at the expense of the Contractor. Light drifting will be permitted in order to draw the parts together, but unfair holes shall be reamed or drilled. All field connections shall be securely bolted prior to riveting. Rivets shall be uniformly and thoroughly heated and no burnt rivets shall be driven. Rivets shall be driven tight, heads shall be full and uniform and no recutting or caulking will be permitted. All defective rivets shall be promptly cut out without injury to the surrounding metal and redriven.

**Sect. 12.5. Painting.** In addition to the shop coat of paint required in the specifications referred to in Sect. 12.3, all metal surfaces unless otherwise specified, shall be given two field coats of best quality paint approved as to color, quality and manufacture. Surfaces inaccessible after erection shall receive two coats of the approved paint before assembling in place. The rest of the structure shall receive the two field coats after erection, allowing enough time between coats for the first coat to dry thoroughly before applying the second. No paint shall be applied in wet or freezing weather nor when the surface of the metal is damp. Painting shall be done in good and workmanlike manner, subject to strict inspection during progress and after completion. All metal shall be thoroughly cleaned of dirt, rust, loose scale, etc., before the paint is applied.

**Sect. 12.6. Measurement and Payment.** The quantity of structural steel to be paid for under Item 12 shall be the number of tons actually incorporated in the work in accordance with the specifications and directions; except that the total weight to be paid for shall not exceed the weight computed from the approved design by more than 2 per cent. Computed weights shall be based on the 20th Edition of the Pocket Companion of the Carnegie Steel Company; for sections and articles not there listed, on 0.2833 pounds per cubic inch of metal. The price stipulated for Item 12 shall include all costs of designs and

drawings, of furnishing, fabricating, erecting, cleaning and painting the metal work, of furnishing, erecting and removing falsework and stagings and all other materials, labor and expense incidental to completing the steel structures in a satisfactory manner.

## STEEL FOR REINFORCING CONCRETE

### Item 13

**Sect. 13.1. Where Used.** Under Item 13 shall be included all steel reinforcement furnished and placed in culverts and elsewhere as shown on the drawings or ordered.

**Sect. 13.2. Description.** Steel reinforcement, Item 13, shall consist of either rods acceptably shaped or deformed so as to afford a mechanical bond with the concrete at frequent intervals and assure thorough contact between the steel and concrete, or an expanded metal or wire-mesh of an acceptable make, all to be of the dimensions shown on the drawings or ordered.

**Sect. 13.3. Quality of Steel.** Steel shall be open-hearth steel of uniform quality, having a tensile strength between the limits of 55,000 and 65,000 pounds per square inch, an elastic limit of not less than 50 per cent of the tensile strength and an elongation of not less than 25 per cent in 8 inches and shall stand bending cold, without cracking, 180 degrees to a diameter equal to the nominal size of the rod. All tests shall be made on samples of the metal before deforming. Twisted square steel bars shall be twisted cold so that each bar shall have one complete turn in a length not less than 8 nor more than 12 times the nominal size. The steel shall show no tendency to crack in twisting and after twisting shall stand bending cold, without cracking, 180 degrees to a diameter equal to twice the nominal size of the rod.

**Sect. 13.4. Placing.** All steel reinforcement shall be accurately shaped and placed in the exact positions and with the spacing shown on the drawings or ordered, and it shall be fastened in position so as to prevent its becoming displaced during the placing of the concrete. Where splicing is necessary, the ends of the rods shall be lapped not less than 40 diameters and shall be thoroughly wired together. Splicing at points of maximum stress will not be permitted. Steel reinforcement having other than the sections shown on the draw-

ings may be used, with approval, at the option of the Contractor, but in such cases the steel used shall be equivalent in tension and bond resistance to that of the rod sizes indicated on the drawings.

**Sect. 13.5. Protection of Steel.** Steel for reinforcement shall be new, unruled stock, free from mill-scale, delivered without rust other than may have accumulated in transportation to the work. It shall be at all times thoroughly protected from moisture until placed in final position. Furthermore, after placing in position, if concreting be interrupted for any considerable number of days, the steel shall be protected with canvas or tarred paper or other satisfactory covering. Projecting ends which are left for a considerable time shall be painted with a heavy coat of cement grout. Any steel which shows scaly rust before the concrete is placed shall be satisfactorily cleaned.

**Sect. 13.6. Measurement and Payment.** The quantity of steel for reinforcing concrete to be paid for under Item 13 shall be the number of pounds actually placed in accordance with the drawings or ordered. It shall not include any waste metal due to the fact that the lengths supplied are too long for their purpose, nor wires, clips or other devices used for securing the reinforcing metal. The quantity paid for shall include, however, bolts used in connecting parts of the reinforcement metal, and extra metal in laps, where authorized, due to the fact that a single bar would be unreasonably long. In computing the weights, if not determined by weighing, 1 cubic inch of steel shall be reckoned at 0.2833 pound. The price stipulated for Item 13 shall include royalties, if any, the cost of steel, cutting, shaping, placing, riveting, fastening in position, coating with cement, testing, and all other work and materials connected therewith.

## 6-INCH STEEL PIPE

### Item 14

**Sect. 14.1. Work Included.** Under Item 14 shall be included the steel pipe line for the water supply system of the Ringwood Mine. The main portion of the line shall be 6-inch, but 8-inch and 10-inch pipe shall be furnished if required.

**Sect. 14.2. Quality and How Laid.** The pipe shall be standard weight black steel pipe. Each length shall be threaded on both ends according to the Briggs Standard. Lengths shall be joined by standard couplings. The pipe shall be laid to the line and grade

directed. The trench shall be at least 2 feet wide at the bottom and shall not exceed 5 feet in depth. The joining of lengths shall be done in a workmanlike manner, using an approved pipe joint compound to assure water tight joints. Valves furnished by the Commission, if required, shall be inserted in the line where directed. The completed line shall be water tight at 100 pounds per square inch pressure.

**Sect. 14.3. Measurement and Payment.** The quantity of 6-inch steel pipe to be paid for under Item 14 shall be the number of linear feet actually laid to the lines established by the Engineer without deductions for valves furnished by the Commission, if any. Each foot of 8-inch pipe shall be measured for payment as 2 feet of 6-inch pipe and each foot of 10-inch pipe as 3 feet of 6-inch pipe. The price stipulated for Item 14 shall include all labor, materials and other expenses necessary for completing the pipe line except that excavation, sand, gravel and broken stone, lumber ordered left in place, cement and concrete shall be paid for under the appropriate items of this contract and valves for the line shall be furnished by the Commission.

## CAST IRON, WROUGHT IRON AND STEEL

### Item 15

**Sect. 15.1. Work Included.** Under Item 15 shall be included the bolts, nuts, washers and plates used in the permanent timber trestles, cast-iron pipe for drains not exceeding 16-inch diameter and any other miscellaneous articles ordered of cast iron, wrought iron or steel not expressly included for payment under other items.

**Sect. 15.2. Quality.** All cast iron, wrought iron and steel shall be of acceptable quality, clean and satisfactory in every respect when built into or attached to the work. Miscellaneous castings shall be strong and tough, and soft enough to permit cutting and drilling. Steel shall, unless otherwise permitted, be equal in quality to steel for reinforcing concrete, as specified under Item 13.

**Sect. 15.3. Measurement and Payment.** The quantity of cast iron, wrought iron and steel to be paid for under Item 15 shall be the number of pounds actually placed in the work in accordance with the drawings and requirements. Weights shall be obtained by weighing, unless, in any case payment by theoretical weight is approved for convenience. Actual weights unduly in excess of theoretical weights shall



not be paid for. The price stipulated for Item 15 shall include all labor, materials and other expenses necessary for furnishing and placing the metal in the completed work. All metal-work used for forms or for covering wooden forms and all rods or other metal used for properly spacing or supporting the sides of forms or molds, or for supporting or securing designated reinforcing metal, even although ordered and left in the masonry, will not be paid for separately, but compensation shall be considered as included in the price stipulated for the masonry in connection with which it is used. Steel or iron furnished by the Contractor in temporary construction trestles or for other use or convenience not required by the drawings or ordered shall not be included for payment under Item 15. Steel for reinforcing concrete shall be paid for under Item 13, structural steel under Item 12 and 6-inch steel pipe under Item 14.

## TIMBER AND LUMBER

### Item 16

**Sect. 16.1. Purpose and Quality.** Under Item 16 timber and lumber of various sizes and kinds shall be furnished as required for permanent trestles, for crossing planks, for guard rails and elsewhere as shown on the drawings or as ordered. Timber and lumber shall be of good quality, sound and free from shakes and loose knots, and suitable for the purpose for which required.

**Sect. 16.2. Measurement and Payment.** The quantity of timber and lumber to be paid for under Item 16 shall be the approved number of thousand feet board measure actually furnished and placed in the work in acceptable condition. Round timber shall be estimated as square timber of the largest size, omitting fractions of an inch, which can be inscribed in the small end of the log. Second-hand timber that has been notched shall be estimated for measurement as of the size of its minimum rectangular cross-section. Item 16 shall not be interpreted to include any material used in the sheeting and bracing of trenches, nor any required for temporary construction trestles, for falsework used in the erection of steel structures, for blocking and bracing in connection with the raising of the highway bridge, for forms for masonry, for landing platforms, for construction of camps, cantonments, Contractor's offices or warehouses or for other purposes or

structures required by the Contractor in the performance of the various items of the contract. The price stipulated for Item 16 shall include all labor, material and other expenses incidental to furnishing, working and placing the timber and lumber satisfactorily and maintaining it in good order until the completion of the contract.

## PLACING TIMBER AND LUMBER FURNISHED BY THE COMMISSION

### Item 17

**Sect. 17.1. Work Included.** The Commission has about 50 M. feet B.M. of large size timber at the Wanaque dam which the Contractor shall use, if directed, in the construction of permanent timber trestles or other structures. Under Item 17 shall be included such of this lumber as is used by the Contractor. Timber shall be worked, built into place and maintained in good order.

**Sect. 17.2. Measurement and Payment.** The quantity of timber and lumber to be paid for under Item 17 shall be the number of thousand feet board measure actually placed in accordance with orders or in accordance with the drawings. Timber that has been notched shall be measured as of the size of its minimum rectangular cross-section. The price stipulated for Item 17 shall include all labor, material and other expenses incidental to taking the timber and lumber from its present location to the location where it is to be used, to working and building it into place and to maintaining it in good order until the completion of the contract.

## RAISING HIGHWAY BRIDGE AT STATION 0

### Item 18

**Sect. 18.1. Work Included.** Under Item 18 the bridge at the southerly end of this contract which carries the highway over the tracks of the Erie Railroad is to be raised approximately 2 feet, necessitating also the raising of the grade of about 600 feet of highway adjacent to the bridge.

**Sect. 18.2. General Requirements.** This work shall be done with no interruption to traffic on the Railroad and with the minimum of inconvenience to traffic on the highway. To that end the necessary watchmen with flags and lights shall be on duty continuously to handle

traffic. In a general way, while the work under this item is being done, the full width of the highway approach on one end of the bridge and at least 7 feet of paved surface on the other end, on which work is proceeding, shall be kept open to traffic at all times. The Contractor shall provide and maintain the necessary signs, barriers, temporary fences, etc., to insure safe traffic across the bridge and to prevent damage to the bridge or to the work. An approved method of procedure will be to close traffic on one half of one approach; build backwall of the bridge abutment and new paved approach for this half of the road; turn traffic over new half, providing short adjustable wooden bridge or apron from the top of new backwall to the bridge floor; repeat operations on other half of same approach; raise bridge providing short adjustable wooden bridge or apron from floor of raised bridge to one-half of original roadway of the other approach; build new approach in two operations similar to those for the first approach.

**Sect. 18.3. Details of Operation to Be Furnished by the Contractor for Approval.** The Contractor shall submit plans and detailed description of the method which he proposes to use for the work under Item 18 and he shall not proceed with the work until such plans have been approved by the Commission, the Railroad, the Borough and the County authorities.

**Sect. 18.4. Payment.** The lump sum price stipulated for Item 18 shall include all labor, materials and expenses incidental to planning the work, raising the approaches and the bridge and safeguarding traffic on the railroad and highway except that grading, concrete, paving, gravel road surfacing and other work or materials covered by items of this contract shall be measured and paid for under the appropriate items.

## ERECTING STRUCTURAL STEEL FURNISHED BY THE COMMISSION

### Item 19

**Sect. 19.1. Work Included.** The Commission will furnish, and deliver f. o. b. cars at point or points designated by the Contractor, one or more second-hand plate girder spans for use at places where trestles to be constructed under this contract cross over the present tracks of the Erie Railroad. Under Item 19 the Contractor shall erect these girders as herein specified.

**Sect. 19.2. Erection and Painting.** The provisions of Sect. 12.4 as regards erection methods and procedure shall apply likewise to work done under Item 19 with the modification that the Contractor may be permitted or required to make field joints securely with bolts. After erection, all metal surfaces shall be given one coat of best quality paint approved as to color, quality and manufacture, applied in accordance with the provisions of Sect. 12.5.

**Sect. 19.3. Measurement and Payment.** The quantity of structural steel to be paid for under Item 19 shall be the number of tons, furnished by the Commission, erected by the Contractor in accordance with the specifications and as directed or permitted. The quantity to be paid for shall be determined by weighing, if practicable, otherwise by computation on the basis of 0.2833 pounds per cubic inch of metal. The price stipulated for Item 19 shall include all cost of taking the structural steel from the cars at the delivery point, erecting, cleaning and painting the metal work, furnishing, erecting and removing false work and stagings and all other materials, labor and expense incidental to receiving and erecting the steel spans in a satisfactory manner.

**NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION**

20 CLINTON STREET, NEWARK, N. J.

**RELOCATION OF ERIE RAILROAD  
AT  
WANAQUE RESERVOIR**



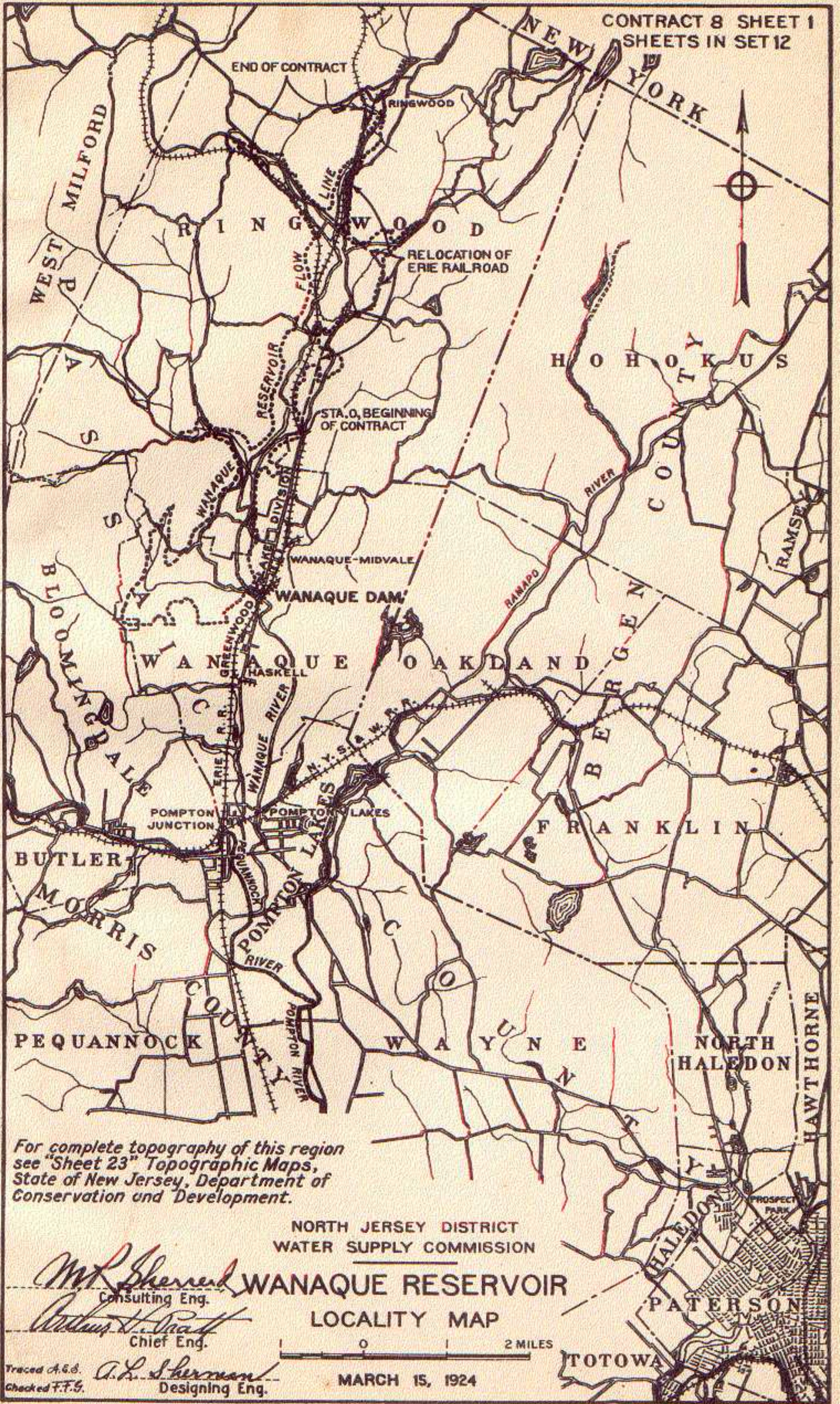
**MARCH 15, 1924**

**Contract Drawings for Contract 8 consist of this title sheet and 12 sheets bearing Accession Numbers:**

<b>1012</b>	<b>1016</b>	<b>1020</b>
<b>1013</b>	<b>1017</b>	<b>1021</b>
<b>1014</b>	<b>1018</b>	<b>1022</b>
<b>1015</b>	<b>1019</b>	<b>1023</b>

**ARTHUR H. PRATT**  
Chief Engineer

**MORRIS R. SHERRERD**  
Consulting Engineer



For complete topography of this region  
see "Sheet 23" Topographic Maps,  
State of New Jersey, Department of  
Conservation and Development.

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION

*W. Sherman*  
Consulting Eng.

*Arthur T. Pratt*  
Chief Eng.

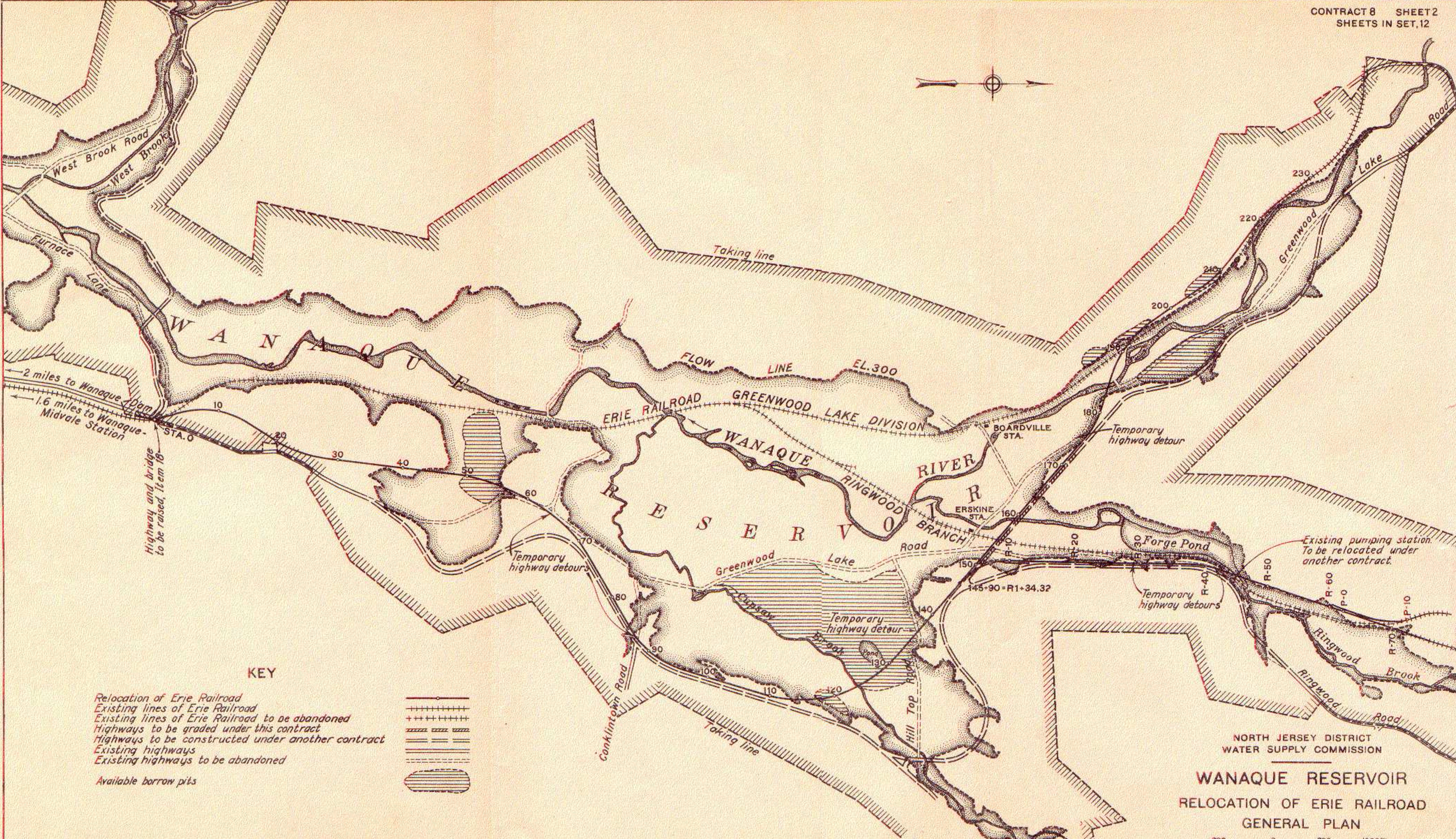
# WANAQUE RESERVOIR LOCALITY MAP

0 2 MILES

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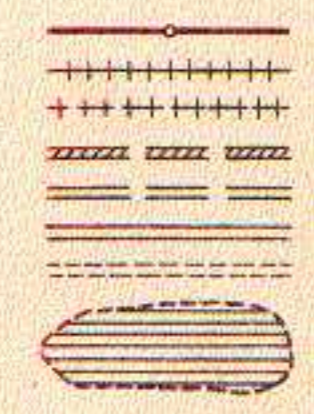
*A.D. Sherman*  
Designing Eng.

MARCH 15, 1924



**KEY**

- Relocation of Erie Railroad
- Existing lines of Erie Railroad
- Existing lines of Erie Railroad to be abandoned
- Highways to be graded under this contract
- Highways to be constructed under another contract
- Existing highways
- Existing highways to be abandoned



Available borrow pits

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION

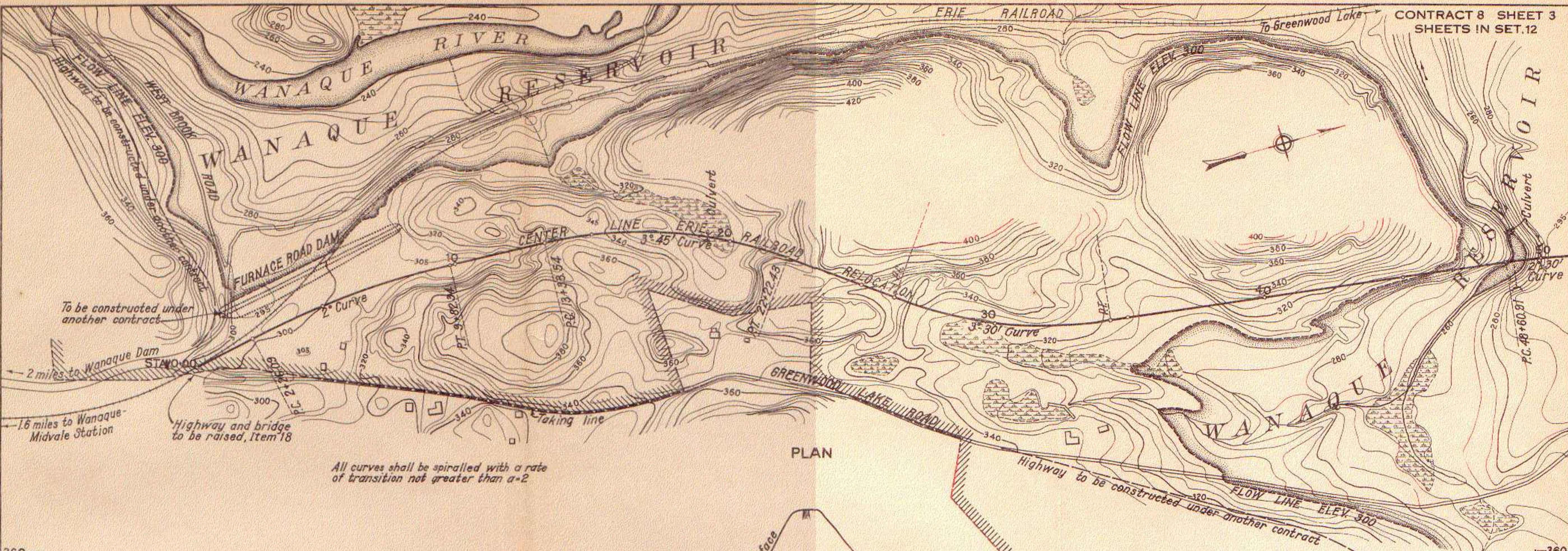
**WANAQUE RESERVOIR  
RELOCATION OF ERIE RAILROAD  
GENERAL PLAN**



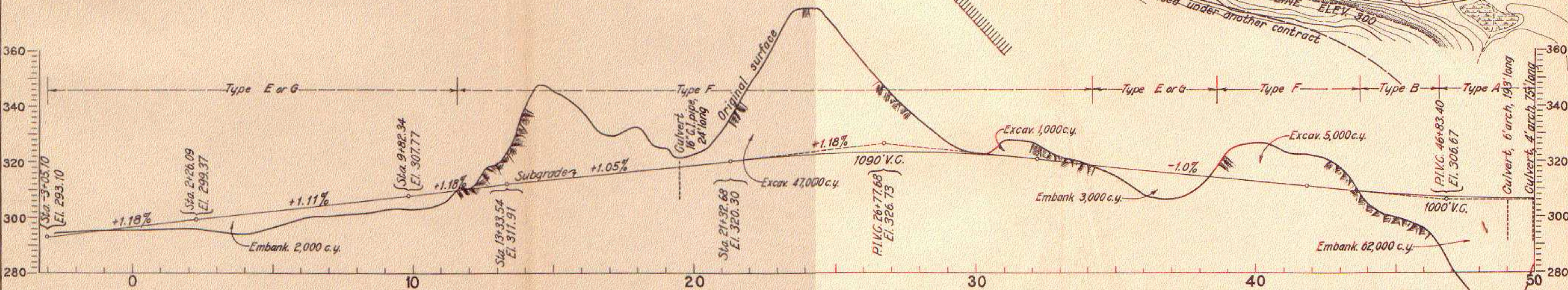
MARCH 15, 1924


Drawn  
Traced A.E.D., C.S.A.  
Checked D.O.G.  
*A. L. Sherman*  
Designing Eng.

*Arthur H. Hart*  
Chief Eng.  
*M. R. Sherrard*  
Consulting Eng.



All curves shall be spiralled with a rate of transition not greater than a=2



Rock outcrop shown thus   
Quantities are approximate only

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION  
**WANAQUE RESERVOIR**  
RELOCATION OF ERIE RAILROAD  
PLAN AND PROFILE  
STATION 0 TO STATION 50

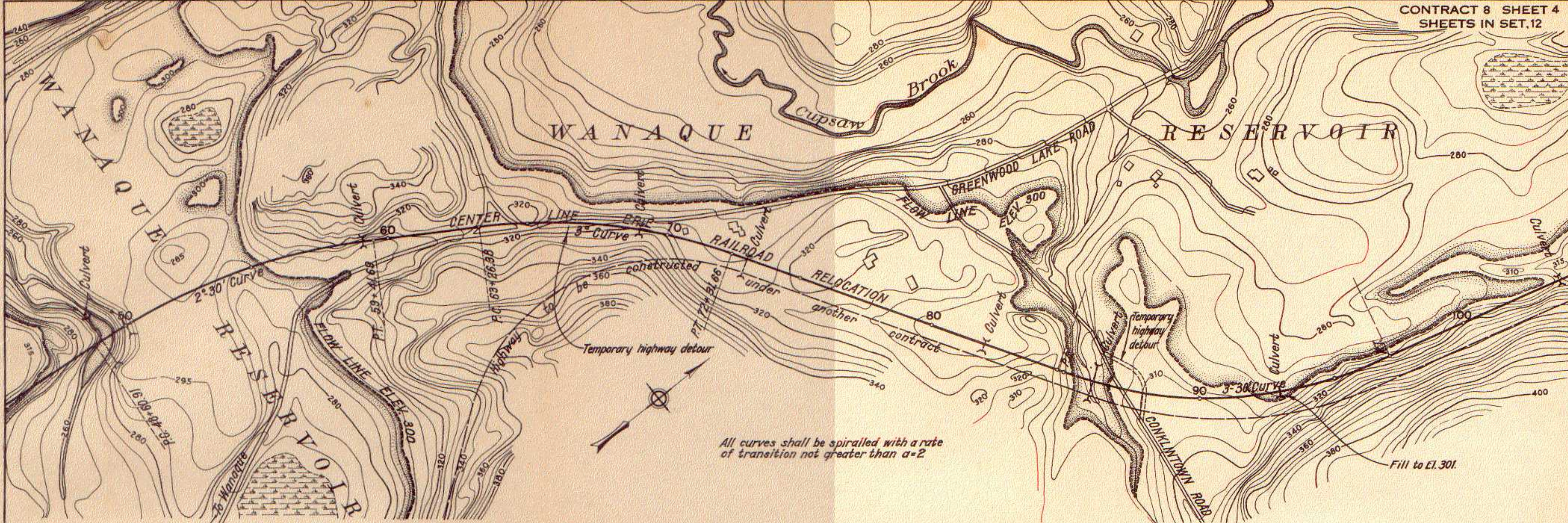


Drawn *J.R.*  
Traced *R. J. C.*  
Checked *R. J. C.*  
*O. L. Sherman*  
Designing Eng.

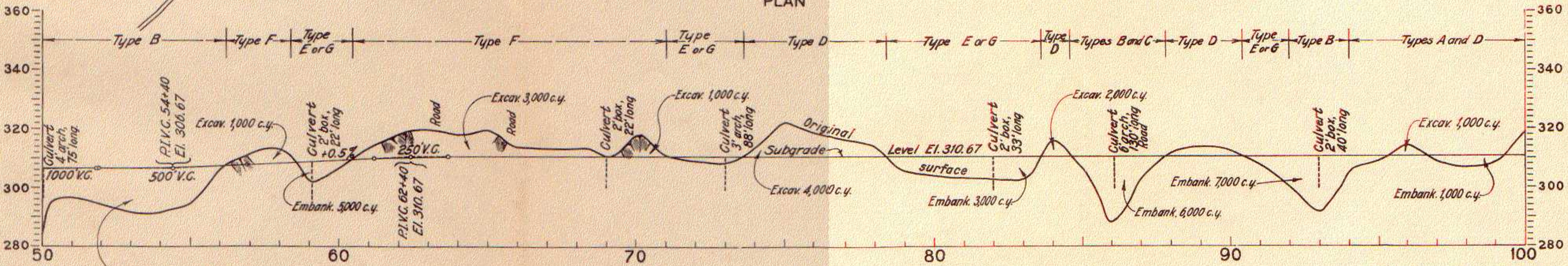
*William H. Pratt*  
Chief Eng.  
*M. J. Sheppard*  
Consulting Eng.

MARCH 15, 1924






PLAN



PROFILE

For c.y. of embankment see Sheet 3, Acc. 1014.

Rock outcrop shown thus   
Quantities are approximate only.

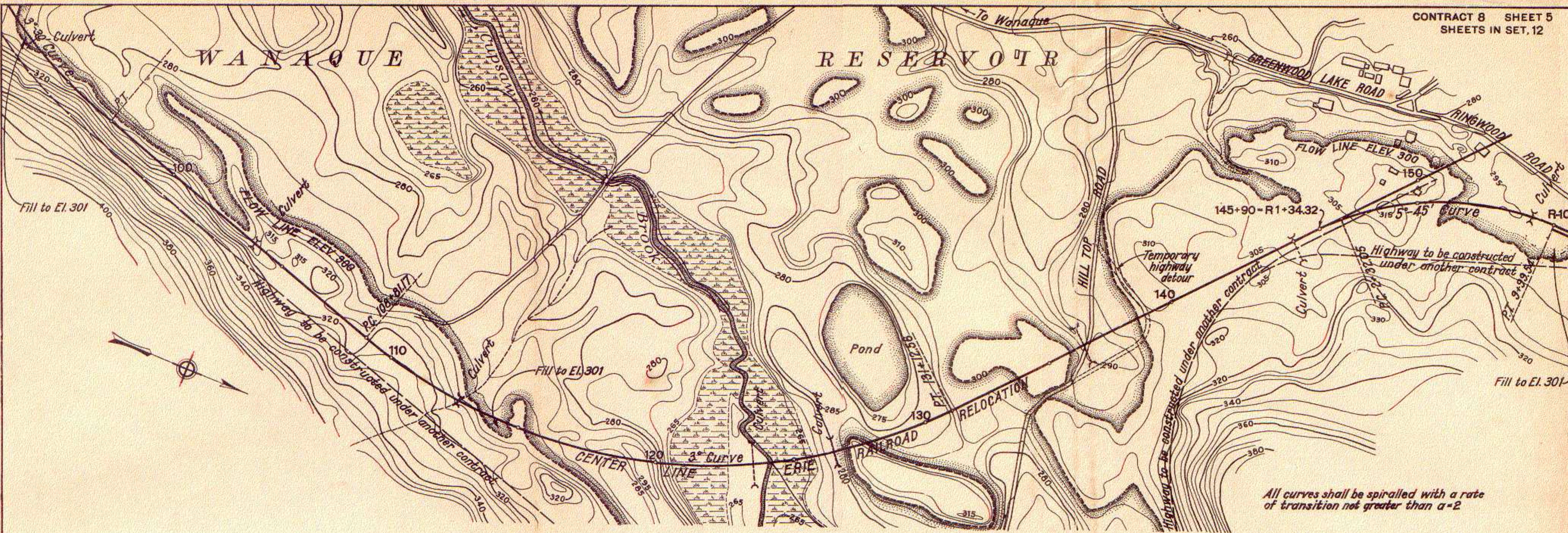
NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION  
**WANAQUE RESERVOIR**  
RELOCATION OF ERIE RAILROAD  
PLAN AND PROFILE  
STATION 50 TO STATION 100



MARCH 15, 1924

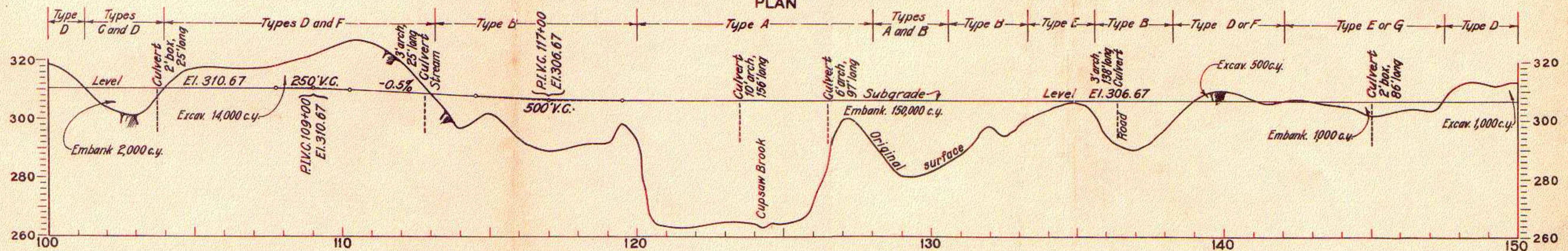
Drawn *J.H.*  
Traced C.S.A. ccc  
Checked *D.M.S.*  
**A.L. Sherman**  
Designing Eng.

*Arthur H. Post*  
Chief Eng.  
*W.M. Sherman*  
Consulting Eng.




All curves shall be spiralled with a rate of transition not greater than  $a=2$

PLAN



PROFILE

Rock outcrop shown thus   
Quantities are approximate only.

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION

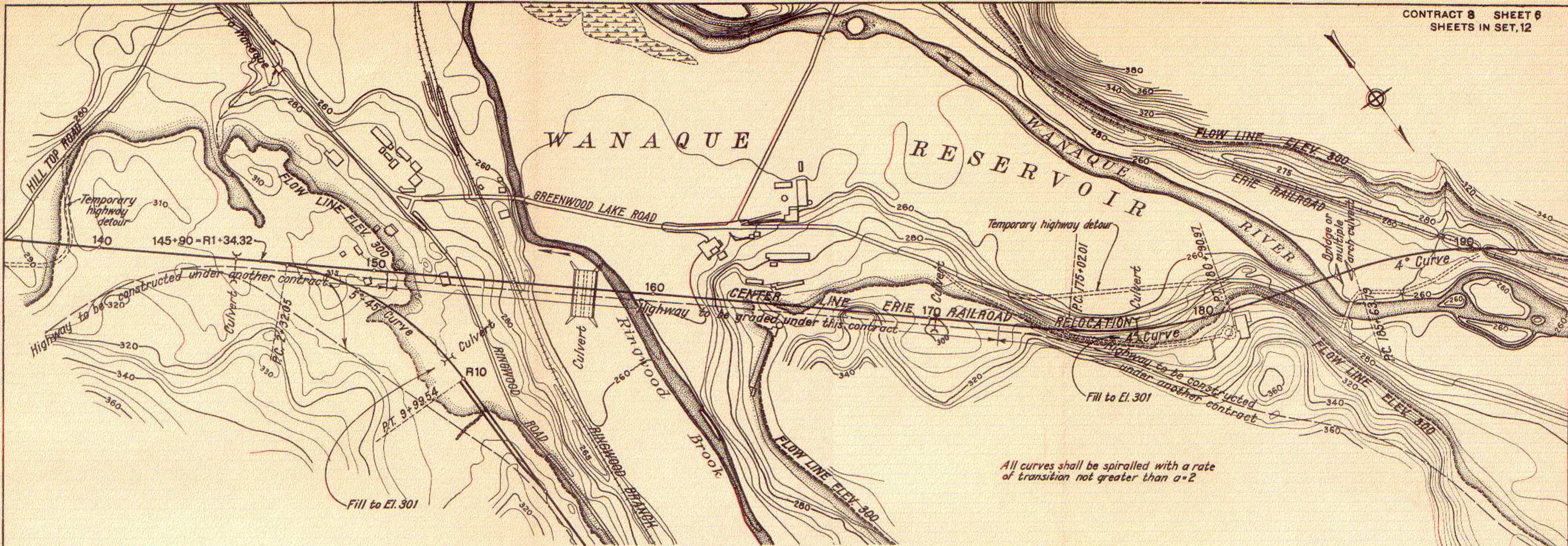
**WANAQUE RESERVOIR**  
**RELOCATION OF ERIE RAILROAD**  
PLAN AND PROFILE  
STATION 100 TO STATION 150



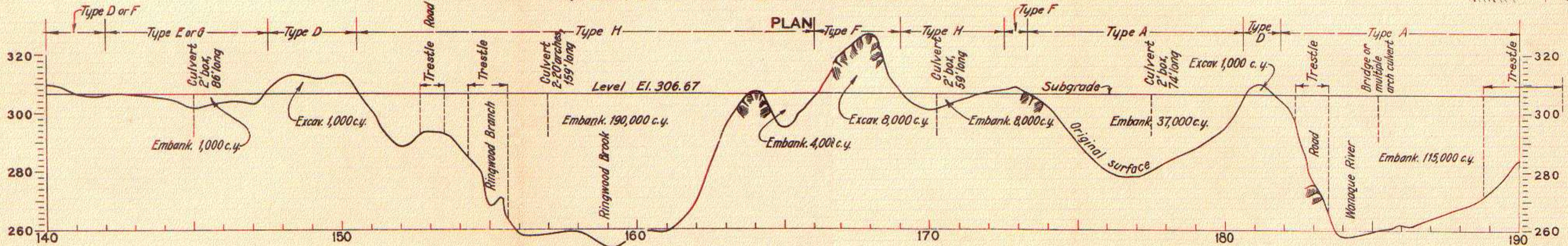
MARCH 15, 1924

Drawn *J.H.*  
Checked *D.H.*  
*A.L. Sherman*  
Designing Eng.


*Arthur H. Van...*  
Chief Eng.  
*M.R. Sherman*  
Consulting Eng.



All curves shall be spiralled with a rate of transition not greater than a=2



PROFILE

Rock outcrop shown thus   
Quantities are approximate only.

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION

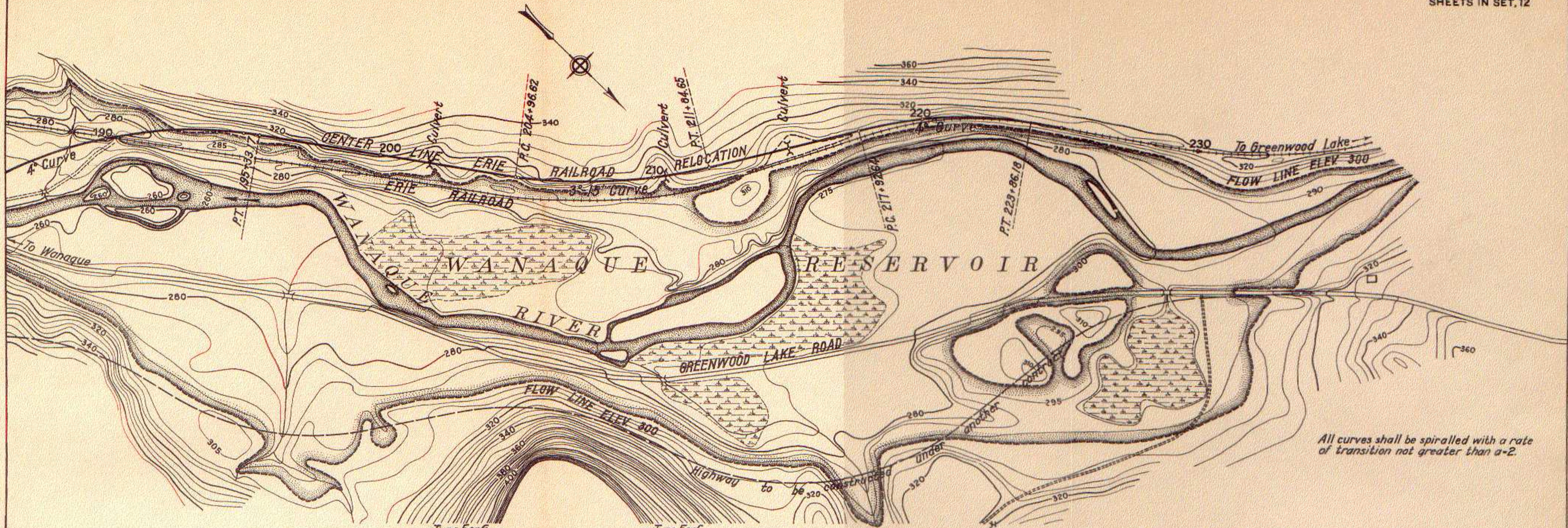
**WANAQUE RESERVOIR**  
**RELOCATION OF ERIE RAILROAD**  
PLAN AND PROFILE  
STATION 140 TO STATION 190



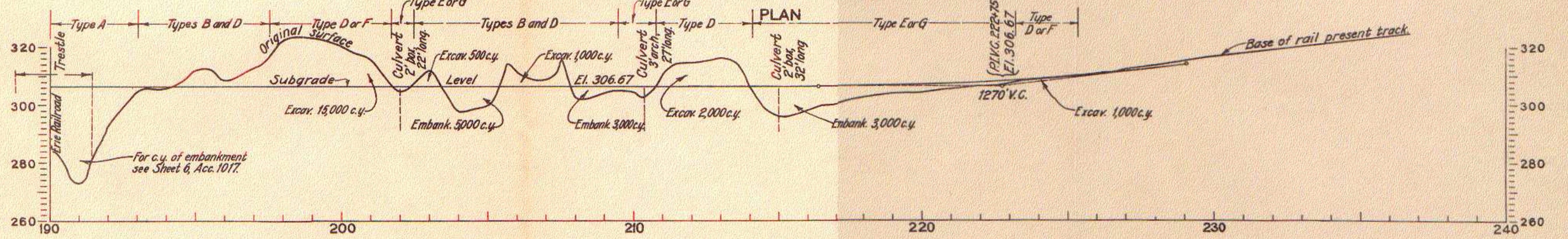
MARCH 15, 1924

Drawn J.C.K.  
Traced C.S.A., C.S.D.  
Checked D.O.G.  
**A.L. Sherman**  
Designing Eng.

*Arthur H. Craft*  
Chief Eng.  
*M.P. Sherman*  
Consulting Eng.



All curves shall be spiralled with a rate of transition not greater than a-2.



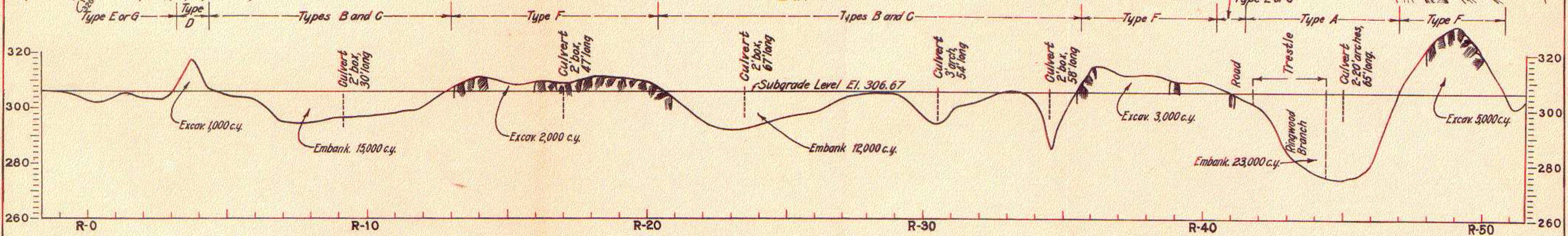
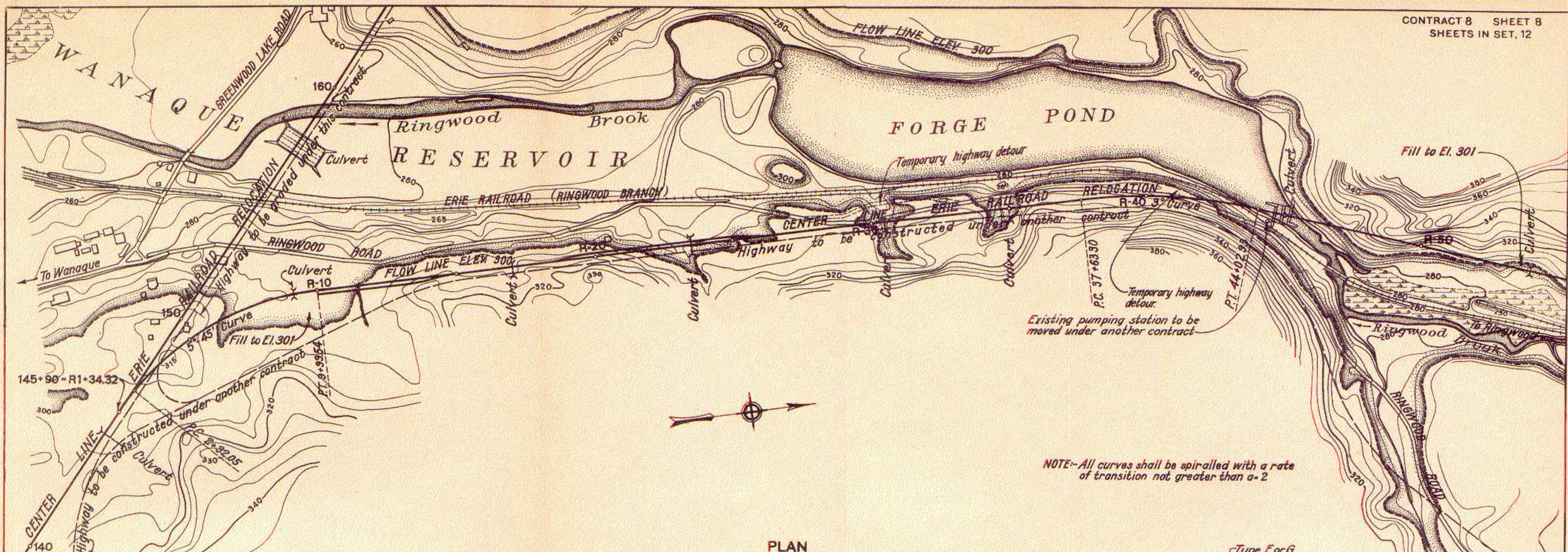
PROFILE

Quantities are approximate only.


NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION  
**WANAQUE RESERVOIR**  
RELOCATION OF ERIE RAILROAD  
PLAN AND PROFILE  
STATION 190 TO STATION 230  
200 0 200 400 FT  
MARCH 15, 1924

Drawn JAC  
Traced C.S.A. C.E.C.  
Checked D.O.G.  
**A. L. Sherman**  
Designing Eng.

*Arthur H. ...*  
Chief Eng.  
*M. R. Sherrard*  
Consulting Eng.



PROFILE

Rock outcrop shown thus   
Quantities are approximate only.

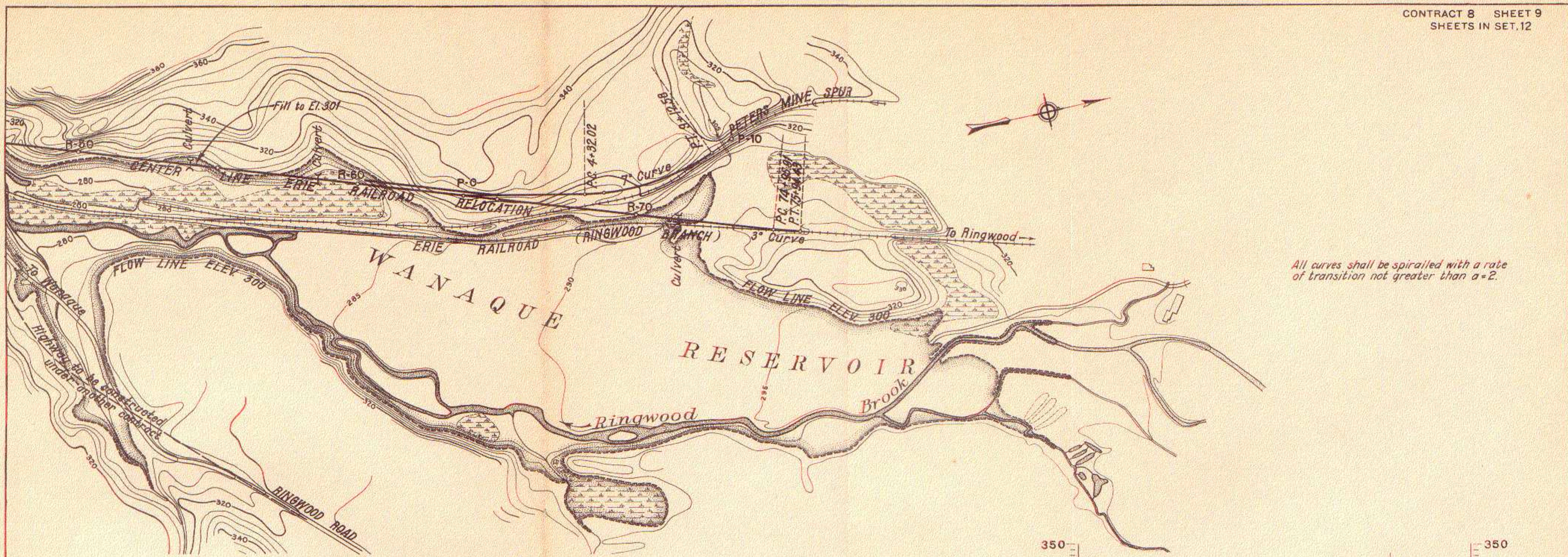
NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION  
**WANAQUE RESERVOIR**  
RELOCATION OF ERIE RAILROAD  
PLAN AND PROFILE  
STATION R-0 TO STATION R-50



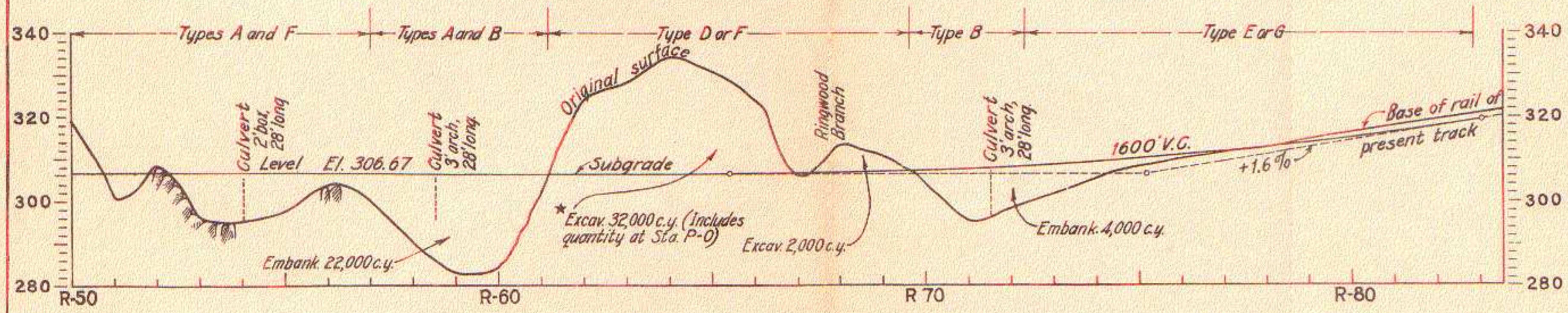
MARCH 15, 1924

Drawn *W.H.G.*  
Traced C. S. A. C. E. A.  
Checked *D.K.G.*  
*A. L. Sherman*  
Designing Eng.


*W.H.G.*  
Chief Eng.  
*M.R. Sherman*  
Consulting Eng.

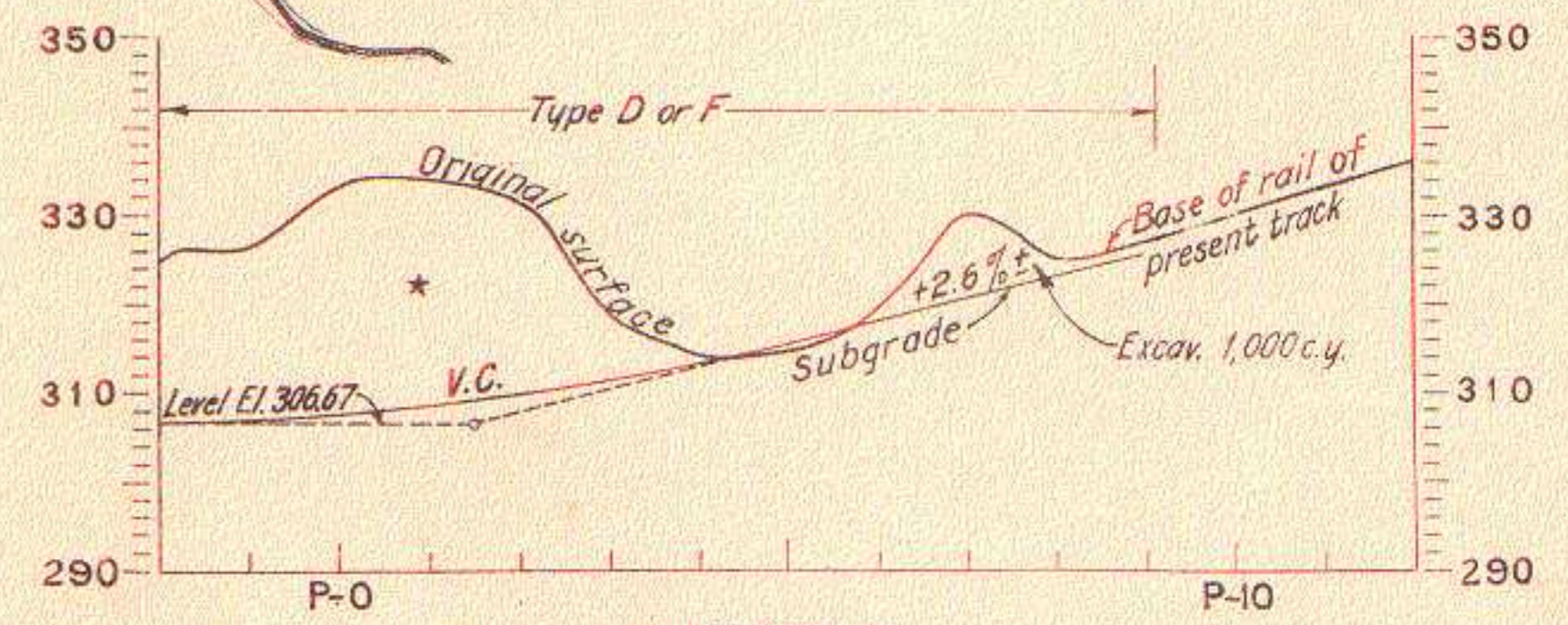


PLAN



PROFILE

Rock outcrop shown thus   
Quantities are approximate only.



PROFILE  
PETERS MINE SPUR

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION

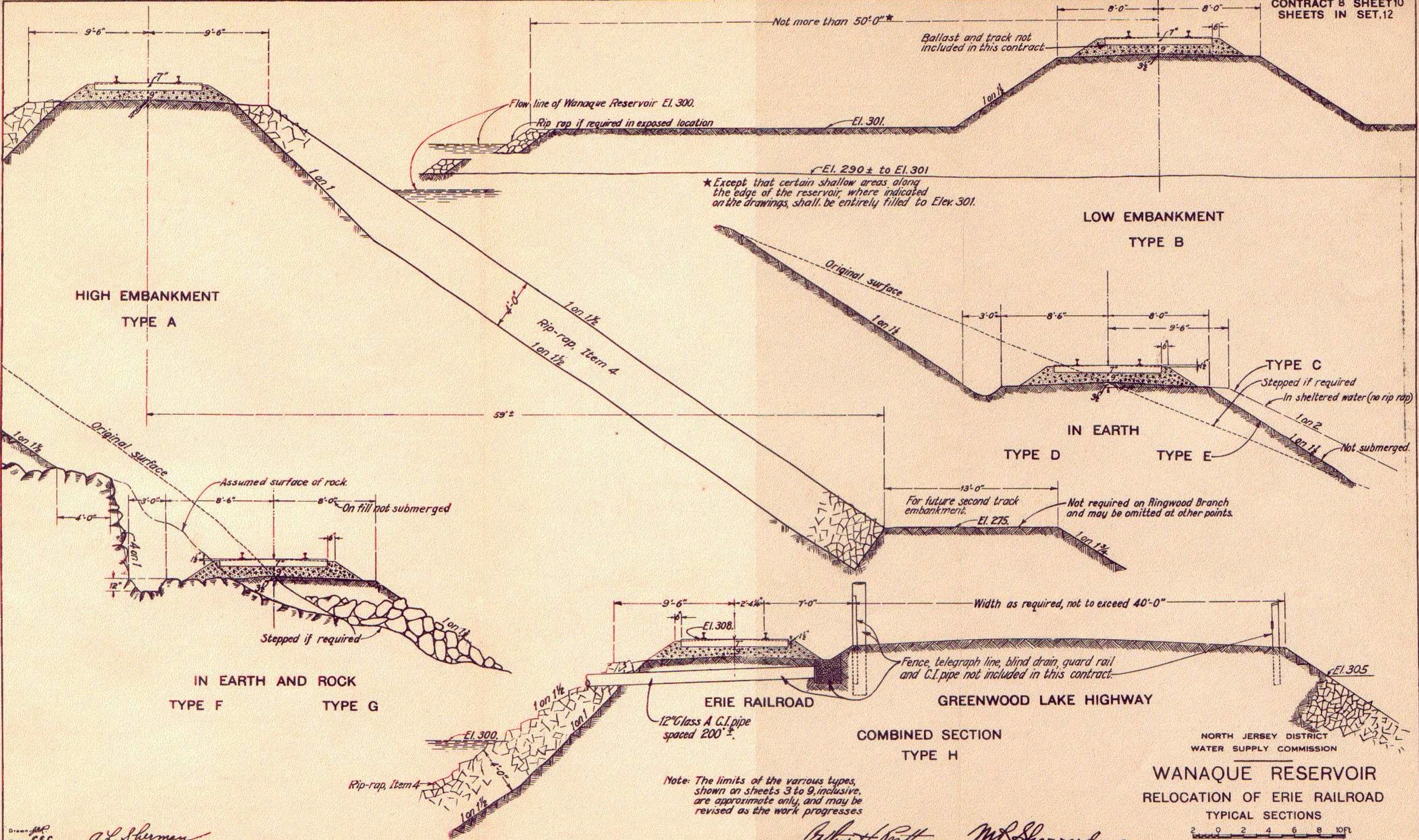
WANAQUE RESERVOIR  
RELOCATION OF ERIE RAILROAD  
PLAN AND PROFILE  
STATION R-50 TO STATION R-82



MARCH 15, 1924

Drawn *J.H.K.*  
Traced C.S.G., C.E.C.  
Checked *D.K.G.*  
**A. L. Sherman**  
Designing Eng.

*William J. Davis*  
Chief Eng.  
*M. R. Sherman*  
Consulting Eng.



Note: The limits of the various types, shown on sheets 3 to 9, inclusive, are approximate only, and may be revised as the work progresses

**WANAQUE RESERVOIR**  
**RELOCATION OF ERIE RAILROAD**  
TYPICAL SECTIONS

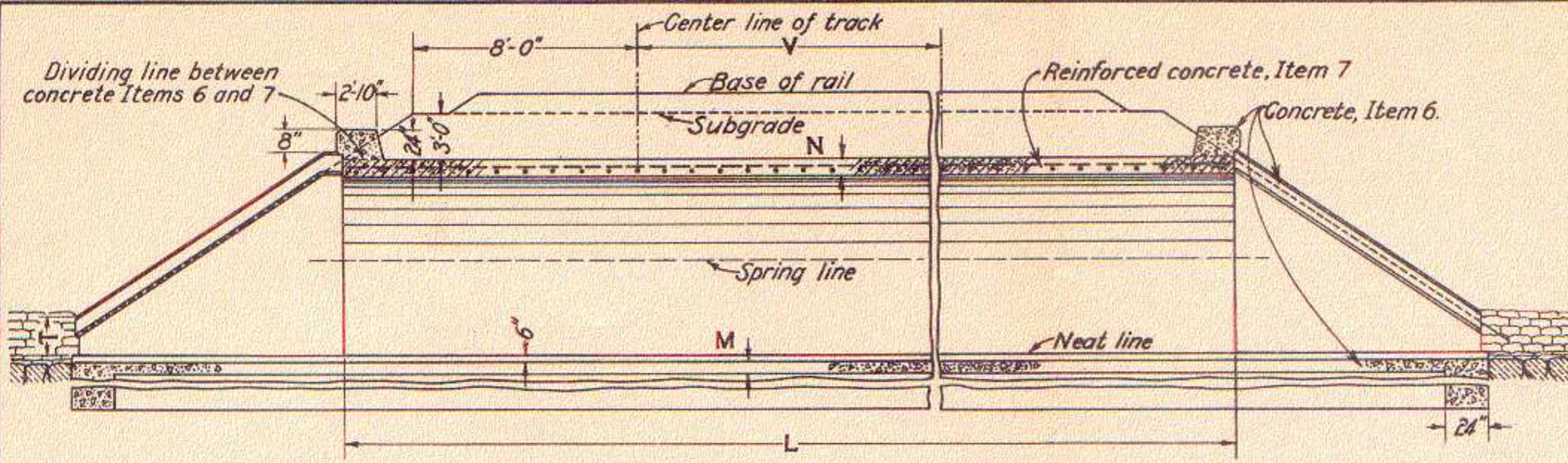


MARCH 15, 1924

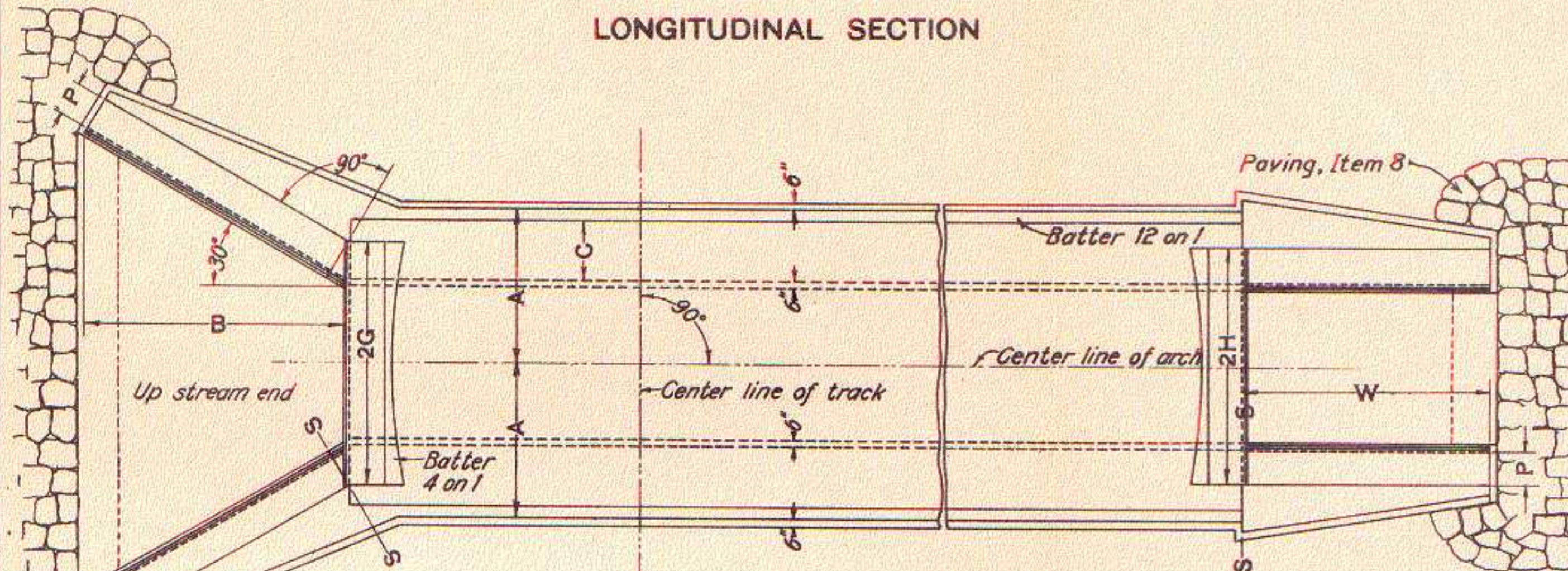
Drawn *W.C.*  
Traced *C.E.C.*  
Checked *D.K.G.*  
**A.L. Sherman**  
Designing Eng.

*William H. Pratt*  
Chief Eng.

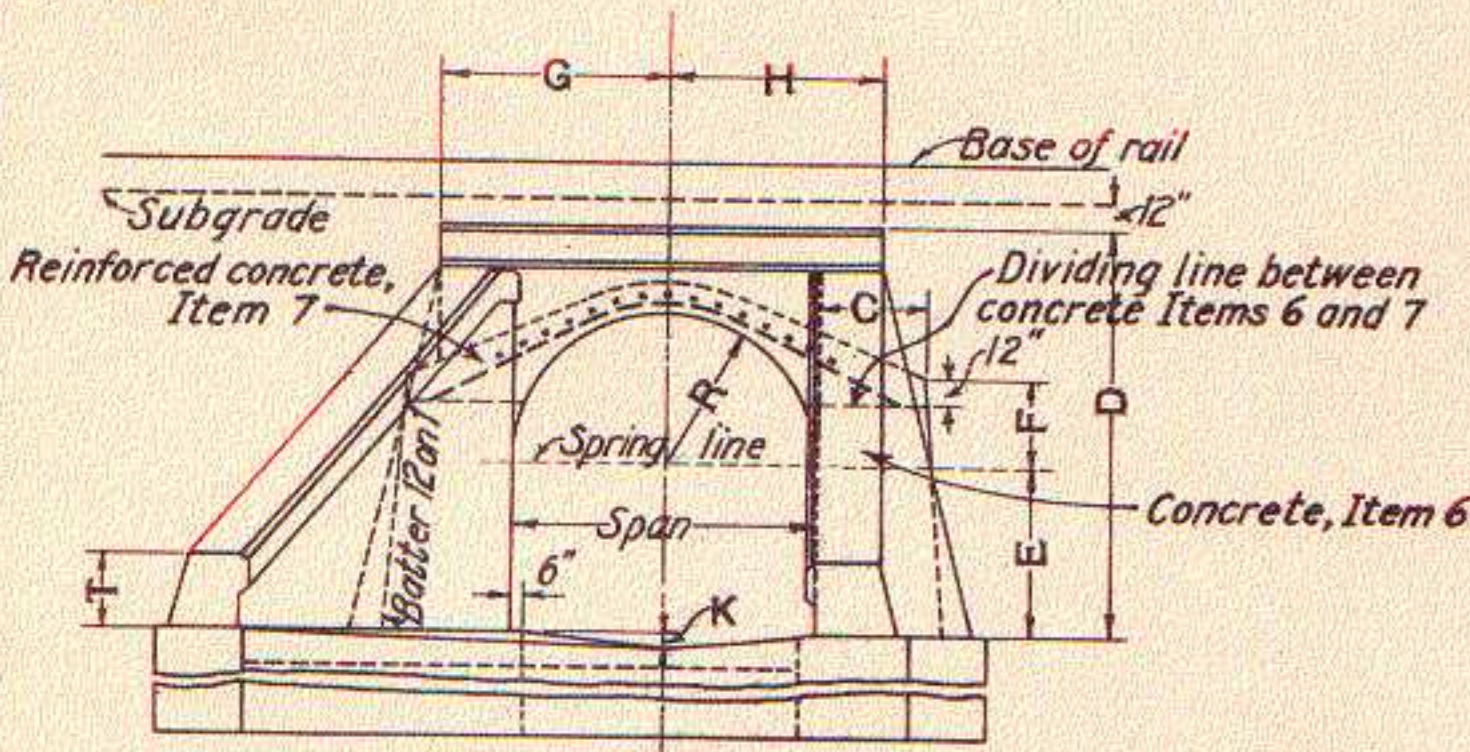
*M.R. Sherrard*  
Consulting Eng.



LONGITUDINAL SECTION



PLAN

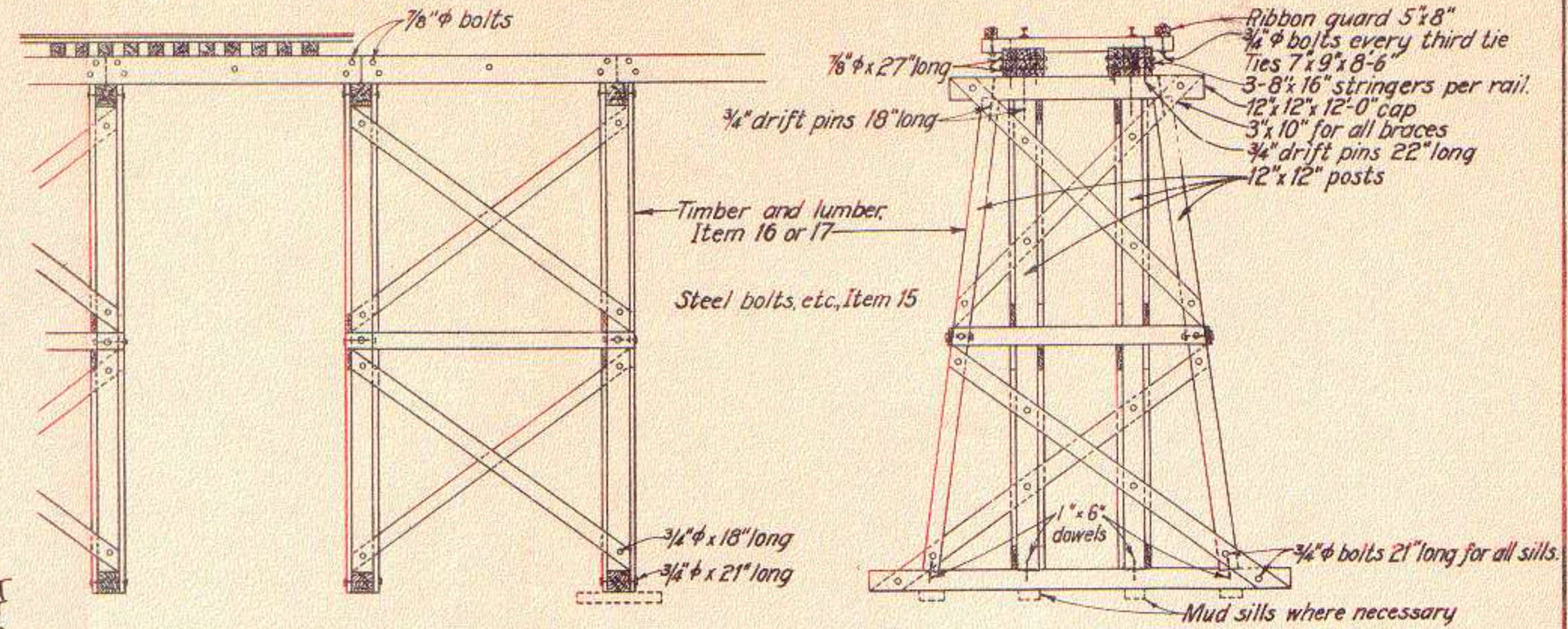


HALF ELEVATION  
UP STREAM END

HALF ELEVATION  
DOWN STREAM END

Dimen- sions	Span in feet					
	3	4	6	10	16	20
A	4' 0"	4' 9"	6' 10"	9' 8"	13' 11"	16' 8"
B	4' 11"	5' 6"	9' 6"	15' 9"	23' 9"	26' 11"
C	2' 2"	2' 3"	3' 4"	3' 11"	4' 10"	5' 6"
D	7' 5"	7' 10"	10' 0"	14' 2"	19' 6"	21' 7"
E	4' 0"	4' 0"	4' 0"	6' 0"	8' 0"	8' 0"
F	0' 0"	0' 0"	2' 0"	3' 1"	4' 9"	5' 10"
G	3' 10"	4' 4"	5' 10 1/2"	7' 10 1/2"	11' 3"	13' 3"
H	3' 6"	4' 0"	5' 6"	7' 6"	10' 10"	12' 10"
K	0' 0"	0' 0"	0' 6"	0' 6"	0' 6"	0' 6"
M	0' 9"	0' 9"	1' 0"	1' 0"	1' 0"	1' 0"
N	0' 9"	0' 10"	1' 0"	1' 2"	1' 6"	1' 7"
P	2' 0"	2' 0"	2' 6"	2' 6"	2' 10"	2' 10"
R	2' 0"	2' 6"	3' 0"	5' 0"	8' 0"	10' 0"
T	6' 1"	6' 6"	3' 0"	3' 0"	3' 0"	3' 0"
W	4' 11"	5' 6"	8' 3"	14' 6"	23' 9"	26' 11"

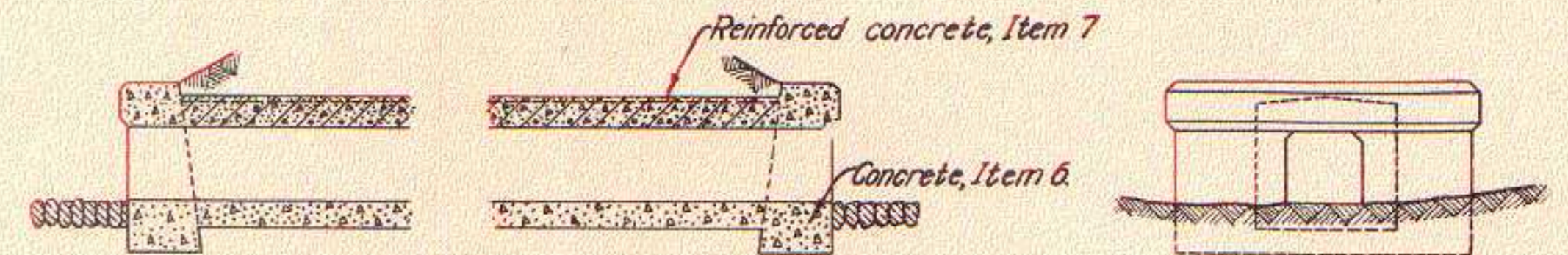
ARCH CULVERT



ELEVATION

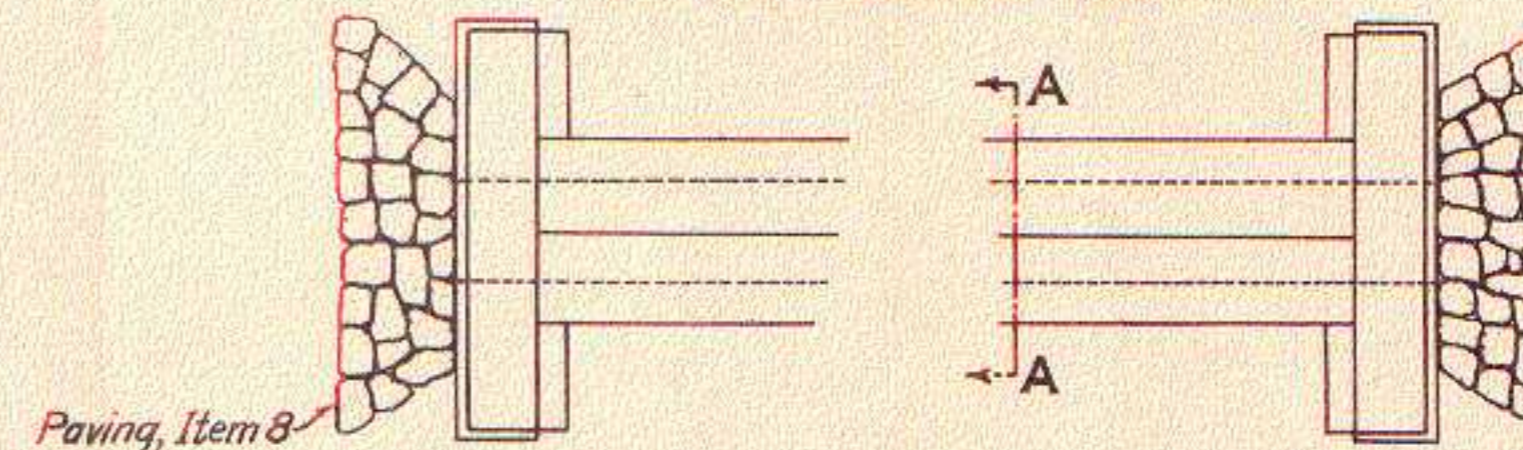
SECTION

FRAMED TRESTLE



LONGITUDINAL SECTION

ELEVATION



PLAN

CROSS SECTION

BOX CULVERT

Note: Types, sizes and dimensions of culverts shown on sheets 3 to 9, inclusive, are approximate only.

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION

WANAQUE RESERVOIR  
RELOCATION OF ERIE RAILROAD  
STANDARD CULVERTS AND TRESTLES

MARCH 15, 1924

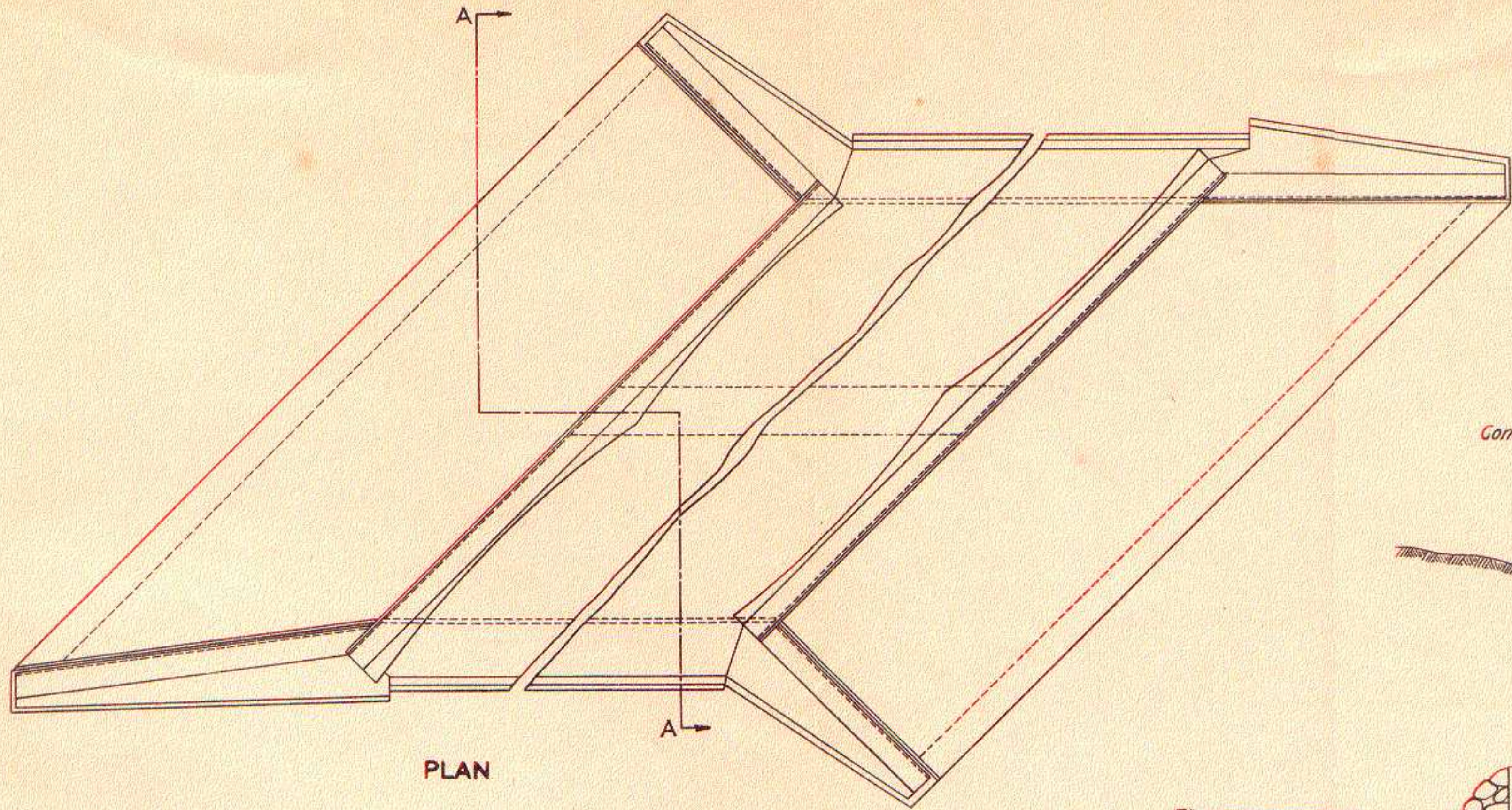
Drawn F.R.F.  
Traced R.R. C.E.C.  
Checked D. D.G.

A.L. Sherman  
Designing Eng.

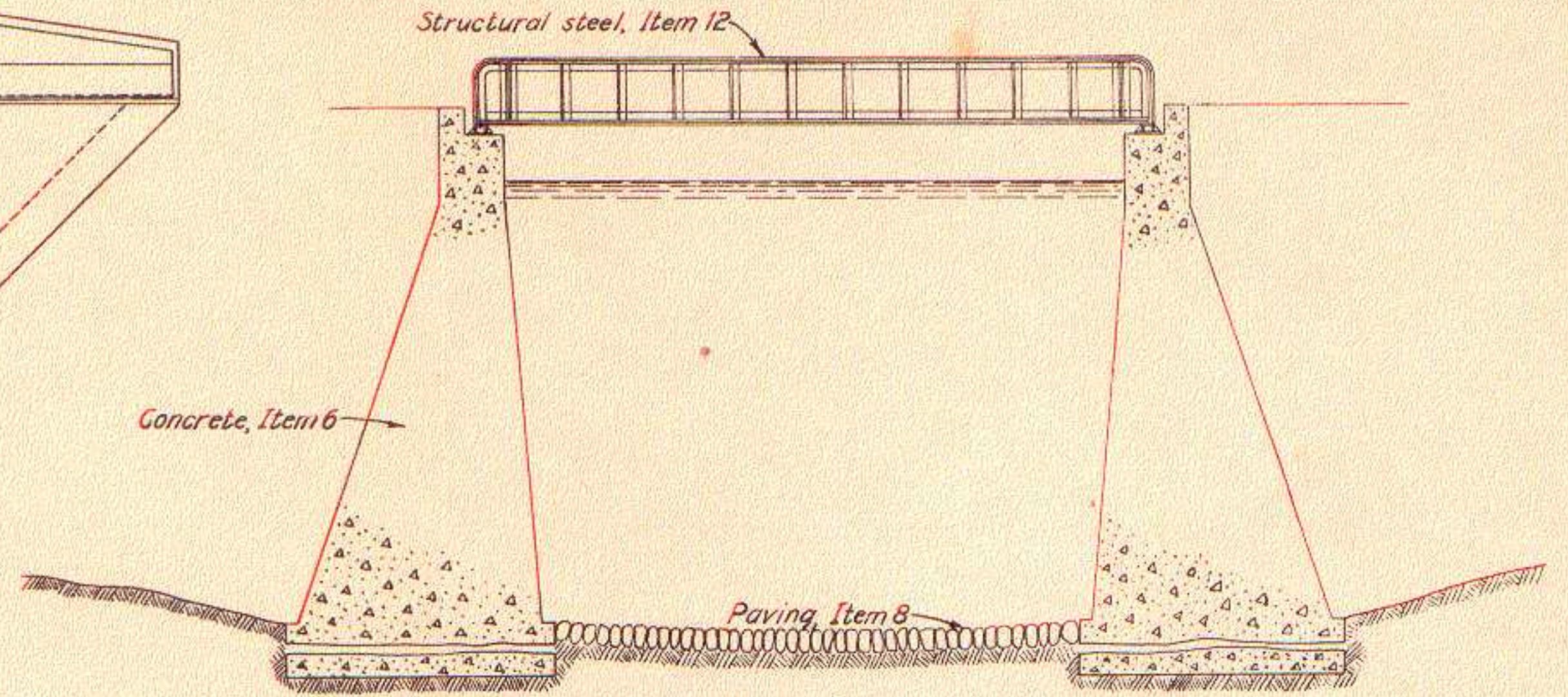
Arthur H. Root  
Chief Eng.

M.A. Sherman  
Consulting Eng.

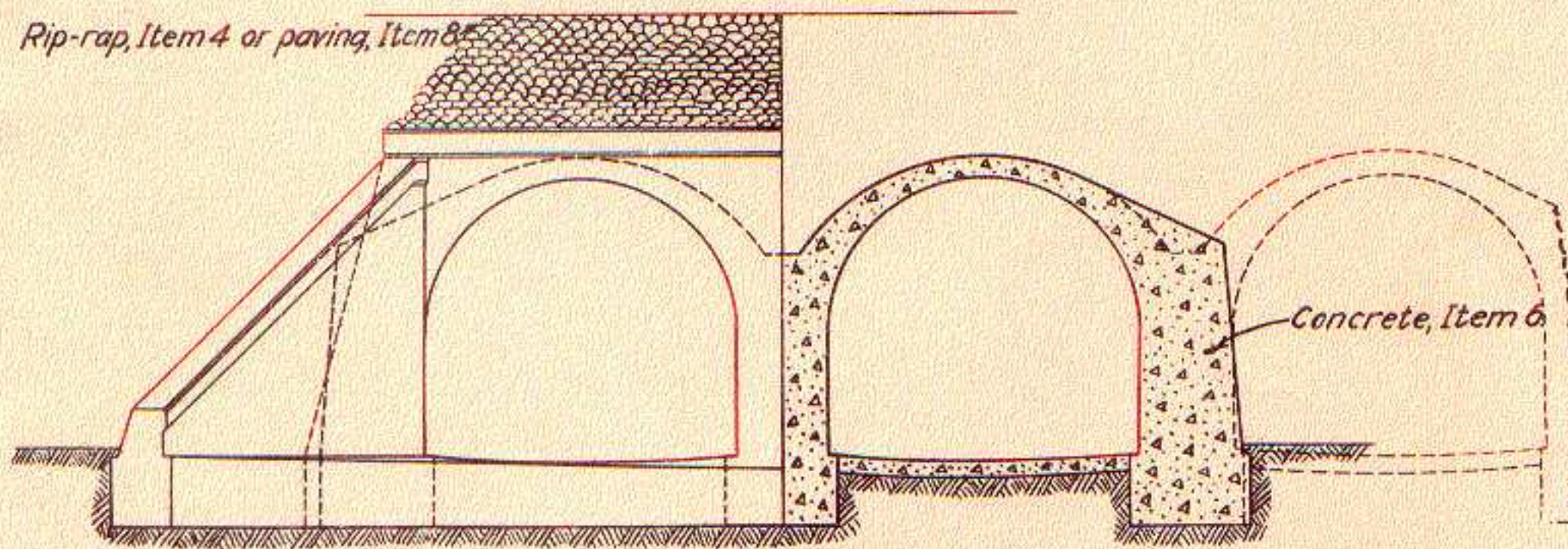




PLAN

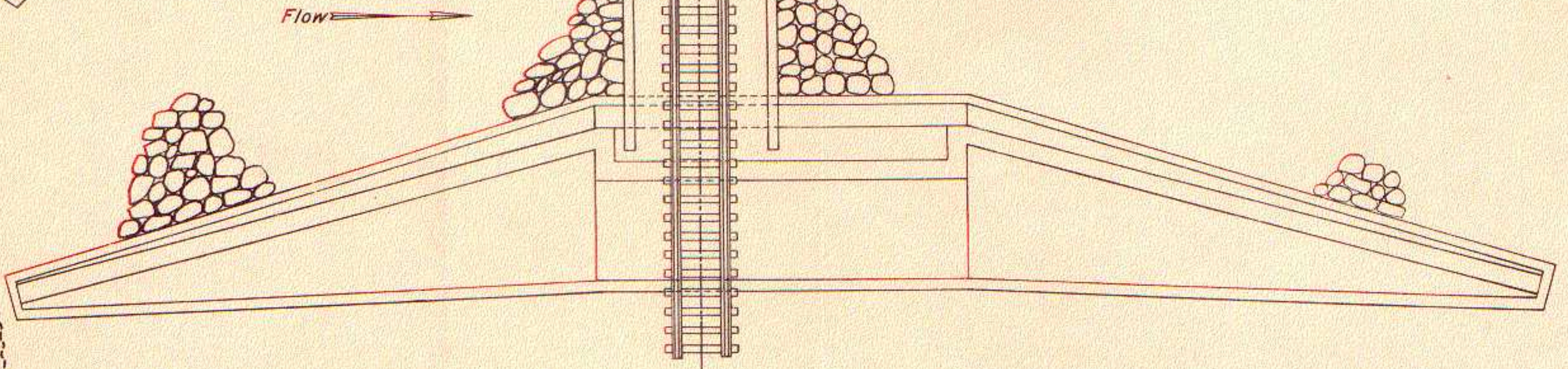


SECTION



SECTION A-A

MULTIPLE ARCH SKEW CULVERT



PLAN

THROUGH PLATE GIRDER BRIDGE

Multiple arch culvert or plate girder bridge to be constructed at or near Sta. 157, 185 and R-45.

NORTH JERSEY DISTRICT  
WATER SUPPLY COMMISSION

WANAQUE RESERVOIR  
RELOCATION OF ERIE RAILROAD

SPECIAL STRUCTURES

MARCH 15, 1924

Drawn S.B.  
Traced R.B.  
Checked B.K.

A.L. Sherman  
Designing Eng.

Arthur H. Pratt  
Chief Eng.

W.R. Sherman  
Consulting Eng.

