BLACKSTONE RIVER FLOOD CONTROL

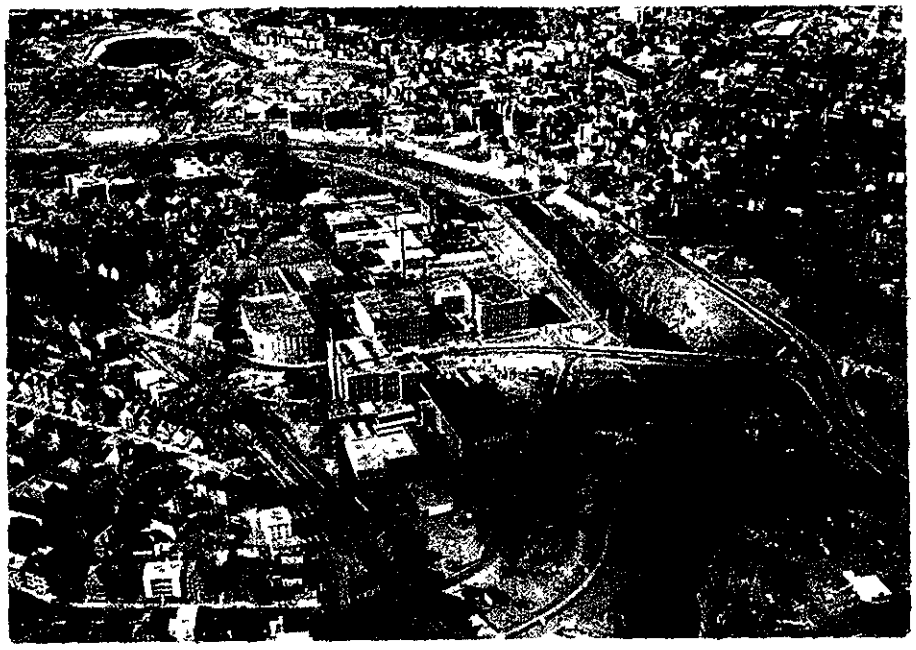
OPERATION AND MAINTENANCE MANUAL

FOR

FLOOD PROTECTION WORKS

LOWER WOONSOCKET

BLACKSTONE, MILL AND PETERS RIVERS
RHODE ISLAND



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

NOVEMBER 1967

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OPERATION AND MAINTENANCE MANUAL

FOR

FLOOD PROTECTIVE WORKS

ON

BLACKSTONE RIVER

AT

LOWER WOONSOCKET, RHODE ISLAND

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 Trapelo Road
Waltham, Massachusetts 02154

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OPERATION AND MAINTENANCE MANUAL
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LOWER WOONSOCKET, RHODE ISLAND

FOREWORD

The Lower Woonsocket Local Protection Project is the second flood control project completed in the City of Woonsocket. The first project is known as the Woonsocket Local Protection Project. The Operation and Maintenance Manual, dated October 1959, for the upper Woonsocket project should be used in conjunction with the following manual.

The successful functioning of the Lower Woonsocket flood protective works is not assured solely by construction of the system of dikes and floodwalls, channel improvements, pressure conduits, and pumping stations. If the system is to perform the functions for which it was designed, it must be carefully maintained during periods of normal river stages and properly operated in coordination with the tainter gates at the Woonsocket Falls Dam during flood periods.

The need for proper maintenance cannot be too highly stressed in view of the fact that large damages may be incurred through operating failure of a critical element in flood time, caused by deterioration or damage that would have been eliminated by proper maintenance.

Necessary maintenance and proper operation require that responsibile local persons have a thorough understanding of the functions of the various units of the system and the recommended methods of maintaining the system and operating it during flood emergencies. It is the purpose of this manual to provide complete information so that all parties may fully understand their responsibilities in maintaining and operating the flood protection system in accordance with the regulations prescribed by the Secretary of the Army as amplified by this manual.

The general flood control Regulations for Maintenance and Operation of Flood Control Works quoted herein were approved by the Acting Secretary of War on 9 August 1944. Upon establishment of the Department of Defense, the improvement of rivers and harbors and other waterways for flood control and other purposes, formerly under the jurisdiction of the Secretary of War, became the responsibility of the Secretary of the Army. Reference therein to the Secretary of War and War Department shall be construed to mean, respectively, the Secretary of the Army and the Department of the Army. Where reference is made to the District Engineer in the Regulations included in this manual, it shall be construed to mean the Division Engineer, New England Division, Corps of Engineers.

OPERATION AND MAINTENANCE MANUAL

for

LOCAL PROTECTIVE WORKS

at

LOWER WOONSOCKET, RHODE ISLAND

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A. GENERAL

1. PURPOSE OF THIS MANUAL. - The City of Woonsocket, by executing assurances of local cooperation, has agreed to maintain and operate the completed Lower Woonsocket Flood Protective Works in accordance with regulations prescribed by the Secretary of the Army.

The purpose of this Manual is to present detailed information to be used as a guide in complying with "Flood Control Regulations - Maintenance and Operation of Flood Control Works" as approved by the Acting Secretary of War on 9 August 1944, and published in this volume as Appendix A.

The regulations are intended to cover all local protection projects constructed by the Department of the Army throughout the United States, are general in nature, and obviously cannot give detailed instructions for the maintenance and operation of a specific project. The details set forth in this Manual for maintenance and operation of the Lower Woonsocket project are intended to supplement the Regulations to insure the maximum protection against floods for which the project was designed. Failure to maintain and operate the project as required by the Regulations and as detailed herein can result in severe property losses, loss of life, and irreparable loss of confidence in the flood protection system by citizens who have invested their funds on the basis of the protection afforded by the flood control works.

2. PROJECT AUTHORIZATION. - The Lower Woonsocket Local Protection project was authorized by the Flood Control Act of 14 July 1960 (Public Law 86-645, 86th Congress, 2d Session) in accordance with recommendations of the Chief of Engineers set forth in Senate Document No. 87, 85th Congress, 2d Session.

3. PROJECT LOCATION. - The project is located in northeastern Rhode Island, on the Blackstone River, and extends from the Bernon Street Bridge near the center of the City of Woonsocket downstream for approximately 7,000 feet to the vicinity of the sewage treatment plant. It extends upstream along the Mill River approximately 2,100 feet from the confluence of the Blackstone River to Privilege Street, and upstream along the Peters River for approximately 2,100 feet to Mill Street.

4. DESCRIPTION OF PROJECT. - The project consists of three independent flood protection units as follows: (a) The Social District Unit which consists of 6 dikes, 3 floodwalls, excavation of 2 channels, 2 pressure conduits, and pumping station, (b) The Hamlet District Unit consisting of 3 dikes, floodwall, pumping station, removal

of a dam and channel improvements, and (c) The Bernon Unit which consists of the removal of a dam and channel improvement.

5. EFFECTIVENESS OF PROTECTION. - The project is designed for flood flows of 33,000 c.f.s. upstream of the Mill and Peters Rivers as modified by the West Hill Reservoir. Downstream of the Mill and Peters Rivers, the project has been designed to pass a flood discharge of 40,000 c.f.s. as modified by West Hill.

These flows are produced as a result of a design storm assumed to be uniformly distributed over the watershed above Woonsocket. Precipitation would amount to 12 inches in 72 hours with a maximum 24-hour quantity of 9.6 inches and a maximum 6-hour quantity of 7.4 inches.

The tops of the dikes and floodwalls provide 3-foot freeboard above the stages of the design discharges.

6. CONSTRUCTION HISTORY. - The construction of the Lower Woonsocket Local Protection Project was accomplished under one construction contract awarded in the amount of $6,983,388 to F. D. Rich, Inc., Stamford, Connecticut. Construction was started on 12 December 1963 and the project was placed in service on 15 April 1967.

The combined total cost of the project is estimated at $9,150,000. The City of Woonsocket expended $2,312,000 for the local interest costs. The Federal cost of the project is estimated at $6,838,000.

7. PLANS. - Plans pertinent to the operation and maintenance of the project are included for reference as Appendix E in this volume. A set of "as-built" construction drawings is being provided the City of Woonsocket.

8. LOCAL COOPERATION. - The authorizing legislation for the Lower Woonsocket project (1960 Flood Control Act) required that responsible local agencies give assurances satisfactory to the Secretary of the Army that they would:

"(a) Contribute in cash 16.1 percent of the cost of the work to be accomplished by the Federal Government. . .;

"(b) Furnish without cost to the United States all lands, easements, and rights-of-way necessary for construction of the project;

"(c) Hold and save the United States free from damages due to the construction works including claims, if any, for water rights;

"(d) Accomplish without cost to the United States all changes, alterations, additions to, or relocations of any utilities or buildings made necessary by the work;

"(e) Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army."

The assurances of the City of Woonsocket are contained in Appendix B of this volume. This manual is to assist the City in fulfilling (c) above in their responsibilities for maintaining and operating the project.

9. GENERAL RULES AND REGULATIONS. - Paragraph 208.10 (a) of the regulations prescribed by the Secretary of War gives general rules for the maintenance and operation of structures and facilities constructed by the United States for local flood protection. Applicable portions are quoted below to avoid the necessity for cross reference and are further defined by remarks under each quotation.

"(1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits."

These requirements cannot be overstressed, and City authorities must make adequate provisions for funds, personnel, equipment, and materials to allow for the proper maintenance and operation of the flood protective works.

"(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the 'Superintendent', who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during the periods of low water, all without cost to the United States."

The committee should be composed of competent members, preferably men experienced in engineering or construction work of a nature similar to the flood protection works. The committee must

be given broad authority to carry out its responsibilities. The name, address, and office and home telephone numbers of the Superintendent, and any changes thereof, shall be promptly furnished the Division Engineer.

"(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times."

Approximately 2500 sand bags and canvas or sisal-craft paper and tools such as picks and shovels and 5 men should be obtained and held in reserve to meet any ordinary emergency that may occur during flood periods. Borrow pits for embankment materials should be secured and sources or where to obtain additional supplies of materials, tools, and equipment should be well established in order that these articles can be obtained quickly in case of an emergency.

"(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities."

The disposal of rubbish, erection of fences, or barriers, the painting or erection of signs, the attachment of clothes lines to flood walls, or any form of trespassing on the project shall be prohibited.

"(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representatives that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work."

Any contemplated improvements or alterations as outlined above must be submitted to the Corps of Engineers, Waltham, Massachusetts, and the approval of the Division Engineer obtained prior to the City authorizing the work. All requests for approval shall be in writing and complete drawings in duplicate, one set of which shall be in reproducible form, must be submitted along with a full description of the work intended. The City will be held responsible for obtaining prior approval from the Corps of Engineers for any improvements or alterations proposed by itself, private parties or any public parties. The City shall furnish the Division Engineer as-built drawings, in duplicate, of the completed work.

"(6) It shall be the duty of the Superintendent to submit a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works."

See Paragraph 12 of this Manual for instructions on submitting reports.

"(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works."

The Division Engineer or his representatives will make periodic inspections of the protective works to determine if the project is being properly maintained and operated by the City.

"(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made."

The City should maintain the facilities and keep them in good repair and not wait for the Division Engineer to call such matters to its attention. Upon request, the Division Office will advise the City how to make any major repairs to the facilities.

"(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods."

The City should formulate plans and negotiate agreements with local organizations and companies, who are operating facilities connected with the protective works, to insure that their activities will be properly coordinated with the Superintendent's organization during flood periods.

"(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations."

The flood control committee should familiarize itself with the contents of this manual. The City authorities are encouraged to call on the Division Office of the Corps of Engineers for any additional advice or instructions required by them in carrying out the City's obligations for maintaining and operating the flood protection facilities.

10. MAINTENANCE. - a. The word "maintenance" as used in this manual applies to the upkeep, repair and care of the work constructed by the United States and turned over to the City of Woonsocket. If the work is neglected there will be deterioration and possible failure in flood time when there is dire need of dependable protection.

b. Satisfactory and dependable operation depends on constant maintenance. The organization that performs maintenance must be familiar with various parts of the system and will be in a position to use them effectively in time of stress.

c. Maintenance includes regular inspection of the entire system. The purpose of an inspection is to detect any deterioration or faulty operation that indicates a need for repair or replacement. This does not mean a casual automobile trip to places easily accessible but actually walking over every part of the system.

d. In addition to inspection, gates and pumping station equipment require testing at stated intervals to discover the difficulties that may develop or the part that will not work when it should.

e. Each of the major features of the project is discussed separately. Particular emphasis is placed on those points which, based on experience with special project features, require special attention.

11. OPERATION. - a. Operation in this manual refers to the actual use of the various features of the protection works during flood periods. It is intended that the procedure outlined herein will be sufficient to insure protection from floods to the design stage. However, advice relative to operation may be obtained at any time from the Engineering Division of the New England Division Office.

b. When abnormal river flows and stages are expected it is important that the Superintendent make immediate decisions and take prompt action and that he have the authority to carry out his decisions.

c. To insure correct operation it is essential that at least one person (preferably 2 or 3) (1) be familiar with all phases of the flood protection works, (2) know when to start the pumping stations, (3) know the location of gates and valves and when to close them, (4) know just what supplies and transport are on hand, and (5) know what men and tools can be mobilized for the patrolling and repair work.

d. Arrangements should be made with the U. S. Department of Commerce, Environmental Sciences Services Administration, 135 High Street, Hartford, Connecticut 06101 (telephone number 203-244-2014), to keep the City informed on flood predictions. The ESSA Weather Bureau at Hartford is the official agency for collecting precipitation and runoff data and the preparation of flood forecasts and is responsible for issuance of flood warnings in the Blackstone River Basin.

e. It will be to the advantage of the City to negotiate agreements with private owners and companies to operate and maintain project features that are directly related to facilities and property of those parties. However, the Corps of Engineers will look only to the City for maintenance and operation of the project since the City executed assurances of local cooperation.

12. INSPECTION AND REPORTS. - The regulations prescribed by the Secretary of the Army call for semi-annual reports to be submitted by the Superintendent to the Division Engineer, covering inspection, maintenance and operation. Inspection of the flood protective facilities shall be made immediately prior to flood seasons, immediately following floods, and otherwise at intervals not exceeding 90 days as required by the regulations. Floods can occur and have occurred in any season of the year (March 1927, November 1927, July and September 1938, October 1954 and August 1955).

To assist the Superintendent in making his inspections and reports, sample forms have been prepared and are included in Appendix C. The Superintendent shall have additional copies printed for use in submitting his reports.

The semi-annual reports shall be submitted in triplicate to the Division Engineer each February and August. The reports will be submitted in letter form with copies of the inspection forms covering the inspections made during the period of the report. The reports shall cover the following points:

a. A description of the maintenance work performed in the preceding six months.

b. The number and classification of men working on maintenance, regularly and intermittently.

c. Description of any work performed by contract on the repair or improvement of the project.

d. Description of use or operation of the system during the period being reported.

e. Suggestions relative to public cooperation and comments concerning public sentiment on the protection obtained are considered pertinent and desirable data for inclusion in the report, but such data are not required.

In addition to the maintenance reports discussed above, monthly reports of operations will be submitted to the Division Engineer. The purpose of the monthly reports is to maintain an up-to-date record of project operations, so that prescribed regulation procedures may be analyzed and modified, where necessary, as actual regulation experience indicates. These reports should include gage readings, gate settings, pumping data and other pertinent information.

B. CHANNEL IMPROVEMENT

13. DESCRIPTION. - The channel improvement covers the widening, deepening and straightening of the channels of the Blackstone, Mill and Peters Rivers. The channels are trapezoidal in section with 1 on 2 side slopes and various bottom widths.

a. Bernon Unit. - The channel improvement of the Blackstone River in the Bernon Unit consists of a pilot channel immediately upstream of Bernon Street Bridge. It has a bottom width of 50 feet and a length of 600 feet.

b. Social District Unit. - The channel improvement of the Blackstone River has a varying bottom width and a length of approximately 600 feet.

c. Hamlet District Unit. - The channel improvement of the Blackstone River has a varying bottom width and a length of approximately 2,000 feet. The Mill River channel has a bottom width of 50 feet and a length of approximately 1,700 feet. The Peters River channel has a bottom width of 20 feet and a length of 400 feet.

14. MAINTENANCE. - Paragraph 208.10 (g) (1) of the prescribed regulations sets forth rules for the maintenance of channels and floodways. These rules are quoted below, followed by brief comments on the particular applicability of these rules to the Lower Woonsocket project.

"Channels and floodways. - (1) Maintenance. - Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

"(i) The channel or floodway is clear of debris, weeds, and wild growth."

All debris and growth which tend to restrict the channel shall be removed promptly.

"(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments."

Dumping of waste materials or any types of encroachment on the channel shall be prohibited and prompt steps shall be taken to remove or have removed any such encroachments.

"(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals."

Shoal areas should be removed but care should be exercised that slopes of the channel and existing banks are not undercut. Existence of shoal areas will be apparent from inspections during time of low flow.

"(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred."

Banks damaged by rain or wave wash or sloughing shall be repaired promptly, using bankrun gravel and rock similar to that used in their original construction.

"(v) Riprap sections and deflection dikes and walls are in good condition."

Rockfill slope protection must be maintained in good condition to resist erosion. Any loss of rock due to slides, erosion or vandalism must be promptly replaced. Periodic checks should be made of the stone slope protection for possible movement or loss of stone, and prompt corrective action taken. The rock toes should be observed closely for stability.

"(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works."

In order for this project to function properly and as designed, the channel of the Blackstone River downstream from the project must be maintained in such condition that it is capable of carrying flood flows and not cause the river to back up, thus nullifying the effect of the improved channel.

"Such inspection shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary."

15. OPERATION. - Paragraph 208.10 (g) (2) of the prescribed regulations gives rules for operation of channels and floodways. These rules which are quoted below are self-explanatory and require no amplification with regard to the **Lower Woonsocket project.**

"(2) Operation. - Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired."

Rules and instructions for emergency repairs measures for the dikes as given in Paragraph 19 are equally applicable to emergency repairs of the channel.

C. DIKES

16. DESCRIPTION. - In the Social District Unit there are 6 dikes and in the Hamlet District Unit there are 3 dikes. These dikes all consist of random fill with selected impervious blankets on the river side and have side slopes of one vertical on two horizontal.

The land side slopes and the freeboard area of the slopes on the river side are protected by turf against erosion. The turf was produced by seeding a 6-inch layer of topsoil. A 12-inch layer of topsoil was employed over the gravel fill toe drains.

The river side slopes below the freeboard area are protected by a layer of rock slope protection material placed on a 12-inch minimum thickness gravel bedding layer. A total thickness of 4 feet of gravel bedding and rock slope protection has been provided on the river side slope where the height is greater than 20 feet for the purpose of insuring stability. In reaches where this occurs, the thickness of the gravel bedding is either 12 inches or 3 feet depending upon the selected thickness of slope protection material. Rock slope protection is required along all reaches of the dikes since all the channel flow velocities at flood stage are greater than 6 feet per second.

A 12-inch layer of rock slope protection is used in reaches where the channel flow is less than 12 feet per second. The stream velocities along the reach of the Peters River Dike and in the Mill River, upstream from the East School Street Bridge, will be between 12 and 15 feet per second during flood stage. In these reaches, the rock slope protection is a well graded rock with a maximum size of 250 pounds and an average rock size of between 50 and 80 pounds.

17. MAINTENANCE. - Paragraph 208.10 (b) (1) of the prescribed regulations sets forth rules for the maintenance of levees. These rules apply equally to earth dikes, and applicable portions are quoted below. Following this, points that apply particularly to the Lower Woonsocket project are discussed.

"Levees. - (1) Maintenance. - The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, to exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable

growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

"(i) No unusual settlement, sloughing or material loss of grade or levee cross section has taken place;

"(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section,

"(iii) No seepage, saturated areas, or sand boils are occurring;

"(iv) ----------Not applicable----------.

"(v) Drains through the levees and gates on said drains are in good working condition;

"(vi) No revetment work or riprap has been displaced, washed out or removed:

"(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

"(viii) Access roads to and on the levee are being properly maintained;

"(ix) ----------Not applicable----------.

"(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

"(xi) There is no unauthorized grazing or vehicular traffic on the levees;

"(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during time of emergency.

"Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days; and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct

dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent."

Any unusual settlement, sloughing or caving should be corrected to restore the original dike grades. No major repair work shall be made without prior approval of the Division Engineer, in order that such repairs that may be necessary will not adversely affect the functioning of the protective facilities.

The landside slopes of **dikes and the freeboard area of the slopes on the river side** were topsoiled and seeded to minimize the damage from erosion and scour caused by surface runoff. Once established, the vegetation shall be mowed at regular intervals.

When sections of the dike require reestablishment of turf, seeding operations should be started at the earliest practical date in the spring to secure the greatest possible protection against erosion. Areas requiring seeding shall be dressed to fill gullies and irregularities in the surface. The following seed mixtures were used in the original construction:

TABLE I

GRASS SEED

For Erosion Control:

Kind of Seed (Botanical Name) (Common Name)	% by Wt. In Mixture	Min.% Purity	Min.% Germ.
Bromus inermis Smooth Brome	15	85	90
Agrostis tenuis hv Highland Bentgrass	5	98	85
Festuca elatior arundinaceae Alta Fescue	35	98	85
Festuca rubra Red Fescue	30	98	85
Poa compressa Canada Bluegrass	10	80	75
Trifolium repens White Clover (New York Wild Strain)	5	98	85

For Lawns:

Kind of Seed	% by Wt. In Mixture	Min.% Purity	Min.% Germ.
Agrostis tenuis hv Highland Bentgrass	5	98	85
Festuca rubra Red Fescue	35	98	85
Festuca rubra commutata Chewing's Fescue	35	98	85
Lolium multiflorum Italian Ryegrass	5	95	90
Poa pratensis Kentucky Blue grass	15	85	75
Trifolium repens White Clover	5	98	85

NOTE: Weed Seed not to exceed 1.0% of total mixture.

Inspections of the dike shall be made during and after periods of high water, as it is at such times that any weak spots will be discovered that might otherwise be overlooked.

18. OPERATION. - Paragraph 208.10 (b) (2) of the prescribed regulations sets forth rules for the operation of levees. These rules apply equally to earth dikes and are quoted below. Following these, a few of the points which apply particularly to the Lower Woonsocket project will be discussed.

"(2) Operation. During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

"(i) There are no indications of slides or sloughs developing;

"(ii) Wave wash or scouring action is not occurring;

"(iii) No low reaches of levee exist which may be overtopped;

"(iv) No other conditions exist which might endanger the structure.

"Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section."

Operation of the dikes may be at a time of moderately high water, such as a spring freshet, or may be when unusual conditions indicate the possibility of dangerous flood heights. Prompt action in starting work is of the utmost importance.

Requirements for patrolling the dikes depend on the depth of water on the river side of dike. Patrolling of the dikes should start when the water surfaces of the rivers reach the same elevation as the surface of the ground on the land side of the dikes and floodwalls. The patrolling should continue until the flood has reached its peak and receded below the elevation of the land side ground.

The water level in observation risers shall be recorded at least twice daily to determine proper functioning of the toe drains whenever the rivers rise 5 feet above the elevation of the surface of the ground on the land side of the dikes and floodwalls.

Patrolmen should be thoroughly instructed as to their duties, what they are to watch for, and the exact limits of their beat. On each journey of inspection they should carefully examine both slopes of the dikes for seepage or wetness on landside slope, sand boils on landside of dike, wave wash or scouring on riverside slope, and indications of slides or sloughs on either slope.

All unauthorized traffic on the dikes should be stopped at once, and patrolmen should be instructed to keep people off the dike unless they can show passes or credentials authorizing their presence.

19. EMERGENCY REPAIR MEASURES. - Scours. - Careful watch should be maintained of the dike for indication of scouring. If any indication of scouring is observed, soundings should be taken to observe the amount and progress of the scour. Sandbagging or dumped rock will generally afford the most practicable means of combatting this condition. The open ends of sandbags so used must be sewed or tied after filling with earth.

Wave wash. - Wave action may cause displacement of riprap and wash-out of earth materials on the riverside slope of the dike. Well-sodded slopes will usually withstand waves from a storm of about an hour's duration without serious damage. An attack over a longer period may become serious and the slopes should be protected by sacking or equivalent means. The extent of washes can be determined by wading along the attacked slope. Sandbags should be placed in the erosions in as effective a manner as possible, carrying the protection well above the action of waves. Sandbags used for this purpose require only about one-half cubic foot of material and should be sewed or tied. The aim is to obtain a maximum of coverage with only sufficient weight to hold the sack in place.

Sand Boils. - a. General. - A sand boil is the result of a transfer of pressure head and seepage from the river, through a pervious stratum near or at the surface, to the landside of the dike.

This seepage under pressure tends to push its way to the surface and actually floats the material through which it flows. No harmful effect results provided the weight of the relatively impervious soil layer overlying the pervious stratum, in which the flow under pressure is occurring, is sufficient to counterbalance this pressure. When the soil stratum overlying the pervious layer is insufficient to counterbalance the upward pressure or when no such stratum exists, boils break through the surface on the landside wherever these weaknesses are present. The sand boil may discharge relatively clear water or the discharge may contain quantities of sand and silt, depending upon the magnitude of the pressure and the size of the boil.

b. Effects of Sand Boils. - Sand boils can produce three distinctly different effects on the levee, depending upon the condition of flow under the levee. These three effects are illustrated in Appendix D. In Figure 1, Plate No. I, the seepage flow develops a definite pipe or tube under the levee. This breaks out at the landside toe in the form of one or more large sand boils. Unless checked, this flow causes a cavern to be developed under the levee, resulting in subsidence of the levee and subsequent overtopping. This case can be most easily recognized by slumping of the levee crown. Figure 2, Plate No. I, illustrates the case where seepage flows under pressure under the levee without following a defined path, as the case above. This flow results in one or more boils outcropping at or near the landside toe. The flow from these boils tends to undercut and ravel the slope, resulting in a sloughing of the slope. Evidence of this type of failure is found in undercutting and ravelling at the landside toe. Figure 3, Plate No. I, shows a third type of effect of a sand boil. In this case, numerous small boils, many of which are scarcely noticeable, outcrop at or near the toe. While no boil may appear to be dangerous in itself, the consequence of the group of boils is to cause flotation of the soil, thereby reducing the shearing strength of the material at the toe, where maximum shearing stress occurs, to such an extent that failure of the slope through sliding results.

c. General Instructions for Handling Sand Boils. - All sand boils shall be watched closely. A sand boil which discharges clear water in a steady flow is usually not dangerous to the safety of the dike. However, if the flow of water increases and the sand boil begins to discharge material, corrective action shall be taken immediately.

d. Method of Treatment. -

(1) The accepted method of treating sand boils is to construct a ring of sandbags around the boil, building up a head of

water within the ring sufficient to prevent further movement of sand and silt. The accepted method of ringing a sand boil, shown on Plate No. II of Appendix D, is as follows:

(a) The entire base of the sack ring is cleared of debris, in order to provide a watertight bond between the natural ground and the sack ring.

(b) The sacks are then laid in a ring around the boil, with joints staggered, and with loose earth between all sacks.

(c) The ring is carried only to a height sufficient to prevent material from being discharged. The ring should not entirely stop the flow of water, because of the probability of the excessive local pressure head causing additional ruptures of impervious strata and boils nearby.

(d) A "V" shaped drain constructed of two boards, or a piece of sheet metal, is then placed near the top of the ring to carry off water.

(2) Actual conditions at each sand boil will determine the exact dimensions of the ring. The diameter and height of the ring depend upon the size of the boil, and the flow of water from it. In general, the following considerations should govern:

(a) The base width should be no less than $1\frac{1}{2}$ times the contemplated height.

(b) It is well to include weak ground near the boil within the ring, thereby preventing a break-through later.

(c) The ring should be of sufficient size to permit sacking operations to keep ahead of the flow of water.

(3) Where many boils are found to exist in a given area, a ring levee of sand bags shall be constructed around the entire area and, if necessary, water pumped into the area to provide sufficient weight to counterbalance the upward pressure.

Sloughs. - During prolonged high water stages, seeping and sloughing conditions on the landside slopes may occur. Such conditions should be observed closely as to progress of seepage up the landside slope and the amount of material that is being carried by seepage. If the seep velocity becomes great enough to cause, or probably cause, erosion or sloughing of the slope, a sandbag covering should be placed on the seeping area, beginning well out from the toe and progressing up the slope. The covering should extend several feet beyond the saturated area. If the material is obtainable,

the affected area should be covered with brush, straw or similar permeable material to a depth of two to four inches before placing the sandbag cover. This will permit the seep water to get away while serving as a filter to prevent loss of earth from the dike. After the covering is placed, close observation should be maintained and additional layers of sandbags placed on the previous ones until the velocity of the seepage is reduced to a point at which the amount of material carried is negligible. Sacking sloughs are illustrated on Plate No. III of Appendix D.

Raising existing earth dikes. - In an emergency, time and other conditions permitting, the grade of a dike can be safely raised three feet. The methods most commonly used for this purpose are outlined in the following paragraphs.

a. Sandbag topping. - The sack ordinarily used for topping an earth dike is a grain or feed sack which holds 100 pounds of grain. Smaller sacks may be used if feed sacks are not available. Grain sacks, filled with about one cubic foot of earth, weighing about 100 pounds, will provide a unit about six inches high, one foot wide and two feet in length.

The sacks may be filled at the source of material and hauled to the dike or filled from stockpile or borrow areas at the dike; conditions determining the method employed. The same is true of filling; i.e., whether power or hand methods are used.

The open end of the sacks should always face upstream or toward the riverside of the dike and need not be sewed or tied. When the sack faces the river the loose end should be folded under and when facing upstream the loose end covered by the succeeding sack.

The front line of sandbags in the first layer should be laid parallel to the dike center line and remaining bags at right angles to the center line. The sandbags in the second layer are all laid at right angles to the center line, the third row similar to the first, etc., as shown on Plate No. IV, Appendix D. All sacks should be lapped about 1/3 each way and well mauled or tramped into place. The sacks should be filled to 2/3 their capacity when flattened out to facilitate proper placing and prevent bursting the sack when mauled or tramped into place.

Plate No. IV illustrates the progressive method of increasing the dike height and gives an approximation of the number of sacks required for dikes of various heights. Plate No. V shows pictures of model sack dike or topping.

A crew of 50 men should fill, carry and place approximately 1500 sacks per eight-hour day, all hand labor, when the source of material is within 150 feet of the point of placement. Production will depend on conditions at the site.

b. Lumber and Sandbag Topping is the most satisfactory method of raising low reaches of earth dike in emergencies. The chief objection is the time required to install. In putting on this topping, as well as any other topping, a careful line of levels should be run

A crew of 50 men should fill, carry and place approximately 1500 sacks per eight-hour day, all hand labor, when the
and grade stakes set in advance unless the dike top follows a dependable grade-line. Two-by-four or two-by-six inch stakes should then be driven on the riverside of the crown six feet apart and one-by-twelve inch boards nailed to landside of the stakes. This wall, backed with a single tier of sandbags, will hold out at least one foot of water. If the second foot is necessary, the layers of bags will have to be increased in number and reinforced. Sandbags are laid substantially in the manner described in (1) above. The stakes should be driven at least three feet into the ground, leaving at least three feet out, which will, in extreme cases, hold a three-foot topping if properly braced behind the sandbags. Plate No. VI, Appendix D illustrates this method of raising a dike.

D. FLOODWALLS

20. DESCRIPTION. The floodwalls are of the "T" and "I" type of reinforced concrete construction with waterstops at expansion joints. Only the upper parts of the walls are visable since the earth on both sides of the walls has been backfilled and compacted. The channel side slopes and the dumped rock protection abut the river side of the wall.

In the Social District Unit there are 1,110 linear feet of reinforced concrete T-walls along the Blackstone River. They have a freeboard of 3 feet, and an average height of 13 feet above ground.

In the Hamlet District there is one reinforced concrete T-type retaining wall, on the Blackstone River, with a length of 75 feet and an average height above ground of 4 feet. On the Mill River there are 610 feet of reinforced concrete T-type retaining walls with an average height above ground of 30 feet. On the Peters River there are 370 feet of reinforced concrete T and I type floodwalls with a freeboard of 3 feet and an average height above ground of 12 feet.

21. MAINTENANCE. - Paragraph 208.10 (c) (1) of the prescribed regulations sets forth rules for the maintenance of floodwalls. Applicable portions of these rules are quoted below.

"Periodic inspections shall be made by the Superintendent to be certain that:

"(i) No seepage, saturated areas, or sand boils are occurring;

"(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

"(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

"(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

"(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

"(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

"(vii) **No bank caving conditions exist riverward of the wall which might endanger its stability;**

"(viii) **Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.**

"Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice."

22. OPERATION. - Paragraph 208.10 (c) (2) of the prescribed regulations gives rules pertaining to floodwalls during periods of flood emergency. These rules are quoted below.

"Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall."

23. EMERGENCY REPAIR MEASURES. - The Superintendent or responsible members of his organization shall take immediate action to correct any condition which endangers the stability of the wall. All such measures taken will be reported to the Division Engineer immediately after the flood period.

Sand Boils. - See Paragraph 19 for emergency measures to be taken in the event sand boils develop.

Monolith Joints. - Appreciable leakage through vertical monolith joints can be controlled by dumping cinders, sawdust, or similar material on the riverside of the wall. The dumped material will be carried into the joint by the water and plug the leak.

Raising Grade of Wall. - In an emergency, the walls may be raised temporarily by a single row of sandbags or by erecting wooden flashboards similar to those shown in Plate VII of Appendix D. Construction of the wooden extensions would require minor modification to fit the Woonsocket floodwall.

E. UTILITIES

24. DESCRIPTION. - Water, sewer and storm drains that pass under the protection and channel are shown on utility sheets included in Appendix E of this manual. The sewer and drainage structures connected with the project are outlined in Table II. They are discussed in more detail hereafter.

25. MAINTENANCE. - The utilities passing through the protection should be adequately maintained and any breaks or leaks promptly repaired. Where any excavations are necessary, backfills shall be carefully and thoroughly compacted taking care that no voids or nests of cobbles or gravel are allowed to occur. Paragraph 208.10 (d) (1) of the prescribed regulations gives rules for the maintenance of drainage structures.

"Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made by the Superintendent to be certain that:

"(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

"(ii) Inlet and outlet channels are open;

"(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

"(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections."

Locations where industrial process water and storm drain effluents are discharged onto the dumped rock slopes should be examined periodically to insure that there is no loss of slope material.

26. OPERATION. - Paragraph 208.10 (d) (2) of the prescribed regulations gives rules for operation of drainage structures. These rules are quoted below.

"Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of floodwater. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition."

As long as storm and other drains and ditches into the channel are draining freely they should present no special operating problems. Operation of the gate closures on the drainage structure running through the pumping station is covered fully in the Pumping Station - Section F.

a. Storm Drainage Structures. - The storm drainage structures designed to prevent flood waters from getting through the protection are classified into two types:

(1) Required Closure During High River Stages. - With this condition, the sluice gate in the structure is closed in accordance with Table II and storm drainage is diverted to a pumping station or diversionary channel.

(2) Emergency Closures During High River Stages. - With this condition the storm drain line is open to the river and partly pressurized during flood stages. The drainage in these lines is picked up at an elevation higher than the river elevation at flood stage. The head differential permits discharge to the river. If the line develops a leak or ruptures during flood stage, it would be necessary to close the sluice gate in the structure at the protection immediately. Local flooding would ensue in the event of rain but the river would be withheld from the protected area.

(3) Intake Structure No. 2. - The operational requirement indicated for Intake Structure No. 2 in Table II is controlled by the flood stage in the Blackstone River. The gate on this structure will also have to be closed if there is a high flow in the Mill River. In this case the indicator for gate closure will be the water elevation in the trapezoidal channel upstream of East School Street. The gates shall be closed when the water in this channel is within 3 feet of overflowing its right bank (looking downstream).

TABLE II
STORM DRAIN SLUICE GATE SCHEDULE

Structure	Location*	Plate No.	Operational Requirements
Sluice Gate Chamber A	Sta. 18+75± Rt. Blackstone River	E-68	Close gate when river gage at Hamlet District P.S. is El. 112.0.
Sluice Gate Chamber D	Sta. 31+48± Rt. Blackstone River	E-71	Emergency closure only.
Intake Structure No. 2 **	Sta. 13+66± 240' Rt. Mill River	E-72	Close gate when river gage at Social St. P.S. is El. 114.5 or when Mill River is 3 ft. from top of right bank.
Sluice Gate Chamber E	Sta. 14+25± 205' Rt. Mill River	E-72	Emergency closure only.
Sluice Gate Chamber B ***	Sta. 18+25± Lt. Blackstone River	E-75	Close gate when river gage at Social District P.S. is El. 115.0.

SANITARY SEWER SLUICE GATE SCHEDULE

Sanitary Bypass Structure A	Sta. 24+50± Rt. Blackstone River	E-68	Emergency closure only.
Girard Ave. Siphon Chamber	Sta. 22+50± Lt. Blackstone River	E-76	Emergency closure only.
Sanitary Bypass C Outfall	Sta. 22+78± Lt. Blackstone River	E-76	Open when the sluice gates on Girard Ave. Siphon Chamber are closed.

* Reference to left or right is looking downstream.

** See Par. 26.a.(3) for supplementary operational requirements.

*** See Par. 26.a.(4) for supplementary operational requirements.

(4) Sluice Gate Chamber B. - When Sluice Gate Chamber B is closed the storm drainage backs up in the storm drain running along the right side (looking downstream) of the Mill River conduit. At the point where an 18" storm drain brings drainage from Page Street into the line (Plate E-90), two flap valves have been installed on structures in this area to prevent water from the pressurized drain backing up under Page Street. If there is rain coincident with the gate closure at Sluice Gate Chamber B, it will be necessary to pump the water backing up under Page Street into the pressurized drain. This can be accomplished by putting the suction line of the pump down Catch Basin "A" and discharging it into the storm drain manhole at Sta. 30+75 Rt. on the Mill River conduit. Access to this structure is from the sidewalk of Gobeille Avenue.

b. Sanitary Sewer Structures. - All sanitary lines under the protection have been provided with emergency closures. The locations of the sanitary siphons with structures for emergency closure are indicated in Table II and shown on Plates Nos. E-68 and E-76. In the event of a leak or rupture in the sanitary siphons under the protection or river, at flood stage, the sluice gates shall be immediately closed. Overflow pipes will carry the sewage to pumping stations in this situation.

c. Mill Water Supply Line. - The mill water supply line provides process water, from the Blackstone River, to several mills along its route, namely Hanora, Florence, Lafayette and French Worsted. Intake structures, at the mills, should be observed for any flow increases caused by high river level. Should an increase be observed, it can be regulated by means of control valves provided at each mill intake.

Any excessive overflow from the mill intake structures should be reduced since all overflow water must be pumped from the Hamlet Avenue pumping station when this station is in operation.

In the event of a break in the mill water supply line, the line can be shut down with sectionalizing valves at Stations 0+00, 2+35, and 67+70.

TABLE III

MILL WATER SUPPLY LINE

Structure	Location	Plate No.	Operational Requirements
Control Valves at: Hanora Florence Lafayette French Worsted	Outside of the listed mills	E-62, E-67, E-68	Regulate to prevent pumping of excessive overflow from Hamlet Avenue pumping station.
Sectionalizing Valves	On mill water supply line at Stations 0+00, 2+35, and 67+70	E-62, E-68	Emergency closure only.

F. PUMPING STATIONS

27. DESCRIPTION. - Two pumping stations were constructed by the Corps of Engineers in the Lower Woonsocket project, to dispose of the interior drainage during high water periods. Each station is provided with sufficient pump capacity with one pump inoperable to discharge two thirds of the design runoff based on the existing developments in the drainage areas. The storm water pumps are driven by diesel engines directly connected through flexible couplings to right angle gear units which transmit the power to the vertical pump shaft. The stations are provided with other facilities, such as trash racks, sluice gates, flap valves, overhead cranes, vent fans, sump pump, etc., to make a reliable, workable and complete installation.

a. Pumping Station Equipment. - (1) Social District Pumping Station. - This pumping station contains three 36-inch diesel-engine-driven propeller pumps. A flap valve is provided on the discharge end of each pump to facilitate starting and prevent backflow through the pump. Stoplogs are provided for installing in slots on the river side of the flap valves to permit maintenance and repair of the flap valves at all river conditions. The engines are radiator-cooled and exhaust cooling air from the engine room is discharged to the outdoors. Each engine is equipped with a hydraulic cranking system consisting of a nitrogen precharged piston type accumulator, hydraulic cranking motor, starter control and associated equipment.

(a) Four electric operated sluice gates are provided, two on the inlet to the station sump and two on the gravity discharge conduit on the river side of the flood wall.

(b) Electricity is supplied by a single-phase 120/240 volt service for the sluice gate operators, vent fan, sump pump, dehumidifier, and lighting.

(2) Hamlet District Pumping Station. - This station contains three 24-inch diesel engine-driven propeller pumps. Each pump discharge is equipped with a flap valve to facilitate starting and prevent backflow through the pumps. Stoplogs are provided same as for the Social District Pumping Station. Engine cooling and starting systems are also the same as at the Social District Pumping Station.

(a) Four electric operated sluice gates are provided, two on the inlet to the station sump and two on the gravity discharge conduit on the river side of the flood way.

(b) Electric energy, same as at the Social District Pumping Station, is supplied to this station.

28. MAINTENANCE. - a. Regulations. - Paragraph 208.10(f)(1) of the prescribed regulations governs the maintenance of pumping stations:

"Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable."

b. Recommendations of Division Engineer. - To help carry out the above-quoted regulations, the Division Engineer recommends the following:

(1) General. - Proper maintenance of the pumping stations requires periodic operation of all equipment at frequent intervals to keep equipment in good working order and all parts well lubricated and free from corrosion. Periodic operation of equipment also permits an inspection of the functioning of all equipment so that defective parts may be properly replaced or repaired before their use is required for pumping operations. Inasmuch as mechanical and electrical equipment deteriorates rapidly from idleness as well as from continued use, a thorough and complete maintenance routine is justified. The heating system should be under automatic operation at all times to prevent condensation of moisture on equipment within the building.

(2) Diesel Engines. - (a) Twice a year, in the spring and fall, each engine should be run for two hours. The operation of the engines for this length of time is necessary to get the crankcase oil warmed up sufficiently to evaporate any fuel that entered the crankcase during starting and to evaporate any moisture that is in the crankcase oil due to condensation. If the station is operated for flood purposes during either of these periods, this operation will meet the maintenance operation requirement. During this period of operation the cut-out coupling between engine and gear unit shall be set so the pump does not operate. The functioning of the engine and accessories should be checked for proper performance. The following are the principal items to be checked:

1 Oil pressure.

2 Water temperature.

(b) Once each month, each engine, gear unit, and pump shall be operated for two to three minutes. This two to three minute operation may be run with the sump dry. DO NOT OPERATE ANY PUMP LONGER THAN THREE MINUTES DRY. This two to three minute operation will demonstrate that the engine will start properly and will be sufficient to circulate oil in the engines and gear units to all surfaces and will spread a grease coating on the grease lubricated shafts and bearings. If this short period of operation indicates any unusual noises in the pump or gear units, the unit should be shut down immediately, the units in question dismantled as necessary to determine the source of trouble and necessary repairs should be made at once.

(c) Oil in the engines should be changed twice a year or after every 100 hours of operation, whichever is more frequent. At the time of oil changing the oil filter should be removed and replaced with new filter element.

(d) The drain valve at the base of the vertical exhaust pipes should be opened once a month while the engine is in operation to allow the condensate collected in the pipe to drain before it collects sufficiently to back up into the exhaust manifold and into the cylinders.

(e) The anti-freeze solution shall be drained and replaced annually. Permanent type anti-freeze shall be used at all times and shall be adequate for protection against freezing at minus 20°F.

(3) Pumps. - (a) No maintenance of the propeller pumps is ordinarily required except that necessary to keep them painted and lubricated. The manual Farval grease lubricator on each pump should be operated to pump grease to each grease lubricated bearing prior to each pump operation and after each half hour during continuous operation. After each "wet sump" pump operation, the inside of the pump column, discharge elbow and the propeller and suction bell shall be flushed clean with hose using city water.

(4) Gear Units. - The gear units are fully enclosed oil lubricated. The oil level must be kept at the indicated level in the sight glass at all times. The oil in the gear units should be changed every two years.

(5) Sluice Gates. - Electrically operated gates should be moved through a complete closing and opening and closing cycle each month. There are on each electrically operated gate hoist some resistors located within the motor control panel in series with the indicating lights. Inasmuch as these resistors will emit a little heat when the indicating lights are on, it is recommended that at all times the feeders to the electrically operated sluice gates be kept energized and the indicating lights kept lighted so that the resistors will provide a little heat to combat any moisture that enters the control panel. The limit switches should be inspected once a year, and contacts cleaned. The stems of all gates should be kept completely coated with a water resistant lubricant at all times to prevent corrosion and provide lubrication.

(6) Sump Pumps. - Each station is provided with a sump pump to handle any seepage into the sump and to evacuate the sump after each pumping operation. The pumps and motors should be lubricated annually and the float mechanism checked monthly by manually raising and lowering the float to start and stop the pump. DO NOT ALLOW THE PUMP TO OPERATE MORE THAN ONE MINUTE WITHOUT WATER.

(7) Painting. - All metal surfaces not otherwise protected must be kept painted to maintain the metal in good condition. The exterior metal work, such as pipe railings, trash racks, cover plates, exterior gate hoist, flap valves, will require frequent painting because of exposure to the weather.

(8) Sump Cleanup. - After each period of high water during which the propeller pumps have been used, the sump should be emptied of water and the sump cleaned of all silt and debris. All internal

and external surfaces of the pumps (and the gear unit oil cooling coils in the Social District Pumping Station) should be thoroughly hosed and scrubbed down to remove any residual wastes before the waste material dries and solidifies. Most of the deposit on the floor can be washed into the sump pump by a stream of water from a hose and then removed with the sump pump. Any large debris, sticks, stones, rags, etc., should be removed manually. After the sump has been cleaned, the sump pump should be cleaned of all foreign matter.

(9) Anchor Bolts. - At yearly intervals, all anchor bolts, piping bolts, Dresser coupling bolts, pump assembly bolts, and all similar parts shall be checked for tightness and tightened if necessary.

(10) Lubrication. - The two main requirements to keep equipment well lubricated are to operate equipment frequently to spread a film of lubricant over the bearing surfaces, and secondly to use proper kinds and grades of good lubricants. Cup greases should not be used on the equipment for any purpose because most cup greases have water as a binder. This moisture in contact with idle metal surfaces will corrode them in time. The types and grades of grease and oils should be in accordance with the equipment manufacturer's recommendations.

(11) Manufacturer's Drawings and Recommendations. - The Corps of Engineers has furnished the City of Woonsocket a complete set of manufacturer's drawings pertaining to the mechanical and electrical equipment in the pumping station. These drawings should be kept in good condition and available for reference at all times. If, for any reason, the drawings become damaged or lost, they should be replaced. The manufacturers will replace drawings for a nominal cost. The Operating and Maintenance Instructions of the engine manufacturers should be followed for diesel engine care.

29. OPERATION. - a. Regulations. - Paragraph 208.10(f)(2) of the prescribed regulations governs the operation of pumping stations:

"Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the 'Operating Instructions' for each station. The equipment shall be operated in accordance with the above-mentioned 'Operating Instructions' and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters,

the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the Division Engineer following each flood."

b. General Operating Procedure. - The following instructions describe the general operating procedure:

Whenever the river stage reaches the stage at which the station is to be placed in operation, the sluice gate at the entrance to the station sump shall be opened and the gate in the gravity flow conduit closed. One or more pumps shall be operated as necessary to maintain the water in the sump below the "High Water Elevation." The pumps should not be operated when the water level is below the "Low Water Elevation" as air will be sucked into the pumps causing vibration and cavitation. During periods of low inflow, the engine may be operated at less than the rated speed but not at lower then 1200 rpm, to reduce the pumping capacity and thus avoid frequent stopping and starting of the engine.

c. Sump Level Indicators. - Sump level indicator gages are installed on the north walls of the Social and Hamlet District pumping stations. Zero on the gages in both stations indicate the low water level in the sump during a pumping cycle. The zeros are equivalent to Elevation 112.16 m.s.l. in the Social District station, and Elevation 111.79 m.s.l. in the Hamlet District station.

d. River Level Gages. - River level gages are installed on the south walls of both pumping stations. Zero on the gages of both Social and Hamlet District pumping stations are equal to Elevation 108.75 m.s.l which is the bottom of the wet wells.

e. Pumping Station Staffing Criteria. - The Social and Hamlet District pumping stations will be staffed when either of the following conditions develop:

	Woonsocket Falls Dam Tainter Gate Settings				USGS Gaging Station* Blackstone River Woonsocket, R.I. (stage, feet)
	#1	#2	#3	#4	
Social District	1	1	1	1	6.0 (4,000 cfs)
Hamlet District	2	1	1	2	7.5 (6,500 cfs)

* See rating table on Plate No. 1.

The operator will immediately make maintenance checks to insure operation of the station and will periodically check the river level gage. He will establish telephone communication with the operator at the Woonsocket Falls Dam so that the operations are thoroughly coordinated.

f. Social District Pumping Station Operating Criteria. - During a flood the station will be operated in the following sequence:

(1) Start Pumping. - When the river gage level at the pumping station rises to 7.0, the operator will:

(a) Open both sump sluice gates.

(b) Start engine No. 1 making sure that clutches are disengaged. Engage clutch to pump as soon as engine is running smoothly.

(c) Close both chamber sluice gates.

(d) Shut off sump pump.

(2) Pump Operations. - Operate engines and pumps according to the following schedule:

	Sump Gage (stage, feet)		
	Pumps		
	No. 1	No. 2	No. 3
Start Pumps	3.5	4.0	4.5
Stop Pumps	0.0	0.5	1.0

The necessity for keeping the pumping station engines running and intermittently operating pumps will depend on the volume and rate of local inflow. It is entirely possible that the rainfall causing the flood or the local runoff will end before or while the river is still in flood. In this event, the gravity chamber sluice gates will be kept closed and the engine(s) operated and pump(s) engaged only as necessary to keep stages in the sump within operating limits.

(3) Terminate Pumping. - When the river recedes to a stage of 7.0 feet on the river level gage at the pumping station, the operator will:

(a) Open both gravity chamber sluice gates.

(b) Stop pump(s) and engine(s).

(c) Complete station logs and prepare report for transmittal to Division Engineer.

(4) Draining and Cleaning Sump. - The sump will be allowed to drain with the receding river levels. When the river level drops to a stage of about 2.5 feet on the pumping station gage, the operator will:

(a) Close the sump sluice gates.

(b) Start sump pump.

(c) Clean and flush wet well as necessary.

g. Hamlet District Pumping Station Operating Criteria. - During a flood, the station will be operated in the following sequence:

(1) Start Pumping. - When the river gage level at the pumping station rises to 7.5, the operator will:

(a) Open both sump sluice gates.

(b) Start engine No. 1 making sure that clutches are disengaged. Engage clutch to pump as soon as engine is running smoothly.

(c) Close both gravity chamber sluice gates.

(d) Shut off sump pump.

(2) Pump Operations. - Operate engines and pumps according to the following schedule:

	Sump Gage Pumps		
	No. 1	No. 2	No. 3
	(stage, feet)		
Start Pumps	4.5	5.0	5.5
Stop Pumps	0.0	0.5	1.0

The necessity for keeping the pumping station engines running and intermittently operating pumps will depend on the volume and rate of local inflow. It is entirely possible that the rainfall causing the flood or the local runoff will end before or while the river is

still in flood. In this event, the gravity chamber sluice gates will be kept closed and the engines operated and pump engaged only as necessary to keep stages in the pump within operating limits.

(3) Terminating Pumping. - When the river recedes to a stage of 7.5 feet on the river level gage at the pumping station, the operator will:

(a) Open both gravity chamber sluice gates.

(b) Stop pump(s) and engine(s).

(c) Complete station logs and prepare report for transmittal to Division Engineer.

(4) Draining and Cleaning Sump. - The sump will be allowed to drain with the receding river levels. When the river level drops to a stage of about 2.5 feet on the pumping station gage, the operator will:

(a) Close the sump sluice gates.

(b) Start sump pump.

(c) Clean and flush sump as necessary.

h. Station Log. - The operators will maintain station logs of station operations. In addition, at half-hour intervals after going on alert, they will record river levels from the river level gage. This record, when coordinated and correlated with the Dam Operating Log for flood periods, will aid in evaluation of the operating procedures. The actual operation experience will indicate where adjustments in the prescribed regulations can improve the functioning of the Lower Woonsocket protective system.

G. MISCELLANEOUS FACILITIES

30. DESCRIPTION. - Miscellaneous structures and facilities constructed as a part of the protective works include two major pressure conduits, ponding areas at the pumping stations, and the East School Street Bridge.

a. Mill River Conduit. - The Mill River Conduit is a two-cell box culvert of reinforced concrete design. Both of the cells have rectangular shaped inside dimensions of 12 feet by 21 feet. The conduit passes beneath three city streets (Social, Gobielle and Clinton) and several paved areas carrying commercial traffic. For this reason, the conduit was designed for H20-S16 wheel loadings.

b. Peters River Conduit. - The Peters River Conduit is a one-cell rectangular shaped box culvert of reinforced concrete design with inside dimensions of 10 feet by 17 feet. The conduit passes beneath Elm, Godfrey and Cumberland Streets carrying commercial traffic. The conduit was designed for H20-S16 wheel loadings.

c. Ponding Areas. - At the Hamlet District Pumping Station and the Social District Pumping Station, small ponding areas were constructed immediately adjacent to these stations.

d. East School Street Bridge. - The East School Street Bridge is a dual purpose structure. It serves as a highway bridge and as a flood control feature. The bridge has upstream and downstream flood walls which tie into the Mill River dikes.

31. MAINTENANCE. - a. Paragraph 208.10(h)(1) of the prescribed regulations governs the maintenance of miscellaneous facilities:

"Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior runoff during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows."

b. Pressure Conduits. - The inlet and outlet structures of the two major pressure conduits also serve as flood walls. For this reason all of the provisions of Paragraph 208.10(c)(1) of the regulations and Section D. - Floodwalls of this manual also apply to the pressure conduits.

The pressure conduits are also drainage structures. Therefore, all of the provisions of Paragraph 208.10(d)(1) of the regulations and Section E. Utilities of this manual also apply to the pressure conduits.

Adequate measures shall be taken to insure that the pressure conduits are kept open and that trash, drift, or debris is not allowed to accumulate in any part of the pressure conduits. The Peters River Conduit and both barrels of the Mill River Conduit shall be inspected for their entire lengths at least once every 30 days. All trash, drift, or debris shall be immediately removed. This is essential because once the Mill and Peters Rivers have begun to flood, it will not be possible to enter the conduits to remove obstructions caused by trash, drift, or debris.

c. Ponding Areas. - The small ponding areas immediately adjacent to the pumping stations shall be inspected at least once every 30 days. All trash, silt, drift, debris or dumped material shall be immediately removed. Large cartons are particularly hazardous because they and similar trash can clog the screens of the pumping stations and prevent the storm water from entering the pumping station sumps.

d. East School Street Bridge. - The bridge also serves as a flood wall. For this reason, the provisions of Paragraph 208.10 (c)(1) of the regulations and Section D - Floodwalls of this manual also apply to the East School Street Bridge.

The bridge also serves as a drainage structure. Therefore, all of the provisions of Paragraph 208.10(d)(1) of the regulations and Section E. - Utilities of this manual also apply to the East School Street Bridge.

Adequate measures shall be taken to insure that the East School Street Bridge is kept open and that trash, drift or debris is not allowed to accumulate under the bridge or the river channels upstream and downstream of the bridge.

The bridge shall be maintained so that it will not become an obstruction during periods of flood discharge. Modifications or the installation of utilities which could encroach on the clearances under the bridge shall be coordinated with theDivision Engineer.

32. OPERATION. - a. Regulations. - Paragraph 208.10(h)(2) of the prescribed regulations governs the operation of miscellaneous facilities:

"Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the Division Engineer unless designed therefor."

b. Debris Removal. - During a flood, frequent observations for debris should be made at the inlet and outlet structures of the Mill and Peters Rivers conduits; the ponding areas of the Hamlet District and Social District Pumping Stations and the East School Street Bridge. Equipment should be available within reasonable time and distance to assist in debris removal wherever necessary.

H. OPERATIONS PLAN

33. PROJECT OPERATION. - A considered and practiced plan or project operation should be in readiness at all times. Severe floods can occur at any time of year. Fortunately, a few hours warning time should be available for local authorities to mobilize men and equipment for serious flood conditions. However, trained operators will be required at the Pumping Stations and manpower and equipment should be on call for duty on the various project features to insure maximum project operation and efficiency.

34. COOPERATION. - Representatives of the Division Engineer stand ready to assist the City in the operation of the project. This in no way lessens the responsibility of the City in operation of the project.

9-210

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

Sta. No. 1-1125.00

Rating table for Blackstone River at Woonsocket, R.I.

from Oct. 1, 1965 to . from to . from to

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
0.00			2.00	355	35	4.00	1700	90	6.00	4060	140	8.00	7400	200						
.10			.10	390	35	.10	1790	100	.10	4200	150	.10	7600							
.20			.20	425	40	.20	1890		.20	4350		.20	7800							
.30			.30	465	45	.30	1990		.30	4500		.30	8000							
.40			.40	510	50	.40	2090		.40	4650		.40	8200							
.50			.50	560	55	.50	2190	100	.50	4800		.50	8400							
.60	46	14	.60	615	60	.60	2290	110	.60	4950	150	.60	8600	200						
.70	60	15	.70	675	60	.70	2400	110	.70	5100	160	.70	8800							
.80	75	15	.80	735	65	.80	2510	120	.80	5260		.80								
.90	90	16	.90	800	70	.90	2630		.90	5420	160	.90								
1.00	106	17	3.00	870	70	5.00	2750		7.00	5580	170	.00								
.10	123	19	.10	940	75	.10	2870		.10	5750		.10								
.20	142	21	.20	1015	75	.20	2990	120	.20	5920	170	.20								
.30	163	23	.30	1090	80	.30	3110	130	.30	6090	180	.30								
.40	186	24	.40	1170	80	.40	3240		.40	6270		.40								
.50	210	25	.50	1250	90	.50	3370	130	.50	6450	180	.50								
.60	235	26	.60	1340		.60	3500	140	.60	6630	190	.60								
.70	261	28	.70	1430		.70	3640		.70	6820		.70								
.80	289	32	.80	1520		.80	3780		.80	7010	190	.80								
.90	321	34	.90	1610	90	.90	3920	140	.90	7200	200	.90								

This table is applicable for open-channel conditions. It is based on 6 discharge measurements made during 1966 (400, 402, 404-407; is identical with rating 31 above 4.6 ft. and is well defined.

Comp. RAG date 9-15-66

Ck'd by LFC date 10-20-66

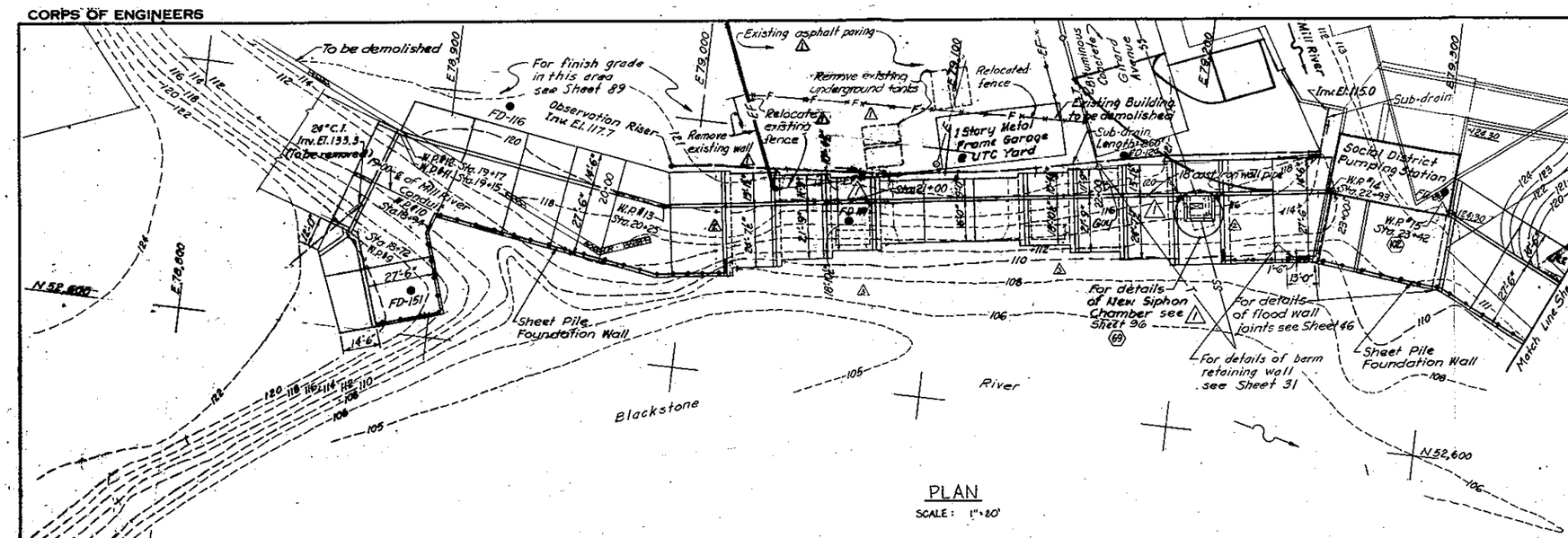
Table No. 32

Extended from 7.0 to 8.7 ft, 7/28/67, by GHS. ✓ NJR 8/1/67

PLATE NO. 1

CORPS OF ENGINEERS

U. S. ARMY

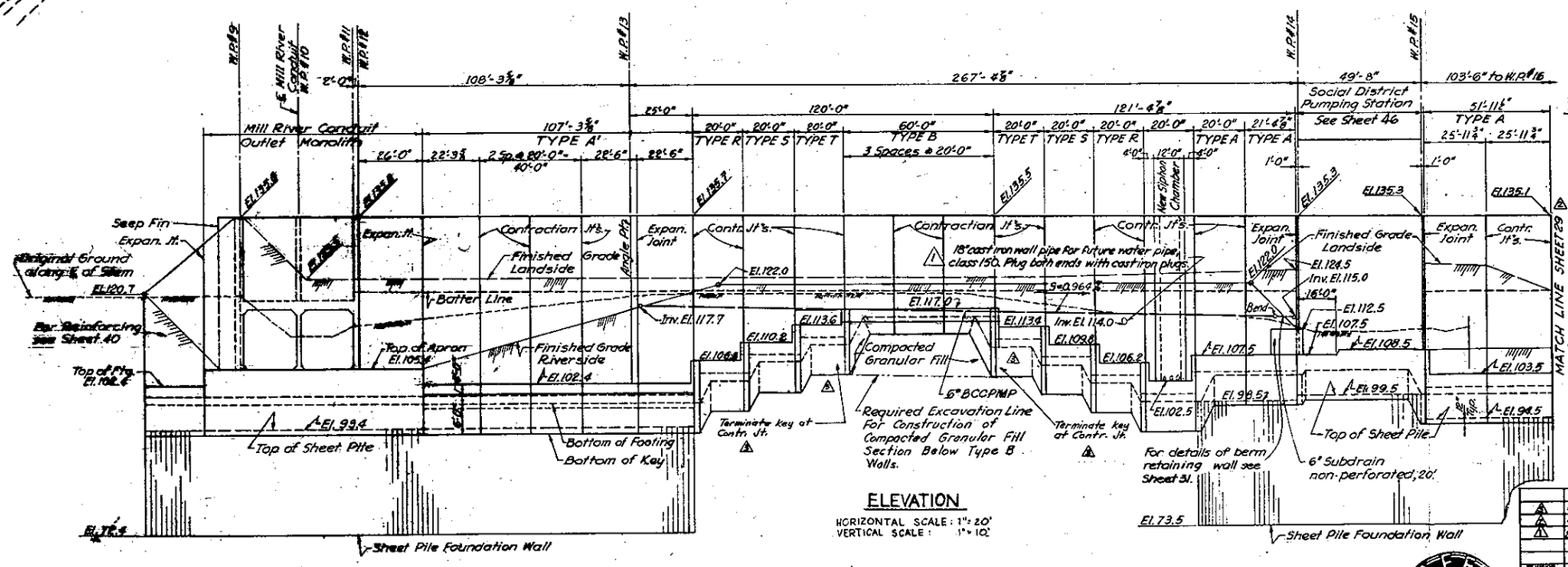


PLAN

SCALE: 1" = 20'

GENERAL CONCRETE NOTES:

1. All Reinforcement shall be lapped a minimum of 24 equivalent bar diameter.
2. All exposed edges to have 1" Chamfer, unless otherwise noted.
3. Concrete protection of steel reinforcing shall be 4" Min. in base, 3" in stems and top of Base, unless otherwise noted.
4. All Construction Joints to be flush type.
5. Bends and hooks shall be as detailed in the Manual of Standard Practice for Detailing Reinforced Concrete Structures of the American Concrete Institute.
6. Construction Joints at locations not indicated must be approved by the Contracting Officer.
7. Payment for furnishing, bending and placing of all steel reinforcement will be paid for under Item 95.
8. Portland cement shall be paid for under Item 94.
9. All level concrete surfaces shall be sloped to drain.



ELEVATION

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'

NOTES:

1. For reinforcing details see Sheets 30 and 31.
2. For details of Joints see Sheet 30.
3. Wall transitions are shown on Sheet 31.
4. For details of utilities see Sheets 89 and 91.
5. For finish grade see sections on Sheet 20.
6. For Mill River Conduit details see Sheet 37.
7. W.P. Stations shown on this sheet are to nearest foot; see Sheet No. 9 for exact station.

REVISION	DATE	DESCRIPTION	BY
3	6-5-69	Keys for Wall T revised.	
2	4-14-69	Revised limits of sheet piling; added note.	
1	8-14-63	Limits of paving, fencing & drain line revised. Notes & wall pipe added. Exist topography shown. (Am #3)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY AR | DR. BY KD | CK. BY

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
BLACKSTONE RIVER
PLAN AND ELEVATION NO. 1
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED | DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-10-[illegible]
DRAWING NUMBER BE-1312
SHEET 28

GRAPHIC SCALES
1" = 20'
1" = 10'

O & M PLATE NO. E-16

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter II—Corps of Engineers, War Department

PART 208—FLOOD CONTROL REGULATIONS

MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 638; 33 U. S. C. 701c; 701c-1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities*—(a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees*—(1) *Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning durin times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls.*—(1) *Maintenance.* Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on

drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) *Closure structures*—(1) *Maintenance.* Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order,

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways* — (1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities* — (1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (49 Stat. 1571, 50 Stat. 877; and 55 Stat. 638; 33 U.S.C. 701c; 701c-1) (Regs. 9 August 1944, CE SPEWF)

[SEAL] J. A. ULIO,
Major General,
The Adjutant General.

[F. R. Doc. 44-12285; Filed, August 16, 1944; 9:44 a. m.]

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APPENDIX B

ASSURANCES OF LOCAL COOPERATION

CITY OF WOONSOCKET, RHODE ISLAND

ASSURANCE

OF THE

CITY OF WOONSOCKET
RHODE ISLAND

BLACKSTONE RIVER BASIN

LOWER WOONSOCKET, RHODE ISLAND

WHEREAS, the project for flood protection on Blackstone, Mill, and Peters Rivers in Woonsocket, Rhode Island, is authorized by Act of Congress approved July 14, 1960, Public Law 86-645, and substantially in accordance with plans and recommendations of the Chief of Engineers in Senate Document Number 87, 85th Congress, 2nd Session; and

WHEREAS, the recommendations of the Chief of Engineers provides for the construction of a local protection project on the Blackstone, Mill, and Peters Rivers in the Social district, the Hamlet district, and the Bernon Dam area of Woonsocket, Rhode Island, provided local interests execute certain assurances satisfactory to the Secretary of the Army; and

WHEREAS, local interests desiring the prosecution of the project are agreeable that the required assurances for local cooperation will be executed.

NOW, THEREFORE, the City of Woonsocket, Rhode Island, acting by and through its Mayor and City Council, in compliance with the conditions contained in Senate Document Number 87, 85th Congress, 2nd Session, will:

(a) contribute in cash 16.1 percent of the cost of the work to be accomplished by the Federal Government, a contribution presently estimated at $1,103,000, to be paid either in a lump sum prior to commencement of construction, or in installments prior to commencement of pertinent items, in accordance with construction schedules, as required by the Chief of Engineers; the final allocation of cost to be made after the actual costs have been determined;

(b) furnish without cost to the United States, all lands, easements and rights-of-way necessary for construction of the project;

(c) hold and save the United States free from damages due to the construction works, including claims, if any, for water rights;

(d) accomplish without cost to the United States, all changes, alterations, additions to, or relocations of any utilities or buildings made necessary by the work; and

(e) maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army.

IN WITNESS WHEREOF, the City of Woonsocket, acting by and through its Mayor and Council, has executed the within assurance this 7th day of May, 1963.

CITY OF WOONSOCKET

BY Kevin H. Coleman, Mayor

ACCEPTANCE

8 May 1963

The within assurance is hereby accepted for and on behalf of the United States.

P. C. HYZER
Brigadier General, USA
Division Engineer

APPENDIX C

INSPECTION REPORT FORMS

FLOOD PROTECTIVE WORKS
LOWER WOONSOCKET LOCAL PROTECTION PROJECT
INSPECTION REPORT

CHECK LIST

Use with NED Form 513 - Inspection Report

1. Pumping Stations

a. Structures
(1) Walls _____
(2) Roofs _____
(3) Windows _____
(4) Painting _____
(5) Storage Ponds _____

b. Pumps, Motors, Engines
(1) When trial operated _____
(2) Lubrication _____
(3) Oil changes _____
(4) Emergency lighting _____
(5) Motor insulation tests _____
(6) Heating _____
(7) Metal intakes, etc. _____
(8) Diesel fuel _____

c. Gates
(1) When trial operated _____
(2) General condition _____
(3) Leaks _____
(4) Lubrication _____
(5) Electrical systems _____
(6) Manual closure _____
(7) Painting _____

2. Gates, Drainage Structures

a. Gates and Valves
(1) When trial operated _____
(2) General condition _____
(3) Leaks _____
(4) Lubrication _____
(5) Painting _____

b. Drainage Structures
(1) Date inspected by Superintendent _____
(2) General condition of manholes, walls, ditches, conduits and culverts _____
(3) Has capacity been reduced by growth of vegetation or by trash dumpage? _____

3. Dikes

a. Date inspected by Superintendent _____
b. General Condition _____
c. Condition of slopes/erosion/grass _____
d. Condition of top _____
e. Sand boils/caving _____
f. Are there any burrowing animal holes in dike? _____
g. Trespassing
   (1) Are there any paths on dike? _____
   (2) Has right-of-way been used for dumping or storage of materials? _____
h. Condition of rock slope protection _____
i. Condition of toe drains _____
j. Describe deficiencies, including location, and corrective measures planned. _____

4. Stop-Logs (Pumping Stations)

a. Condition of logs _____
b. Availability of logs _____
c. Correct number of logs _____
d. Condition of stop log slots _____
e. Condition of storage facilities _____

5. Log Boom - N/A (not applicable)

6. Channels

a. Date inspected by Superintendent _____
b. General condition of channel _____
c. Has the capacity of the channel been reduced due to growth of vegetation, shoaling, or other encroachments? _____
d. General condition of rock slope protection _____
e. Has there been any removal of rock? _____
f. Has there been any movement of the rock slope protection? _____
g. Describe deficiencies, including location, and corrective measures planned _____

7. Concrete Structures (Floodwalls, pressure conduits, bridge, etc.)

a. Date inspected by Superintendent _____
b. General condition of concrete _____
_____
c. Any evidence of surface deterioration? _____
d. Any development of cracks? _____
e. Any evidence of movement or settlement? _____
f. Any cracking or spalling of concrete at joints? _____
g. Condition of subdrains _____
h. Trespassing
(1) Are there any signs painted on or attached to the structures? _____
(2) Are there any clotheslines or other items attached to the structures? _____
i. Describe deficiencies, including location, and corrective measures planned _____
_____
_____
_____

8. Miscellaneous

a. Is emergency operation plan up-to-date? _____
b. Is sufficient emergency equipment available at all times? _____
c. Is sufficient manpower available at all times? _____
d. Is the emergency equipment in good working condition? _____
e. Has the semi-annual report been submitted? _____

9. General

a. Have all deficiencies noted in previous Inspection Report been corrected? _____
b. Has any high water been experienced since the last Inspection Report? If so, _____
If so, describe briefly, including dates, height of water, and effect on protective works. _____
_____
_____
_____

10. Remarks and Additional Comments

Indicate Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use continuation sheet if necessary.

LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

Project:

Maintaining Agency:

Type Inspection: _____Semi-Annual Staff _____90 Day Interim

River Basin: Date of Inspection

Feature	Sat	Unsat	Deficiencies
PUMPING STATIONS - STRUCTURES			
INTERIOR			
EXTERIOR			
PUMPS - MOTORS - ENGINES			
TRIAL OPERATED			
GENERAL CONDITION			
POWER SOURCE			
INSULATION TESTS			
METAL INTAKES/OUTLETS			
GATE VALVES			
GATES - DRAINAGE STRUCTURES			
TRIAL OPERATED			
GENERAL CONDITION			
LUBRICATION			
DIKES - DAMS			
GENERAL CONDITION			
SLOPES/EROSION			
SAND BOILS/CAVING			
TRESPASSING			
SLOPE PROTECTION			
DRAINS			
STOP-LOGS - LOG BOOM			
CONDITION OF LOGS			
AVAILABILITY OF LOGS			
HIGHWAY SLOTS			
STORAGE FACILITIES			
CHANNELS - OUTLET WORKS CHANNEL			
BANKS			
OBSTRUCTION CONTROL			

NED FORM JAN. 66 513

Feature	Sat	Unsat	Deficiencies
CONCRETE STRUCTURES			
SURFACE			
SETTLEMENT			
JOINTS			
DRAINS			
MISCELLANEOUS			
EMERGENCY OPER. PLAN			
EMERGENCY EQUIPMENT			
SEMI-ANNUAL REPORT			

Inspection Party:

Photographs Taken:

Remarks & Additional Comments:

(Indicate Here Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use Continuation Sheet if necessary.)

X ALL APPLICABLE ITEMS. IF UNSAT INDICATE SPECIFIC DEFICIENCIES. INDICATE IF NOT APPLICABLE.

TE	INSPECTED BY: TYPED NAME & TITLE	SIGNATURE

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

IN REPLY REFER TO:
NEDOD-R

TO: Superintendent, Local Flood Protection System

REFERENCE: Code of Federal Regulations, Title 33, Section 208.10 (a) (6), Local Flood Protection Works

Assurances given by local cooperating agencies prior to construction of Local Protection Projects require the submission of a semi-annual report to the Division Engineer. As "Superintendent" of your project this becomes your responsibility. This brochure is intended to help you in preparing your reports.

We hope that you do not have the misconception that these reports are valueless, for they serve a definite and useful purpose. Statistical information derived from these reports is invaluable for future design and also for evaluating effectiveness of the present protection system. The semi-annual reports, when properly submitted, provide information on conditions that often indicate the necessity for changes or modification to the existing system. In short, they help us to determine whether the project is doing the job for which it was built.

Attached are samples of good reports which might help you in preparing yours.

Exhibit "A" is the semi-annual report. It is submitted in letter form. Basically it covers the five (5) specific areas of information required in the "Reports" paragraph of the standard project O&M Manual. It should be brief but complete. Negative replies to outline paragraphs should be submitted, if applicable.

Exhibits "B" and "C" are the 90-day interim reports required as attachments to the semi-annual report. Additional reports of conditions "before" and "after" floods should also be attached when applicable. NED Form 513 is now used instead of suggested report forms normally found in Appendix "C" of the O&M Manual.

Exhibit "D" contains an excerpt from Part 208, Title 33, United States Code. This contains Flood Control Regulations for use in Maintenance and Operation of Flood Control Works.

If you have any difficulties at all in preparing your reports, please don't hesitate to talk it over with our people during their visits to your project.

TOWN OF WEST SPRINGFIELD, MASSACHUSETTS
ENGINEERING DEPT.

INCLUDING STREETS, SEWERS, DIKES, ASH COLLECTIONS AND SIDEWALKS

WALLACE W. WYMAN
TOWN ENGINEER
JOHN J. BRENNAN
ASST. SUPT. OF STREETS
ARTHUR F. BINGHAM
ASST. TOWN ENGINEER

TEL. RE 3-7831
EXT. 37, 42, 44, 55

HOURS:
YARD: 7 A.M. – 4 P.M.
OFFICES: 8:30 A.M. – 5 P.M.

September 8, 1964

Division Engineer
U. S. Army Engineers
New England Division
484 Trapelo Road
Waltham, Mass. 02154

Re: Semi-annual Dike Inspection Report on West Springfield Dikes

Dear Sirs:

As required by your regulations I wish to report that the following maintenance work has been performed during the past six months:

All sodded dikes have been mowed and raked at regular intervals. Eroded portions of the surface have been repaired with loam and seed. Weeds in the rip-rapped areas have been sprayed with a weed killing spray. All dikes have been patrolled and checked at regular intervals. The vitrified clay pipes at the tops of all relief wells at the toe of the Riverdale Dike have been cleaned, repaired or replaced, as necessary.

We use a permanent crew of one foreman, one equipment operator and one maintenance man augmented by two or three laborers during the summer months.

A request for bids on the replacement of the first engine in the Warren Street pumping station is being advertised this month. We are requesting some quotations on exterior waterproofing of the older stations and will do as much as we can with the available funds. Three mufflers need repairs to the muffler or insulation jacket. This will be done.

All engines are started and test operated once a week. All stations have had resistance tests made during the summer.

EXHIBIT A

There have been nothing but compliments made regarding the maintenance and operation of the dike system. The Town Meeting has never refused any legitimate request for funds for repair or operation.

Very truly yours,

/s/ Wallace W. Wyman

WWW:ck
2 Incls:
1. Interim Inspection Report dtd. 6 May 1964
2. Interim Inspection Report dtd. 27 Aug. 1964

LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

Project: West Springfield Dike System

Maintaining Agency: Town of West Springfield, Massachusetts

Type Inspection: _____ Semi-Annual Staff _X_ 90 Day Interim

River Basin: Connecticut River Date of Inspection 5 May 1954

Feature	Sat	Unsat	Deficiencies
PUMPING STATIONS - STRUCTURES			
INTERIOR	X		
EXTERIOR	X		Waterproofing of walls to be scheduled.
PUMPS - MOTORS - ENGINES			
TRIAL OPERATED	X		
GENERAL CONDITION	X		Pump Engine Replacement Program has been
POWER SOURCE	X		initiated.
INSULATION TESTS	X		Insulation tests required.
METAL INTAKES/OUTLETS	X		
GATE VALVES	X		
GATES - DRAINAGE STRUCTURES			
TRIAL OPERATED	X		See Remarks
GENERAL CONDITION	X		
LUBRICATION	X		
DIKES - ~~DAMS~~			
GENERAL CONDITION	X		
SLOPES/EROSION	X		
SAND BOILS/CAVING	X		
TRESPASSING	X		Dikes in need of barriers to prevent access.
SLOPE PROTECTION	X		
DRAINS	X		
STOP-LOGS - LOG BOOM			
CONDITION OF LOGS	X		
AVAILABILITY OF LOGS	X		
HIGHWAY SLOTS	X		See Remarks
STORAGE FACILITIES	X		See Remarks
CHANNELS - OUTLET WORKS CHANNEL - Not Applicable			
BANKS			
OBSTRUCTION CONTROL			

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EXHIBIT B

Feature	Sat	Unsat	Deficiencies
CONCRETE STRUCTURES			
SURFACE	X		
SETTLEMENT	X		
JOINTS	X		
DRAINS	X		
MISCELLANEOUS			
EMERGENCY OPER. PLAN	X		
EMERGENCY EQUIPMENT	X		
SEMI-ANNUAL REPORT	X		
CONDUITS	X		
FLAP VALVES	X		

Inspection Party:

Wallace W. Wyman, Town Engineer, West Springfield, Mass.

Photographs Taken:

None Required

Remarks & Additional Comments:

(Indicate Here Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use Continuation Sheet if necessary.)

GATES: Gates were not operated during inspection. Riverdale, Bridge Street and Circuit Avenue stations were in operation during river flood stages in April.

HIGHWAY SLOTS: Two Highway Slot Frames need minor repair and resetting.

STORAGE FACILITIES: Vertical cracking in storage structure evident. Need re-jointing.

X ALL APPLICABLE ITEMS. IF UNSAT INDICATE SPECIFIC DEFICIENCIES. INDICATE IF NOT APPLICABLE.

DATE	INSPECTED BY: TYPED NAME & TITLE	SIGNATURE
6 May 1964	Wallace W. Wyman, Town Engineer	/s/ Wallace W. Wyman

LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

Project: West Springfield Dike System

Maintaining Agency: Town of West Springfield, Massachusetts

Type Inspection: _____ Semi-Annual Staff __x__ 90 Day Interim

River Basin: Connecticut River Date of Inspection 27 August 1964

Feature	Sat	Unsat	Deficiencies
PUMPING STATIONS - STRUCTURES			
INTERIOR	X		
EXTERIOR	X		Walls to be waterproofed next month.
PUMPS - MOTORS - ENGINES			
TRIAL OPERATED	X		
GENERAL CONDITION	X		Three mufflers need repairs.
POWER SOURCE	X		
INSULATION TESTS	X		To be made next month.
METAL INTAKES/OUTLETS	X		
GATE VALVES	X		
GATES - DRAINAGE STRUCTURES			
TRIAL OPERATED	X		
GENERAL CONDITION	X		
LUBRICATION	X		
DIKES - DAMS			
GENERAL CONDITION	X		
SLOPES/EROSION	X		
SAND BOILS/CAVING	X		None Found
TRESPASSING	X		
SLOPE PROTECTION	X		
DRAINS	X		Repairs made this summer.
STOP-LOGS - LOG BOOM			
CONDITION OF LOGS	X		
AVAILABILITY OF LOGS	X		
HIGHWAY SLOTS	X		
STORAGE FACILITIES	X		Walls to be waterproofed.
CHANNELS - OUTLET WORKS CHANNEL - Not Applicable			
BANKS			
OBSTRUCTION CONTROL			

NED FORM JAN. 66 513

EXHIBIT C

Feature	Sat	Unsat	Deficiencies
CONCRETE STRUCTURES			
SURFACE	X		
SETTLEMENT	X		
JOINTS	X		
DRAINS	X		
MISCELLANEOUS			
EMERGENCY OPER. PLAN	X		
EMERGENCY EQUIPMENT	X		
SEMI-ANNUAL REPORT	X		
CONDUITS	X		
FLAP VALVES	X		

Inspection Party:

Wallace W. Wyman, Town Engineer, West Springfield, Mass.

Photographs Taken:

None Required

Remarks & Additional Comments:

(Indicate Here Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use Continuation Sheet if necessary.)

ALL APPLICABLE ITEMS. IF UNSAT INDICATE SPECIFIC DEFICIENCIES. INDICATE IF NOT APPLICABLE.

DATE	INSPECTED BY: TYPED NAME & TITLE	SIGNATURE
27 Aug 1964	Wallace W. Wyman, Town Engineer	/s/ Wallace W. Wyman

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter II—Corps of Engineers, War Department

PART 208—FLOOD CONTROL REGULATIONS

MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 638; 33 U. S. C. 701c; 701c-1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities*—(a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees*—(1) *Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken; such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days; and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls.*—(1) *Maintenance.* Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on

EXHIBIT D

drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) *Closure structures*—(1) *Maintenance.* Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order,

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways* — (1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities* — (1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (49 Stat. 1571, 50 Stat. 677; and 56 Stat. 638; 33 U.S.C. 701c; 701c-1) (Regs. 9 August 1944, CE SPEWF)

[SEAL] J. A. ULIO,
Major General,
The Adjutant General.

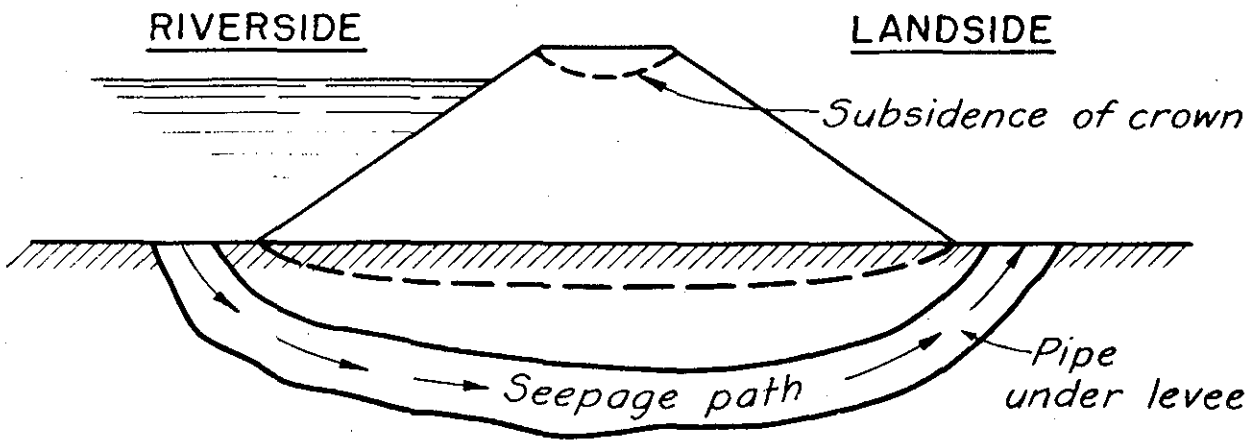
[F. R. Doc. 44-12285; Filed, August 16, 1944; 9:44 a. m.]

APPENDIX D

FLOOD EMERGENCY MEASURES

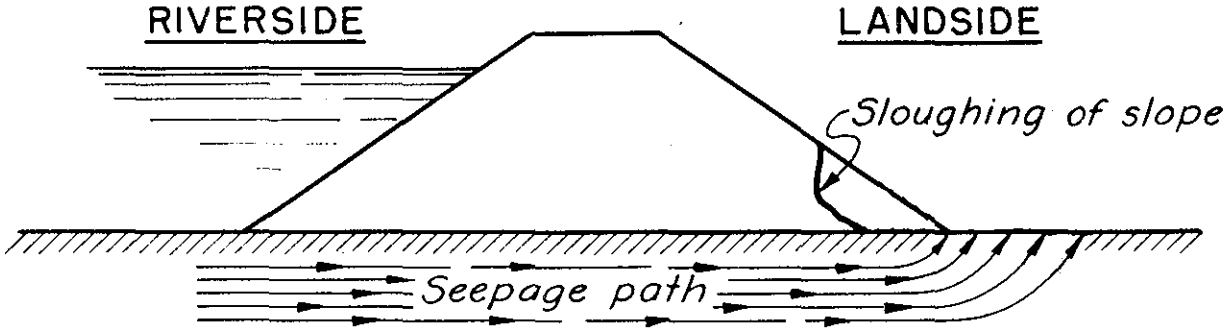
Plate No.	Title
I	Effect of Sand Boils
II	Sand Boil
III	Sacking Sloughs
IV	Sack Dike or Topping
V	Model Sack Dike or Topping
VI	Lumber and Sack Topping
VII	Flashboards

EFFECTS OF SAND BOILS ON LEVEE



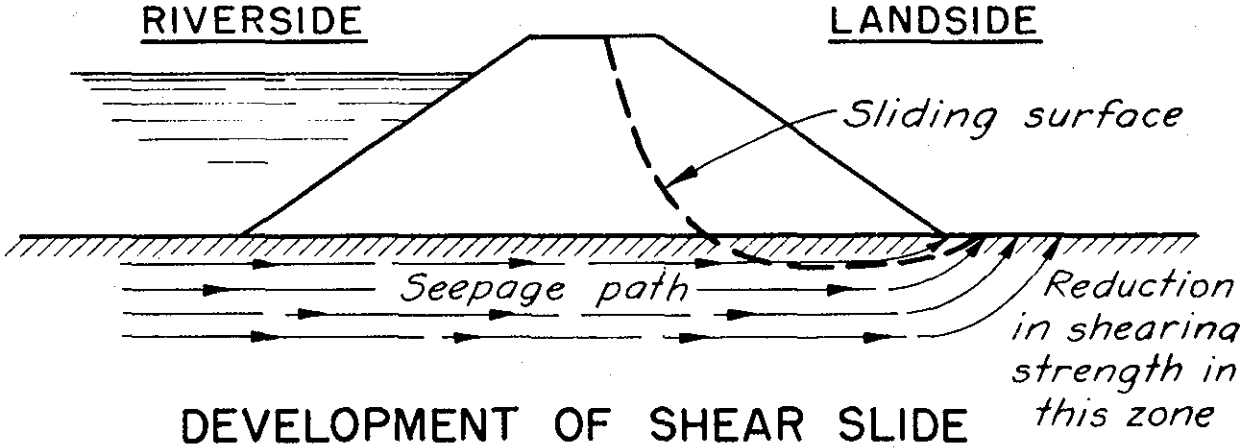
DEVELOPMENT OF PIPE UNDER LEVEE

Fig. 1



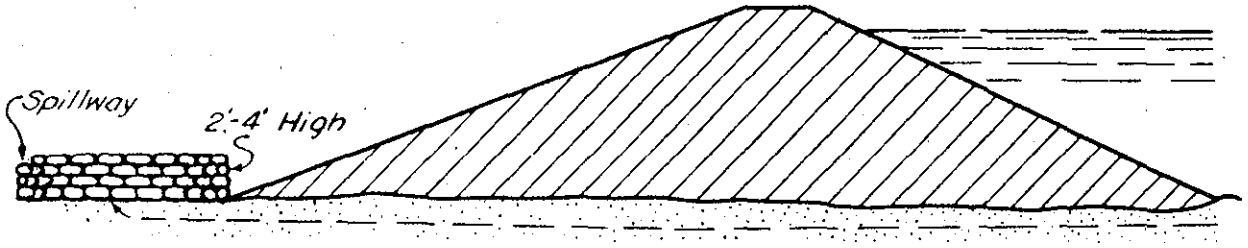
SLOUGHING OF LANDSLIDE SLOPE DUE TO RAVELLING AND UNDERCUTTING OF TOE

Fig. 2

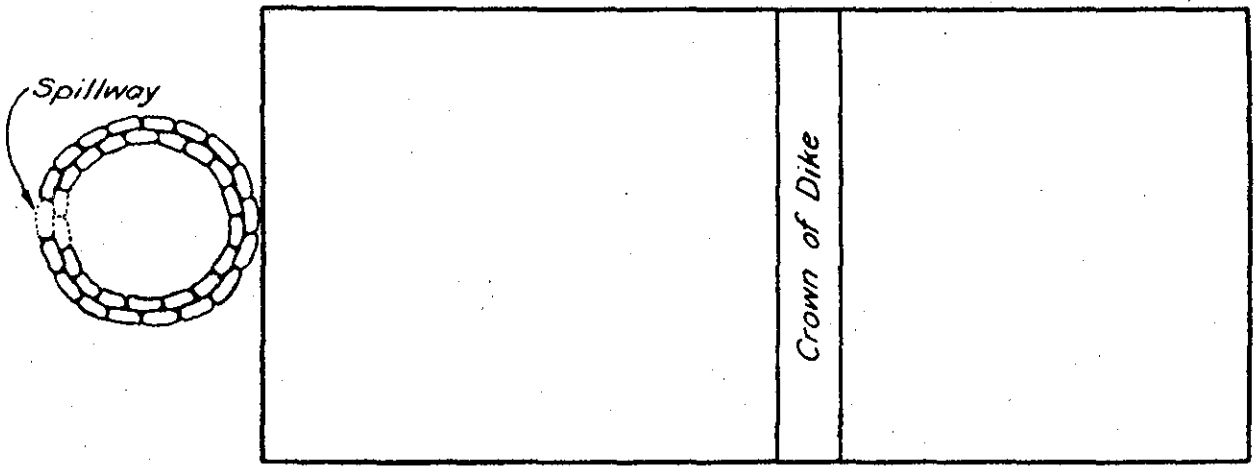


DEVELOPMENT OF SHEAR SLIDE

Fig. 3



Wall should be built on firm ELEVATION foundation, with width of base at least $1\frac{1}{2}$ times the height.
Be sure to place sacks on ground clear of sand discharge.
Tie into dike if boil is near toe.

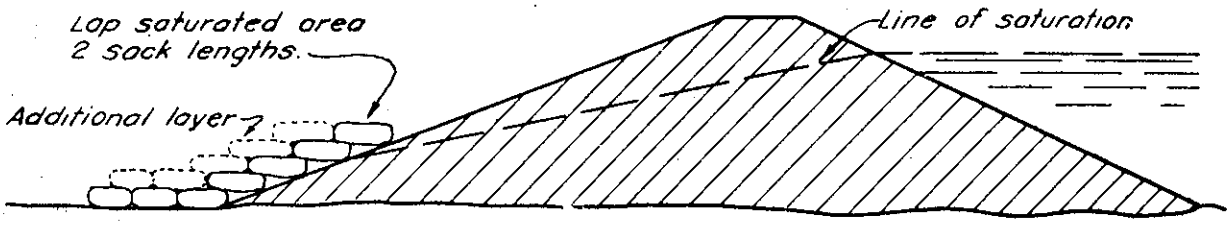


PLAN

Do not sack boil which does not put out material. Height of sack loop or ring should be only sufficient to create enough head to slow down flow through boil so that no more material is displaced and boil runs clear. Do not try to stop fully, flow through boil.

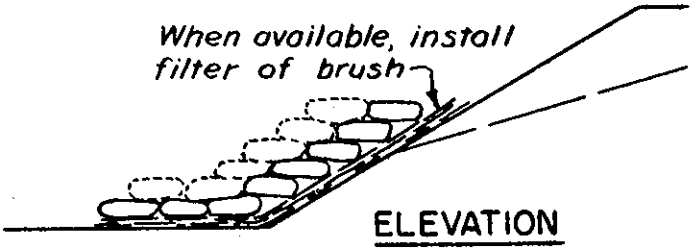
SAND BOIL
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

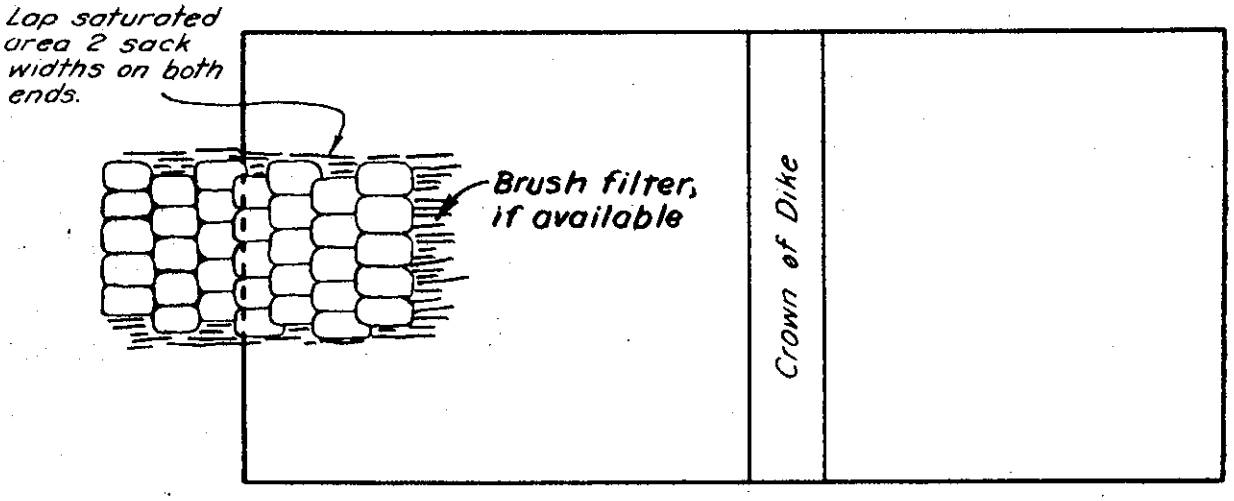


ELEVATION

Number of layers determined by velocity of seepage and amount of material being carried



ELEVATION

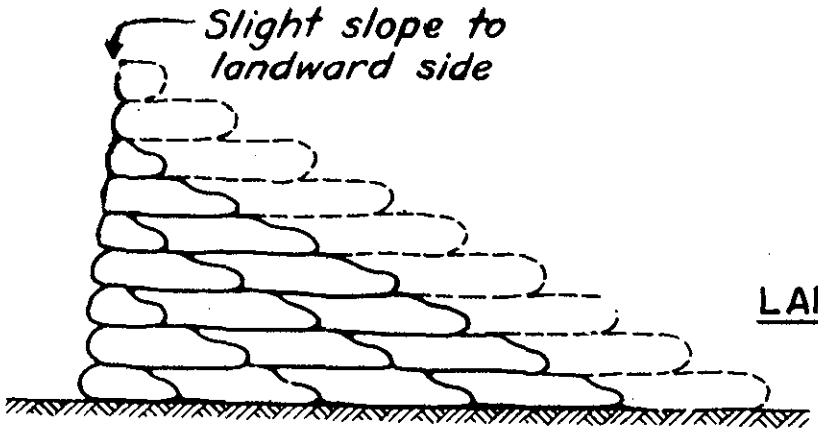


PLAN

Sacks should be laid shingle fashion and not moulded into place.

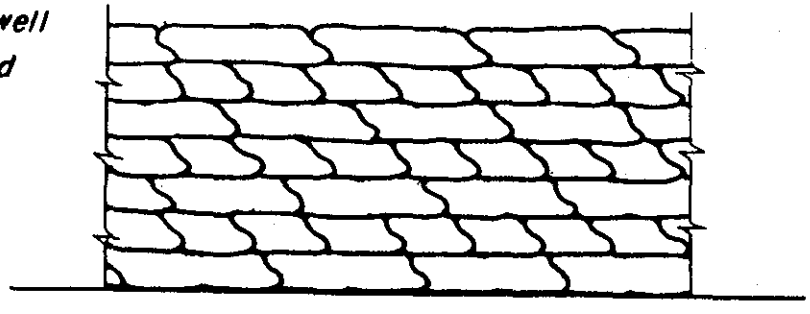
SACKING SLOUGHS
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.



SECTION

Note: Sacks should be lapped at least 1/3 all ways and well mauled or tamped into place.



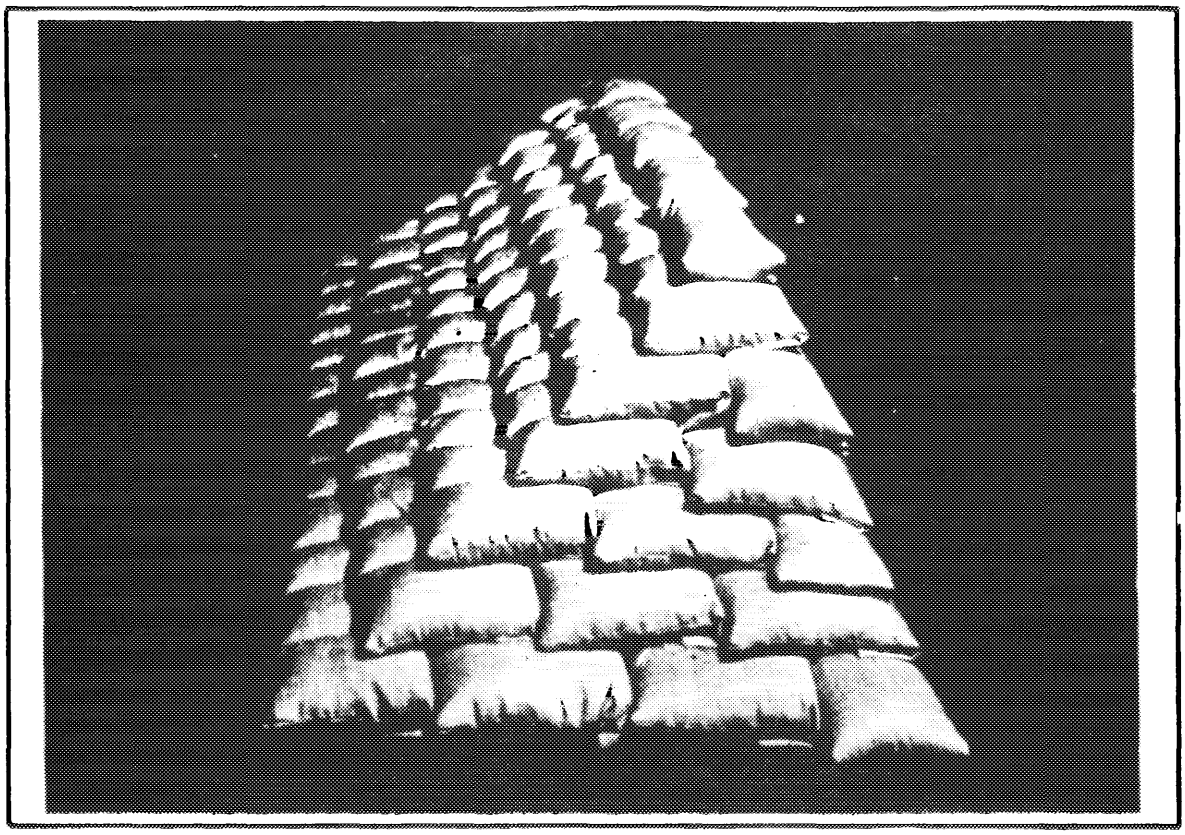
RIVERSIDE ELEVATION

SACKS REQUIRED PER 100' STA.
100 lb. "Feed" Sacks - 1 Cu. Ft. Each

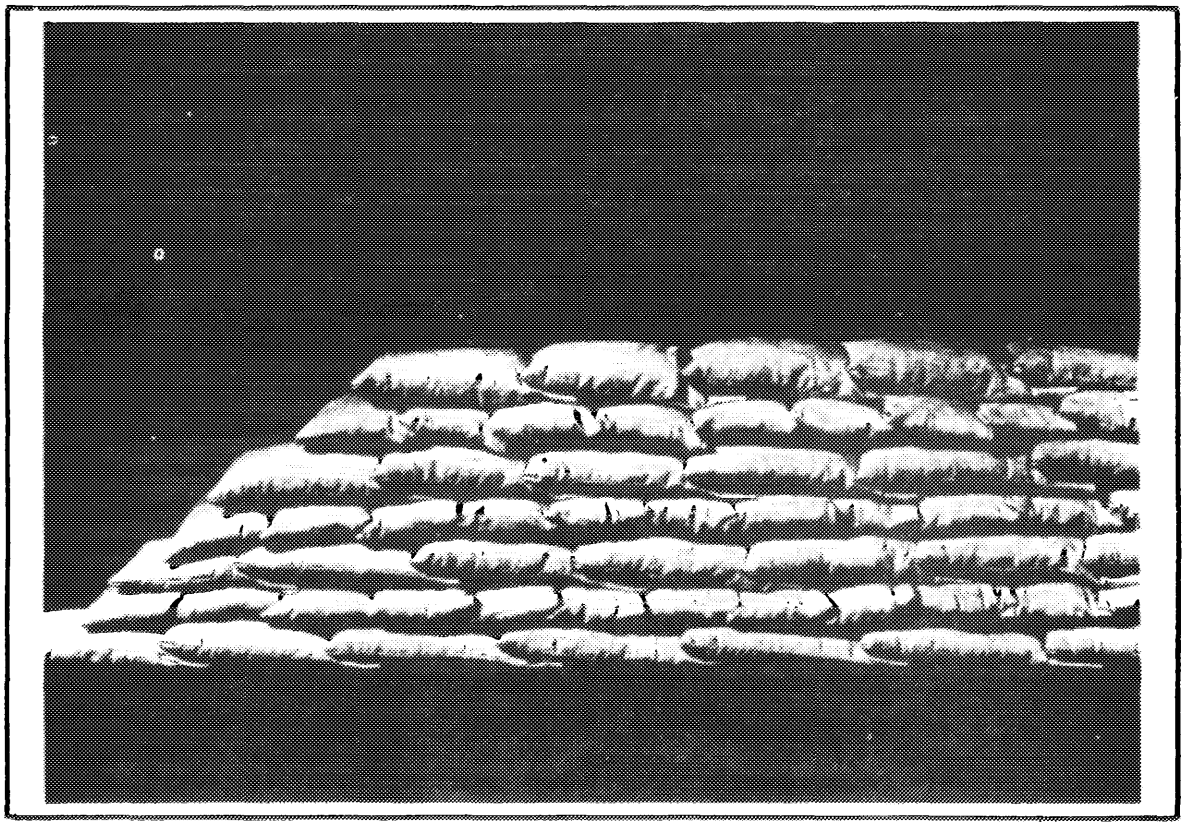
Approx. Hgt. Sack Dike	Sacks High	Required
1.5	3	300
2.0	4	750
3.0	6	1400
4.0	8	2250
5.0	10	3250
6.0	12	4500
7.0	14	5950
8.0	16	7600

SACK DIKE OR TOPPING
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

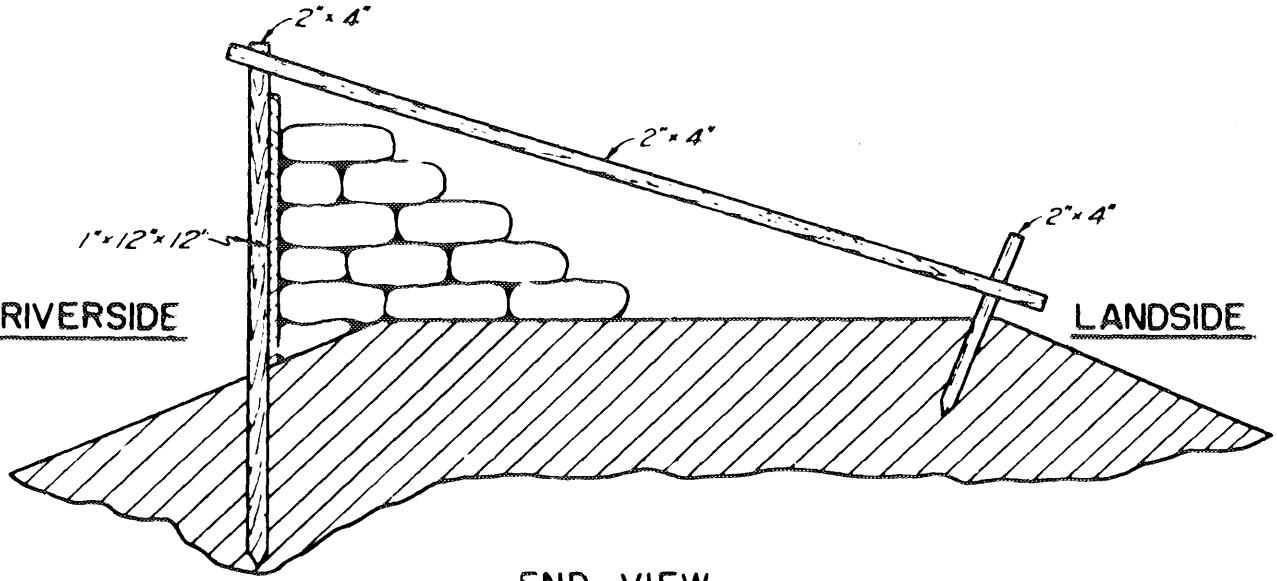


MODEL SACK DIKE OR TOPPING
Typical Section

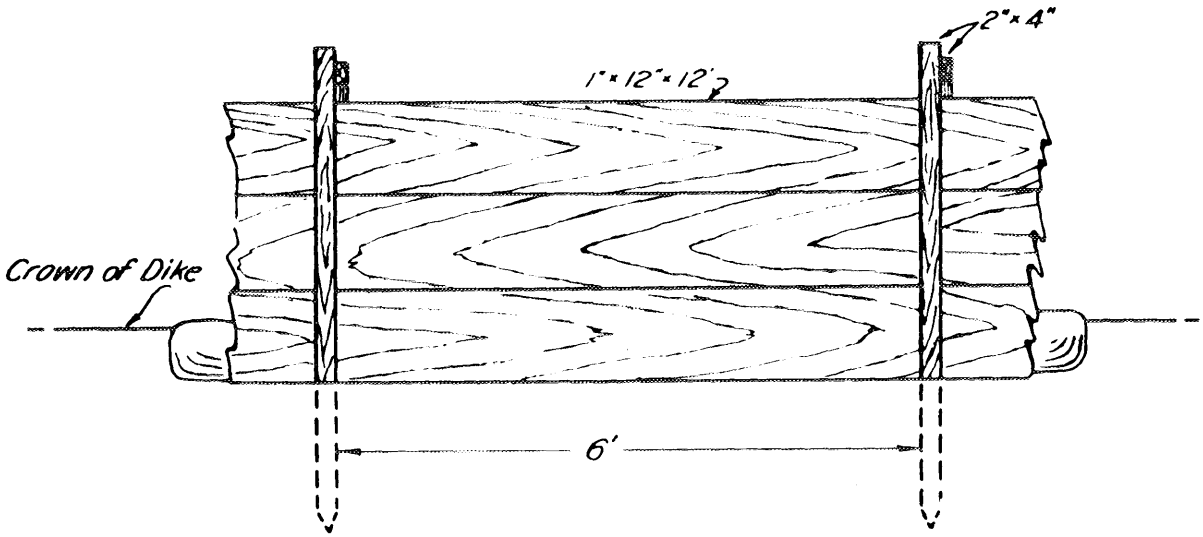


MODEL SACK DIKE OR TOPPING
Riverside View

PLATE NO. V



END VIEW



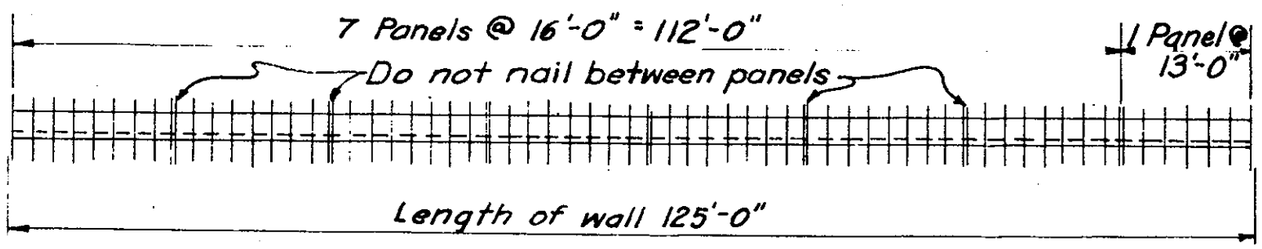
FRONT ELEVATION

BILL OF MATERIAL TO CONSTRUCT 100 FEET

25 pcs. 1"×12"×12'	17 pcs. 2"×4"×6'
17 pcs. 2"×4"×10'	17 pcs. 2"×4"×2'

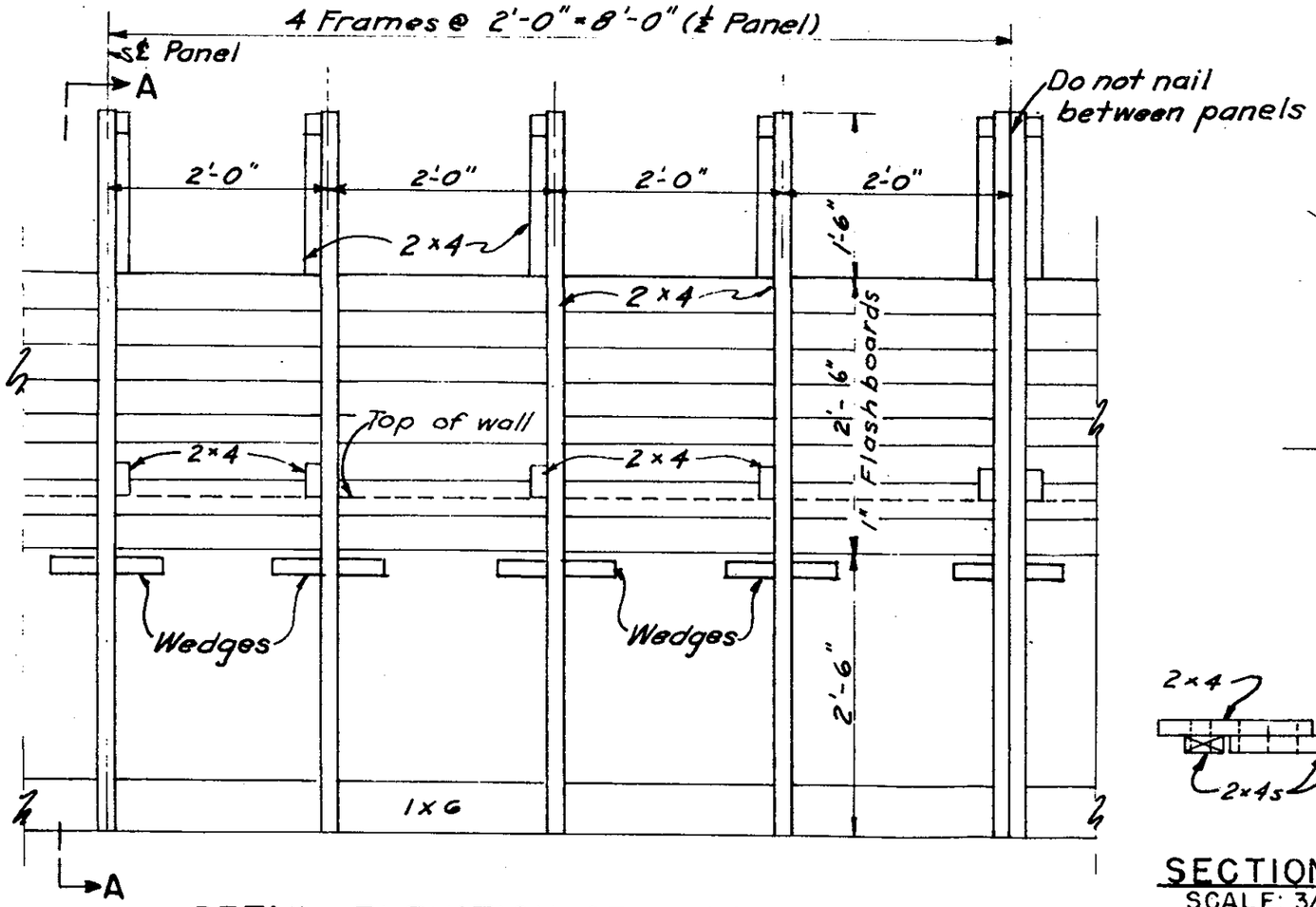
LUMBER AND SACK TOPPING
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

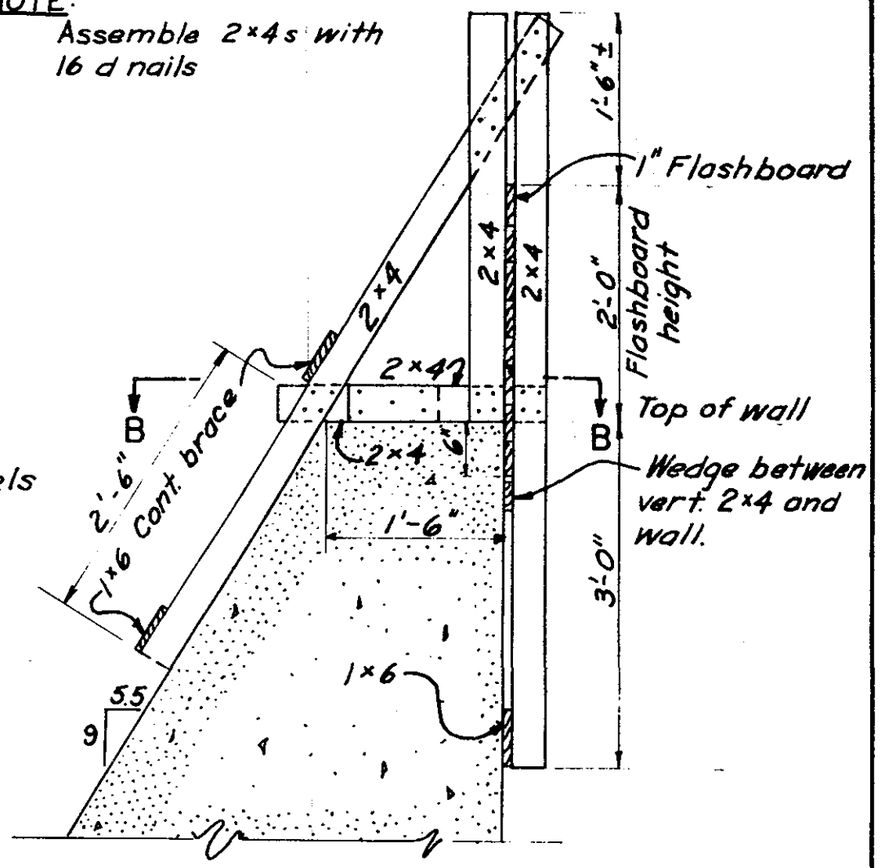


ELEVATION OF FLASHBOARDS
SCALE: 1/16" = 1'-0"

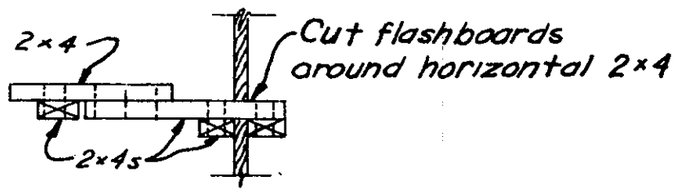
NOTE: Assemble 2×4s with 16 d nails



DETAIL ELEVATION OF FLASHBOARD FRAMES
SCALE: 3/4" = 1'-0"



SECTION A-A
SCALE: 3/4" = 1'-0



SECTION B-B
SCALE: 3/4" = 1'-0"

FLOOD EMERGENCY MEASURES

FLASHBOARDS

APPENDIX E

PLANS

LIST OF PLATES

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E-2	3	Bernon Dam Demolition and Channel Improvements
E-3	15	Dikes and Channel Improvements - Blackstone River - Plan and Profile No. 1
E-4	16	Dikes and Channel Improvements - Blackstone River - Plan and Profile No. 2
E-5	17	Dikes and Channel Improvements - Blackstone River - Plan and Profile No. 3
E-6	18	Dikes and Channel Improvements - Blackstone River - Plan and Profile No. 4
E-7	19	Social District - Dike Sections
E-8	20	Social District - Flood Wall Sections
E-9	21	Hamlet District - Dike Sections No. 1
E-10	22	Hamlet District - Dike Sections No. 2
E-11	23	Dikes and Channel Improvements - Mill River - Plan and Profile No. 1
E-12	24	Dikes and Channel Improvements - Mill River - Plan and Profile No. 2
E-13	25	Dikes and Channel Improvements - Mill River - Sections
E-14	26	Dike and Channel Improvements - Peters River - Plan, Profile and Sections
E-15	27	New Mill River Dam - Plan and Sections

Plate No.	Sheet No.	Description
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E-17	29	Flood Walls - Blackstone River - Plan and Elevation No. 2
E-18	30	Flood Walls - Blackstone River - Sections and Details No. 1
E-19	31	Flood Walls - Blackstone River - Sections and Details No. 2
E-20	32	Flood Walls - Blackstone River - Villanova Street at Footbridge
E-21	33	Flood Walls - East School Street - Plan and Elevation No. 1
E-22	34	Flood Walls - East School Street - Plan and Elevation No. 2
E-23	35	Flood Walls - Peters River - Plan, Elevation and Details
E-24	36	Mill River Conduit - Plan and Profile No. 1
E-25	37	Mill River Conduit - Plan and Profile No. 2
E-26	38	Mill River Conduit - Sections and Details
E-27	39	Mill River Conduit - Intake Details
E-28	40	Mill River Conduit - Outlet Details
E-29	41	Peters River Conduit - Plan and Profile No. 1
E-30	42	Peters River Conduit - Plan and Profile No. 2
E-31	43	Peters River Conduit - Sections and Details
E-32	44	Peters River Conduit - Intake Details
E-33	45	Peters River Conduit - Outlet Details
E-34	46	Social District Pumping Station - Site Plan and Miscellaneous Details

Plate No.	Sheet No.	Description
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E-36	48	Social District Pumping Station - Architectural - Elevations and Details
E-37	49	Social and Hamlet District Pumping Stations - Architectural - Typical Details
E-38	51	Social District Pumping Station - Structural - Reinforcing Details No. 1
E-39	52	Social District Pumping Station - Structural - Reinforcing Details No. 2
E-40	53	Social District Pumping Station - Structural - Reinforcing Details No. 3
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E-42	55	Social District Pumping Station - Structural and Miscellaneous Steel
E-43	56	Social and Hamlet District Pumping Stations - Structural - Typical Steel Details
E-44	57	Social District Pumping Station - Mechanical - Plans and Sections
E-45	58	Social District Pumping Station - Mechanical - Details
E-46	59	Social District Pumping Station - Electrical - Plans and Details
E-47	60	Hamlet District Pumping Station - Site Plan and Miscellaneous Details
E-48	61	Hamlet District Pumping Station - Architectural - Plans, Elevations and Details
E-49	62	Hamlet District Pumping Station - Architectural - Elevations and Details
E-50	63	Hamlet District Pumping Station - Structural - Reinforcing Details No. 1

Plate No.	Sheet No.	Description
E-51	64	Hamlet District Pumping Station - Structural - Reinforcing Details No. 2
E-52	65	Hamlet District Pumping Station - Structural - Reinforcing Details No. 3
E-53	66	Hamlet District Pumping Station - Structural - Reinforcing Details No. 4
E-54	67	Hamlet District Pumping Station - Structural and Miscellaneous Steel
E-55	68	Hamlet District Pumping Station - Mechanical - Plans and Sections
E-56	69	Hamlet District Pumping Station - Mechanical - Details
E-57	70	Hamlet District Pumping Station - Electrical - Plans and Details
E-58	71	East School Street Bridge - General Plan - Profiles and Sections
E-59	72	East School Street Bridge - Foundation Plan and Details
E-60	73	East School Street Bridge - Deck Plan and Reinforcing Details
E-61	74	East School Street Bridge - Site Plan and Details
E-62	75	Mill Water Supply Line - Plan No. 1
E-63	76	Mill Water Supply Line - Plan No. 2
E-64	77	Mill Water Supply Line - Plan No. 3
E-65	78	Mill Water Supply Line - Plan No. 4
E-66	79	Hamlet District - Drainage and Utilities Plan and Details No. 1

Plate No.	Sheet No.	Description
E-67	80	Hamlet District - Drainage and Utilities Plan and Details No. 2
E-68	81	Hamlet District - Drainage and Utilities Plan and Details No. 3
E-69	82	Mill Water Supply Line - Profile No. 1
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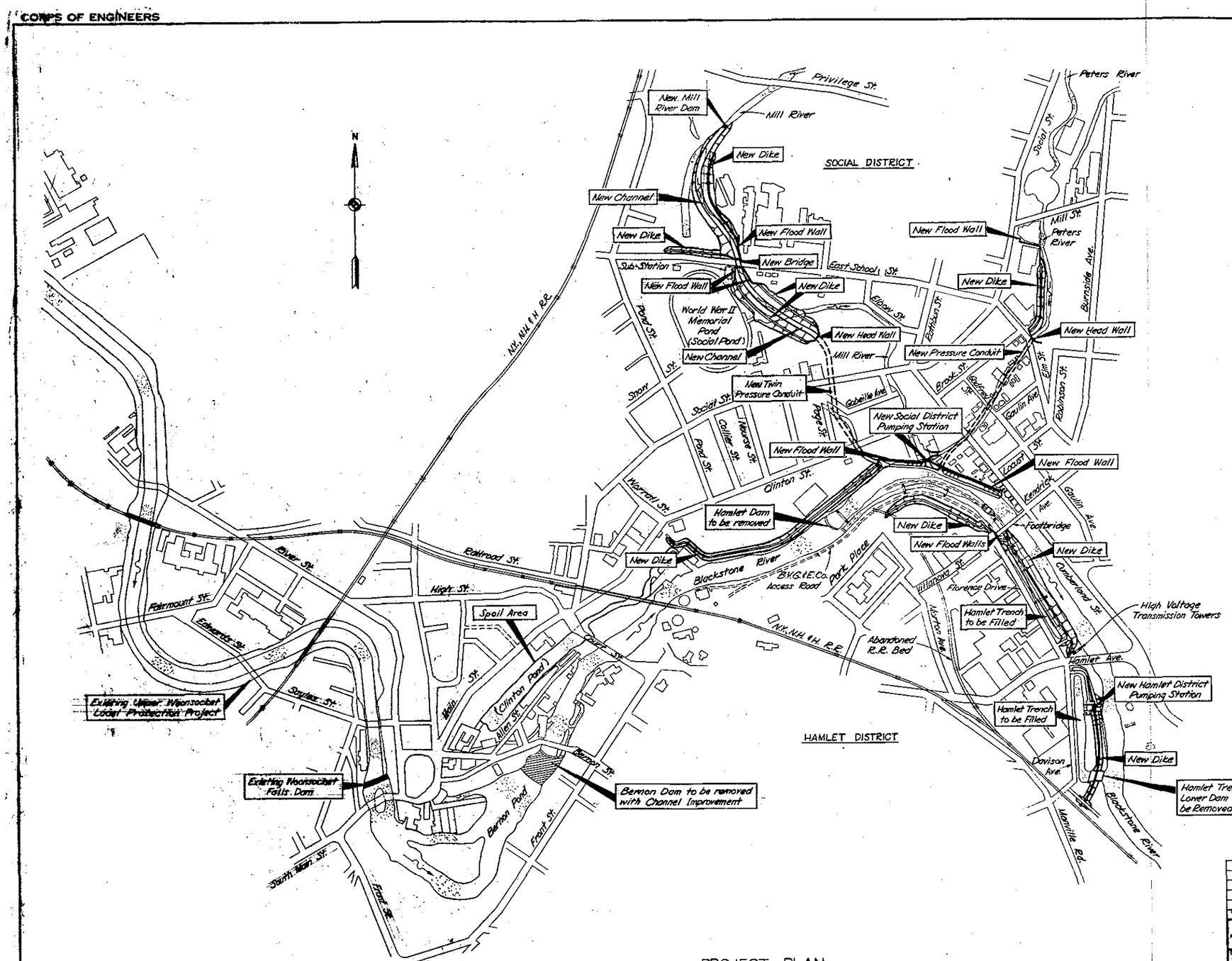
E-71	84	Davison Avenue - New Storm Drainage
E-72	85	Mill River - Drainage and Utilities - Plan and Details No. 1
E-73	86	Mill River - Drainage and Utilities - Plan and Details No. 2
E-74	87	Mill River - Drainage and Utilities - Plan and Details No. 3
E-75	88	Mill River - Drainage and Utilities - Plan and Details No. 4
E-76	89	Mill River - Drainage and Utilities - Plan and Details No. 5
E-77	90	Peters River - Drainage and Utilities - Plan and Details No. 1
E-78	91	Peters River - Drainage and Utilities - Plan and Details No. 2
E-79	92	Utility Details No. 1
E-80	93	Utility Details No. 2
E-81	94	Utility Details No. 3
E-82	95	Utility Details No. 4
E-83	96	Utility Details No. 5
E-84	97	Utility Details No. 6

Plate No.	Sheet No.	Description
E-85	98	Utility Details No. 7
E-86	99	Utility Details No. 8
E-87	101	Electrical Modifications to Bernon Street Bridge and High Tension Towers
E-88	102	Hydrographs No. 1
E-89	103	Hydrographs No. 2
E-90	HLA-4-1	Drain Line Modifications - Plan and Sections



PROJECT PLAN
SCALE 1"=300'

GRAPHIC SCALE
1"=300' 300' 0 300' 600'

LEGEND

NEW	EXISTING	DESCRIPTION
x265.7	x 265.7	ELEVATIONS
266	266	CONTOURS
		BUILDINGS
		ROADS OR WALKS
		CURBING
		RAILROAD
		EARTH FILL
		EARTH CUT
	T	TELEPHONE MANHOLE
		CONTRACTORS WORK LIMIT
F	EF	FENCE
		STONE WALLS
		GRADE TO DRAIN
SD	SD	STORM DRAIN
		STORM DRAINAGE MANHOLE
	CB	CATCH BASIN
C	C	CULVERT
	WL	MILL WASTE LINE
SS	SS	SANITARY SEWER LINE
	O	SEWER MANHOLE
W	W	WATER LINE
		GATE VALVE
MS		MILL WATER SUPPLY LINE
		GUARD RAIL
G	G	GAS LINE
E	E	ELECTRIC LINE OVERHEAD
	T	TELEPHONE LINE UNDERGROUND
	FD	FOUNDATION TEST BORING
	FTT	FOUNDATION TEST TRENCH
		BID ITEM NUMBER
		SUB DRAIN
	WL	WATER LEVEL AT TIME OF CONSTRUCTION
		ROCK SLOPE PROTECTION, ROCK CHANNEL PROTECTION OR ROCK PAVING
		EARTH CUT WITH ROCK SLOPE PROTECTION
		EARTH FILL WITH ROCK SLOPE PROTECTION, OR ROCK PAVING
E		ELECTRIC LINE UNDERGROUND
		FIRE HYDRANT
		POST INDICATOR VALVE
	T	TELEPHONE LINE OVERHEAD

REVISION	DATE	DESCRIPTION	BY
1	11-27-63	Symbols added to legend. (Am. #1)	

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PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.R.D. | DR. BY R.L.K. | CK. BY J.B.

SUBMITTED: Chief, Engineering Division
PROJECT ENGINEER: Chief, Design Branch
APPROVED: Chief, Construction Branch

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET

PROJECT PLAN

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

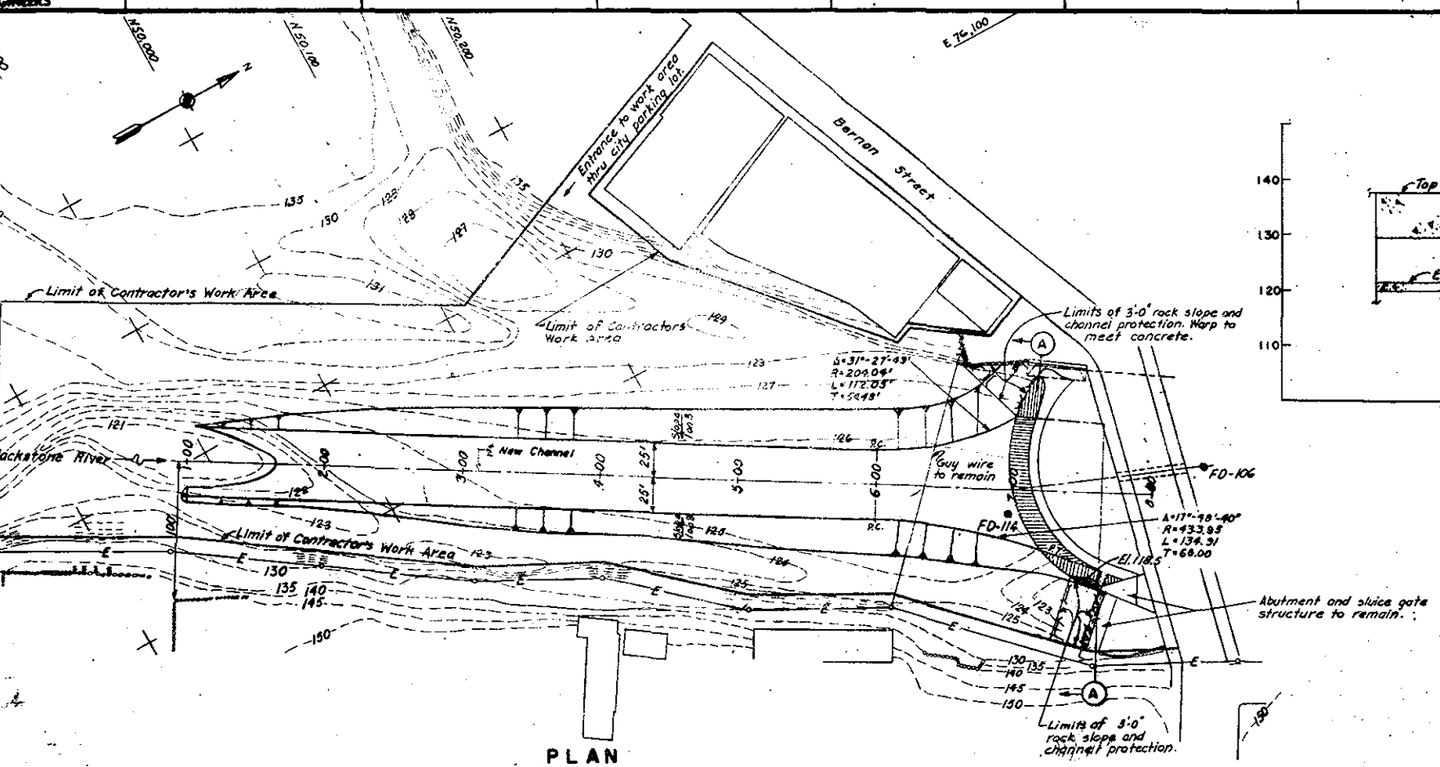
APPROVED: Chief, Engineering Division
DATE: JUNE, 1963

SCALE 1"=300' | SPEC. NO. CIV. ENG.-DA-19-020-CIVENG-63-

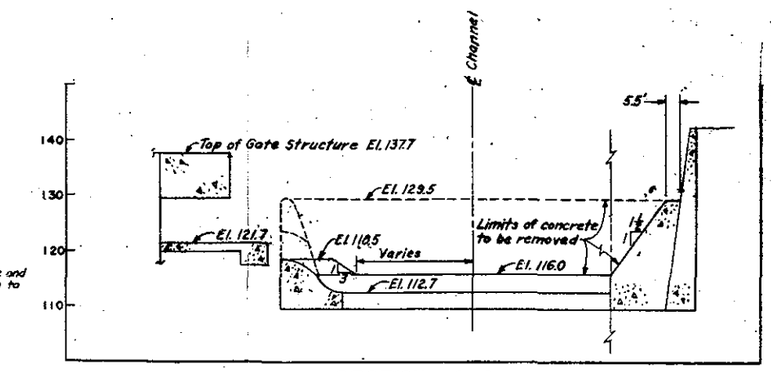
DRAWING NUMBER: BE-1312
SHEET 2

O & M PLATE NO. E-1

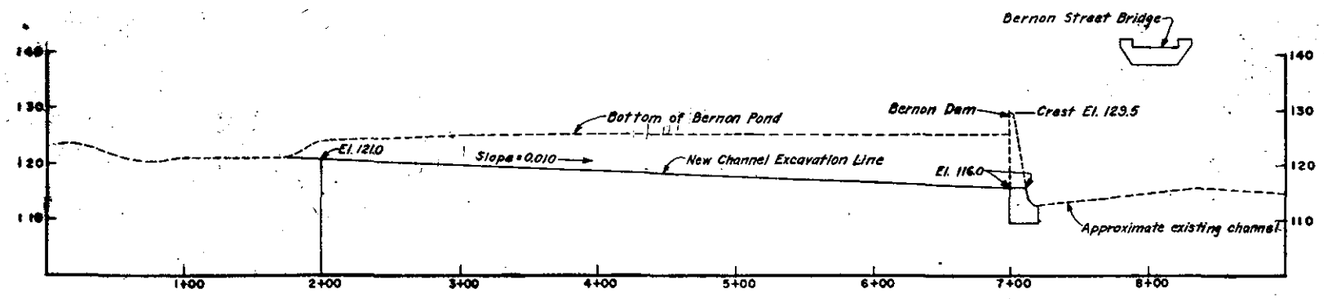
CORPS OF ENGINEERS — U. S. ARMY



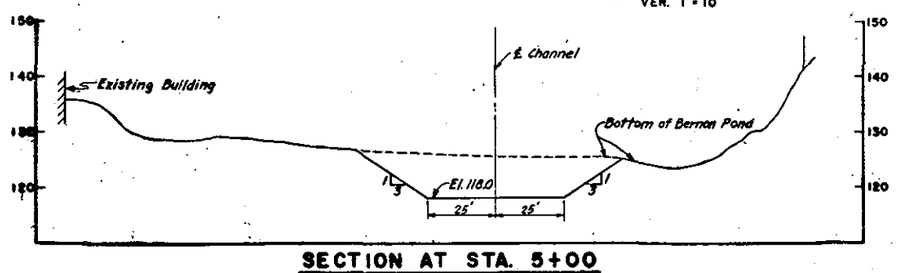
PLAN
SCALE: 1" = 40'



SECTION A-A
SCALE: HOR. 1" = 20'
VER. 1" = 10'



PROFILE - ℄ CHANNEL
SCALE: HOR. 1" = 40'
VER. 1" = 10'



SECTION AT STA. 5+00
(TYPICAL FOR NEW CHANNEL EXCAVATION)
SCALE: HOR. 1" = 20'
VER. 1" = 10'

NOTES:

1. All work on this sheet will be paid for under Item (2)
2. Station 7+00 of ℄ New Channel is located at the intersection of a line projected upstream thru ℄ of Bernon Street Bridge pier with the upstream face of Bernon Dam.
3. Bernon Dam concrete shall be removed to limits shown. Removal method shall be such that concrete beyond 1'-0" of limits shown shall be undisturbed. Contractor shall repair all damage to existing concrete beyond 1'-0" of limits shown which result from removal work.
4. Hatching in Plan view denotes limits of demolition.

GRAPHIC SCALES
1" = 40' — 40' 0 40' 80'
1" = 20' — 20' 0 20' 40'
1" = 10' — 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY D.T.H. | DR. BY E.V.K. | CK. BY EJC

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
BERNON DAM DEMOLITION
AND CHANNEL IMPROVEMENTS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

DATE SEPT. 1964

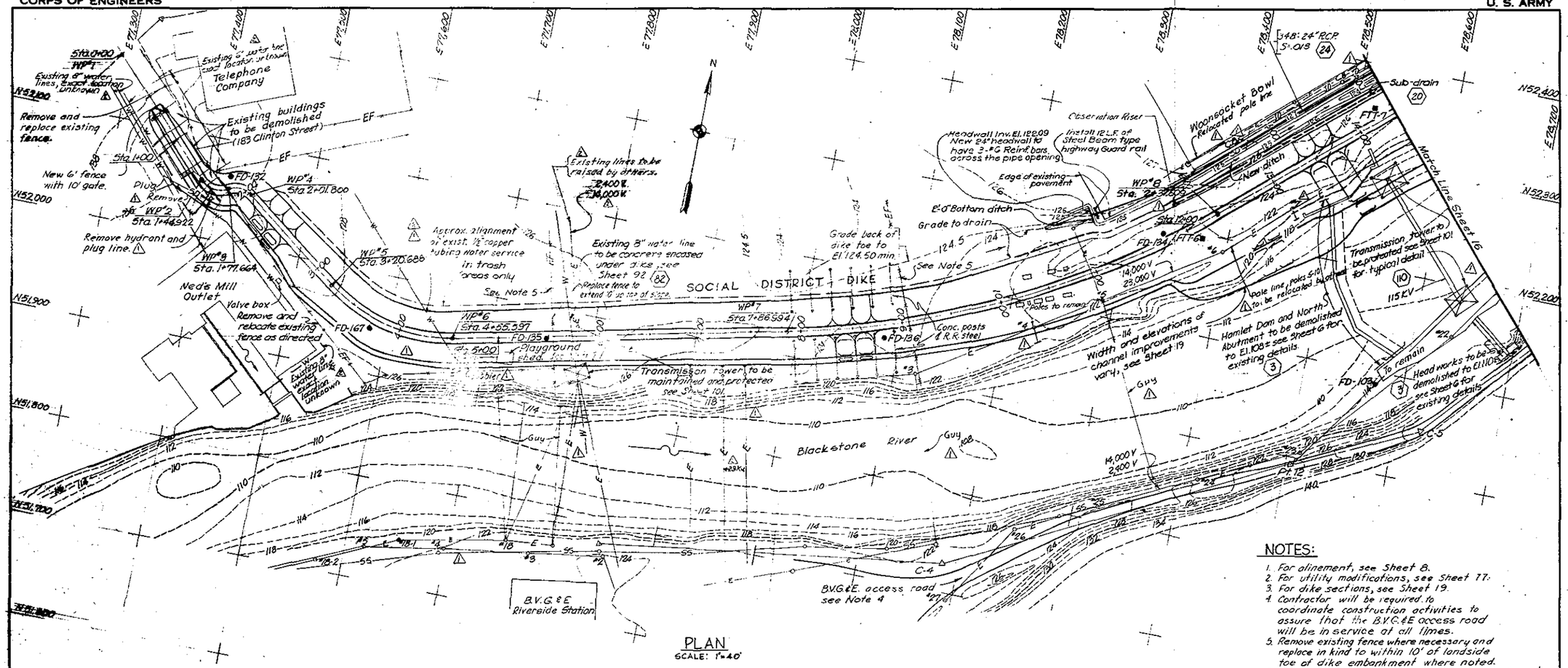
SCALES SHOWN | SPEC. NO. CIV. ENG. 19-016-64-2
DRAWING NUMBER
SE-1312
SHEET 3

THIS DRAWING SUPERSEDES DRAWING NO. SE-1312 SHEET 3 DATED JUNE 1963

O & M PLATE NO. E-2

CORPS OF ENGINEERS

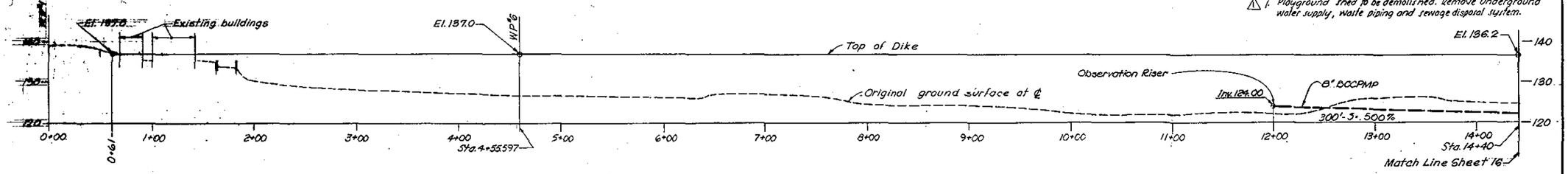
U. S. ARMY



PLAN
SCALE: 1"=40'

NOTES:

1. For alinement, see Sheet 8.
2. For utility modifications, see Sheet 77.
3. For dike sections, see Sheet 19.
4. Contractor will be required to coordinate construction activities to assure that the B.V.G.&E. access road will be in service at all times.
5. Remove existing fence where necessary and replace in kind to within 10' of landside toe of dike embankment where noted.
6. Existing electric wood pole lines in areas of const. to be relocated by others except as otherwise noted.
7. Playground shed to be demolished. Remove underground water supply, waste piping and sewage disposal system.



PROFILE
SCALE: HORZ. 1"=40'
VERT. 1"=10'

GRAPHIC SCALES
1"=40' 40 0 40 80
1"=10' 10 0 10 20

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	8-14-63	Exist. utility lines shown & clarified. Notes added. (Am #5)	
3	5-7-63	Exist. water & electric utilities added.	
		Grading & notes revised. (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.R.D. DR. BY D.P.T.
SUBMITTED: ARCHITECT-ENGINEERS
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DIKES AND CHANNEL IMPROVEMENTS
BLACKSTONE RIVER
PLAN AND PROFILE NO. 1
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

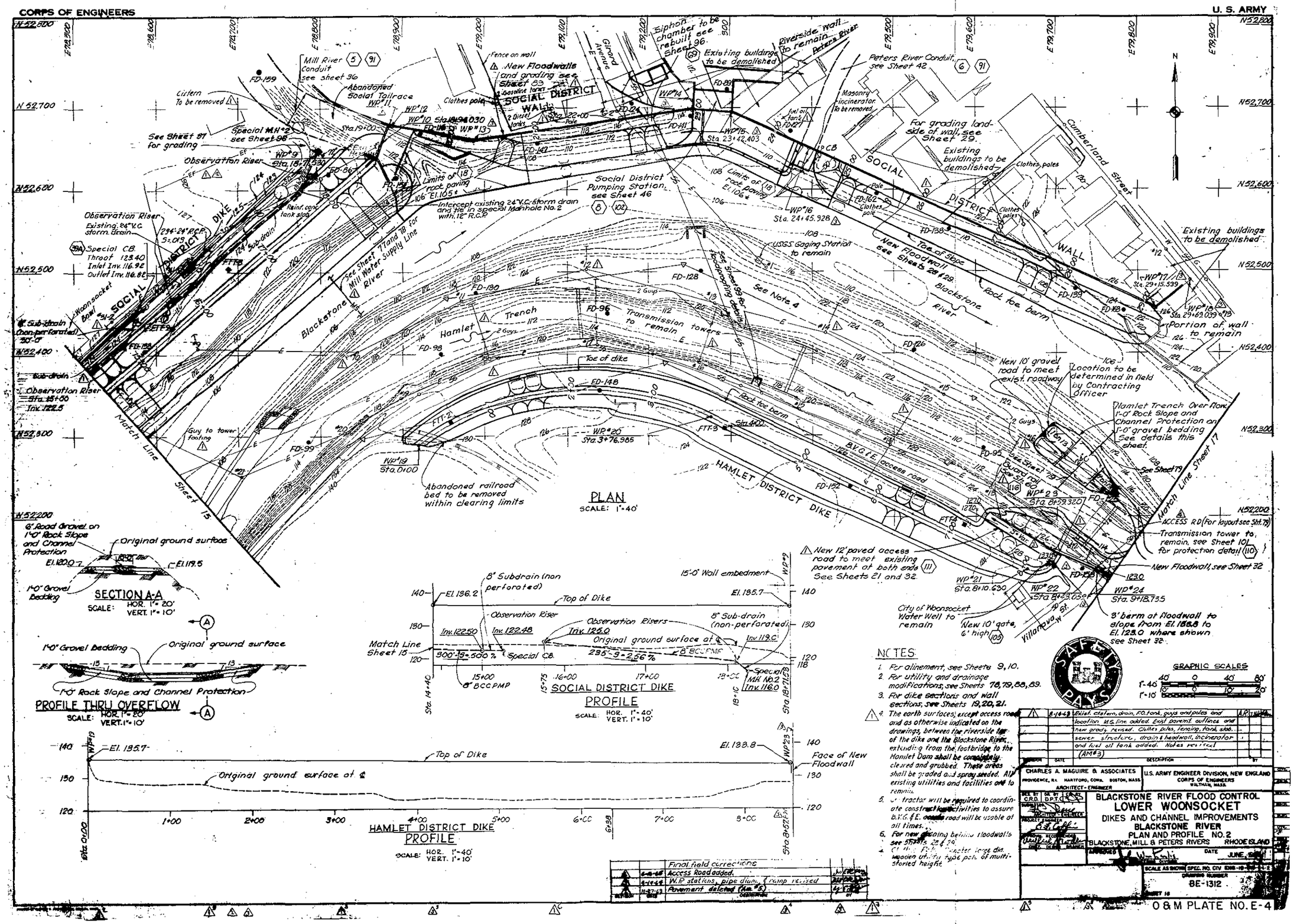
APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG. 19-016-64-
DRAWING NUMBER BE-1312
SHEET 18

O&M PLATE NO. E-3

CORPS OF ENGINEERS

U. S. ARMY



NOTES:

1. For alinement, see Sheets 9, 10.
2. For utility and drainage modifications; see Sheets 78, 79, 88, 89.
3. For dike sections and wall sections; see Sheets 19, 20, 21.
4. The earth surfaces, except access roads and as otherwise indicated on the drawings, between the riverside toe of the dike and the Blackstone River, extending from the footbridge to the Hamlet Dam shall be completely cleared and grubbed. These areas shall be graded and spray seeded. All existing utilities and facilities are to remain.
5. A tractor will be required to coordinate construction activities to assure B.L.G.&E. access road will be usable at all times.
6. For new grading behind floodwalls see Sheets 28 & 29.
7. [illegible] 24" diameter large dia. wooden utility type pole of multi-storied height.

GRAPHIC SCALES

40' 0 40' 80'

1"=40'

1"=10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY
6-4-68		Exist. cistern, drain, F.O. tank, guys and poles and location M.S. line added. Exist pavement outlines and new grade revised. Clothes poles, fencing, tank, slab, sewer structure, drain & headwall, incinerator and fuel oil tank added. Notes revised (AM #3)	
4-14-68		Final field corrections	
6-6-68		Access Road added.	
4-14-68		W.P. stations, pipe diam., & ramp revised	
11-27-63		Pavement deleted (Am #5)	

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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY CRD DR. BY DPT CK. BY

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DIKES AND CHANNEL IMPROVEMENTS
BLACKSTONE RIVER
PLAN AND PROFILE NO. 2
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

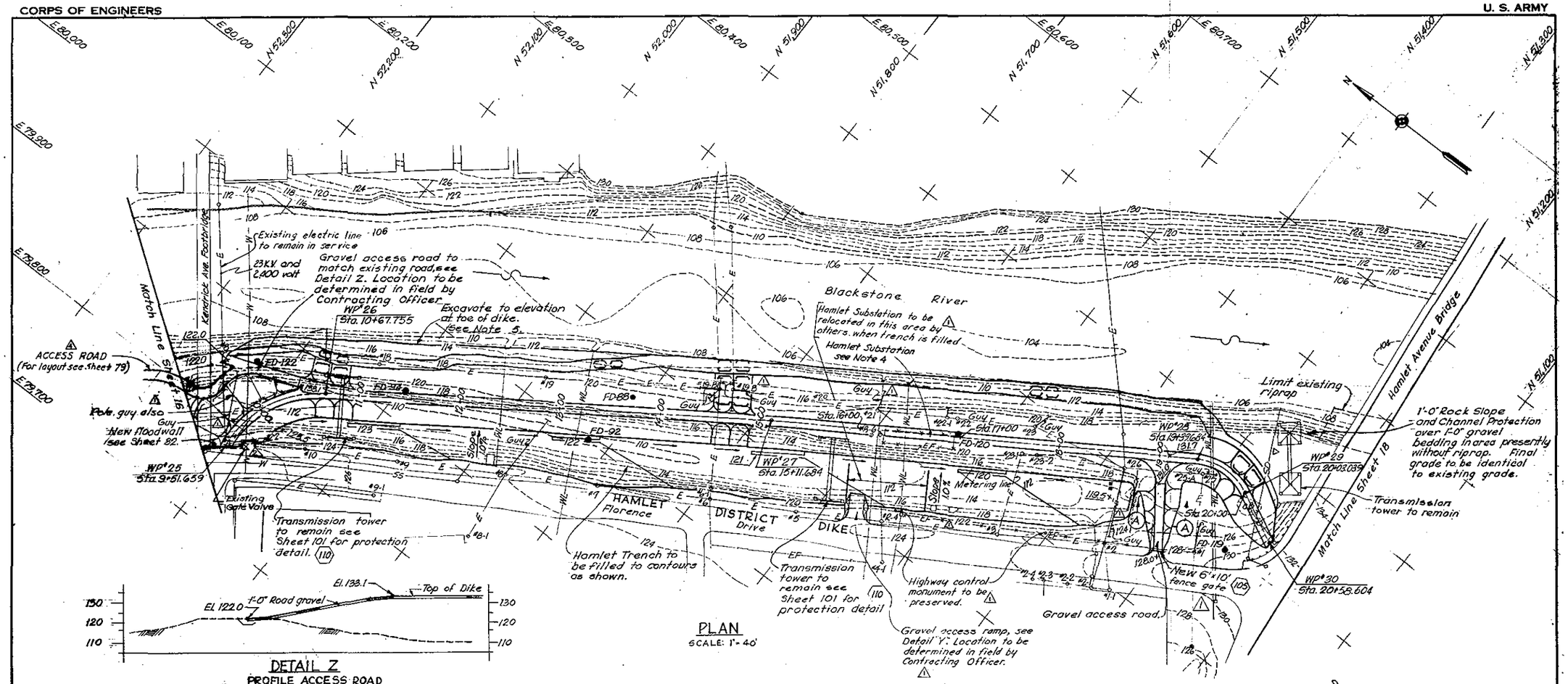
DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV DACW-10-[illegible]

DRAWING NUMBER BE-1312

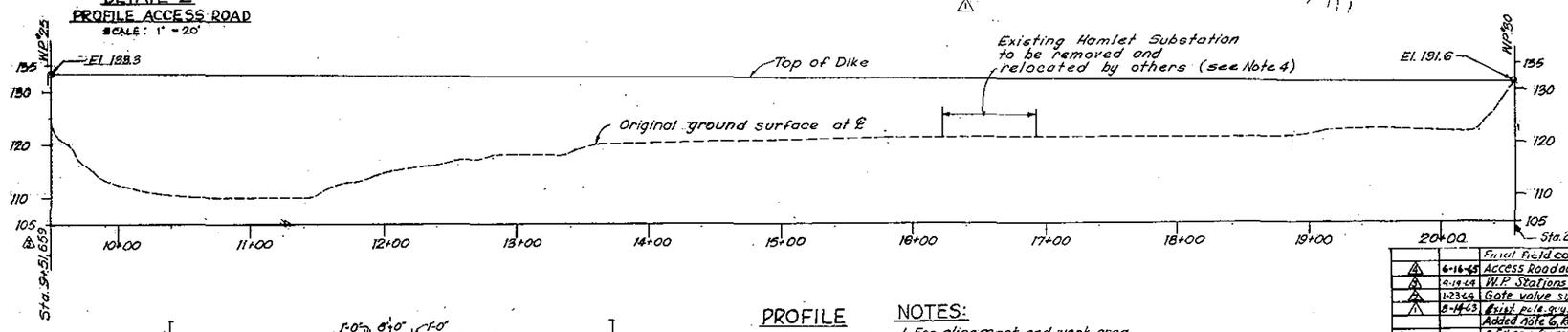
SHEET 15

O & M PLATE NO. E-4

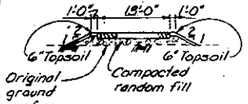


PLAN
SCALE: 1" = 40'

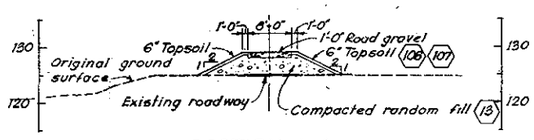
DETAIL Z
PROFILE ACCESS ROAD
SCALE: 1" = 20'



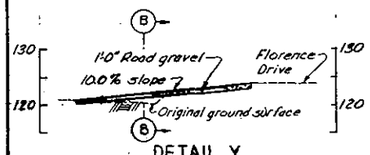
PROFILE
SCALE: HORZ. 1" = 40'
VERT. 1" = 10'



SECTION B-B
SCALE: 1" = 10'



SECTION A-A
SCALE: 1" = 10'



DETAIL Y
PROFILE ACCESS RAMP
SCALE: 1" = 10'

NOTES:

1. For alinement and work area limits, see Sheet 10.
2. For utility and drainage modifications, see Sheets 79, 80 & 81.
3. For dike sections, see Sheet 21.
4. Contractor shall be required to coordinate construction activities with B.Y.G.&E. Co. to permit removal and relocation (by others) of the Hamlet Substation and the wood pole electric system (23KV, 14KV and 2,400 volt)
5. Limit of excavation varies with elevation of toe of dike which varies uniformly from El. 114.0 at Sta. 10+45 to El. 106.0 at Sta. 19+40

NOTES:

6. The entire earth area between the toe of the dike and the pavement of Florence Drive, from Sta. 19+00± to the New Gravel Access Road at Sta. 19+00± shall be topsoiled using 6" (six inches) of topsoil, and seeded, unless otherwise indicated.

GRAPHIC SCALES
1"=40' 40 0 40 80
1"=10' 10 0 10 20

REVISION	DATE	DESCRIPTION	BY
5	6-16-65	Access Road added.	
4	4-19-64	W.P. Stations revised on profile.	
3	1-23-64	Gate valve symbol revised.	
2	8-14-63	Exist. pole, guys & fence added.	
1		Added note 6, Rock Slope & Channel Protection, & fill area for relocated sub-station (AM #9)	AP
		Final field corrections	

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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.R.D. DR. BY D.P.T. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, ENGINEERING DIVISION

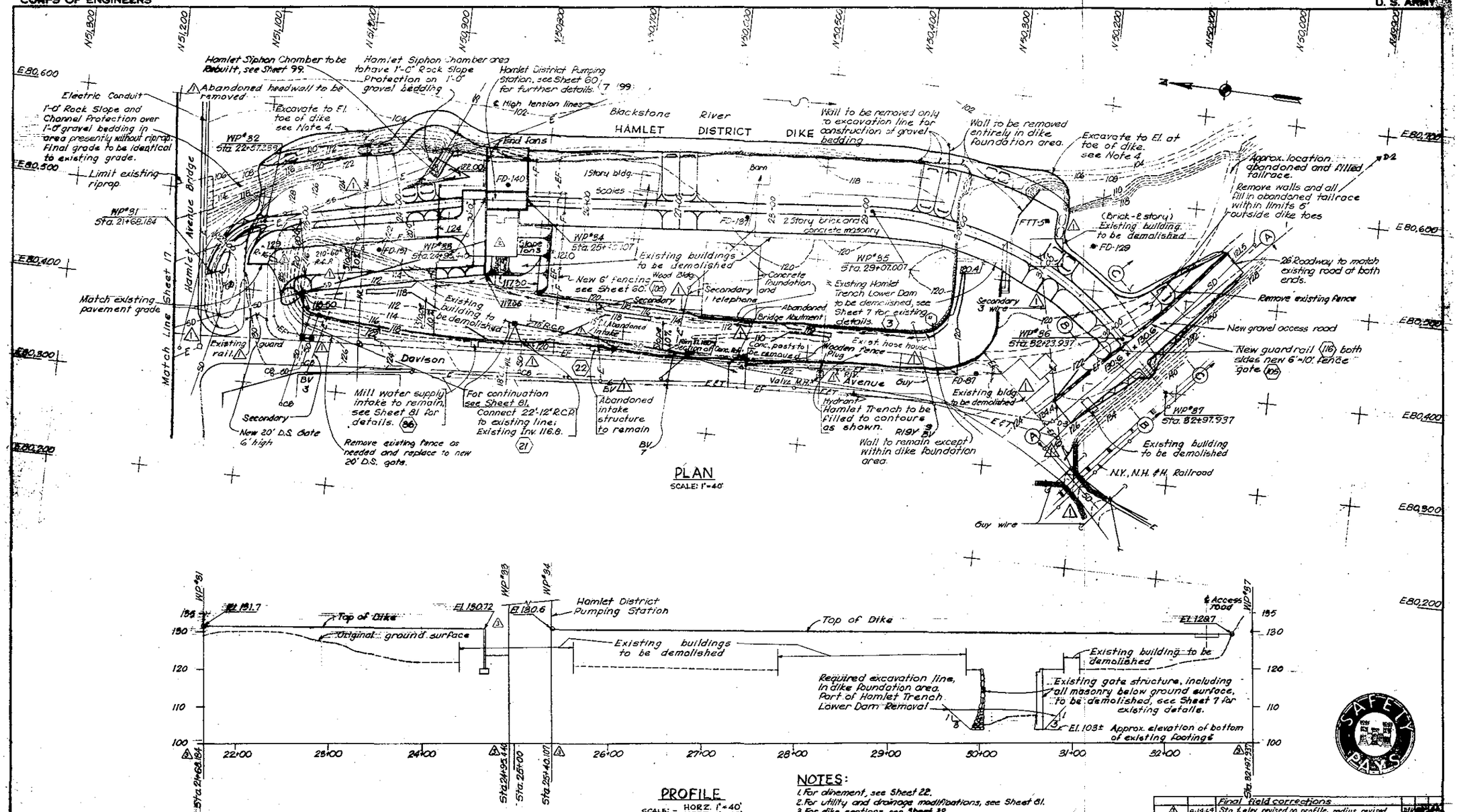
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DIKES AND CHANNEL IMPROVEMENTS
BLACKSTONE RIVER
PLAN AND PROFILE NO. 3

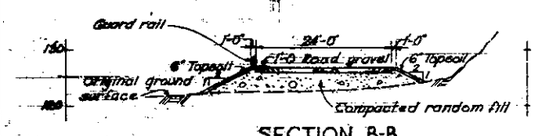
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

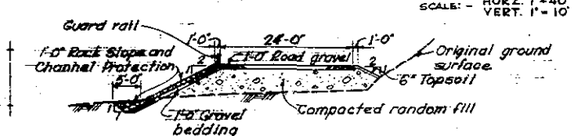
APPROVED: DATE JUNE, 1963

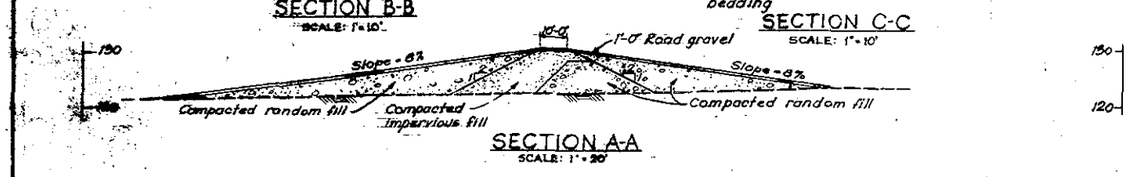
SCALE AS SHOWN | SPEC. NO. CIV. ENG. 96-65-B-2
DRAWING NUMBER 8E-1312
SHEET 17

O & M PLATE NO. E-5









NOTES:

1. For alinement, see Sheet 22.
2. For utility and drainage modifications, see Sheet 61.
3. For dike sections, see Sheet 22.
4. Limit of excavation varies with elevation of toe of dike which varies uniformly from El. 106 @ Sta. 22+56 to El. 104 @ Sta. 30+50 and from El. 104 @ Sta. 30+50 to El. 110 @ Sta. 30+90.
5. Topsoiling and seeding shall be done on the entire earth area extending from the access road to the Hamlet Pumping Station and the access road at Sta. 32+38±, except on the area between the landside toe of the dike and the Hamlet Trench to Sta. 30+30±, which is not otherwise required to be topsoiled and seeded or otherwise indicated on the drawings.

GRAPHIC SCALES

1" = 40' 40' 0 40' 80'

1" = 10' 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	9-19-69	Sta. 5 elev revised on profile, radius revised.	
3	11-21-66	Note revised & stone log storage bldg. deleted from 5	
1	8/14/63	Exist. utility lines, notes & hydrant added.	
		Rock toe of dike, contours, notes, storm drainage revised. (Am #3)	

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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.R.D. DR. BY D.P.T.
SUBMITTED
ARCHITECT - ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DIKES AND CHANNEL IMPROVEMENTS
BLACKSTONE RIVER
PLAN AND PROFILE NO. 4

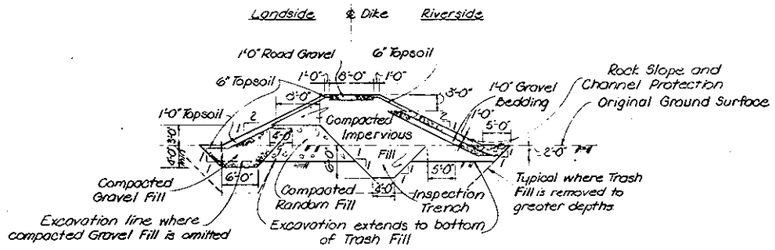
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG. 40-20-843

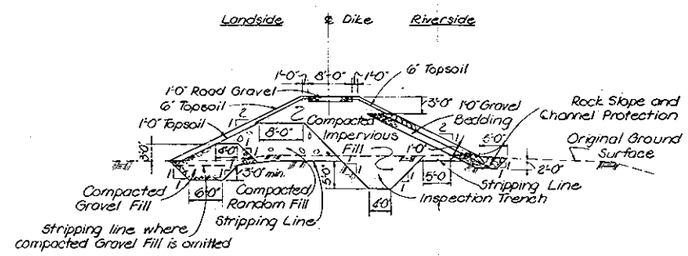
DRAWING NUMBER BE-1312

SHEET 18



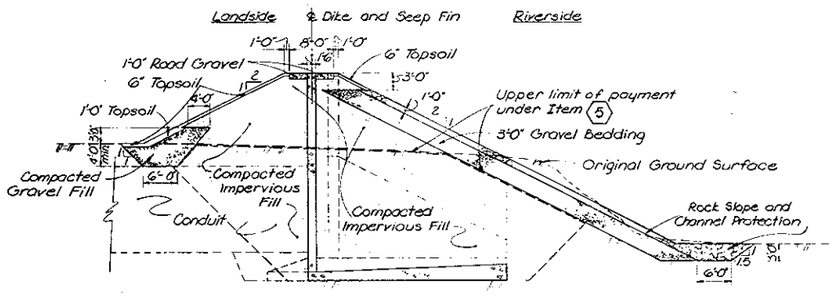
STA. 1+45 to STA. 11+67

1. Typical in Trash Fill areas between Sta. 2+15 to 11+67
2. Omit compacted Gravel Fill zone upstream from Sta. 2+15



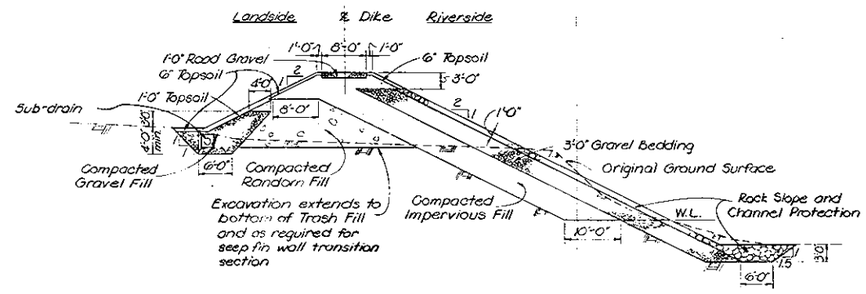
STA. 0+61 to STA. 11+67

1. Typical in non-Trash Fill areas upstream from Sta. 11+67 and Trash Fill areas upstream from Sta. 1+45
2. Omit compacted Gravel Fill zone upstream from Sta. 2+15
3. Omit inspection trench upstream of Sta. 1+45



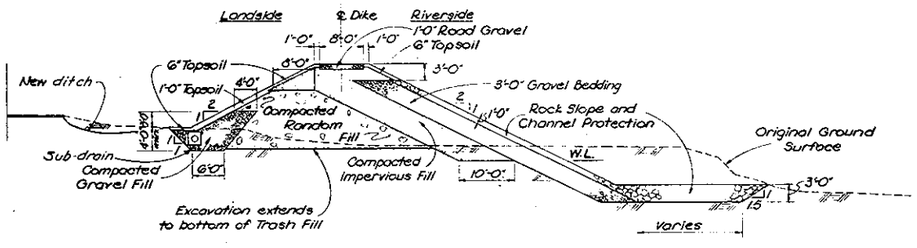
STA. 18+60 to STA. 18+73

1. Typical from Sta. 18+60 to Sta. 18+73
2. For backfill for conduit and wing wall see Sheets 37 and 40.



STA. 13+60 to 18+60

1. Typical from Sta. 13+60 to Sta. 18+10
2. Compacted Impervious Fill is to be used in place of Compacted Random Fill from Sta. 18+10 to Sta. 18+60



STA. 11+67 to STA. 13+60

1. Elevation at riverside toe varies uniformly from El. 115 at Sta. 11+75 to El. 109 at Sta. 13+60

NOTES:

1. Compacted gravel fill zone in trash areas shall extend to a depth of 4'-0" or to the bottom of excavation of the trash fill, or as required Sheet 20 for sub-drain whichever is lower.
2. Thickness of gravel bedding and topsoil shall be measured normal to slope lines.
3. For details of sub-drain, see Sheets 15, 16 and 20.

GRAPHIC SCALE
1"=10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

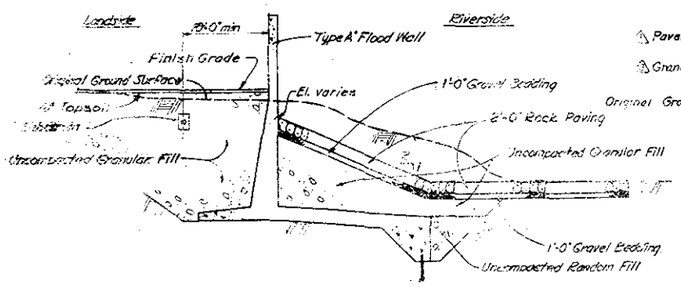
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.P. CD. DR. BY R.J.S.
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

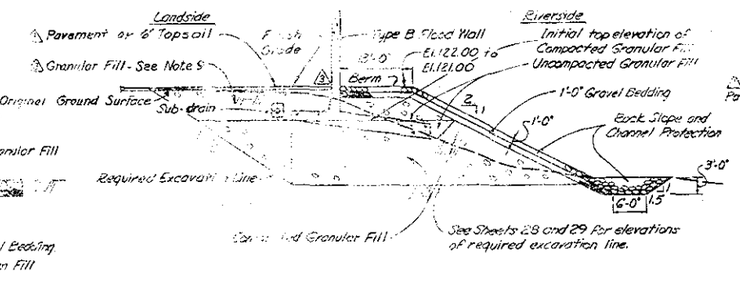
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT
DIKE SECTIONS
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

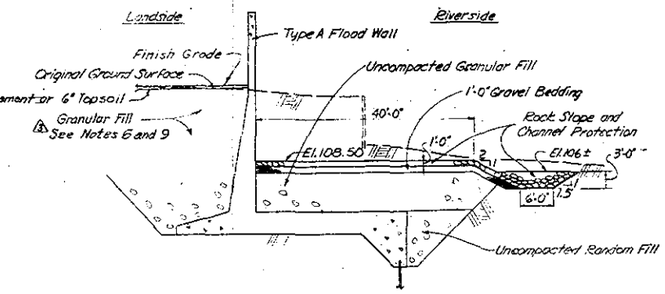
SCALE 1"=10'-0" SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER
BE-1312
SHEET 19



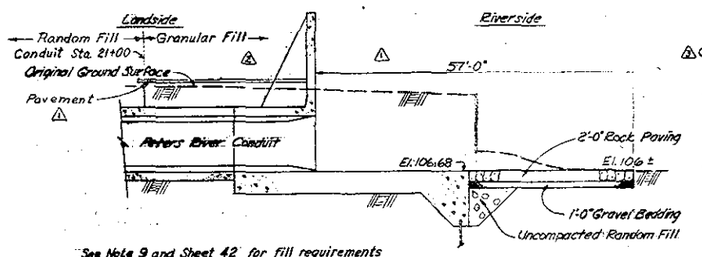
STA. 19+43 to STA. 20+50



STA. 21+10 to STA. 21+70

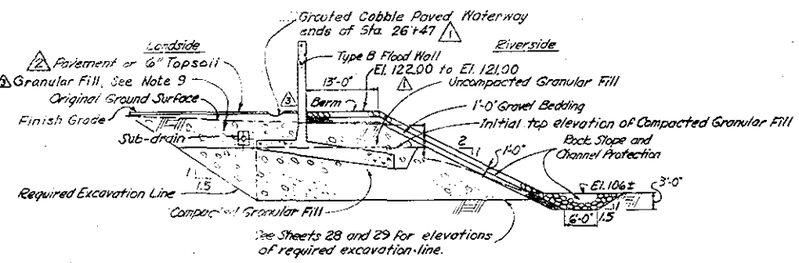


STA. 23+42 to STA. 24+26

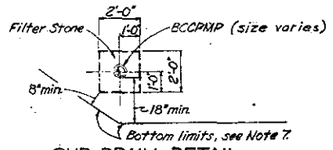


See Note 9 and Sheet 42 for fill requirements along and over conduit.

STA. 24+46



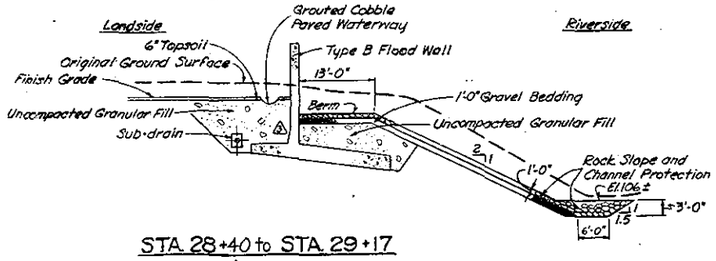
STA. 25+60 to STA. 28+40



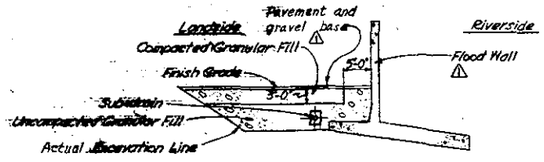
SUB-DRAIN DETAIL

For perforated pipe reaches of sub-drains in Granular Fills or Gravel Fills

SCALE - 3/8" = 1'-0"

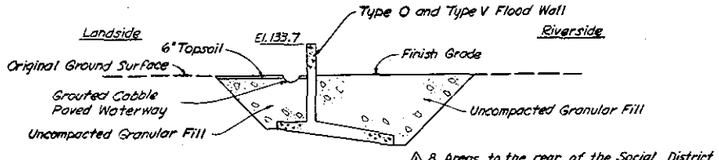


STA. 28+40 to STA. 29+17



TYPICAL SECTION AT PAVEMENT

Compacted Granular Fill Zone to be constructed in areas to be paved (See Note 9)



STA. 29+17 to STA. 29+59

Note: Above sections are to a scale of 1" = 10'

NOTES:

1. Required excavation line on landside shall not extend beyond limits of work area, if necessary provide sheeting along work area limit.
2. For Type B Walls, compaction of granular fill shall be constructed with top elevation the same as the bottom corner of the wall footing at the landside edge before starting construction of the wall footing.
3. For grades on each side of wall, see Sheet 28 and 29.
4. Omitted
5. For details of sub-drain pipes, see Sheets 28 and 29.
6. Compacted Granular Fill is to be used in place of Uncompacted Granular Fill in back of flood wall between Sta. 22+15 to Sta. 22+93 and Sta. 23+42 to Sta. 23+92 except within 5 feet of all walls except pumping station walls.
7. Bottom limits of Granular or Gravel Fill shall meet requirements of Note 1 on Sheet 19, required excavation line on Sheets 28 and 29, and dimensions shown on sub-drain detail.

(For continuation see below)

8. Areas to the rear of the Social District wall disturbed by the new construction between Sta. 18+71 and 29+70 and within the work area limit lines shall be topsoiled except for streets and those areas designated on the plans as being paved or having gravel surfaces.
9. Between Sta. 20+50 and Sta. 22+15, and between Sta. 23+92 and Sta. 28+40, Fill on the landside of wall above elevation of toe of wall shall be uncompacted granular fill except: (a) compacted granular fill shall be constructed to the limits shown by section in areas to be paved, (b) in area shown on Sheet 42 for random fill to be placed along and over the Peters River Conduit.

GRAPHIC SCALES

3/8" = 1'-0" 4' 0 4'

1" = 10' 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY
4	4-19-69	Revised stationing, fill details, sections; deleted Note, and added Note	RMK
3	11-2	Changed stationing, added note, removed waterway (Amd 3)	
1	8-7-63	Notes and Elevation added and revised (Amd 1)	

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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.P. CD. DR. BY R.J.H. CHKD. BY
SUBMITTED: ARCHITECT - ENGINEER
PROJECT ENGINEER
REGIONAL RECEIVING AGENCY CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT
FLOOD WALL SECTIONS

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

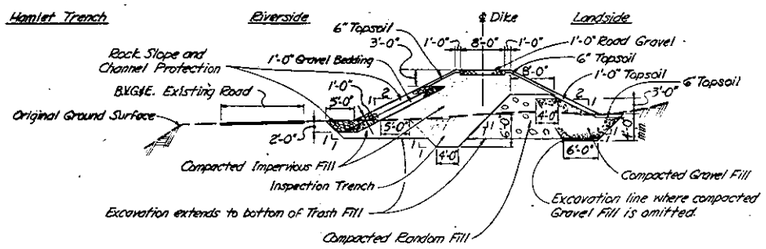
APPROVED: CHIEF, ENGINEERING DIVISION DATE JUNE, 1963

SCALE 1" = 10'-0" SPEC. NO. CIV. ENG.-19-GPO-62-8

DRAWING NUMBER BE-1312

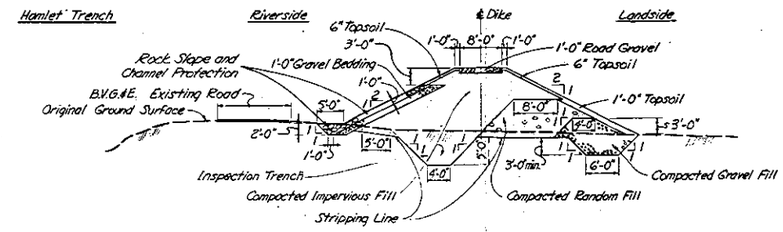
SHEET 20

O & M PLATE NO. E-8



STA. 0+20 to STA. 7+32

1. Typical in Trash Fill areas between Sta. 0+20 and Sta. 7+32 except omit compacted Gravel Fill zone upstream from Sta. 2+50

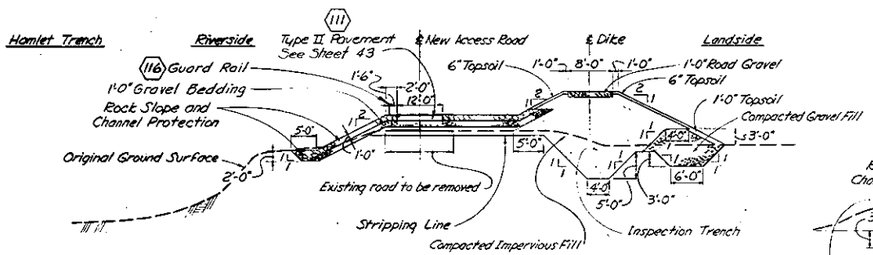


STA. 0+00 to STA. 7+32

1. Typical in non-Trash Fill areas upstream from Sta. 7+32
2. Omit inspection trench upstream from Sta. 0+20
3. Omit compacted Gravel Fill zone upstream from Sta. 2+50

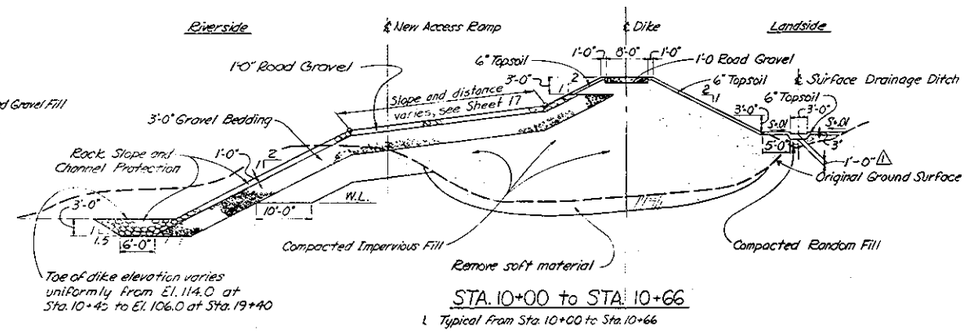
STA. 19+38 to STA. 20+25

1. Typical dike from Sta. 19+38 to Sta. 20+25.



STA. 7+32 to STA. 8+58

1. Typical from Sta. 7+32 to Sta. 7+76.
2. Omit compacted Gravel Fill zone downstream from Sta. 7+76.

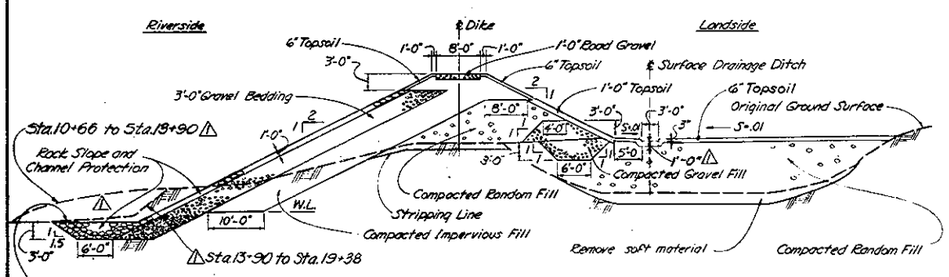


STA. 10+00 to STA. 10+66

1. Typical from Sta. 10+00 to Sta. 10+66

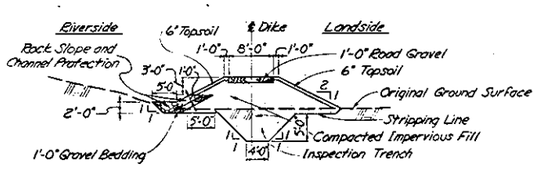
NOTES:

1. Compacted gravel fill zone in trash areas shall extend to a depth of 4'-0" or to the bottom of excavation of the trash fill, whichever is lower
2. For grading plan of Hamlet Trench see Sheet 17.
3. For extension of excavation in trash area, see section on Sheet 20
4. For dike details in vicinity of floodwall at Kendrick Avenue footbridge see Sheet 32
5. △ For layout and sections of Access Road revision in vicinity of sta. 9+00 to 10+00 see Sheet 79.



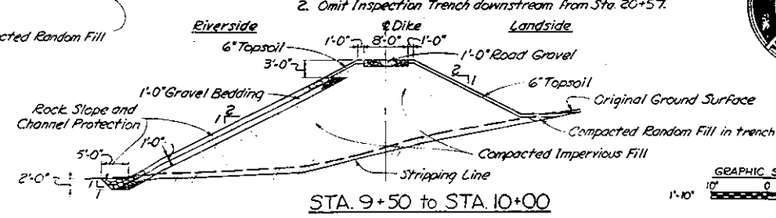
STA. 10+66 to STA. 19+38

1. Typical from Sta. 10+66 to Sta. 19+38.



STA. 20+25 to STA. 20+57

1. Typical from Sta. 20+25 to Sta. 20+57.
2. Omit Inspection Trench downstream from Sta. 20+57.



STA. 9+50 to STA. 10+00

1. Typical from Sta. 9+50 to Sta. 10+00.

GRAPHIC SCALE

1'-10" 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY
△	6-16-65	Note added.	
△	4-19-64	Data added.	

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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY P.P. CD. BY R.L.H. CK. BY
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET

HAMLET DISTRICT

DIKE SECTIONS NO. 1

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION

DATE JUNE, 1963

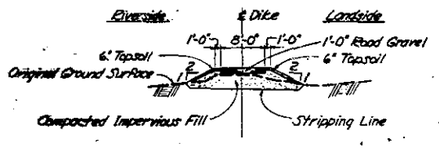
SCALE 1"=10'-0" SPEC. NO. CIV. ENG.-19-08-64-2

DRAWING NUMBER BE-1312

SHEET 21

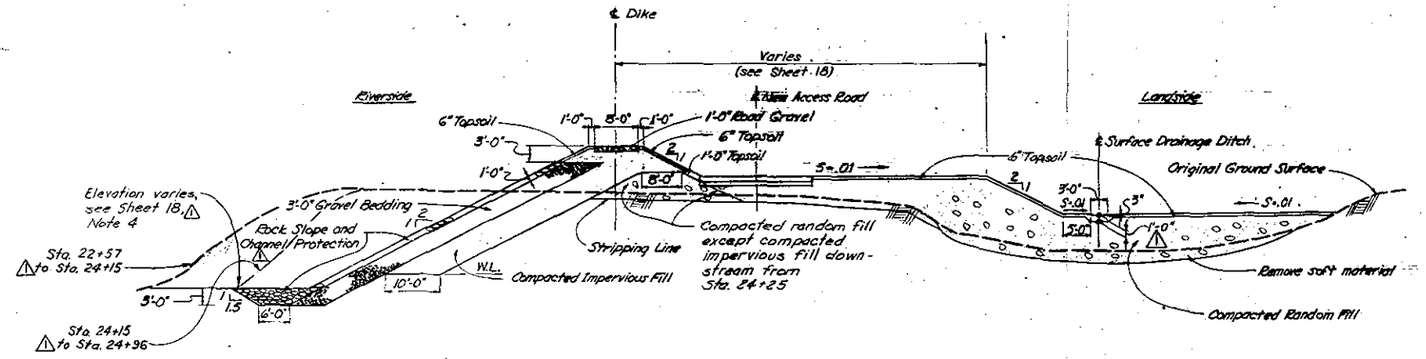
△ △ △

O & M PLATE NO. E-9



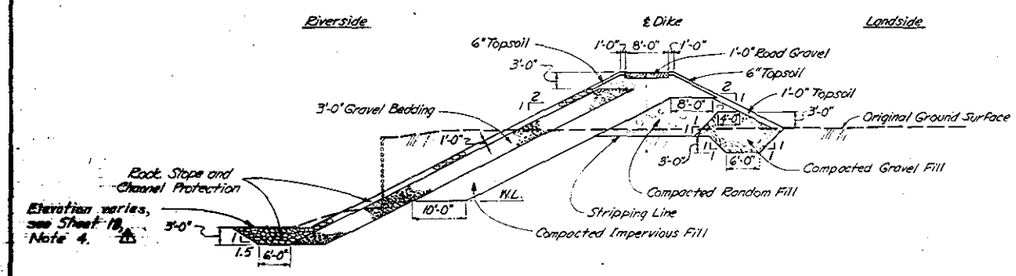
STA. 21+68 to STA. 22+57

Typical from Sta. 21+68 to Sta. 22+57



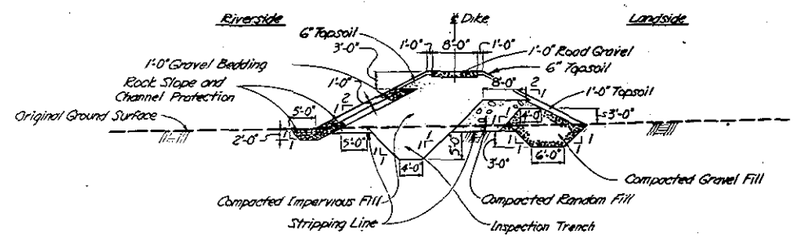
STA. 22+57 to STA. 24+96

Typical except in vicinity of Hamlet Siphon Chamber. See special section.



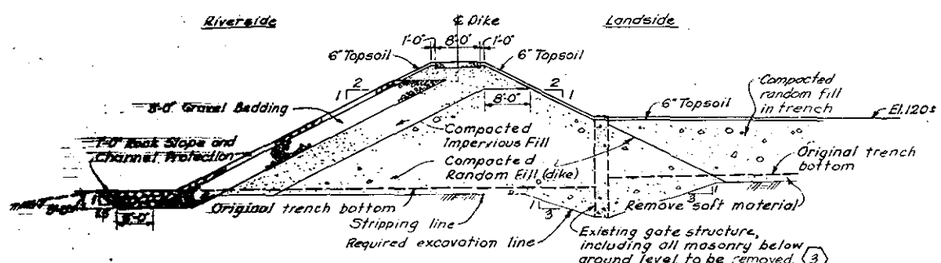
STA. 25+40 to STA. 30+00

Typical from Sta. 25+40 to Sta. 30+00

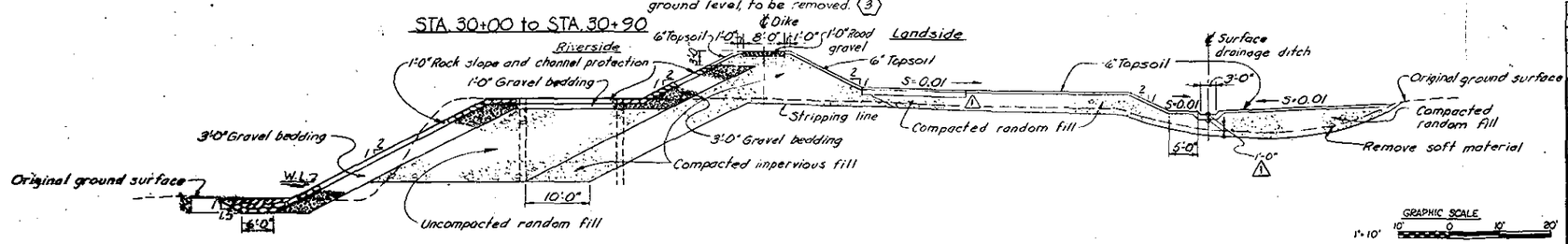


STA. 30+90 to STA. 32+20

1. Delete compacted gravel fill downstream Sta. 31+85
2. Delete inspection trench downstream Sta. 32+20
3. Typical from Sta. 30+55 to Sta. 31+85
4. See Sheet 18 for details at ramp.



STA. 30+00 to STA. 30+90



TYPICAL IN VICINITY OF HAMLET SIPHON CHAMBER

NOTES:

1. For grading plan of Hamlet Trench see Sheets 17 and 18.
2. For embankment beyond Sta. 32+00 see Sheet 18.
3. See Sheet 60 for pavement section.

GRAPHIC SCALE 1"=10' 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	DRN	CHK	APP
1	4-14-69	Data added, notes corrected			

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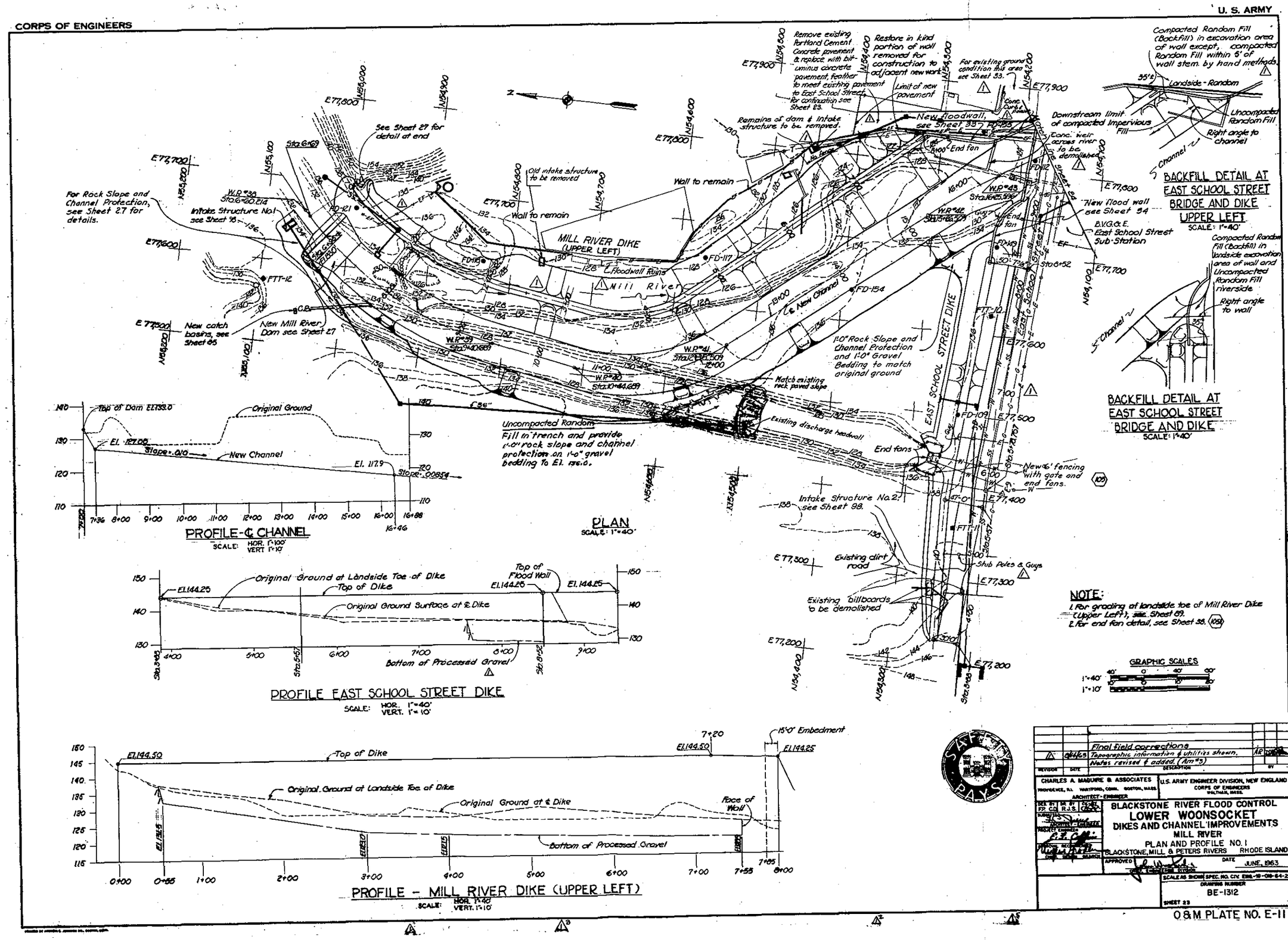
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND — CORPS OF ENGINEERS — WALTHAM, MASS.

DES. BY GA PP CD; DR. BY R.L.H.; CK. BY C.P.D.

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT
DIKE SECTIONS NO. 2
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED — DATE JUNE, 1968

SCALE 1"=10'-0" SPEC. NO. CIV. DRAWING NUMBER BE-1312 SHEET 22


CORPS OF ENGINEERS
U. S. ARMY
MILL RIVER DIKE (UPPER LEFT)
Mill River
Floodwall Ruins
New Channel
EAST SCHOOL STREET DIKE
Existing discharge headwall
Uncompacted Random Fill in trench and provide 1'-0" rock slope and channel protection on 1'-0" gravel bedding to El. 136.0.
1'-0" Rock Slope and Channel Protection and 1'-0" Gravel Bedding to match original ground
Match existing rock paved slope
Remove existing Portland Cement Concrete pavement & replace with bituminous concrete pavement, feather to meet existing pavement to East School Street. For continuation see Sheet 23.
Restore in kind portion of wall removed for construction to adjacent new work.
Limit of new pavement
For existing ground condition this area see Sheet 33.
Remains of dam & intake structure to be removed.
New floodwall, see Sheet 33
Conc. weir across river to be demolished
New flood wall see Sheet 34
B.V.G.&E. East School Street Sub-Station
Old intake structure to be removed
Wall to remain
See Sheet 27 for detail at end
For Rock Slope and Channel Protection, see Sheet 27 for details.
Intake Structure No.1 see Sheet 98
New catch basins, see Sheet 85
New Mill River Dam see Sheet 27
Intake Structure No.2 see Sheet 98.
Existing dirt road
Existing billboards to be demolished
Stub Poles & Guys
New 6' fencing with gate and end fans.
End fans
Top of Dam El.133.0
Original Ground
New Channel
El. 127.00
Slope .010
El. 117.9
Slope .00854
PROFILE-℄ CHANNEL
SCALE: HOR. 1"=100' VERT. 1"=10'
PLAN
SCALE: 1"=40'
Original Ground at Landside Toe of Dike
Top of Dike
Top of Flood Wall
Original Ground Surface at ℄ Dike
Bottom of Processed Gravel
PROFILE EAST SCHOOL STREET DIKE
SCALE: HOR. 1"=40' VERT. 1"=10'
Top of Dike
Original Ground at Landside Toe of Dike
Original Ground at ℄ Dike
Face of Wall
Bottom of Processed Gravel
15'-0" Embedment
PROFILE - MILL RIVER DIKE (UPPER LEFT)
SCALE: HOR. 1"=40' VERT. 1"=10'
Compacted Random Fill (Backfill) in excavation area of wall except, compacted Random Fill within 5' of wall stem by hand methods.
Landside - Random
Uncompacted Random Fill
Right angle to channel
Downstream limit of compacted Impervious Fill
BACKFILL DETAIL AT EAST SCHOOL STREET BRIDGE AND DIKE UPPER LEFT
SCALE: 1"=40'
Compacted Random Fill (Backfill) in landside excavation area of wall and Uncompacted Random Fill riverside
Right angle to wall
BACKFILL DETAIL AT EAST SCHOOL STREET BRIDGE AND DIKE
SCALE: 1"=40'
NOTE:
1. For grading of landside toe of Mill River Dike (Upper Left), see Sheet 89.
2. For end fan detail, see Sheet 38.
GRAPHIC SCALES
Final field corrections
Topographic information & utilities shown.
Notes revised & added. (Am #3)
CHARLES A. MAGUIRE & ASSOCIATES
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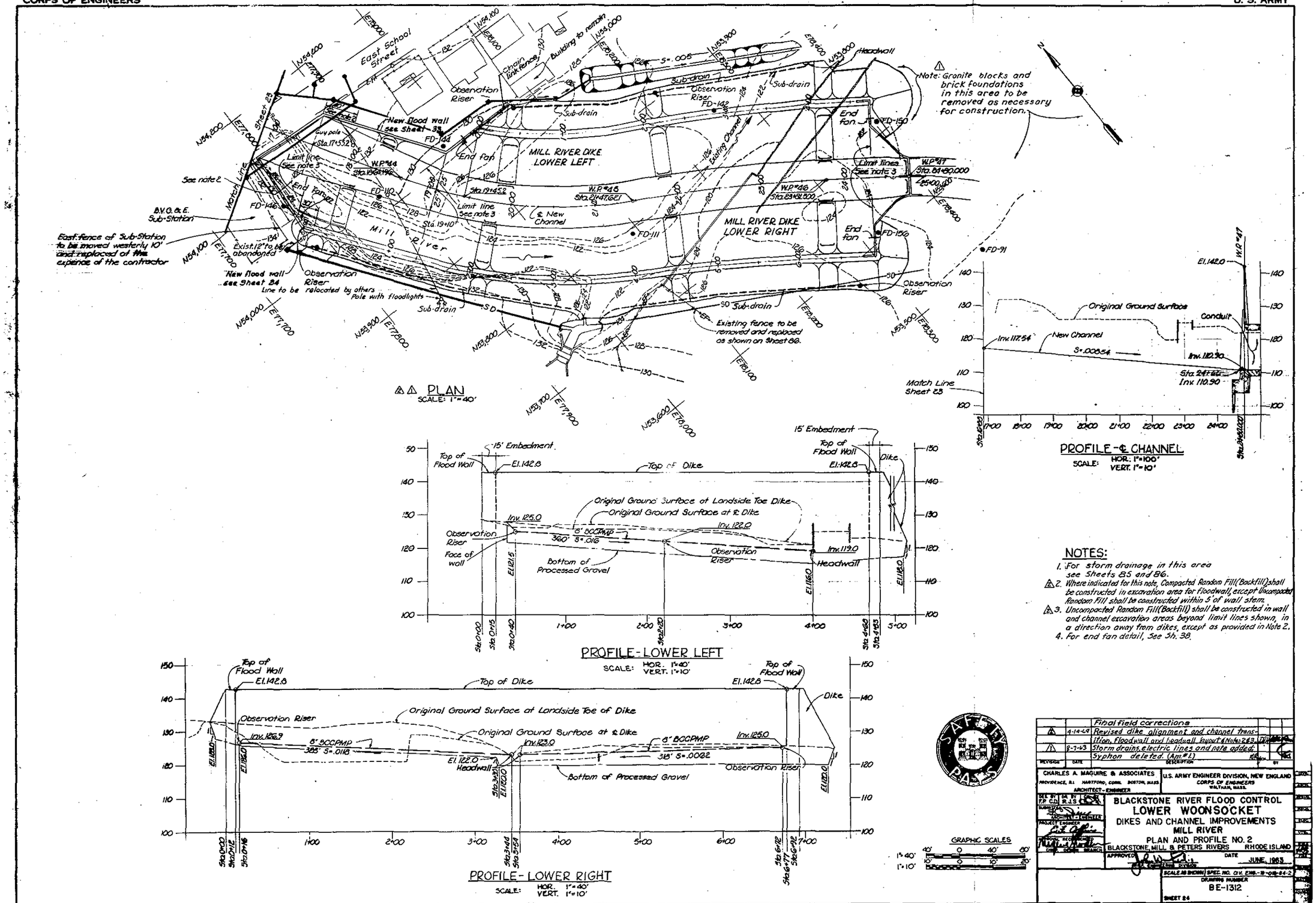
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DIKES AND CHANNEL IMPROVEMENTS
MILL RIVER
PLAN AND PROFILE NO. 1
BLACKSTONE, MILL & PETERS RIVERS
RHODE ISLAND
JUNE, 1963
DRAWING NUMBER
BE-1312
SHEET 23
O&M PLATE NO. E-11



NOTES:

1. For storm drainage in this area see Sheets 85 and 86.
2. Where indicated for this note, Compacted Random Fill (Backfill) shall be constructed in excavation area for floodwall, except Uncompacted Random Fill shall be constructed within 5' of wall stem.
3. Uncompacted Random Fill (Backfill) shall be constructed in wall and channel excavation areas beyond limit lines shown, in a direction away from dikes, except as provided in Note 2.
4. For end fan detail, See Sh. 38.

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
2	4-14-64	Revised dike alignment and channel transition, floodwall and headwall layout & Notes 2 & 3.	
1	8-7-63	Storm drains, electric lines and note added; Syphon deleted. (Am. #1)	

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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.P. C.D. DR. BY R.J.S. CHECK

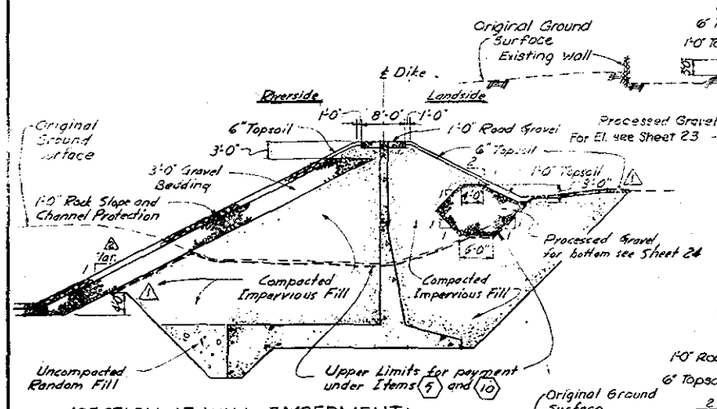
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DIKES AND CHANNEL IMPROVEMENTS
MILL RIVER
PLAN AND PROFILE NO. 2
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: DATE JUNE, 1963
CHIEF, ENGINEERING DIVISION

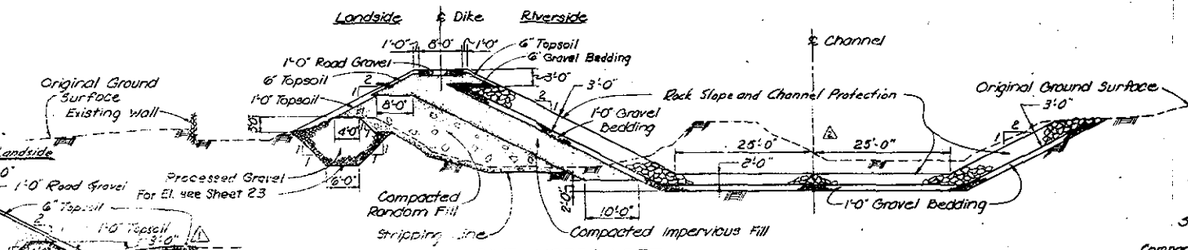
SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 24

O & M PLATE NO. E-12



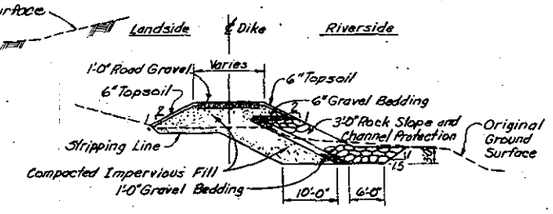
SECTION AT WALL EMBEDMENT

Typical: Dike Lower Right, Sta. 0+12 upstream to end of dike.
Dike Lower Right, Sta. 6+78 downstream to end of dike.
Dike Lower Left, Sta. 4+70 downstream to end of dike.



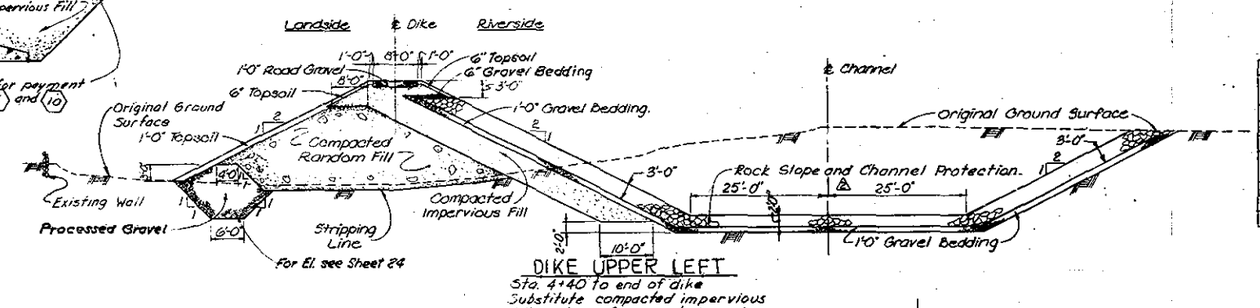
DIKE UPPER LEFT

Sta. 0+55 to Sta. 4+40



DIKE UPPER LEFT

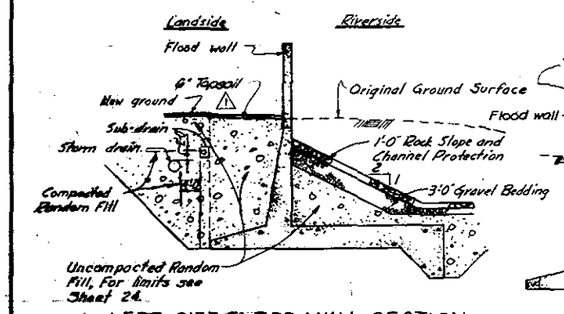
Sta. 0+00 to 0+20
For dike section from Sta. 0+20 to Sta. 0+55, see Sheet 27.



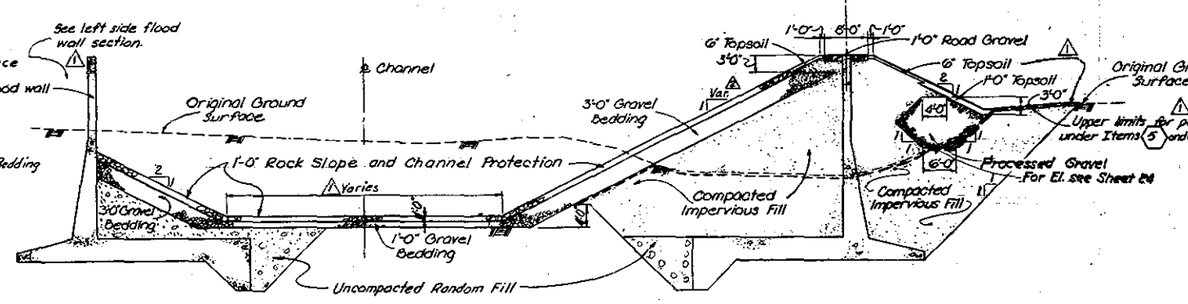
DIKE UPPER LEFT

Sta. 4+40 to end of dike
Substitute compacted impervious fill in place of compacted random fill downstream of Sta. 7+40.

SCHEDULE OF CHANNEL WIDTHS AND SIDE SLOPES			
Channel Stations	Width	Slope of Dike, Channel Side	
		Left Dike	Right Dike
7+36 to 15+26.5	50'	1 (Ver.) : 2.0 (Hor.)	1 (Ver.) : 2.0 (Hor.)
15+26.5 to 16+50	varies	1 : 2.0 ±	1 : 2.0
16+50 to 17+55.2	75'	East School	Street Bridge
17+55.2 to 19+10	varies	1 : 2.0.	1 : 2.27± at 17+80 1 : 2.0 at 19+10
19+10 to 19+45.2	50'	1 : 2.0 to 1 : 1.87	1 : 2.0
19+45.2 to 21+47.6	50'	1 : 1.87 to 1 : 2.0	1 : 2.0
21+47.6 to 24+37.6	50'	1 : 2.0	1 : 2.0



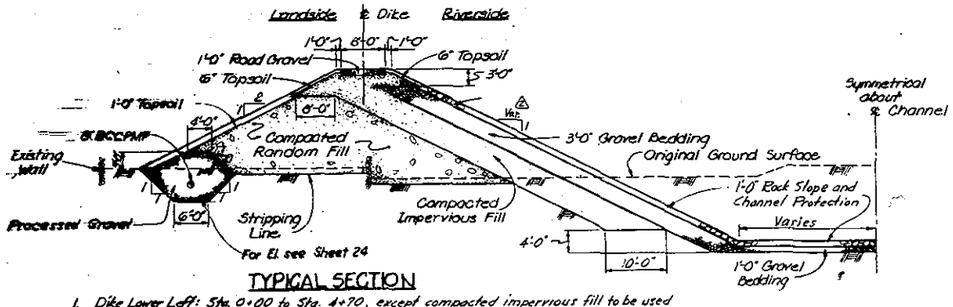
LEFT SIDE FLOOD WALL SECTION DOWNSTREAM OF BRIDGE



SECTION AT CHANNEL STA. 17+85

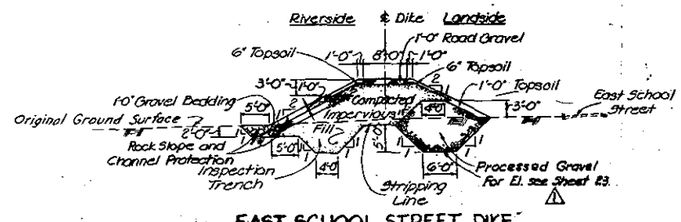
NOTES:

1. Sub drain within zone of processed gravel consists of perforated pipe and observation risers. The processed gravel is not part of the sub drain. For pipe detail, see Sheets 23 and 24.
2.
3. For profiles of bottom of processed gravel zones, see Sheet 24.



TYPICAL SECTION

1. Dike Lower Left: Sta. 0+00 to Sta. 4+70, except compacted impervious fill to be used in place of compacted random fill upstream from Sta. 0+67 and downstream from Sta. 4+20.
2. Dike Lower Right: Sta. 0+00 to Sta. 6+78, except compacted impervious fill to be used in place of compacted random fill upstream from Sta. 0+62 and downstream from Sta. 6+28.



EAST SCHOOL STREET DIKE

1. Omit Inspection Trench sta. 5+05 to sta. 3+88
2. Omit Processed Gravel sta 7+65 to sta 3+88
3. All fill (backfill) in excavation area for adjoining flood wall for a distance of 35' from the end of the wall, shall be Compacted Impervious Fill.

GRAPHIC SCALES (1"=10') 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY
4	4-14-69	Revised channel widths and slopes; added schedule	
3	8-14-63	Added topsoil, notes; moved payment line and deleted Note 2; changed station. (Am #3)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY P.R.C.N. DR. BY R.A.S.C.S. CK. BY
NUMBERS
ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH
CHIEF, ENGINEERING DIVISION

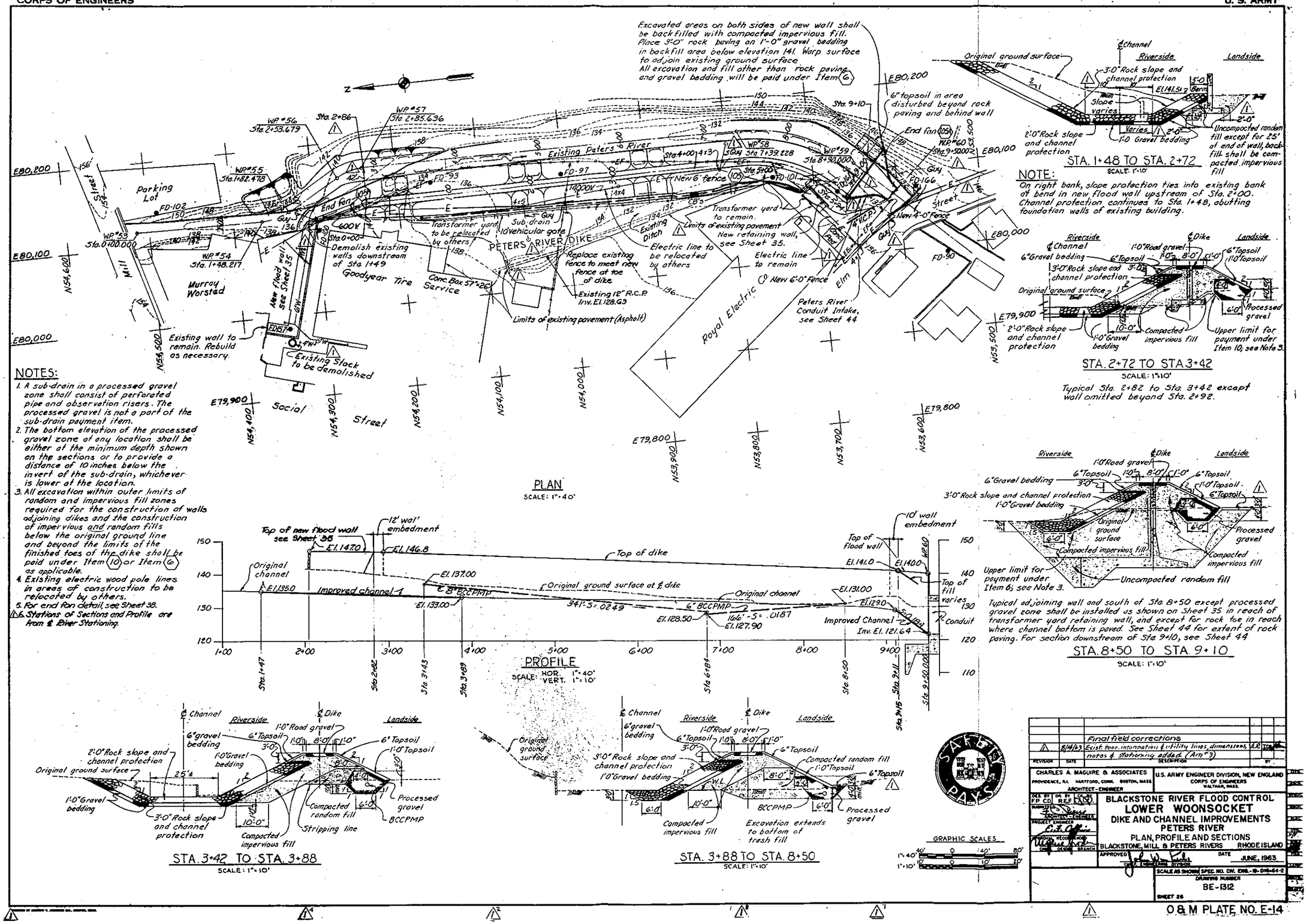
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DIKE AND CHANNEL IMPROVEMENTS
MILL RIVER
SECTIONS

BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

APPROVED: DATE JUNE, 1963

SCALE 1"=10' SPEC. NO. CIV. ENG-19-066-63-2
DRAWING NUMBER BE-1312
SHEET 29

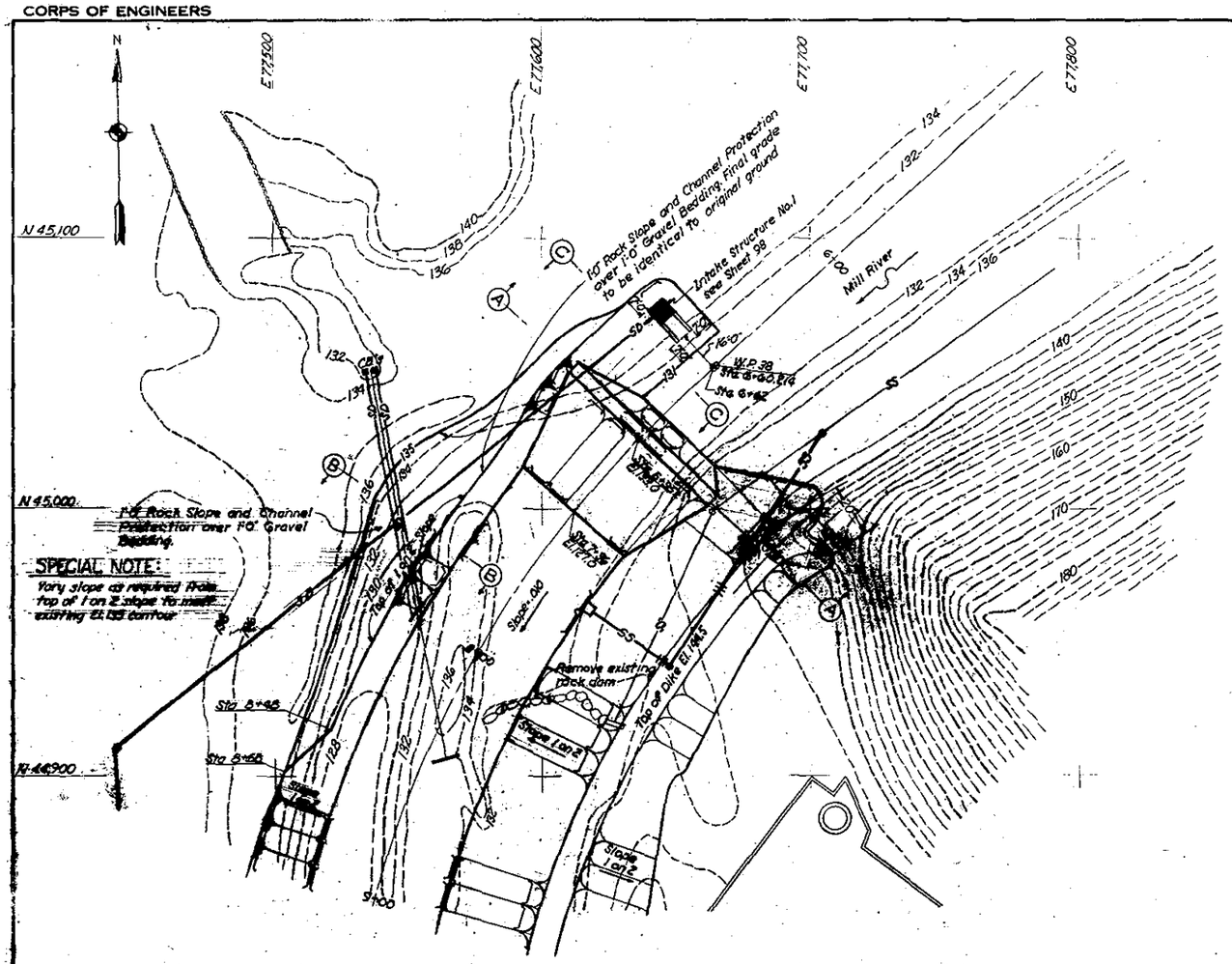
O & M PLATE NO. E-13



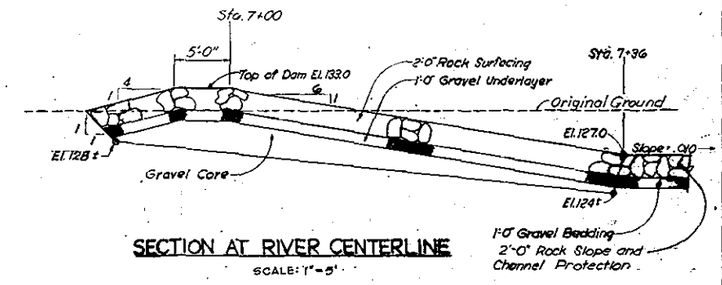
NOTES:

1. A sub-drain in a processed gravel zone shall consist of perforated pipe and observation risers. The processed gravel is not a part of the sub-drain payment item.
2. The bottom elevation of the processed gravel zone at any location shall be either at the minimum depth shown on the sections or to provide a distance of 10 inches below the invert of the sub-drain, whichever is lower at the location.
3. All excavation within outer limits of random and impervious fill zones required for the construction of walls adjoining dikes and the construction of impervious and random fills below the original ground line and beyond the limits of the finished toes of the dike shall be paid under Item 10 or Item 6 as applicable.
4. Existing electric wood pole lines in areas of construction to be relocated by others.
5. For end fan detail, see Sheet 38.
6. Stations of Sections and Profile are from ℄ River Stationing.

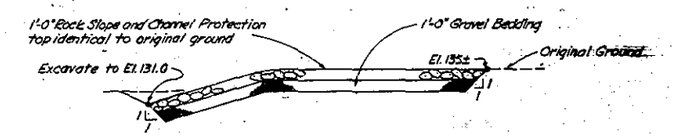
O & M PLATE NO. E-14



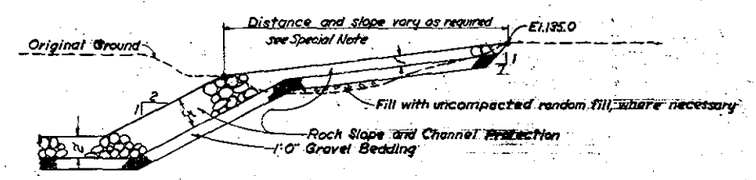
PLAN
SCALE: 1" = 20'



SECTION AT RIVER CENTERLINE
SCALE: 1" = 5'

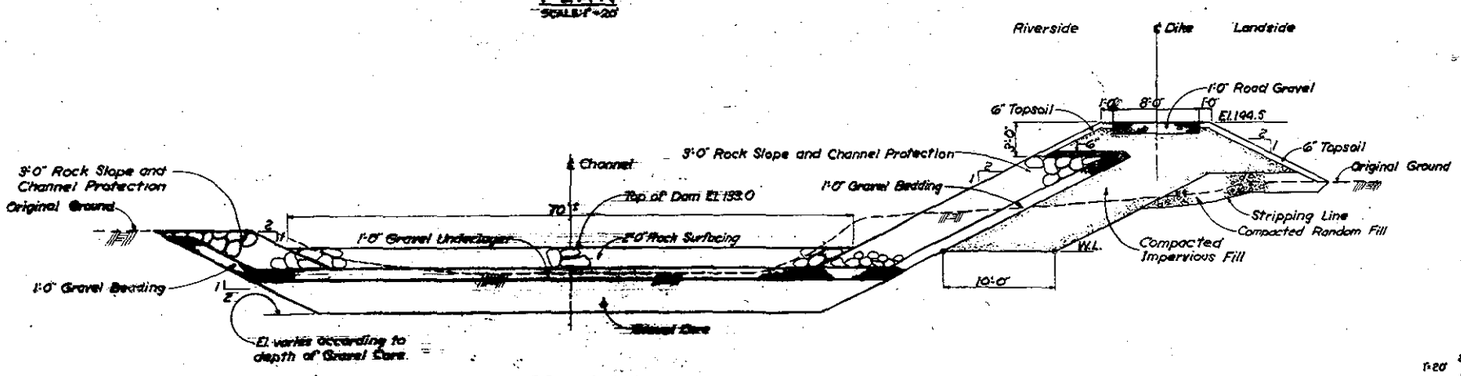


SECTION C-C
SCALE: 1" = 5'



SECTION B-B
SCALE: 1" = 5'

NOTES:
1. For grading, drainage, and utility modifications see Sheets 85 and 89
2. Dam is defined as consisting only of gravel core, gravel underlayer, and rock surfacing to be paid under Item 85



SECTION A-A
SCALE: 1" = 5'

GRAPHIC SCALES
1" = 20' 20 0 20 40
1" = 5' 5 0 5 10

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT - ENGINEER

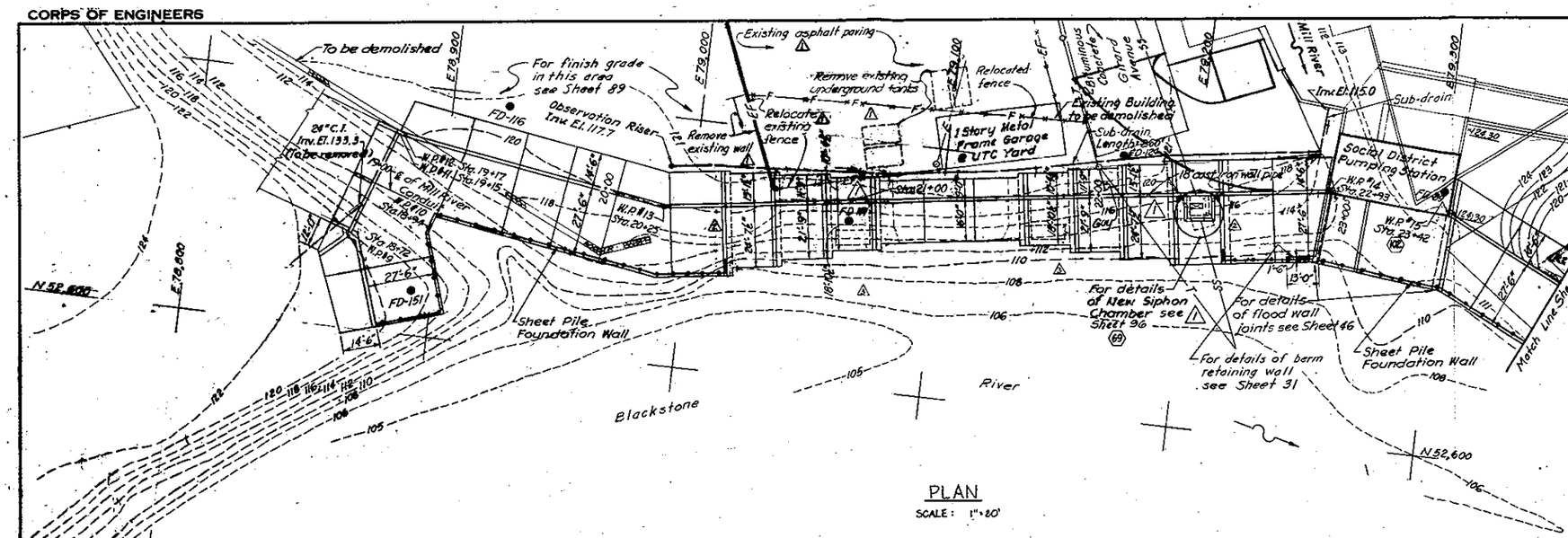
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
NEW MILL RIVER DAM
PLAN AND SECTIONS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: Chief, Engineering Division
DATE: JUNE, 1963
SCALE AS SHOWN
SPEC. NO. CIV. ENG-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 27

CORPS OF ENGINEERS

U. S. ARMY

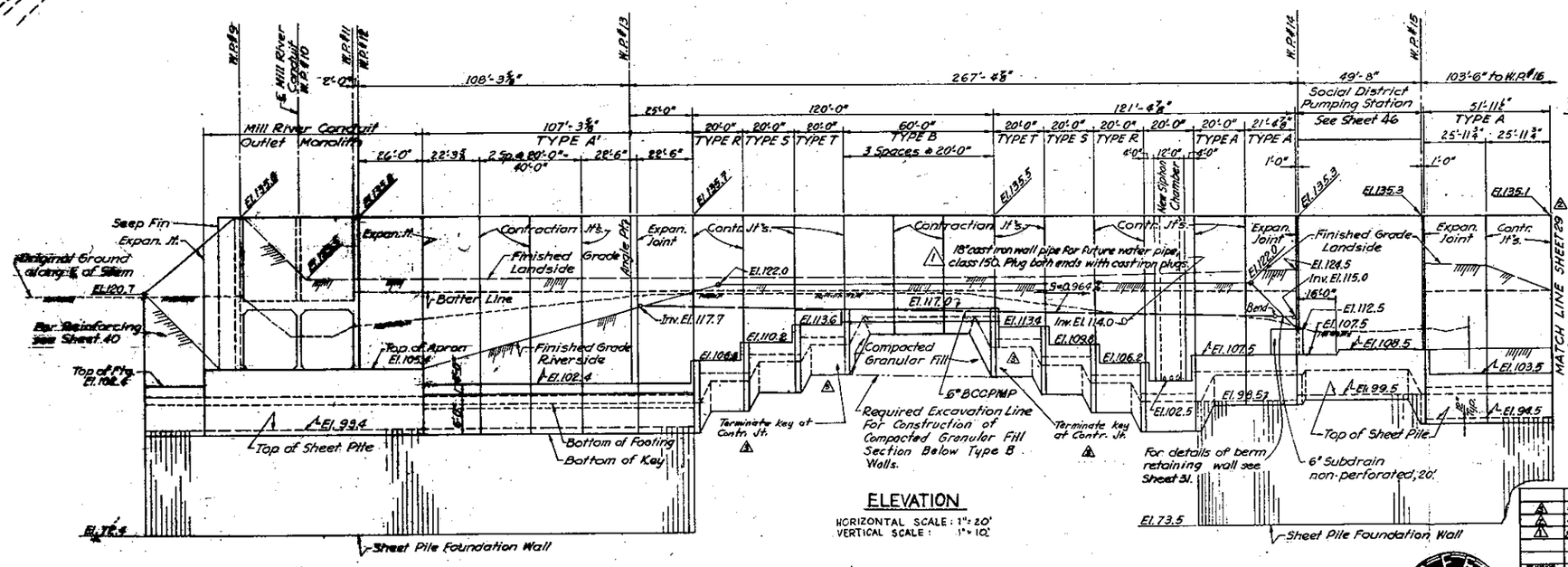


PLAN

SCALE: 1" = 20'

GENERAL CONCRETE NOTES:

1. All Reinforcement shall be lapped a minimum of 24 equivalent bar diameter.
2. All exposed edges to have 1" Chamfer, unless otherwise noted.
3. Concrete protection of steel reinforcing shall be 4" Min. in base, 3" in stems and top of Base, unless otherwise noted.
4. All Construction Joints to be flush type.
5. Bends and hooks shall be as detailed in the Manual of Standard Practice for Detailing Reinforced Concrete Structures of the American Concrete Institute.
6. Construction Joints at locations not indicated must be approved by the Contracting Officer.
7. Payment for furnishing, bending and placing of all steel reinforcement will be paid for under Item 95.
8. Portland cement shall be paid for under Item 94.
9. All level concrete surfaces shall be sloped to drain.



ELEVATION

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'

NOTES:

1. For reinforcing details see Sheets 30 and 31.
2. For details of Joints see Sheet 30.
3. Wall transitions are shown on Sheet 31.
4. For details of utilities see Sheets 89 and 91.
5. For finish grade see sections on Sheet 20.
6. For Mill River Conduit details see Sheet 37.
7. W.P. Stations shown on this sheet are to nearest foot; see Sheet No. 9 for exact station.

REVISION	DATE	DESCRIPTION	BY
3	6-5-69	Keys for Wall T revised.	
2	4-14-69	Revised limits of sheet piling; added note.	
1	8-14-63	Limits of paving, fencing & drain line revised. Notes & wall pipe added. Exist topography shown. (Am #3)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY AR | DR. BY KD | CK. BY

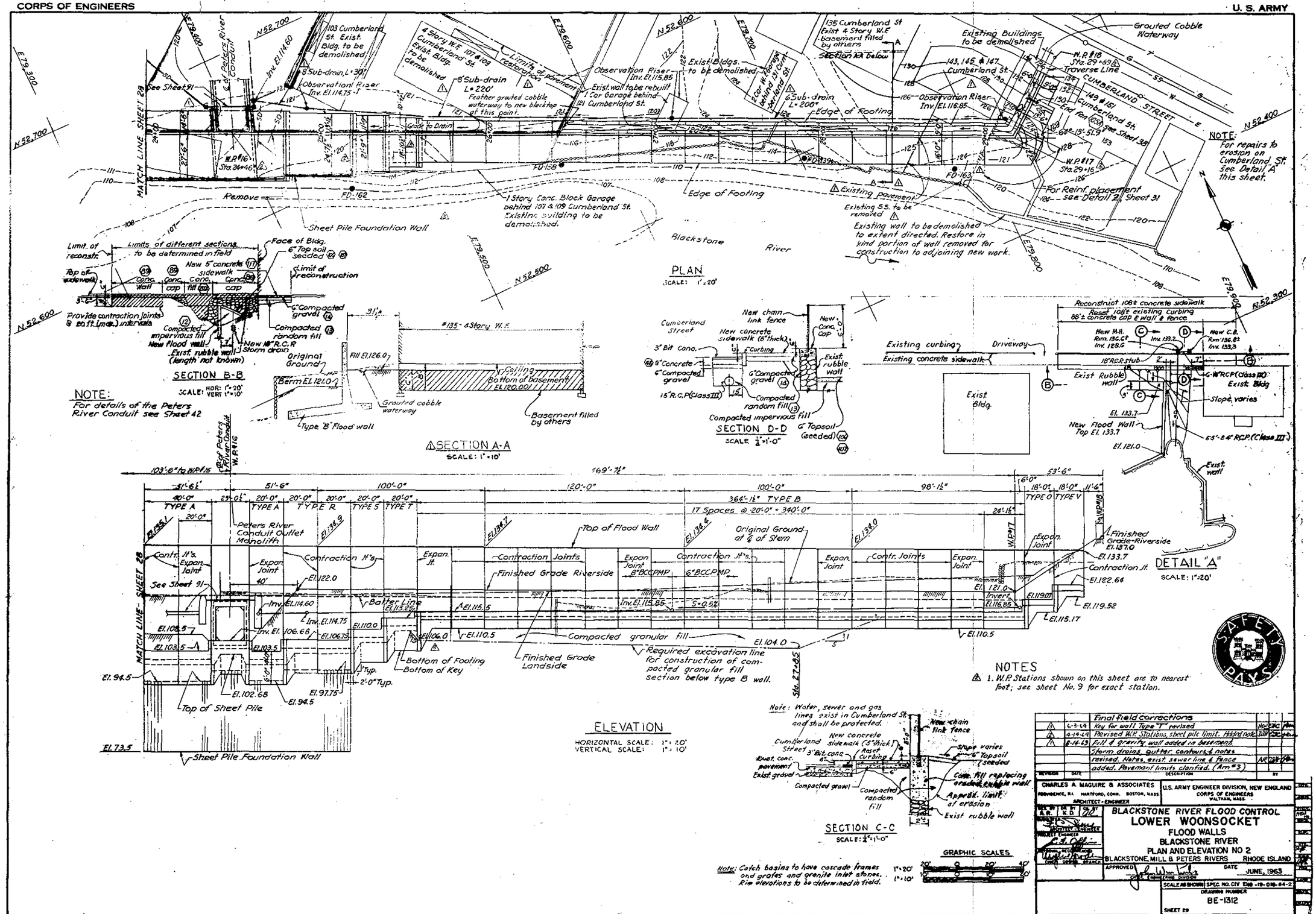
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
BLACKSTONE RIVER
PLAN AND ELEVATION NO. 1
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

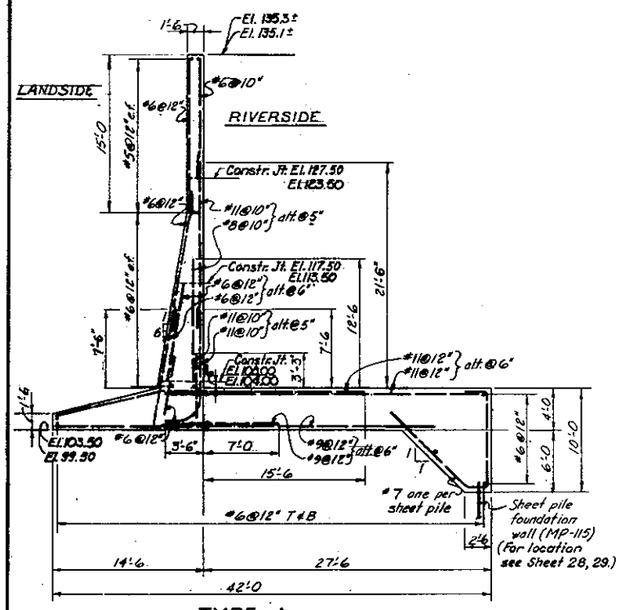
APPROVED
DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-[illegible]
DRAWING NUMBER BE-1312
SHEET 28

GRAPHIC SCALES
1" = 20'
1" = 10'

O & M PLATE NO. E-16

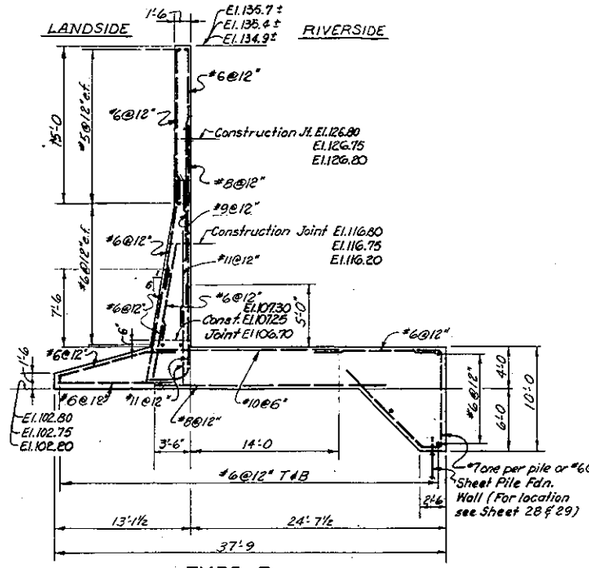

PLAN
SCALE: 1" = 20'
SECTION B-B
SCALE: HOR: 1" = 20' VERT 1" = 10'
SECTION A-A
SCALE: 1" = 10'
SECTION D-D
SCALE 1/4" = 1'-0"
ELEVATION
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'
SECTION C-C
SCALE: 1/4" = 1'-0"
DETAIL "A"
SCALE: 1" = 20'
GRAPHIC SCALES
NOTE: For details of the Peters River Conduit see Sheet 42
NOTE: For repairs to erosion on Cumberland St. see Detail "A" this sheet.
NOTES
1. W.P. Stations shown on this sheet are to nearest foot; see sheet No. 9 for exact station.
Blackstone River
CUMBERLAND STREET
MATCH LINE SHEET 28
MATCH LINE - SHEET 28
Sheet Pile Foundation Wall
Top of Sheet Pile
Peters River Conduit Outlet Monolith
Top of Flood Wall
Original Ground at ℄ of Stem
Finished Grade Riverside
Finished Grade Landside
Compacted granular fill
Required excavation line for construction of compacted granular fill section below type B wall.
Bottom of Footing
Bottom of Key
Batter Line
Contraction Joints
Expan. Joint
Contr. Joints
Type 'B' Flood wall
Grouted cobble waterway
Basement filled by others
Compacted random fill
Compacted impervious fill
Exist. rubble wall
Exist. Bldg.
Driveway
Existing curbing
Existing concrete sidewalk
Reconstruct 108± concrete sidewalk
Reset 108± existing curbing
88'± concrete cap & wall & fence
Slope varies
New Flood Wall Top El. 133.7
Exist. wall
Finished Grade=Riverside El. 133.0
Contraction Jt.
Note: Water, sewer and gas lines exist in Cumberland St. and shall be protected.
Note: Catch basins to have cascade frames and grates and granite inlet stones. Rim elevations to be determined in field.
Final field corrections
6-3-64 Key for wall Type "T" revised
4-14-64 Revised W.P. Stations, sheet pile limit. Field note
8-14-63 Fill & gravity wall added on basement. Storm drains, gutter, contours & notes revised. Notes, exist sewer line & fence added. Pavement limits clarified. (Am #3)
REVISION DATE DESCRIPTION BY
CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT - ENGINEER
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
BLACKSTONE RIVER
PLAN AND ELEVATION NO 2
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
DATE JUNE, 1963
SCALE AS SHOWN
SPEC. NO. CIV Eng-19-018-64-2
DRAWING NUMBER
BE-1312
SHEET 29
SAFETY PAYS



TYPE A

SCALE: 3/16"=1'-0"

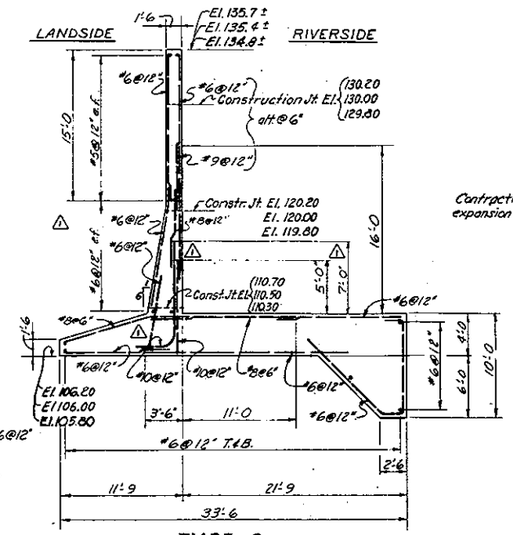
89 94 95



TYPE R

SCALE: 3/16"=1'-0"

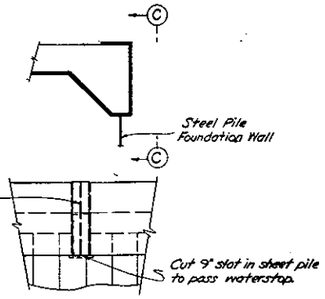
89 94 95



TYPE S

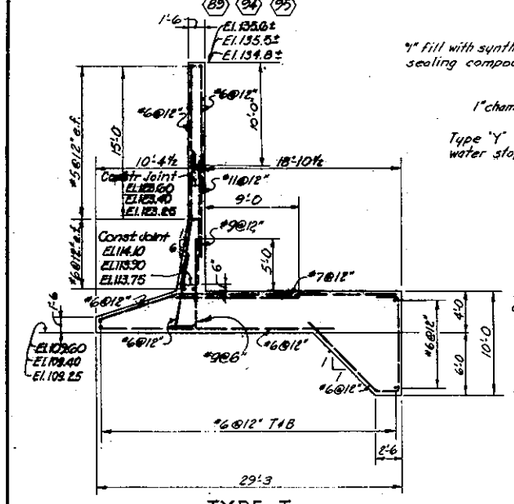
SCALE: 3/16"=1'-0"

89 94 95



SECTION C-C

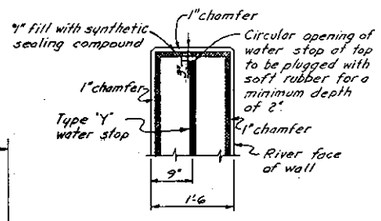
NOT TO SCALE



TYPE T

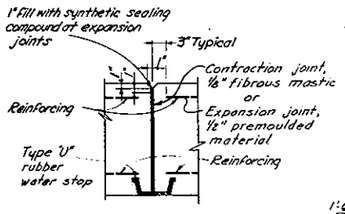
SCALE: 3/16"=1'-0"

89 94 95



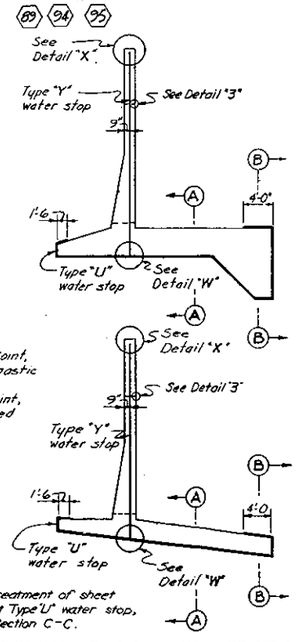
DETAIL X

SCALE: 1"=1'-0"



SECTION A-A

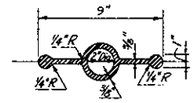
NOT TO SCALE



Note:
For treatment of sheet pile at Type "U" water stop, see Section C-C.

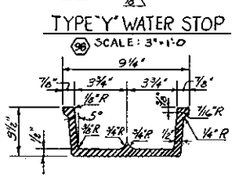
TYPICAL FLOOD WALL SECTIONS

NOT TO SCALE



TYPE "Y" WATER STOP

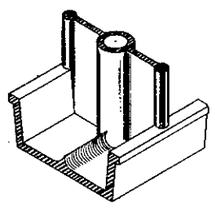
98 SCALE: 3"=1'-0



TYPE "U" WATER STOP

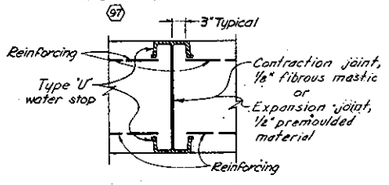
SCALE: 3"=1'-0

97



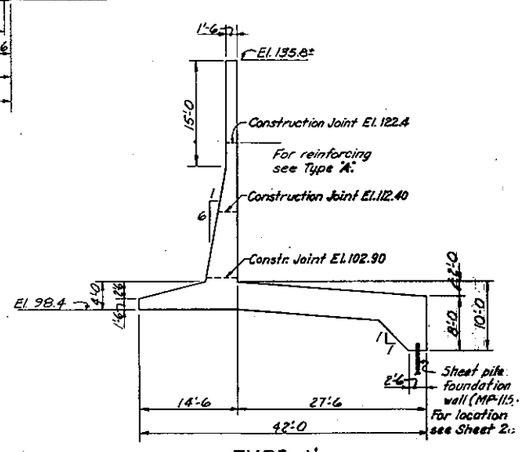
DETAIL W

SCALE: 3"=1'-0



SECTION B-B

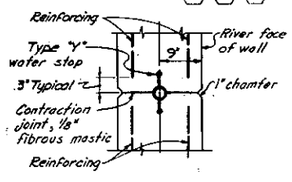
NOT TO SCALE



TYPE A'

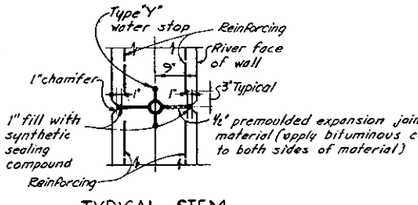
SCALE: 3/16"=1'-0"

89 94 95



TYPICAL STEM CONTRACTION JOINT

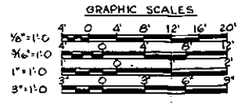
SCALE: 1"=1'-0



TYPICAL STEM EXPANSION JOINT

SCALE: 1"=1'-0

GRAPHIC SCALES



REVISION	DATE	DESCRIPTION	BY
1	1-23-64	Revised reinf. Type "S", deleted Const. Jt. Detail 3	JW

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY A.R. | DR. BY | CK. BY

ARCHITECT-ENGINEER

PROJECT ENGINEER

CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
BLACKSTONE RIVER
SECTIONS AND DETAILS NO. 1

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION

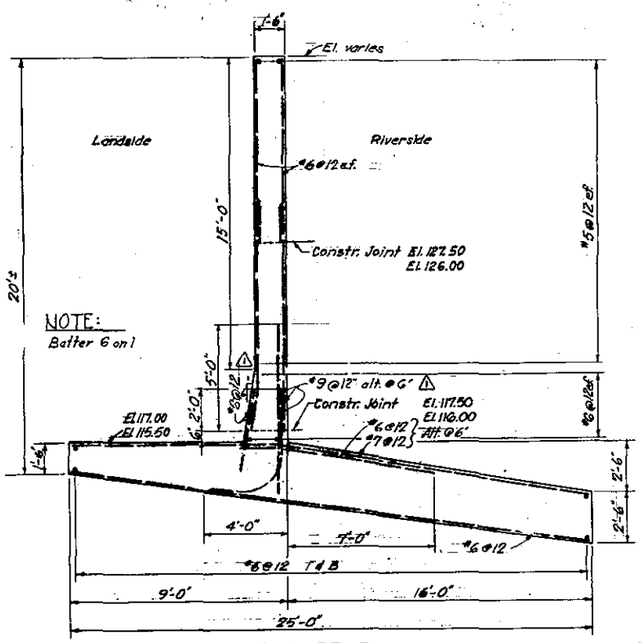
DATE: 4 JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-018-64-2

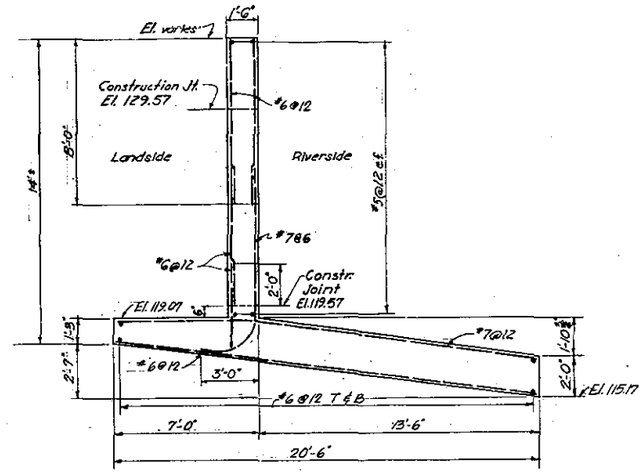
DRAWING NUMBER
BE-1312

SHEET 30

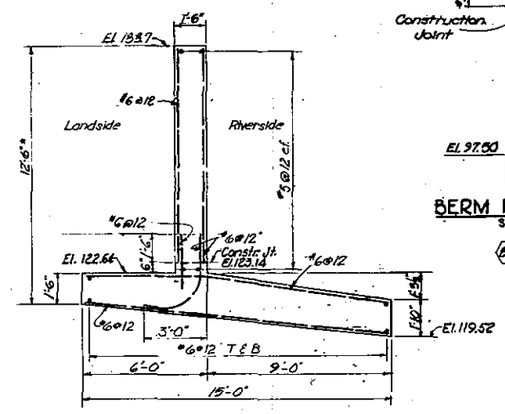
O & M PLATE NO. E-18



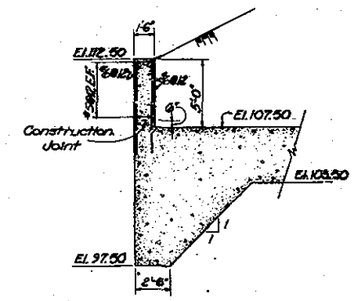
TYPE B
SCALE: 3/8" = 1'-0"
(89) (94) (95)



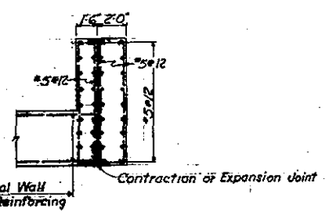
TYPE O
SCALE: 3/8" = 1'-0"
(89) (94) (95)



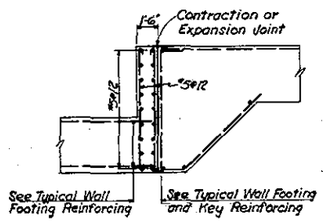
TYPE V
SCALE: 3/8" = 1'-0"
(89) (94) (95)



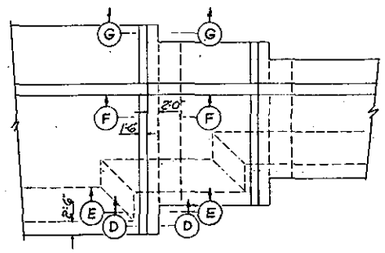
BERM RETAINING WALL
SCALE: 1/4" = 1'-0"
(89) (94) (95)



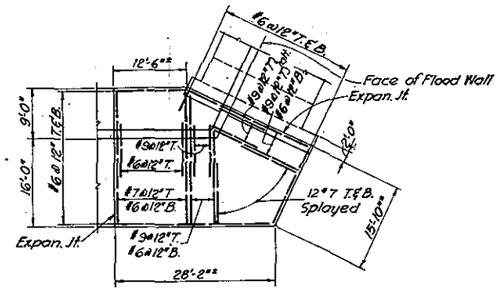
SECTION G-G
SCALE: 1/4" = 1'-0"



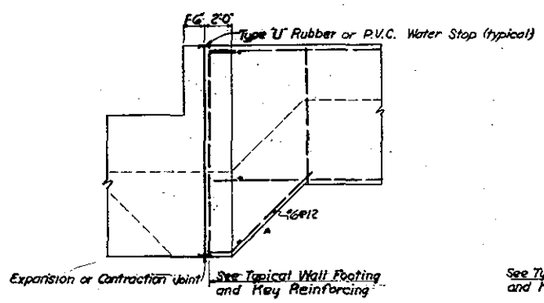
SECTION F-F
SCALE: 1/4" = 1'-0"



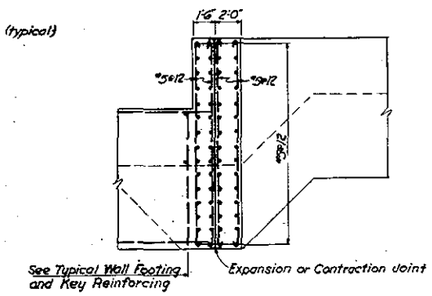
FOOTING PLAN



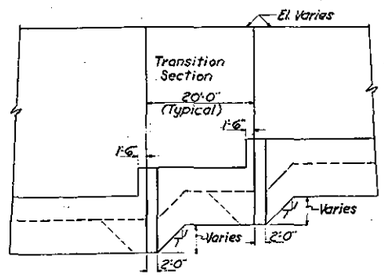
DETAIL Z
SCALE: 1" = 10'



SECTION E-E
SCALE: 1/4" = 1'-0"



SECTION D-D
SCALE: 1/4" = 1'-0"



ELEVATION

TYPICAL WALL TRANSITION
SCALE: 1" = 10'

GRAPHIC SCALES
1/4" = 1'-0"
3/8" = 1'-0"
1" = 10'

REVISION	DATE	DESCRIPTION	BY
△	1-23-69	Added slope to Type "B" Revised reinf. Type "B"	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

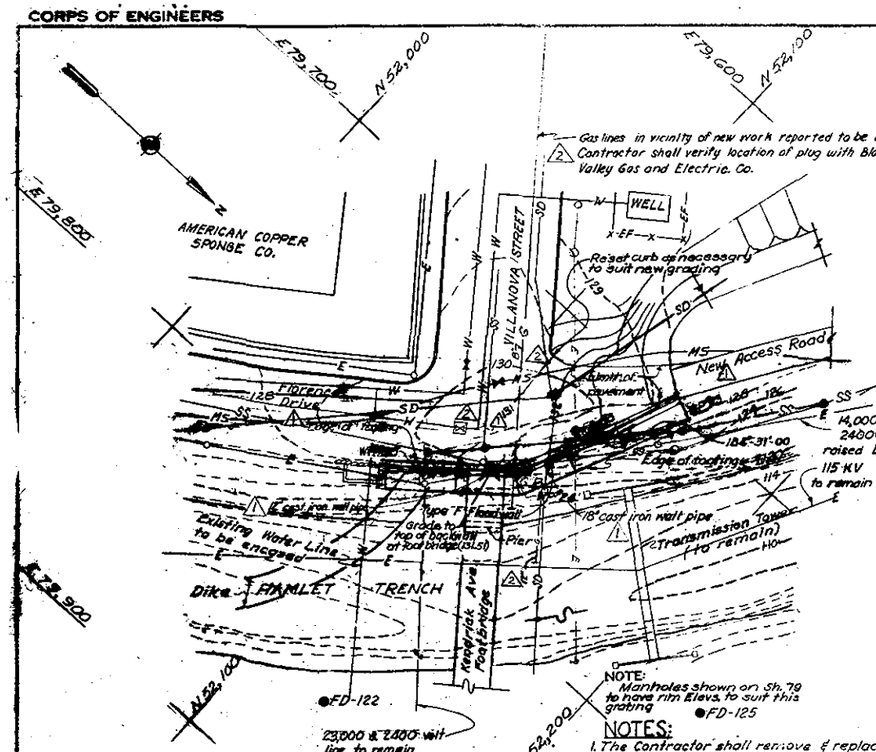
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY A.R. DR. BY D.P.T.
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
BLACKSTONE RIVER
SECTIONS AND DETAILS NO. 2
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-08-64-2
DRAWING NUMBER BE-1312
SHEET 31

O & M PLATE NO. E-19



NOTE:
Manholes shown on Sh. 79 to have rim Elevs. to suit this grading

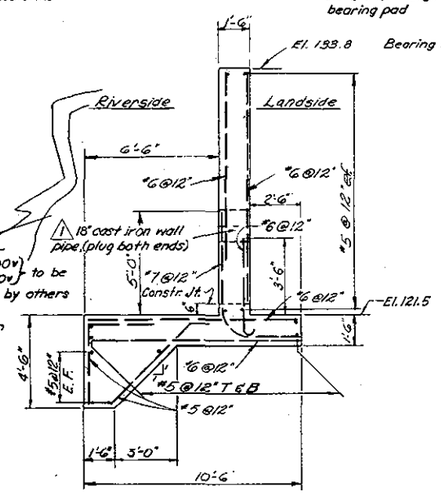
NOTES:
1. The Contractor shall remove & replace the end span of the existing Kendrick Avenue Footbridge to allow for the construction of the flood wall.
2. See Sheet 79 for utilities.
3. Cast iron wall pipes for future water pipes, class 150. Plug both ends with cast iron plugs. Exact location to be furnished by Contracting Officer.

COORDINATES

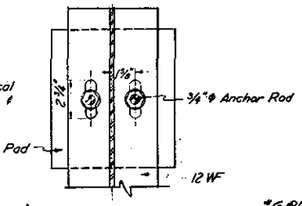
W.P.	North	East
23	52,102,100	79,700.200
24	52,102,352	79,756.278
25	52,101,900	79,777.109

W.P. #23, 24 & 25 are at the toes of the Stem

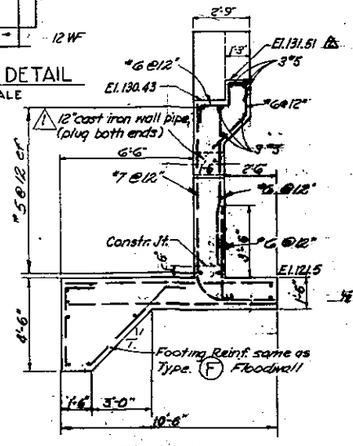
PLAN
SCALE: 1" = 20'



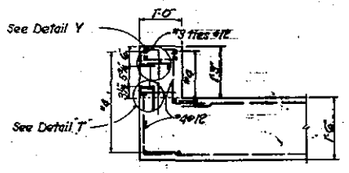
TYPE F
SCALE 3/8" = 1'-0"



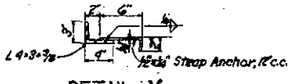
BEARING DETAIL
NOT TO SCALE



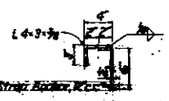
ABUTMENT
SCALE: 3/8" = 1'-0"



TYPICAL REINFORCING IN WALL RETURN
SCALE: 3/4" = 1'-0"

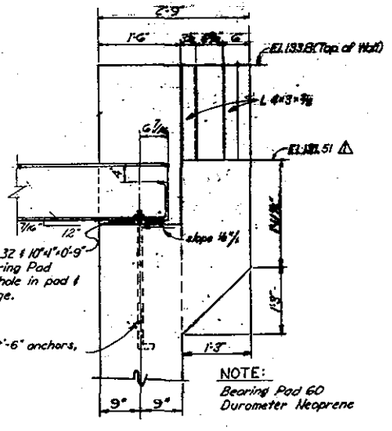


DETAIL Y
SCALE: 3/4" = 1'-0"



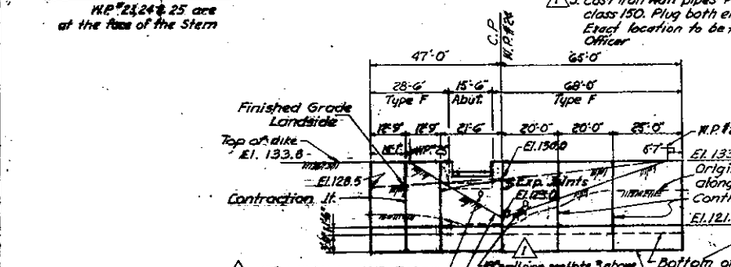
DETAIL T
SCALE: 3/4" = 1'-0"

NOTES:
1. All Elevations & dimensions are to be verified in the field before dismantling the Footbridge end span.
2. Stop logs 6" x 12" (nominal) timbers S4S. Approximate length 14'-0" cut to sliding fit in field. See specifications for security provisions.

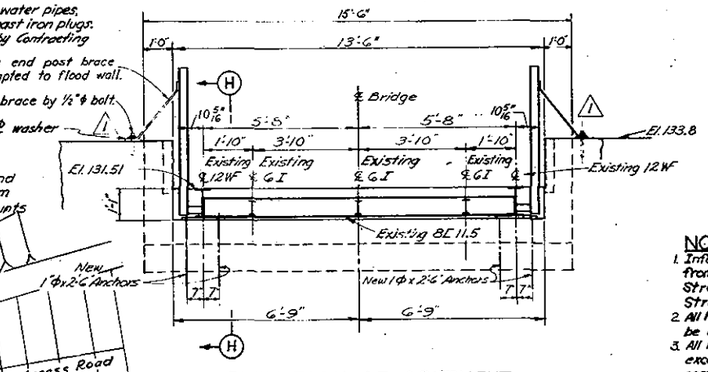


NOTE:
Bearing Pad 60 Durometer Neoprene

SECTION H-H
SCALE 1" = 1'-0"



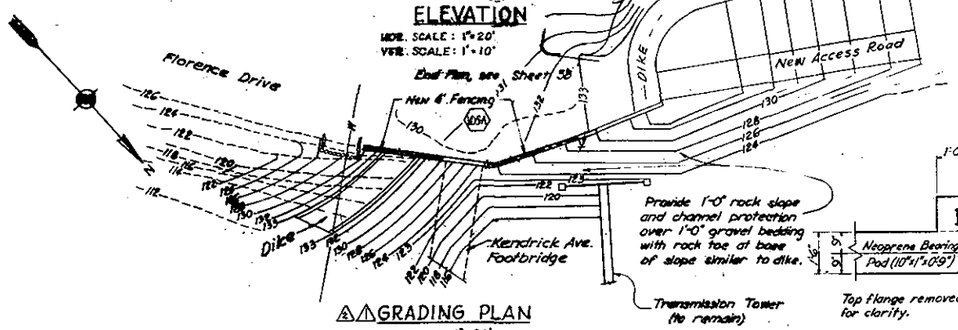
ELEVATION
HOR. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'



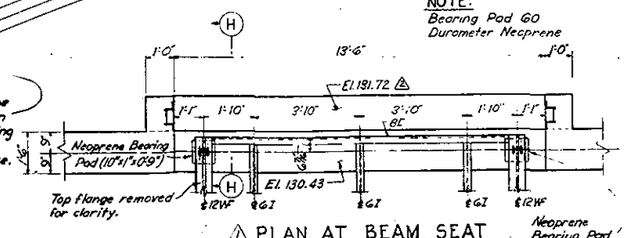
ELEVATION OF ABUTMENT
SCALE: 1/2" = 1'-0"

NOTES:
1. Information for existing Bridge taken from reference drawings of Lowland Street Bridge by Eastern Bridge & Structural Company, dated 8-13-34.
2. All Fill (Backfill) Riverside of wall shall be compacted impervious fill.
3. All Fill (Backfill) in Landside excavation area of wall shall be compacted random fill.
4. For details of 12" wall pipe see sheet 73.

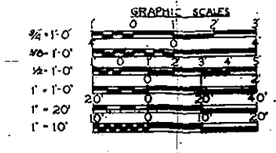
NOTE:
Bearing Pad 60 Durometer Neoprene



GRADING PLAN
SCALE: 1" = 20'



PLAN AT BEAM SEAT
SCALE 1/2" = 1'-0"



REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	4-14-64	Note added. Gas and water line layout, access road grades, and wall elev. revised.	
1	8/14/63	Abut. & bearing details, notes & symbol revised.	
		Notes, and post braces & wall pipes added (Am #3)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY N.T. | DR. BY W.B. | CK. BY

ARCHITECT - ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
BLACKSTONE RIVER
VILLANOVA STREET AT FOOTBRIDGE
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

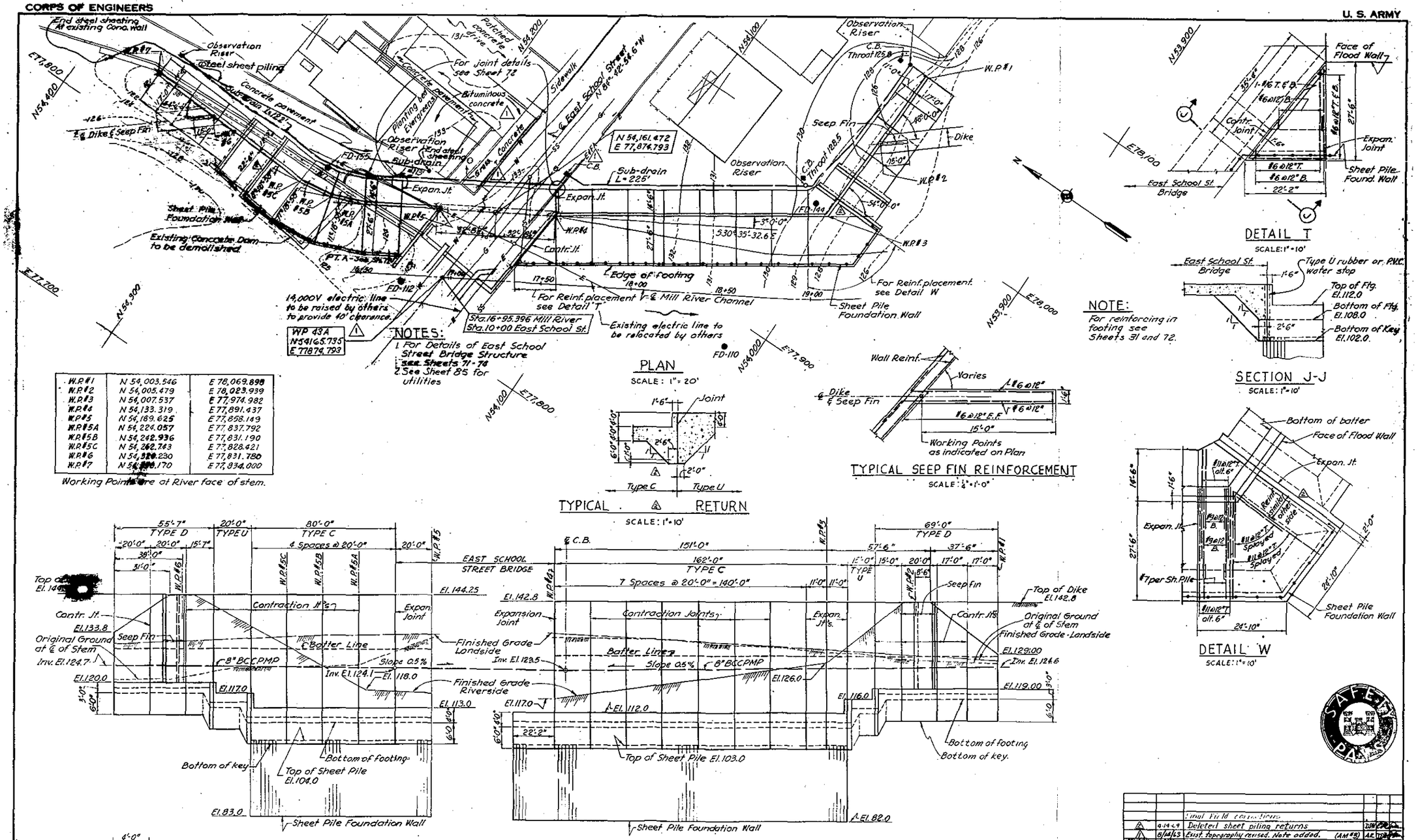
APPROVED: DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. OIV. ENG-19-040-64-3
DRAWING NUMBER BE-1312
SHEET 35.

O & M PLATE NO. E-20

CORPS OF ENGINEERS

U. S. ARMY



W.P.#1	N 54,003.546	E 78,069.898
W.P.#2	N 54,005.479	E 78,023.939
W.P.#3	N 54,007.537	E 77,974.982
W.P.#4	N 54,133.319	E 77,891.437
W.P.#5	N 54,189.625	E 77,858.149
W.P.#5A	N 54,224.057	E 77,837.792
W.P.#5B	N 54,242.936	E 77,831.190
W.P.#5C	N 54,262.783	E 77,828.421
W.P.#6	N 54,[illegible].230	E 77,831.780
W.P.#7	N 54,[illegible].170	E 77,834.000

Working Points are at River face of stem.

NOTES:

1. For Details of East School Street Bridge Structure see Sheets 71-76
2. See Sheet 85 for utilities

PLAN

SCALE: 1" = 20'

TYPICAL ⚠ RETURN

SCALE: 1" = 10'

TYPICAL SEEP FIN REINFORCEMENT

SCALE: 1/4" = 1'-0"

DETAIL T

SCALE: 1" = 10'

NOTE:

For reinforcing in footing see Sheets 31 and 72.

SECTION J-J

SCALE: 1" = 10'

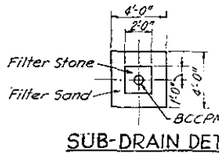
DETAIL W

SCALE: 1" = 10'

ELEVATION

HORIZONTAL SCALE: 1" = 20'

VERTICAL SCALE: 1" = 10'



SUB-DRAIN DETAIL

For sub-drains in random fill, perforated pipe reach only.

SCALE: 1/4" = 1'-0"

GRAPHIC SCALES

1" = 1'-0" 1" = 20' 1" = 10'

REVISION	DATE	DESCRIPTION	BY
		Final Field Corrections	
4	4-14-69	Deleted sheet piling returns	DJW
3	8/14/63	Exist. topography revised. Note added. (AM #8)	AE

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY A.R. | DR. BY K.D. | CK. BY

SUBMITTED: Architect-Engineer

PROJECT ENGINEER

APPROVD. RECOMMENDED: Chief, Design Branch

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
EAST SCHOOL STREET
PLAN AND ELEVATION NO. 1

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: Chief, Engineering Division

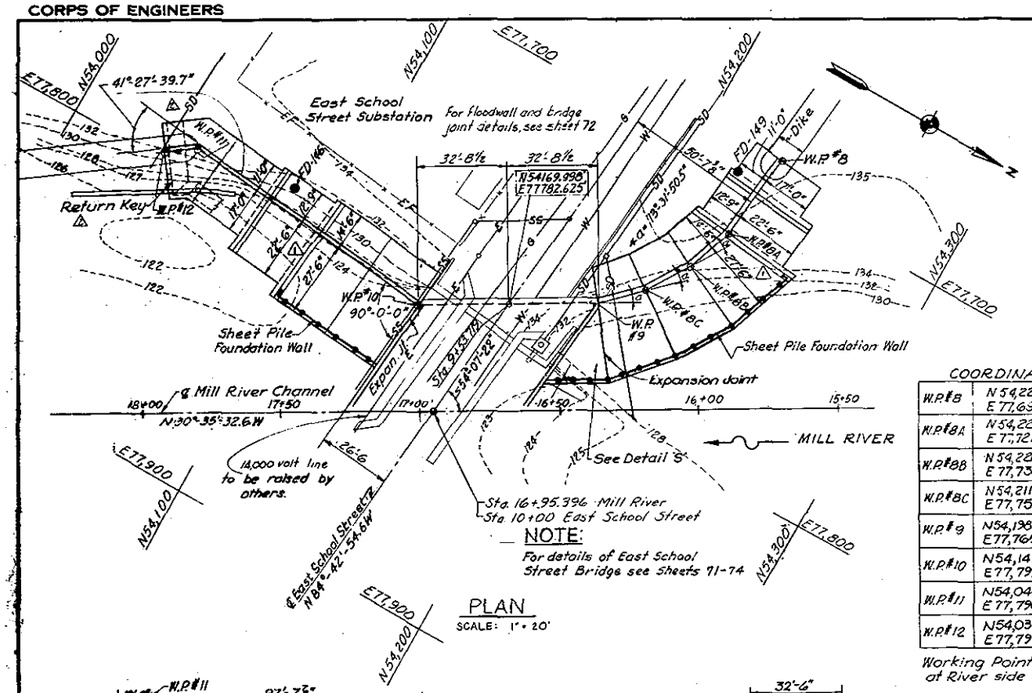
DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-018-64-2

DRAWING NUMBER BE-1312

SHEET 33

O & M PLATE NO. E-21

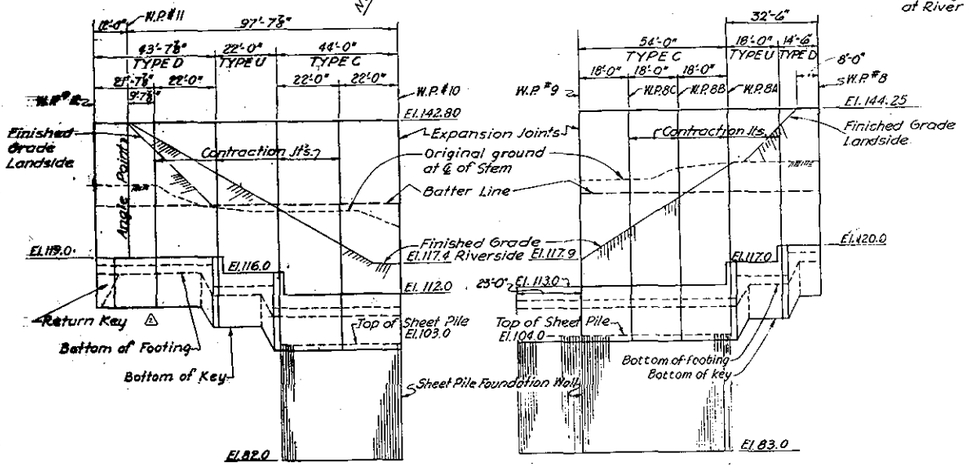


PLAN
SCALE: 1" = 20'

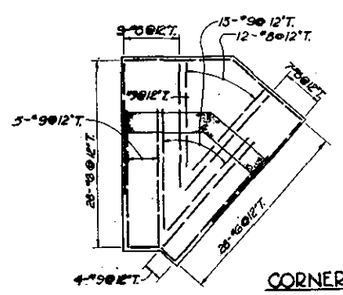
NOTE:
For details of East School Street Bridge see Sheets 71-74

COORDINATES	
W.P. #8	N 54,229.501 E 77,633.842
W.P. #8A	N 54,226.508 E 77,721.204
W.P. #8B	N 54,220.703 E 77,738.242
W.P. #8C	N 54,211.072 E 77,753.449
W.P. #9	N 54,138.151 E 77,765.981
W.P. #10	N 54,141.646 E 77,799.269
W.P. #11	N 54,044.610 E 77,790.276
W.P. #12	N 54,034.924 E 77,797.358

Working Points are at River side of Stem

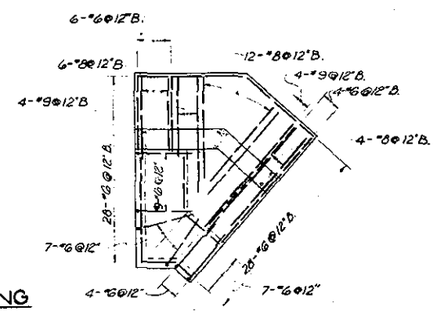


ELEVATION
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'

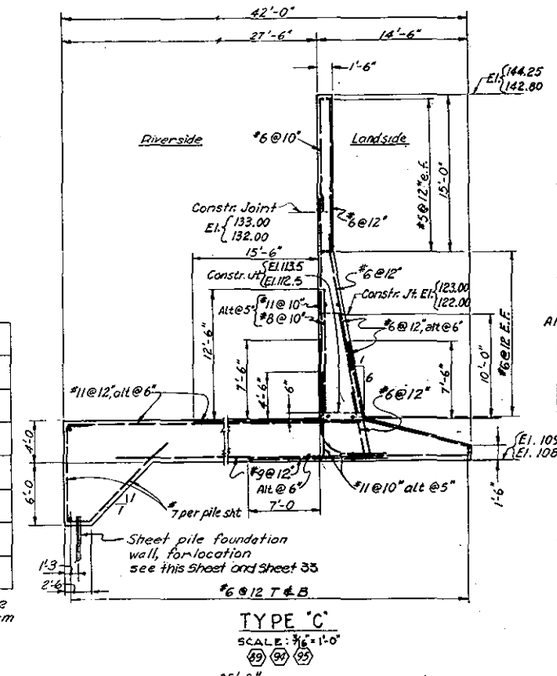


TOP STEEL
SCALE: 3/16" = 1'-0"

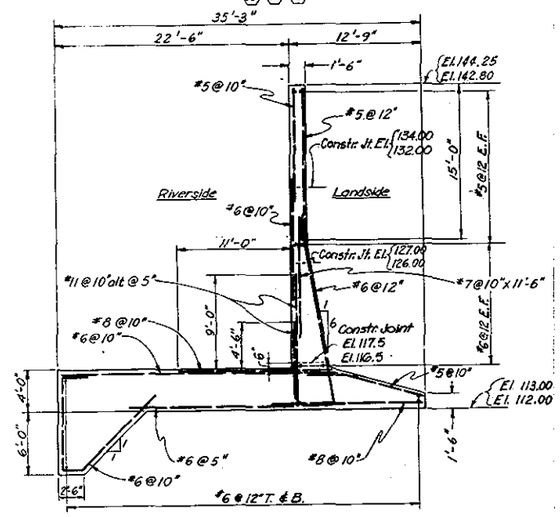
CORNER FOOTING REINFORCING
(TYPE D)



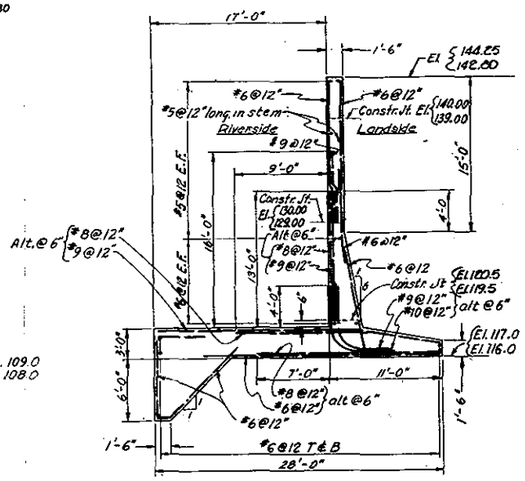
BOTTOM STEEL
SCALE: 3/16" = 1'-0"



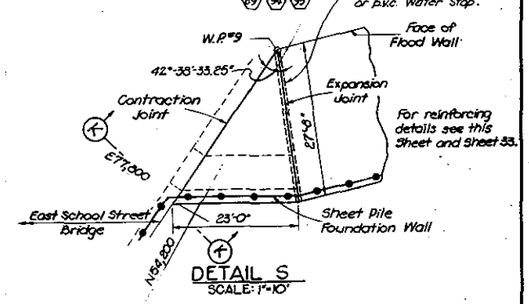
TYPE "C"
SCALE: 3/16" = 1'-0"
(89) (94) (95)



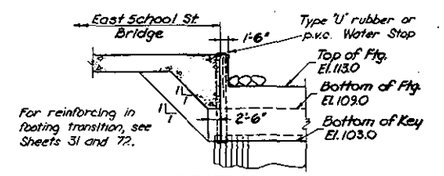
TYPE "U"
SCALE: 3/16" = 1'-0"
(93) (94) (95)



TYPE "D"
SCALE: 3/16" = 1'-0"
(89) (94) (95)



DETAIL S
SCALE: 1" = 10'



SECTION K-K
SCALE: 1" = 10'

GRAPHIC SCALES
3/16" = 1'-0"
1" = 20'
1" = 10'

REVISION	DATE	DESCRIPTION	BY
4	5-5-69	Key for Wall D @ W.P. #12 revised	
1	9-19-69	Deleted sheet piling returns	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY A.R. DR. BY K.D. CK. BY

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
EAST SCHOOL STREET
PLAN AND ELEVATION NO. 2
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

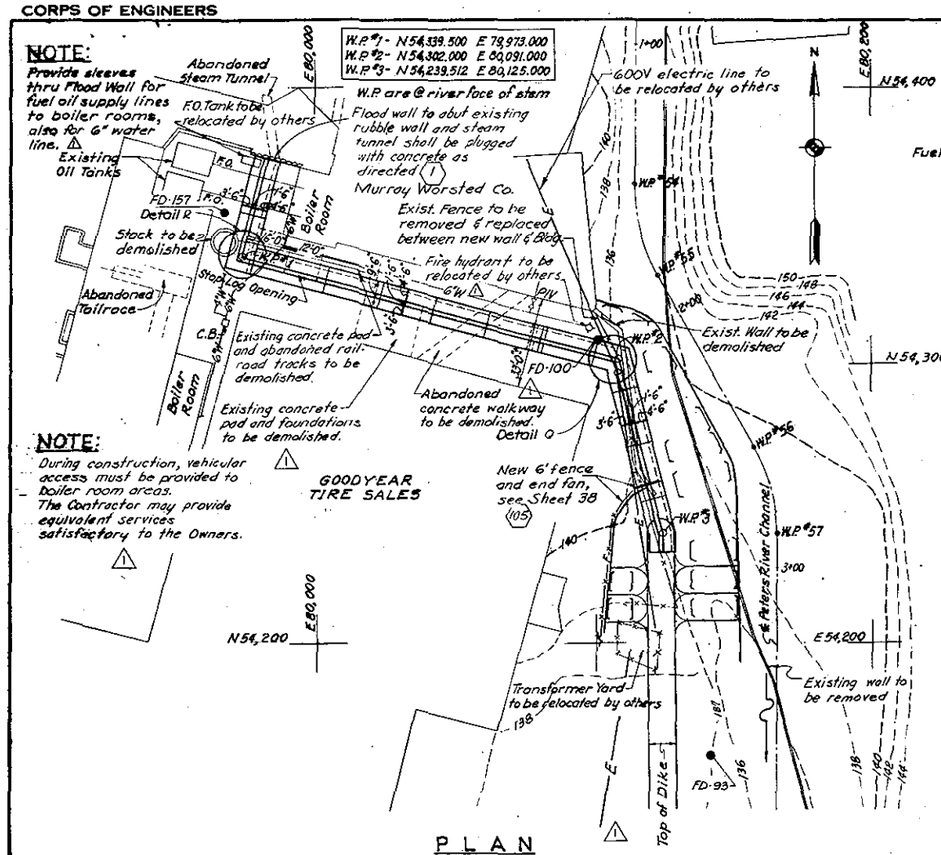
APPROVED DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-010-64-2
DRAWING NUMBER BE-1312
SHEET 34

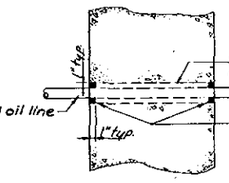
O & M PLATE NO. E-22

NOTE:
Provide sleeves thru Flood Wall for fuel oil supply lines to boiler rooms, also for 6" water line.

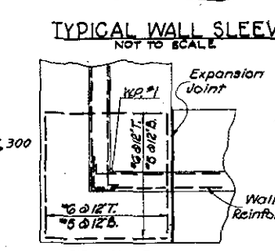
NOTE:
During construction, vehicular access must be provided to boiler room areas. The Contractor may provide equivalent services satisfactory to the Owners.



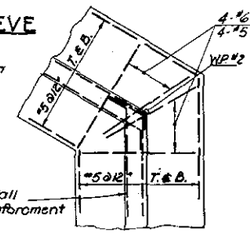
PLAN
PETERS RIVER FLOOD WALL
SCALE: 1"=20'



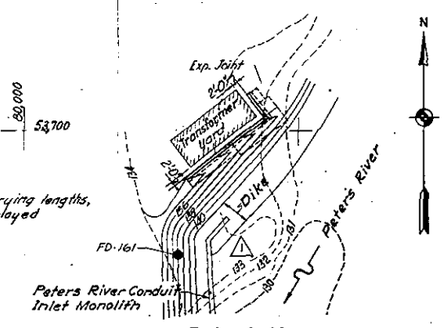
TYPICAL WALL SLEEVE
NOT TO SCALE



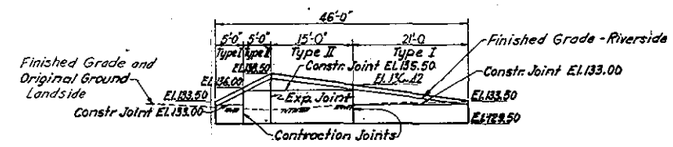
DETAIL-R
SCALE: 1/4"=1'-0"



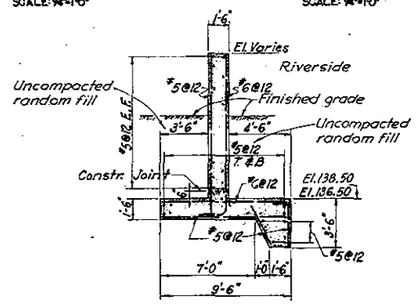
DETAIL Q
SCALE: 1/4"=1'-0"



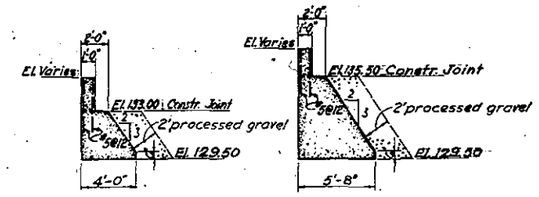
PLAN
ELM STREET TRANSFORMER YARD WALL
SCALE: 1"=20'



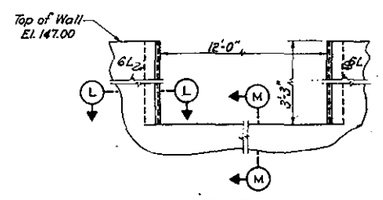
ELEVATION
SCALE: 1"=10'



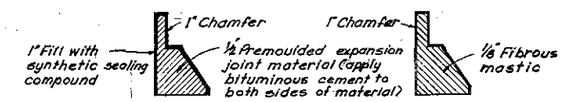
TYPICAL WALL SECTION
TYPE P
SCALE: 1/4"=1'-0"



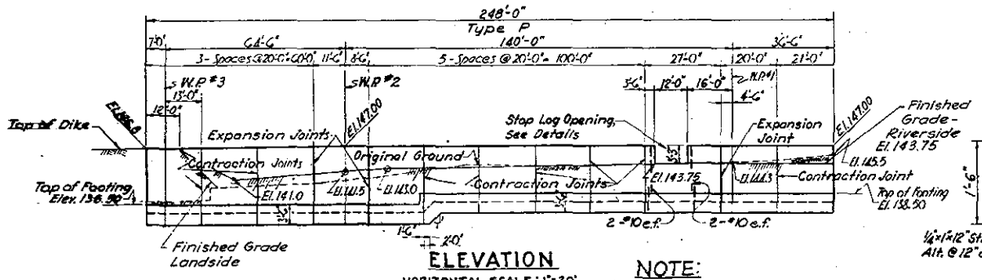
TYPE I TYPE II
TYPICAL WALL SECTIONS
SCALE: 1/4"=1'-0"



ELEVATION

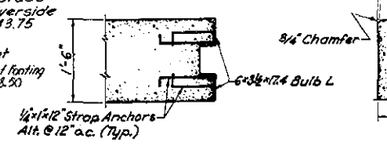


EXPANSION JOINT CONTRACTION JOINT
TYPICAL JOINT DETAILS ELM STREET WALL
SCALE: 1/4"=1'-0"

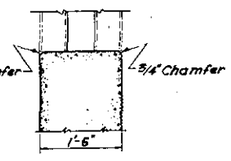


ELEVATION
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=10'

NOTE:
Stop logs 6"x12" (nominal) timbers S4S. Approximate length 12'-6", cut to sliding fit in field. See specifications for security provision. Eyebolt & recess for stop-logs to be as shown on Sheet 56.



SECTION L-L



SECTION M-M

STOP LOG OPENING DETAILS
SCALE: 1"=1'-0"

GRAPHIC SCALES
1"=20' 20' 0 20' 40'
1"=10' 10' 0 10' 20'
1/2"=1'-0" 4' 0 4' 8'
1"=1'-0" 1' 0 1' 2'

REVISION	DATE	DESCRIPTION	BY
1	6/14/63	Grading and notes revised, existing utilities shown, notes added. CAM #3	AR

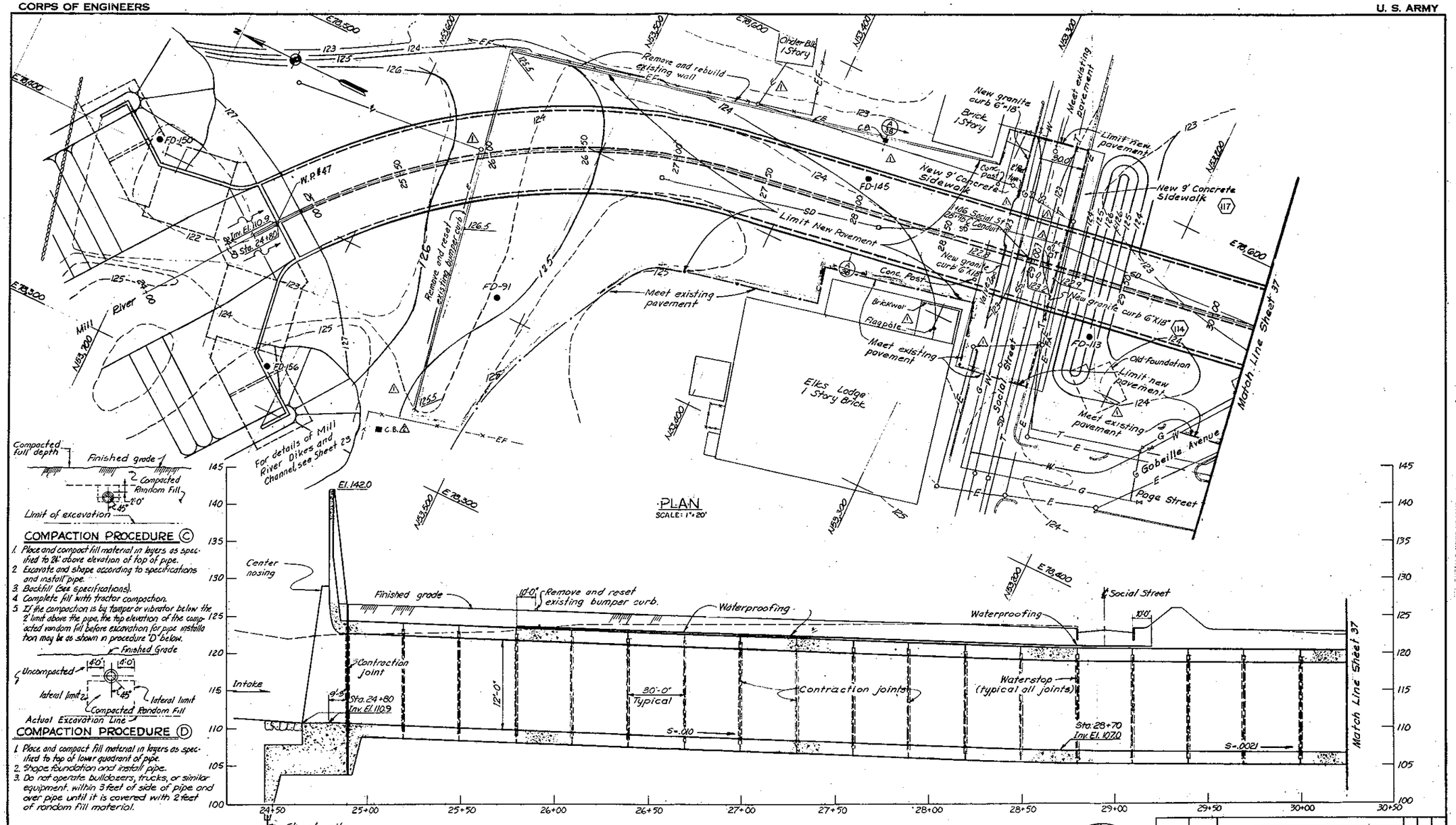
CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY H.R. DR. BY B.S. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
DIVISION RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
FLOOD WALLS
PETERS RIVER
PLAN, ELEVATION AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 38



NOTES:

1. For details of utilities, see Sheet 87
2. For paving details, details of joints and water stop details see Sheet 43.

LEGEND	
NEW	DESCRIPTION
(A)	Uncompacted random fill for full depth
(B)	Compacted random fill for upper 4 feet
(C)	Compacted random fill for full depth
(D)	Compacted random fill for full depth under utility

GRAPHIC SCALES
1"=20' 20' 0 20' 40'
1"=5' 5' 0 5' 10'

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
2	6-16-65	Catch basin added.	
1	8-14-63	Contour revised & contour added. Schedule revised. Exist. topo. information shown (Am #3)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY FEK DR. BY RLH CK. BY

SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

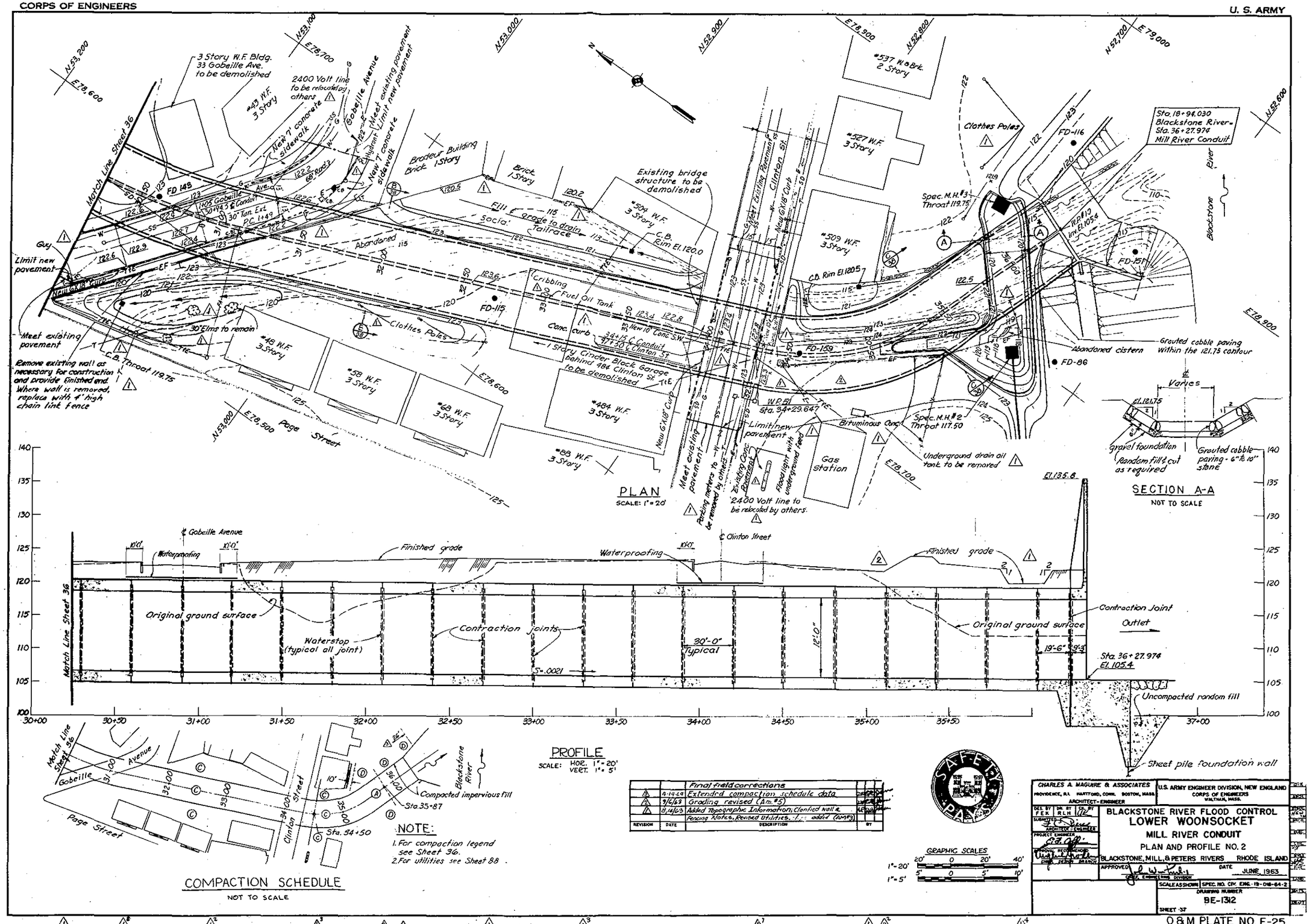
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER CONDUIT
PLAN AND PROFILE NO. 1
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 36

O & M PLATE NO. E-24

CORPS OF ENGINEERS

U. S. ARMY



REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
3	4-14-64	Extended compaction schedule data	
2	9/6/63	Grading revised (Am. #5)	
1	8/14/63	Added Topographic Information, Clarified wall & Fencing Notes, Revised Utilities, [illegible] added (AM#3)	

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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY FEK | DR. BY RLH | CK. BY

SUBMITTED
ARCHITECT-ENGINEER

PROJECT ENGINEER

APPROVAL RECOMMENDED
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER CONDUIT
PLAN AND PROFILE NO. 2
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION

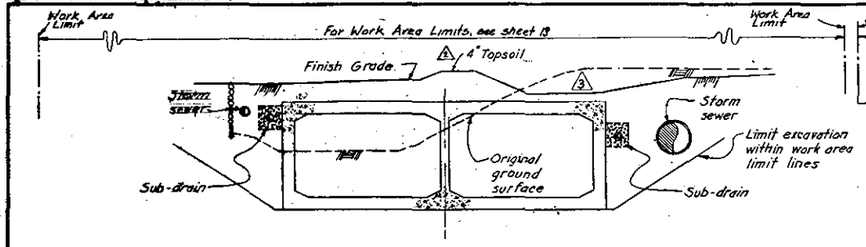
DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-018-64-2

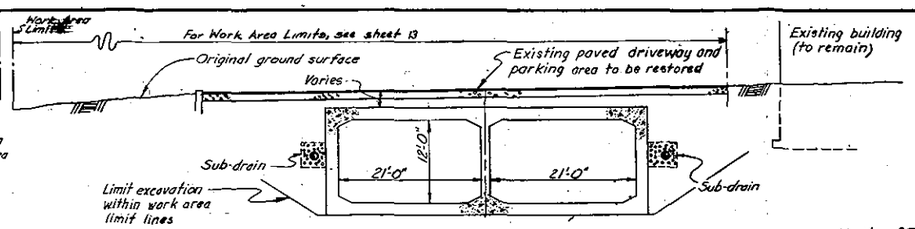
DRAWING NUMBER
BE-1312

SHEET 37

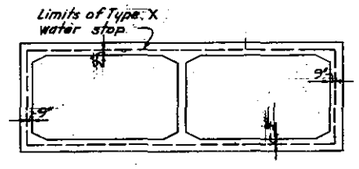
O & M PLATE NO. E-25



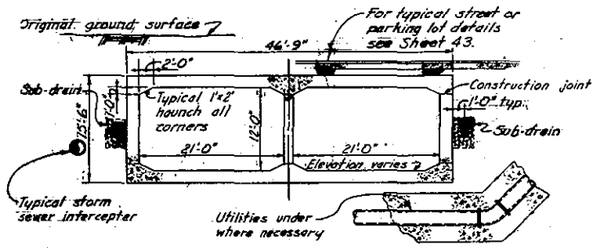
SECTION C/37
SCALE: 1/8" = 1'-0"



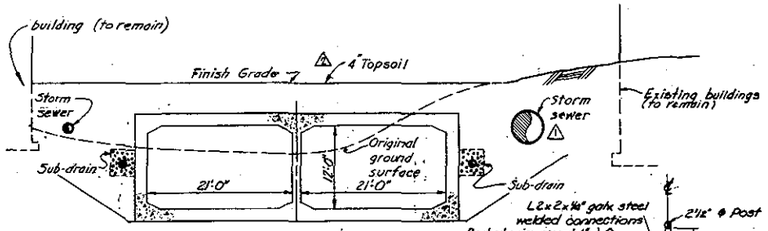
△ SECTION A/36
SCALE: 1/8" = 1'-0"



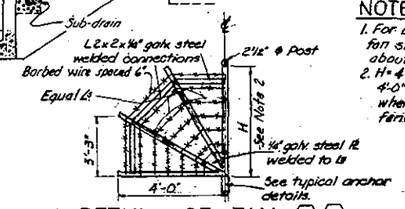
WATER STOP PLACEMENT DIAGRAM
SCALE: 1/8" = 1'-0"



TYPICAL CONDUIT SECTION
SCALE: 1/8" = 1'-0"



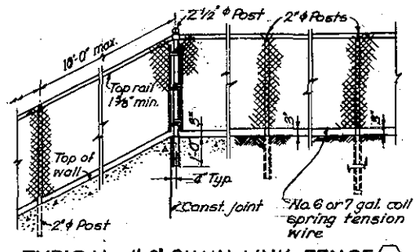
SECTION B/37
SCALE: 1/8" = 1'-0"



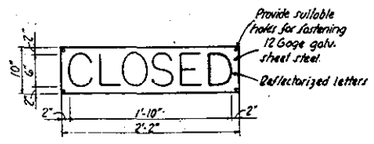
DETAIL OF FAN (105) (105A)
SCALE: 1/2" = 1'-0"

NOTES:

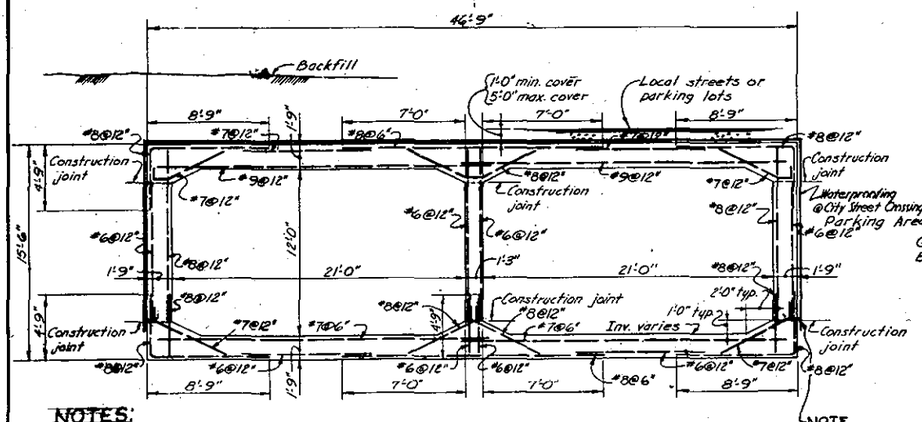
1. For double end fan, end fan shown is symmetrical about ℄.
2. H = 4'-0" when used with 4'-0" fence and H = 6'-0" when used with 6'-0" fence.



TYPICAL 4'-0" CHAIN LINK FENCE (105)
NOT TO SCALE



GATE SIGN
NOT TO SCALE

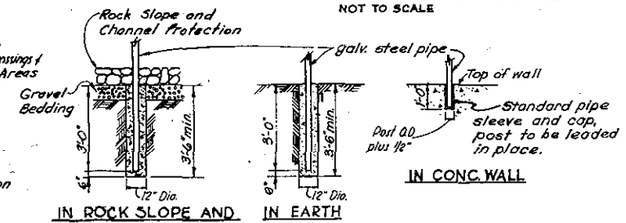


NOTES:

1. Longitudinal steel:
   Bottom of roof slab #8@12"
   All others #6@12"
2. Splice all bars 24 bar diameters.
3. 2" clearance at bottom of base slab, all others are 3".

NOTE
Waterproofing at Clinton St. will be extended 3" below the Invert Const. Jt.
All other waterproofing will extend 6" below the relocated Const. Jt.

TYPICAL CONDUIT SECTION SHOWING REINFORCEMENT
SCALE: 1/4" = 1'-0"



IN ROCK SLOPE AND CHANNEL PROTECTION
IN EARTH
IN CONC. WALL

TYPICAL FOOTINGS
NOT TO SCALE

NOTES

1. For Utilities, see Sheets 87 and 88.
2. For detail of contraction or expansion joints, see Sheet 45.
3. For sub-drain plans see Sheets 43, 87 and 88.
4. For fill details see Sheets 36 and 37.
5. For water stop details see Sheet 43.

GRAPHIC SCALES
1/2" = 1'-0" 0 1' 2' 3' 4' 5'
1/8" = 1'-0" 0 4' 8' 12' 16' 20'
1/4" = 1'-0" 0 4' 8'

REVISION	DATE	DESCRIPTION	BY	BY
		Final field corrections		
4	11-27-63	Section revised (Am. #5)	LF	
3	11-27-63	Notes added. (Am. #3)	LF	
1	11-27-63	Sections revised. (Am. #1)	LF	

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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY JHL | DR. BY REP | CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER CONDUIT
SECTIONS AND DETAILS

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

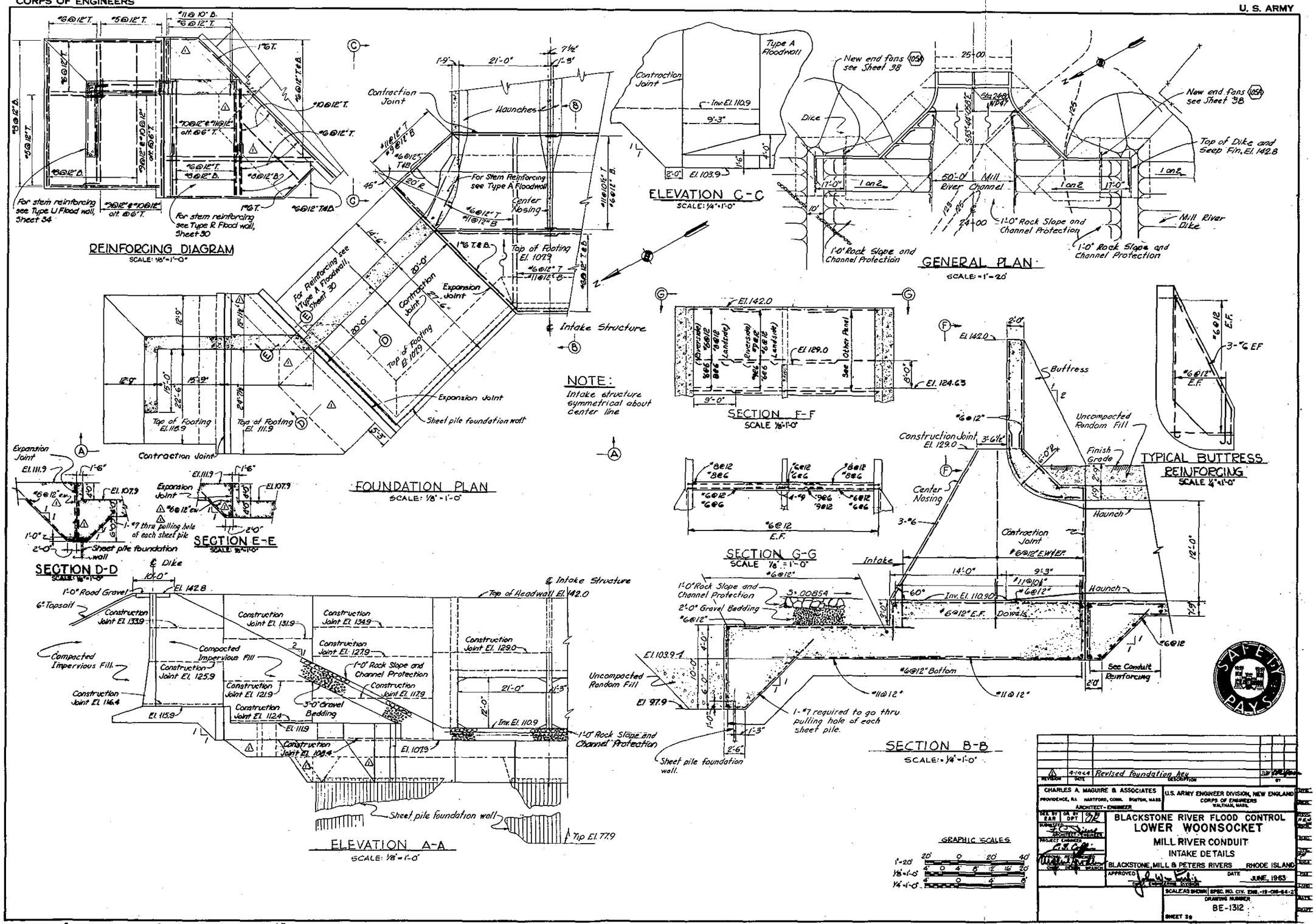
SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER
BE-1312
SHEET 38

SAFETY PAYS

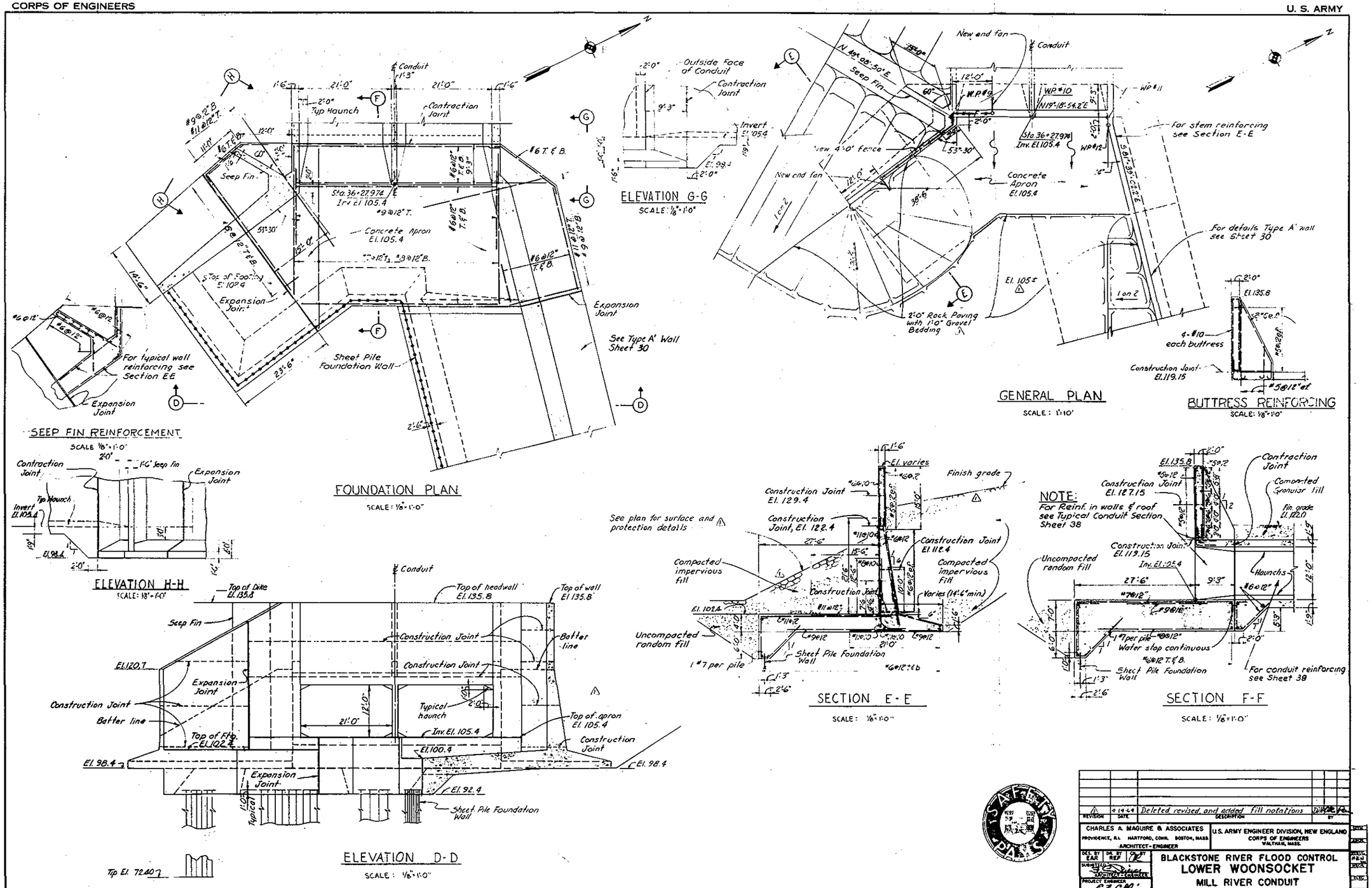
O & M PLATE NO. E-26

CORPS OF ENGINEERS

U. S. ARMY



O & M PLATE NO. E-27



REVISION	DATE	DESCRIPTION	BY
4	14-4-4	Deleted revised, and added fill notations	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY EAR DR. BY REF 72 TR. BY

SUBMITTED: CHIEF, DESIGN BRANCH

PROJECT ENGINEER

APPROVED: CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER CONDUIT
OUTLET DETAILS

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

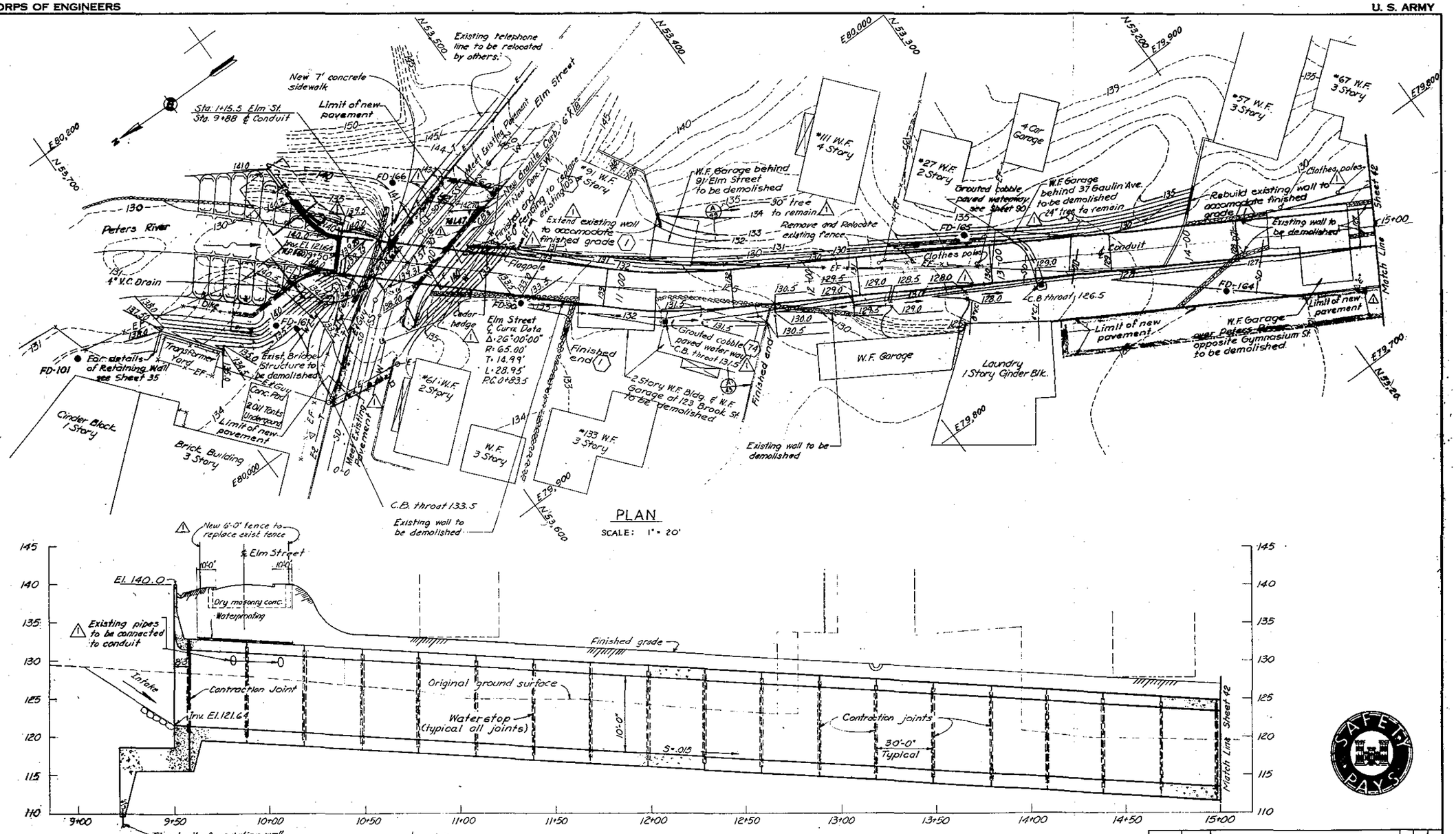
APPROVED: CHIEF, ENGINEERING DIVISION

DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-016-64-2

DRAWING NUMBER BE-1312

SHEET 40

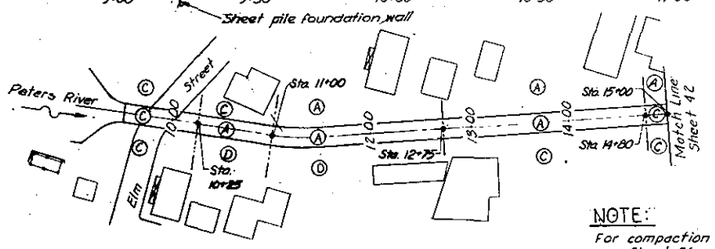


PLAN

SCALE: 1" = 20'

PROFILE

SCALE: HORIZONTAL 1" = 20'
VERTICAL 1" = 5'



COMPACTION SCHEDULE

NOT TO SCALE

NOTE:
For compaction legend see Sheet 36.

NOTES:

1. For details of utilities, see Sheet 90.
2. For details of paving, joints, and water stops, see Sheet 43.
3. Gas, telephone and electric lines to be relocated by others.
4. Clothes pole - denotes large diameter wooden utility type pole of multi-storied height.

GRAPHIC SCALES

1" = 5' 5' 0 5' 10'
1" = 20' 20' 0 20' 40'

REVISION	DATE	DESCRIPTION	BY
1	8-14-63	Exist. topographic information & utility lines shown. Limit of paving, grading & notes revised. Notes added. (Am #3)	

CHARLES A. MAGUIRE & ASSOCIATES
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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

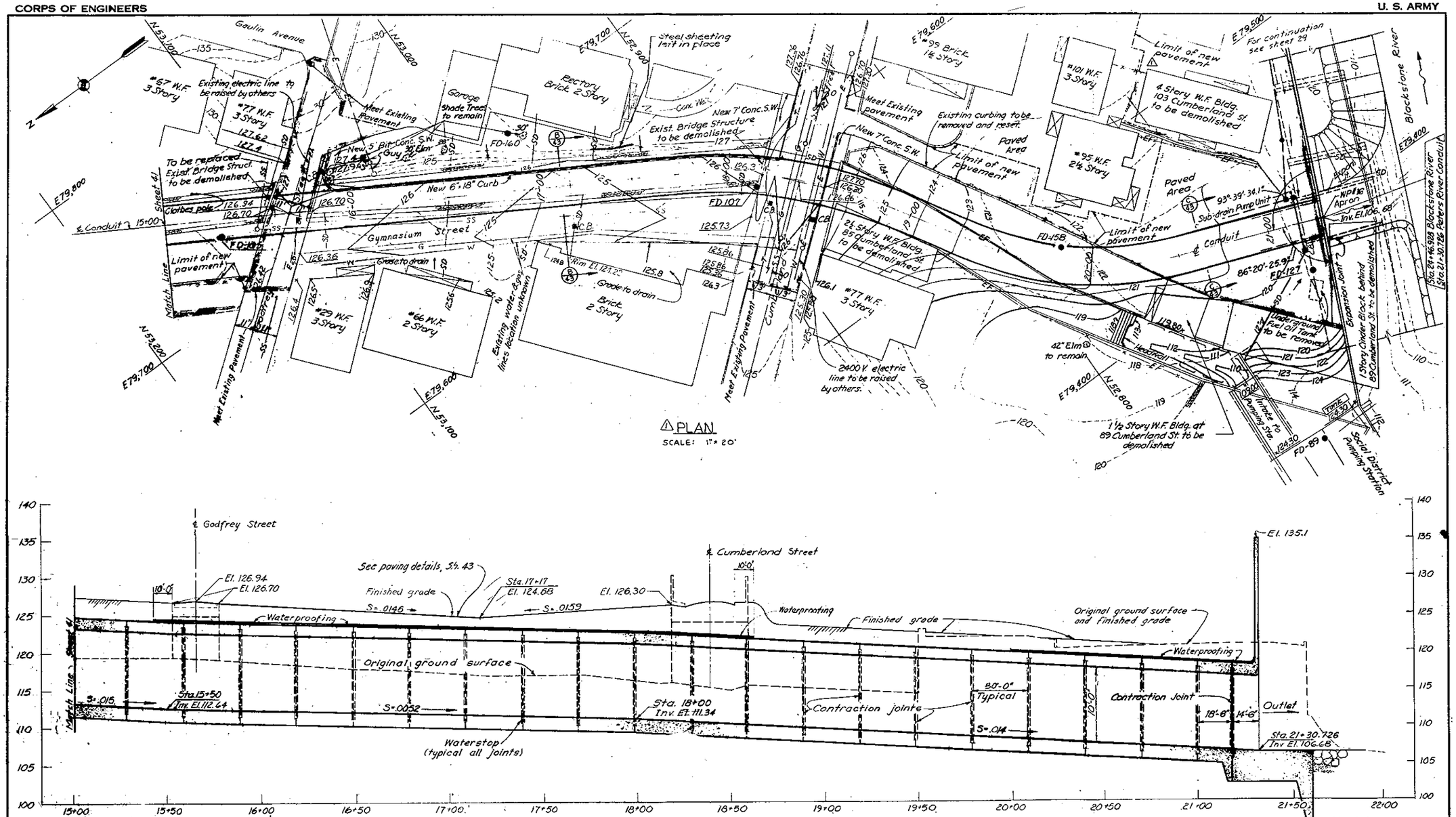
DES. BY F.E.K. DR. BY R.J.S.
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
PETERS RIVER CONDUIT
PLAN AND PROFILE NO. 1
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

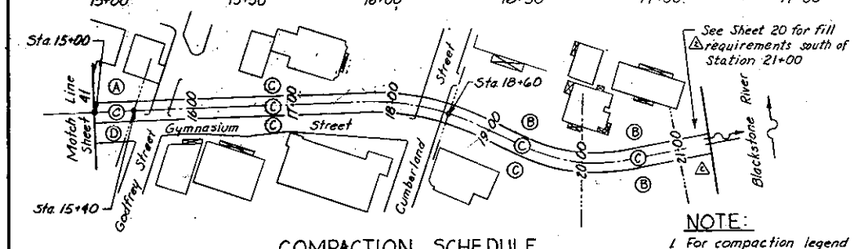
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER
BE-1312
SHEET 41

O & M PLATE NO. E-29



PROFILE

SCALE: HORIZONTAL 1" = 20'
VERTICAL 1" = 5'



COMPACTION SCHEDULE

NOT TO SCALE

NOTE:

1. For compaction legend see Sheet 36.
2. For compaction procedure relative to sub-drain pump unit, see sheet 91.
3. Clothes pole - denotes large diameter wooden utility type pole of multi-storied height.

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	4-14-64	Rev. compaction schedule	

GRAPHIC SCALES

1" = 5' 5' 0 5' 10'
1" = 20' 20' 0 120' 40'

REVISION	DATE	DESCRIPTION	BY
4	7-6-63	Limit of paving, grading & curbs revised;	
		Notes, elevations, waterproofing added; Exist. Topo.	
		information & utility lines shown (Am. 5)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY FEK DR. BY RJS CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

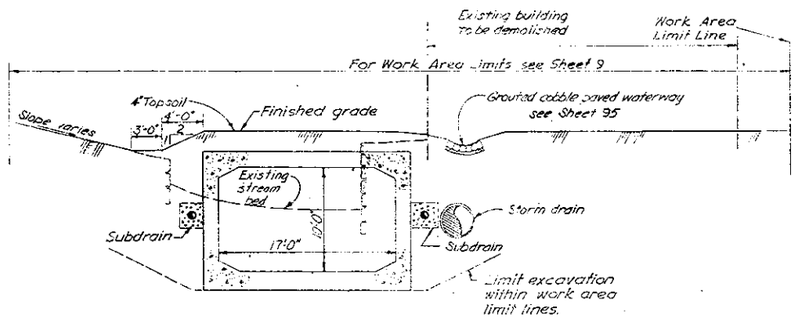
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
PETERS RIVER CONDUIT
PLAN AND PROFILE NO. 2

BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

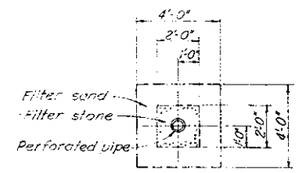
APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

SCALE: AS SHOWN SPEC. NO. CIV ENG-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 42

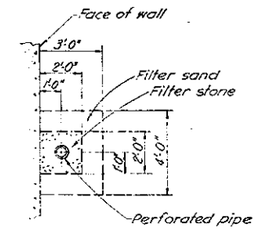
O & M PLATE NO. E-30



△ SECTION
SCALE: 3/16"=1'-0"



TYPICAL



ADJACENT TO WALL

SUBDRAIN DETAILS

SCALE: 3/8"=1'-0"

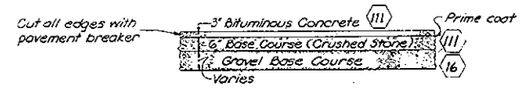
NOTE:
For subdrain with perforated pipe in random fill or natural earth. No filter materials are required in reaches of non-perforated connector pipes.

(20)

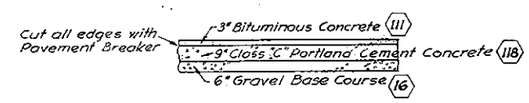
STREET PAVEMENT SCHEDULE

STREET NAME	STREET PAVEMENT AND PATCH TYPE
Elm Street	II
Godfrey Street	IIIA
Gymnasium Street	IIIA
Cumberland Street	I
East School Street	I
East School Street Bridge	Special (See detail below)
Social Street	I
Gobeille Avenue	II
Clinton Street	I
Girard Avenue	IIIA
Parking Areas	IIIA (min.)
Paved Access Ramps	(See Sheet 60)
Bituminous Sidewalks	IIIA

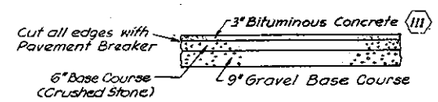
NOTE:
Pavement replacement and patching on streets not listed above shall be selected from the typical sections below which will most nearly match the type and strength of the existing pavement.



EAST SCHOOL STREET BRIDGE PAVEMENT



TYPE I PAVEMENT

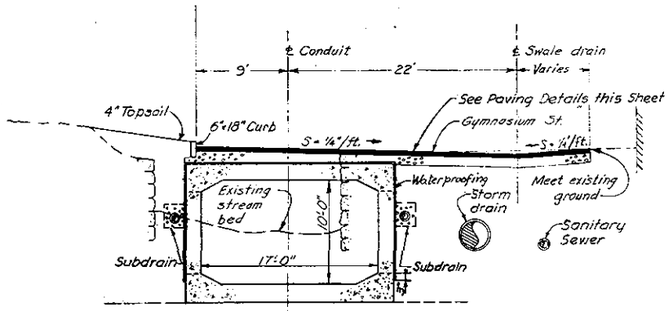


TYPE II PAVEMENT

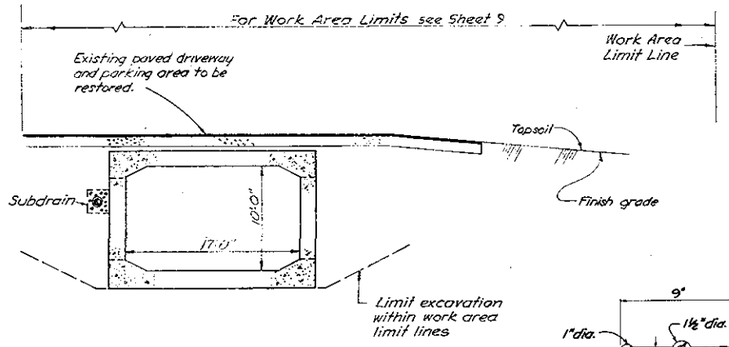
TYPE IIIA PAVEMENT

NEW PAVEMENT & PATCH DETAILS

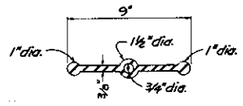
NO SCALE



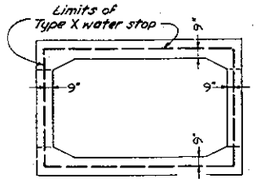
△ SECTION
SCALE: 3/16"=1'-0"



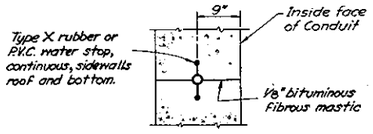
△ SECTION
SCALE: 3/16"=1'-0"



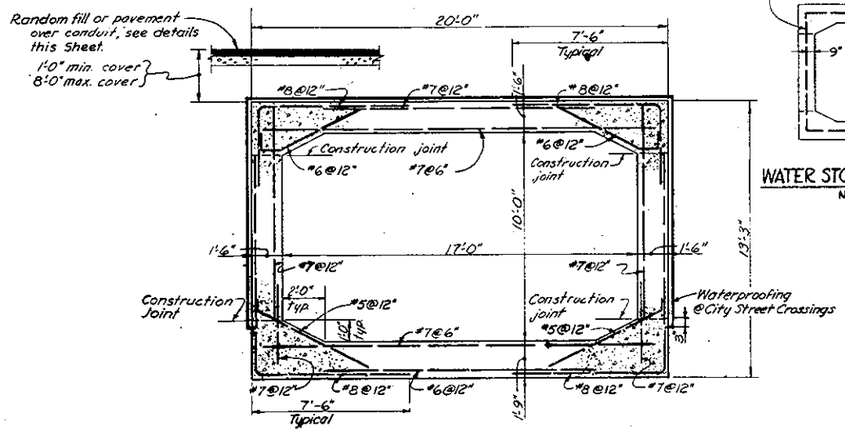
TYPE X WATER STOP
NOT TO SCALE



WATER STOP PLACEMENT DIAGRAM
NOT TO SCALE



TYPICAL CONTRACTION JOINT
SCALE: 1"=1'-0"
(91) (98)

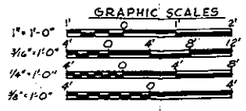


TYPICAL CONDUIT SECTION
SCALE: 3/8"=1'-0"

NOTES:
1. Splice all bars 24 bar diameters.
2. Longitudinal steel: bottom of roof slab #7 @ 12", all others #5 @ 12".
3. Minimum cover for the main reinforcement: bottom of base slabs 4", protection for all other steel 3".

SAFETY PAYS

GRAPHIC SCALES



REVISION	DATE	DESCRIPTION	BY
2	9-6-63	Final field corrections	
1	6/14/63	Sections revised. CAM #3)	

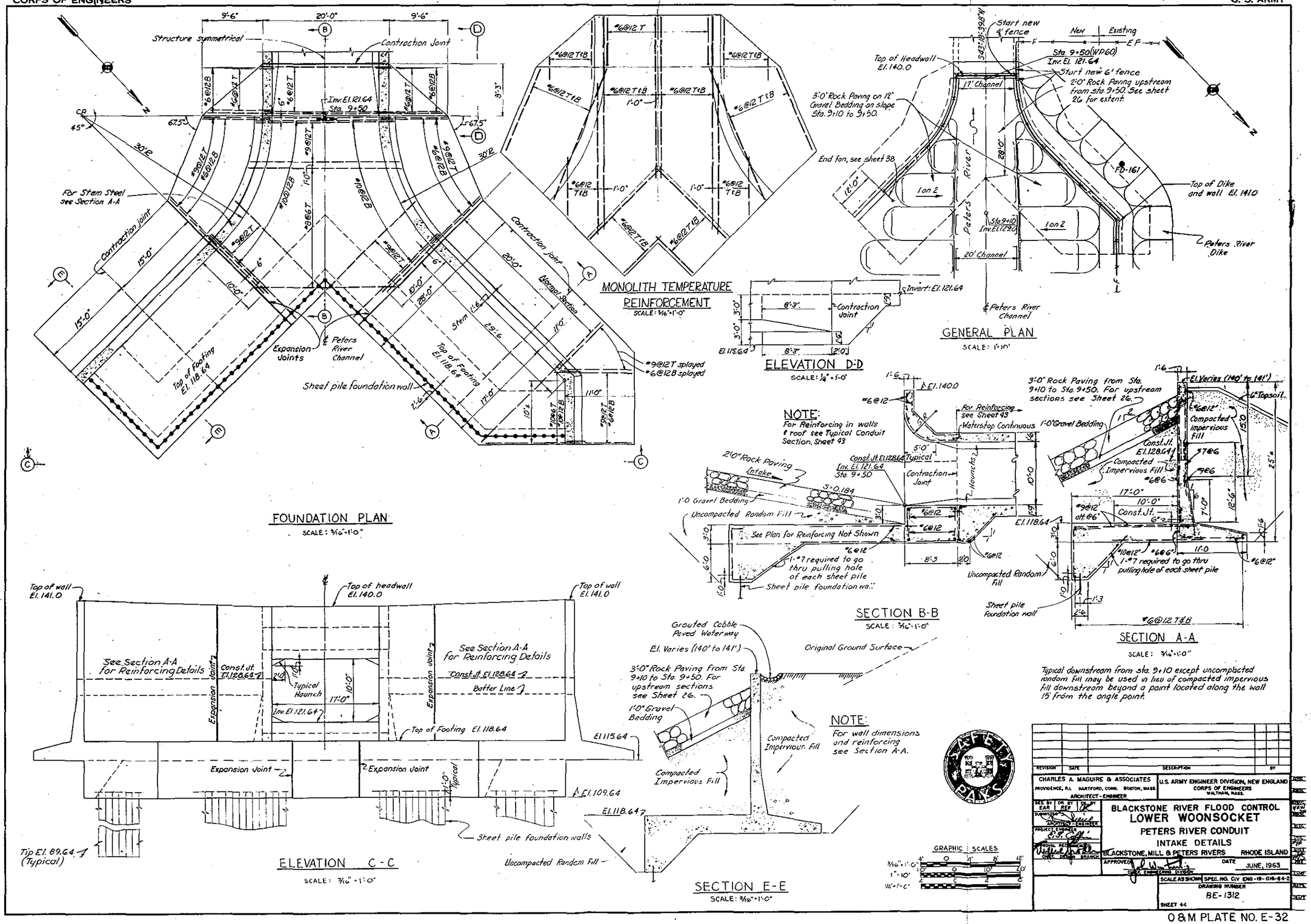
CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

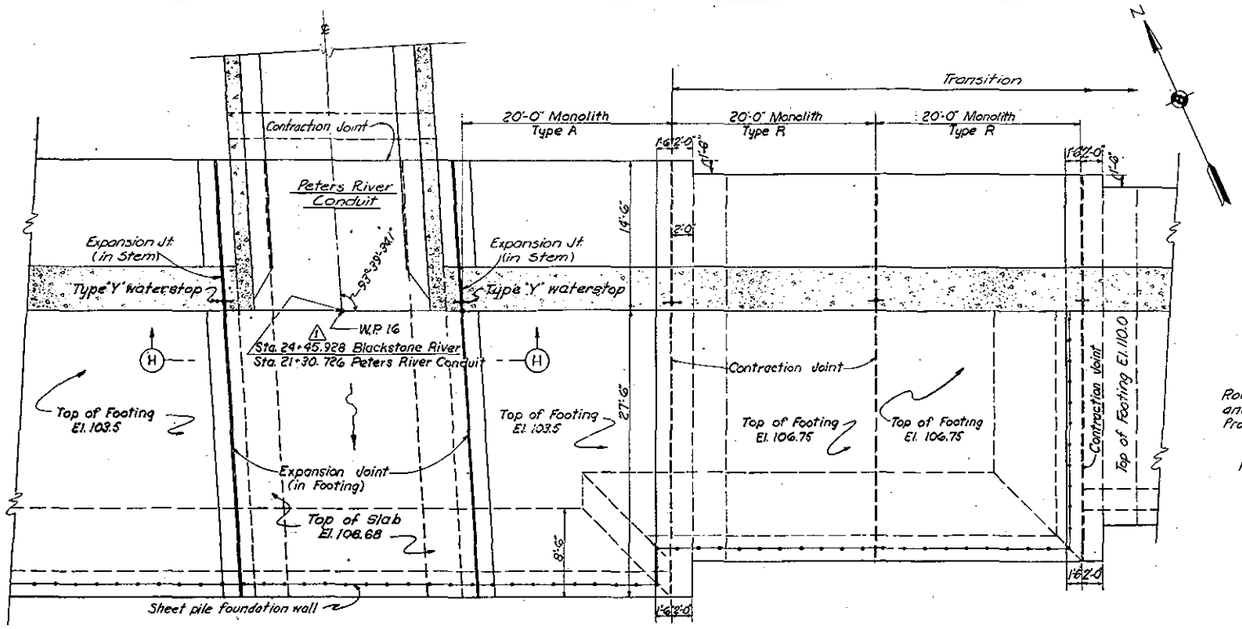
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY JHL | DR. BY REF | CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
REGIONAL RECOMMENDED: CHIEF, DESIGN BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
PETERS RIVER CONDUIT
SECTIONS AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
DATE JUNE, 1963
SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 42

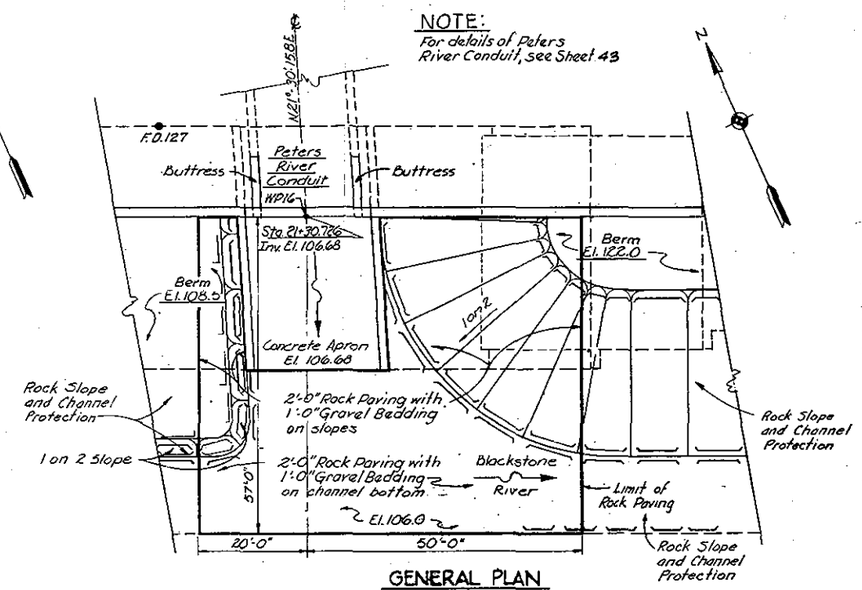
O & M PLATE NO. E-31


FOUNDATION PLAN
SCALE: 3/16"=1'-0"
MONOLITH TEMPERATURE REINFORCEMENT
SCALE: 3/16"=1'-0"
ELEVATION D-D
SCALE: 1/4"=1'-0"
GENERAL PLAN
SCALE: 1"=10'
SECTION B-B
SCALE: 3/16"=1'-0"
SECTION A-A
SCALE: 3/16"=1'-0"
ELEVATION C-C
SCALE: 3/16"=1'-0"
SECTION E-E
SCALE: 3/16"=1'-0"
NOTE:
For Reinforcing in walls & roof see Typical Conduit Section, Sheet 43
NOTE:
For wall dimensions and reinforcing see Section A-A.
Typical downstream from sta. 9+10 except uncompacted random fill may be used in lieu of compacted impervious fill downstream beyond a point located along the wall 15 from the angle point.
GRAPHIC SCALES
CHARLES A. MAGUIRE & ASSOCIATES
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
PETERS RIVER CONDUIT
INTAKE DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
JUNE, 1963
SCALE AS SHOWN
DRAWING NUMBER
BE-1312
SHEET 44



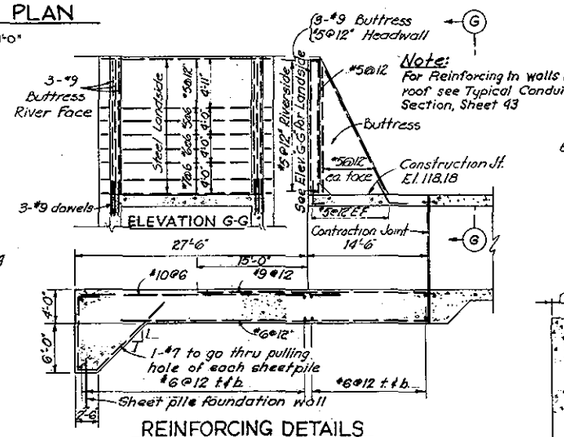
FOUNDATION PLAN

SCALE: 3/16"=1'-0"



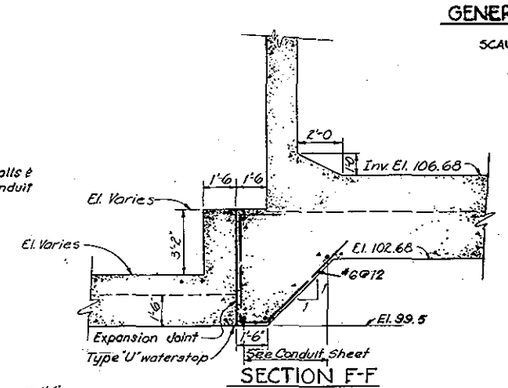
GENERAL PLAN

SCALE: 1"=10'



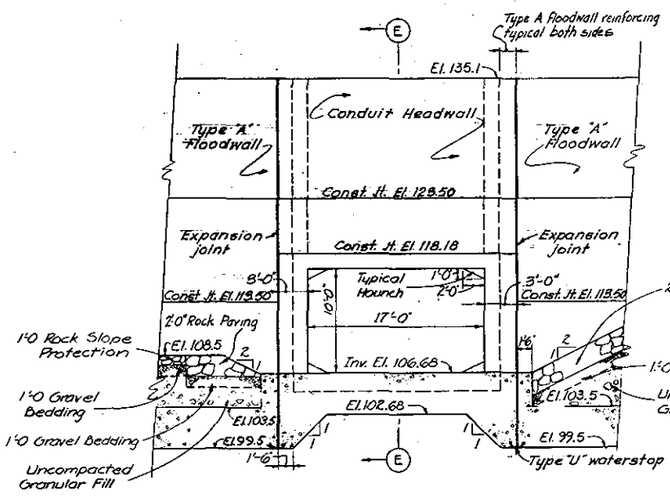
REINFORCING DETAILS
OUTLET MONOLITH

NOT TO SCALE



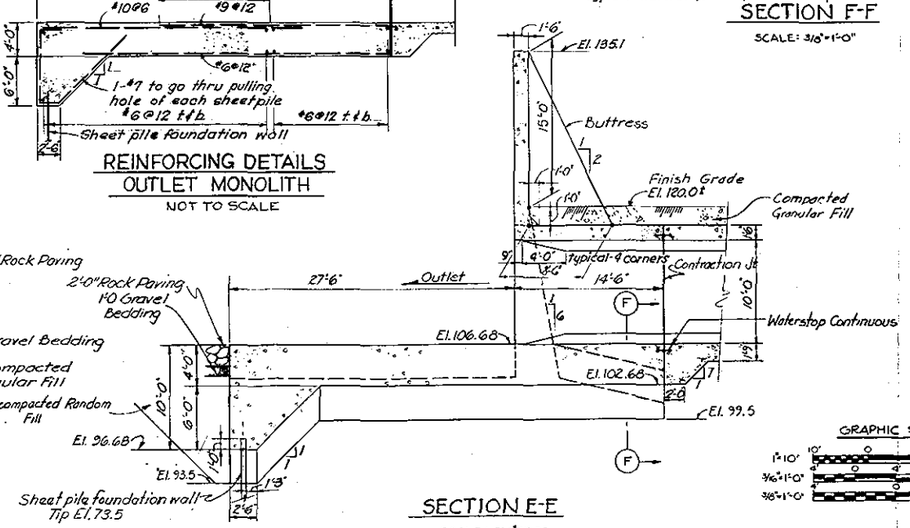
SECTION F-F

SCALE: 3/16"=1'-0"



ELEVATION H-H

SCALE: 3/16"=1'-0"



SECTION E-E

SCALE: 3/16"=1'-0"

GRAPHIC SCALES

1"=10' 3/16"=1'-0" 3/16"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	4-14-69	Revised Sta., W.P. 16	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY EAR CK. BY RJS

PROJECT ENGINEER

CHIEF, DESIGN BRANCH

APPROVED

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
PETERS RIVER CONDUIT
OUTLET DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

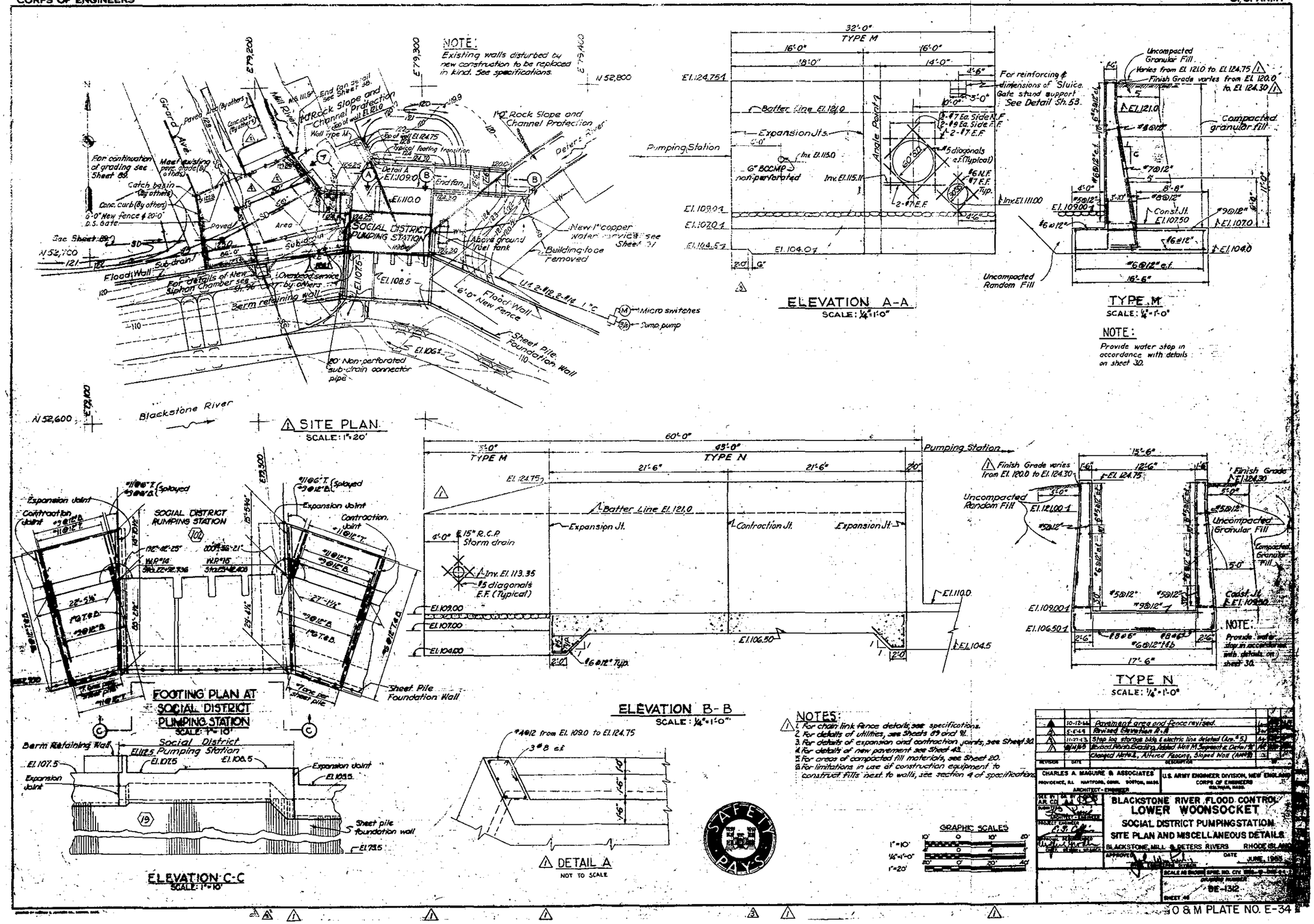
DATE JUNE, 1963

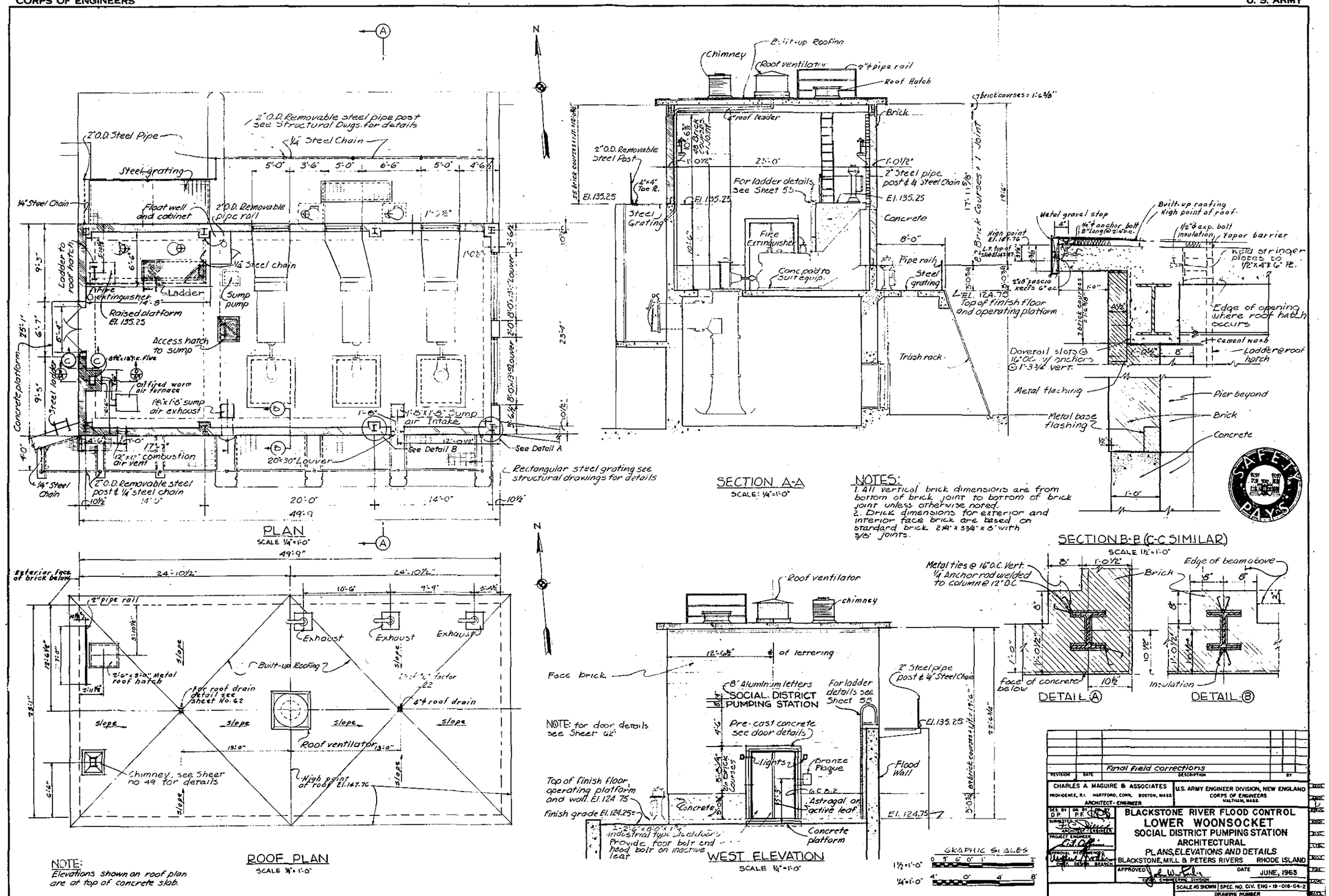
SCALE AS SHOWN | SPEC. NO. CIV ENG-19-018-64-2

DRAWING NUMBER
BE-1312

SHEET 45

O & M PLATE NO. E-33


NOTE:
Existing walls disturbed by new construction to be replaced in kind. See specifications.
SITE PLAN
SCALE: 1" = 20'
SOCIAL DISTRICT PUMPING STATION
Blackstone River
Flood Wall
Berm retaining wall
Rock Slope and Channel Protection
Sheet Pile Foundation Wall
Micro switches
Sump pump
ELEVATION A-A
SCALE: 1/4" = 1'-0"
Pumping Station
Batter Line El. 121.0
Expansion Jts.
Angle Point
TYPE M
SCALE: 1/4" = 1'-0"
Uncompacted Granular Fill
Compacted granular fill
Uncompacted Random Fill
NOTE:
Provide water stop in accordance with details on sheet 30.
FOOTING PLAN AT SOCIAL DISTRICT PUMPING STATION
SCALE: 1" = 10'
Expansion Joint
Contraction Joint
Sheet Pile Foundation Wall
ELEVATION C-C
SCALE: 1" = 10'
Social District Pumping Station
ELEVATION B-B
SCALE: 1/4" = 1'-0"
Pumping Station
Batter Line El. 121.0
Expansion Jt.
Contraction Jt.
Expansion Jt.
Storm drain
Inv. El. 113.35
15 diagonals E.F. (Typical)
DETAIL A
NOT TO SCALE
TYPE N
SCALE: 1/4" = 1'-0"
Finish Grade varies from El. 120.0 to El. 124.30
Uncompacted Random Fill
Uncompacted Granular Fill
Compacted Granular Fill
NOTE:
Provide water stop in accordance with details on sheet 30.
NOTES:
1. For chain link fence details, see specifications.
2. For details of utilities, see Sheets 49 and 51.
3. For details of expansion and contraction joints, see Sheet 30.
4. For details of new pavement see Sheet 48.
5. For areas of compacted fill materials, see Sheet 20.
6. For limitations in use of construction equipment to construct fills next to walls, see section 4 of specifications.
GRAPHIC SCALES
1" = 10'
1/4" = 1'-0"
1" = 20'
SAFETY PAYS
CHARLES A. MAGUIRE & ASSOCIATES
ARCHITECT - ENGINEER
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
SITE PLAN AND MISCELLANEOUS DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
JUNE, 1965
DE-1312
O & M PLATE NO. E-34



REVISION	DATE	DESCRIPTION	BY
		Final field corrections	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

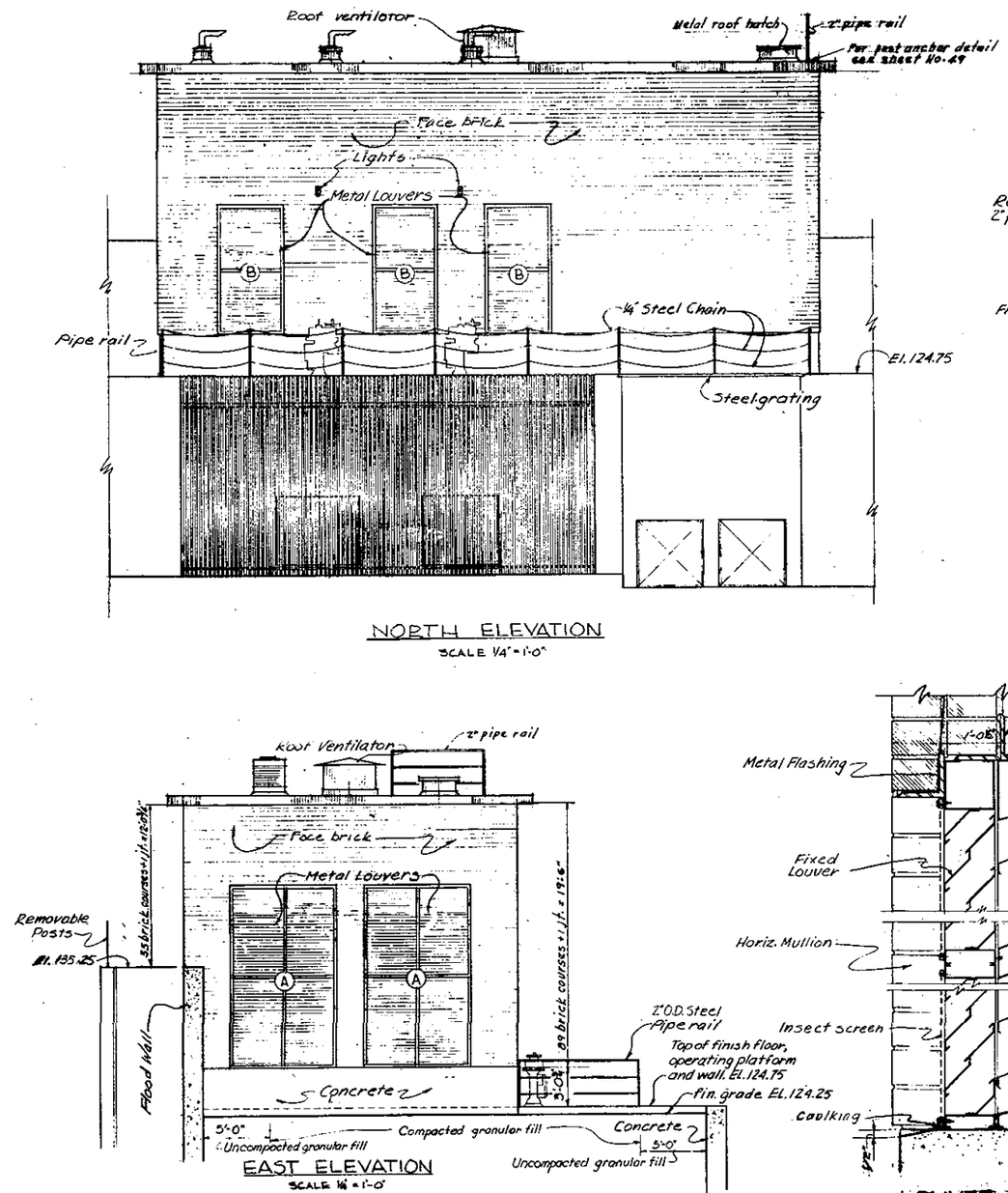
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
ARCHITECTURAL
PLANS, ELEVATIONS AND DETAILS

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: Chief, Engineering Division
DATE: JUNE, 1963

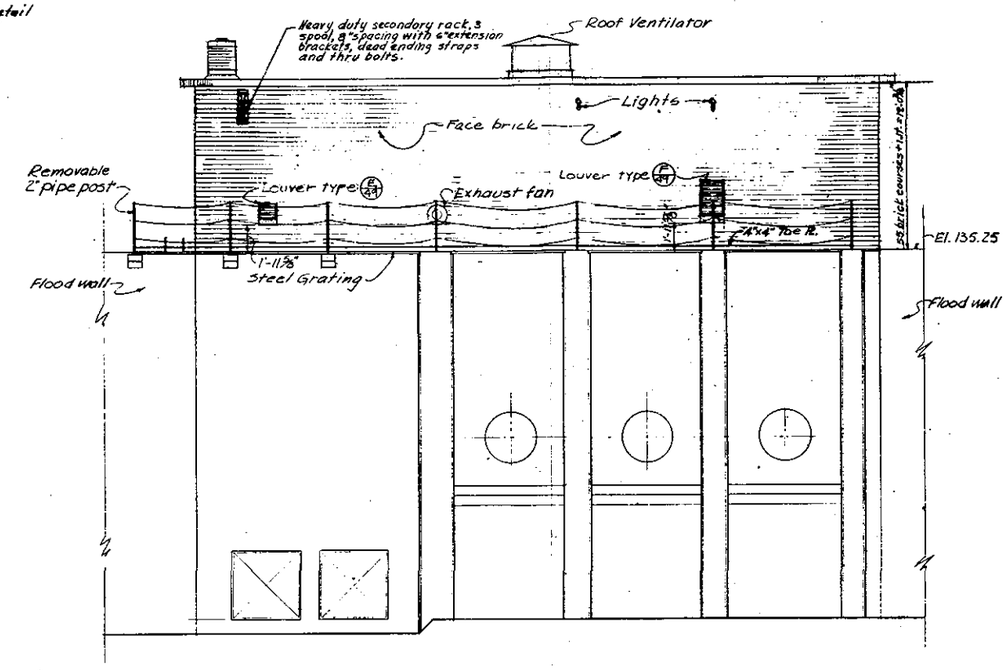
SCALE AS SHOWN | SPEC. NO. CIV. ENG-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 47

O & M PLATE NO. E-35

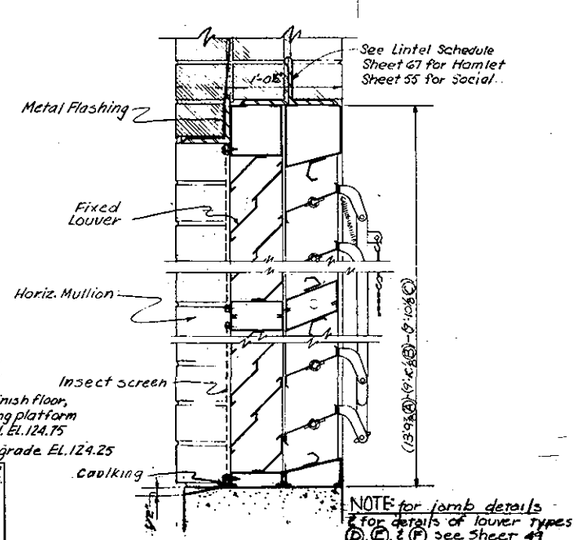


NORTH ELEVATION
SCALE 1/4" = 1'-0"

EAST ELEVATION
SCALE 1/4" = 1'-0"



SOUTH ELEVATION
SCALE 1/4" = 1'-0"



LOUVER DETAIL
TYPES (A) (B) (C)
SCALE 3" = 1'-0"

GRAPHIC SCALES
3" = 1'-0"
1/4" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

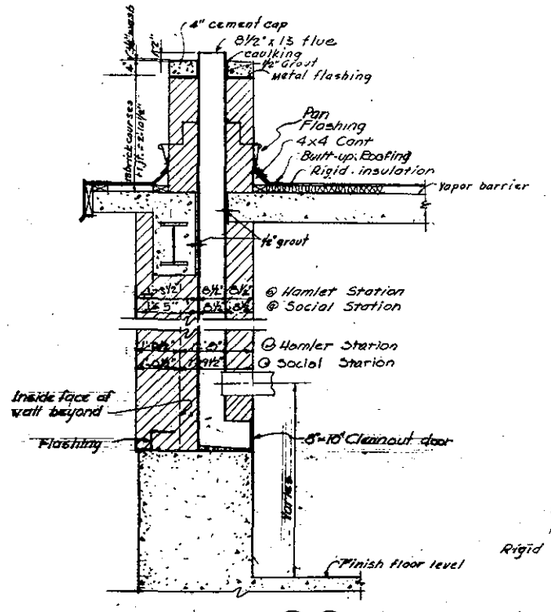
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY D.P. DR. BY P.F. CHECK
SUBMITTED ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
ARCHITECTURAL
ELEVATIONS AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

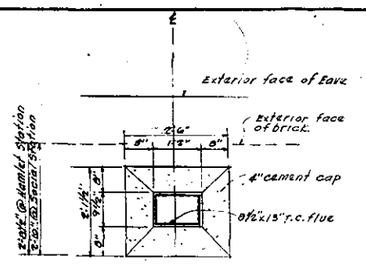
APPROVED
DATE JUNE, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 48

O & M PLATE NO. E-36



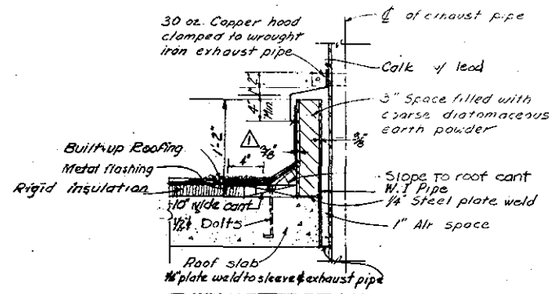
SECTION

SCALE 3/8" = 1'-0"



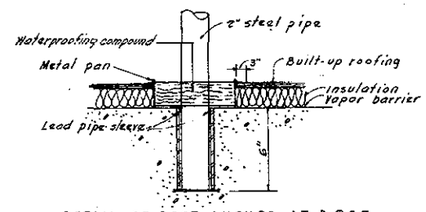
DETAIL OF CHIMNEY CAP

SCALE 3/4" = 1'-0"



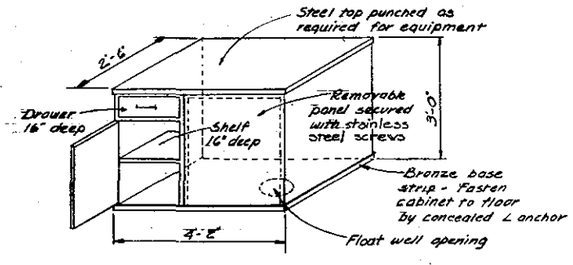
EXHAUST DETAIL

SCALE 1½" = 1'-0"



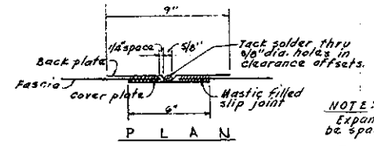
DETAIL OF POST ANCHOR AT ROOF

SCALE: 3" = 1'-0"



FLOAT WELL CABINET DETAIL

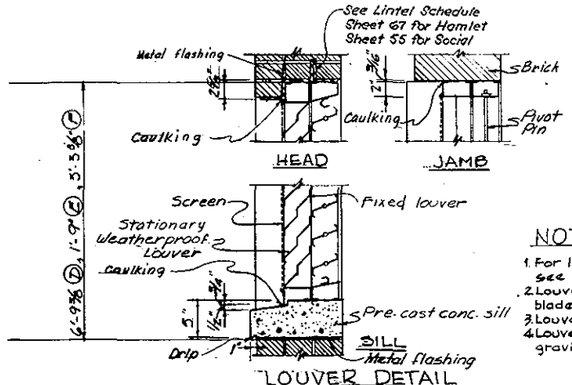
NO SCALE. Float well cabinet for Hamlet District Pumping Station to be opposite hand see Sheet 61.



DETAIL OF GRAVEL STOP EXPANSION JT.

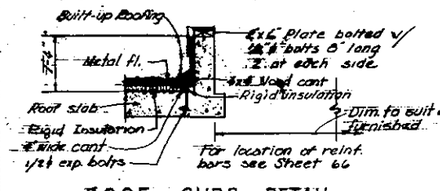
SCALE: 3" = 1'-0"

NOTE: Expansion joints shall be spaced 16'-0" o.c.



LOUVER DETAIL TYPES Ⓓ Ⓔ & Ⓕ

SCALE 1½" = 1'-0"



ROOF CURB DETAIL

SCALE 3/4" = 1'-0"

NOTE: For Roof Hatch detail see sheet No. 62

NOTES:

1. For louver types Ⓐ Ⓑ & Ⓒ see Sheet 48.
2. Louver Ⓓ - Metal with adjustable blades @ 4° ac.
3. Louver Ⓔ - is fixed louver, only.
4. Louver Ⓕ - is fixed louver with gravity louver inside opening inward.

GRAPHIC SCALES

3" = 1'-0"
1½" = 1'-0"
3/4" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
1	8/14/63	Exhaust Detail revised (AM #3)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY D.P. DR. BY P.F. CHKD.
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED
CHIEF, DESIGN BRANCH
APPROVED
CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL & HAMLET DISTRICT PUMPING STATIONS
ARCHITECTURAL
TYPICAL DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

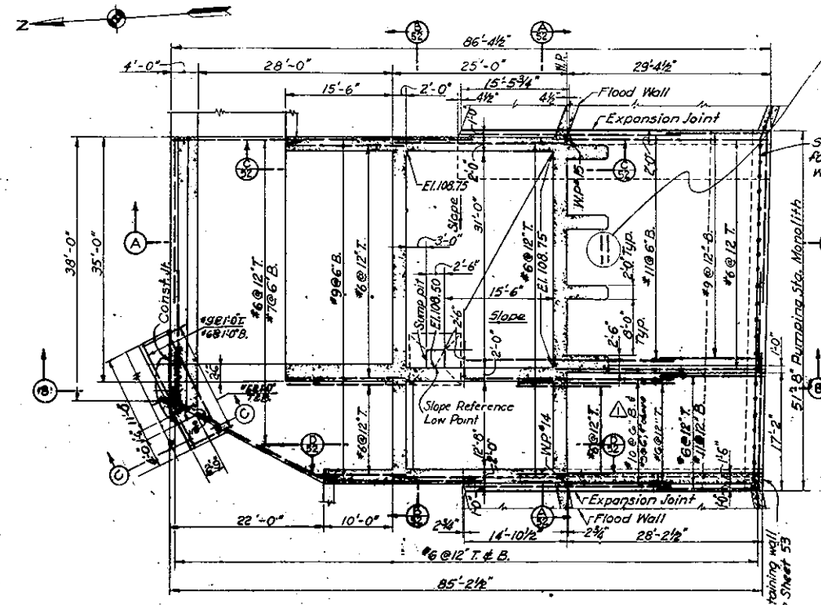
DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-18-0-0-64-2

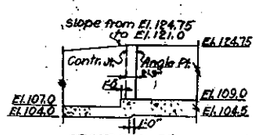
DRAWING NUMBER
BE-1312

SHEET 49

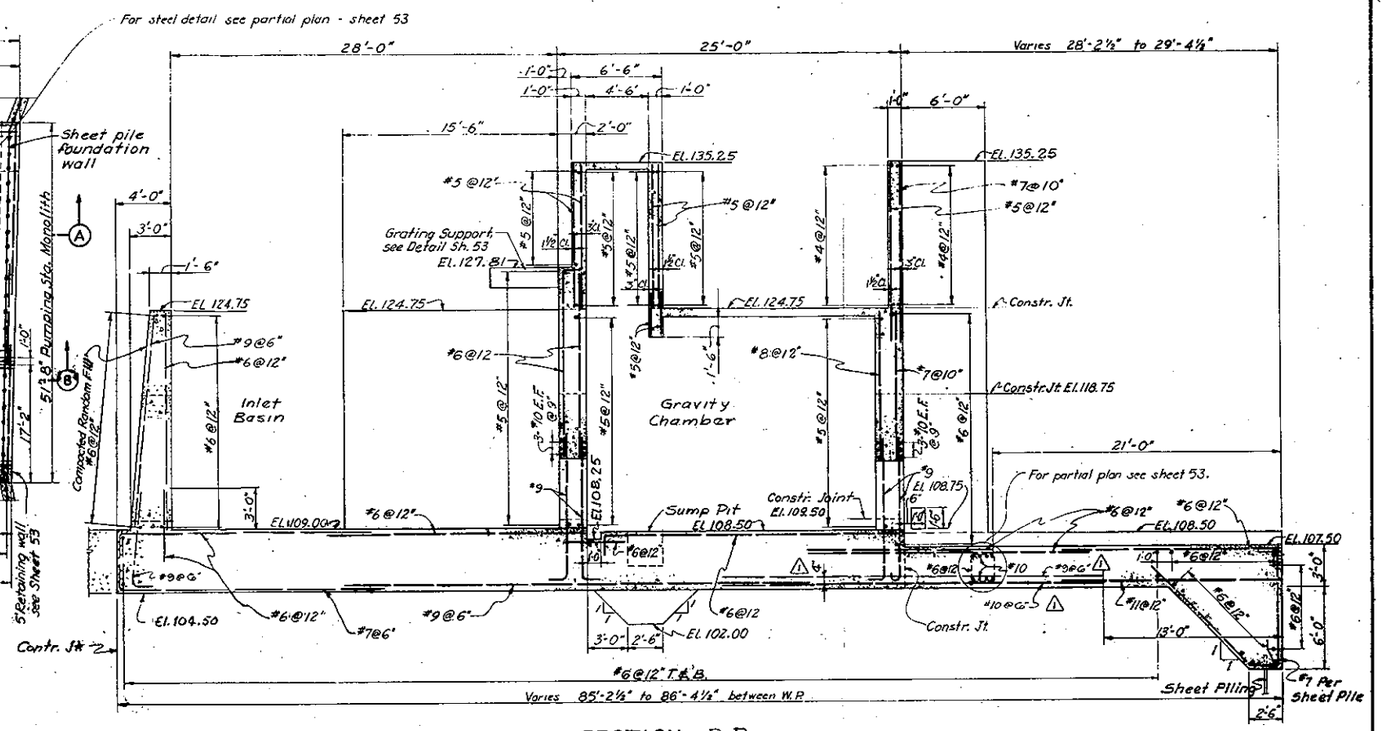
O & M PLATE NO. E-37



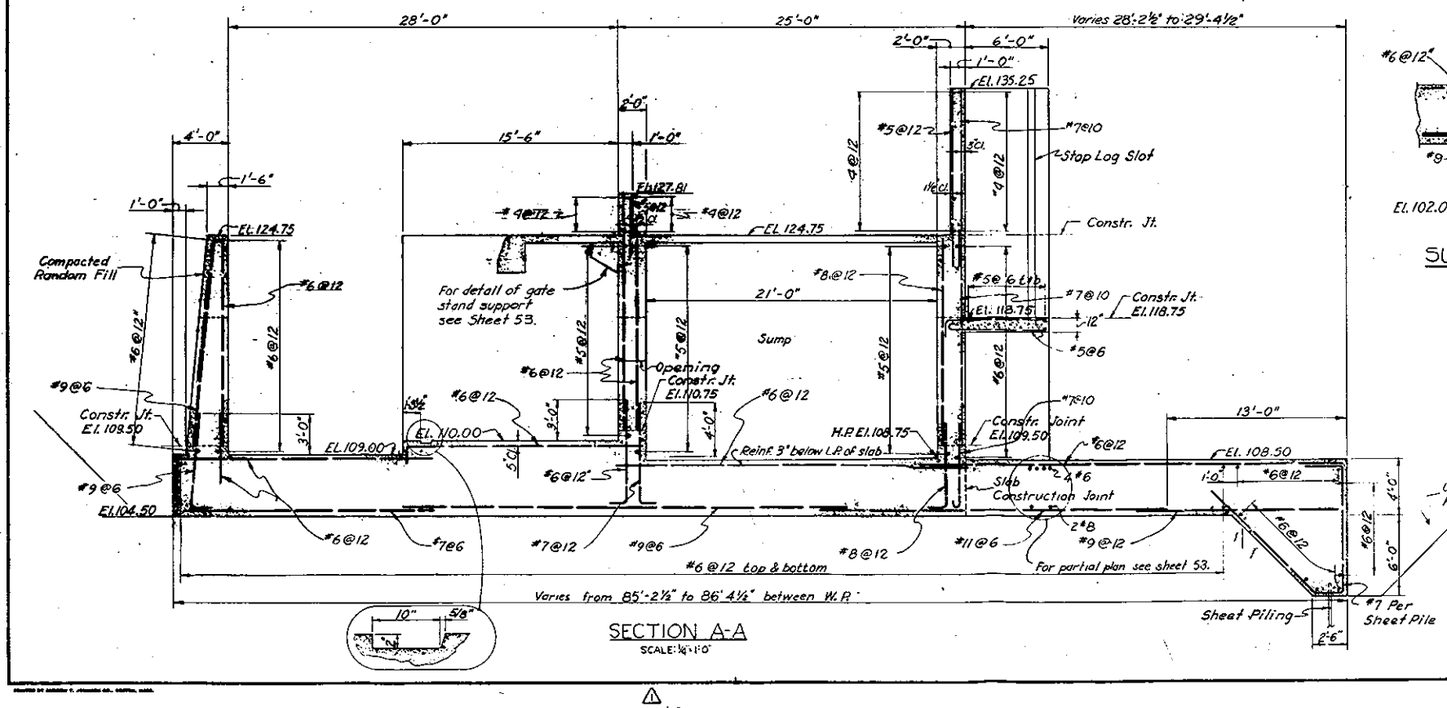
FOUNDATION PLAN
SCALE: 1/8" = 1'-0"



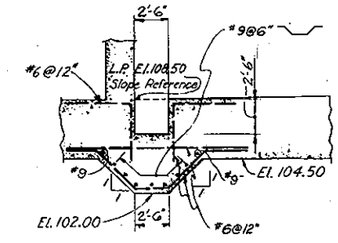
SECTION C-C
SCALE 1/16" = 1'-0"



SECTION B-B
SCALE: ¼" = 1'-0"



SECTION A-A
SCALE: ¼" = 1'-0"



SUMP PIT DETAIL
SCALE: ¼" = 1'-0"

GENERAL NOTES:

1. Fabricator shall supply complete slab and wall steel layout, showing arrangement and details at all openings.
2. All reinforcing which is interrupted by openings must be replaced in adjacent areas. (where not shown)
3. All reinforcing shall be detailed in accordance with the latest issue of A.C.I. - "Manual of Standard Practice for Detailing Reinforced Concrete Structures." Provide necessary chair bars, supports, etc.
4. Bar laps to be 24 diameter minimum.

NOTES:

1. Clear cover for reinforcing steel, unless noted otherwise:
   Base slab bottom 4"
   Base slab top and walls 3"
2. All work on this sheet to be paid under Items
   (19) (90) (94) (95) (97) (98)

GRAPHIC SCALES
1/8" = 1'-0": 8' 0' 8' 16'
1/4" = 1'-0": 4' 0' 4' 8'

REVISION	DATE	DESCRIPTION	BY
1	1-23-64	Final field corrections Revised reinf. foundation Plan & Sect. B-B	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.H. DR. BY V.P.S.
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

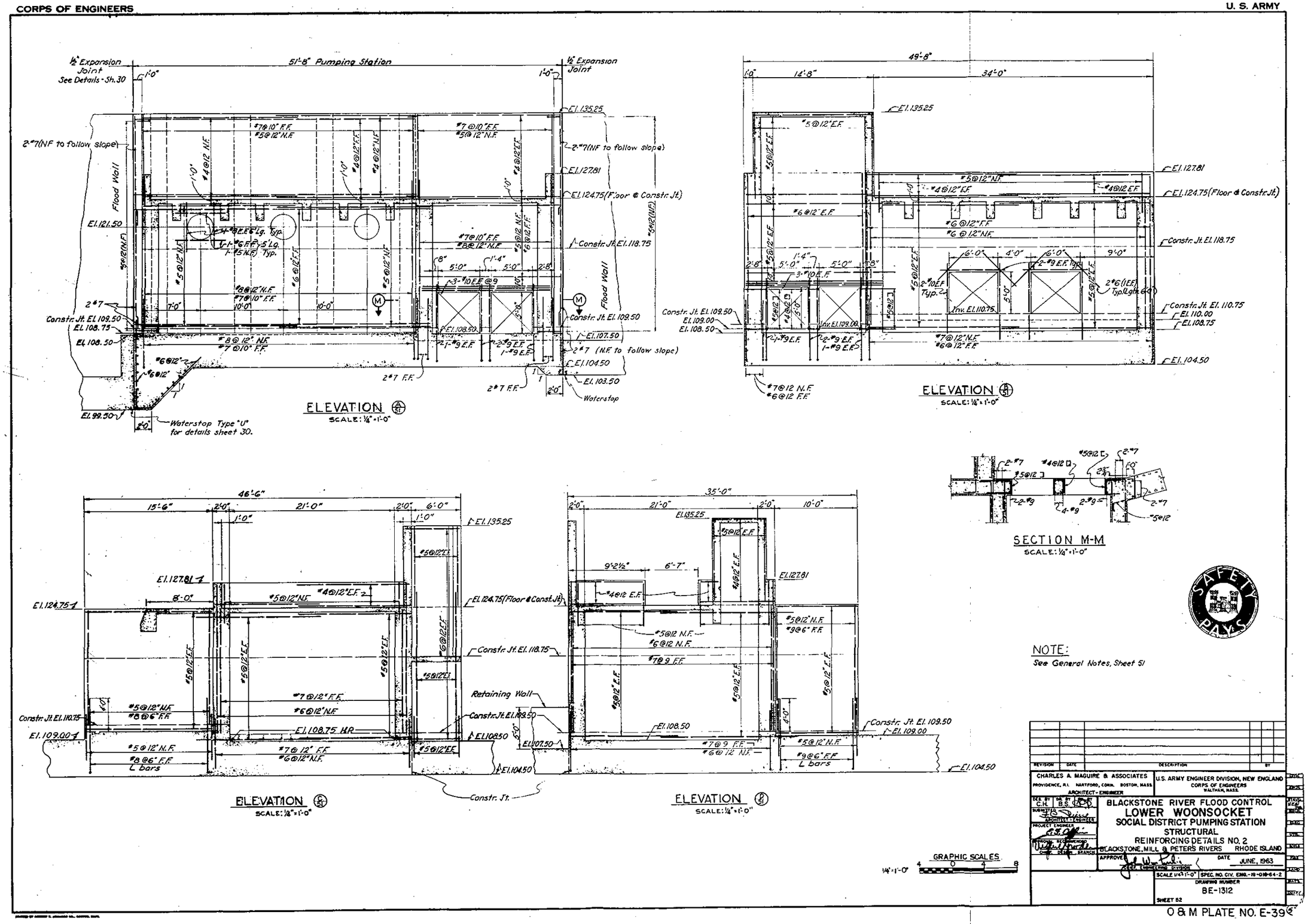
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 1

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: JUNE 1963

SCALES SHOWN
SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER
BE-1312
SHEET 51

O & M PLATE NO. E-38



NOTE:
See General Notes, Sheet 51

REVISION	DATE	DESCRIPTION	BY

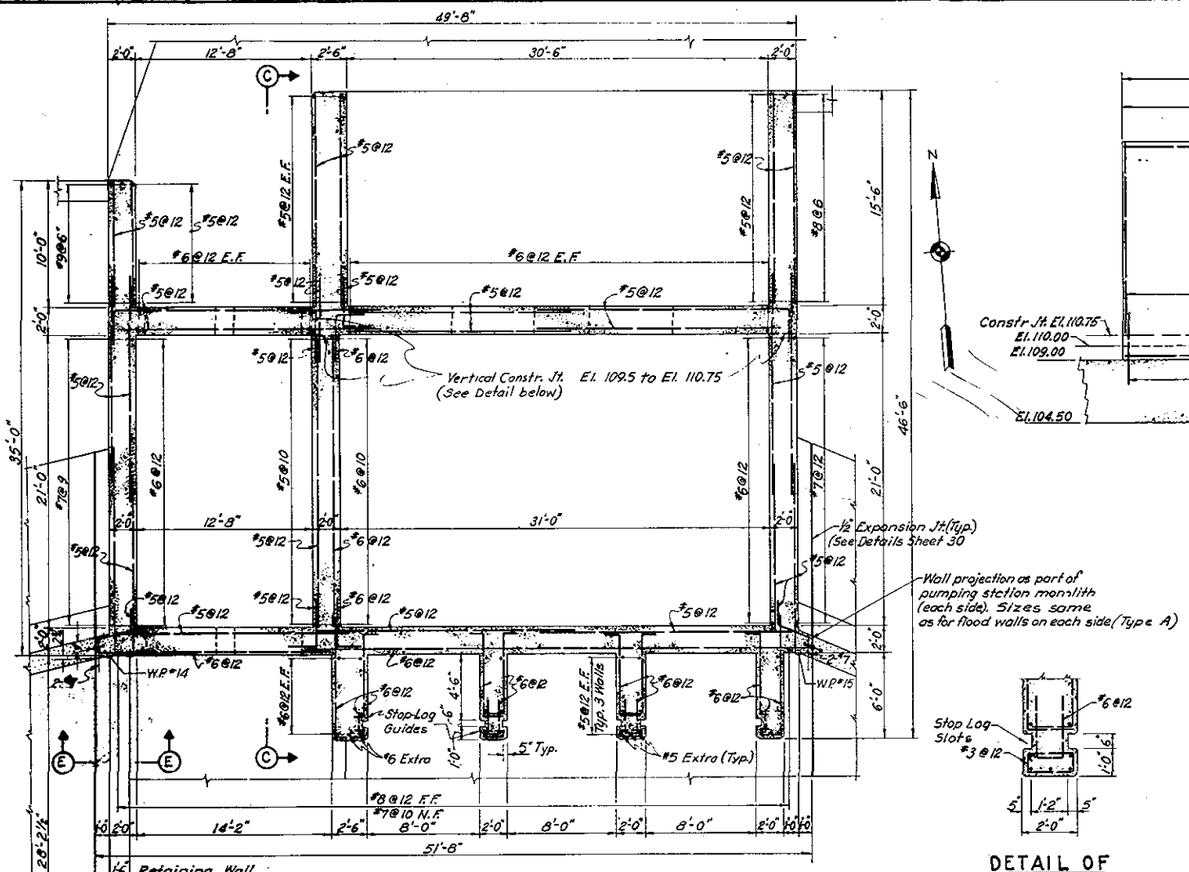
CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

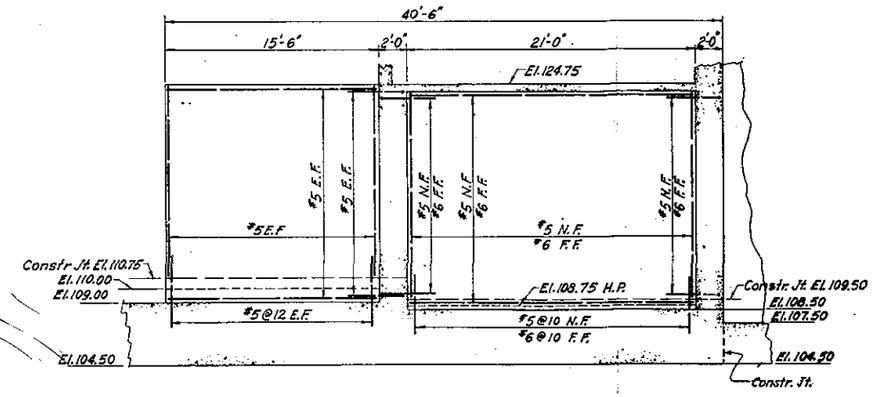
DES. BY C.H. DR. BY B.S.
SUBMITTED ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 2
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

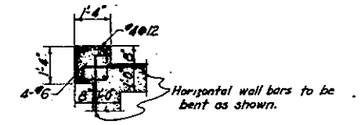
APPROVED CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE 1/4"=1'-0" SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 52



PLAN AT EL. 119.00
SCALE: ¼"=1'-0"

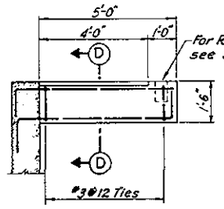


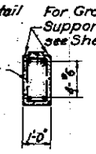
SECTION C-C
SCALE: ¼"=1'-0"



PILASTER A4

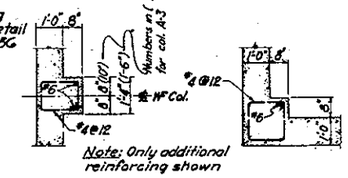
DETAIL OF STOP-LOG GUIDES
SCALE: ½"=1'-0"





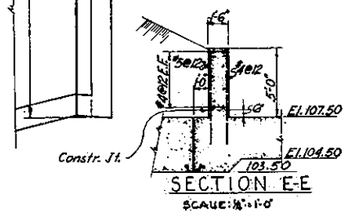
SECTION D-D

GRATING SUPPORT DETAILS
SCALE: ½"=1'-0"

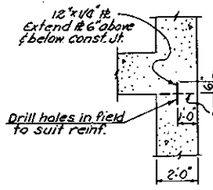


INTERIOR CORNER

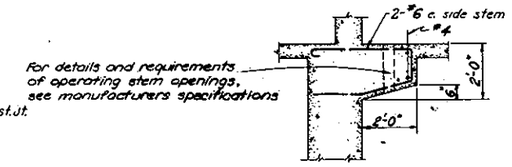
PILASTER DETAILS
SCALE: ½"=1'-0"



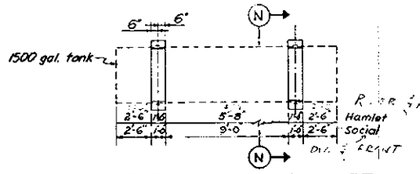
SECTION E-E
SCALE: ⅜"=1'-0"



TYPICAL VERTICAL CONST. JT.
SCALE: 3/8"=1'-0"



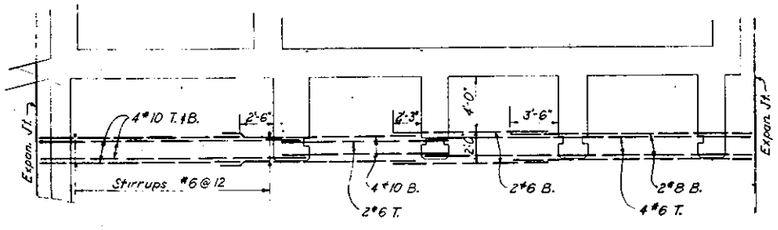
GATE STAND SUPPORT DETAIL
SCALE: ½"=1'-0"



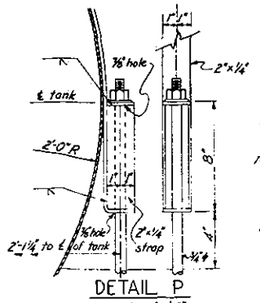
PLAN-FUEL OIL TANK SUPPORTS
SCALE: ¼"=1'-0"

NOTES:

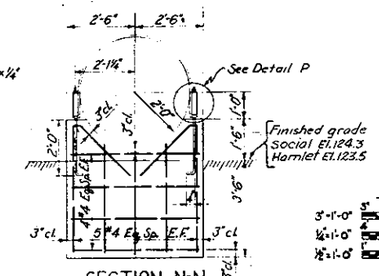
1. All work on this sheet is to be paid under Items (90) (94) (95) (97) (98)
2. Berm retaining wall not shown on Pumping Station Monolith is to be paid under items (89) (94) (95) (97) (98)



SOUTH APRON PARTIAL REINFORCING PLAN
SCALE: ¼"=1'-0"



DETAIL P
SCALE: 3"=1'-0"



SECTION N-N
SCALE: ½"=1'-0"

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

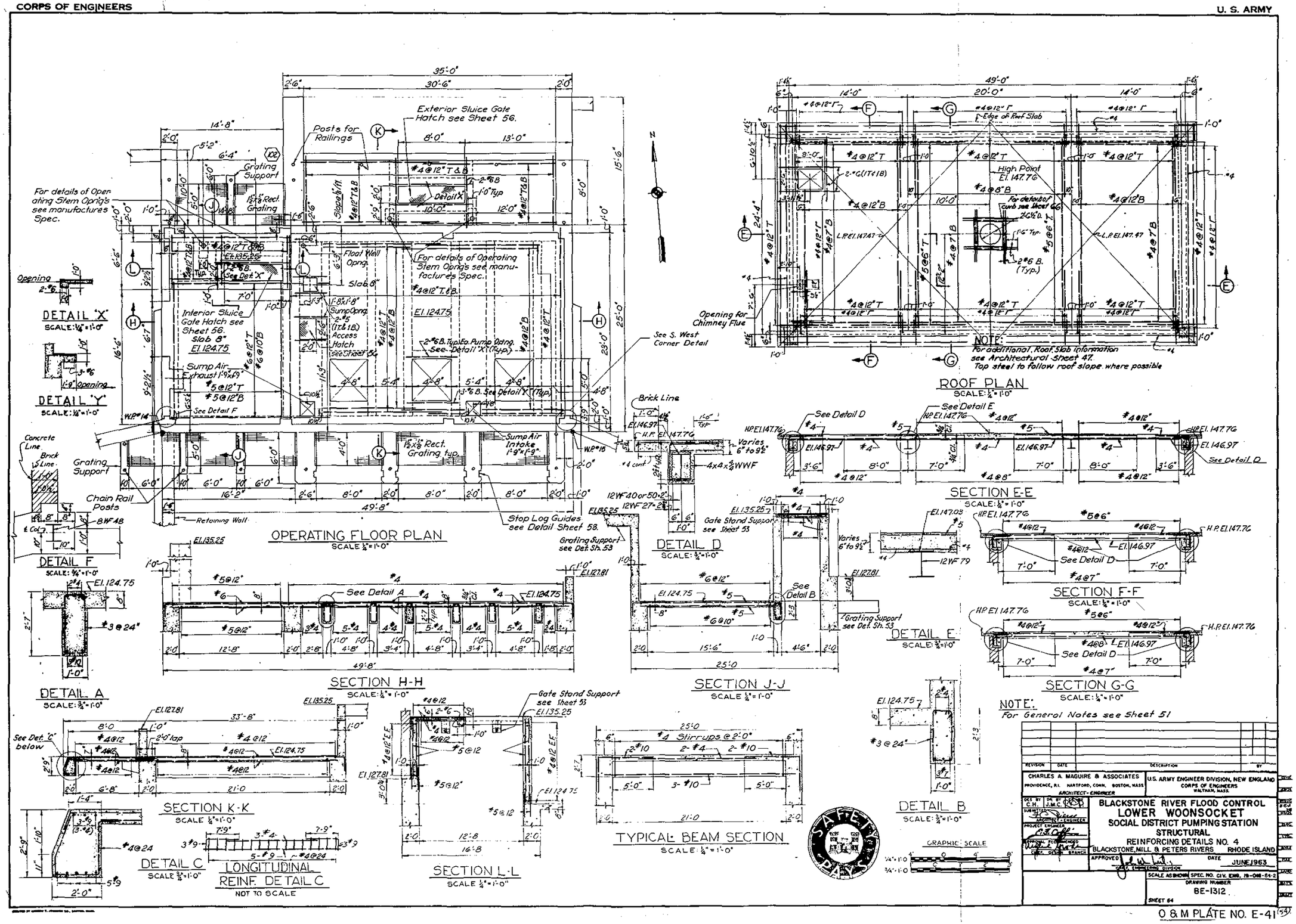
DES. BY C.H. DR. BY B.B. CK. BY
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVED RECOMMENDED
CHIEF, POWER BRANCH

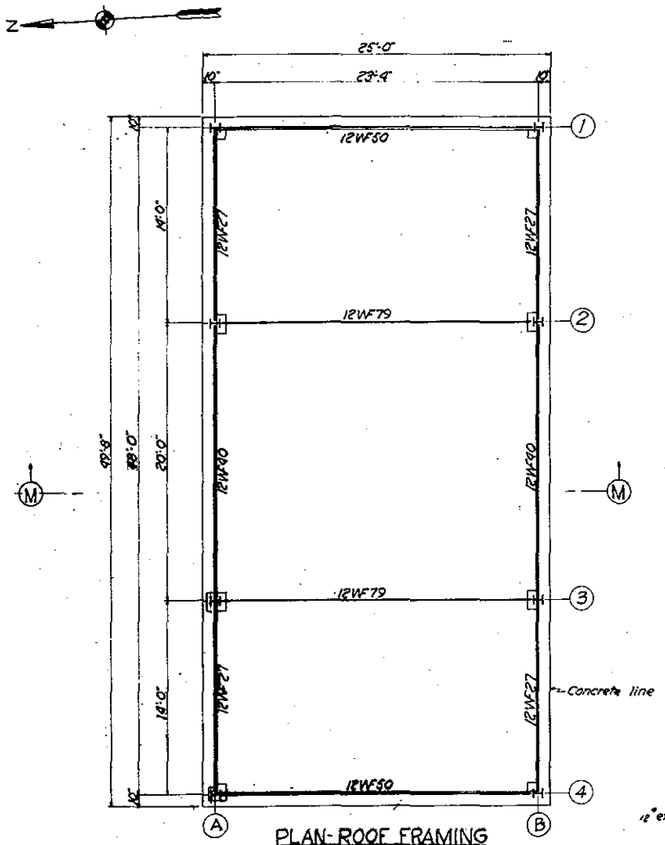
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 3
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

APPROVED DATE JUNE, 1963
CHIEF, ENGINEERING DIVISION

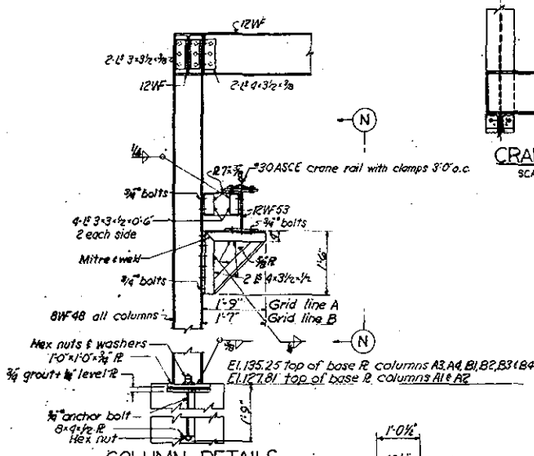
SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 53

O & M PLATE NO. E-40

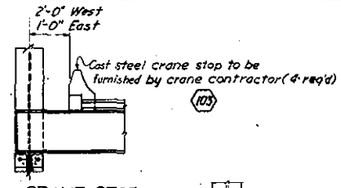

OPERATING FLOOR PLAN
SCALE ¼"=1'-0"
ROOF PLAN
SCALE: ¼"=1'-0"
NOTE:
For additional Roof Slab information see Architectural Sheet 47.
Top steel to follow roof slope where possible
SECTION E-E
SCALE: ¼"=1'-0"
SECTION F-F
SCALE: ¼"=1'-0"
SECTION G-G
SCALE: ¼"=1'-0"
NOTE:
For General Notes see Sheet 51
DETAIL 'X'
SCALE: ½"=1'-0"
DETAIL 'Y'
SCALE: ½"=1'-0"
DETAIL A
SCALE: ¾"=1'-0"
DETAIL B
SCALE: ¾"=1'-0"
DETAIL C
SCALE ¾"=1'-0"
LONGITUDINAL REINF. DETAIL C
NOT TO SCALE
DETAIL D
SCALE: ¼"=1'-0"
DETAIL E
SCALE: ¾"=1'-0"
SECTION H-H
SCALE: ¼"=1'-0"
SECTION J-J
SCALE ¼"=1'-0"
SECTION K-K
SCALE ¼"=1'-0"
SECTION L-L
SCALE ¼"=1'-0"
TYPICAL BEAM SECTION
SCALE: ¼"=1'-0"
GRAPHIC SCALE
SAFETY PAYS
CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 4
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
JUNE 1963
SCALE AS SHOWN
DRAWING NUMBER
BE-1312
SHEET 64



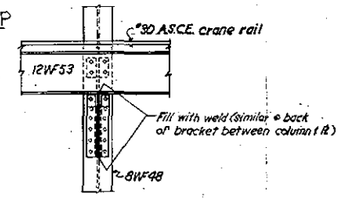
PLAN-ROOF FRAMING
SCALE: 1/16"=1'-0"



COLUMN DETAILS
SCALE: 3/16"=1'-0"



CRANE STOP
SCALE: 3/16"=1'-0"

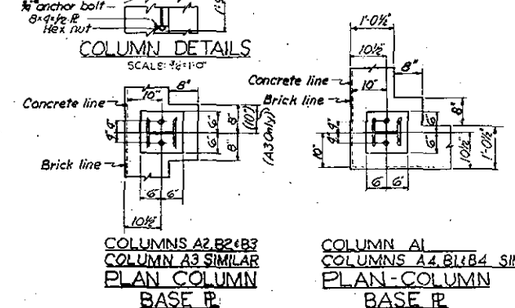


SECTION N-N
SCALE: 3/16"=1'-0"

STEEL LINTEL SCHEDULE

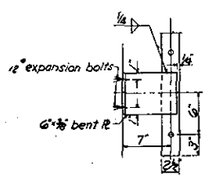
NO.	Description
8'-0"	3-Ls 6×3½×⅜*
5'-0"	3-Ls 3½×3×3/16*
1'-8"	3-Ls 3½×2½×⅜*
1'-0"	3-Ls 3½×2½×3/16*

* 3½" legs outstanding
bearing - 4"

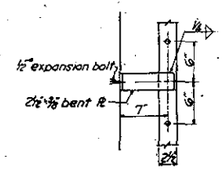


COLUMNS A2, B2 & B3
COLUMN A3 SIMILAR
PLAN COLUMN BASE Pl
SCALE: 3/4"=1'-0"

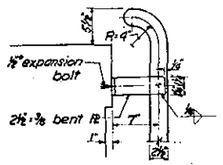
COLUMN A1
COLUMNS A4, B1 & B4 SIMILAR
PLAN-COLUMN BASE Pl
SCALE: 3/4"=1'-0"



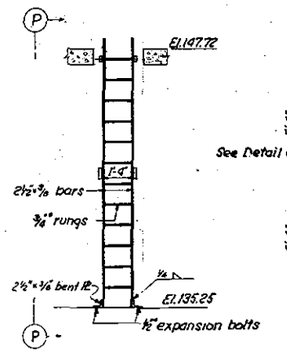
DETAIL F
SCALE: 1½"=1'-0"



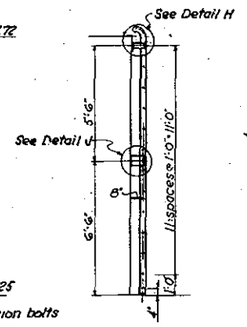
DETAIL G
SCALE: 1½"=1'-0"



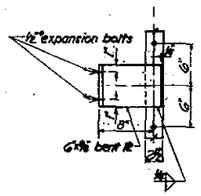
DETAIL H
SCALE: 1½"=1'-0"



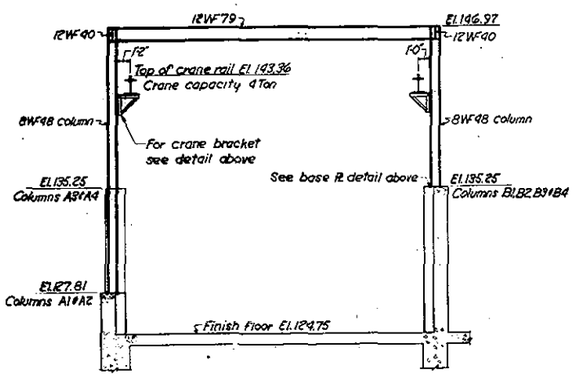
ROOF HATCH LADDER
SCALE: 3/16"=1'-0"



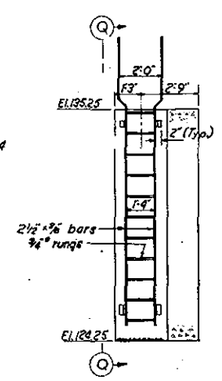
SECTION P-P
SCALE: 3/16"=1'-0"



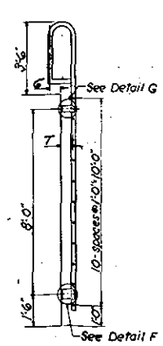
DETAIL J
SCALE: 1½"=1'-0"



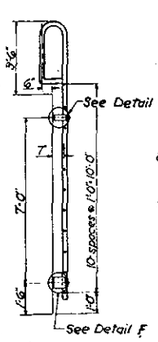
SECTION M-M
SCALE: 1/4"=1'-0"



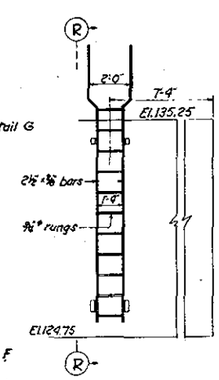
EXTERIOR LADDER
SCALE: 3/8"=1'-0"



SECTION Q-Q
SCALE: 3/8"=1'-0"



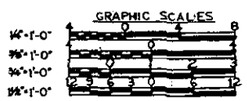
SECTION R-R
SCALE: 3/8"=1'-0"



INTERIOR LADDER
SCALE: 3/8"=1'-0"

NOTES:

1. All steel connections to be ¾" High Strength Bolts with standard "B" connections unless otherwise noted.
2. All structural and miscellaneous metal work on this sheet is to be paid for under Item (102).



REVISION	DATE	DESCRIPTION	BY

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT - ENGINEER

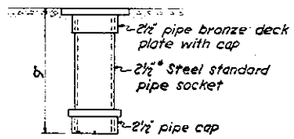
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.H. DR. BY W.W.
PRINCIPAL ENGINEER
PROJECT ENGINEER
CHIEF, ENGINEERING DIVISION
CHIEF, DESIGN BRANCH

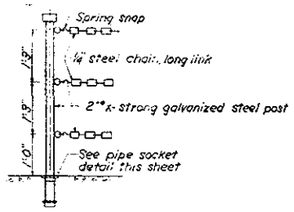
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
STRUCTURAL
STRUCTURAL AND MISCELLANEOUS STEEL
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

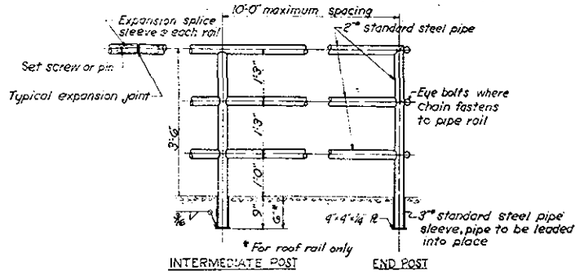
SCALE AS SHOWN
SPEC. NO. CIV. ENG.-18-016-64-2
DRAWING NUMBER
BE-1312
SHEET 86



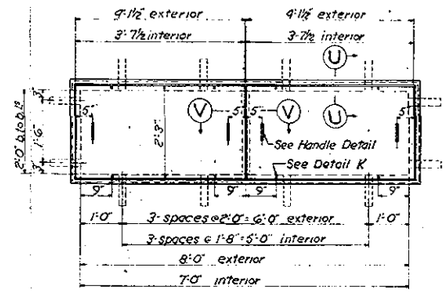
PIPE SOCKET FOR REMOVABLE POST
SCALE: 3/16" = 1'



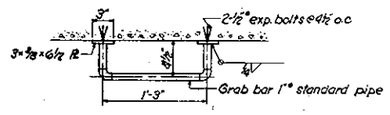
REMOVABLE POST FOR CHAIN GUARD RAIL
SCALE: 3/4" = 1'-0"



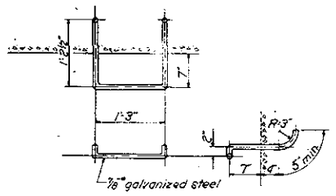
TYPICAL EXTERIOR PIPE RAILING DETAILS
SCALE: 3/4" = 1'-0"



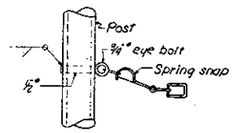
SLUICE GATE HATCH FRAME AND COVER
ONE INTERIOR AND ONE EXTERIOR FOR EACH STATION
SCALE: 3/4" = 1'-0"



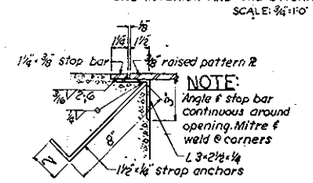
GRAB BAR DETAIL
SCALE: 1½" = 1'-0"



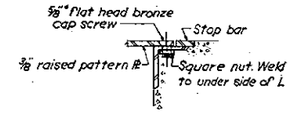
LADDER RUNG DETAIL
SCALE: 1" = 1'-0"



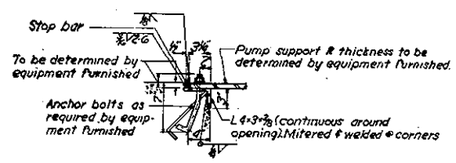
EYE BOLT DETAIL
SCALE: 3" = 1'-0"



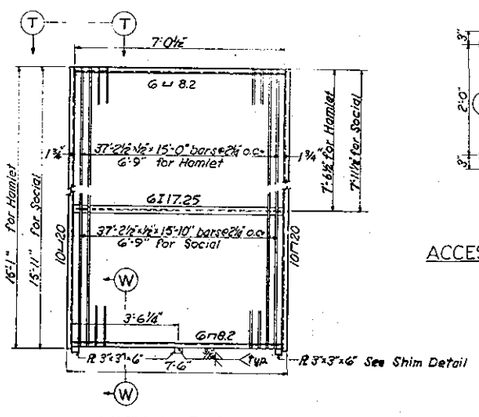
SECTION U-U
SCALE: 3" = 1'-0"



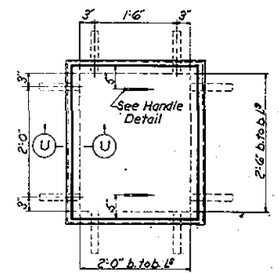
FOR EXTERIOR HPS ONLY
DETAIL K
SCALE: 3" = 1'-0"



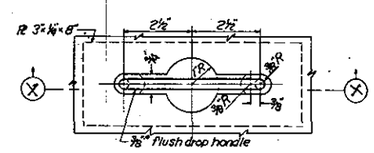
FRAME AND COVER AT SUMP PUMP OPENING
SCALE: 1½" = 1'-0"



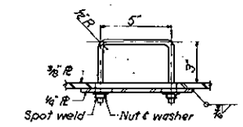
ELEVATION-TRASH RACK
4-REQUIRED FOR SOCIAL
2-REQUIRED FOR HAMLET
SCALE: 1½" = 1'-0"



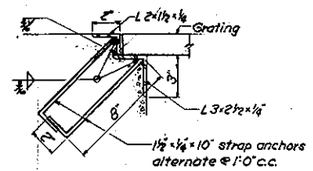
ACCESS HATCH COVER AND FRAME
ONE EACH STATION
SCALE: 1" = 1'-0"



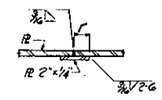
HANDLE DETAIL
SCALE: HALF



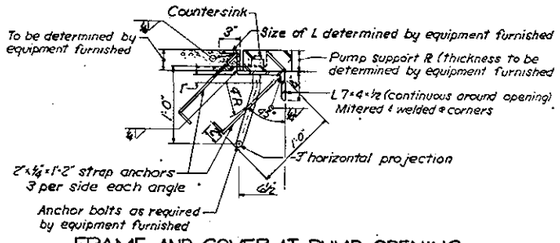
SECTION X-X
SCALE: 3" = 1'-0"



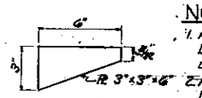
GRATING SUPPORT
SCALE: 3" = 1'-0"



SECTION V-V
SCALE: 3" = 1'-0"



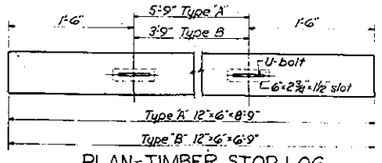
FRAME AND COVER AT PUMP OPENING
SCALE: 1½" = 1'-0"



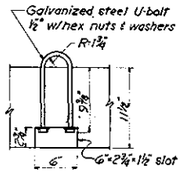
SHIM DETAIL
SCALE: 3" = 1'-0"

NOTES:

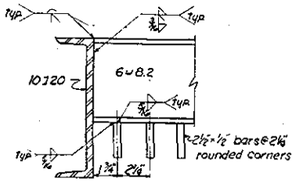
1. All work on this sheet pertaining to Social District Pumping Station is to be paid under Item (102)
2. All work on this sheet pertaining to Hamlet District Pumping Station is to be paid under Item (99)



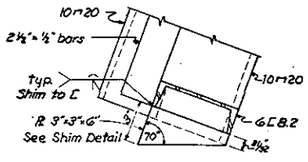
PLAN-TIMBER STOP LOG
18 - TYPE 'A' REQUIRED FOR SOCIAL
13 - TYPE 'B' REQUIRED FOR HAMLET
SCALE: 1½" = 1'-0"



U-BOLT DETAIL
SCALE: 1½" = 1'-0"



SECTION T-T
SCALE: 3" = 1'-0"



SECTION W-W
SCALE: 3" = 1'-0"

GRAPHIC SCALES

1½" = 1'-0"
3/4" = 1'-0"
1" = 1'-0"
1½" = 1'-0"
3" = 1'-0"
HALF SIZE

REVISION	DATE	DESCRIPTION	BY
1	11-27-63	Timber stop log quantity revised (Am. #6)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

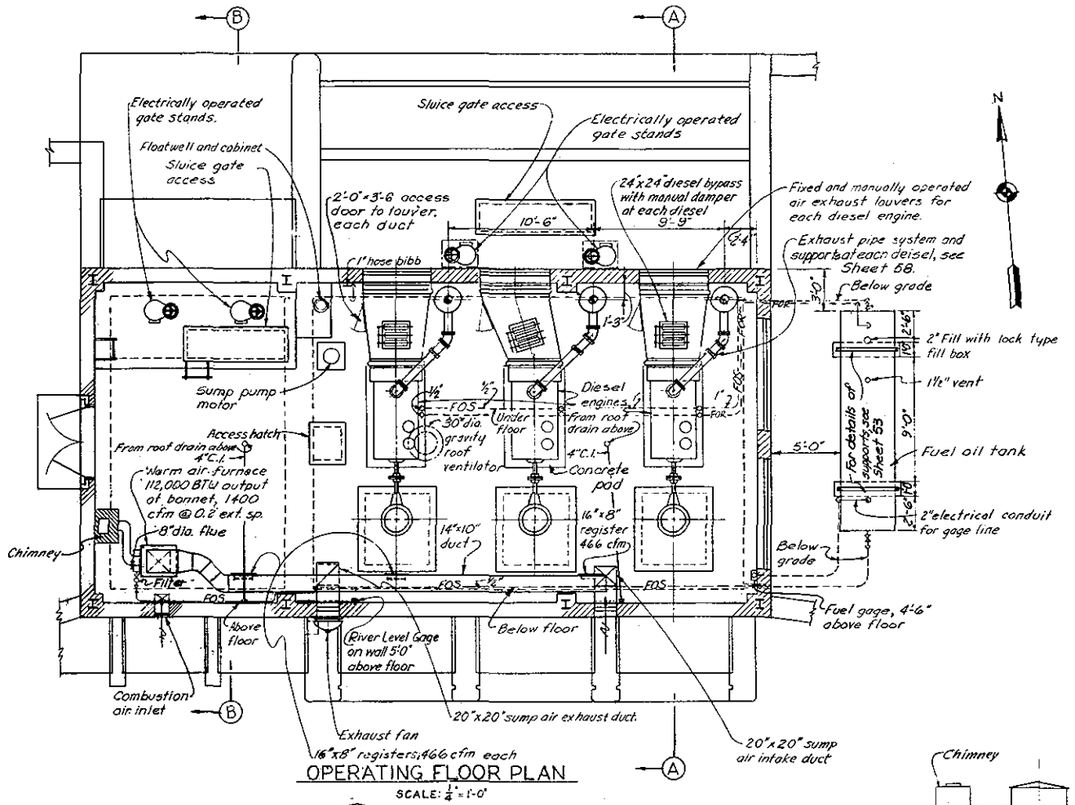
DES. BY C.H. DR. BY W.W.G. CHECKED
SUPERVISED BY
ARCHITECT-ENGINEER
PROJECT ENGINEER
REVIEW RECOMMENDED
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL & HAMLET DISTRICT PUMPING STATIONS
STRUCTURAL
TYPICAL STEEL DETAILS
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

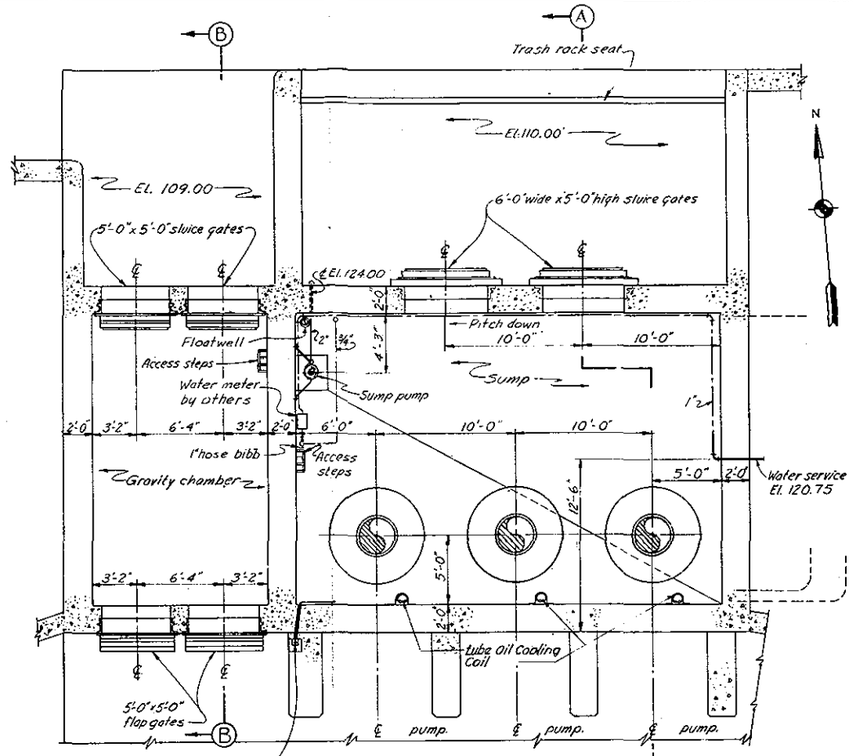
APPROVED
CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

SCALE AS SHOWN
SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER
BE-1312
SHEET 56

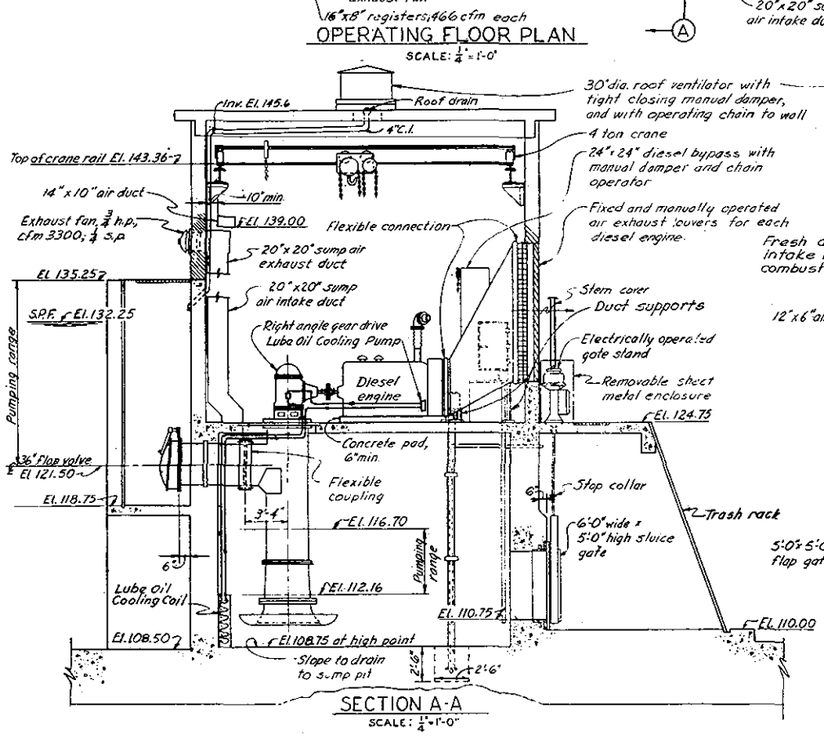
O & M PLATE NO. E-43



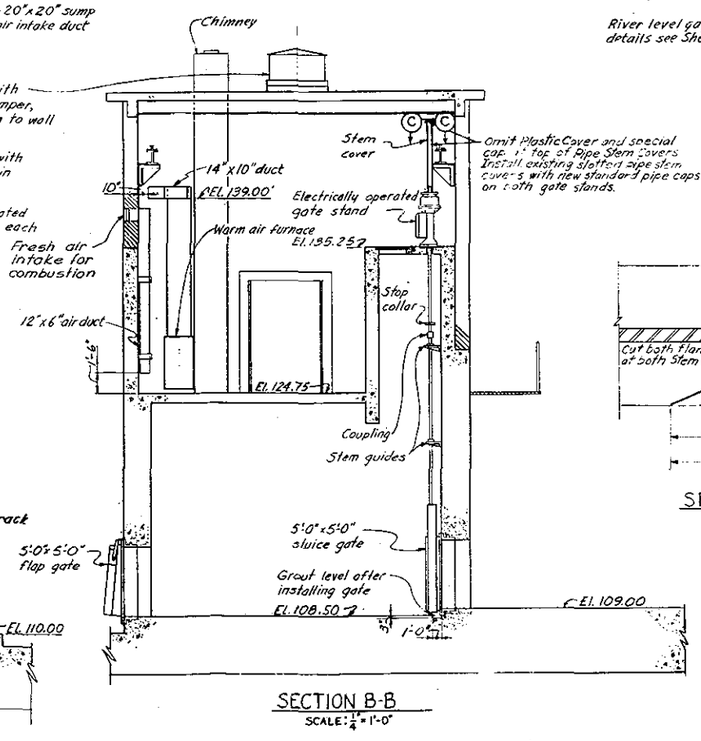
OPERATING FLOOR PLAN
SCALE: 1/4" = 1'-0"



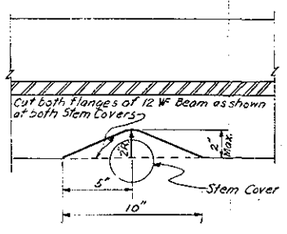
SUMP PLAN
SCALE 1/4" = 1'-0"



SECTION A-A
SCALE: 1/4" = 1'-0"



SECTION B-B
SCALE: 1/4" = 1'-0"



SECTION C-C
SCALE 3" = 1'-0"

GRAPHIC SCALE
1/4" = 1'-0" 4' 0 4' 8'
3" = 1'-0" 3" 0 3" 6" 9"

REVISION	DATE	DESCRIPTION	BY
		Final Field Corrections	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.K. CD. DR. BY V.P.S. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
RECOMMENDED: CHIEF, DESIGN BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
MECHANICAL
PLANS AND SECTIONS

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

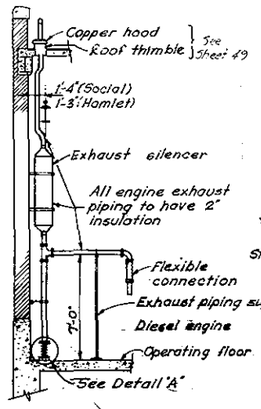
DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-018-64-2

DRAWING NUMBER BE-1312

SHEET 57

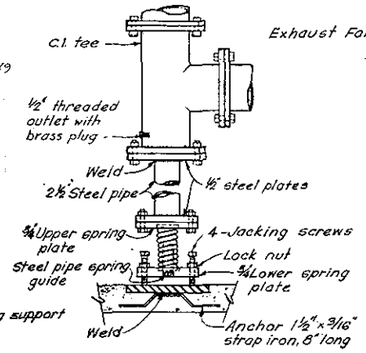
O & M PLATE NO. E-44



TYPICAL DETAIL OF ENGINE EXHAUST PIPING

SCALE: 1/4" = 1'-0"

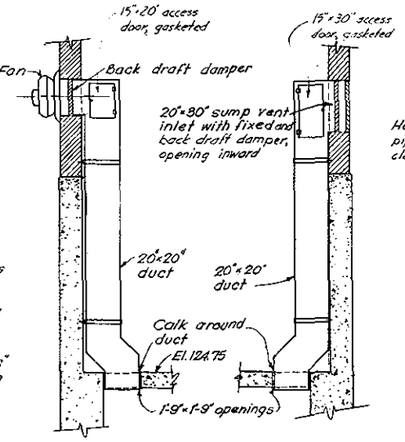
100 103



TYPICAL DETAIL "A"

NOT TO SCALE

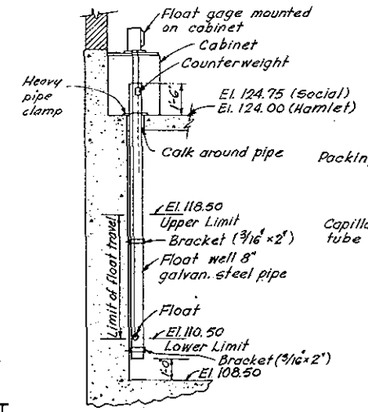
100 103



SUMP VENTILATION

SCALE: 3/8" = 1'-0"

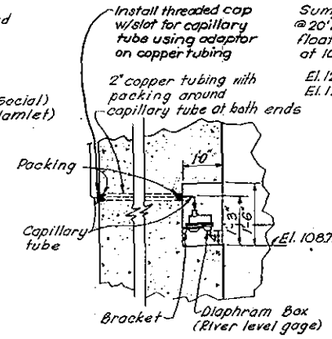
103



TYPICAL DETAIL OF SUMP FLOAT WELL

SCALE: 3/8" = 1'-0"

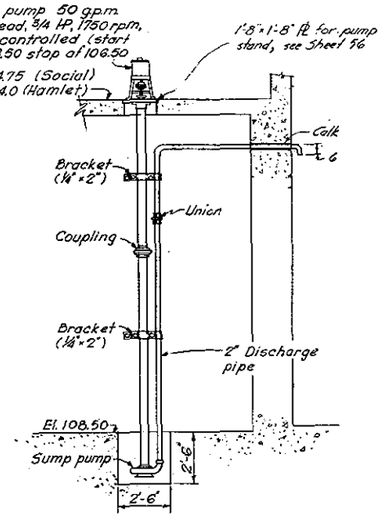
100 103



TYPICAL DETAIL OF RIVER LEVEL GAGE

SCALE: 3/4" = 1'-0"

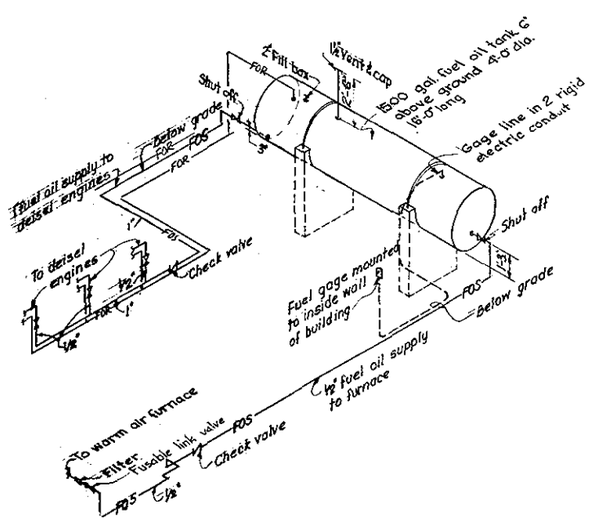
100 103



TYPICAL DETAIL OF SUMP PUMP

SCALE: 3/8" = 1'-0"

100 103

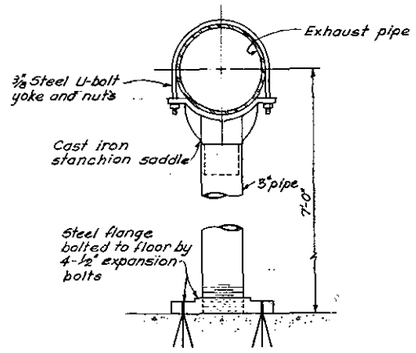


FUEL OIL PIPING

ISO-SCHEMATIC

NOT TO SCALE

103



EXHAUST PIPING SUPPORT

SCALE: 3" = 1'-0"

103

GRAPHIC SCALES

1/4"=1'-0" 4' 0 4' 8'

3/8"=1'-0" 8' 0 8'

3/4"=1'-0" 4' 0 2' 4'

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.R.D. DR. BY D.P.T. CHKD.
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

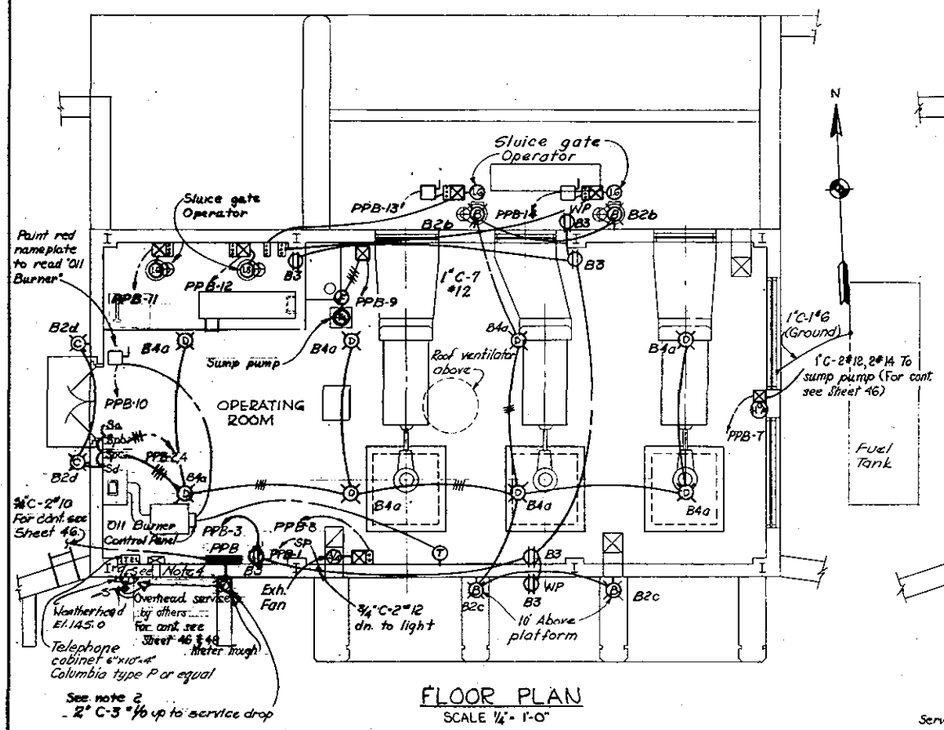
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
MECHANICAL
DETAILS
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

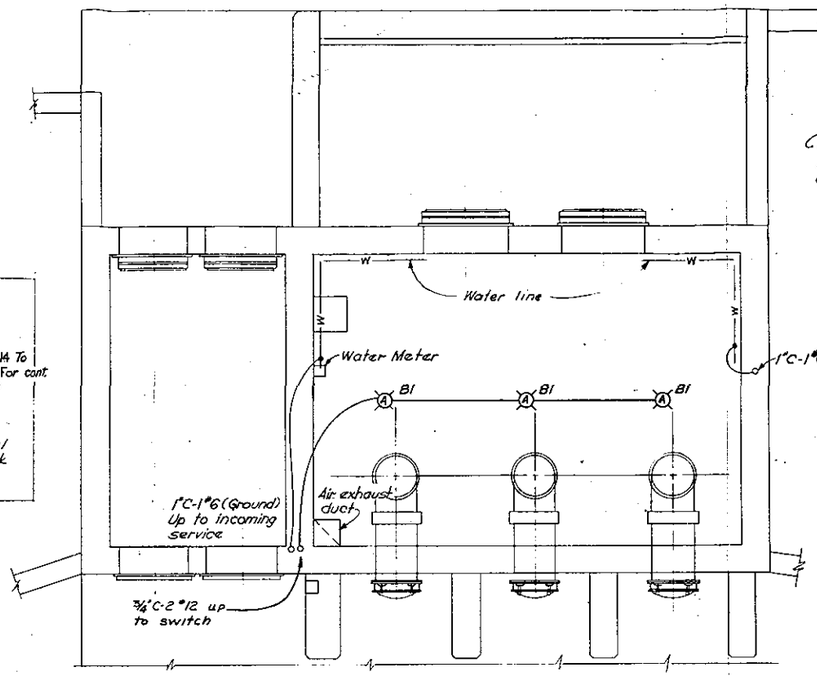
SCALE AS SHOWN | SPEC. NO. CIV. ENG-19-018-64-2

DRAWING NUMBER
BE-1312

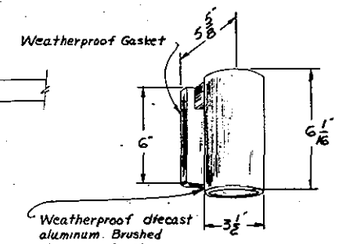
SHEET 50



FLOOR PLAN
SCALE 1/4" = 1'-0"



SUMP PLAN
SCALE 1/4" = 1'-0"



DETAIL C
NOT TO SCALE

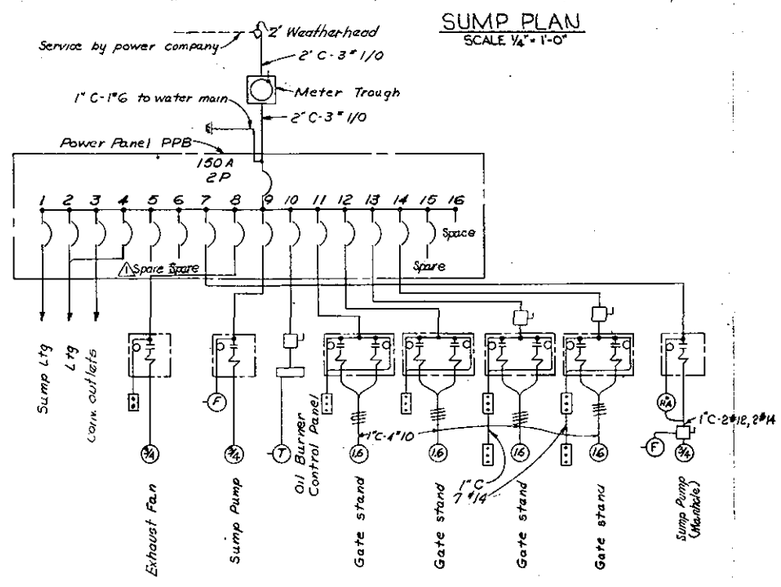
LEGEND	
NEW	DESCRIPTION
(H)	Hand-off-automatic selector switch
(A) 4a	Ceiling light outlet, letter refers to fixture schedule, subscript refers to panelboard & fixture switched
(B) Sa	Wall light outlet Single pole switch, 20 ampere, 277 volts, Located 4'-0" above finish floor; subscript indicates light to be switched.
SP	Single pole switch & pilot light.
	Duplex convenience outlet, 15 ampere, 125 volts, 3 wire grounded, located 4'-0" above finish floor
WP	Duplex convenience outlet, weatherproof, with 2 spring doors.
(M)	Motor numeral denotes horsepower.
	Raise, lower, stop, push button station with pilot lights.
	Motor starter
	Start stop push button station
	Disconnect switch horsepower rated, non-fused
(M)	Micro-switch
(T)	Thermostat
	Panelboard
	Conduit run concealed in walls or ceiling.
	Conduit run in floor slab.
	Conduit run exposed.
	Home run to panelboard, hash marks indicate number of wires, sized as indicated in panelboard schedule, if more than two.
(F)	Float switch

POWER PANEL PPB
120/240 VOLT 1 PHASE 3 WIRE SOLID NEUTRAL
150 AMP MAIN BREAKER-TOP- SURFACE MOUNTED
LOCATION- SOCIAL DISTRICT PUMPING STATION

CIRCUIT NO.	BRKR. POLES	BRKR. FRAME AMP. TRIP	DESCRIPTION	HORSE POWER	K.W.	AMP L1	AMP L2	WIRE SIZE	REMARKS
1	1	20	Sump lighting		.450	3.8		12	
2	1	20	Exterior lighting		.750	6.3		12	
3	1	20	Convenience outlets		.900		7.5	12	
4	1	20	Operating floor lighting		1.200		10.0	12	
5	1	20	Spare						
6	1	20	Spare						
7	2	20	Sump pump (manhole)	3/4		6.9	6.9	12	
8	2	20	Exhaust fan	3/4		6.9	6.9	12	
9	2	15	Sump pump	3/4		6.9	6.9	12	
10	2	30	Oil burner	1/4		9.1	9.1	12	
11	2	40	Gate stand	1.6		11.6	11.6	10	
12	2	40	Gate stand	1.6		11.6	11.6	10	
13	2	40	Gate stand	1.6		11.6	11.6	10	
14	2	40	Gate stand	1.6		11.6	11.6	10	
15	2	15	Spare						
16	2	—	Space						Bussing only
			TOTAL	9 1/2	5.300	104.3	96.3		

LIGHTING FIXTURE SCHEDULE

FIXTURE TYPE	SEE DETAIL	CORPS OF ENGINEERS TYPE	NO. OF LAMPS	LAMP TYPE	LAMP LUMENS	MOUNTING HEIGHT	REMARKS
A	—	V 2	1	150 PS25/991F	2250	Ceiling	With guard
B	—	VG4	1	150 PS25/991F	2250	10'-0"	Except as noted
C	C	—	1	75 A 19/1F	1150	7'-6"	
D	—	I 2	1	150 PS25/991F	2250	Ceiling	
E	—	I 2	1	150 PS25/991F	2250	10'-0"	With stems as reqd.



SINGLE LINE DIAGRAM
NOT TO SCALE

GRAPHIC SCALES
1/4"=1'-0"

NOTES:

1. Where conduit is not identified it shall be 3/4" rigid steel, threaded, with 2 wires sized as indicated in the panelboard schedule, minimum size conduit shall be 3/4" nominal size.
2. Meter trough shall conform to power company's requirements. install 2" conduit with 3" 1/0 conductors up to service drop. Weatherhead shall be at least 11' above platform.
3. All work on this Sheet is to be paid under Item (102)
4. Provide heavy duty secondary rack, 5 spools, 8" spacing, with 2-3/8" thru bolts and extension brackets.

REVISION	DATE	DESCRIPTION	BY
1	11-27-63	Final field corrections Panel schedule & single line diagram revised (Am.5)	

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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY J.L. DR. BY D.M. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVED RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
SOCIAL DISTRICT PUMPING STATION
ELECTRICAL
PLANS AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

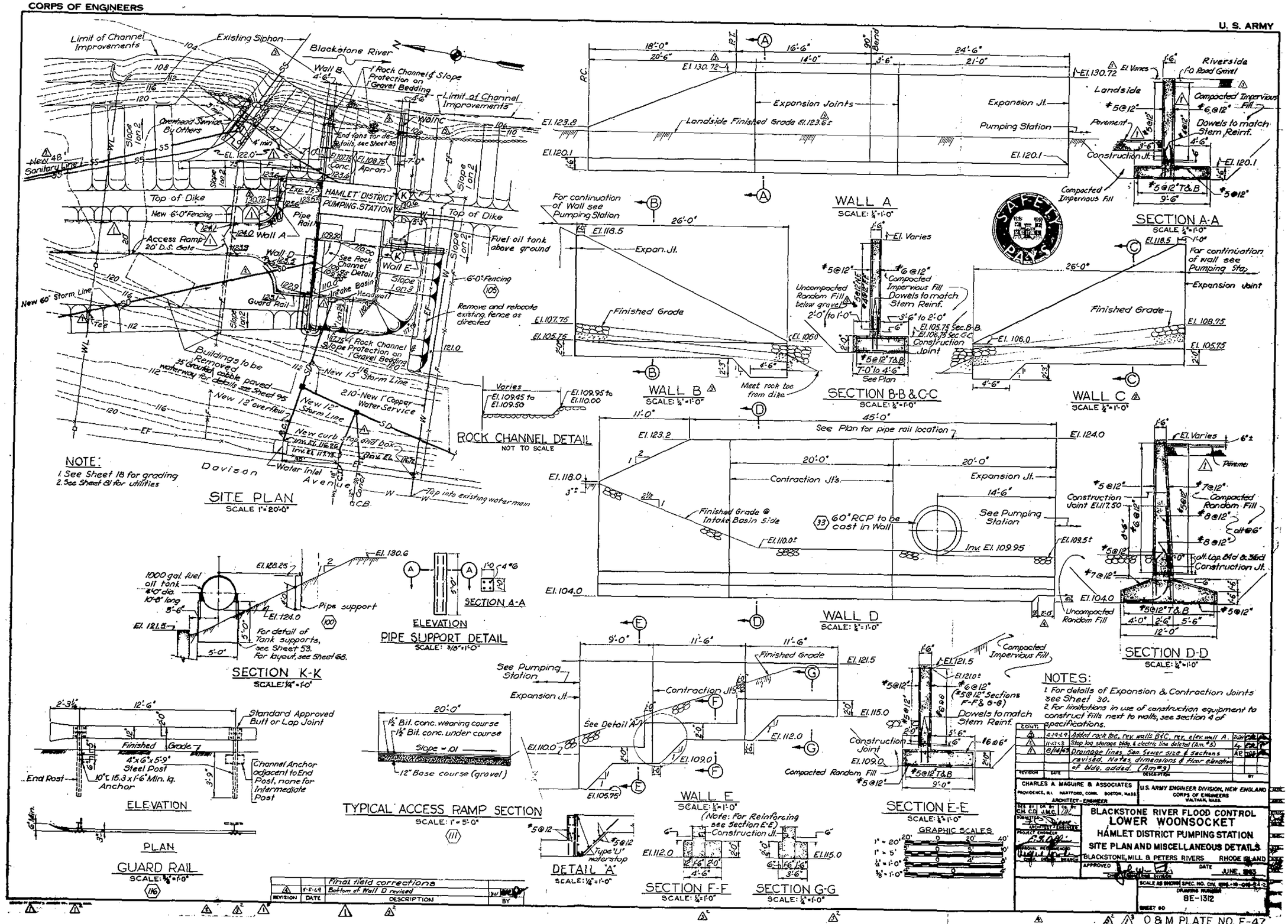
APPROVED: CHIEF, ENGINEERING DIVISION DATE JUNE, 1963

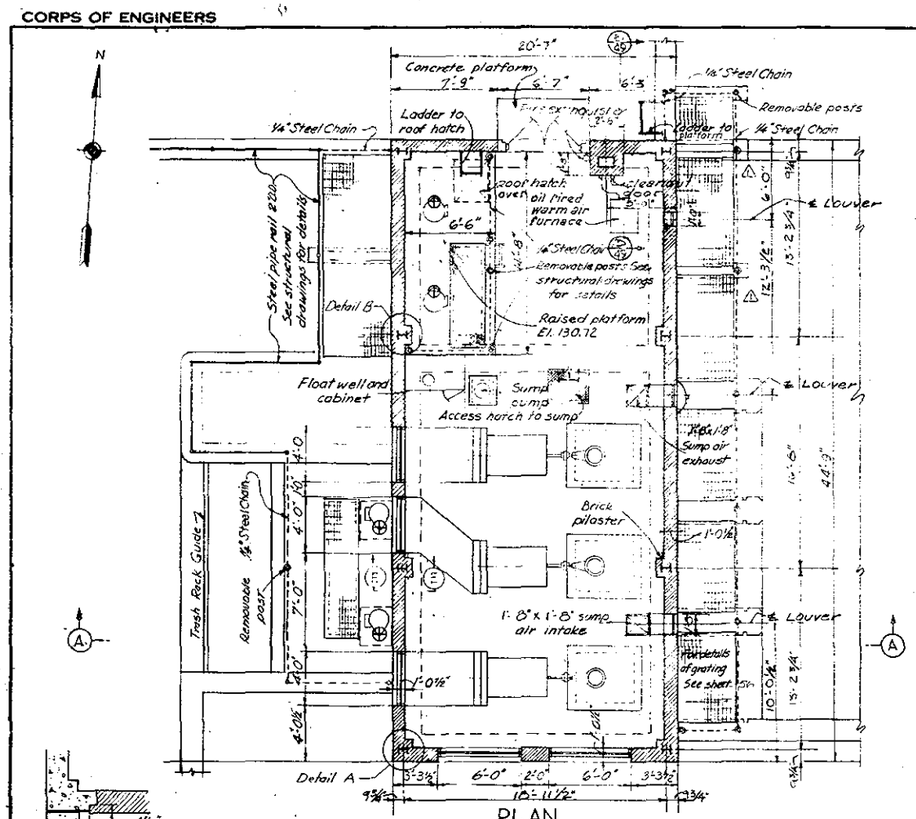
SCALE 1/4"=1'-0" SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 59

O & M PLATE NO. E-46

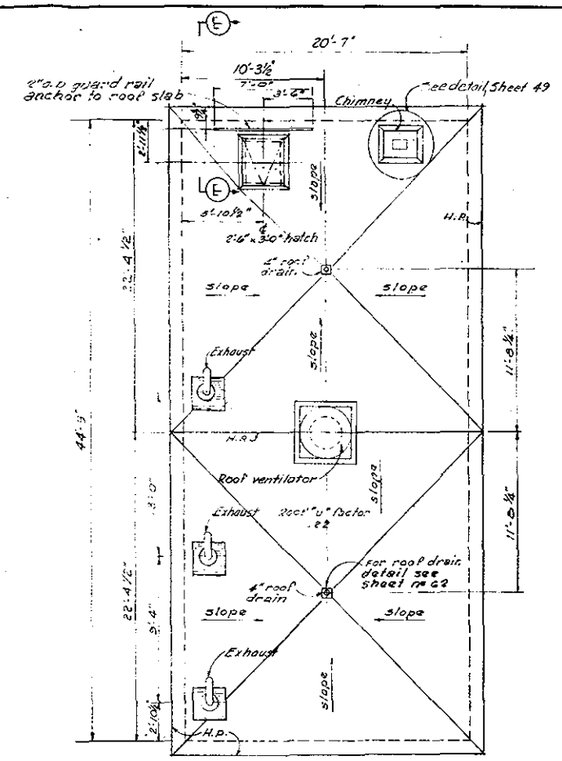
CORPS OF ENGINEERS

U. S. ARMY

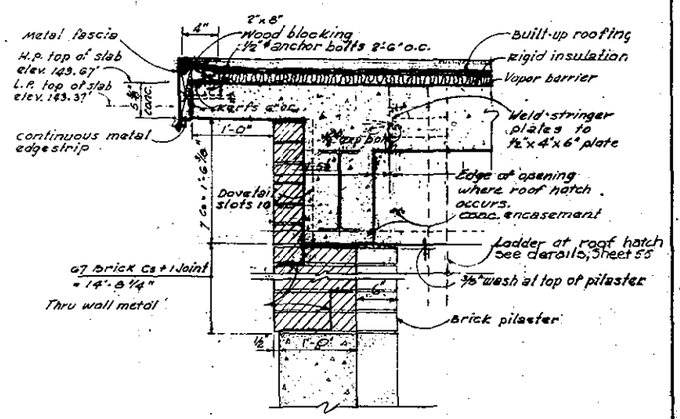




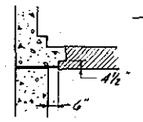
PLAN
SCALE: 1/4" = 1'-0"



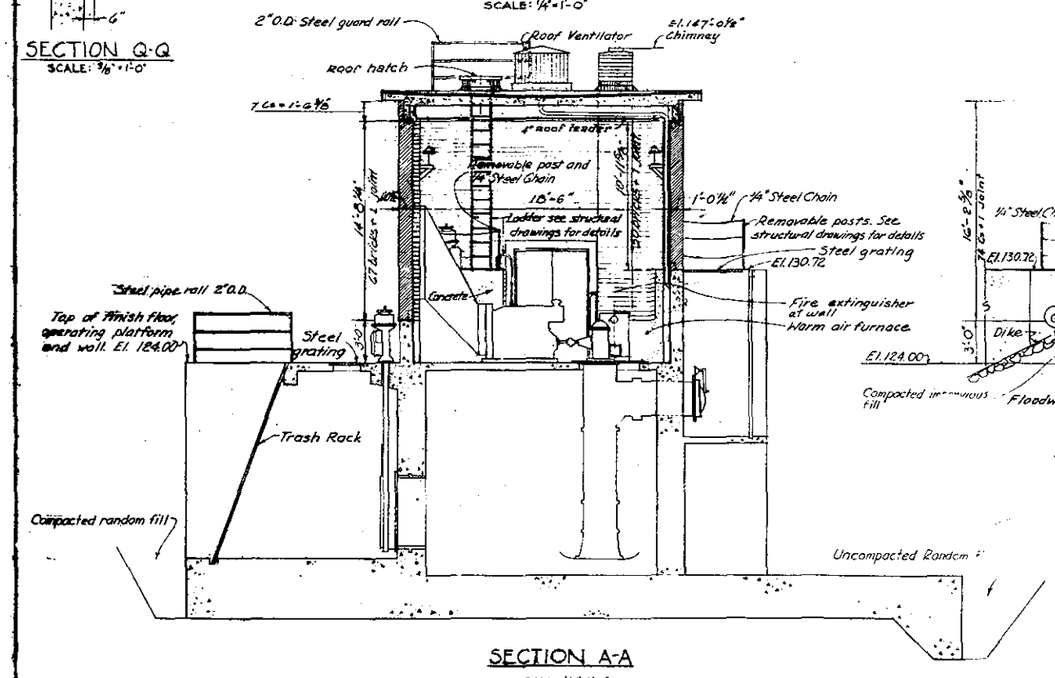
ROOF PLAN
SCALE: 1/4" = 1'-0"



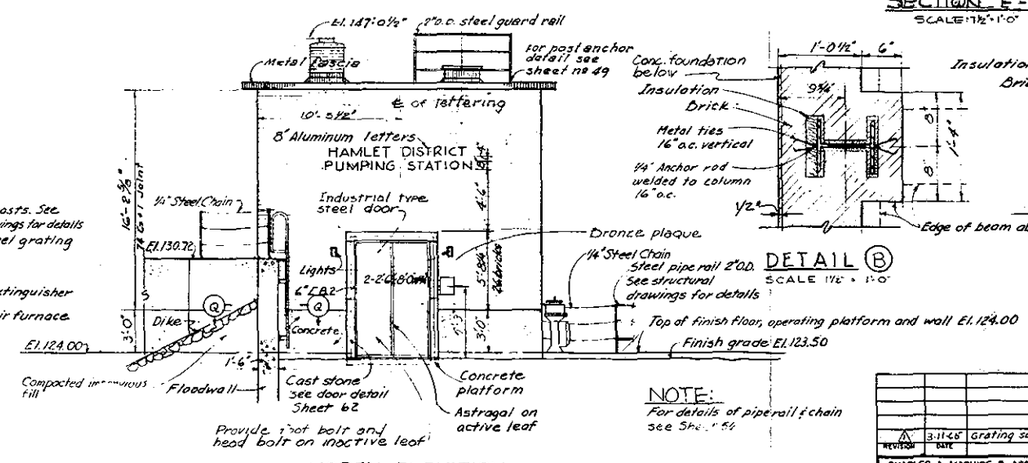
SECTION "E - E"
SCALE: 1 1/2" = 1'-0"



SECTION Q-Q
SCALE: 3/8" = 1'-0"

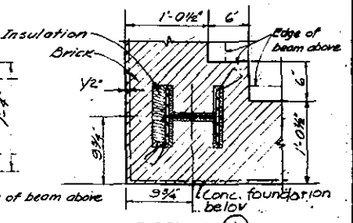


SECTION A-A
SCALE: 1/4" = 1'-0"



NORTH ELEVATION
SCALE: 1/4" = 1'-0"

DETAIL (B)
SCALE 1 1/2" = 1'-0"



DETAIL (A)
SCALE 1 1/2" = 1'-0"

NOTE:
For details of pipe rail & chain see Sheet 54

NOTE:
1. All vertical brick dimensions are from bottom of brick joint to bottom of brick joint, unless otherwise noted.
2. Brick dimensions for exterior and interior face brick are based on standard brick 2 1/4 x 3 3/4 x 8" with 3/8" joints.

GRAPHIC SCALES
3/4" = 1'-0"
1/4" = 1'-0"
1 1/2" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
A	3-11-68	Grating support locations revised.	

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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

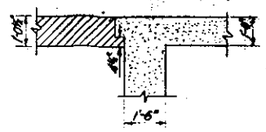
DES. BY D.P. DR. BY H.J. CK. BY
SUBMITTED
ARCHITECT - ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
ARCHITECTURAL
PLANS, ELEVATIONS AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

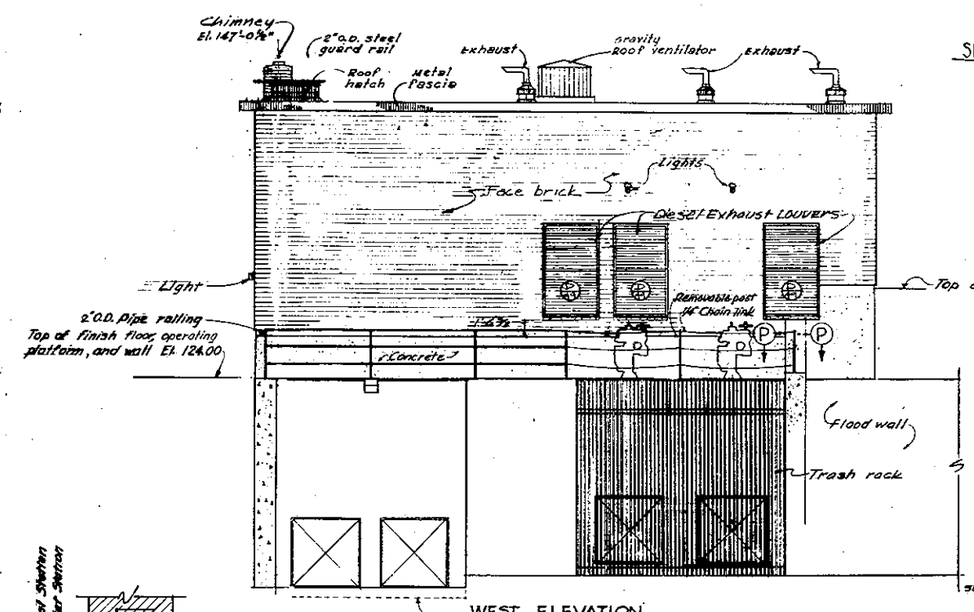
APPROVED DATE JUNE 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-049-64-2
DRAWING NUMBER
8E-1312
SHEET 61

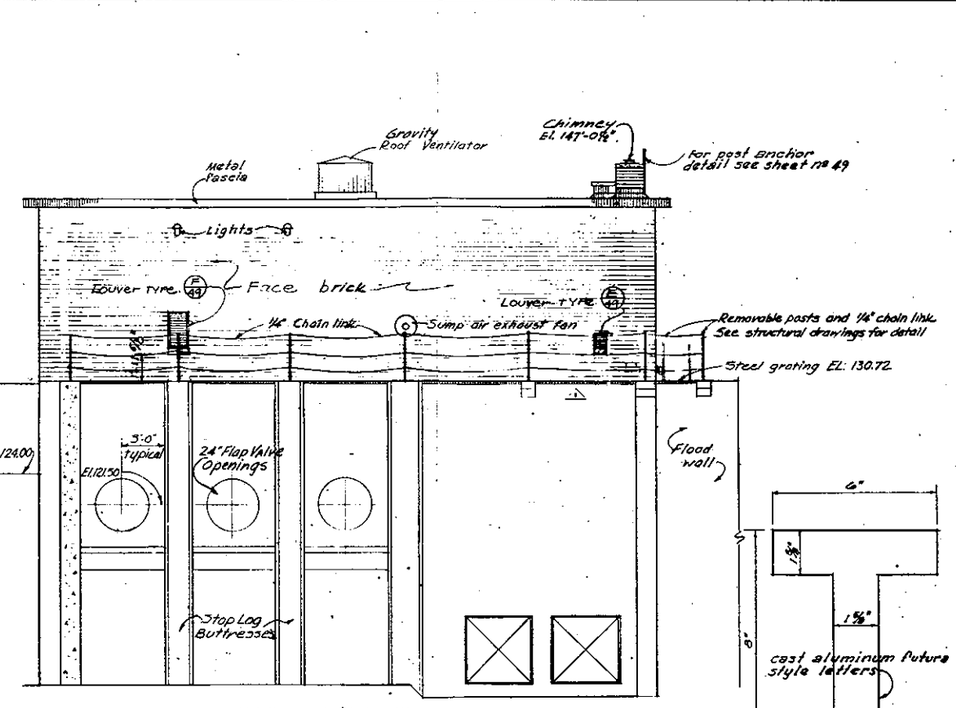
O & M PLATE NO. E-48



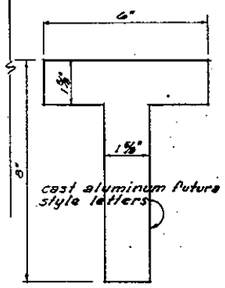
SECTION P-P
SCALE: 1/2"=1'-0"



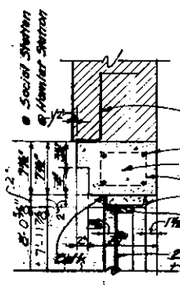
WEST ELEVATION
SCALE: 1/4"=1'-0"



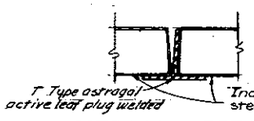
EAST ELEVATION
SCALE: 1/4"=1'-0"



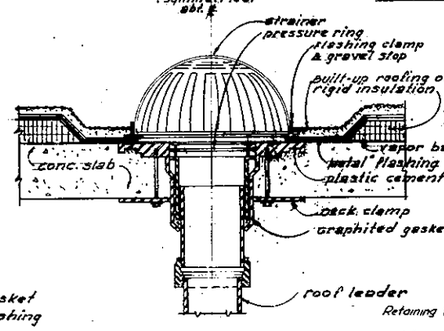
ELEVATION
HALF SIZE



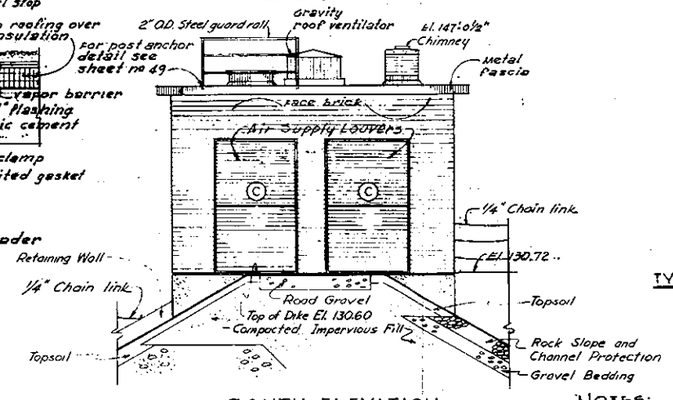
HEAD



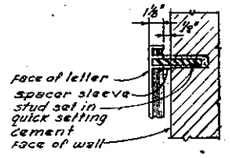
ASTRAGAL DETAIL
HALF SIZE



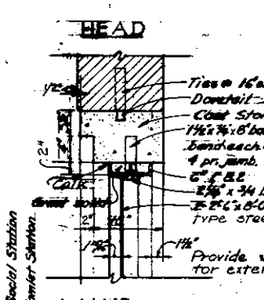
ROOF DRAIN DETAIL
SCALE: 3"=1'-0"



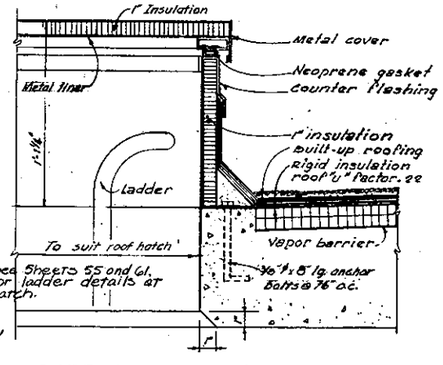
SOUTH ELEVATION
SCALE: 1/4"=1'-0"



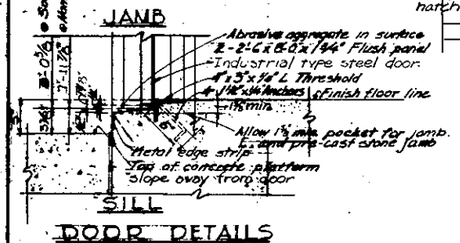
SECTION
SCALE: 3"=1'-0"
TYPICAL LETTER DIMENSIONS



JAMB



ROOF HATCH DETAIL
SCALE 3" = 1'-0"



SILL

DOOR DETAILS
SCALE 1 1/2" = 1'-0"

NOTES:
1. For details of mechanical equipment see sheets 60 & 69

GRAPHIC SCALES

1"=1'
1/4"=1'-0"
3/4"=1'-0"
1 1/2"=1'-0"
3"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	3-11-65	Grating support locations and chain link revised	

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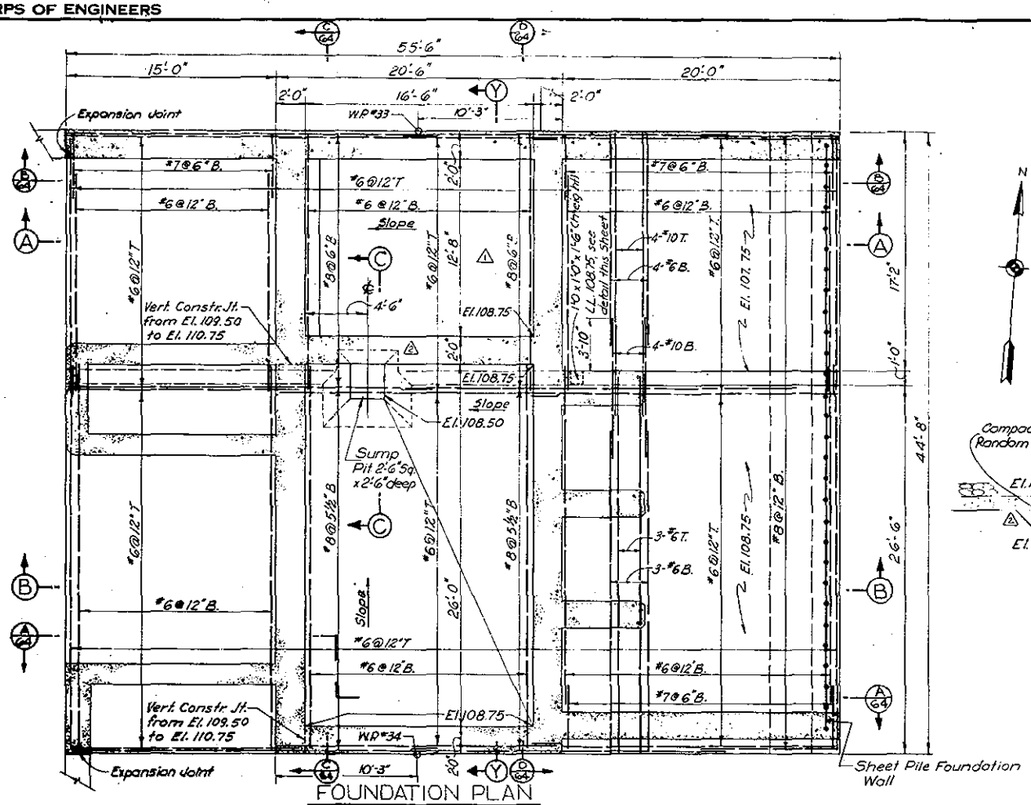
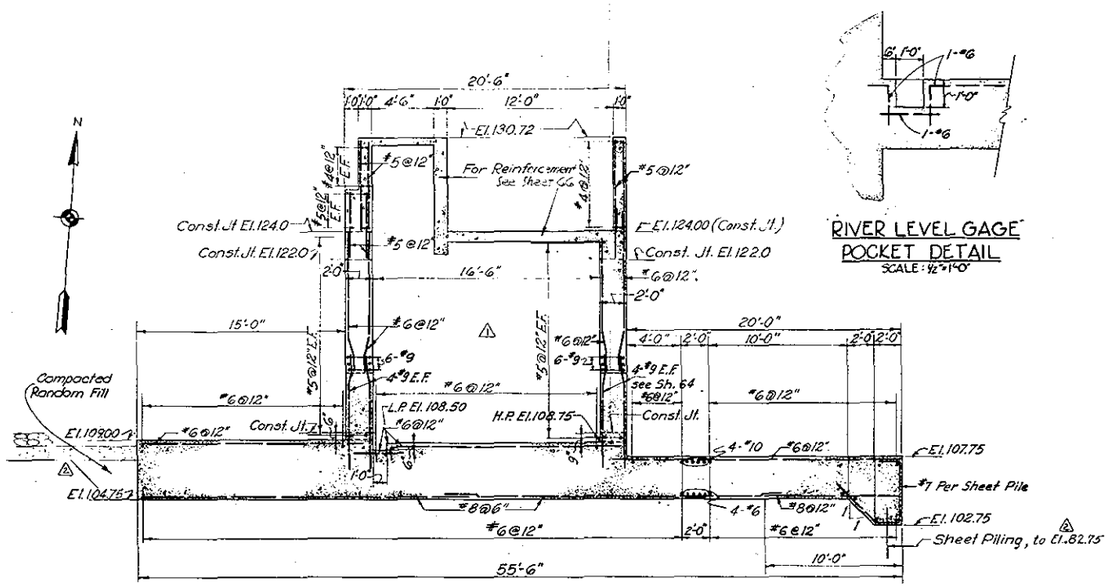
ELEVATIONS AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
Chief, Engineering Division
DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-68-64-2
DRAWING NUMBER
BE-1312
SHEET 62

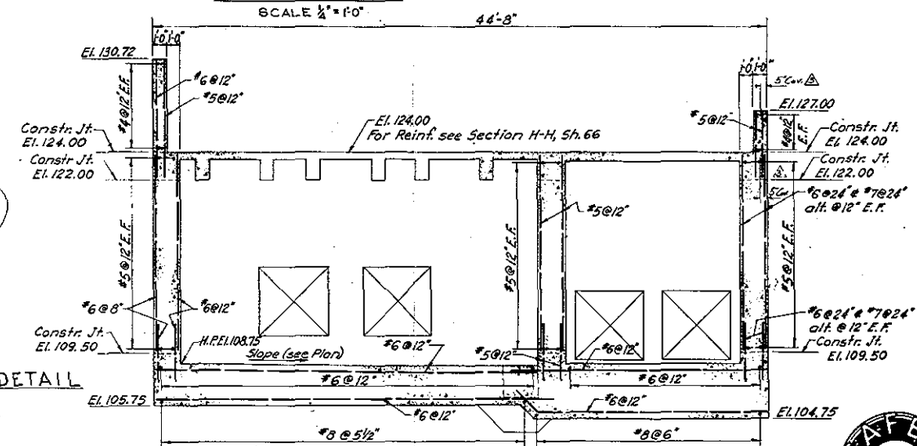


FOUNDATION PLAN
SCALE ¼" = 1'-0"

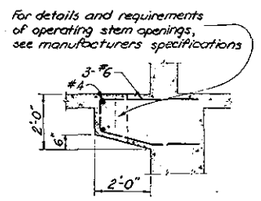


SECTION A-A
SCALE ¼" = 1'-0"

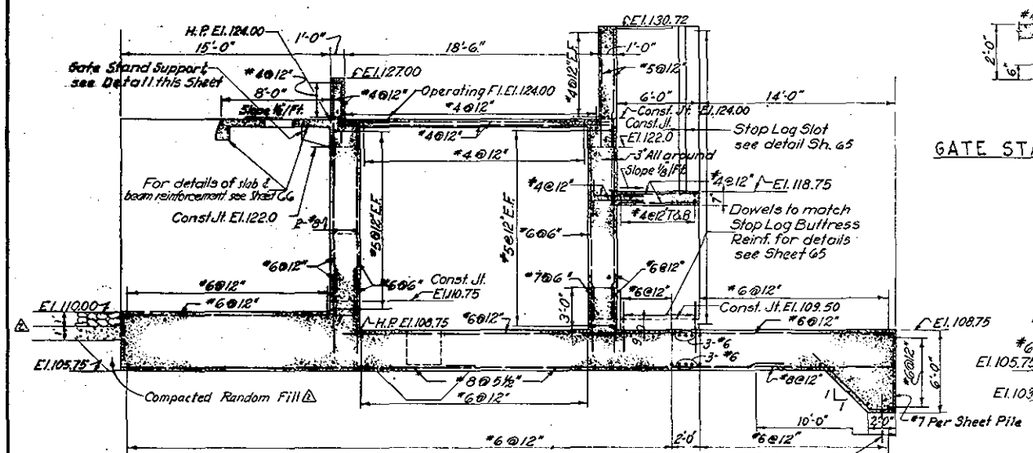
RIVER LEVEL GAGE POCKET DETAIL
SCALE: ½" = 1'-0"



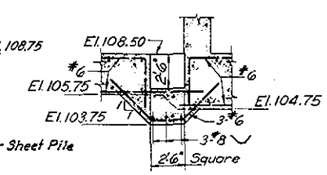
SECTION Y-Y
SCALE: ¼" = 1'-0"



GATE STAND SUPPORT DETAIL
SCALE: ½" = 1'-0"



SECTION B-B
SCALE: ¼" = 1'-0"



SECTION C-C
SCALE: ½" = 1'-0"

NOTES:
1. Fabricator shall supply complete slab & wall steel layout showing arrangement & details @ all openings.
2. Reinforcing Steel interrupted at openings must be replaced in adjacent areas.

GRAPHIC SCALES
½" = 1'-0" 1' 0 1' 2' 3' 4' 5'
¼" = 1'-0" 4' 0 4' 8'

REVISION	DATE	DESCRIPTION	BY
2	6-5-64	Cover for reinf. chgd. to clear waterstop.	
1	4-14-64	Rev. fill & sump; added sheet piling length.	
1	11-27-63	Notes and pay item deleted (Am. #5)	

CHARLES A. MAGUIRE & ASSOCIATES
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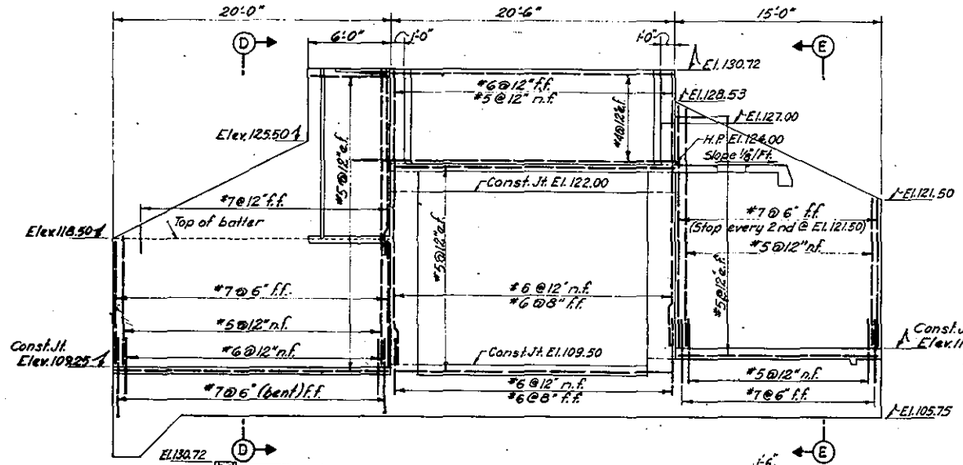
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

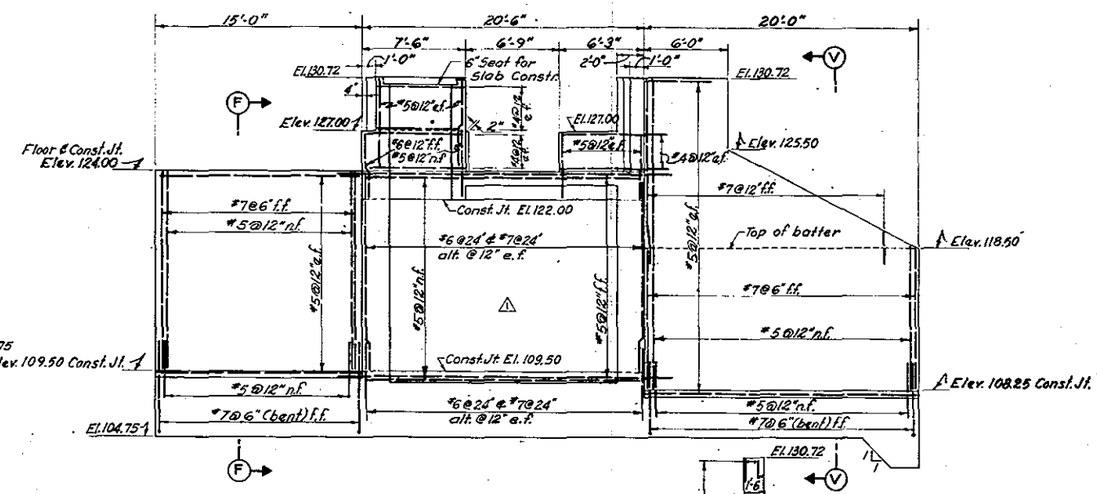
DES. BY C.H. DR. BY R.H. CHECKED J.C.
SUBMITTED ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVED CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 1
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

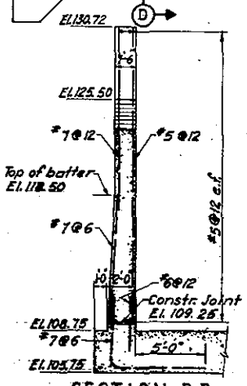
APPROVED CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE (¼") 1'-0"
SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 63



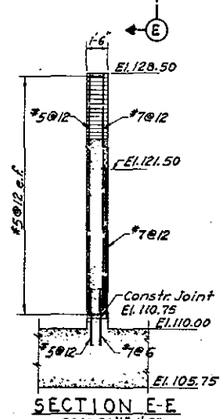
ELEVATION
SCALE: 1/4" = 1'-0"



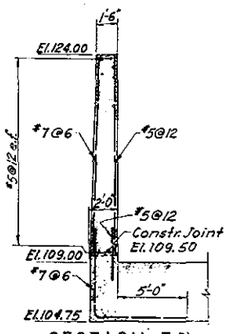
ELEVATION
SCALE: 1/4" = 1'-0"



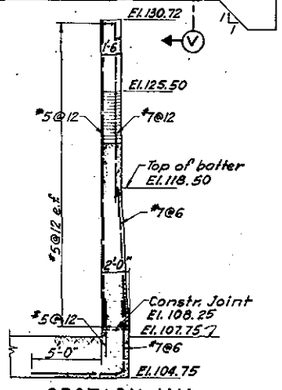
SECTION D-D
SCALE: 1/4" = 1'-0"



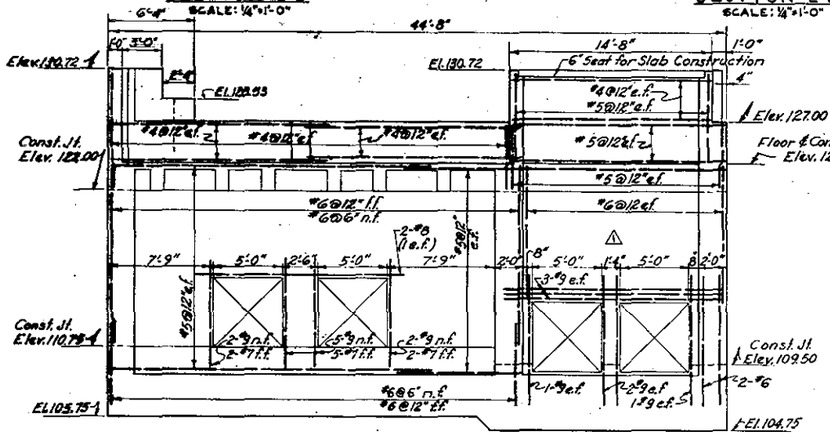
SECTION E-E
SCALE: 1/4" = 1'-0"



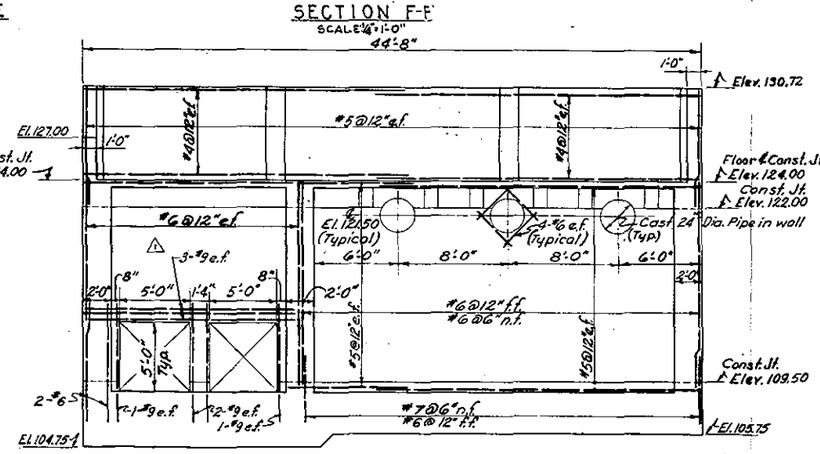
SECTION F-F
SCALE: 1/4" = 1'-0"



SECTION V-V
SCALE: 1/4" = 1'-0"



ELEVATION
SCALE: 1/4" = 1'-0"



ELEVATION
SCALE: 1/4" = 1'-0"

GRAPHIC SCALES
1/4" = 1'-0" 4' 0 4' 8'

NOTES:

1. Fabricator shall supply complete slab & wall steel layout showing arrangement & details @ all openings
2. Reinforcing Steel which is interrupted by openings must be replaced in adjacent areas (where not shown)

REVISION	DATE	DESCRIPTION	BY
1	11-27-63	Notes and pay item deleted (km #5)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

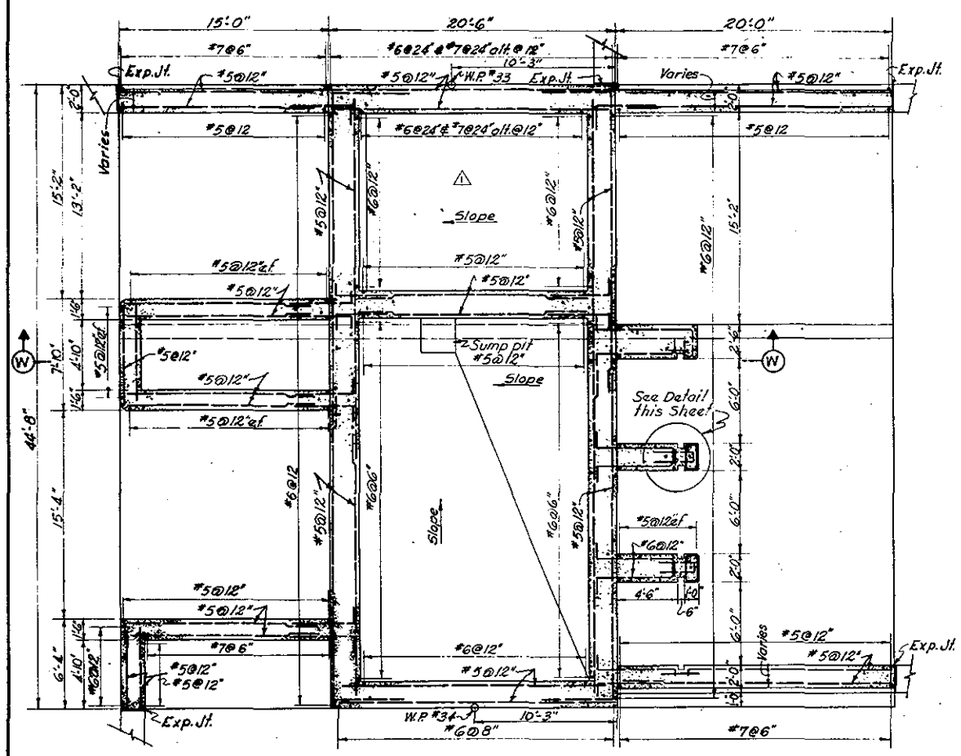
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.H. DR. BY A.J.
SUBMITTED
CHIEF, ENGINEERING DESIGN BRANCH
PROJECT ENGINEER
RECOMMENDED
CHIEF, DESIGN BRANCH

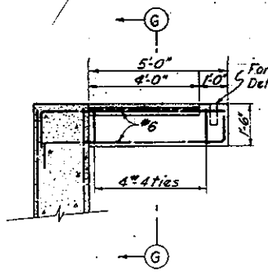
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 2
BLACKSTONE, MILL & PETERS RIVERS, RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

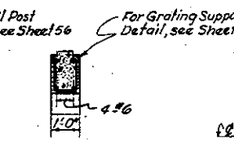
SCALE 1/4" = 1'-0" SPEC. NO. CIV ENG-19-06-64-2
DRAWING NUMBER BE-1312
SHEET 64



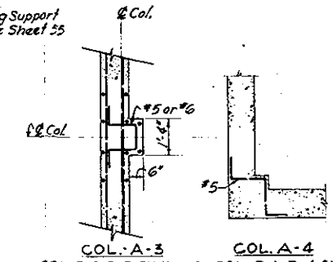
HORIZONTAL SECTION @ ELEV. 116.00
SCALE: 1/4"=1'-0"



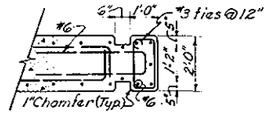
GRATING SUPPORT DETAILS
SCALE: 1/2"=1'-0"



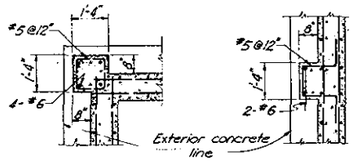
SECTION G-G



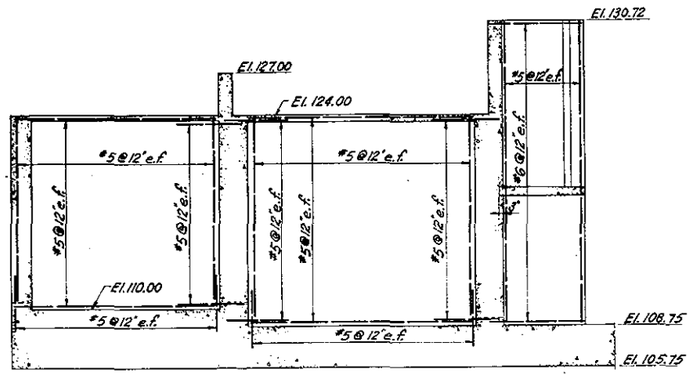
COL. A-3
COL. B-2, B-3 SIMILAR
COL. A-4
COL. B-1, B-4 SIMILAR
PILASTER DETAILS
SCALE 1/2"=1'-0"



DETAIL OF STOP LOG GUIDES
SCALE: 1/2"=1'-0"



COL. A-1 COL. A-2
PILASTER DETAILS
SCALE: 1/2"=1'-0"



ELEVATION OF INTERIOR WALL
SECTION W-W
SCALE: 1/4"=1'-0"

GRAPHIC SCALES
1/4"=1'-0"
1/2"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	11-27-67	Note deleted (Am. #5)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

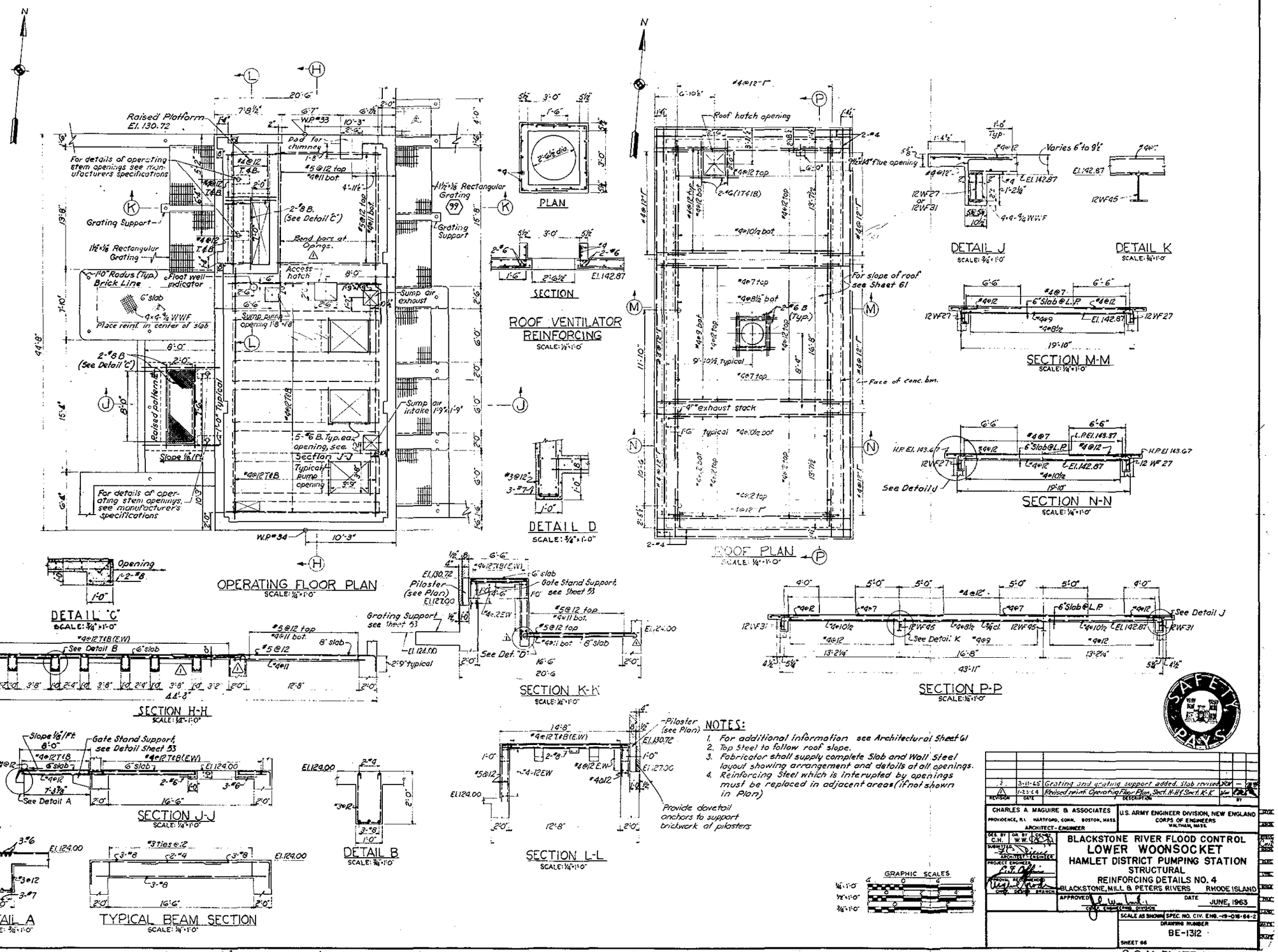
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.H. DR. BY R.L.H. CHK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 3
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE AS SHOWN
SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 65

O & M PLATE NO. E-52



NOTES:

1. For additional information see Architectural Sheet 61
2. Top Steel to follow roof slope.
3. Fabricator shall supply complete Slab and Wall Steel layout showing arrangement and details at all openings.
4. Reinforcing Steel which is interupted by openings must be replaced in adjacent areas (if not shown in Plan)

REVISION	DATE	DESCRIPTION	BY
2	3-11-65	Grating and grating support added. Slab revised	
1	1-23-64	Revised reinf. Operating Floor Plan, Sect. H-H & Sect. K-K	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

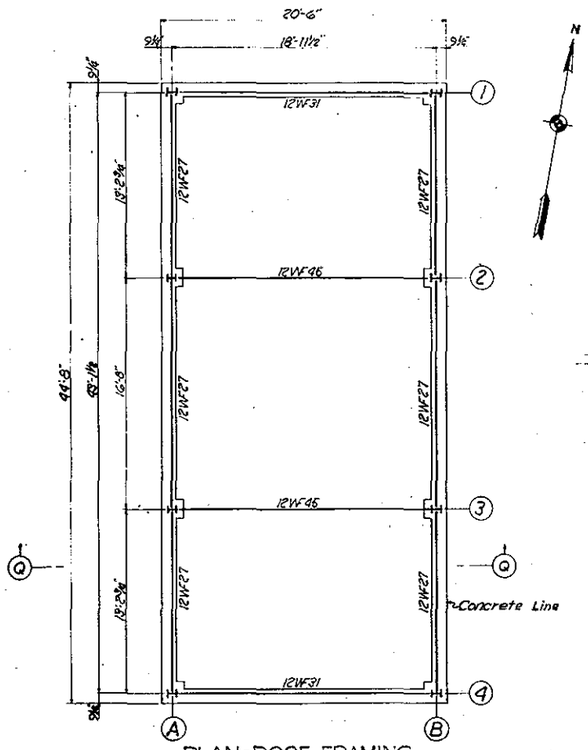
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY C.H. DR. BY W.W. CHK. BY
SUBMITTED ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED CHIEF, DESIGN BRANCH

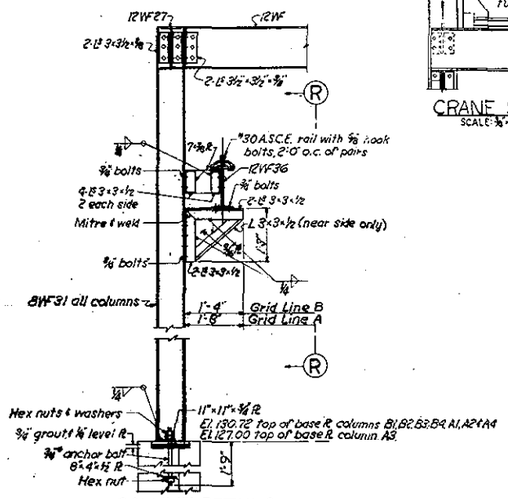
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
STRUCTURAL
REINFORCING DETAILS NO. 4
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 66

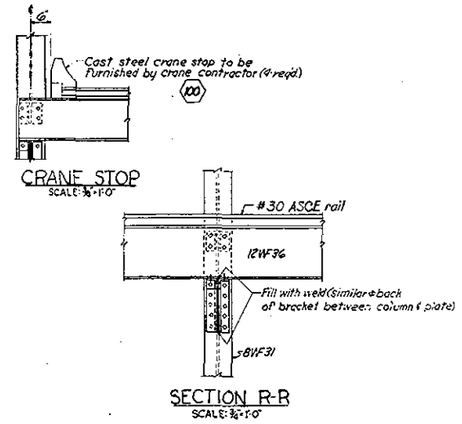
O & M PLATE NO. E-53



PLAN-ROOF FRAMING
SCALE: 1/4"=1'-0"



COLUMN DETAILS
SCALE: 3/4"=1'-0"



CRANE STOP
SCALE: 3/4"=1'-0"

SECTION R-R
SCALE: 3/4"=1'-0"

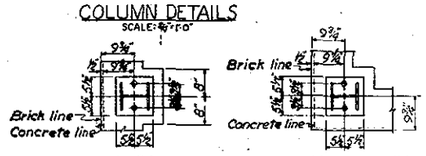
STEEL LINTEL SCHEDULE

M.O.	Description
6'-0"	3-L8" 4 x 4 x ⅜
4'-0"	3-L8" 3½x2½x⅜
1'-8"	3-L8" 3½x2½x⅜
1'-0"	3-L8" 3½x2½x⅜

NOTES:
1. The 3½" leg of the angle is outstanding
2. Bear lintels 6" min. each end.

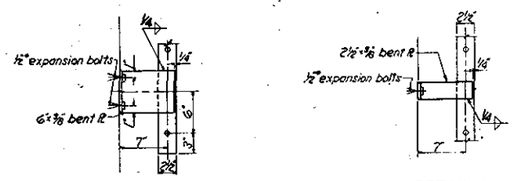
NOTES:
1. For Details of Trash Racks see Sh. 56
2. For Details of Lintels over Louvers see Sheet 48 and 49 (Type C & D)

NOTE:
All steel connections to be ¾" High Strength Bolts with standard "B" connections unless otherwise noted



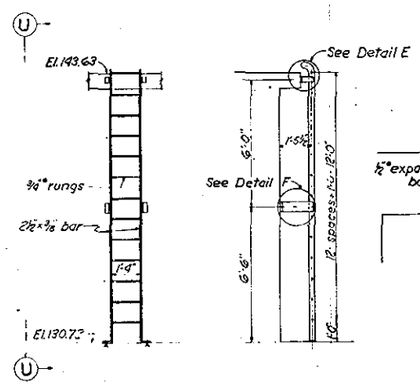
PLAN-COLUMN BASE ℞ COLUMNS-A2, A3, B2 & B3
SCALE: 3/4"=1'-0"

PLAN-COLUMN BASE ℞ COLUMNS-A1, A4, B1 & B4
SCALE: 3/4"=1'-0"



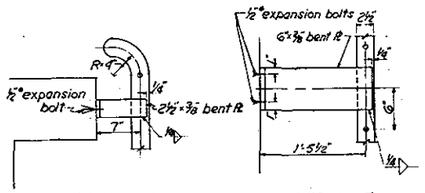
DETAIL G
SCALE: 1½"=1'-0"

DETAIL H
SCALE: 1½"=1'-0"



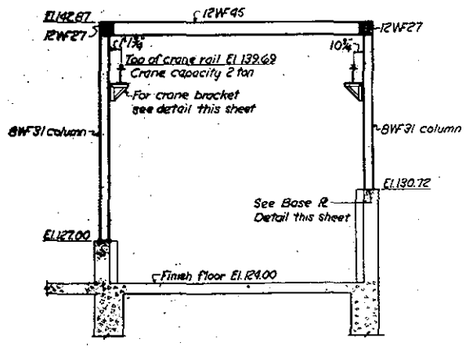
ROOF HATCH LADDER
SCALE: 3/8"=1'-0"

SECTION U-U
SCALE: 3/8"=1'-0"

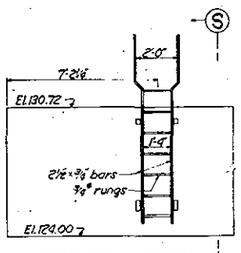


DETAIL E
SCALE: 1½"=1'-0"

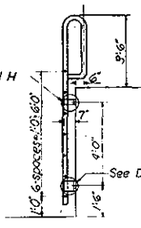
DETAIL F
SCALE: 1½"=1'-0"



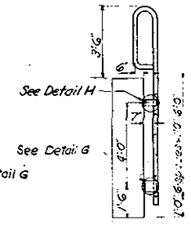
SECTION Q-Q
SCALE: 1/4"=1'-0"



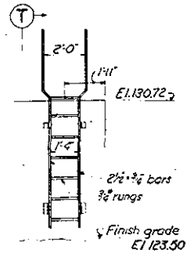
INTERIOR LADDER
SCALE: 3/8"=1'-0"



SECTION S-S
SCALE: 3/8"=1'-0"



SECTION T-T
SCALE: 3/8"=1'-0"



EXTERIOR LADDER
SCALE: 3/8"=1'-0"

GRAPHIC SCALES
1/4"=1'-0"
3/8"=1'-0"
3/4"=1'-0"
1½"=1'-0"

REVISION	DATE	DESCRIPTION	BY

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

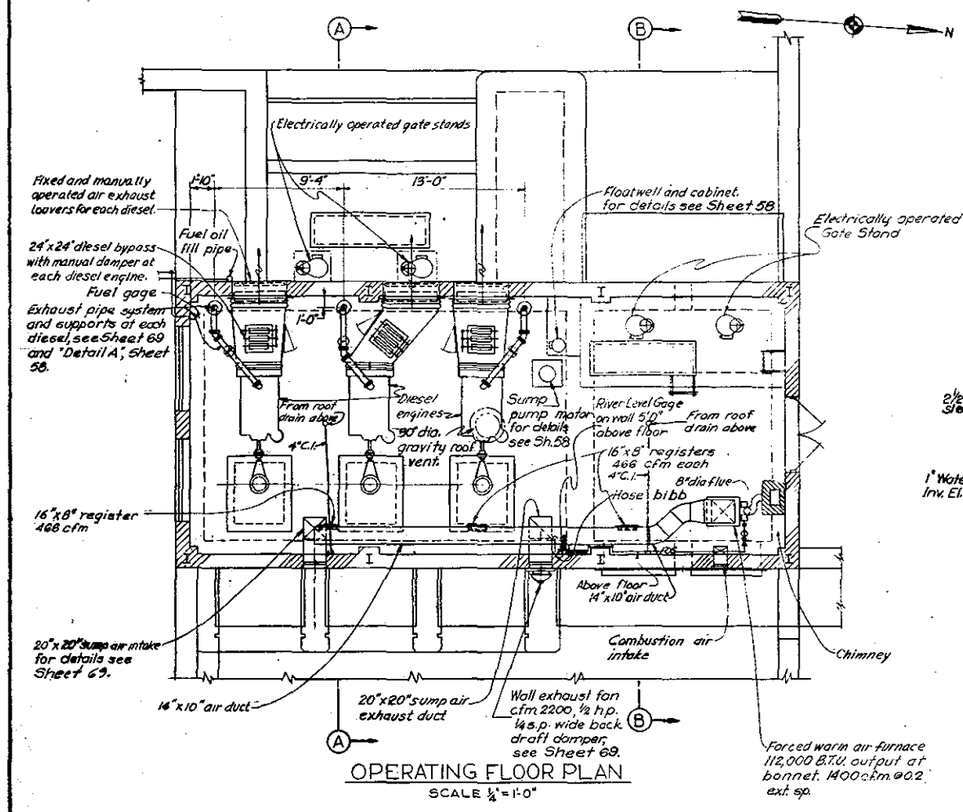
DES. BY C.H. DR. BY W.W. CK. BY
SUBMITTED: ARCHITECT - ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH
CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
STRUCTURAL
STRUCTURAL AND MISCELLANEOUS STEEL
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
DATE JUNE, 1963

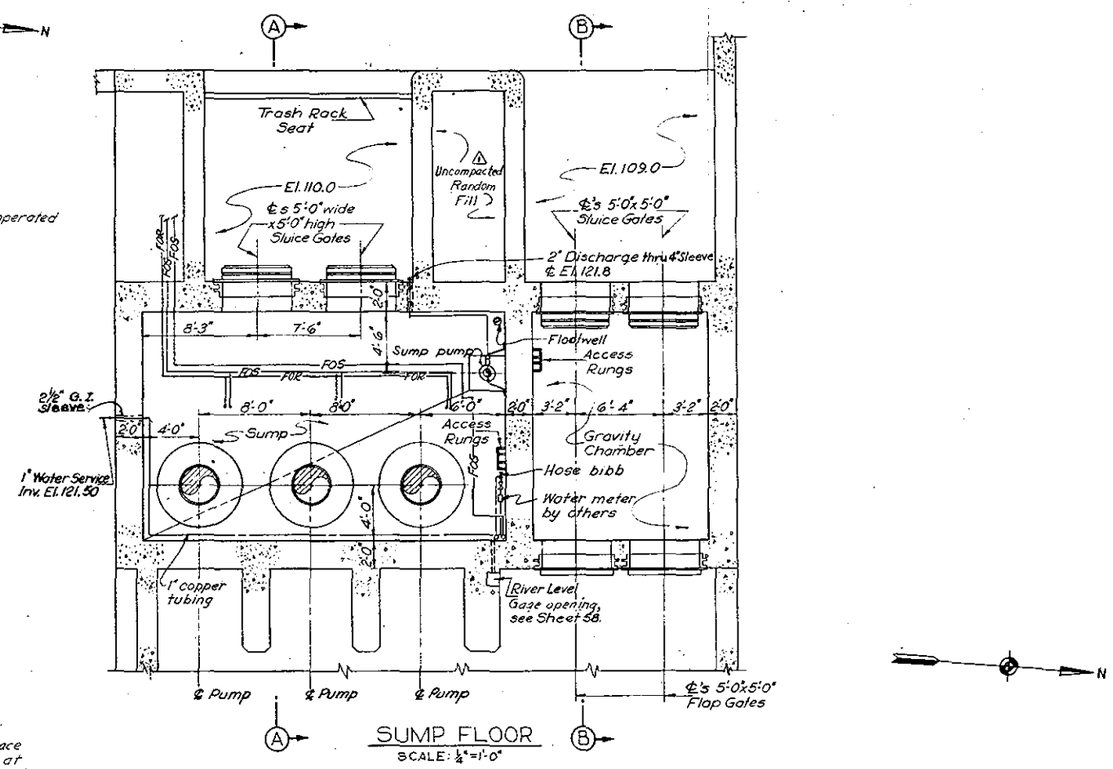
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 67

O & M PLATE NO. E-54



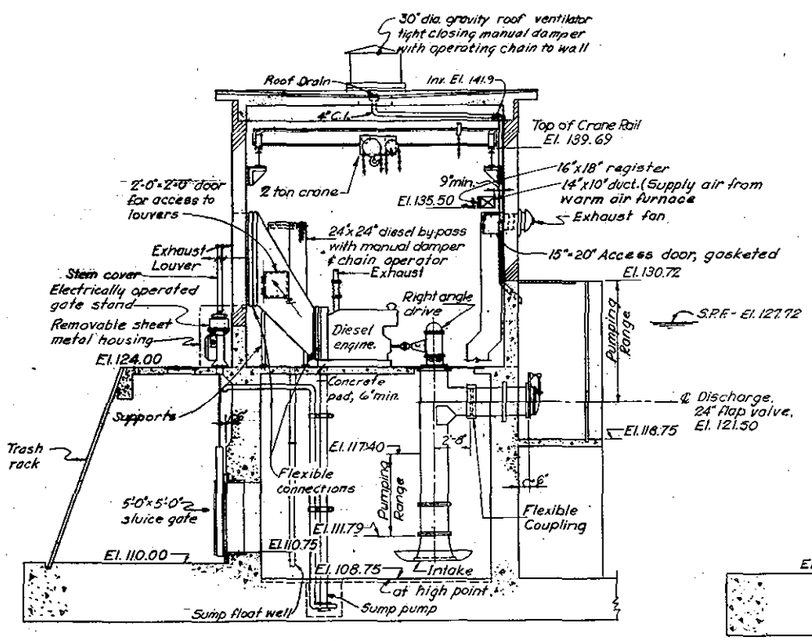
OPERATING FLOOR PLAN

SCALE 1/4" = 1'-0"



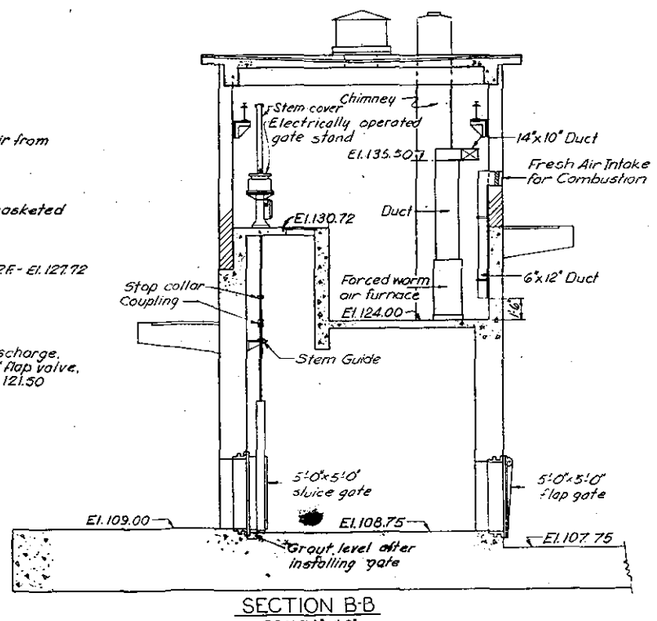
SUMP FLOOR

SCALE: 1/4" = 1'-0"



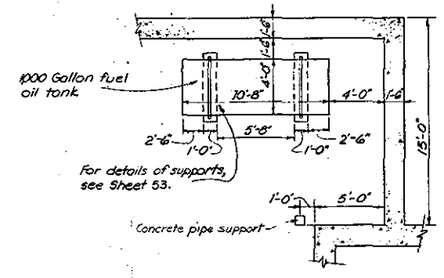
SECTION A-A

SCALE: 1/4" = 1'-0"



SECTION B-B

SCALE 1/4" = 1'-0"



FUEL OIL TANK LOCATION PLAN

SCALE: 1/4" = 1'-0"

GRAPHIC SCALE

0 4' 8'

1/4" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
1	4-19-49	Revised Fill in pier	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY FK-CD DR. BY JMC
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH
APPROVED
CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
MECHANICAL
PLANS AND SECTIONS

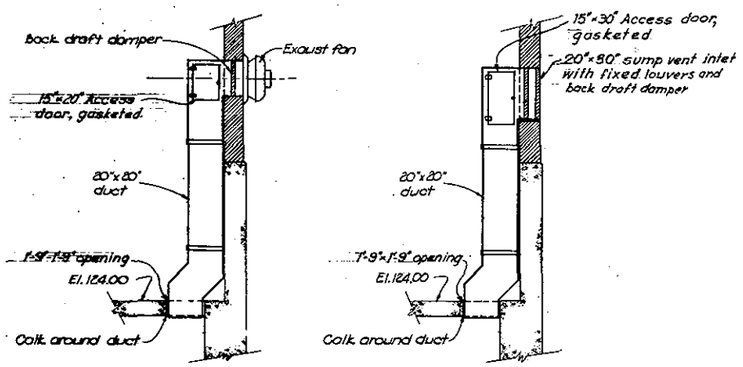
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

DATE JUNE, 1963

SCALE 1/4" = 1'-0" SPEC. NO. CIV. ENG.-19-040-54-2

DRAWING NUMBER BE-1312

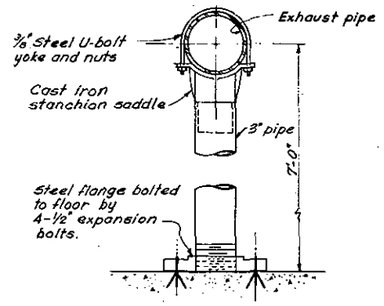
SHEET 68



AIR EXHAUST AIR INLET

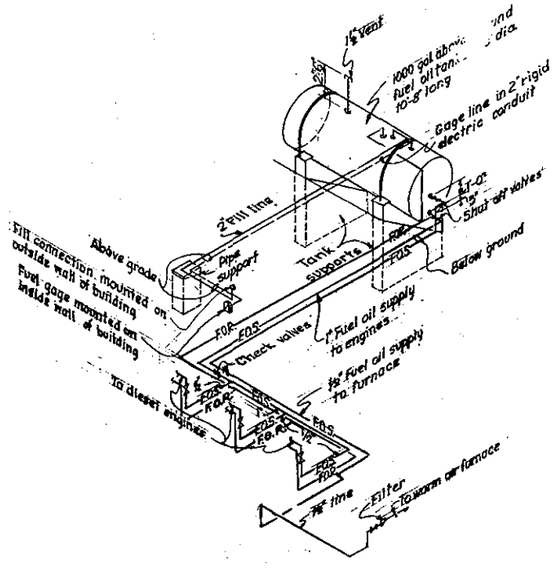
SUMP VENTILATION

SCALE: 3/8" = 1'-0"



EXHAUST PIPING SUPPORT

SCALE: 3" = 1'-0"



FUEL OIL PIPING

ISO-SCHEMATIC

NOT TO SCALE

GRAPHIC SCALE

3/8" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
		Final field connections	

CHARLES A. MAGUIRE & ASSOCIATES
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WALTHAM, MASS.

DES. BY C.R.D. | DR. BY RS | CK. BY DTK | CK. BY

SUBMITTED: Assoc. Engineer
PROJECT ENGINEER
POWER MECHANICAL ENGINEER
CHIEF DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
MECHANICAL
DETAILS

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

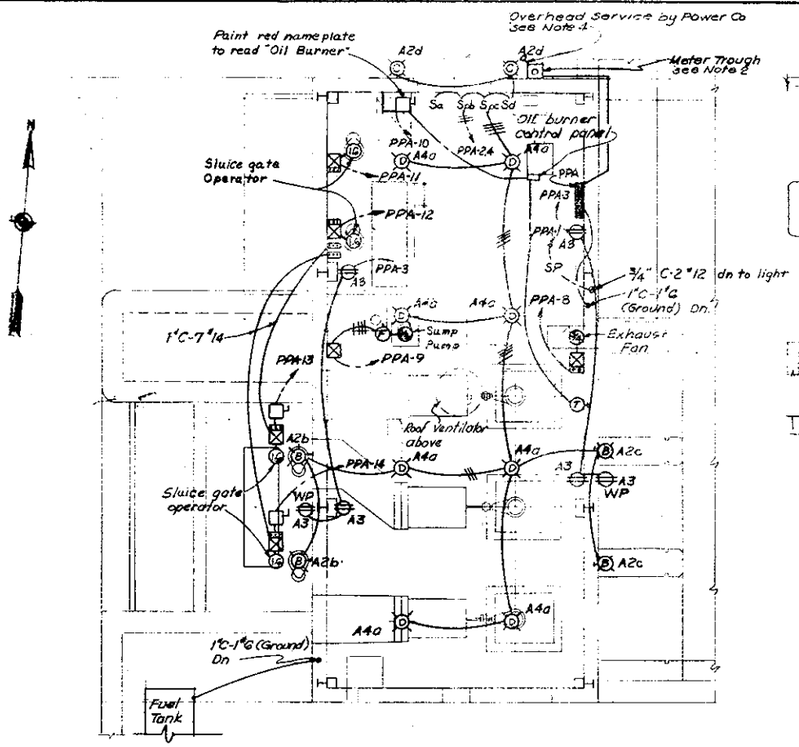
APPROVED
CHIEF, ENGINEERING DIVISION

DATE JUNE, 1963

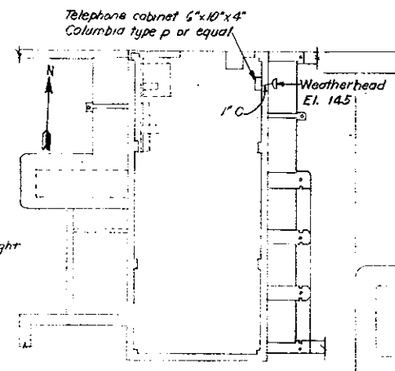
SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-016-64-2

DRAWING NUMBER
BE-1312

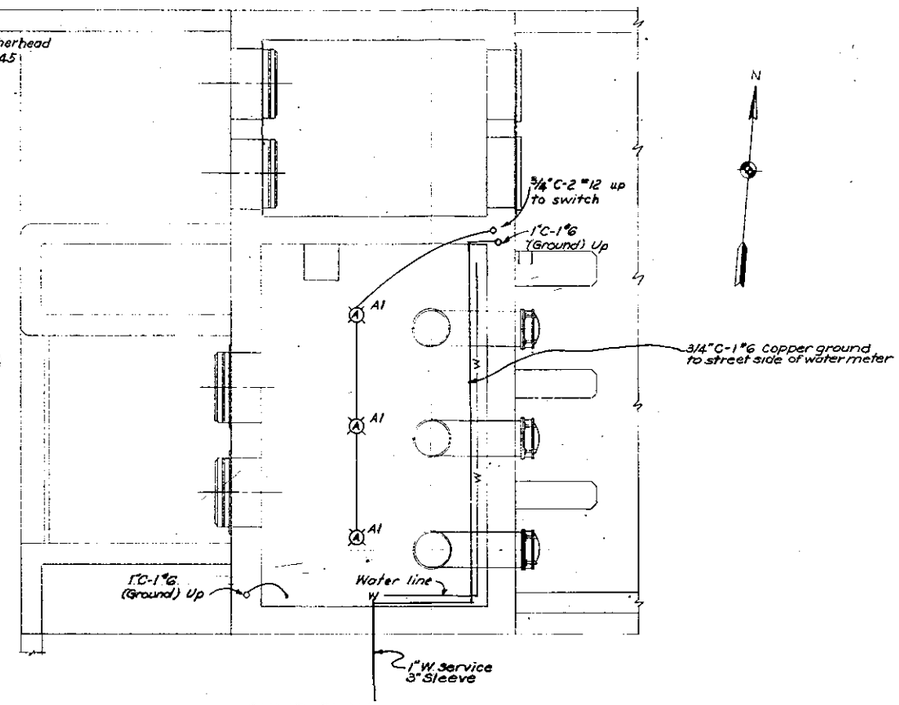
SHEET 69



FLOOR PLAN
SCALE 1/4"=1'-0"



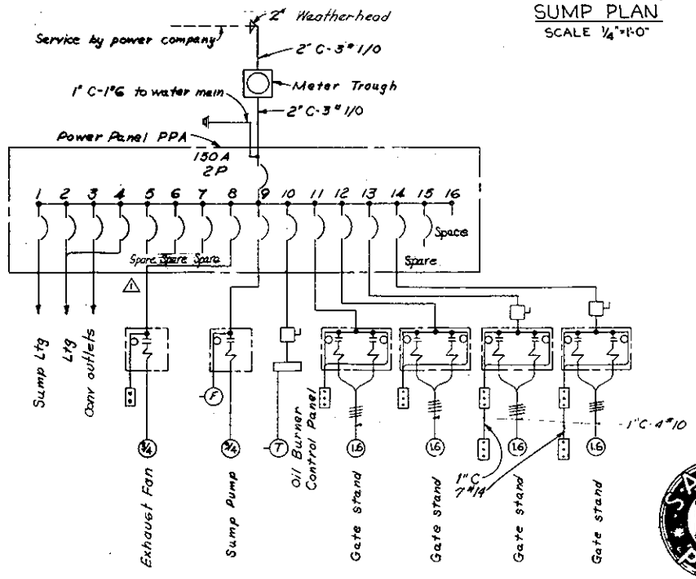
TELEPHONE SERVICE ADDITION



SUMP PLAN
SCALE 1/4"=1'-0"

POWER PANEL PPA
120/240 VOLT 1 PHASE 3 WIRE SOLID NEUTRAL
150 AMP MAIN BREAKER-TOP-SURFACE MOUNTED
LOCATION-HAMLET DISTRICT PUMPING STATION

CIRCUIT NO.	BRKR. POLES	BRKR. FRAME	BRKR. AMP. TRIP	DESCRIPTION	HORSE POWER	K.W.	AMP L1	AMP L2	WIRE SIZE	REMARKS
1	1	1	20	Sump lighting		.450	3.8		12	
2	1		20	Exterior lighting		.750	6.3		12	
3	1		20	Convenience outlets		.900		7.5	12	
4	1	1	20	Operating floor lighting		1.200		10.0	12	
5	1		20	Spare						
6	1		20	Spare						
7	1		20	Spare						
8	2		20	Exhaust fan	3/4		6.9	6.9	12	
9	2		15	Sump pump	3/4		6.9	6.9	12	
10	2		30	Oil burner	1/6		9.1	9.1	12	
11	2		40	Gate stand	1.6		11.6	11.6	10	
12	2		40	Gate stand	1.6		11.6	11.6	10	
13	2		40	Gate stand	1.6		11.6	11.6	10	
14	2		40	Gate stand	1.6		11.6	11.6	10	
15	2		15	Spare						
16	2		-	Space						Bussing only
				TOTAL	9½	9.300	104.3	96.3		



SINGLE LINE DIAGRAM
NOT TO SCALE

NOTES:
1. For General Notes, Legend and Fixture Schedule see Sheet 59
2. Meter trough shall conform to power company requirements. Install 2" conduit with 3#1/0 conductors up to service drop. Weatherhead shall be at least 11' above finished pavement
3. All work on this Sheet is to be paid under Item 99
4. Provide 3/4" Eye bolt thru wall for messenger wire attachment

GRAPHIC SCALES
1/4"=1'-0"

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
1	11-7-63	Panel & one line diagram revised (Am. #5)	

CHARLES A. MAGUIRE & ASSOCIATES
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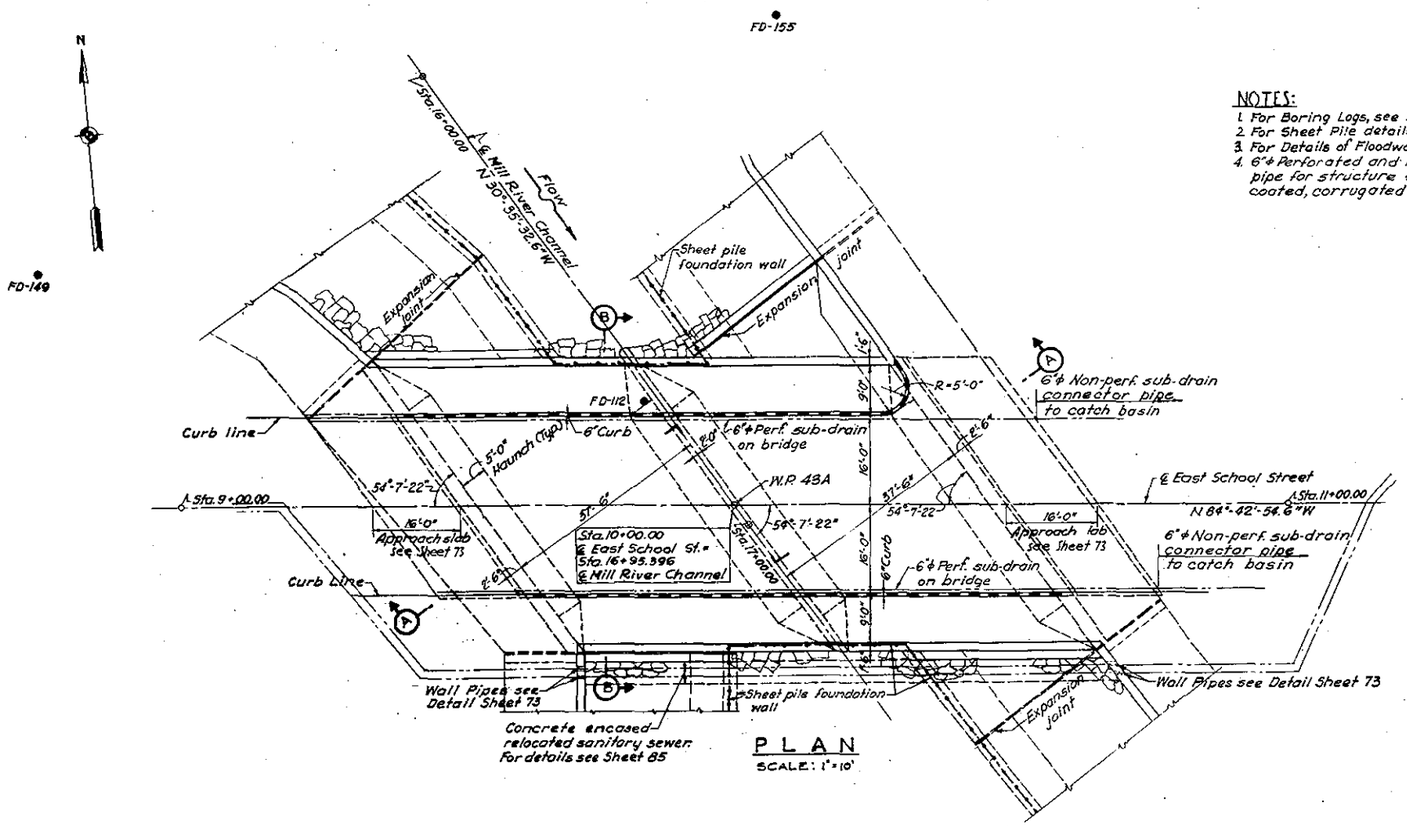
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES BY J.L. DR BY D.M. CK BY
SUBMITTED ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED CHIEF, DESIGN BRANCH

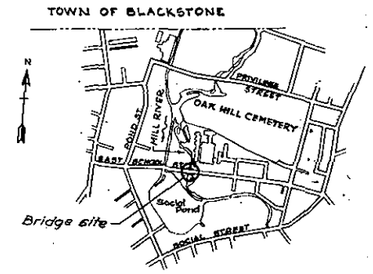
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT PUMPING STATION
ELECTRICAL
PLANS AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE 1/4"=1'-0" SPEC. NO. CIV. ENG.-19-010-64-2
DRAWING NUMBER BE-1312
SHEET 70

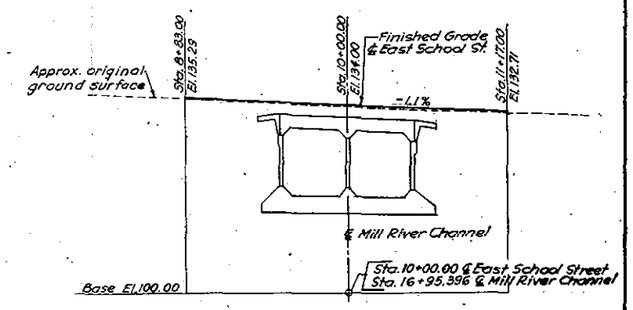
NOTES:
1. For Boring Logs, see Sheet 104.
2. For Sheet Pile details see Sheet 72.
3. For Details of Floodwalls see Sheets 33, 34.
4. 6"ϕ Perforated and non-perforated drain pipe for structure shall be bituminous coated, corrugated metal pipe.



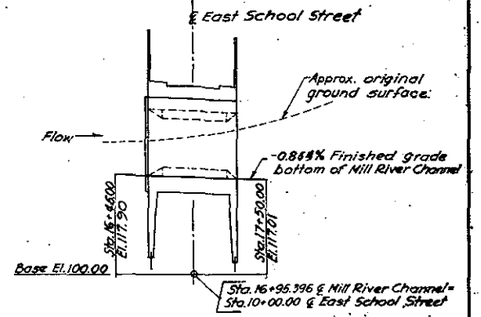
PLAN
SCALE: 1" = 10'



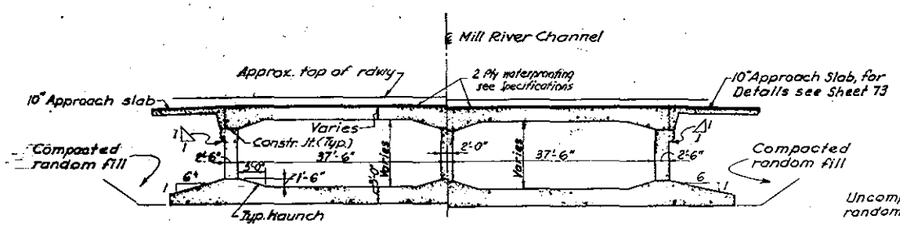
LOCATION PLAN



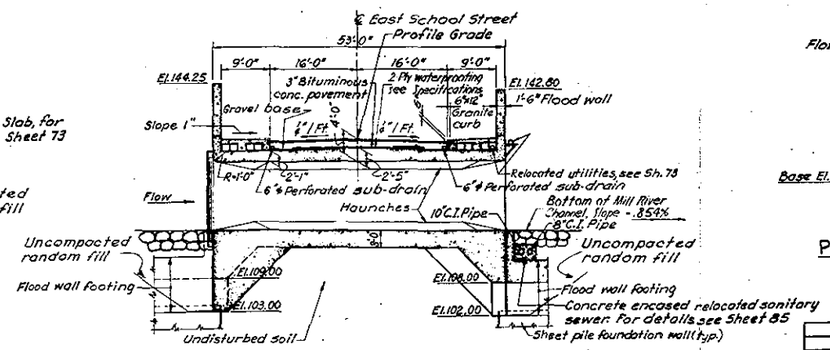
PROFILE - EAST SCHOOL STREET
SCALES: HORIZONTAL 1" = 40'
VERTICAL 1" = 10'



PROFILE - MILL RIVER CHANNEL
SCALES: HORIZONTAL 1" = 40'
VERTICAL 1" = 10'



SECTION A-A
SCALE: 1" = 10'



SECTION B-B
SCALE: 1" = 10'

GRAPHIC SCALES
1" = 40' 40' 0 40' 80'
1" = 10' 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY

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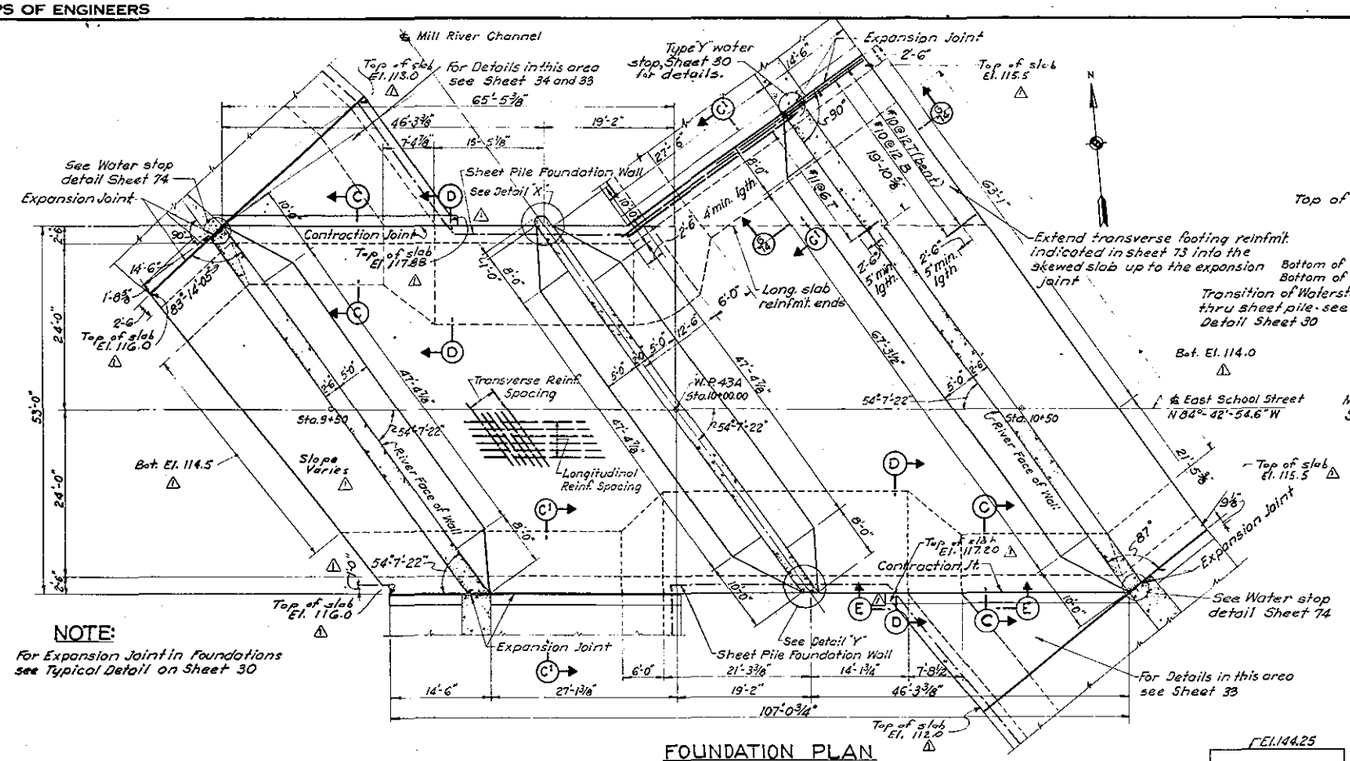
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY J.R. | DR. BY K.D. | CK. BY

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
EAST SCHOOL STREET BRIDGE
GENERAL PLAN
PROFILES AND SECTIONS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
DATE JUNE, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG.-18-08-64-2
DRAWING NUMBER BE-1312
SHEET 71

O & M PLATE NO. E-58

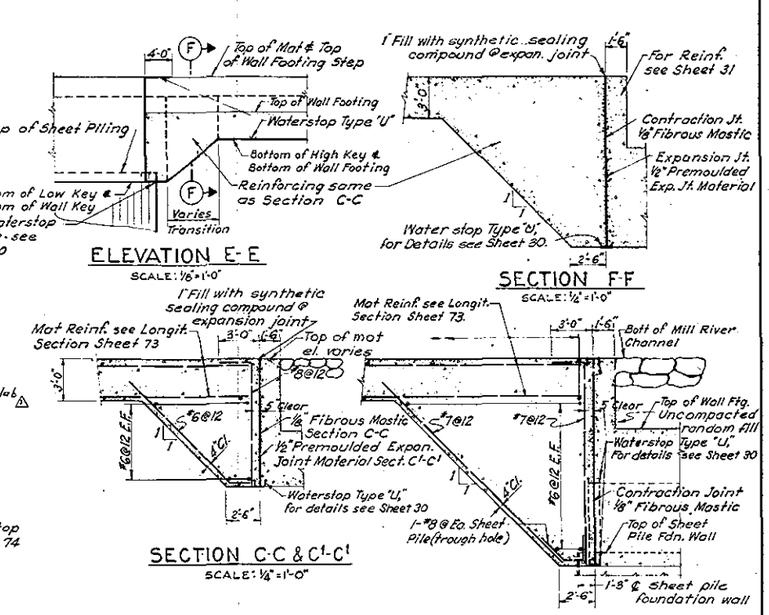


FOUNDATION PLAN

SCALE: 1/8" = 1'-0"

NOTE:

For Expansion Joint in Foundations see Typical Detail on Sheet 30



ELEVATION E-E

SCALE: 1/8" = 1'-0"

SECTION F-F

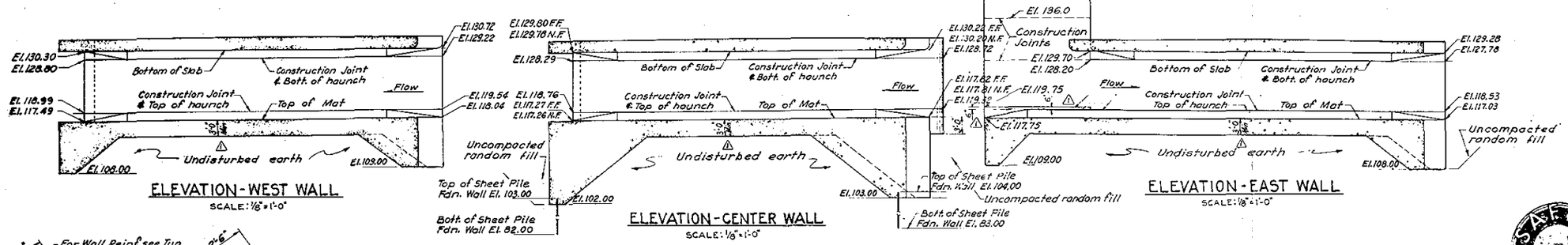
SCALE: 1/2" = 1'-0"

SECTION C-C & C1-C1

SCALE: 1/4" = 1'-0"

SECTION D-D

SCALE: 1/2" = 1'-0"



ELEVATION - WEST WALL

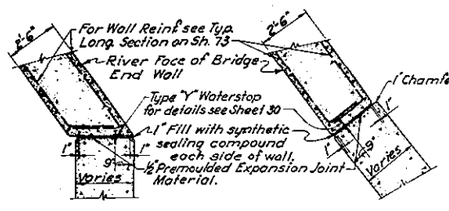
SCALE: 1/8" = 1'-0"

ELEVATION - CENTER WALL

SCALE: 1/8" = 1'-0"

ELEVATION - EAST WALL

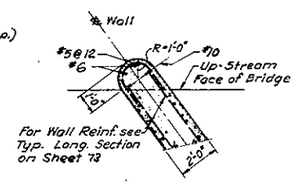
SCALE: 1/8" = 1'-0"



S.W. END N.W. & S.E. END

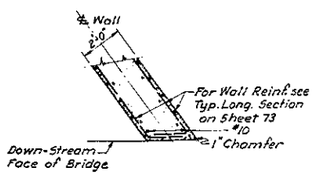
EXPANSION JOINT DETAILS

SCALE: 3/8" = 1'-0"



DETAIL "X"

SCALE: 3/8" = 1'-0"



DETAIL "Y"

SCALE: 3/8" = 1'-0"

NOTES:

1. For Mat Reinforcement see Typical Longitudinal Section, Sheet 73
2. Transverse Construction Joints in Base Mat or Deck Slab, if used, shall be made parallel to the Center Wall and located as nearly as practicable at the quarter points of spans nearest to the Center Wall.
3. All Reinforcement spliced at Transverse Construction Joints in the Base Mat or Deck Slab shall be lapped at least 24 bar diameters.
4. Submit proposed details of Construction Joints in base mat or deck slab for approval.

REVISION	DATE	DESCRIPTION	BY
1	5 5 64	Foundation Plan elevations added, slope & outline revised	

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CORPS OF ENGINEERS
WALTHAM, MASS.

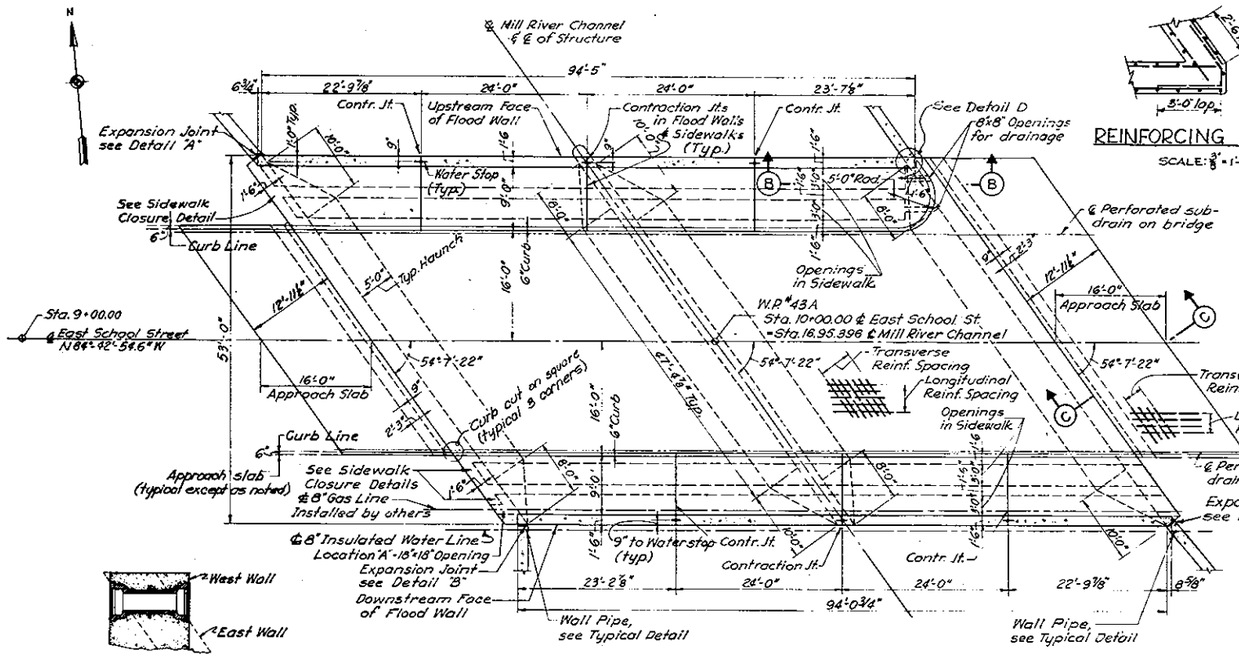
DES BY J.R. DR BY B.S. CK BY
SUBM'D BY
ARCHITECT-ENGINEER
PROJECT ENGINEER
RECOMMENDED
CHIEF, STRUC. BRANCH
APPROVED
CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
EAST SCHOOL STREET BRIDGE
FOUNDATION PLAN AND DETAILS
BLACKSTONE, MILL, & PETERS RIVERS RHODE ISLAND

DATE JUNE, 1963

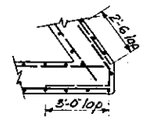
SCALE AS SHOWN SPEC. NO. CIV ENG-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 72

O & M PLATE NO. E-59

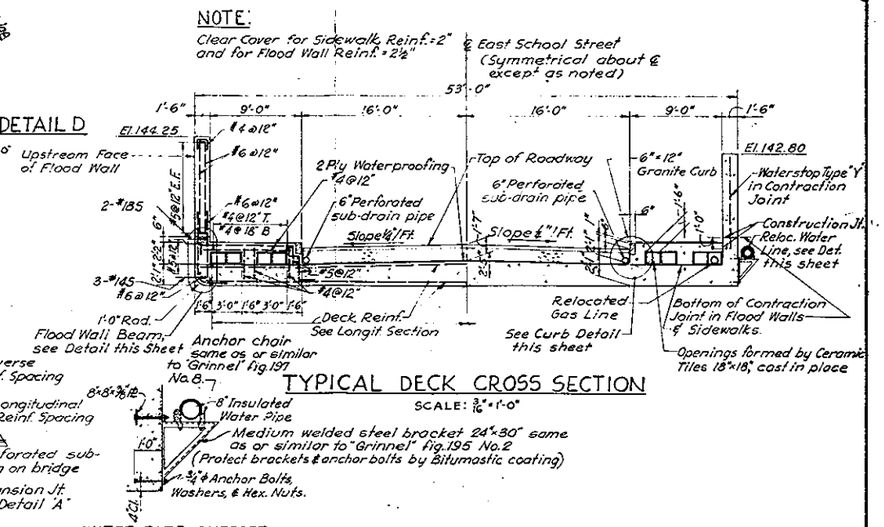


DECK PLAN
SCALE: 1/8" = 1'-0"

TYPICAL WALL PIPE DETAIL
NOT TO SCALE

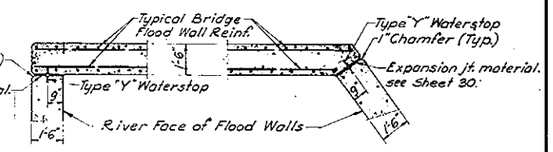


REINFORCING DETAIL D
SCALE: 3/8" = 1'-0"

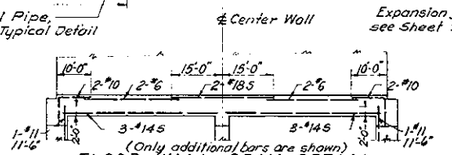


TYPICAL DECK CROSS SECTION
SCALE: 3/16" = 1'-0"

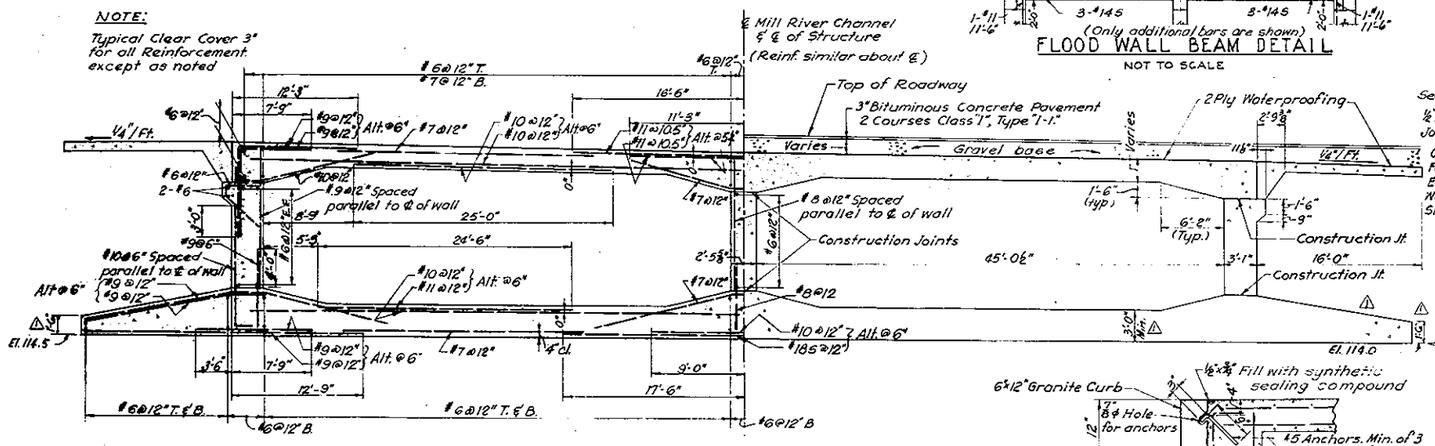
WATER PIPE SUPPORT DETAIL



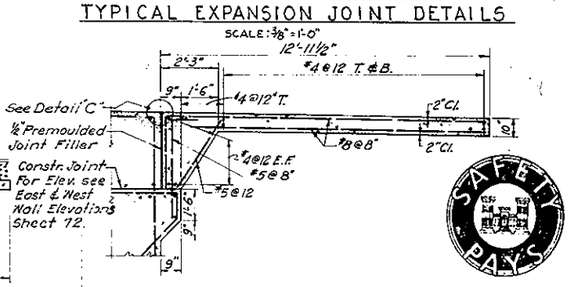
TYPICAL EXPANSION JOINT DETAILS
SCALE: 3/8" = 1'-0"



FLOOD WALL BEAM DETAIL
NOT TO SCALE

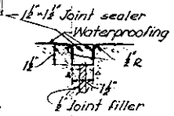


TYPICAL LONGITUDINAL SECTION
SCALE: 3/16" = 1'-0"

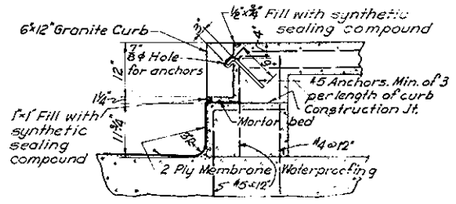


TYPICAL SECTION C-C
THRU APPROACH SLAB
NOT TO SCALE

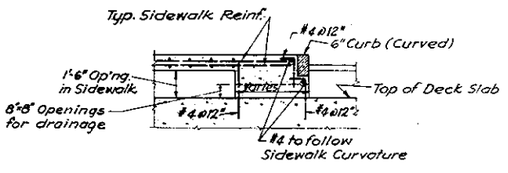
NOTES:
1. For Elevations of Wall Construction Joints see Sheet 72
2. For notes pertaining to Transverse Constr. Joints in Deck Slab see Sheet 72
3. The Fabricator shall supply complete reinforcing steel layout.



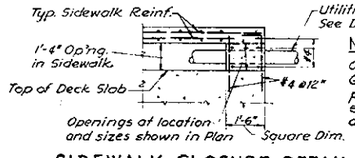
DETAIL C
SCALE: 3" = 1'-0"



DETAIL OF CURB ANCHOR & WATERPROOFING CORNER
SCALE: 1" = 1'-0"



SECTION B-B
SCALE: 3/8" = 1'-0"



NOTE:
Opening at location "A" for Gas line will be filled with premoulded joint filler and synthetic sealing compound after installation.

SIDEWALK CLOSURE DETAIL
SCALE: 3/8" = 1'-0"

GRAPHIC SCALES
1" = 1'-0"
1/8" = 1'-0"
3/16" = 1'-0"
3/8" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
1	5-5-69	Typ. Long. Section dimens. added; slope of slab thickness revised.	

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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES BY J.R. DR BY B.S. CK BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
RECOMMENDED: CHIEF DESIGN BRANCH

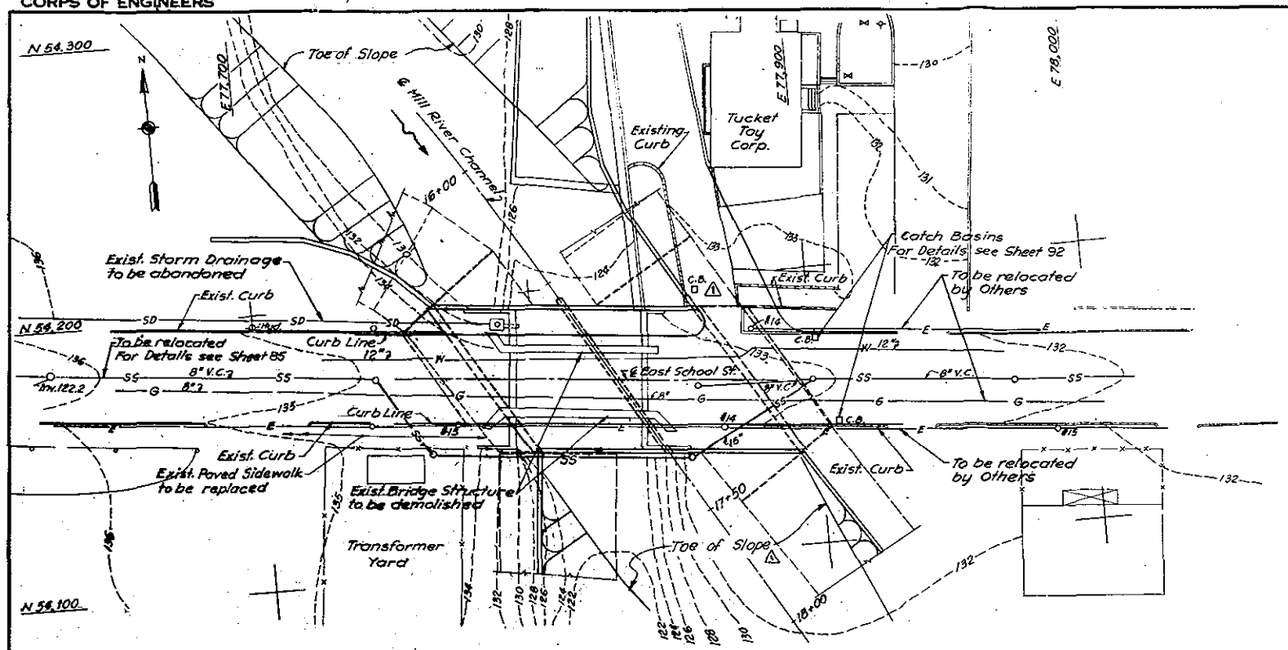
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
EAST SCHOOL STREET BRIDGE
DECK PLAN AND REINFORCING DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

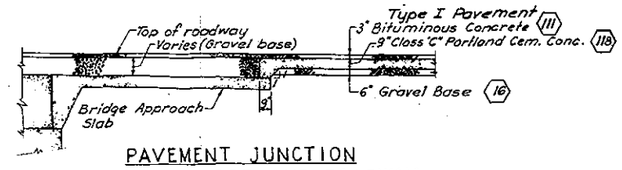
SCALE AS SHOWN SPEC. NO. CIV. ENG-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 73

CORPS OF ENGINEERS

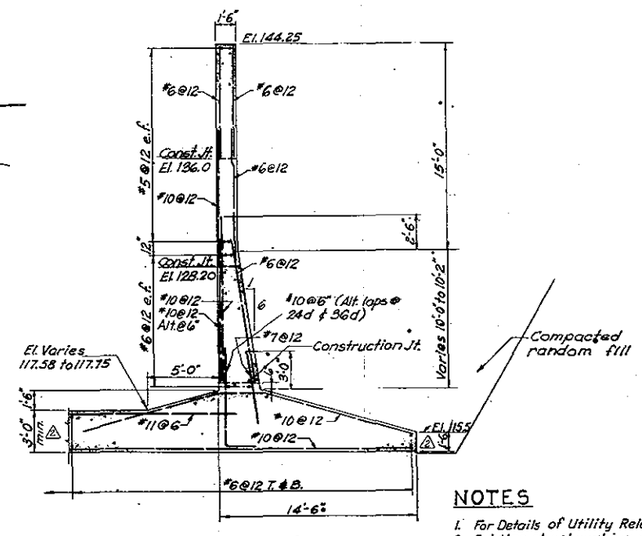
U. S. ARMY



SITE PLAN
SCALE: 1"=20'



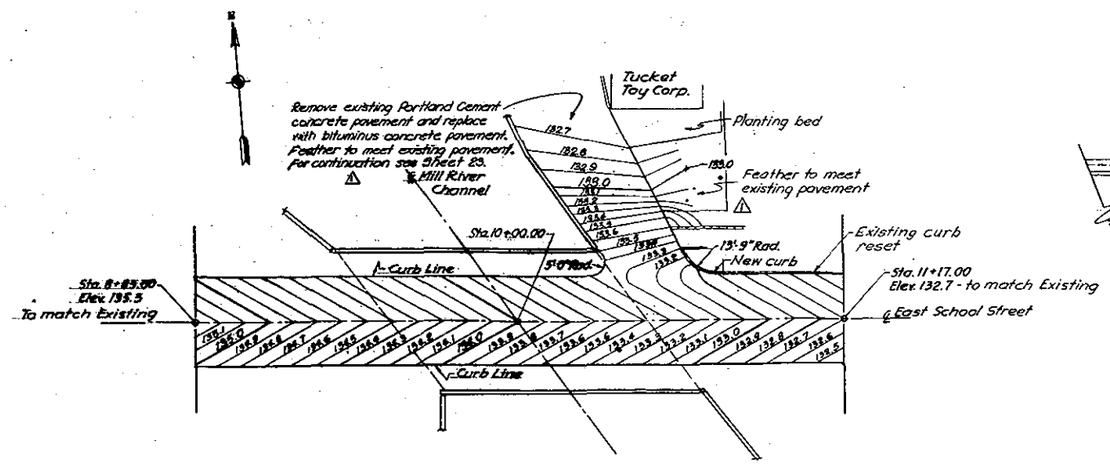
PAVEMENT JUNCTION
BETWEEN BRIDGE AND ROADWAY
SCALE: 1/4"=1'-0"



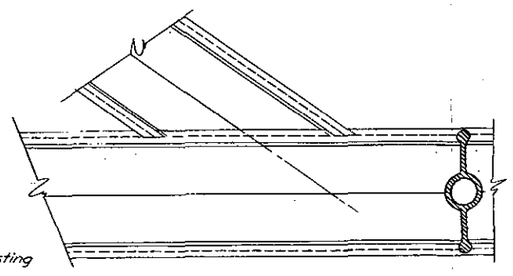
SECTION
SCALE: 1/4"=1'-0"

NOTES

1. For Details of Utility Relocations see Sheet 85
2. Existing street curbing removed during construction shall be stored and reset or used for new construction as required.
3. Existing street pavement excavated or damaged during construction shall be replaced in accordance with the Grading Plan and pavement details on this sheet and as directed by the Contracting Officer.



GRADING PLAN
SCALE: 1"=20'



WATERSTOP
(INTERSECTION @ NW & SE CORNERS)
NOT TO SCALE

GRAPHIC SCALES
1/4"=1'-0"
1"=20'

REVISION	DATE	DESCRIPTION	BY
2	5-5-69	Section 5/8 revised.	
1	8/14/63	Topographic & Paving Information Revised (APP'D)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY J.R. | DR. BY K.D. | CK. BY J.R.

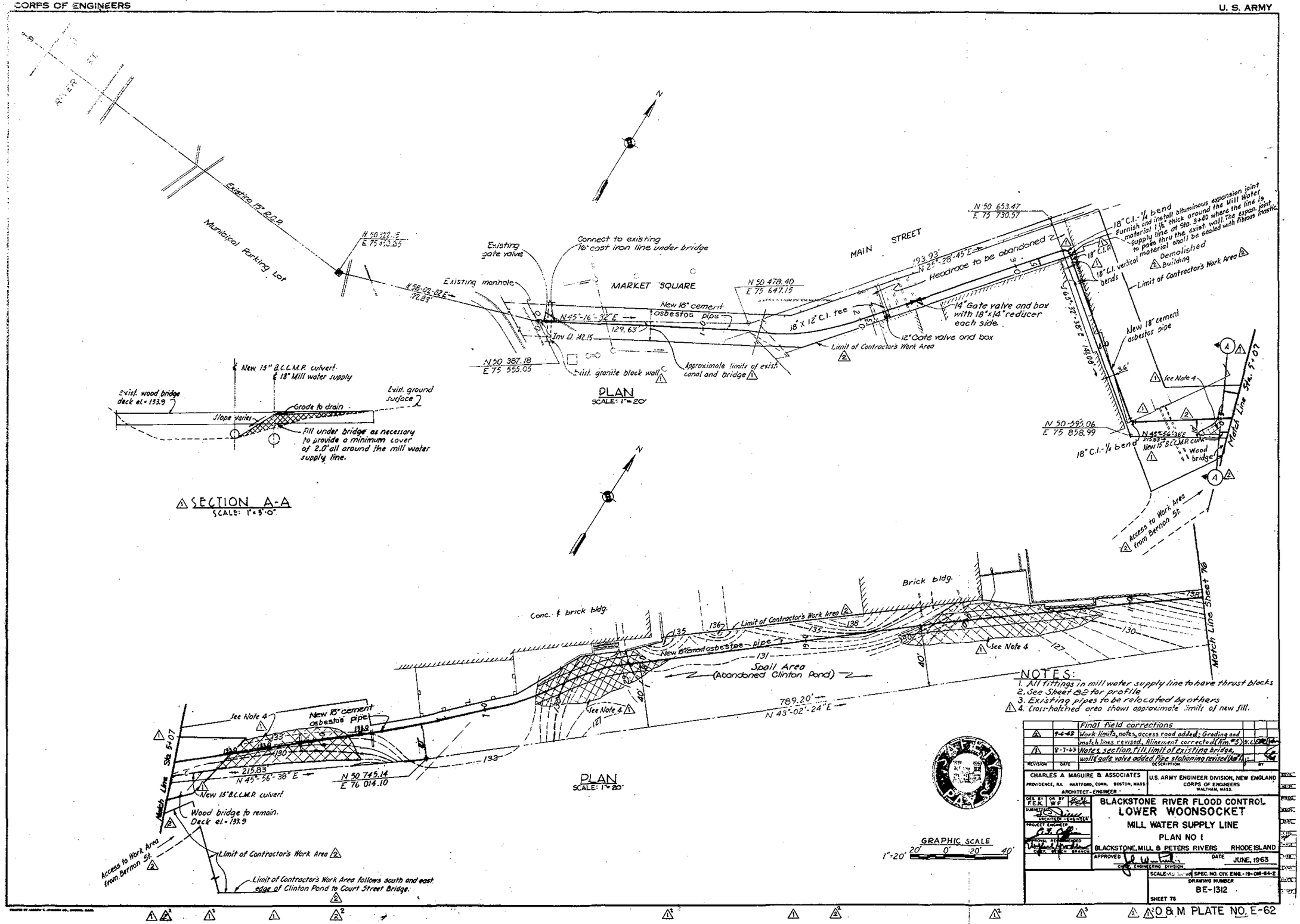
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
EAST SCHOOL STREET BRIDGE
SITE PLAN AND DETAILS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: JUNE, 1963

SCALE 1"=20' | SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER: BE-1312
SHEET 74

O & M PLATE NO. E-61



NOTES:

1. All fittings in mill water supply line to have thrust blocks
2. See Sheet B2 for profile
3. Existing pipes to be relocated by others
4. Cross-hatched area shows approximate limits of new fill.

REVISION	DATE	DESCRIPTION	BY
		Final Field corrections	
2	9-6-63	Work limits, notes, access road added; Grading and match lines revised, Alinement corrected (Am. #5)	
1	8-7-63	Notes, section, fill, limit of existing bridge, wall & gate valve added. Pipe stationing revised (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGINEER
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY W.F. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL WATER SUPPLY LINE
PLAN NO 1

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

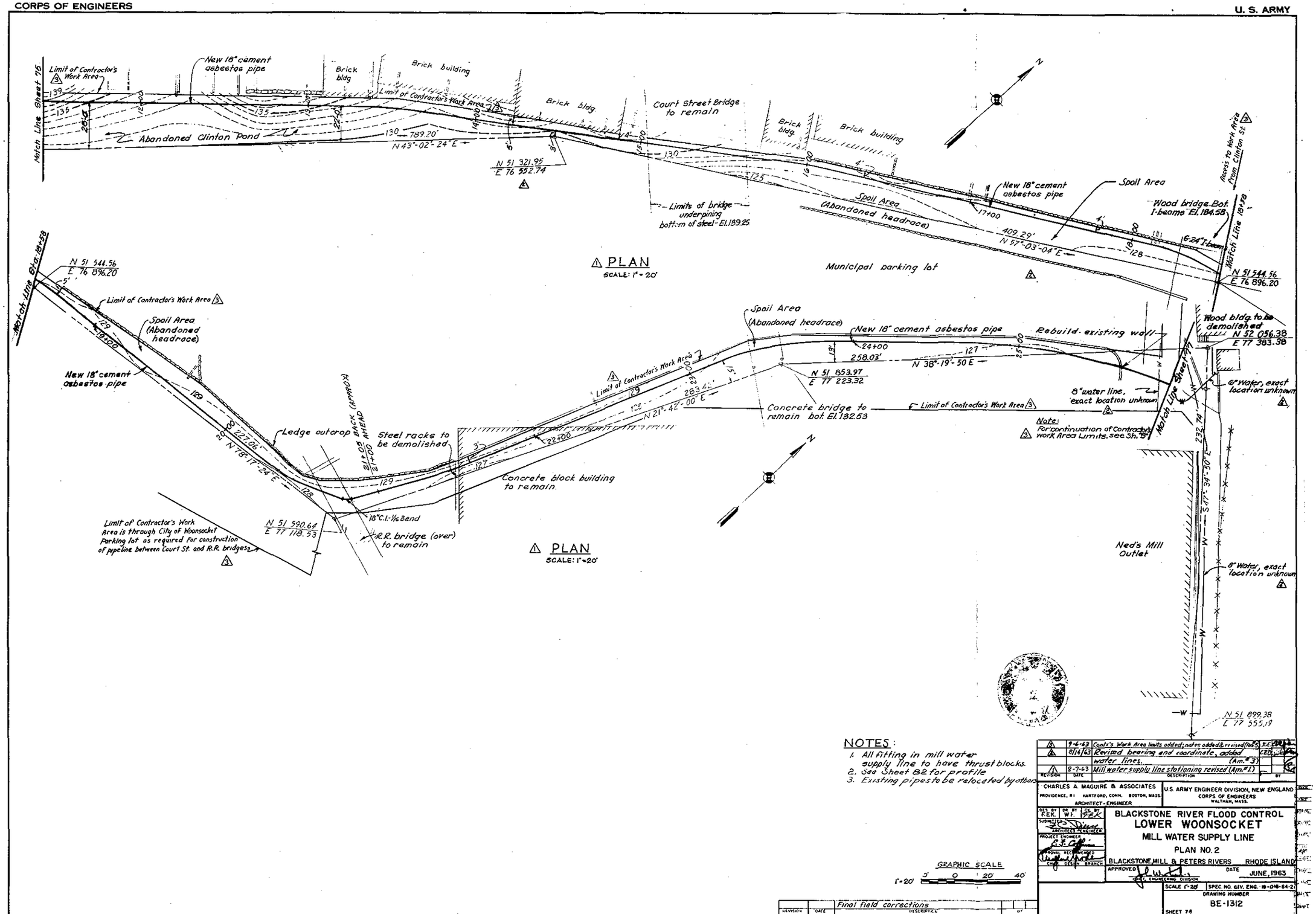
DATE JUNE, 1963

SCALE: AS SHOWN SPEC. NO. CIV. ENG.-19-016-64-2

DRAWING NUMBER BE-1312

SHEET 7B

O & M PLATE NO. E-62



NOTES:

1. All fitting in mill water supply line to have thrust blocks.
2. See Sheet B2 for profile
3. Existing pipes to be relocated by others

REVISION	DATE	DESCRIPTION	BY
4	9-6-63	Cont's Work Area limits added; notes added & revised (Am. #5)	R.E.
3	8/14/63	Revised bearing and coordinate, added water lines. (Am. #3)	R.E.D.
1	8-7-63	Mill water supply line stationing revised (Am. #1)	

REVISION | DATE | DESCRIPTION | BY

Final field corrections

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY R.E.K. | DR. BY W.F. | CK. BY

SUBMITTED: ARCHITECT-ENGINEER

PROJECT ENGINEER

APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL WATER SUPPLY LINE
PLAN NO. 2

BLACKSTONE MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION

DATE JUNE, 1963

SCALE 1" = 20'

SPEC. NO. CIV. ENG. 19-016-64-2

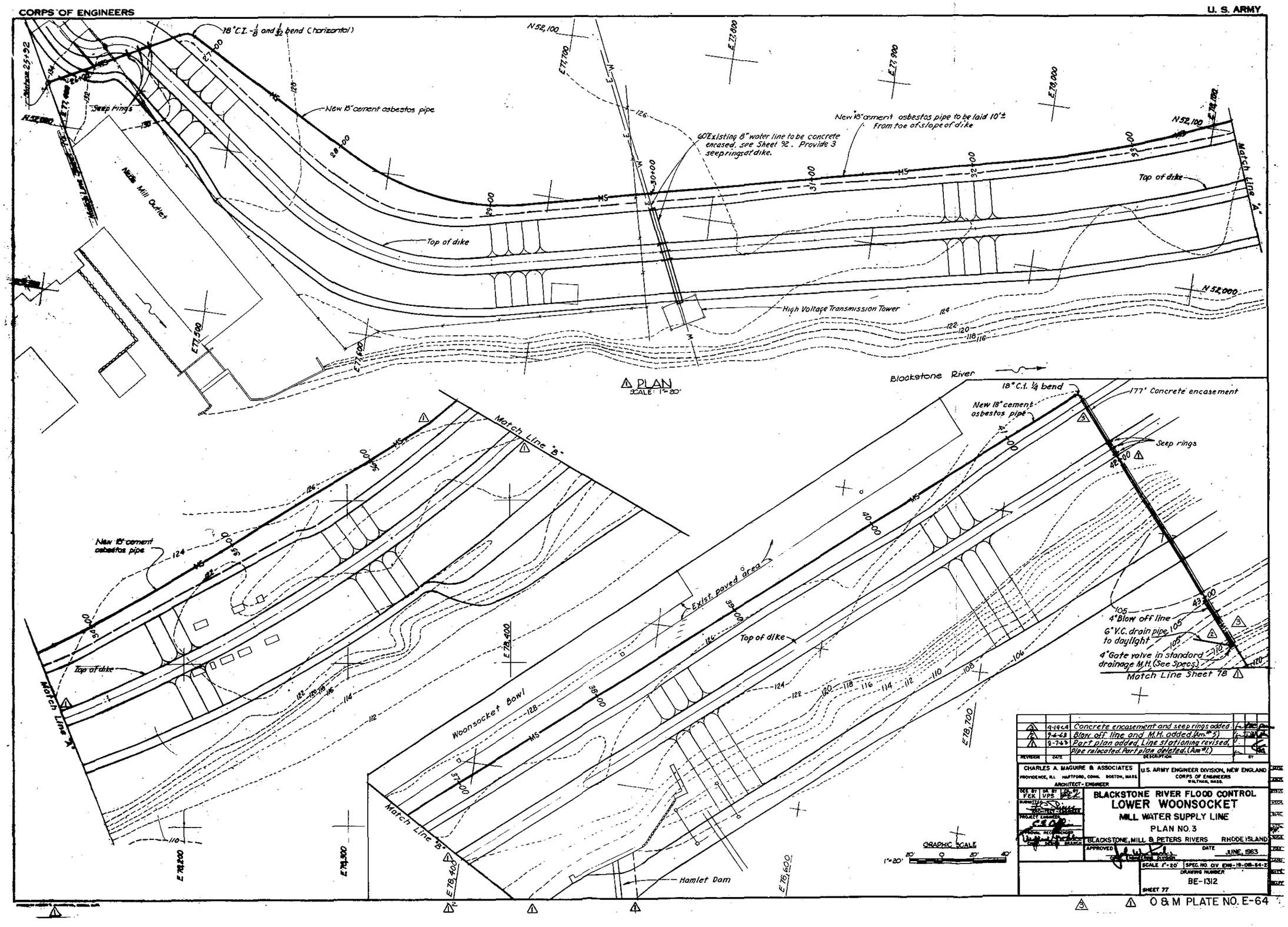
DRAWING NUMBER BE-1312

SHEET 7B

O & M PLATE NO. E-63

CORPS OF ENGINEERS

U. S. ARMY



REVISION	DATE	DESCRIPTION	BY
4	9-19-64	Concrete encasement and seep rings added.	
3	7-6-63	Blow off line and M.H. added. (Am. #5)	
2	8-7-63	Part plan added, Line stationing revised,	
1		Pipe relocated. Part plan deleted. (Am #1.)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY FEK | DR. BY VPS | CK. BY

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL WATER SUPPLY LINE
PLAN NO. 3

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED

DATE JUNE, 1963

SCALE 1"=20'

SPEC. NO. DIV ENG-19-018-64-2

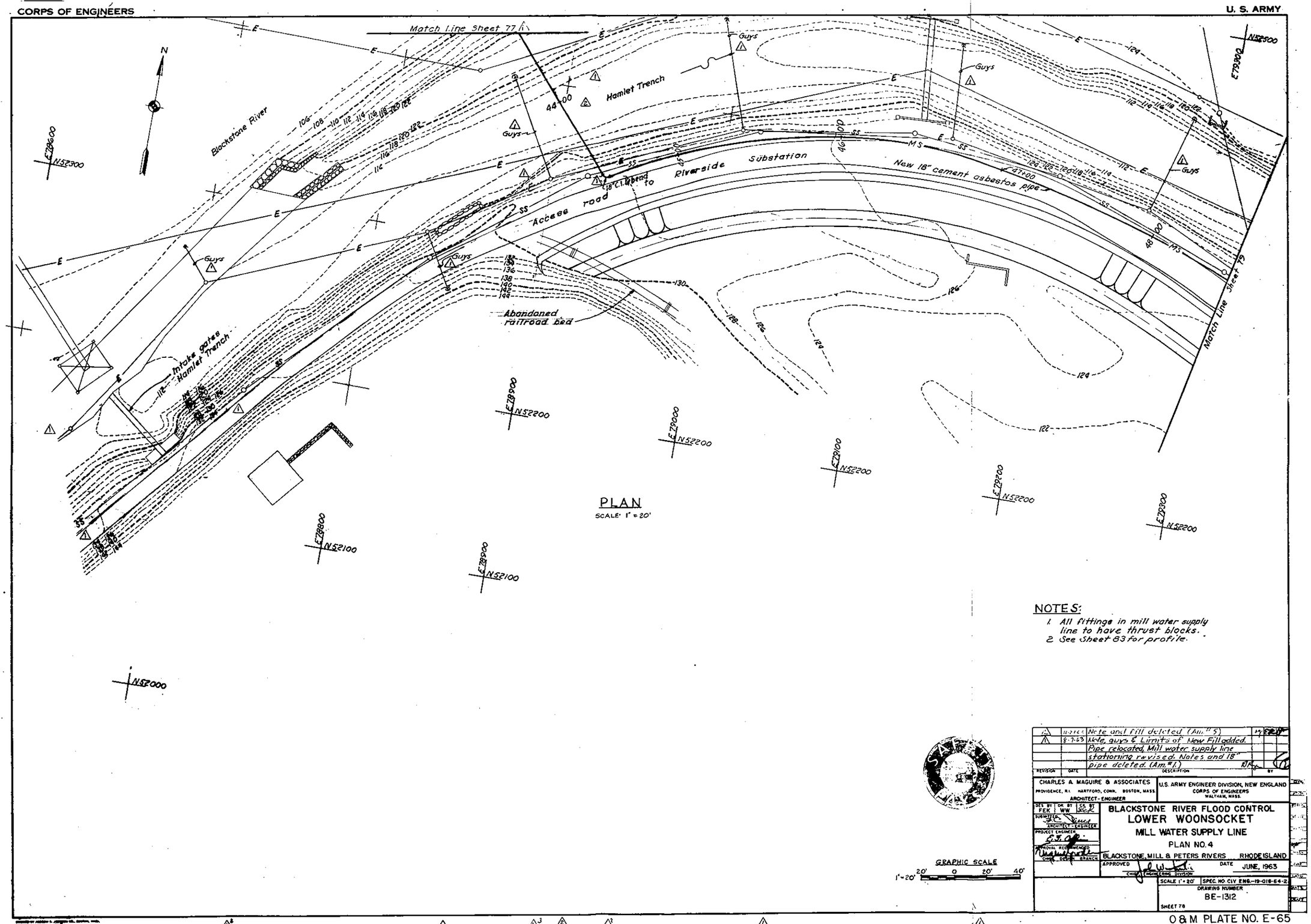
DRAWING NUMBER BE-1312

SHEET 77

O & M PLATE NO. E-64

CORPS OF ENGINEERS

U. S. ARMY



PLAN

SCALE: 1" = 20'

NOTES:

1. All fittings in mill water supply line to have thrust blocks.
2. See Sheet 83 for profile.

REVISION	DATE	DESCRIPTION	BY
2	11-27-63	Note and fill deleted (Am. #5)	
1	8-7-63	Note, guys & Limits of New Fill added. Pipe relocated, Mill water supply line stationing revised. Notes and 18" pipe deleted. (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES BY FEK | DR BY WW | CK BY

SUBMITTED: ARCHITECT-ENGINEER

PROJECT ENGINEER

APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL WATER SUPPLY LINE
PLAN NO. 4
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION

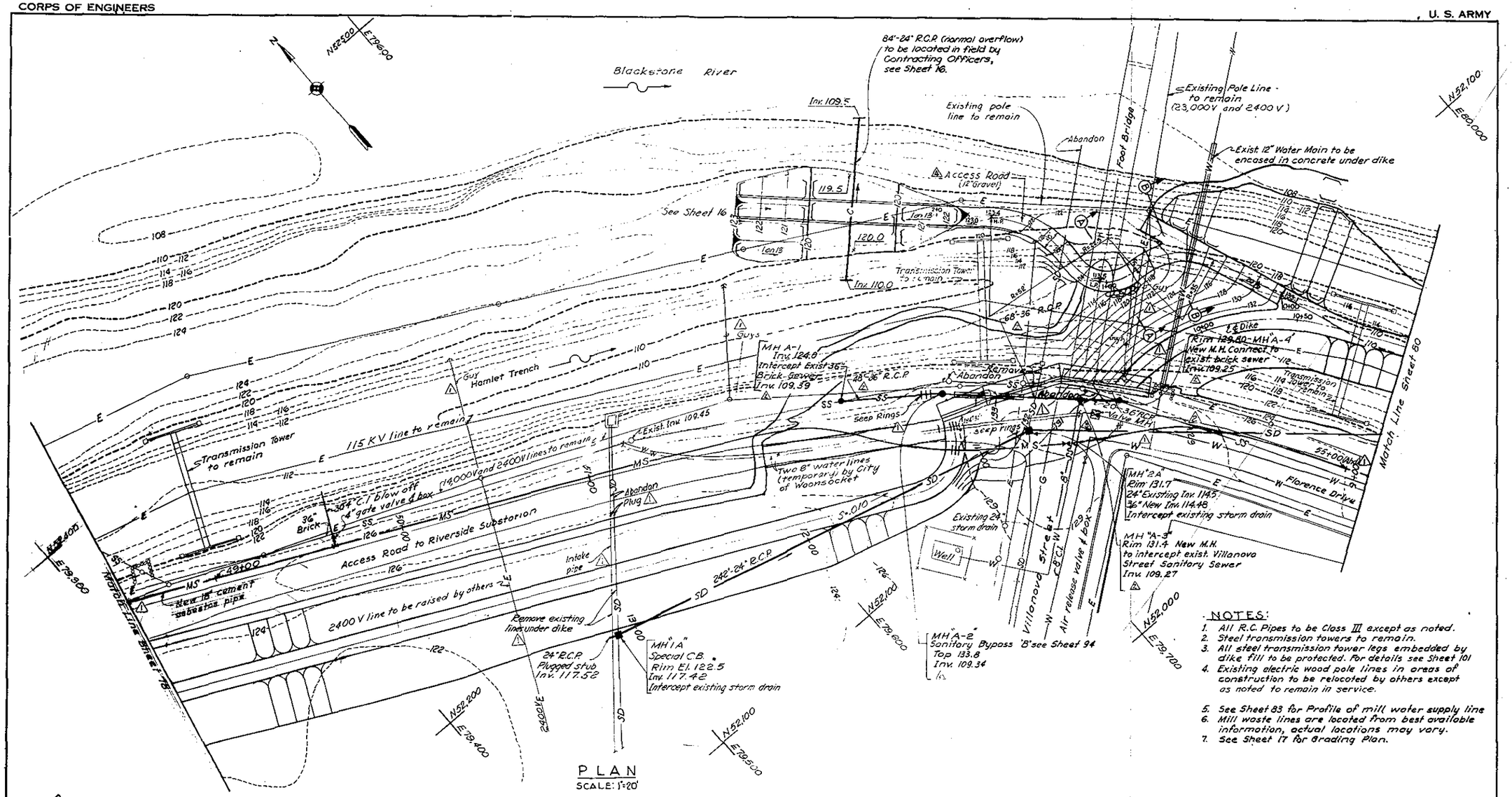
DATE JUNE, 1963

SCALE 1" = 20' | SPEC. NO. CIV ENG.-19-018-64-2

DRAWING NUMBER BE-1312

SHEET 78

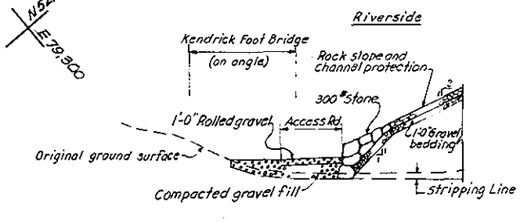
O & M PLATE NO. E-65



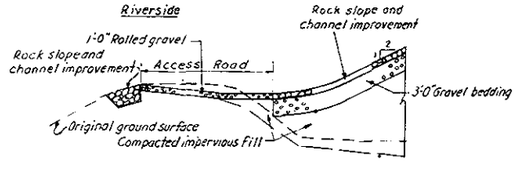
PLAN
SCALE: 1"=20'

NOTES:

1. All R.C. Pipes to be Class III except as noted.
2. Steel transmission towers to remain.
3. All steel transmission tower legs embedded by dike fill to be protected. For details see Sheet 101
4. Existing electric wood pole lines in areas of construction to be relocated by others except as noted to remain in service.
5. See Sheet 83 for Profile of mill water supply line
6. Mill waste lines are located from best available information, actual locations may vary.
7. See Sheet 17 for Grading Plan.



SECTION A-A
SCALE 1"=10'



SECTION B-B
SCALE 1"=10'

GRAPHIC SCALE
1"=20' 20' 0 20' 40'

REVISION	DATE	DESCRIPTION	BY
		Final Field Corrections	
1	6-16-65	Access Road and Sections added. Grading revised in vicinity of Access Road.	
2	9-14-64	Water line layout revised.	
1	11-27-63	Epoxy coating deleted. (Am. #5)	
1	8-7-63	Exist. Valve M.H. Intake pipe, guy & notes added. Note 6 Mill water supply line stationing revised. M.S. pipe line relocated. Seep rings deleted & revised. (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY W.W. CK. BY
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. I

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION

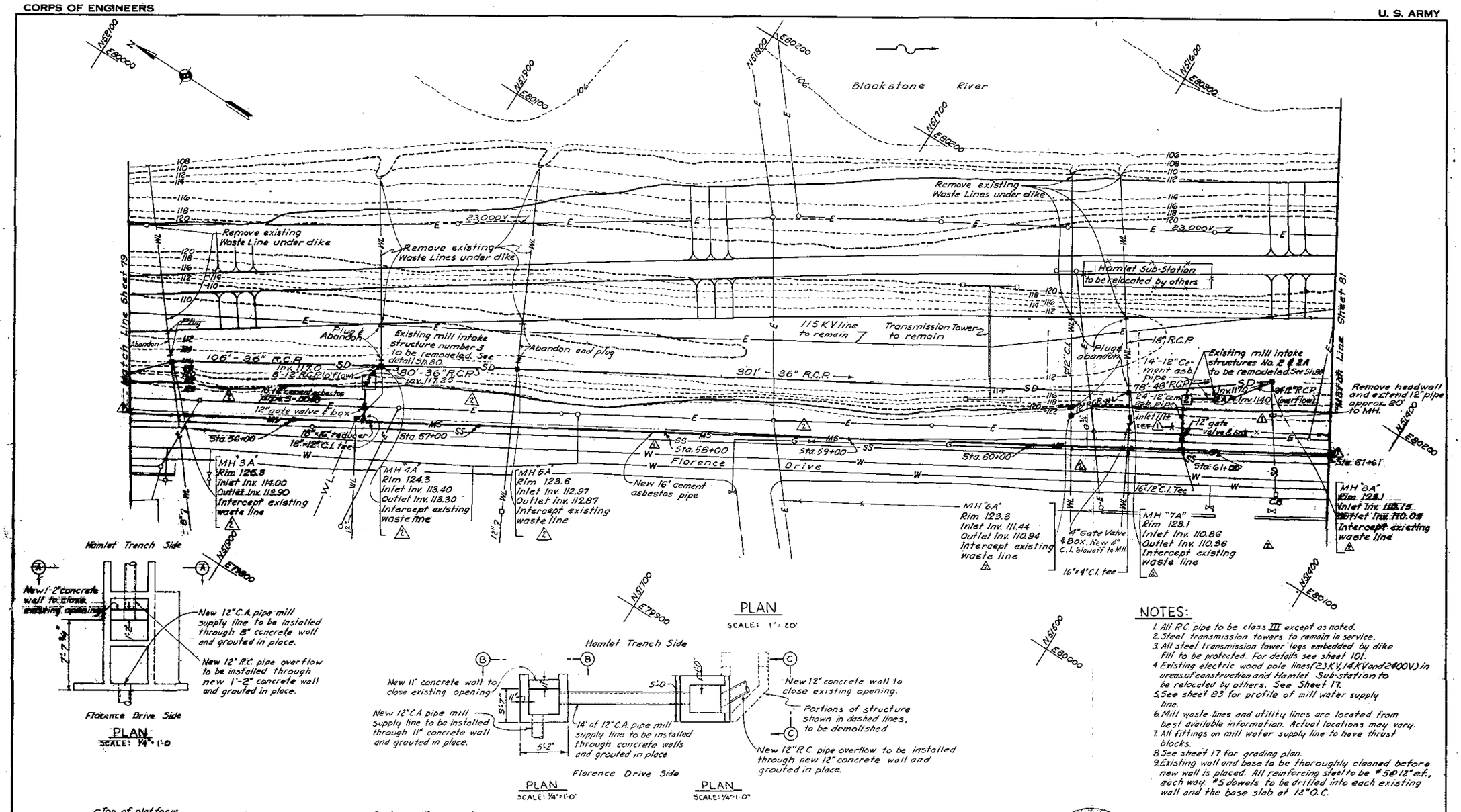
DATE JUNE, 1963

SCALE 1"=20' SPEC. NO. CIV. ENG.-19-016-64-2

DRAWING NUMBER
BE-1312

SHEET 78

O & M PLATE NO. E-66

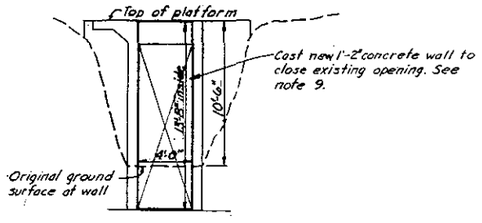


PLAN
SCALE: 1" = 20'

PLAN
SCALE: 1/4" = 1'-0"

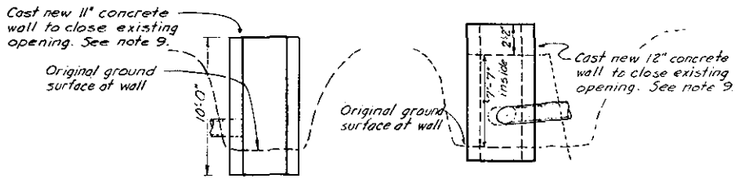
PLAN
SCALE: 1/4" = 1'-0"

PLAN
SCALE: 1/4" = 1'-0"



ELEVATION A-A
SCALE: 1/4" = 1'-0"

MILL INTAKE STRUCTURE 3 (21) (86)



ELEVATION B-B
SCALE: 1/4" = 1'-0"

(86) MILL INTAKE STRUCTURE 2

ELEVATION C-C
SCALE: 1/4" = 1'-0"

MILL INTAKE STRUCTURE 2A (21) (86)

NOTES:

1. All R.C. pipe to be class III except as noted.
2. Steel transmission towers to remain in service.
3. All steel transmission tower legs embedded by dike fill to be protected. For details see sheet 101.
4. Existing electric wood pole lines (23 KV, 14 KV and 2400 V) in areas of construction and Hamlet Sub-station to be relocated by others. See Sheet 17.
5. See sheet B3 for profile of mill water supply line.
6. Mill waste lines and utility lines are located from best available information. Actual locations may vary.
7. All fittings on mill water supply line to have thrust blocks.
8. See sheet 17 for grading plan.
9. Existing wall and base to be thoroughly cleaned before new wall is placed. All reinforcing steel to be #5 @ 12" e.f., each way. #5 dowels to be drilled into each existing wall and the base slab at 12" O.C.

GRAPHIC SCALES
1/4" = 1'-0": 4' 0 4' 8'
1" = 20': 20' 0 20' 40'

REVISION	DATE	DESCRIPTION	BY
1	11-23-63	Final Field Corrections Epoxy coating deleted. (Am. #5)	W
2	9-2-63	Existing fence and headwall added. M.W.S. stationing and arrow revised. (Am. #7)	

CHARLES A. MAGUIRE & ASSOCIATES
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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

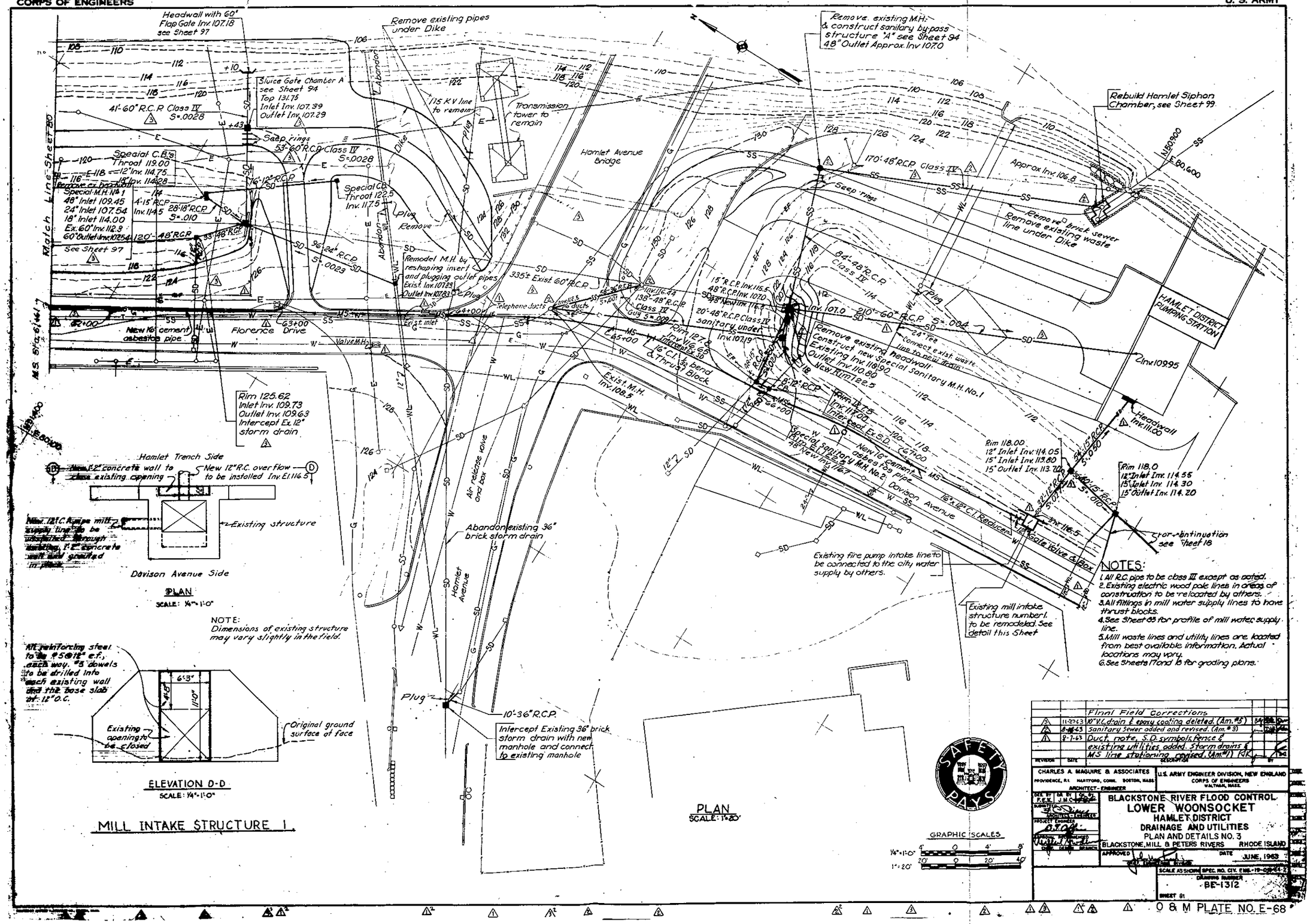
DES. BY F.E.K. DR. BY W.W.
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
PROJECT ENGINEER CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO 2

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV ENG-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 80



NOTES:

1. All R.C. pipe to be class III except as noted.
2. Existing electric wood pole lines in areas of construction to be relocated by others.
3. All fittings in mill water supply lines to have thrust blocks.
4. See Sheet 83 for profile of mill water supply line.
5. Mill waste lines and utility lines are located from best available information. Actual locations may vary.
6. See Sheets 17 and 18 for grading plans.

REVISION	DATE	DESCRIPTION	BY
		Final Field Corrections	
3	11-27-63	10" V.C. drain & epoxy coating deleted. (Am. #5)	
2	8-14-63	Sanitary Sewer added and revised. (Am. #3)	
1	8-7-63	Duct, note, S.D. symbols, fence & existing utilities added. Storm drains & MS line stationing revised. (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

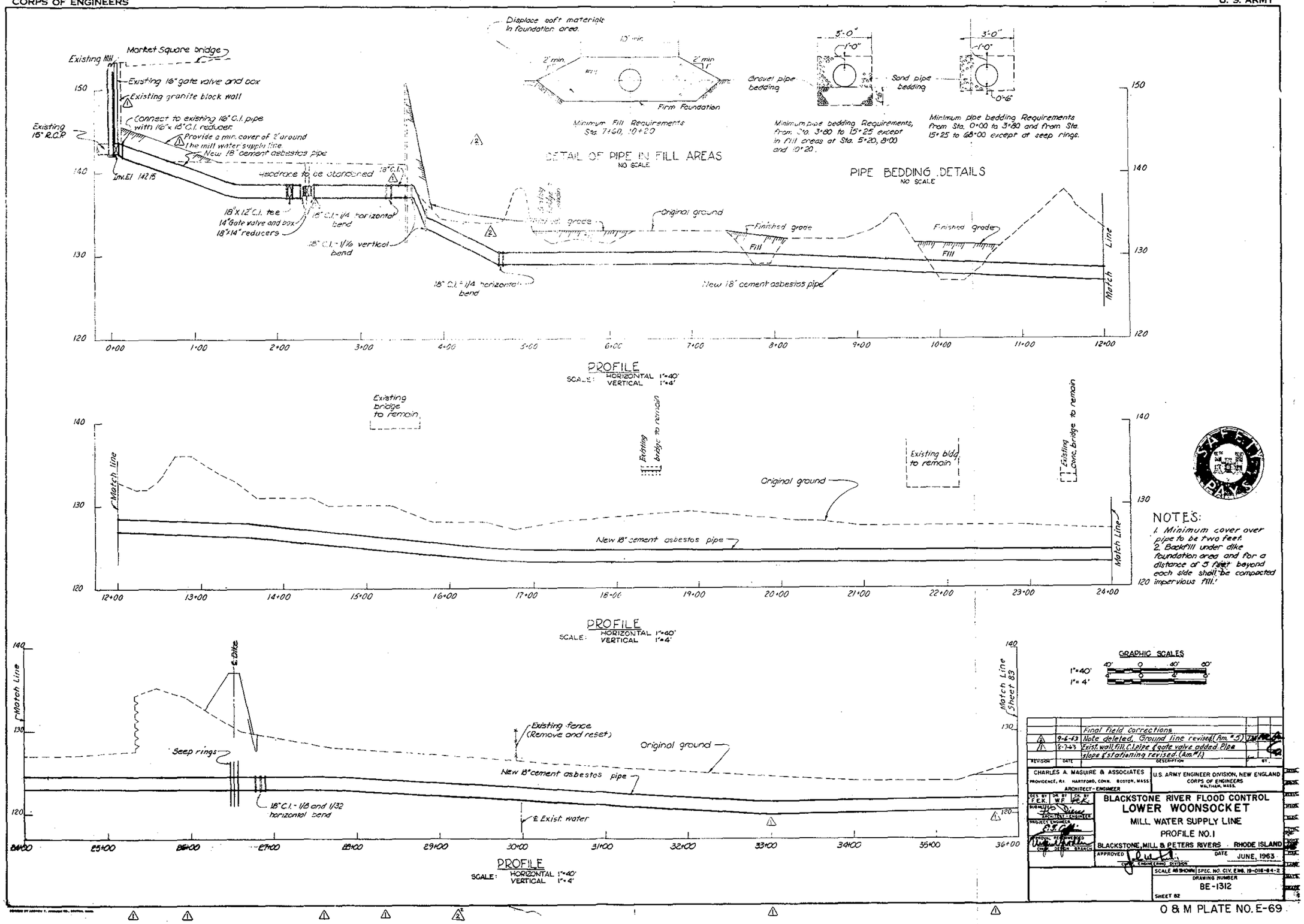
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY J.M.C. CK. BY R.G.
SURVEY
ARCHITECT-ENGINEER
PROJECT ENGINEER
CIVIL DESIGN BRANCH

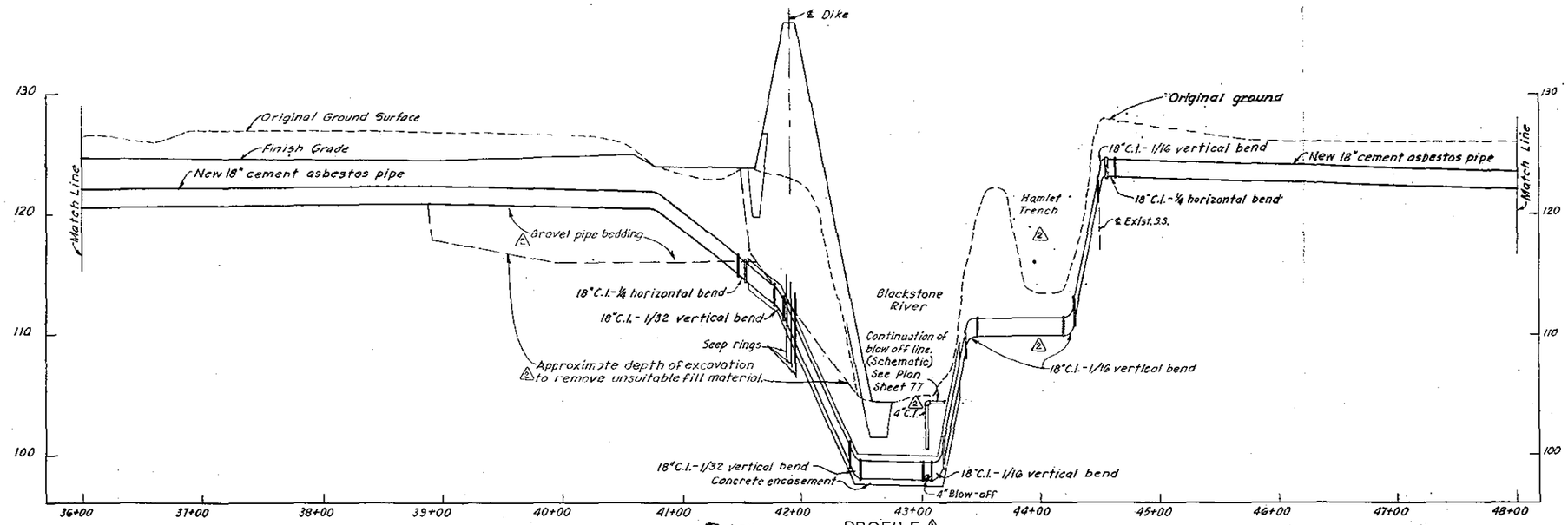
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HAMLET DISTRICT
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. 3
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-08-64-2
DRAWING NUMBER BE-1312
SHEET 91

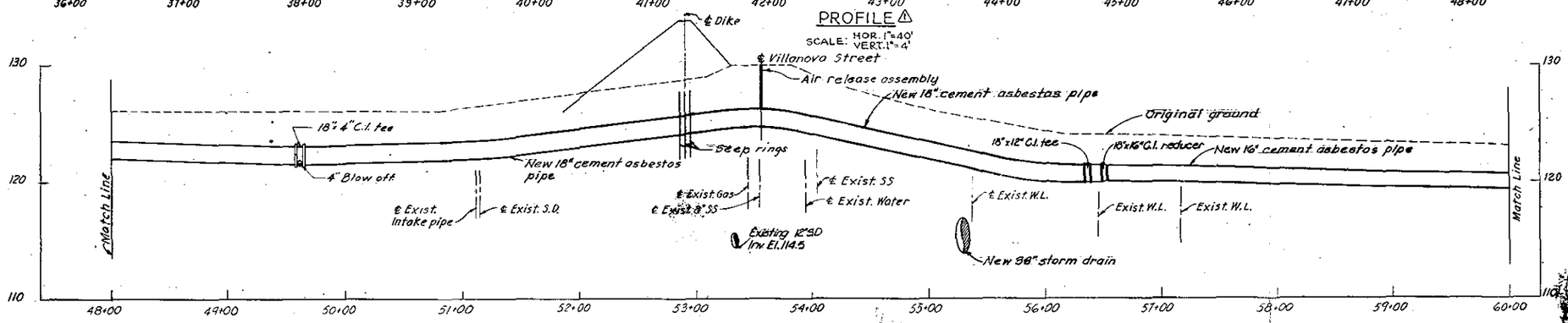


O & M PLATE NO. E-69



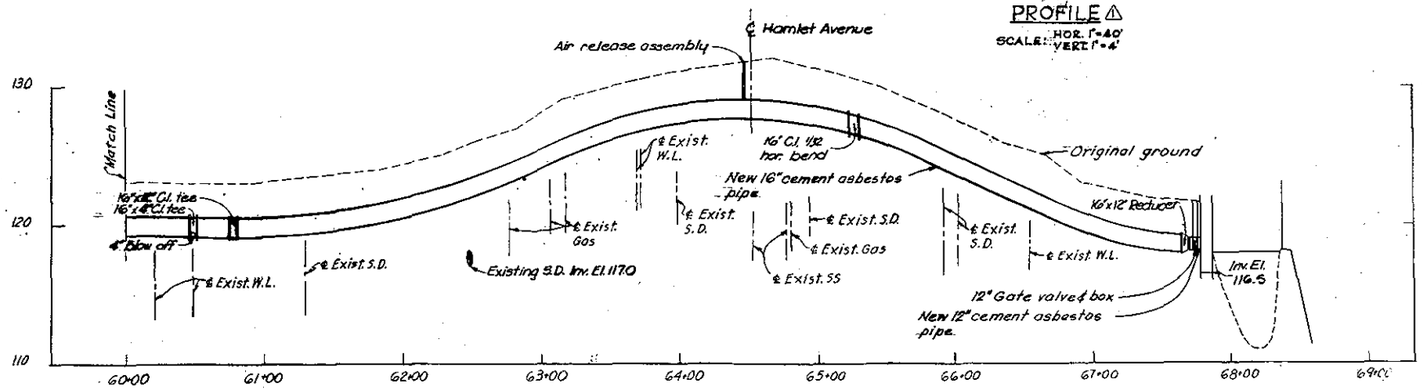
PROFILE 1

SCALE: HOR. 1"=40' VERT. 1"=4'



PROFILE 1

SCALE: HOR. 1"=40' VERT. 1"=4'



PROFILE 1

SCALE: HOR. 1"=40' VERT. 1"=4'

GRAPHIC SCALES

1"=40' 40' 0 40' 80'

1"=4' 4' 0 4' 8'

NOTE:

1. Existing utilities locations and inverts shown are approximate and are to be located by the contractor.

REVISION	DATE	DESCRIPTION	BY
2	9-6-63	Blow off line added; MS line revised.	
1	6-7-63	Notes and gravel pipe bedding line revised (Am. #5) Existing utilities added. Pipe alinement and slope revised. (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY W.F. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVED: RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL WATER SUPPLY LINE
PROFILE NO. 2

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION DATE JUNE, 1963

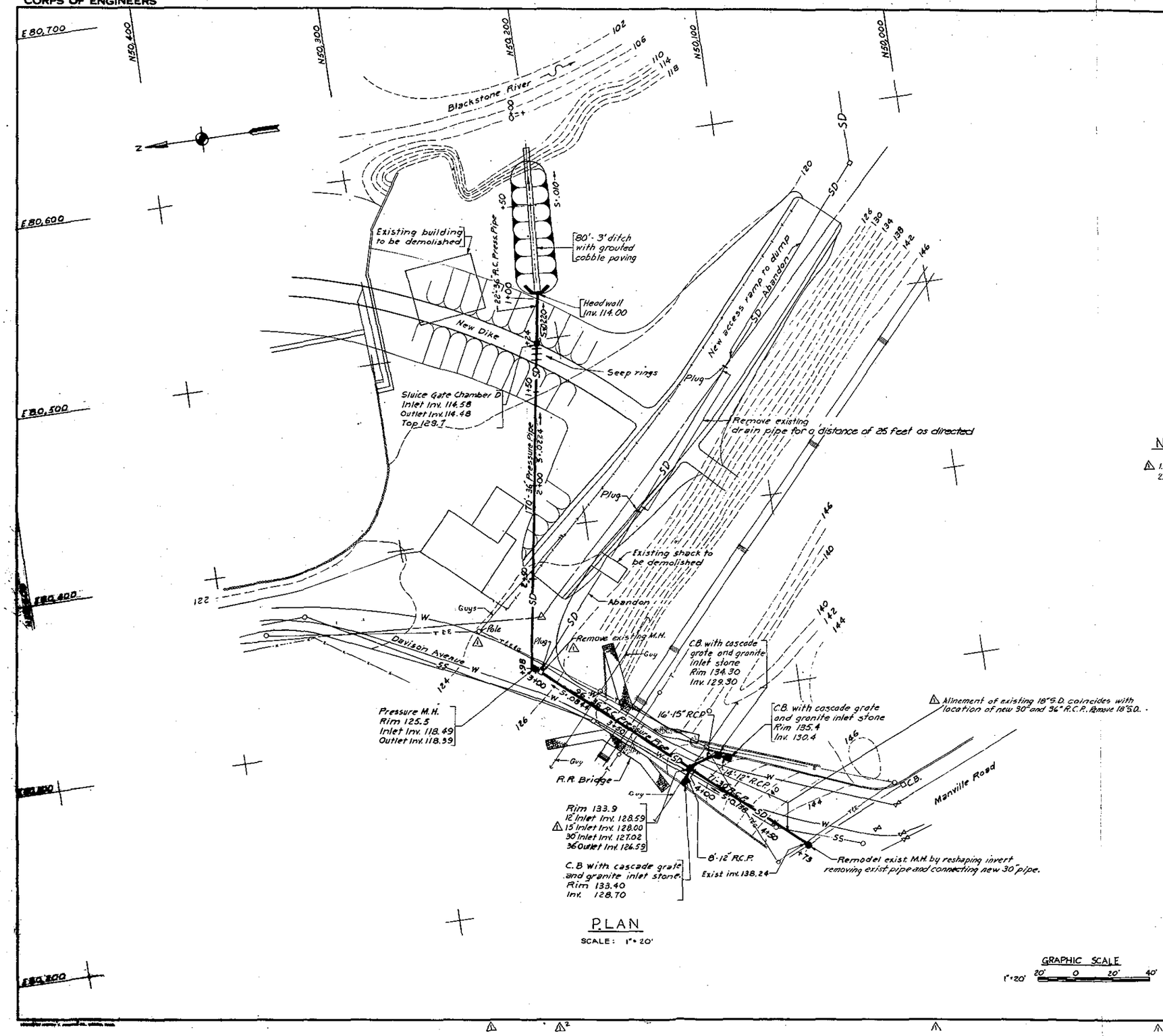
SCALE AS SHOWN SPEC. NO. CIV. ENG.-18-018-64-2

DRAWING NUMBER BE-1312

SHEET 89

CORPS OF ENGINEERS

U. S. ARMY



PLAN

SCALE: 1" = 20'

NOTES:

1. All R.C.P. to be class III except as noted.
2. Rims of all new manholes to be set flush with finished grade.

GRAPHIC SCALE

1" = 20' 20' 0 20' 40'

REVISION	DATE	DESCRIPTION	BY
1	8-7-63	Electric lines, guys & notes added, storm drain size revised, existing water relocated & note deleted. (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. | DR. BY R.C. | CK. BY C.R.A.

SUBMITTED: ARCHITECT-ENGINEER

PROJECT ENGINEER

APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
DAVISON AVENUE
NEW STORM DRAINAGE
BLACKSTONE, MILL & PETERS RIVERS · RHODE ISLAND

APPROVED: CHIEF, ENGINEERING DIVISION

DATE JUNE, 1963

SCALE 1" = 20'

SPEC. NO. CIV. ENG.-19-016-64-2

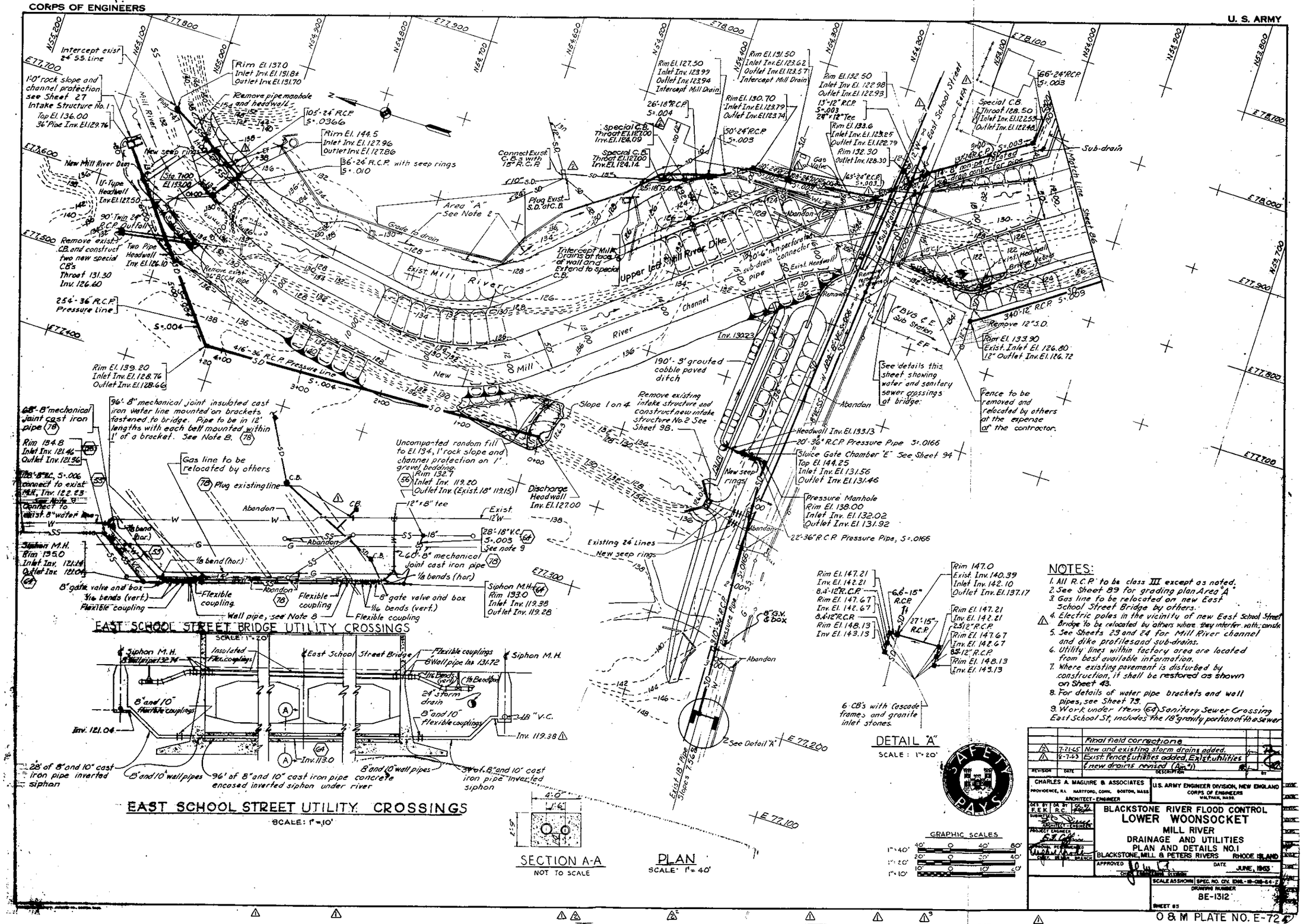
DRAWING NUMBER BE-1312

SHEET 84

O & M PLATE NO. E-71

CORPS OF ENGINEERS

U. S. ARMY



NOTES:

1. All R.C.P. to be class III except as noted.
2. See Sheet 8B for grading plan Area "A".
3. Gas line to be relocated on new East School Street Bridge by others.
4. Electric poles in the vicinity of new East School Street Bridge to be relocated by others where they interfer with constr.
5. See Sheets 23 and 24 for Mill River channel and dike profiles and sub-drains.
6. Utility lines within factory area are located from best available information.
7. Where existing pavement is disturbed by construction, it shall be restored as shown on Sheet 43.
8. For details of water pipe brackets and wall pipes, see Sheet 7B.
9. Work under Item (64) Sanitary Sewer Crossing East School St. includes the 18" gravity portion of the sewer.

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
2	7-21-65	New and existing storm drains added.	
1	8-7-65	Exist. fence & utilities added, Exist. utilities (new drains revised (Apr.))	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY R.C. CK. BY
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. 1

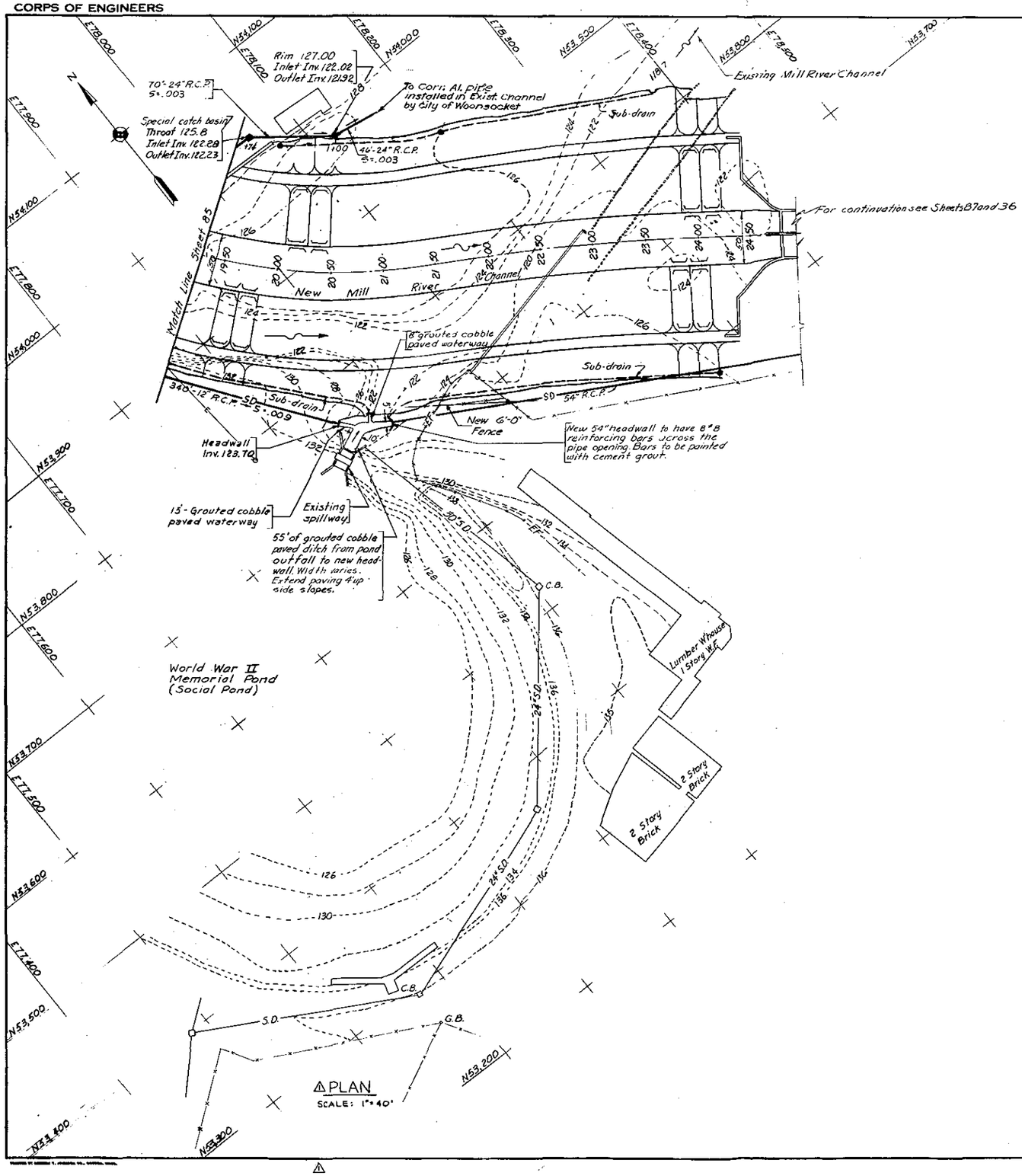
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION

DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-018-64-7
DRAWING NUMBER BE-1312
SHEET 85

O & M PLATE NO. E-72



NOTES:

1. All R.C.P. to be Class III except as noted.
2. Berms to be topsoiled and seeded.
3. For details of waterway and paved ditch see Sheet 95.

SAFETY PAYS

GRAPHIC SCALES

1" = 40' 40' 0 40' 80'

1" = 4' 4' 0 4' 8'

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
1	9-7-63	Drain elec. line added, new drains revised, siphon & paved rock gutter deleted (Am 1)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY R.C. CK. BY

SUBMITTED: ARCHITECT-ENGINEER

PROJECT ENGINEER

GENERAL REPRESENTATIVE

CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. 2

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

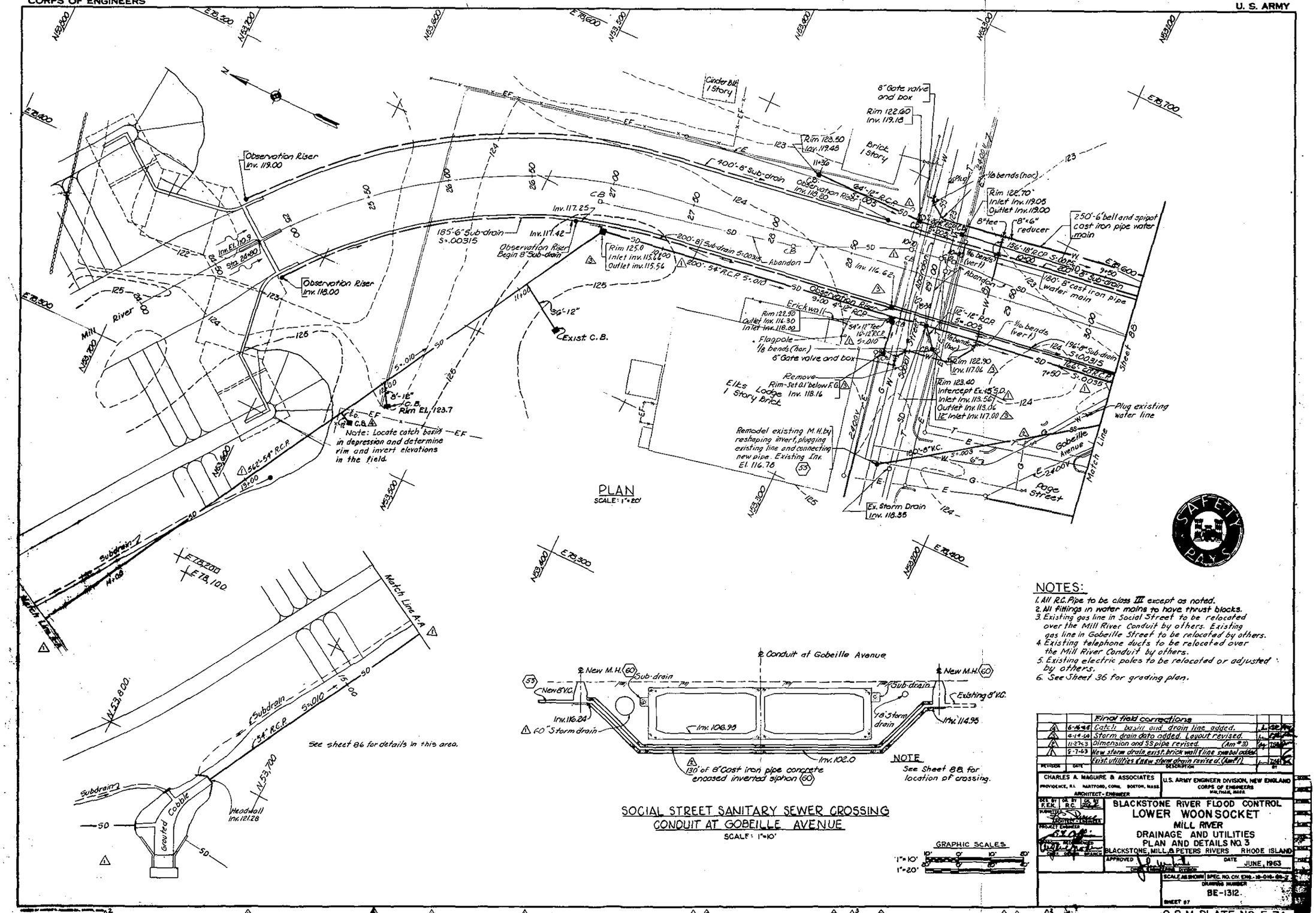
APPROVED: CHIEF, ENGINEERING DIVISION

DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-019-64-2

DRAWING NUMBER
BE-1312

SHEET 94



NOTES:

1. All R.C. Pipe to be class III except as noted.
2. All fittings in water mains to have thrust blocks.
3. Existing gas line in Social Street to be relocated over the Mill River Conduit by others. Existing gas line in Gobeille Street to be relocated by others.
4. Existing telephone ducts to be relocated over the Mill River Conduit by others.
5. Existing electric poles to be relocated or adjusted by others.
6. See Sheet 36 for grading plan.

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	6-16-46	Catch basin and drain line added.	
3	4-14-64	Storm drain data added. Layout revised.	
2	11-27-63	Dimension and SS pipe revised. (Am #3)	
1	5-7-63	New storm drain, exist. brick wall & line symbol added. Exist. utilities & new storm drain revised. (Am #1)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY R.C. CK. BY
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
RECOMMENDED
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. 3

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION

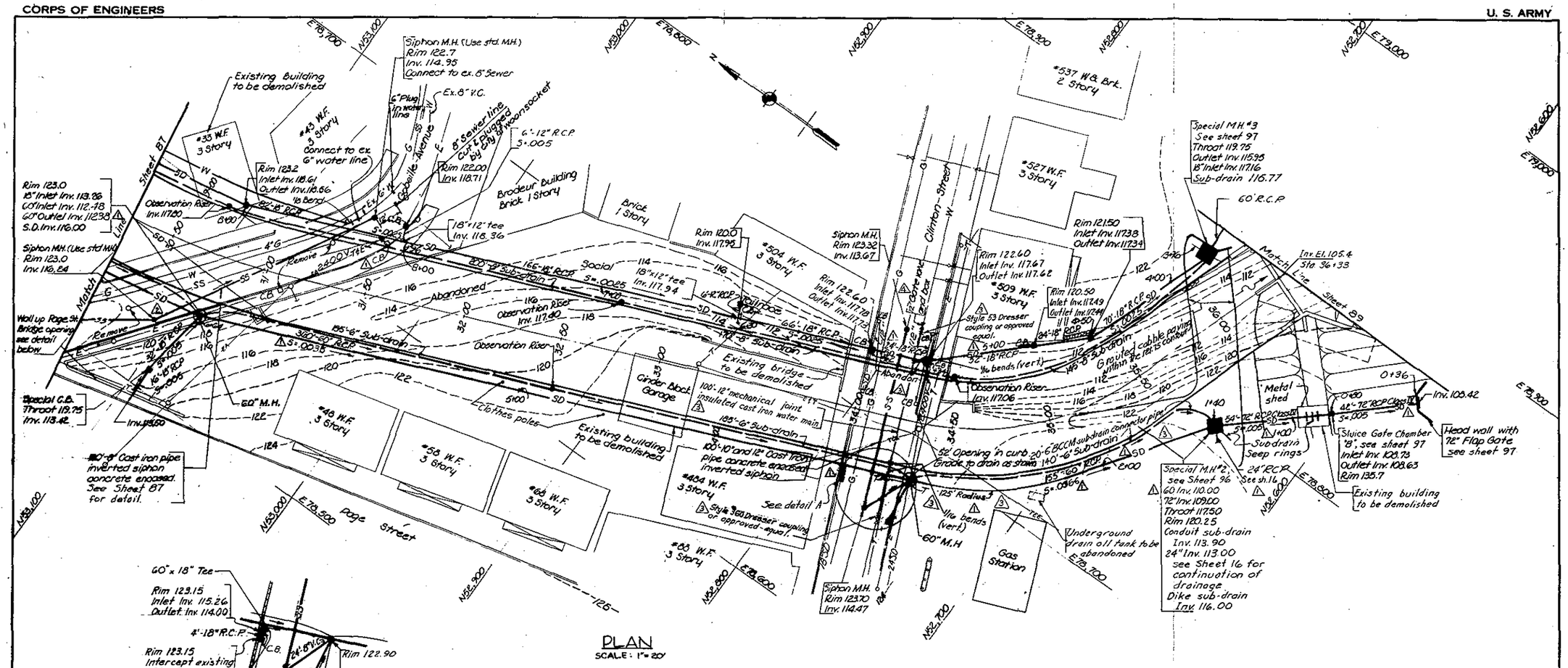
DATE JUNE, 1963

SCALE AS SHOWN | SPEC. NO. CIV. ENG.-18-016-66-2

DRAWING NUMBER
BE-1312.

SHEET 87

O & M PLATE NO. E-74



PLAN
SCALE: 1" = 20'

DETAIL "A"
SCALE: 1" = 20'

SANITARY SEWER CROSSING CLINTON STREET
SCALE: 1" = 10'

SECTION A-A
NOT TO SCALE

SECTION — ELEVATION
WALL FOR PAGE STREET BRIDGE OPENING
NOT TO SCALE

NOTES:

1. All R.C.P. to be class III except as noted.
2. All fittings in water mains to have thrust blocks.
3. See Sheet 37 for grading plan.
4. See Sheet 87 for detail of Social Street Sanitary Sewer Crossing Mill River Conduit at Gobelle Avenue.
5. Existing gas line in Clinton Street to be relocated over Mill River Conduit by others.
6. Existing telephone ducts to be relocated over Mill River Conduit by others.
7. Where sub-drain pipes begin in a storm drain manhole, suitable clay plugs will be installed to provide future access to the line for flushing or cleaning purposes.
8. Existing electric poles in Gobelle Avenue and Clinton Street to be relocated by others. see specs.

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	6-14-64	Detail "A" revised.	
3	1-23-64	Gate valve size changed.	
2	9-6-63	Water line & S.D. revised; M.H. deleted. (Am. #5)	
1	8-15-63	M.H. and SS pipe revised. (Am. #3)	
	8-7-63	C.B. notes, clothes poles, symbols added.	
		New drains & note revised. (Am. #1).	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT - ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY FEK RJS
SUBMITTED
ARCHITECT - ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED
CHIEF, DESIGN BRANCH

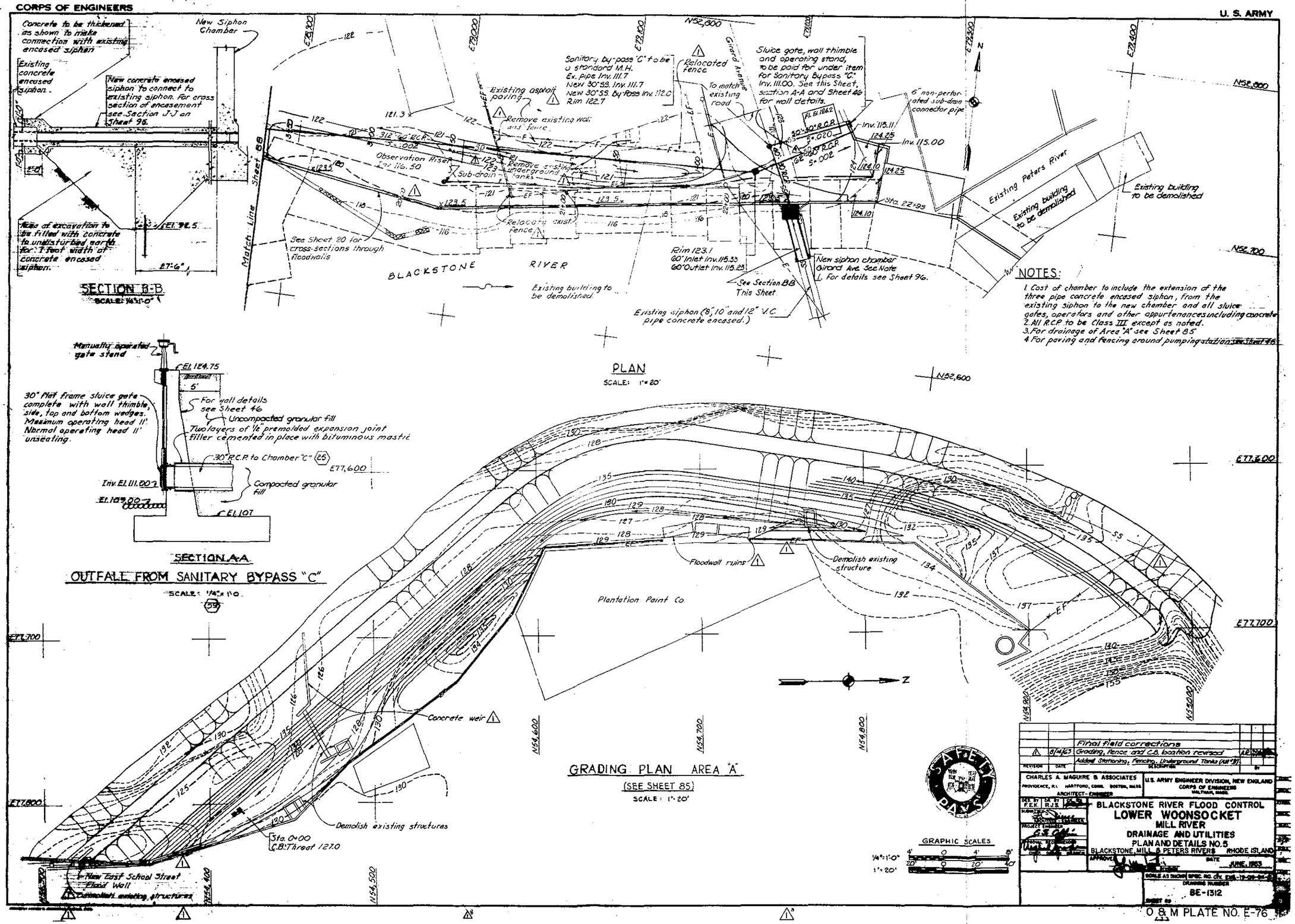
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
MILL RIVER
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. 4
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED
CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

SCALE AS SHOWN
SPEC. NO. CIV ENG-19-016-64-2
DRAWING NUMBER BE-1312
SHEET 88

CORPS OF ENGINEERS

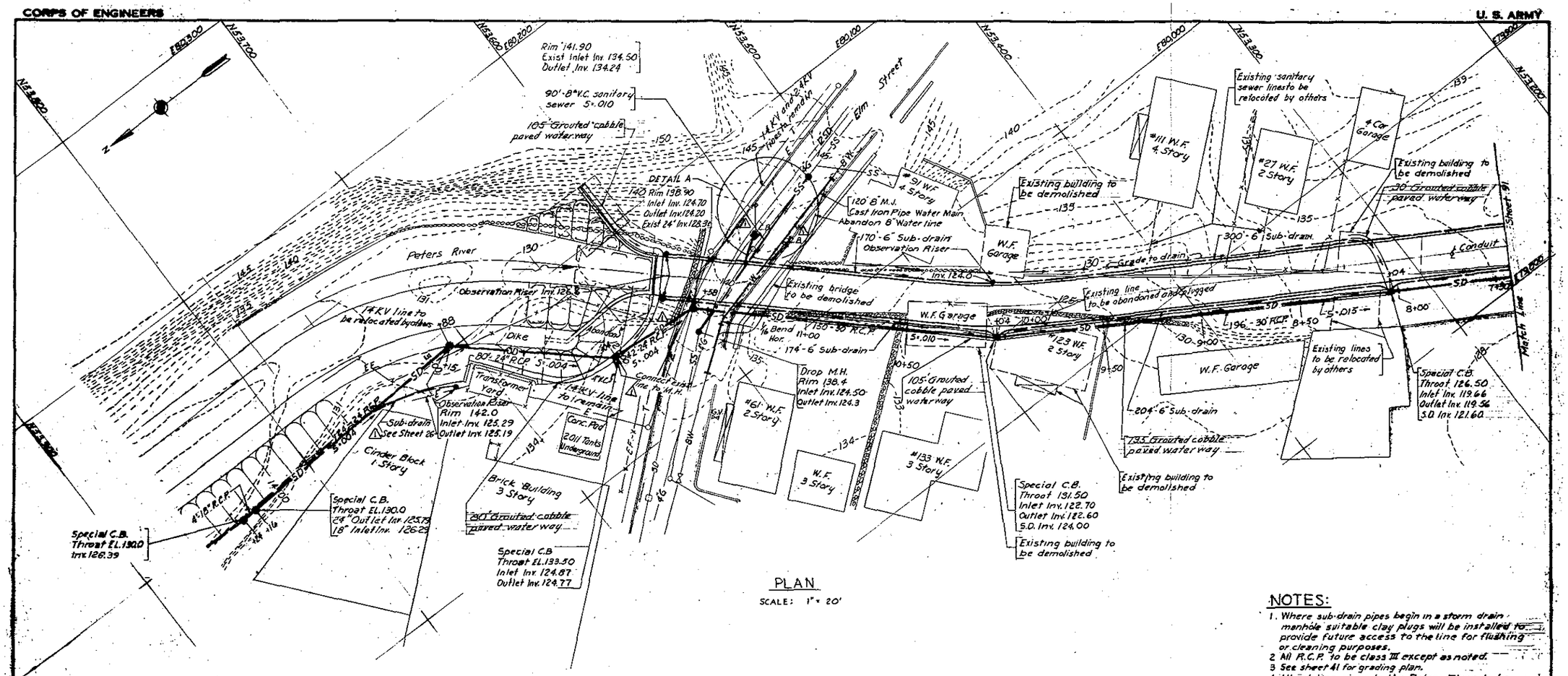
U. S. ARMY



O & M PLATE NO. E-76

CORPS OF ENGINEERS

U. S. ARMY

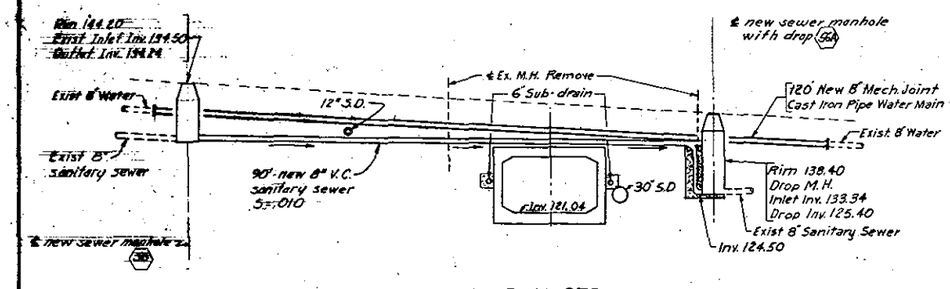


PLAN

SCALE: 1" = 20'

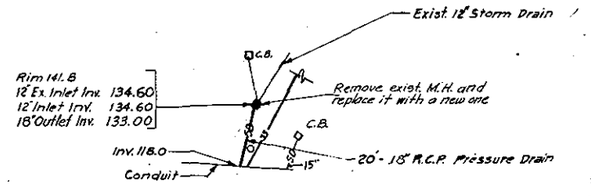
NOTES:

1. Where sub-drain pipes begin in a storm drain manhole suitable clay plugs will be installed to provide future access to the line for flushing or cleaning purposes.
2. All R.C.P. to be class III except as noted.
3. See sheet 41 for grading plan.
4. All existing pipes to the Peters River to be plugged unless otherwise noted.
5. Rims of all new manholes to be set flush with finished grade.
6. Existing gas line in Elm Street to be relocated over Peters River Conduit by others.
7. Existing telephone ducts in Elm Street to be relocated over Peters River Conduit by others.
8. Existing electric poles to be relocated by others.



ELM STREET
SANITARY SEWER AND WATER CROSSING

SCALE: 1"=10'



DETAIL "A"

SCALE: 1"=20'

GRAPHIC SCALES

1"=20' 20' 0 20' 40'

1"=10' 10' 0 10' 20'

REVISION	DATE	DESCRIPTION	BY
1	8-7-63	Waste line and note added. Storm drains and detail revised. (Am. #1)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY R.C.

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
PETERS RIVER
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. 1
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

APPROVED DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-[illegible]

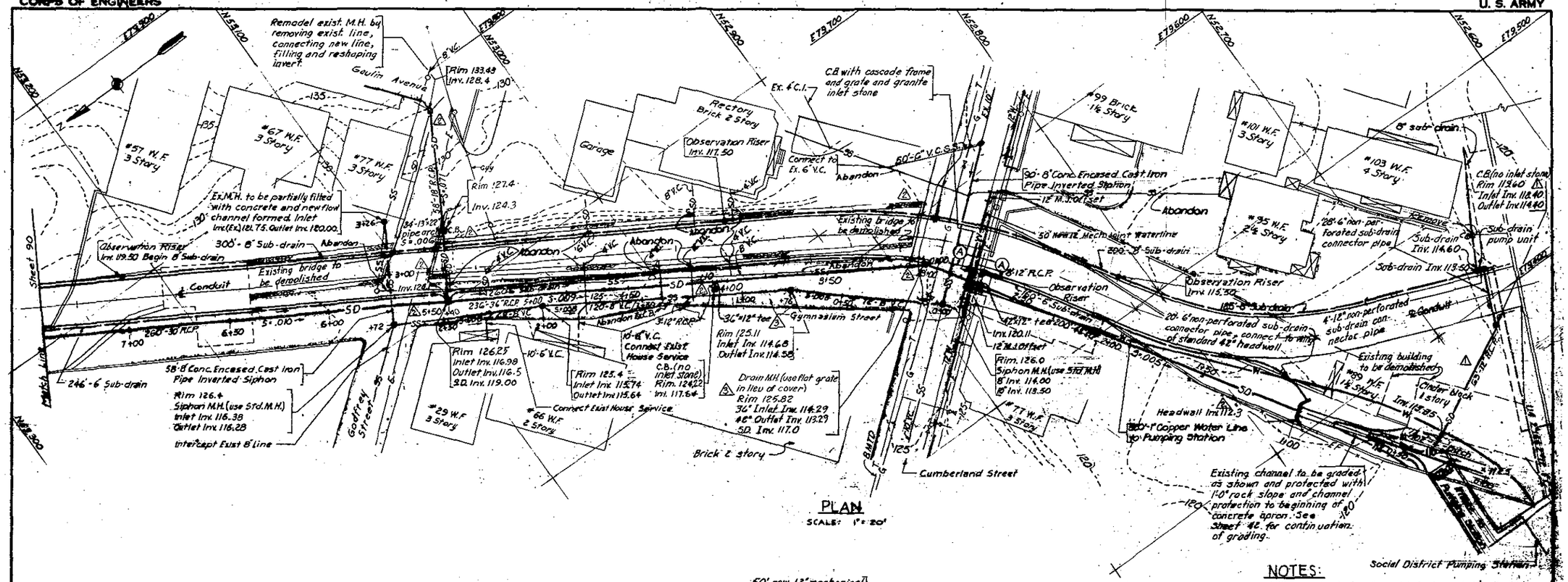
DRAWING NUMBER BE-1312

SHEET 90

O & M PLATE NO. E-77

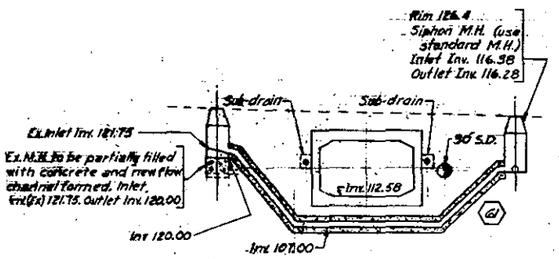
CORPS OF ENGINEERS

U. S. ARMY



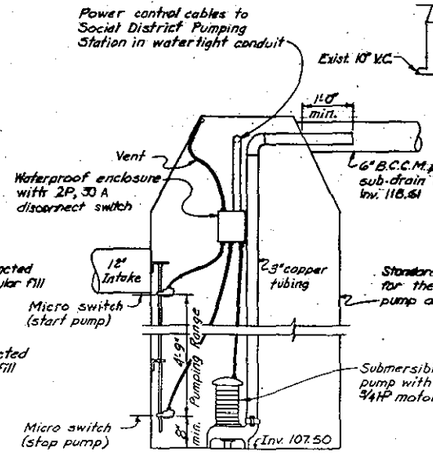
PLAN

SCALE: 1" = 20'



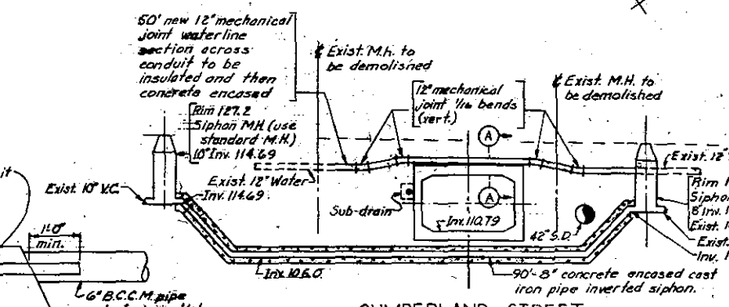
GODFREY STREET SANITARY SEWER CROSSING

SCALE: 1" = 10'



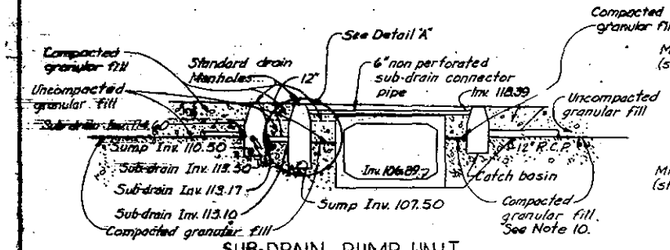
DETAIL "A"

NOT TO SCALE



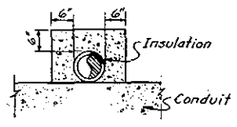
CUMBERLAND STREET SANITARY SEWER AND WATER CROSSING

SCALE: 1" = 10'



SUB-DRAIN PUMP UNIT. PETERS RIVER CONDUIT

SCALE: 1" = 10'



SECTION A-A

NOT TO SCALE

GRAPHIC SCALES

1" = 20' 20' 0 20' 40'

1" = 10' 10' 0 10' 20'

NOTES:

1. Where sub-drain pipes begin in a storm drain manhole suitable clay plugs will be installed to provide future access to the line for flushing or cleaning purposes.
2. All R.C.P. to be class III except as noted.
3. See Sheet 4E for grading plan.
4. All existing pipes to the Peters River to be plugged unless noted otherwise.
5. Existing Sanitary Sewer in Gymnasium Street to be abandoned during construction of conduit. New lines to be constructed when conduit is complete.
6. Rims of all new manholes to be set flush with finished grade.
7. Existing gas line in Cumberland Street to be relocated by others over Peters River Conduit.
8. Existing telephone duct lines in Cumberland Street to be relocated by others over Peters River Conduit.
9. Existing electric line in Cumberland Street to be relocated by others.
10. Compacted granular fill to extend up to the invert of and 4' either side of the line from the sub-drain pump unit outlet catch basin to the pumping station wall. See Note 4 on Sheet 20.

REVISION	DATE	DESCRIPTION	BY
		Final Field corrections	
4	4-14-64	Catch basin and line revised.	
3	9-6-63	Storm drain layout revised. (Am. #5)	
2	8-7-63	Storm drains, sewer size & rim elevation revised. Note deleted. (Am. #1).	

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U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

SAFETY PAYS

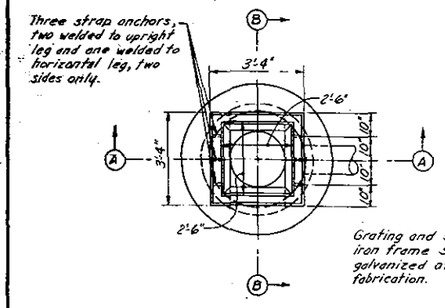
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
PETERS RIVER
DRAINAGE AND UTILITIES
PLAN AND DETAILS NO. 2

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

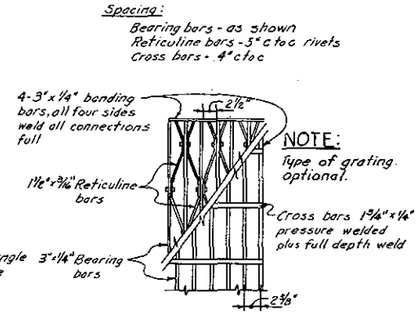
APPROVED DATE JUNE

BE-1312

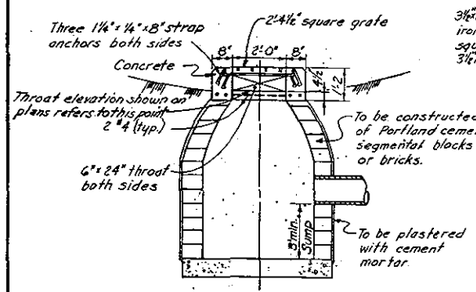
O & M PLATE NO. E-78



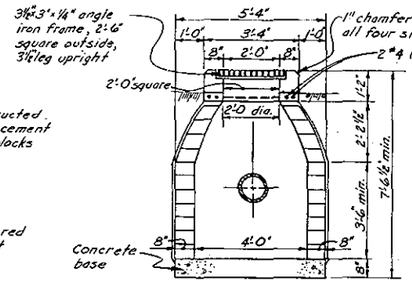
PLAN (GRATE REMOVED)
SCALE: 1/2"=1'-0"



TYPES OF GRATING
NOT TO SCALE

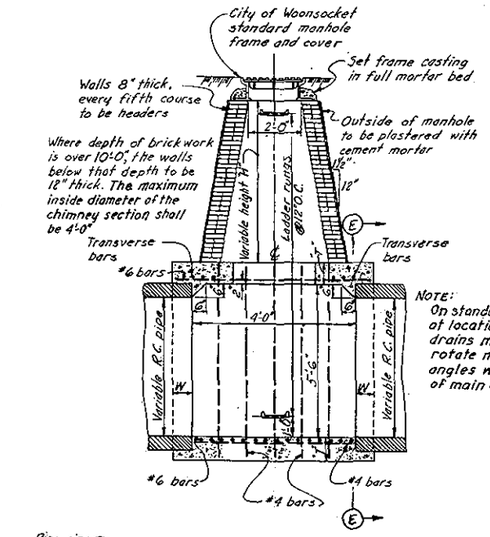


SECTION A-A
SCALE: 1/2"=1'-0"



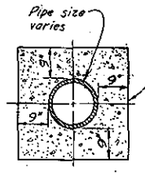
SECTION B-B
SCALE: 1/2"=1'-0"

SPECIAL CATCH BASIN
(39A)



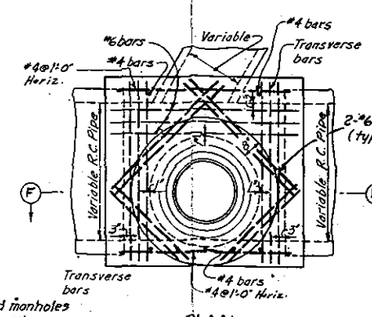
Note:
On standard manholes at locations where drains meet at an angle, rotate manhole to make angles with center line of main drains equal.

SECTION F-F
SCALE: 1/2"=1'-0"

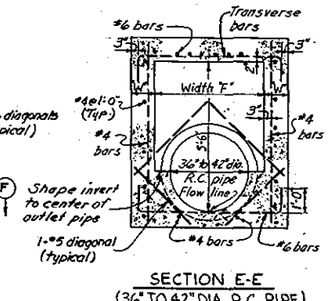


This encasement to be used except as noted otherwise on the plans.

TYPICAL CONCRETE ENCASEMENT OF PIPES
NOT TO SCALE



PLAN
SCALE: 1/2"=1'-0"



SECTION E-E
(36" TO 42" DIA. R.C. PIPE)
SCALE: 1/2"=1'-0"

*Note:
The "F" dimension for the manholes at the following locations is modified as indicated.

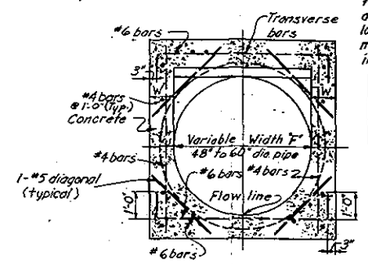
Size of Pipe	Width "F"*	Height "H" 8'-15.9 T	W	16'-23.9 T	W	24' & up T	W
36"	4'-6"	8"	10"	8"	12"	9"	12"
42"	4'-6"	8"	10"	8"	12"	9"	12"
48"	4'-6"	8"	10"	8"	12"	9"	12"
54"	5'-0"	8"	10"	8"	12"	10"	12"
60"	5'-6"	8"	10"	9"	12"	11"	12"

*Except as noted

Location	Width "F"
30'± Rt. Sta. 27+00± on Mill River Conduit	6'-6"
92'± Rt. Sta. 30+75± on Mill River Conduit	7'-6"
2'± Lt. Sta. 62+74± on Mill Supply Line	6'-0"
20'± Lt. Sta. 22+18± on Blackstone River Floodwall	7'-6"

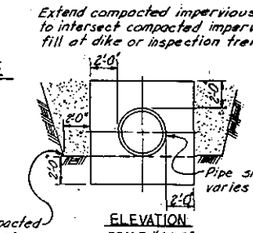
Size, Number and Spacing of Bars

T	Top Slab Trans. bars	Top Slab Long. bars	Bottom Slab Trans. #6 bars	Bottom Slab Long. #6 bars	Sidewalls Vert. & Hor. #4 bars
8"	6-#7	3-#6	6 1/2" O.C.	12" O.C.	12" O.C.
9"	6-#7	5-#6	5 1/2" O.C.	Do.	Do.
10"	6-#8	3-#6	5" O.C.	Do.	Do.
11"	6-#8	3-#6	4 1/2" O.C.	Do.	Do.

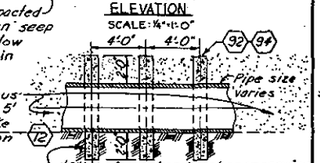


SECTION E-E
(48" TO 60" DIA. R.C. PIPE)
SCALE: 1/2"=1'-0"

Extend compacted impervious fill to intersect compacted impervious fill at dike or inspection trench.



ELEVATION
SCALE: 1/4"=1'-0"



SECTION
SCALE: 1/4"=1'-0"

SEEP RINGS

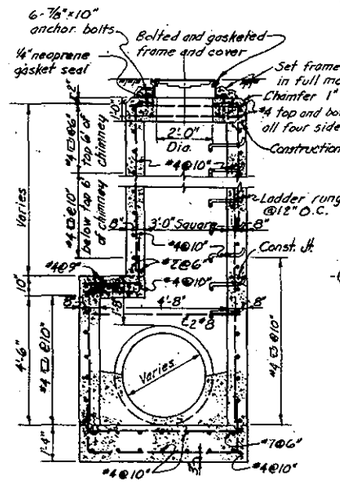
Lower limit of compacted impervious fill when seep ring is located below inspection trench in original ground.

Compacted impervious fill to extend to 5' beyond base of dike for new installation

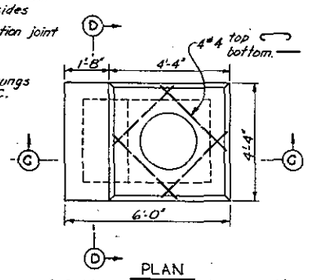
Seep rings to be cast in slot with undisturbed earth between rings when placed in original ground.

Compacted impervious fill to extend along pipe for 5 feet outside of seep rings where seep rings are placed on existing pipes.

⚠ STANDARD MANHOLE FOR 36" TO 60" DIA. R.C. PIPE
(40) (41) (42) (43) (44)



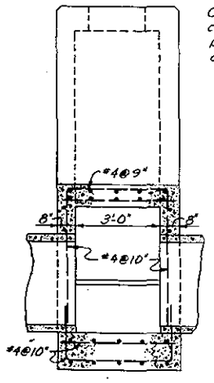
SECTION C-C
SCALE: 1/2"=1'-0"



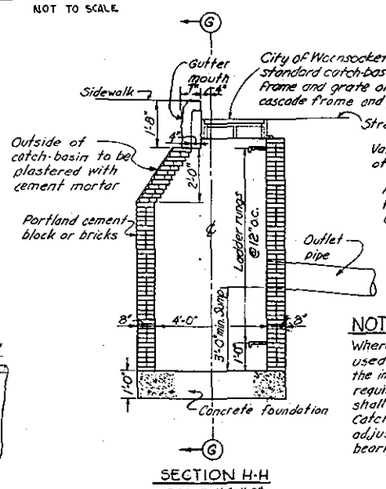
PLAN
(FRAME AND GRATE REMOVED)
SCALE: 1/2"=1'-0"

NOTES:
1. All pipe openings to have 4 #7 diagonal bars e.f.
2. Minimum steel cover to be 3".
3. Invert of manhole to be shaped to provide smooth flow line.
4. Frame to be bolted to M.H. top with six bolts and sealed with a 1/4" gasket seal
5. Max. distance between const. Jts. 10'-0"±

PRESSURE MANHOLE
(38)

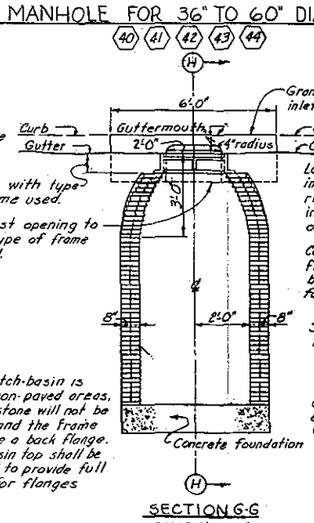


SECTION D-D
SCALE: 1/2"=1'-0"



SECTION H-H
SCALE: 1/2"=1'-0"

NOTE:
Where catch-basin is used in non-paved areas, the inlet stone will not be required and the frame shall have a back flange. Catch-basin top shall be adjusted to provide full bearing for flanges



SECTION G-G
SCALE: 1/2"=1'-0"

STANDARD CATCH-BASIN
(36) (39)

NOTE
Main reinforcement minimum cover 2 1/2"

GRAPHIC SCALES
1/4"=1'-0" 4' 0 4' 8'
1/2"=1'-0" 1' 0 1' 2' 3' 4' 5'

REVISION	DATE	DESCRIPTION	BY
2	4-14-64	Standard manhole detail revised	
1	11-27-63	Title of "Detail" revised. (Am. #3)	

CHARLES A. MAGUIRE & ASSOCIATES
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ARCHITECT-ENGINEER

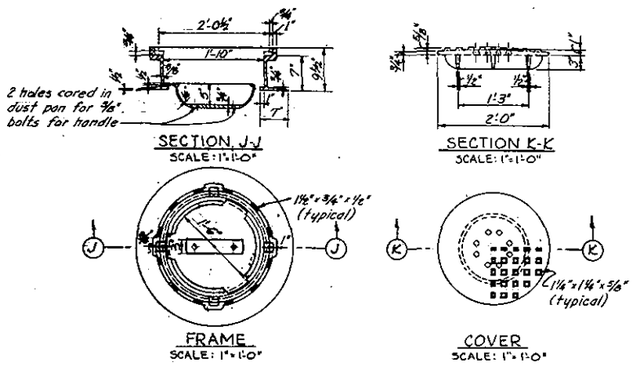
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY R.E.P. CK. BY
SUBMITTED: CHIEF, ENGINEERING DIVISION
PROJECT ENGINEER
APPROVED: CHIEF, DESIGN BRANCH

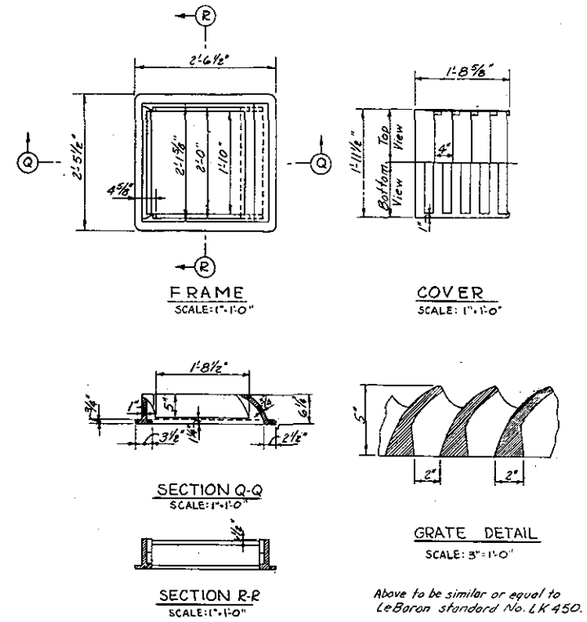
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
UTILITY DETAILS NO. 1
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
APPROVED: CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-098-64-2
DRAWING NUMBER BE-1312
SHEET 98

SAFETY PAYS

O & M PLATE NO. E-79

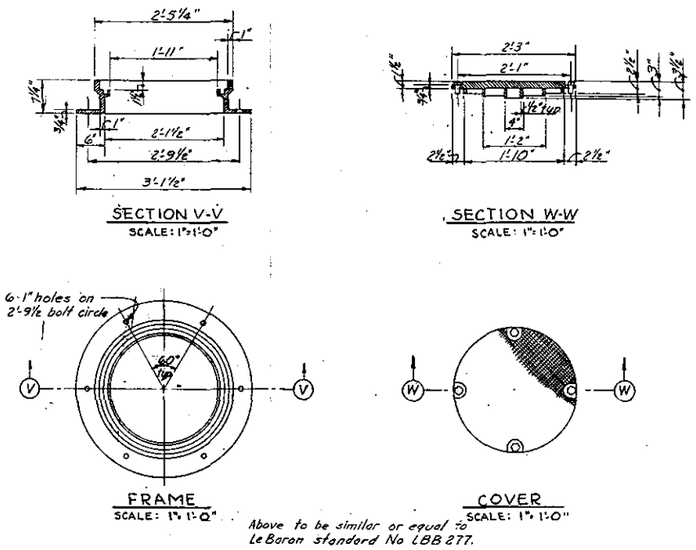


CITY OF WOONSOCKET STANDARD DRAIN AND SEWER MANHOLE FRAME AND COVER



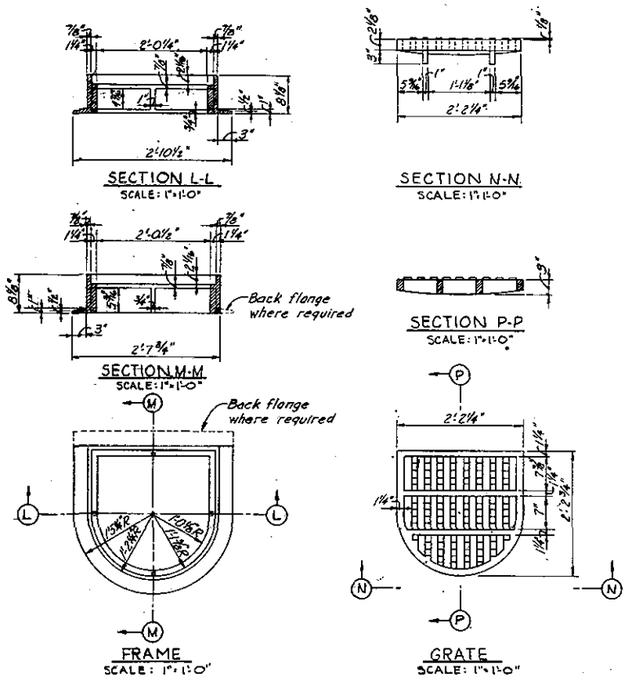
CASCADE FRAME AND GRATE

(39)



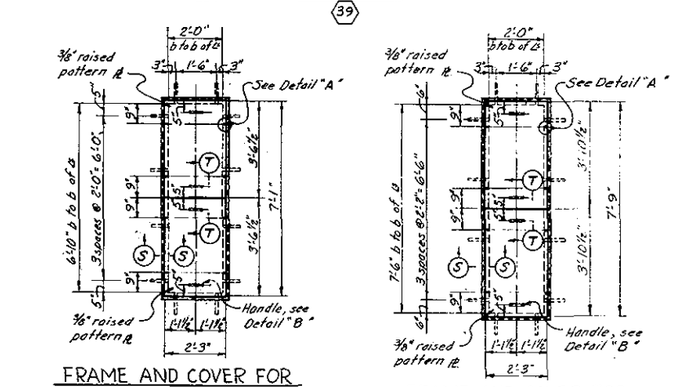
PRESSURE MANHOLE FRAME AND COVER

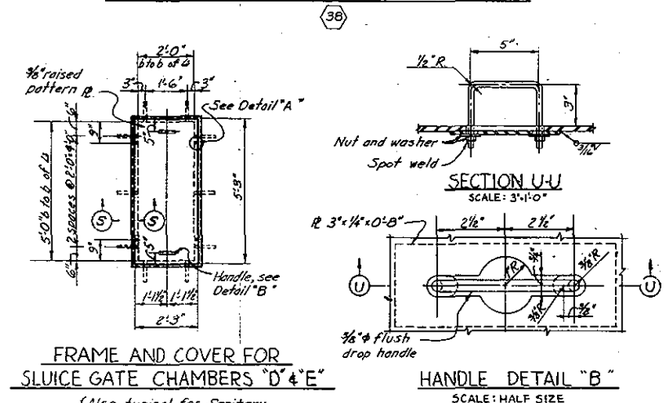
(38)

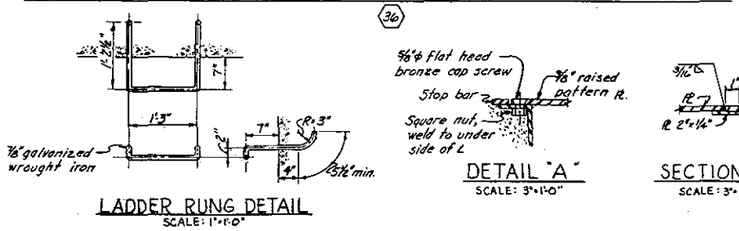


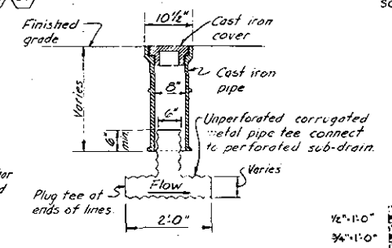
CITY OF WOONSOCKET STANDARD CATCH-BASIN FRAME AND GRATE

(36)









GRAPHIC SCALES

½"=1'-0"
¾"=1'-0"
1"=1'-0"
3"=1'-0"
HALF SIZE

REVISION	DATE	DESCRIPTION	BY

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY P.E.K. DR. BY R.E.F. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION

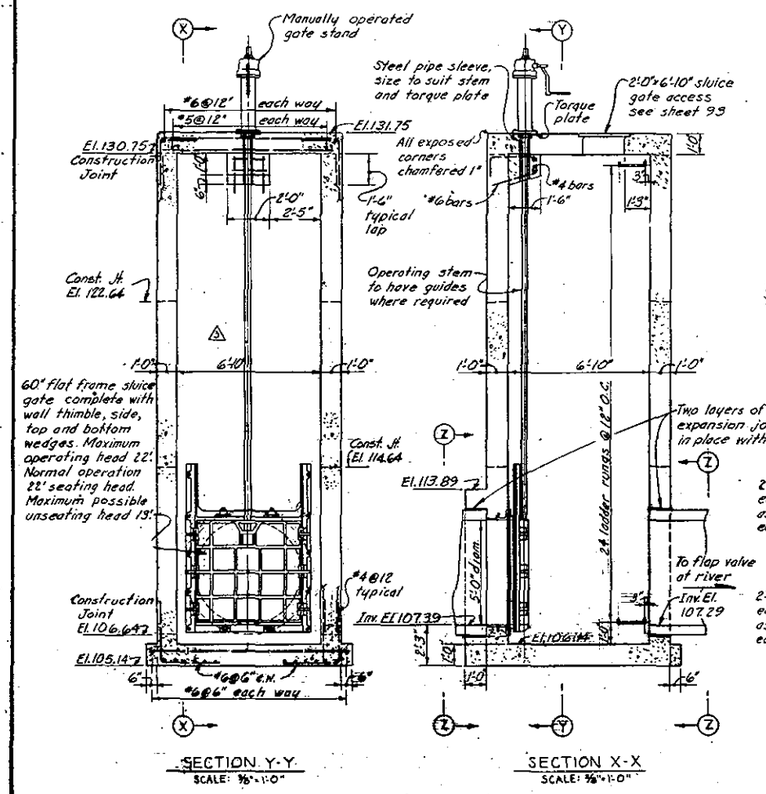
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
UTILITY DETAILS NO. 2

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

DATE JUNE, 1963

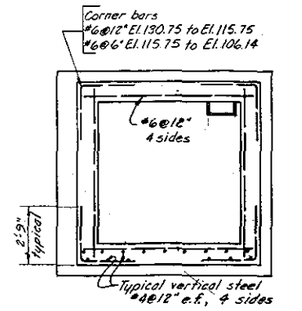
SCALE AS SHOWN
SPEC. NO. CIV. ENG-19-080-65-2
DRAWING NUMBER
BE-1312
SHEET 95

O & M PLATE NO. E-80

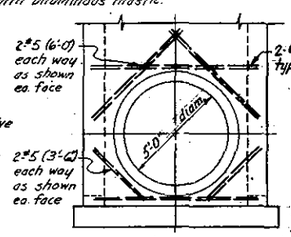


(HAMLET) SLUICE GATE CHAMBER "A"

49



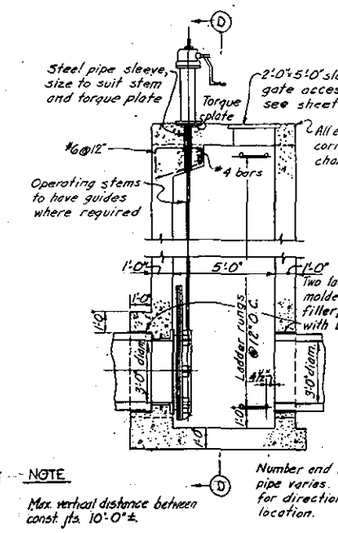
PLAN OF WALL REINFORCING
SCALE: 3/8"=1'-0"



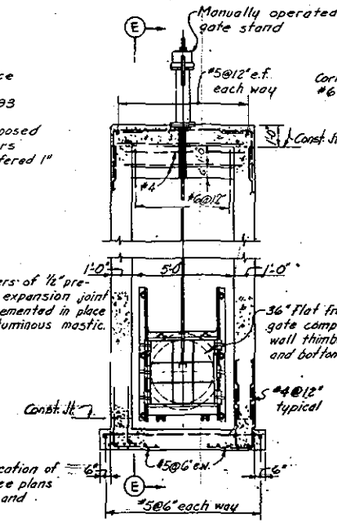
ELEVATION Z-Z
SCALE: 3/8"=1'-0"

Sheet 84
Sheet 85
~~Sheet 87~~
Sheet 79

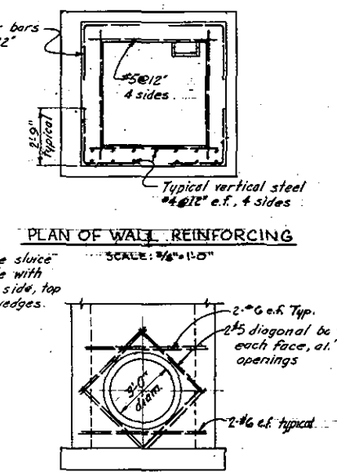
NOTE
Max. vertical distance between const. jts. 10'-0"±.



SECTION E-E
SCALE: 3/8"=1'-0"



SECTION D-D
SCALE: 3/8"=1'-0"



PLAN OF WALL REINFORCING
SCALE: 3/8"=1'-0"

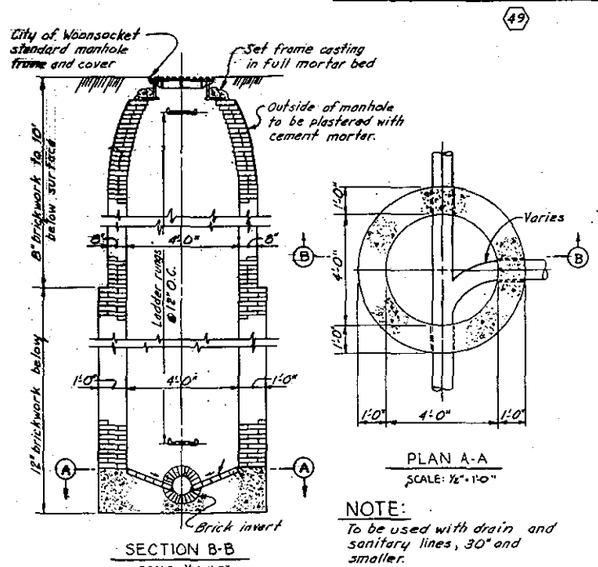
TYPICAL WALL OPENING
SCALE 3/8"=1'-0"

STRUCTURE	TOP EL.	INLET INV. EL.	OUTLET INV. EL.	BOTTOM EL.	LOCATION OF SLUICE GATE	BYPASS OUTLET INV. EL.	LOCATION	MAX. OPER. HEAD	NORMAL OPER. HEAD	MAX. UNSEATING HEAD
Sluice Gate Chamber "D"	129.70	114.58	114.48	113.48	Inlet Pipe	None	Davison Ave. Drain	19'	Seating 15'	19'
Sluice Gate Chamber "E"	144.25	133.30	133.20	132.20	Inlet Pipe	None	E. School St. Drain	14'	Seating 11'	14'
~~Sanitary Bypass "A"~~	~~130.80~~	~~107.0±~~	~~107.0±~~	~~106.00~~	~~Outlet Pipe~~	~~113.00~~	~~S. Hamlet Ave. Bridge~~	~~22'~~	~~Unseating 22'~~	~~22'~~
Sanitary Bypass "B"	133.80	109.34	109.34	108.34	Outlet Pipe	None	W. Kendrick Ave. Footbridge	23'	Seating 23'	5'

STRUCTURE FOR 36" SLUICE GATES

51A 51B 58

Note:
Sanitary Bypass "A" (Item 57) shall be similar to (Hamlet) Sluice Gate Chamber "A" except as follows: Pipe and Gate size 48", Top El. 130.80, Inlet Inv. El. 107.0±, Outlet Inv. El. 106.9, Bottom El. 106.65, Location of Sluice Gate - Outlet Pipe, Max. Operating Head 22', Normal Operating Head-Unseating 22', Max. Unseating Head 22'.



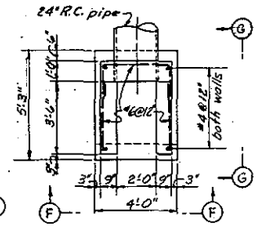
SECTION B-B
SCALE: ½"=1'-0"

PLAN A-A
SCALE: ½"=1'-0"

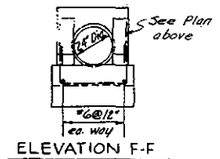
NOTE:
To be used with drain and sanitary lines, 30" and smaller.

STANDARD MANHOLE
SANITARY AND DRAIN

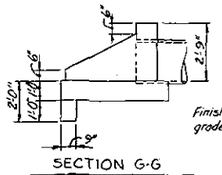
56 37



PLAN
SCALE: 3/8"=1'-0"



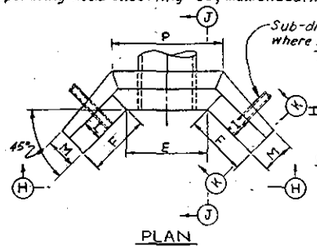
ELEVATION F-F
SCALE: 3/8"=1'-0"



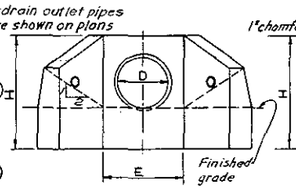
SECTION G-G
SCALE: 3/8"=1'-0"

"U" TYPE HEADWALL

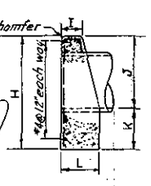
89 94 5



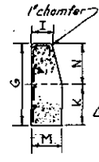
PLAN



ELEVATION H-H



SECTION J-J

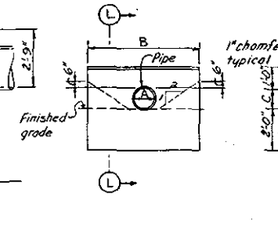


SECTION K-K

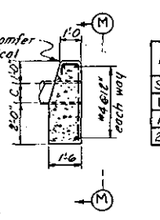
D	E	G	H	I	J	K	L	M	N	P	F	cu. yds	lbs.
36"	4'-6"	4'-3"	6'-0"	1'-0"	4'-0"	2'-0"	1'-8"	1'-6"	2'-3"	5'-11"	5'-0"	4.15	62
42"	5'-0"	4'-6"	6'-6"	1'-0"	4'-6"	2'-0"	1'-10"	1'-6"	2'-6"	6'-4"	5'-9"	5.25	68
60"	6'-6"	5'-3"	8'-0"	1'-0"	6'-0"	2'-0"	2'-4"	1'-6"	3'-9"	8'-9"	8'-0"	9.57	110
△1 54"	6'-0"	5'-0"	7'-6"	1'-0"	5'-6"	2'-0"	2'-2"	1'-6"	3'-0"	7'-10"	7'-3"	7.88	88

STANDARD WING TYPE HEADWALL
NOT TO SCALE
89 94 95

NOTE:
1. Headwalls with flap gates (including cement concrete and reinforcing steel) included in △1 items 52 53
2. Main reinforcement min. cover 2½".



ELEVATION M-M



SECTION L-L

A	C	B	cu. yds	lbs.
SD	Drain	5'-10"	1.06	19
12"	12"	7'-6"	1.49	26
15"	15"	8'-9"	1.82	29
24	24	12'-6"	2.95	46

GRAPHIC SCALES
3/8"=1'-0"
½"=1'-0"

STANDARD HEADWALL
NOT TO SCALE
89 94 95

REVISION	DATE	DESCRIPTION	BY
△3	11-27-62	Epoxy coating deleted. (Am. #5)	
△2	11-27-62	Sanitary bypass "A" revised (Am. #3.)	
△1	11-27-62	Headwall added, bypass outlet & pay item deleted (Am. #1)	

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ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY R.E.F. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
CHIEF, DESIGN BRANCH

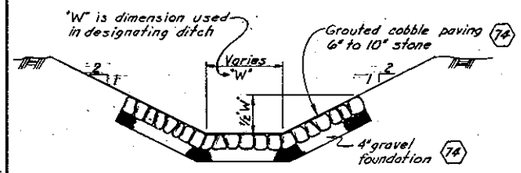
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
UTILITY DETAILS NO. 3

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

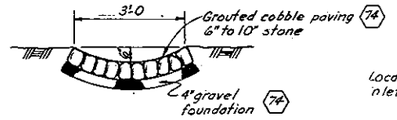
APPROVED
CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963

SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-016-64-2
DRAWING NUMBER
BE-1312
SHEET 94

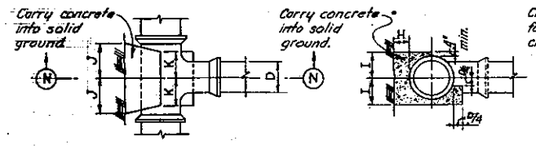
O & M PLATE NO. E-81



GROUTED COBBLE PAVED DITCH
NOT TO SCALE

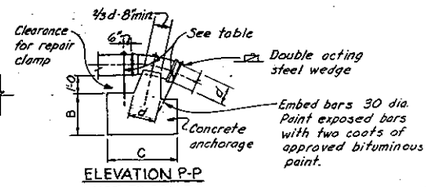


GROUTED COBBLE PAVED WATERWAY
NOT TO SCALE



PLAN
NOT TO SCALE

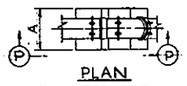
SECTION N-N
NOT TO SCALE



ELEVATION P-P
NOT TO SCALE

	SIZE OF BRANCH					
D	6"	8"	10"	12"	16"	18"
H	8"	9"	10"	1'-0"	1'-2"	1'-4"
I	8"	10"	1'-0"	1'-3"	1'-8"	2'-1"
J	6"	8"	1'-0"	1'-0"	1'-4"	1'-8"
K	6"	8"	8"	8"	10"	1'-2"

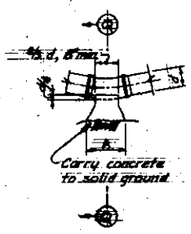
THRUST BLOCK FOR TEES



PLAN
NOT TO SCALE

BEND		PIPE SIZE d					
		6"	8"	10"	12"	16"	18"
1/16	A	2'-0"	3'-4"	3'-8"	4'-0"	4'-4"	4'-8"
	B	1'-9"	2'-3"	2'-6"	2'-6"	2'-6"	2'-8"
	C	2'-6"	2'-8"	3'-10"	4'-0"	5'-6"	7'-6"
	REINF.	3#6	3#6	3#6	3#6	3#6	3#6
1/8	A	2'-6"	3'-0"	4'-0"	4'-6"	5'-2"	5'-6"
	B	2'-6"	2'-9"	3'-0"	3'-6"	4'-0"	4'-6"
	C	3'-0"	4'-0"	4'-6"	4'-9"	6'-6"	8'-0"
	REINF.	3#6	3#6	3#6	3#6	3#6	4#6

ANCHORAGE FOR VERTICAL BENDS

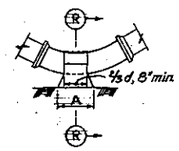


ELEVATION
NOT TO SCALE

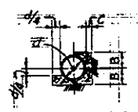
SECTION Q-Q
NOT TO SCALE

BEND		PIPE SIZE d					
		6"	8"	10"	12"	16"	18"
1/16	A	9"	1'-0"	1'-6"	1'-9"	2'-3"	3'-0"
	B	7"	7"	8"	10"	1'-0"	1'-2"
	C	7"	7"	8"	8"	9"	10"
1/8	A	1'-3"	1'-8"	2'-1"	2'-6"	3'-4"	4'-2"
	B	7"	8"	9"	11"	1'-3"	1'-6"
	C	7"	8"	10"	11"	1'-3"	1'-6"

THRUST BLOCK FOR VERTICAL BENDS



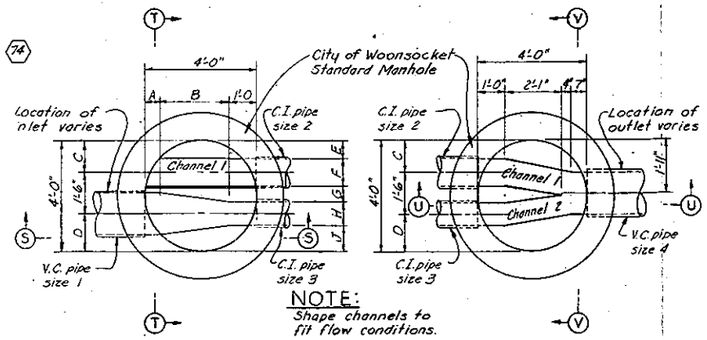
PLAN
NOT TO SCALE



SECTION R-R
NOT TO SCALE

BEND		PIPE SIZE d					
		6"	8"	10"	12"	16"	18"
1/16	A	9"	1'-0"	1'-6"	1'-9"	2'-3"	3'-0"
	B	7"	8"	9"	10"	1'-0"	1'-2"
	C	8"	9"	10"	11"	1'-2"	1'-4"
1/8	A	3"	8"	2'-1"	2'-6"	3'-4"	4'-2"
	B	7"	8"	9"	11"	1'-3"	1'-6"
	C	8"	9"	10"	11"	1'-2"	1'-4"

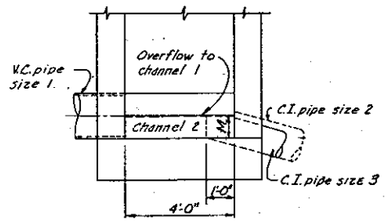
THRUST BLOCK FOR HORIZONTAL BENDS



NOTE:
Shape channels to fit flow conditions.

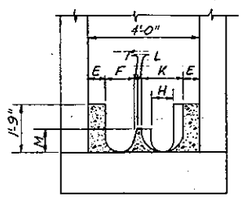
PLAN- INLET CHAMBER
SCALE: ½"=1'-0"

PLAN - OUTLET CHAMBER
SCALE: ½"=1'-0"

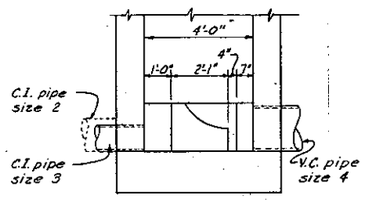


SECTION S-S
SCALE: ½"=1'-0"

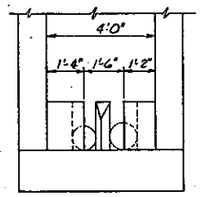
NOTE:
For complete dimensions, see charts below.



SECTION T-T
SCALE: ½"=1'-0"



SECTION U-U
SCALE: ½"=1'-0"

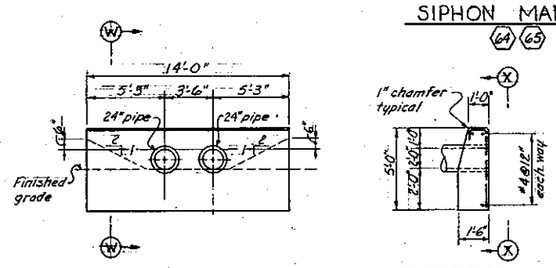


SECTION V-V
SCALE: ½"=1'-0"

SIPHON MANHOLES
(64) (65)

MANHOLE	CHANNEL 1	CHANNEL 2	V.C. PIPE SIZE 1	C.I. PIPE SIZE 2	C.I. PIPE SIZE 3	V.C. PIPE SIZE 4
Clinton St.	12"	10"	18"	12"	10"	18"
East School St.	10"	8"	8"	10"	8"	18"

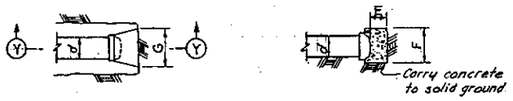
MANHOLE	A	B	C	D	E	F	G	H	J	K	L	M
Clinton St.	6½"	2'-5½"	1'-1½"	1'-4½"	7½"	1'-0"	7"	10"	11½"	1'-6"	2"	10"
East School St.	3½"	2'-8½"	1'-3½"	1'-2½"	10½"	10"	9"	8"	1'-2½"	8"	8"	8"



ELEVATION X-X
NOT TO SCALE

SECTION W-W
NOT TO SCALE

SPECIAL HEADWALL FOR TWO 24" PIPES

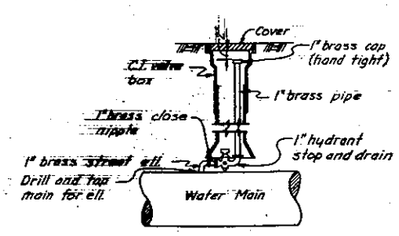


PLAN
NOT TO SCALE

SECTION Y-Y
NOT TO SCALE

	PIPE SIZE d					
	6"	8"	10"	12"	16"	18"
E	6"	8"	8"	10"	1'-0"	1'-4"
F	11"	1'-2"	1'-6"	1'-9"	2'-4"	2'-11"
G	1'-3"	1'-8"	2'-1"	2'-6"	3'-4"	4'-2"

THRUST BLOCK FOR CAPS



TYPICAL AIR RELEASE VALVE AND BOX
NOT TO SCALE
(86)

GRAPHIC SCALE
½"=1'-0"

REVISION	DATE	DESCRIPTION	BY

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.E.K. DR. BY R.E.P. CK. BY
SUBMITTED: ARCHITECT-ENGINEER
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

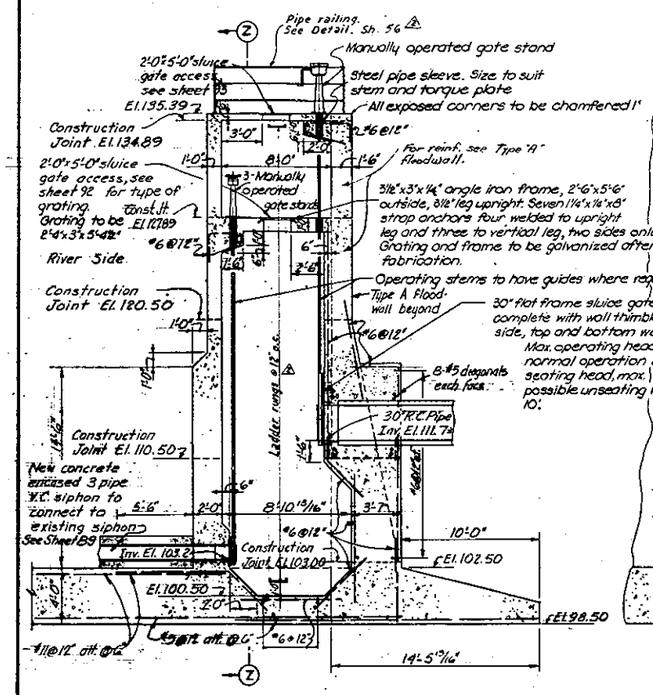
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
UTILITY DETAILS NO. 4

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

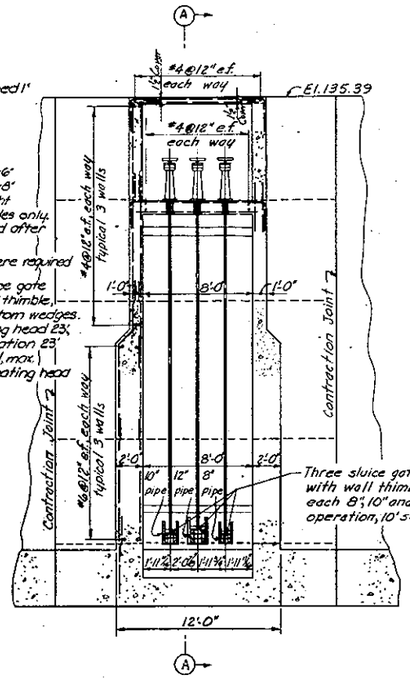
APPROVED: Chief, Engineering Division
DATE JUNE, 1963

SCALE AS SHOWN
SPEC. NO. CIV. ENG.-19-08-64-2
DRAWING NUMBER BE-1312
SHEET 98

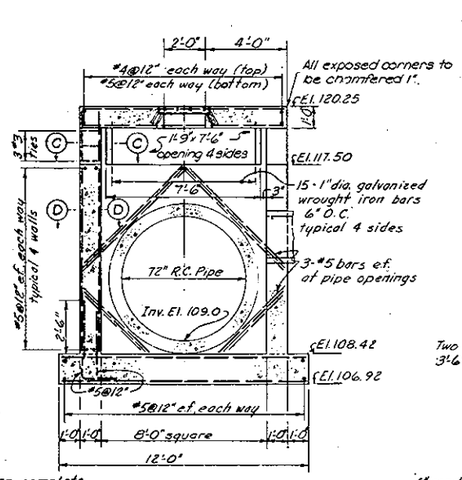
O & M PLATE NO. E-82



SECTION A-A
SCALE: ¼"=1'-0"

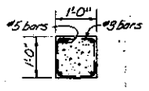


SECTION Z-Z
SCALE: ¼"=1'-0"

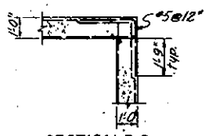


SECTION E-E
SCALE: ⅜"=1'-0"

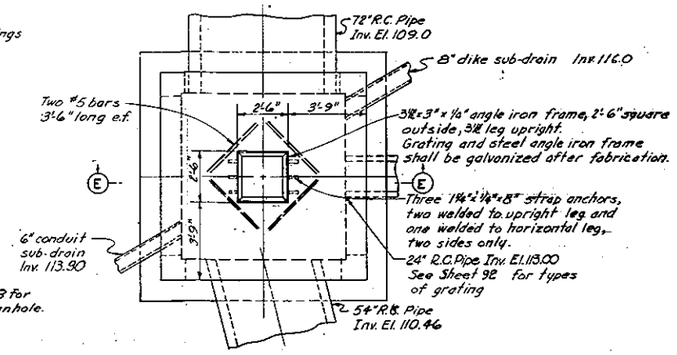
NOTE:
See Sheet 88 for location of Manhole.



SECTION C-C
SCALE: ¾"=1'-0"

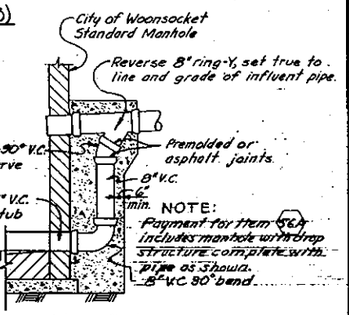


SECTION D-D
SCALE: ⅜"=1'-0"



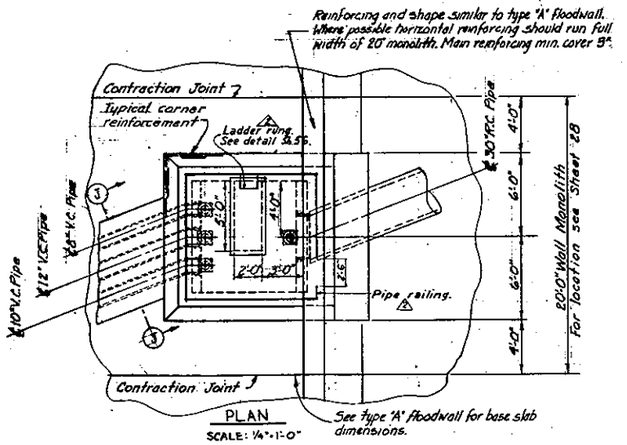
PLAN (GRATE REMOVED)
SCALE: ⅜"=1'-0"

SPECIAL MANHOLE NO. 2
(46)

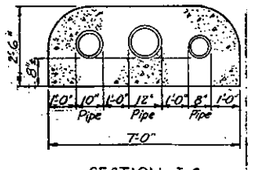


NOTE:
Payment for item 56A includes manhole with drop structure complete with pipe as shown.

DROP MANHOLE DETAIL
NOT TO SCALE
(56A)

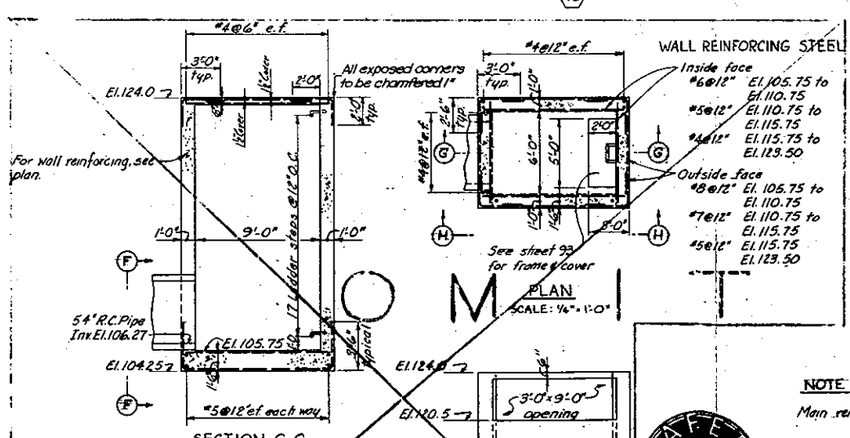


PLAN
SCALE: ¼"=1'-0"

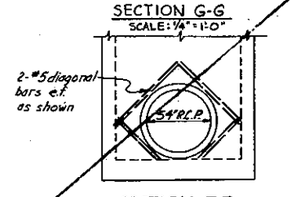


SECTION J-J
SCALE: ½"=1'-0"

NEW SIPHON CHAMBER - GIRARD AVENUE
(69)



SECTION G-G
SCALE: ¼"=1'-0"



SECTION F-F
SCALE: ¼"=1'-0"

SECTION H-H
SCALE: ¼"=1'-0"

NOTE:
See Sheet 86 for location of Manhole

SPECIAL MANHOLE NO. 4
(48)

NOTE
Main reinforcement min. cover 2½"

GRAPHIC SCALES
¼"=1'-0"
⅜"=1'-0"
½"=1'-0"
¾"=1'-0"

REVISION	DATE	DESCRIPTION	
4	4-14-64	Pipe railing and ladder rungs added	
3	11-27-63	Manhole deleted. (Am. #1)	

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CORPS OF ENGINEERS
WALTHAM, MASS.

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
UTILITY DETAILS NO. 5

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

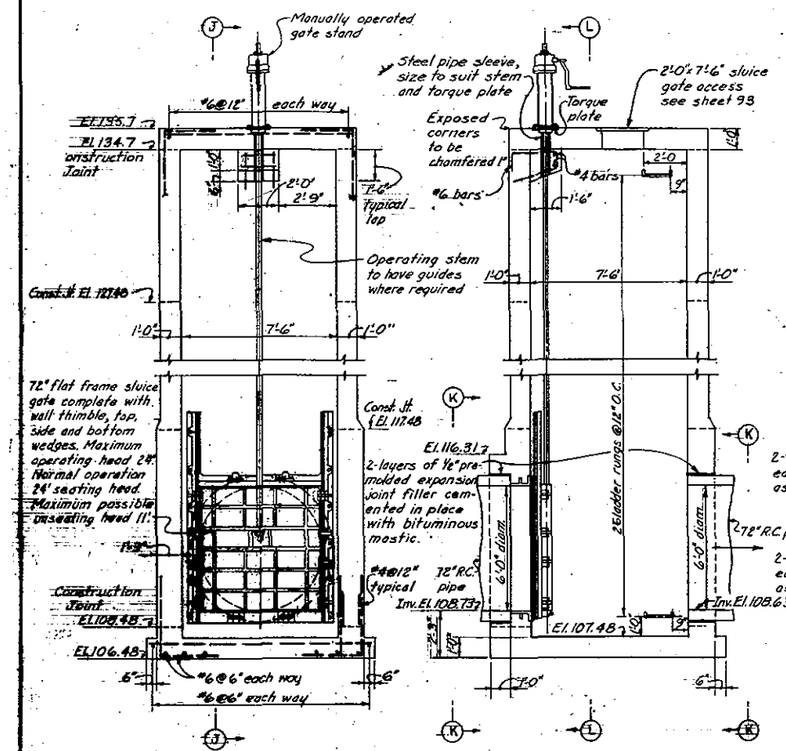
APPROVED: DATE JUNE 1964

SCALE AS SHOWN

DRAWING NUMBER
BE-1312

SHEET 96

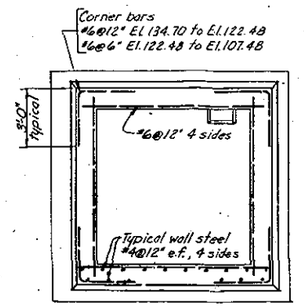
O & M PLATE NO. E-83



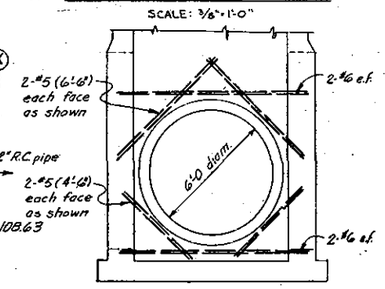
SECTION L-L
SCALE: 3/8"=1'-0"

SECTION J-J
SCALE: 3/8"=1'-0"

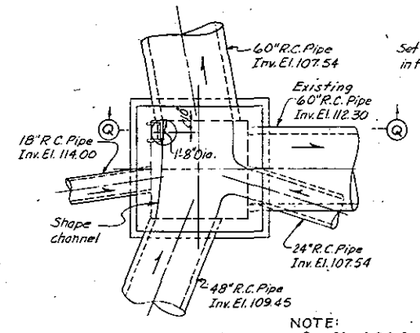
STUICE GATE CHAMBER "B" (50)



PLAN OF WALL REINFORCING
SCALE: 3/8"=1'-0"

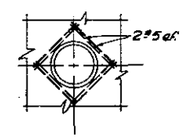


SECTION K-K
SCALE: 3/8"=1'-0"

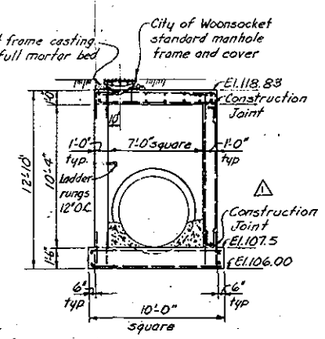


NOTE:
See Sheet B1 for location of Manhole

PLAN
SCALE: ¼"=1'-0"



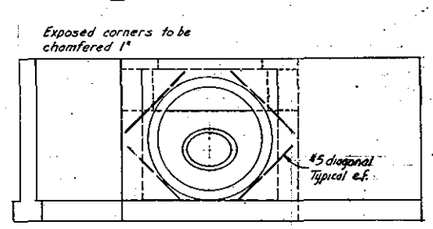
TYPICAL OPENING REINFORCING
NOT TO SCALE



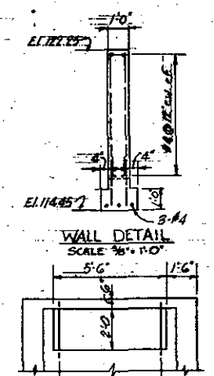
All reinforcement #4@12" e.f., each way

SECTION Q-Q
SCALE: ¼"=1'-0"

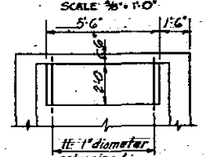
SPECIAL MANHOLE NO. 1 (45)



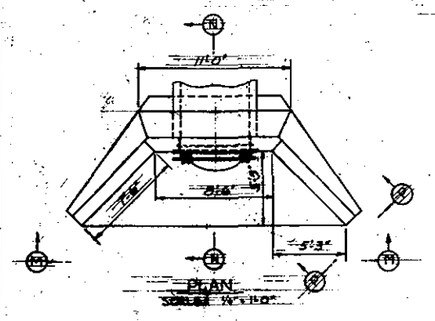
ELEVATION R-R
SCALE: 3/8"=1'-0"



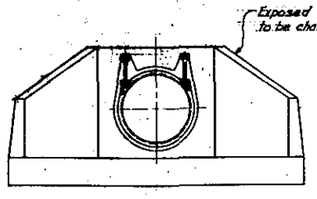
WALL DETAIL
SCALE: 3/8"=1'-0"



SECTION T-T
SCALE: 3/8"=1'-0"

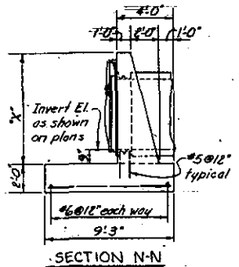


PLAN
SCALE: ¼"=1'-0"



ELEVATION M-M
SCALE: ¼"=1'-0"

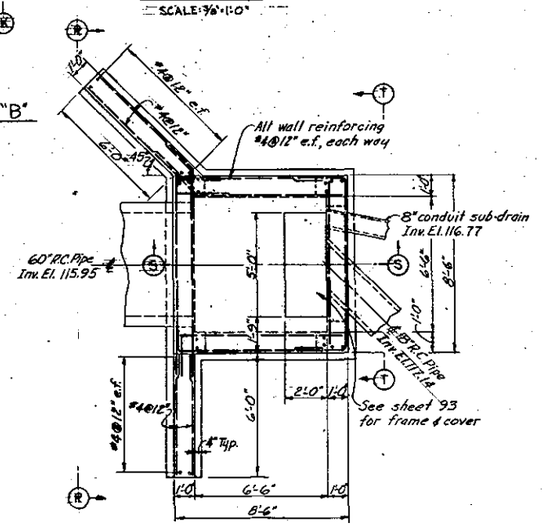
PIPE SIZE	"X"
60"	8'-0"
72"	9'-0"



SECTION N-N
SCALE: ¼"=1'-0"

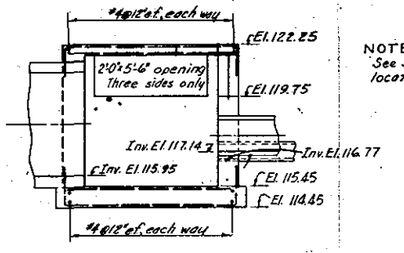
SECTION P-P
SCALE: ¼"=1'-0"

HEADWALL WITH FLAP GATE (52) (52A) (53)



PLAN
SCALE: 3/8"=1'-0"

NOTE
1. Main reinforcement min. cover 2½".



SECTION S-S
SCALE: 3/8"=1'-0"

NOTE:
See Sheet B8 for location of Manhole

SPECIAL MANHOLE NO. 3 (47)

GRAPHIC SCALES
¼"=1'-0"
3/8"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	11-27-63	Epoxy coating deleted (Am #5)	

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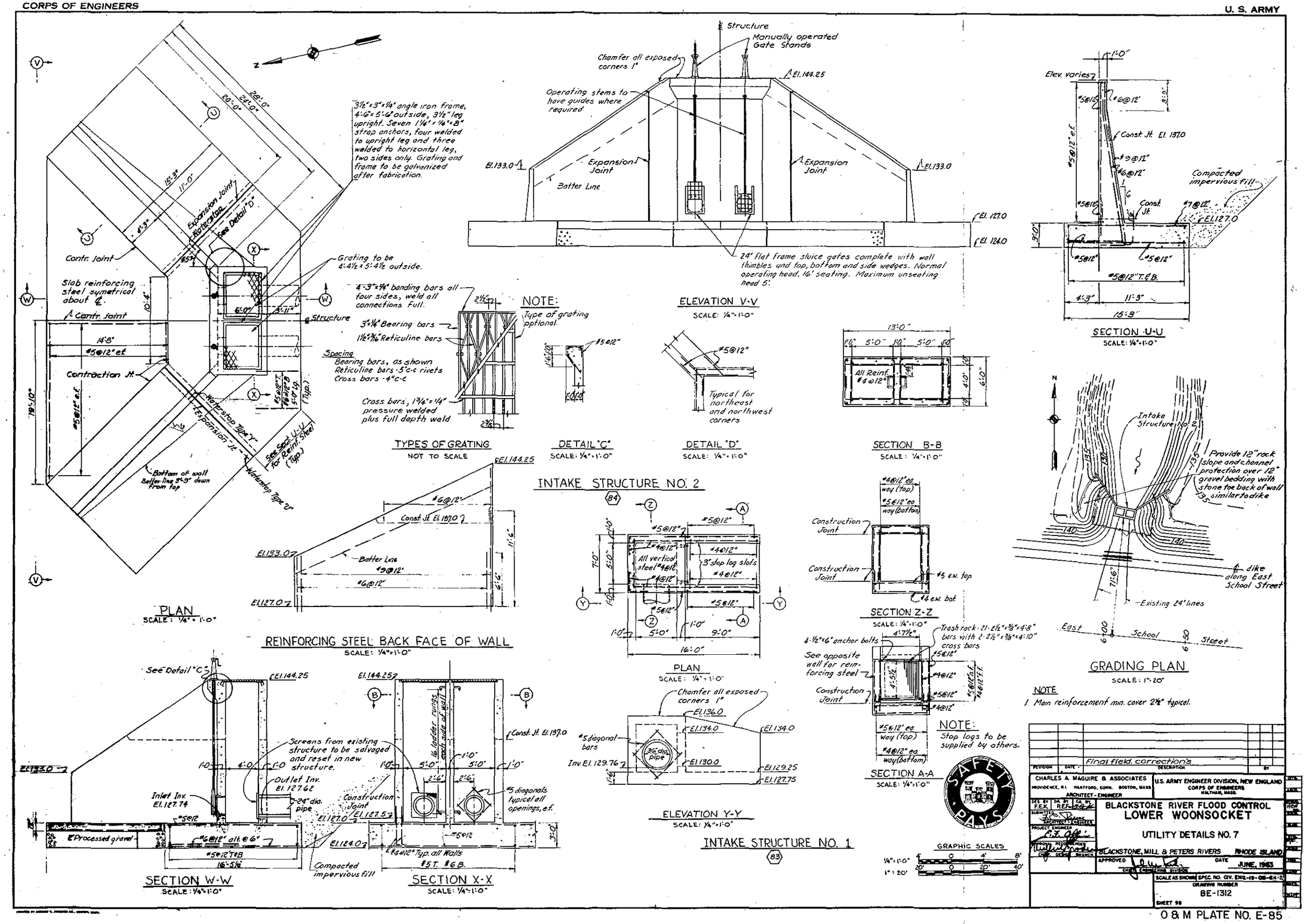
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY FEK | DR. BY R.E.F. | CK. BY

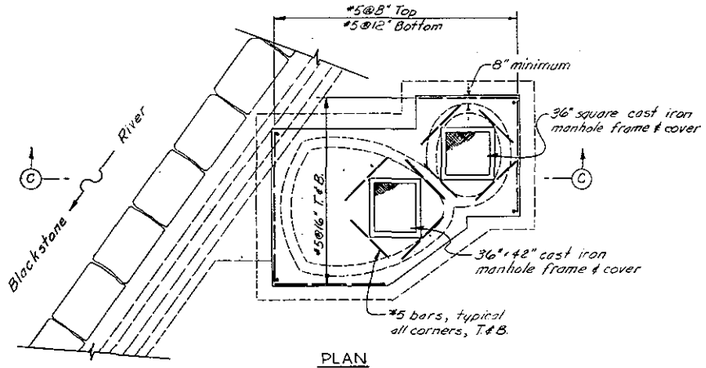
BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
UTILITY DETAILS NO. 6

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
DATE JUNE, 1963
APPROVED
SCALE AS SHOWN SPEC. NO. CIV. ENG.-19-08-64-2
DRAWING NUMBER BE-1312
SHEET 97

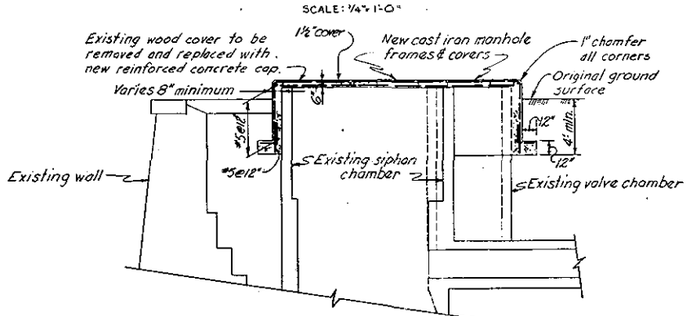
O & M PLATE NO. E-84



O & M PLATE NO. E-85

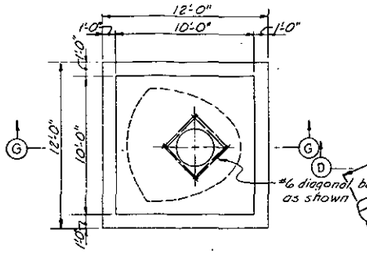


PLAN
SCALE: 1/4"=1'-0"

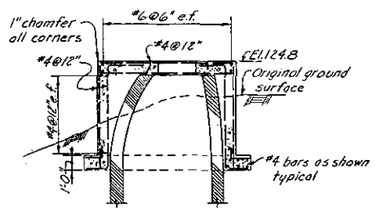


SECTION C-C
SCALE: 1/4"=1'-0"

SIPHON CHAMBER
VICINITY COURT STREET BRIDGE
(67)

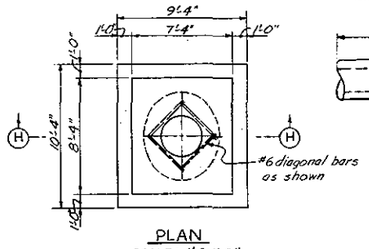


PLAN
SCALE: 1/4"=1'-0"

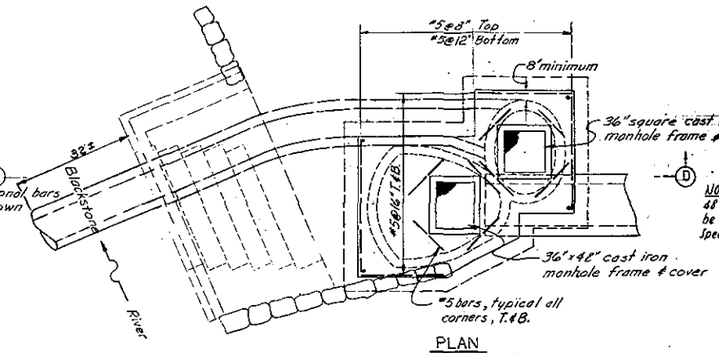


SECTION G-G
SCALE: 1/4"=1'-0"

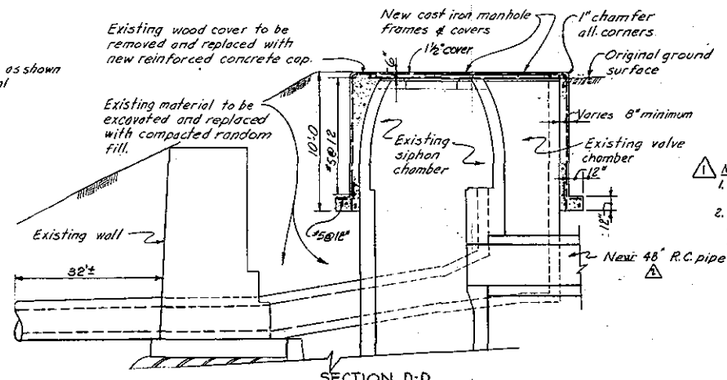
MANHOLE NO. 3



PLAN
SCALE: 1/4"=1'-0"

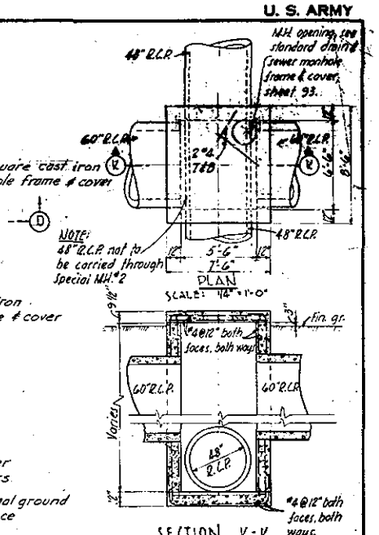


PLAN
SCALE: 1/4"=1'-0"



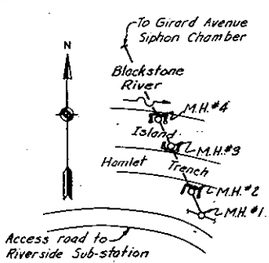
SECTION D-D
SCALE: 1/4"=1'-0"

HAMLET SIPHON CHAMBER
(66)

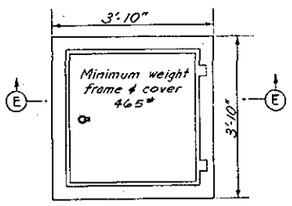


SPECIAL SANITARY MANHOLE NO. 1

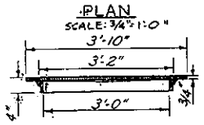
NOTES:
1. Special M.H. #2 similar except for piping arrangement, see Plan, sheet 01
2. Special M.H. #2 to have invert shaped with concrete fill similar to standard sanitary and drain manhole, sheet 94



VICINITY MAP
NOT TO SCALE

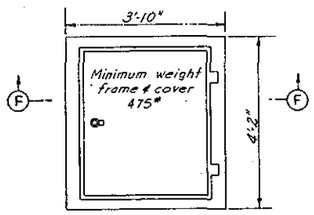


PLAN
SCALE: 3/4"=1'-0"

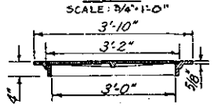


SECTION F-F
SCALE: 3/4"=1'-0"

SQUARE MANHOLE COVER

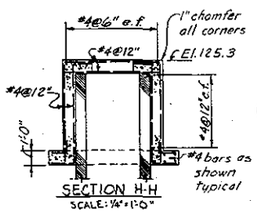


PLAN
SCALE: 3/4"=1'-0"



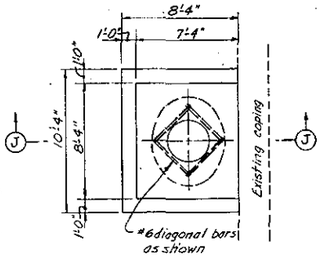
SECTION E-E
SCALE: 3/4"=1'-0"

RECTANGULAR MANHOLE COVER

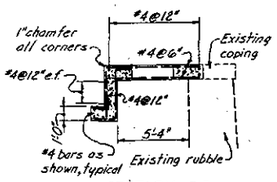


SECTION H-H
SCALE: 1/4"=1'-0"

MANHOLES NO. 1 & 2



PLAN
SCALE: 1/4"=1'-0"



SECTION J-J
SCALE: 1/4"=1'-0"

MANHOLE NO. 4

FLOODPROOFING - GIRARD AVENUE SIPHON MANHOLES
(68)

NOTES:
1. Manhole Covers to be complete with hasp for locking
2. Manhole Covers to have streamlined type lift handle and hinges with ½" diameter bronze hinge pins.
3. One square and one rectangular manhole cover to be used in the siphon chamber near Court Street Bridge and the Hamlet Siphon Chamber.
4. Main reinforcement minimum cover 2½".

GRAPHIC SCALES
1/4"=1'-0"
3/4"=1'-0"

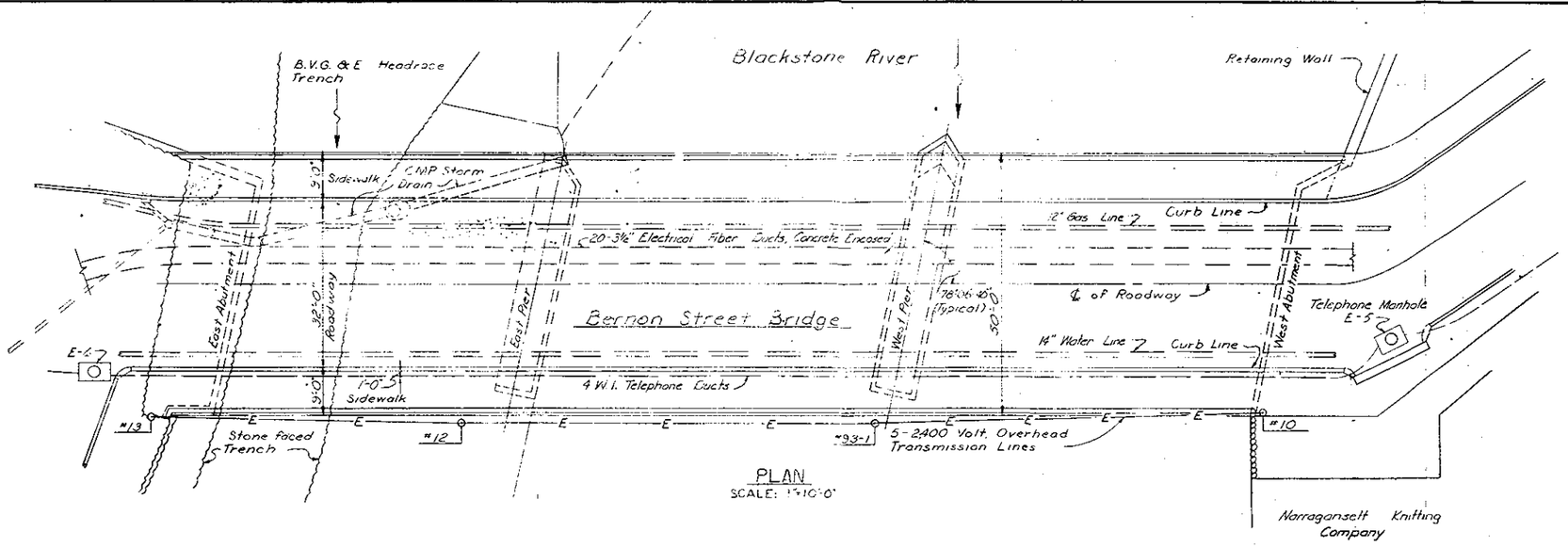
REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
2	11-27-63	Pipe size revised. (Am. #5)	
1	8-14-63	Detail and notes added. (Am. #3)	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

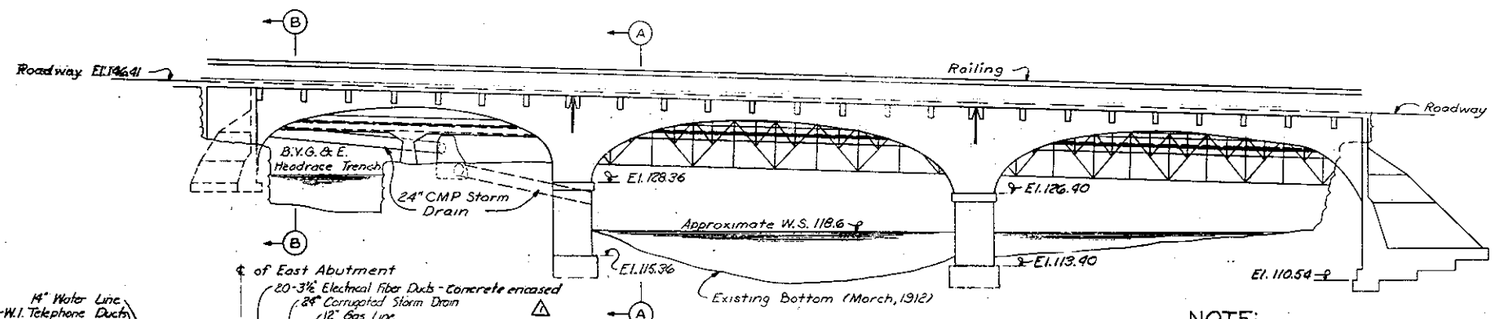
DES. BY F.E.K. DR. BY R.E.E. CK. BY
SUBMITTED
ARCHITECT-ENGINEER
PROJECT ENGINEER
RECOMMENDED
CHIEF, DESIGN BRANCH

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
UTILITY DETAILS NO. 8
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
APPROVED
CHIEF, ENGINEERING DIVISION
DATE JUNE, 1963
SCALE AS SHOWN
SPEC. NO. CIV. ENG.-19-018-64-2
DRAWING NUMBER BE-1312
SHEET 99

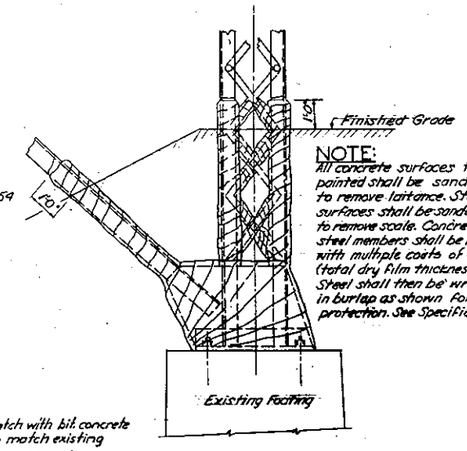


PLAN
SCALE: 1"=10'-0"

NOTE:
1. Plan, Elevation and Section AA and BB have been reproduced from reference drawings for information only and do not represent any required new construction. Existing conditions shall be verified by the Contractor in the Field.
2. Reference Drawings
City of Woonsocket Highway Dept. Drawing No.: Index No. 327
Blackstone Gas and Electric Drawing Nos.:
H-1996
F-1895

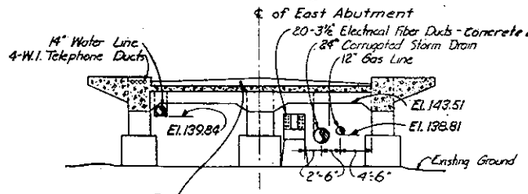


ELEVATION
SCALE: 1"=10'-0"



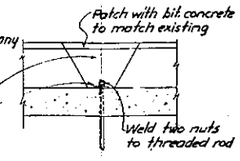
NOTE:
All concrete surfaces to be painted shall be sandblasted to remove laitance. Steel surfaces shall be sandblasted to remove scale. Concrete and steel members shall be protected with multiple coats of epoxy (total dry film thickness 8.0 mils). Steel shall then be wrapped in burlap as shown for protection. See Specifications.

TYPICAL DETAIL
TRANSMISSION TOWER
STEEL PROTECTION
NOT TO SCALE
(110)



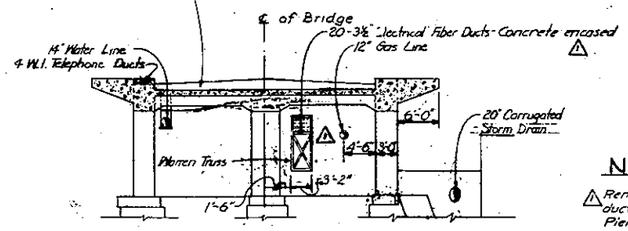
SECTION B-B
SCALE: 1/8"=1'-0"

NOTE:
The contractor shall coordinate the demolition of the existing truss support with the utility company (B.V.G.&E.) in order to maintain continuous service.

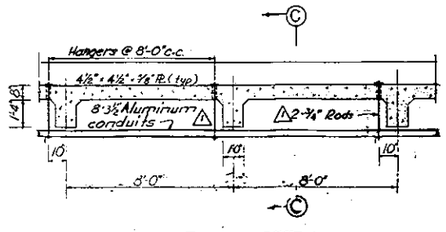


DETAIL "D"
SCALE: 3/4"=1'-0"

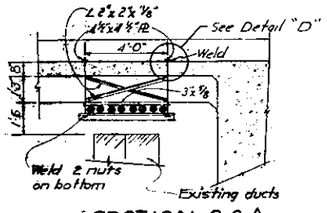
Bit concrete
Granite paving blocks
Ballast



SECTION A-A
SCALE: 1/8"=1'-0



LONGITUDINAL SECTION



SECTION C-C

NOTE:
Remove existing truss & duct banks between East Pier & West Abutement

NEW ELECTRIC CONDUITS & SUPPORT
BERNON BRIDGE
SCALE: ⅜"=1'-0"
(38)

GRAPHIC SCALES
1/8"=1'-0"
3/16"=1'-0"
1"=10'
3/4"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	9-6-83	Note & detail added; sections & notes revised.	

CHARLES A. MAGUIRE & ASSOCIATES
PROVIDENCE, R.I. HARTFORD, CONN. BOSTON, MASS.
ARCHITECT-ENGINEER

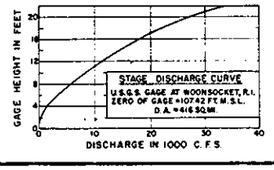
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY A.R. | DR. BY W.B. | CHECKED BY | SUBMITTED | CHIEF, ARCHITECT-ENGINEER | PROJECT ENGINEER | CHIEF, DESIGN BRANCH | APPROVED

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
ELECTRICAL MODIFICATIONS TO BERNON STREET BRIDGE AND HIGH TENSION TOWERS
BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND
DATE JUNE, 1983
SCALE AS SHOWN | SPEC. NO. CIV. ENG.-19-016-84-2
DRAWING NUMBER BE-1312
SHEET 101

NOTES

For General Notes applying to this sheet see Sheet No. 103.



REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON, MASS.

DR. BY	TR. BY	CK. BY
E. L. P.	S.F.C.	J.D.

E. F. Coffin
PROJECT ENGINEER

E. F. Chen
CHIEF, HYDROMETEOROLOGY SECTION

APPROVED: [illegible]
CHIEF, DESIGN BRANCH

APPROVED: [illegible]
CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET
HYDROGRAPHS NO. 1

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

DATE JUNE 1963

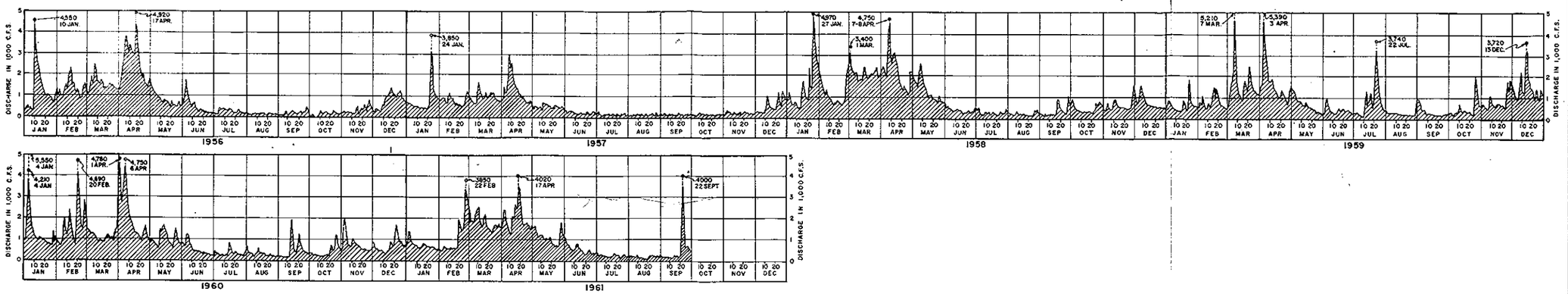
SCALE: AS SHOWN | SPEC. NO. CIV. ENG-19-016-642

DRAWING NUMBER BE-1312

SHEET 102

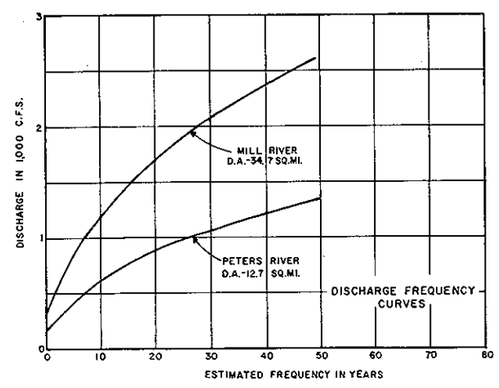
CORPS OF ENGINEERS

U. S. ARMY



NOTES:

1. These hydrographs are the daily average stream flow record of the Blackstone River at the U.S.G.S. gaging station at Woonsocket, Rhode Island from the tributary drainage area of 416 square miles.
2. Instantaneous peak discharges are shown where available.
3. The data contained herein are not intended as representations or warrantees but are furnished for information only. It is expressly understood that the government will not be responsble for any deductions, interpretations or conclusions there from made by any bidder or contractor.
4. There are no stream flow measurements or discharge records for the Mill or Peters Rivers.
5. Seasonal variations in flow on the Mill and Peters Rivers generally follow the flow pattern on the Blackstone River.
6. The estimated peak flows of 3400 cfs on the Mill River and 1500 cfs on the Peters River during the record flood of August 1955 are estimated to have frequencies of occurrence in excess of 100 years.



REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY G.L.F. | TR. BY G.S. | CK. BY P.J.B.

E. F. Coffin
PROJECT ENGINEER

E. F. Childs
CHIEF, HYDROTECHNICAL SECTION

APPROVED: [signature]
CHIEF, DESIGN BRANCH

APPROVED [signature]
CHIEF, ENGINEERING DIVISION

BLACKSTONE RIVER FLOOD CONTROL
LOWER WOONSOCKET

HYDROGRAPHS NO. 2

BLACKSTONE, MILL & PETERS RIVERS RHODE ISLAND

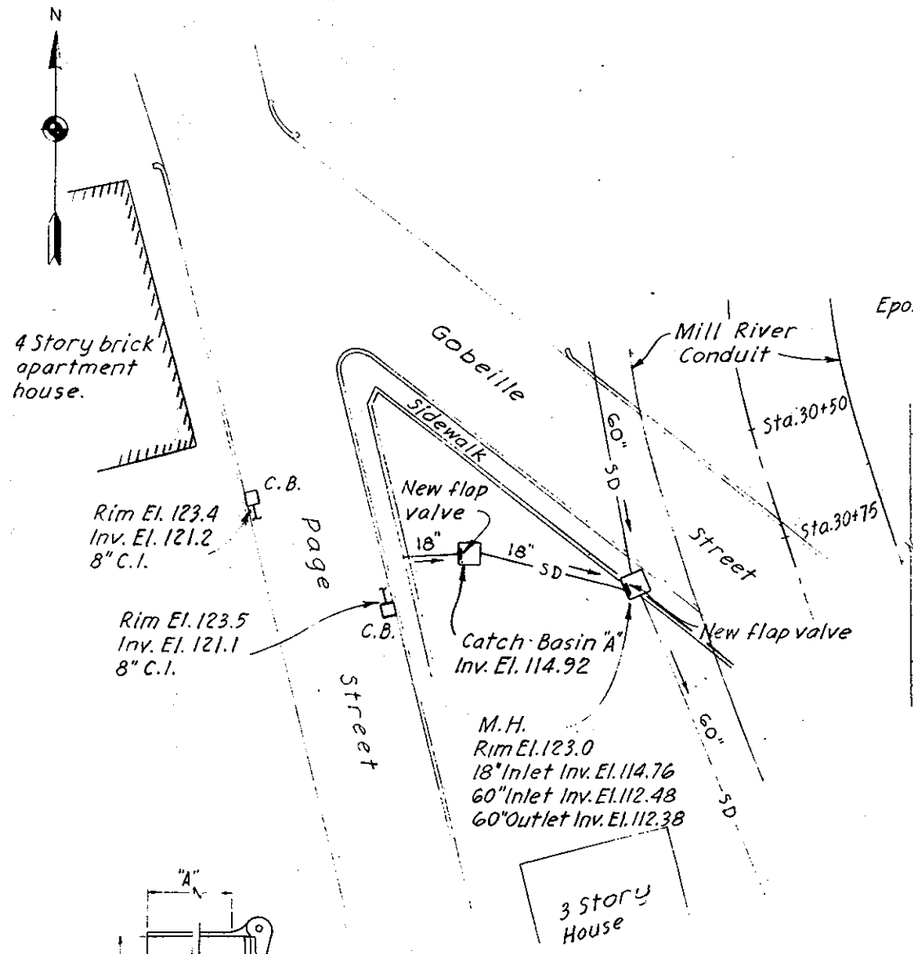
DATE JUNE 1963

SCALE: AS SHOWN SPEC. NO. CIV. ENG.-19-016-64-2

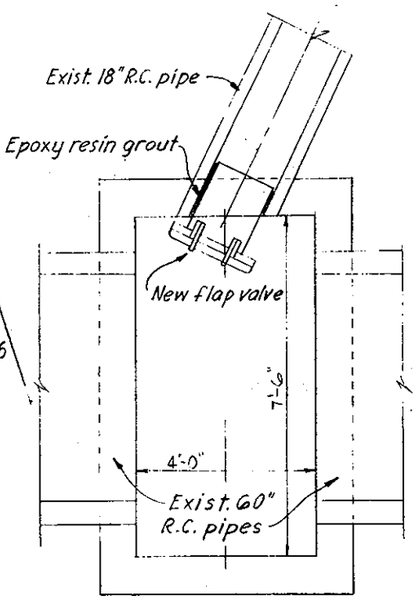
DRAWING NUMBER BE-1312

SHEET 103

O & M PLATE NO. E-89

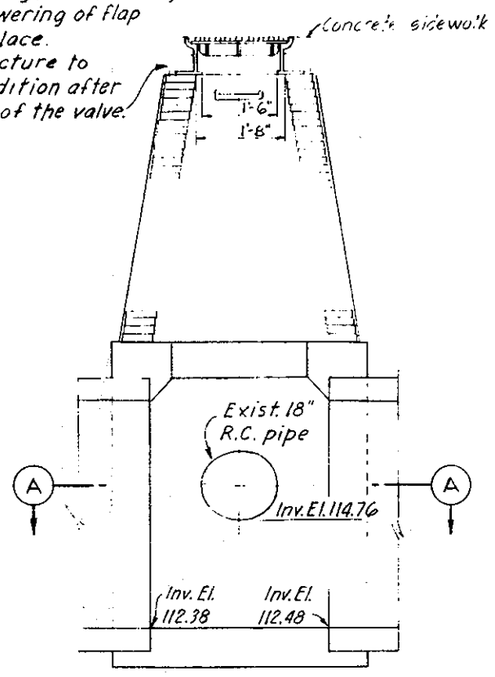


PLAN
SCALE: 1"=20'

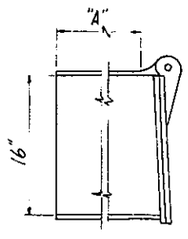


SECTION A-A
SCALE 1/2"=1'-0"

Note: Remove manhole frame, brick wall and ladder rungs as necessary to permit lowering of flap valve into place. Restore structure to original condition after installation of the valve.

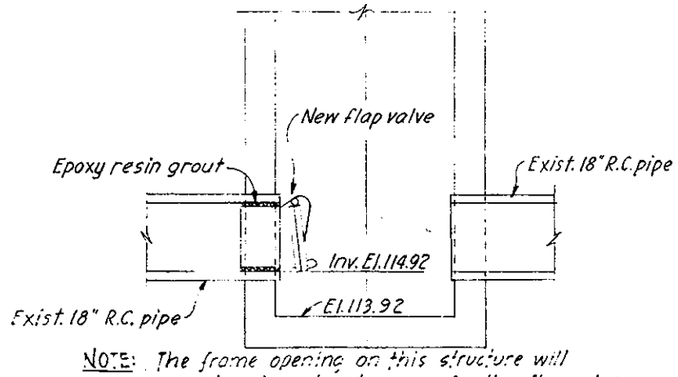


MANHOLE SECTION
SCALE 1/2"=1'-0"



SPIGOT FRAME FLAP VALVE SECTION
NOT TO SCALE

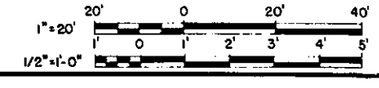
NOTE: The "A" dimension shall be a minimum of 12 inches for the flap valve to be installed in the catch basin and a minimum of 18 inches for the flap valve in the manhole. If an 18 inch spigot end flap valve is not available, an 18 inch pipe length with a threaded flange may be used as an insert and a flanged flap valve bolted to it.



NOTE: The frame opening on this structure will provide adequate clearance for the flap valve.

CATCH BASIN SECTION
SCALE: 1/2"=1'-0"

GRAPHIC SCALES



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DRAWN BY: J. F. H.	BLACKSTONE RIVER FLOOD CONTROL
TRACED BY:	LOWER WOONSOCKET
CHECKED BY: W. J. F.	DRAIN LINE MODIFICATIONS
APPROVED:	PLAN AND SECTIONS
	BLACKSTONE, MILL AND PETERS RIVERS RHODE ISLAND
	SCALE: AS SHOWN DATE: MAR 1967
	SHEET 1 BLA-4

O & M PLATE NO. E-90