HOUSATONIC RIVER FLOOD CONTROL

OPERATION AND MAINTENANCE MANUAL

FOR

FLOOD PROTECTION WORKS

DERBY, CONNECTICUT

HOUSATONIC AND NAUGATUCK RIVERS

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

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FOREWORD

The successful functioning of the Derby Flood Protection Works is not assured solely by construction of a system of dikes, floodwalls, floodgates, pumping stations, sluice gate structures, and other appurtenant structures. 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 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 responsible 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.

A. GENERAL

1. PURPOSE OF THIS MANUAL. Included in the authorization of the project are conditions specified by the Secretary of War to be met by local interests. One of these conditions is the Operation and Maintenance of the project after its completion. Under Assurances, dated 24 September 1968, furnished to the Government by the city of Derby, the city of Derby has agreed to meet these conditions, and in particular, the operation and maintenance of the project after its completion. A copy of the above assurances in included in Appendix "D" of this Manual.

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 Manual 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 Derby 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 Derby Local Protection project was authorized by the Flood Control Act of 1965 (Public Law 89-298, dated October 27, 1965) in accordance with recommendations of the Chief of Engineers set forth in House Document No. 324, 88th Congress.

3. PROJECT LOCATION. The Derby Local Protection project is located in the city of Derby, New Haven County, Connecticut, on the Naugatuck and Housatonic Rivers. The Derby Local Protection project portion along the Naugatuck River extends approximately 4400 feet along the right bank of the river and begins at the Division Street Bridge (located on the city line between Derby and Ansonia) and terminates at high ground on the upstream side of Connecticut State Route No. 34 bridge over the Naugatuck River. The Derby Local Protection project portion along the Housatonic River extends approximately 1935 feet along the left bank of the river and begins at the north abutment of the Bridge Street bridge and terminates at the Connecticut Route 8 bridge embankment.

4. DESCRIPTION OF PROJECT. The project consists of earth dikes and concrete floodwalls; channel improvement; pressure conduits; four sluice gate structures, four railroad gates; and one pumping station.

5. EFFECTIVENESS OF PROTECTION.

a. The protective works on the Naugatuck River and the Housatonic River were designed for the maximum river stage resulting from:

(1) The peak discharge in the Naugatuck River of the standard project flood as modified by the authorized comprehensive plan of seven upstream flood control reservoirs;

(2) A concurrent flood-flow in the Housatonic River from the same standard project storm; and

(3) An abnormal high tide in Long Island Sound.

6. CONSTRUCTION HISTORY. The construction of the Derby local protection project was accomplished under one construction contract awarded in the amount of $5,843,882.50 to Oneglia & Gervasini Construction Company, Inc., Torrington, Connecticut. Notice to proceed with the work was given on 13 May 1970 and the project was placed in operation by January 1973.

The combined total cost of the project is estimated at $7,000,000. The city of Derby expended an estimated $300,000 for local interest costs. The Federal cost of the project (including the short section included in the Ansonia-Derby Construction project) is estimated at $6,700,000.

7. PLANS. Plans pertinent to the operation and maintenance of the project are included for reference in Appendix "F" in this volume. The original tracings when corrected to indicate "as-built" construction will be forwarded to the city of Derby.

8. LOCAL COOPERATION. The authorizing legislation for the Derby Local Protection project was the Flood Control Act of 1965, dated 27 October 1965, (Public Law 89-298) and reads as follows:

In House Document Numbered 324, 88th Congress, the Chief of Engineers recommended that, prior to construction, local interests give assurances satisfactory to the Secretary of the Army that they will:

"a. Provide without cost to the United States all lands, easements, and right-of-way necessary for the construction of the project including lands for spoil disposal, storm water pondage, and collector ditches together with necessary changes in sewage systems, highway bridges and roads, railroad track except railroad bridges and approaches, and other utilities;

"b. Hold and save the United States free from damages due to the construction works;

"c. Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army;

"d. Prevent encroachment on improved channels and on ponding areas and if capacity of the latter is impaired, provide equally effective storage, pumping capacity, or both, without cost to the United States; and

"e. Prevent encroachment within 20 feet of the top of the west bank of Naugatuck River at the proposed widening upstream from the highway bridge at Derby."

The assurances of the city of Derby are contained in Appendix "D" of this volume. This Manual is to assist the city of Derby in fulfilling d above of 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 shall 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 400 waterproof plastic sand bags, 3,300 grain or feed type bags, and tools such as picks and shovels and 7 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. Waterproof bags for use at Railroad Gates shall be filled and stored in shelters adjacent to gates. The other sand bags and its sand shall be kept separate until time of use in order to avoid the decay of the bags. The following is a breakdown of the 3,700 sand bags required and those areas where particular attention should be given.

(a) Railroad Gates Nos. 1, 2A, 2B and 3. Approximately 100 waterproof plastic bags filled with 4 cubic yards of sand shall be stored in a storage shed, adjacent to each gate, land side and held in storage for use in sealing the bottom of each railroad gate during flood periods when gates are closed.

(b) Central Location. Approximately 3,300 sand bags (these bags shall be grain or feed type bags) and 200 cubic yards of sand stored separately to fill them should be held in reserve in case it is necessary to stop leaks through the dikes and walls and to control sand boils and seepage behind the dikes and walls.

"(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, dikes, 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 Division Engineer 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 Division 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 Division 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 Division Engineer covering inspection, maintenance, and operation of the protective works.

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

(7) The Division 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. "Follow-up" inspections, when necessary, will be made to determine if deficiencies observed during the inspection have been corrected. A report with the results of each inspection will be furnished to the city of Derby for appropriate action.

(8) Maintenance measures or repairs which the Division 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 Corps of Engineers with this document has furnished local interests with an Operation and Maintenance Manual for the completed project 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 Derby. 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, sluice gate structure and pumping station equipment and railroad closure gates require testing at stated intervals to discover the difficulties that may develop or the part that will not work when it should.

e. During the winter months it may be necessary to inspect certain project features in order to make certain that no problems exist that could delay the operation of the project in the event a sudden thaw and rain storm occurs. The Superintendent should prepare a check off list of water problem; this list should include:

(1) R.R gates are free to swing closed.

(2) Flap gates are operable.

(3) Pumping station gates are free of ice and debris.

(4) Conduit and drainage structures, entrances and openings are free of debris, leaves, snow and ice.

(5) Sluice gate structure No. 1 is accessible. This list should be expanded as experience indicates.

f. 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 under Appendix "B" 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 Reservoir Control Center (Telephone 617-894-2400, Ext. 627) of the New England Division office.

b. Representatives of the Division Engineer stand ready to assist the city of Derby in the operation of the project. This in no way lessens the responsibility of the city of Derby in operating the project.

c. 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.

d. To insure correct operation it is essential that at least two persons (preferably 3) (1) be familiar with all phases of the flood protection works; (2) know when to start the pumping station; (3) know the location of all 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.

e. Arrangements should be made with the River Forecast Center, 135 High Street, Hartford, Connecticut, 06101 (Telephone 203-244-2014), to keep the city informed on flood predictions. The National Weather Service maintains the River Forecast Center at Hartford and is the official agency for collecting precipitation and runoff data. Personnel at the Center prepare flood forecasts and are responsible for issuance of flood warnings in the Housatonic River basin.

f. 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 to the city for maintenance and operation of the project since the city executed assurances of local cooperation.

g. The city of Derby should cooperate with the city of Ansonia as the two communities operate adjacent flood control projects to the extent where the two projects meet.

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 and maintenance. 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.

To assist the Superintendent in making his inspections and reports, sample check list forms including blank NED Form 513 and sample forms marked Exhibits A, B, and C have been prepared and 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, Attn: Reservoir Branch, Operations Division, 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.

B. CHANNEL IMPROVEMENT

13. DESCRIPTION. This portion of the manual covers drainage ditches and swales and outfalls of sluice gate and pumping station gravity discharges and outlets.

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 Derby 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. All stone protection shall be kept free of all vegetation growth.

"(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, ditch or swale, 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."

Fills and obstructions shall be removed but care should be exercised that stone protection is not displaced and that the slopes of the discharge channels and existing banks are not undercut. Existence of fills and obstructions 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 . . . . . dikes and walls are in good condition."

Stone 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 protection for possible movement or loss of stone, and prompt corrective action taken.

"(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 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 . . . . dikes. The Superintendent shall provide for periodic repair and cleaning of debris . . . . . 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 Derby project.

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

C. DIKES

16. DESCRIPTION. There are dikes along the right bank of the Naugatuck River and along the left bank of the Housatonic River. The dikes are rolled earth filled with stone slope protection along river sides, with topsoiled and seeded land slopes and with road gravel top surfaces. The thickness of the stone protection varies as required by the various velocities in the channels. The height of the dikes vary from 10 to 30 feet. The land side slopes vary from 1 on 2 to 1 on 2.5, depending on location of dike; the river side slopes are generally 1 on 3.

17. MAINTENANCE. Paragraph 208.10 (b) (1) of the prescribed regulations sets forth rules for the maintenance of levees. For the purpose of this manual the words "levees" and "dikes" are interchangeable. These rules quoted for levees apply equally to earth dikes, and applicable portions are quoted below. Following this, points that apply particularly to the Derby project are discussed.

"Dikes. (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. ..... not applicable .....

"To prevent development of possible piping channels and discontinuities which may lead to erosion of embankments by flowing water, trees or shrubs will not be planted on the sides or top of embankments. Areas of natural ground riverward of dikes may be considered for planting. However, in each case, the effect of the plantings on total performance of the project must be assessed, and the proposal submitted to the Division Engineer for prior approval. 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 occuring;

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

The project includes underdrain pipes along the land side toes of the dikes and along the back of all walls for nearly the full length of their reaches. In general the underdrains are constructed in straight runs between observation risers and manholes. During low water periods, and at least once a year, the underdrains should be inspected to determine if sections of the drains are crushed or are partially or fully filled. One method to inspect condition of drains, when the drains are in straight runs and terminate in a manhole at one or both ends, is by placing a light at the end of the run in a manhole or observation riser and detect the condition of run by placing a sloping mirror (similar to an inverted periscope) in adajcent manhole or observation riser. If the inspection indicates any filling or obstruction in a pipe, the pipe shall be cleaned out by flushing and where necessary by use of rooters or by excavation or by replacement. For other runs, inspection shall be made as outlined in Paragraph 18 below when the river is at least five feet above the toe of dike.

"(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 and ramps 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 tops of the dikes, except for roadways, were topsoiled and seeded to minimize the damage from erosion and scour caused by surface runoff. Maintenance of a sturdy sod growth on dike embankments is highly important as sod is one of the most effective means of protecting the levee against erosion from rain, current and wavewash. Periodic mowing is essential to maintaining a good sod growth, and should be done at such intervals as necessary to keep down weeds and other noxious growth and to prevent the grass height from exceeding 12".

When sections of the dikes 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 mixture was used in the original construction:

TABLE I

GRASS SEED

Kind of Seed (Botanical Name) (Common Name)	% of Wt. In Mixture	Min. % Purity	Min. % Germ.
Agrostis tenuis hv Highland Bentgrass	5	98	85
Bromus inermis Smooth Brome	15	85	90
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	5	98	85

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

Inspections of the dikes 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.

All stone protection shall be kept free of vegetation growth.

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 Derby 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 reaches 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 underdrains and observation risers along both dikes and walls should be inspected during and following each major high water period and otherwise at intervals not exceeding one year. They can best be inspected by noting the flow or rise of water in observation risers. If water rises in an observation riser, a constriction is indicated.

The water level in observation risers shall be recorded at least twice daily to determine proper functioning of the underdrains 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.

Wave wash. Wave action may cause displacement of stone protection and wash-out of earth materials on the riverside and brookside slopes of the dikes as applicable. 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 "E". 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 of Appendix "E", 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, of Appendix "E", 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 "E" 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 1-1/2 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 sandbags 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 "E".

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 shall be a grain or feed type sack (in lieu of waterproof, canvas or sisal-craft type) 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 of Appendix "E". All sacks should be lapped about 1/3 each way and well mauled or tramped into place. The sacks should be filled to two-thirds their capacity when flattened out to facilitate proper placing and prevent bursting the sack when mauled or tramped into place.

Plate No. IV of Appendix "E" 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 of Appendix "E" shows pictures of model sack dike or topping.

A crew of 160 men should fill, carry and place approximately 5,000 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, location of storage and loading areas, and type of bag filling equipment used.

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 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 river side of the crown six feet apart and one-by-twelve inch boards nailed to land side 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 a 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 of Appendix "E" illustrates this method of raising a dike.

D. FLOODWALLS

20. DESCRIPTION. Except at Railroad Gate No. 1, there are no concrete floodwalls along the Naugatuck River. The floodwalls are of the "I" and "T" types of reinforced concrete construction with waterstops at all joints. Only the upper parts of the walls are visable since the fill and drainage materials placed on both sides of the wall have been back-filled and compacted. In most instances, the channel side slopes and the stone protection abut the river side of the wall.

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 . . . . . are in good working condition, and that such facilities are not becoming clogged."

Such inspections shall be made every 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. See instructions under Section C "Dikes" for

maintenance of underdrains. 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.

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 as shown in Plate VII of Appendix "E".

E. DRAINAGE STRUCTURES (Sluice Gate Structures)

24. DESCRIPTION. Sewer lines and storm drains that pass under the protection and channel are shown on general plan and utility sheets included in Appendix "F" of this Manual. The sewer and drainage sluice gate structures connected with the project are described below. See drawings for location of pressure, special drainage structures and standard underdrain, drain and sewer manhole structures not included as a sluice gate structure. The structures are provided with gates, access covers, ladders, pipe railings, etc. as applicable to make a reliable, workable and complete installation.

a. Pertinent Data - Sluice Gate Structures

Sluice Gate No.	Gate Size(s)	Motor Operated	Manually Operated	Sluice Gate Structure in Dike
* 1	72" x 72"	-	x	River side
* 2	96" x 72"	x	-	River side
* 3	18" x 18"	-	x	River side
** 11	48" x 48"	-	x	River side

b. Location - Sluice Gate Structures

Sluice Gate No.	Location	Type of Utility
1	Sta. 16+00± Right Bank Naugatuck River	6' x 6' Conduit
2	Sta. 13+90± Left Bank Housatonic River	8' x 6' Gravity Storm Conduit
3	Sta. 19+27± Left Bank Housatonic River	18" Concrete Encased Sanitary Line
11	Sta. 112+80 Right Bank Naugatuck River	4' x 4' Conduit from 48" Pressure Conduit

* These structures constructed as part of the Derby Project

** This structure constructed as part of the Ansonia-Derby Project.

c. Construction. All sluice gate structures are of concrete construction of various sizes and configurations with access through top of structure. See drawing for various types of construction covering other type drainage structures.

d. Sluice Gate Operation. All sluice gates are manually operated except for gate in Sluice Gate Structure No. 2 which is motor operated. The design of the project is such that gates in Structure Nos. 1 and 2 will be required to be closed in time of flood control operations. Gates No. 3 and 11 are only closed in case of rupture of pipes through or under the protection or crossing the river.

e. Power Wrench. An electrically-operated power wrench, stand mounted, with suitable attachments is provided for operation of manually-operated sluice gates in Structures 1 and 11. (In case of emergency, sluice gate in Structure 2 will be operated using wrench stored in Derby Pumping Station.) The unit is complete with its own portable engine generator as a source of electricty in the event normal electric service is not available. Hand wheels shall be removed, if necessary, for operation of gates by power wrenches. The complete unit shall be truck mounted and available for instant service. Units shall be tested at least once a month, including engine-generator set.

f. Pressure Conduits. At no time in the future shall the city permit anyone to tie into the pressure conduits, noted on plan as "NPC". These pipe lines are a vital part of the overall protection, and considerable damage will result to protected areas if other drain or sewer lines are connected to the pressure conduits.

g. Special Drainage Structure No. 8. This structure provides the outlet from the ponding area shown on Dwg. No. HOU-11, Sheet 127. The city must keep this ponding area free from structures, or other permanent items. The inlet to Structure No. 8 including riprap areas shall be kept clean at all times. Adjacent dike which forms the ponding area shall be maintained as covered in Chapter C "Dikes" above.

25. MAINTENANCE. The lines and drains 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 sluice gate and other 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 gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. 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 occuring 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 sewer lines and storm drain effluents are discharged onto the stone protection should be examined periodically to insure that there is no loss of stone material.

Electrically operated gates should be moved through a complete closing and opening cycle or opening and closing cycle each month. Manually operated gates should be operated a few inches of travel each month and through full travel once yearly. 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. All drainage and sanitary structures including special drainage and standard manholes shall be inspected at least once a year and all collected debris shall be removed.

All metal surfaces not otherwise protected must be kept painted to maintain the metal in good condition. The exterior and interior metal work, such as ladders, sluice gates, pipe railings and cover plates, exterior gate hoist and flap valves, will require frequent painting because of exposure to the weather and/or to waters.

26. OPERATION. Paragraph 208.10 (d) (2) of the prescribed regulations gives rules for operation of sluice gate 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 dikes 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 sewer lines and storm and other drains and ditches into the channel are draining freely they should present no special operating problems.

The requirements of Paragraph 208.10 (f) (2) of the prescribed regulations which governs the operation of pumping stations applies to the operation of the drainage and sluice gate structures.

Competent operators shall be provided whenever it appears that necessity for gate operation is imminent. The operators shall throughly inspect, trial operate, and place in readiness all plant equipment. The operators shall be familiar with the equipment manufacturer's instructions and drawings and with the "Operating Instructions" for each sluice gate structure. 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 gate shall be thoroughly cleaned and equipment thoroughly inspected, oiled and greased. A record or log of operation shall be kept for each gate, a copy of which shall be furnished the Reservoir Control Center following each flood.

F. PUMPING STATION

27. DESCRIPTION. One pumping station was constructed by the Corps of Engineers in the city of Derby, to dispose of the interior drainage during high water periods. The 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 pumps are vertical, fixed blade, propeller type of standard construction using steel columns and discharge elbows, cast iron bowls and suction bells, bronze impellers, stainless steel pump shafts, and bronze bearings. Each pump is provided with a manually operated centralized lubrication system. The station is provided with other facilities, such as louvers, sluice gates, overhead crane, vent fan, sump pump, etc., to make a reliable, workable and complete installation.

a. Pertinent Data - Derby Pumping Station.

1. Drainage Areas - 247 Acres.

2. Pumping Station

Number of Pumps	3
Capacity (each)	30,000 gpm @ 32 Static Head
Horsepower	500
Building Size	42'-8" x 22'-0"

b. General.

1. Pumping Station. The station is located in back of the protection. It is of brick and concrete, 42'-8" x 22'-0" outside dimensions of the superstructure. The intake chamber is 7'-0" wide, while the gravity flow discharge is in a 6'-0" wide chamber leading to a 8' x 6' gravity conduit pipe. Flood discharge will be by three (3) 36" steel pipes carried over the dike.

c. Pumping Equipment. All pumps are driven by diesel engines through right angle gear units. The pumps are vertical, fixed blade, propeller type of standard construction using steel columns and discharge elbows, cast iron bowls and suction bells, bronze impellers, stainless steel pump shafts and bronze bearings. Each pump is provided with manually operated centralized lubrication system. All pumps are capable of operation against all river stages up to the top of the dike.

1. Pumping Station. Three pumps are provided with each pump having a capacity of 66.6 c.f.s. (30,000 gpm), one-third of the required station capacity, against the standard project flood with suction sump at low water elevation. Each pump discharges over the top of the dike. Three sluice gates, one located in front of each pump, will seal off the pump sump except when opened for activation of the station. A sluice gate is provided on the river side of the dike in a sluice gate structure to close off the gravity flow conduit.

d. Sluice gates. All sluice gates at the pumping station are seating pressure type of standard cast iron construction with bronze seals. Manually operated floor stands will be installed for operation of each gate.

An electrically-operated power wrench, stand mounted, with suitable attachments is provided for operation of the manually-operated sluice gates in the station and for emergency operation of the electrically-operated sluice gate in Sluice Gate Structure No. 2. The unit is complete with its own portable engine generator as a source of electricity in the event normal electric service is not available. Hand wheels shall be removed, if necessary, for operation of gates by means of power wrenches. One complete unit shall be stored in the pumping station.

e. Traveling crane. The station is provided with a hand operated, single girder, traveling crane with a low headroom, hand operated, chain hoist of capacity required to handle the heaviest piece of equipment.

f. Sump pump. An electric motor operated wet pit type sump pump is provided in the pumping station for dewatering and for handling any leakage into the sump.

g. Heating. The pumping station is equipped with oil fired forced warm air furnace, thermostatically controlled to maintain inside temperature at 55° F. In addition, a humidistat will override the thermostat to operate the heater as necessary to maintain the relative humidity at not higher than 50%.

h. Ventilation. A small fan with ductwork is provided for ventilation of the sump. The diesel engines are radiator cooled with each radiator connected to exterior wall louver by ductwork to prevent short circuiting of cooling air. Inlet louvers are provided for air supply to the radiators.

i. Water level indicators. Indicators for both the station sump and the river water levels are provided.

j. Electric service. Electric service is obtained from the control center in the adjacent Sewage Treatment Plant. Service is 120/240 v, 3-phase, 3-wire. The service is extended from existing lines underground to the station. All conductors have heat and moisture resisting type insulation and are installed in rigid steel conduit.

Conduit has been installed for use by the Southern New England Telephone Company for providing future telephone service. All sluice gates within the pumping stations are manually operated. Electric service to Sluice Gate Structure No. 2 is extended from the pumping station.

28. MAINTENANCE.

a. Regulations. Paragraph 208.10(f)(1) of the prescribed regulations governs the maintenance of pumping station.

Pumping plant 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 flashlights or lanterns for emergency lighting shall be kept on hand at all times. An empty conduit has been provided at each station so that telephone service can be provided by the city 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. The results of the megger tests shall be forwarded to the Division Engineer, Attention: Reservoir Branch, Operations Division. In addition, a record shall be kept by the Superintendent 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 station 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.

(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:

Oil Pressure
Water Temperature

(b) Once each month, each engine, gear unit, and pump shall be operated for two or 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 sump flooded and the unit operated as necessary to determine the source of trouble and necessary repairs.

(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) Antifreeze no longer requires draining at the end of each cold weather season; it may be retained in the cooling system for an extended period dependent on the outcome of a hydrometer test accomplished during performance of scheduled Preventative Maintenance Service on the engine. Rust inhibitor shall be added annually. Permanent type anti-freeze shall be used at all times and shall be adequate for protection against freezing at minus 20° F.

(f) All manually operated louvers shall be opened prior to starting engines.

(3) Pumps. 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. The manually operated gates should be operated a few inches of travel each month and through full travel once yearly. 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 pump. The station is provided with a sump pump to handle any seepage into the sump and to evacuate the sump after each pumping operation. The pump and motor should be lubricated annually and the float mechanism checked monthly by manually raising and lowering the float to start and stop the pump. Sump pump is provided with "Hand-Off-Automatic" switch. Switch shall be in Automatic position at all times except when station sluice gates are open to station sump in which case it should be placed in the "Off" position. The "On" position of the switch should only be used in an emergency and only under constant surveillance of the water elevation in the sump. 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 and hoist housings will require frequent painting because of exposure to the weather.

(8) Pump sump. 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. 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 Derby a complete set of manufacturer's drawings pertaining to the mechanical and electrical equipment in the pumping stations. These drawings should be kept in good condition by the city of Derby 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 plant whenever it appears that necessity for pump operation is imminent. The operators shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operators shall be familiar with the equipment manufacturer's 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, a copy of which shall be furnished the Reservoir Control Center following each flood.

G. CLOSURE STRUCTURES

30. DESCRIPTION. Closure structures (railroad gates) are provided to permit passage through the protection system during normal times. The gates are normally located in the concrete abutments when not in use. Sand bags are stored in a weathertight shelter, land side of wall. The requirement for closing gates with a minimum warning period and possibly during high winds, make it desirable to have an assembled gate, necessitating a minimum closing time. Sand bags will be used at the bottom of the gates on the river side to seal off space between the bottom of gates and surface of rail bed. When in storage the gates are locked into the abutment cavities by means of padlocked bolts attached to clip angles set into concrete abutment and by a fixed jack which is also utilized in the maintenance of gate hinges or other gate repairs. The Superintendent shall know at all times the location of the keys which operate the padlocks. Construction details are shown on the drawings in Appendix "F".

a. Railroad Gates 1, 2A, 2B and 3. These gates are single leaf steel gates and close at an angle of 90°.

Gate	Clear Opening Width feet	Height feet
No. 1	30' - 0"	10' - 9"
No. 2A	26' - 0"	11' - 5"
No. 2B	39' - 6"	9' - 1"
No. 3	30' - 0"	10' - 9"

31. MAINTENANCE.

a. Paragraph 208.10(e)(1) of the prescribed regulations gives rules for the maintenance of closure structures. These rules apply equally to the railroad gates and applicable portions are quoted below.

"(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 condition;

"(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 at 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. ....."

b. Trial closure of all the closure structures shall be made once a year and whenever a change is made in key operating personnel. Where railroad operation makes trial closures of a railroad closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial placement of sand bag closures is not required. Supplies of sand bags and materials for filling will be carefully checked and restacked as necessary prior to and following flood periods. Sand bag storage shelters shall be inspected annually and repainted when required. In addition, all closure items will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

32. OPERATION.

a. Paragraph 208.10(e)(2) of the prescribed regulations gives rules for operation of all closure structures and applicable portions are quoted below:

"(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."

b. Closure of each movable gate shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring.

c. Timing of the closure of these openings shall be as described in Appendix "B". Earlier closing may be necessary if increasing wind velocities and rainfall will make closure difficult if delayed.

d. Warning should be given to the railroad company that these gates will be closed to traffic for the duration of the flood. After the flood has subsided, the police department and railroad company should be notified that the gates are open for traffic.

e. When the emergency crew is assembled they should be prepared to start closing each gate. This would include cleaning any obstructions out of railroad bed; removal of bags from shelters and moving to river side of gate; additional sand bags, if required, and anything necessary to insure closing of gates. When the flood has subsided, this procedure would be reversed. The sand bags if wet shall be emptied and dried out prior to being refilled and returned to storage. Bins for the storage of additional sand should be provided in the shelters.

f. Sequence of operations for closing of railroad gates.

(1) Preparatory steps.

(a) Notify railroad company within time prescribed in appendix covering "Operating Instructions for Floods".

(b) Remove padlocked bolt which secures each gate in open position. This bolt is located at opposite end of gate leaf from hinges and located 3'-3" from gate bottom.

(c) Note: The removed bolt is reused in locking gate in closed position.

(d) Back off gate support jack (with provided jack handle) so it will clear all obstructions by at least 1 inch. (Remove all obstacles on railroad and/or pavement to assure gate passage over railroad and pavement).

(e) Place sand bags on river side of gate.

(2) Closing steps.

(a) See drawings of gates shown in Appendix "F".

(b) Swing gate out of recess to closed position using proper construction equipment and cables.

(c) After gate is in closed position, insert bolt in anchor plates. Lower jack to take weight of gate.

(d) Close adjustable plates to sill.

(e) Place sand bags along river side gate bottom to minimize leakage, bags shall be two bags high and two deep.

(f) Check perimeter of gate for adequate closure and tightness.

(3) Reopening of gates. In reopening gates, follow above steps in reverse order. Return bags to storage as outlined in e above.

(4) Construction type equipment necessary to perform the work, keys to operate padlocked bolts, and all miscellaneous tools and equipment including block and tackle and cables should be available at the site to perform the above closing and opening operations within the shortest time possible. Mechanized equipment shall be modified as necessary for gate closing and opening operations. Portable ladders, bolt cutters, and additional bolts shall be included among the provided equipment.

H. MISCELLANEOUS FACILITIES

33. DESCRIPTION. Miscellaneous structures and facilities constructed as part of the protective works include the tile gages, pavements, flap gates not covered elsewhere, access bridges, access bridge pipe railing, chain link fencing, and highway railing.

34. 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."

35. 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 or heavy rainfall, observations for collection of debris should be made along the protection. Debris could block the flow of water to pressure conduits and to the drain inlets. Men and equipment should be available within reasonable time and distance to assist in debris removal wherever necessary.

I. OPERATIONS PLAN

36. PROJECT OPERATION. A plan of operation for floods is covered in Appendix "B". 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 Derby Pumping Station and Sluice Gate Structures, and for closure of railroad gates, and manpower and equipment should be on call for duty on the various project features to insure maximum project operation and efficiency.

37. 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 State of Connecticut or the city in the operation of the project.

J. DRAWINGS AND SPECIFICATIONS

38. DRAWINGS AND SPECIFICATIONS. A complete set of contract plans and specifications was furnished the city of Derby at the time of initiation of project construction. A full-sized set of plans showing the project as actually constructed will be furnished the city of Derby at the time of completion and transmittal of this manual; reduced prints of these drawings pertinent to the operation and maintenance of the project are included for reference in Appendix "F".

APPENDIX A

REGULATIONS PRESCRIBED BY THE SECRETARY OF THE ARMY

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

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 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 B

STANDARD OPERATING PROCEDURE

DURING FLOOD PERIODS

APPENDIX B

STANDARD OPERATING PROCEDURE
DURING FLOOD PERIODS

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APPENDIX B

STANDARD OPERATING PROCEDURE DURING FLOOD PERIODS

SCOPE

1. GENERAL

This appendix prescribes details for the operation of the appurtenant features of the Derby project prior to and during flood periods. Climatologic and hydrologic data are included for background information.

RESPONSIBILITIES

2. CITY OF DERBY

The city is responsible for the operation of the entire flood protection works constructed within the limits of the city in accordance with the detailed regulation of this appendix. This includes certain structures under the Ansonia-Derby contract such as the Naugatuck River dike beginning at Division Street and extending downstream including sluice gate structure No. 11. These responsibilities include:

a. Complete operation of the project during flood periods in the Naugatuck and Housatonic Rivers.

b. Determining phases of preparedness, mobilization or operations based on National Weather Service flood forecasts and weather reports, Naugatuck and Housatonic River stages or information obtained from the Corps of Engineers.

c. Training personnel in specific duties and holding periodic practice operations to insure timely and efficient operating procedures.

d. Establishing and maintaining an adequate communication system with the National Weather Service to obtain weather and flood forecasts as well as advisories on storm conditions.

e. Coordination of railroad gate closures with Penn Central Transportation Company.

f. Establishing and maintaining an adequate communication system with the city of Ansonia in order to coordinate plans for effective operation of both projects during flood periods.

g. Informing the general public, by means of local radio stations and newspapers, of the flood situation and the closing of the gates.

3. CITY OF ANSONIA

The city of Ansonia is responsible for the operation and maintenance of the entire flood protection works within the limits of that city. Flood protection in Ansonia is provided along both banks of the Naugatuck River from Division Street bridge upstream to the American Brass Company hydroelectric plant. Protection is also provided along the lower reaches of Beaver Brook.

4. CORPS OF ENGINEERS

The Reservoir Control Center (RCC) of the Corps of Engineers continually monitors rainfall and runoff conditions in order to operate its system of flood control reservoirs in the Naugatuck River watershed. This climatologic and hydrologic information is available to the city upon request. Observers from RCC will monitor operations for several floods to determine whether personnel training has been adequate and whether the operating instructions, as written, need revision.

The system of Corps of Engineers flood control works in the Housatonic River basin consists of 7 reservoirs and 5 local protection projects. Hall Meadow Brook and East Branch Dams, together with local protection projects on the East and West Branches and the main stem of the Naugatuck River, provide flood protection to the city of Torrington. Thomaston Dam, with the largest flood control capacity in the Naugatuck River system, will reduce flood stages at all downstream damage centers. Northfield Brook, Hancock Brook, Black Rock and Hop Brook Lakes, located on tributaries of the Naugatuck River, will supplement Thomaston in reducing flood levels in the lower Naugatuck River. The location of all the flood control projects in the watershed is shown on plate B-1 and pertinent data for the 7 reservoirs are contained in table B-1.

TABLE B-1

PERTINENT DATA
FLOOD CONTROL RESERVOIRS
NAUGATUCK RIVER WATERSHED

RESERVOIR	HALL MEADOW BROOK*	EAST BRANCH*	THOMASTON	NORTHFIELD BROOK	BLACK ROCK	HANCOCK BROOK	HOP BROOK
LOCATION	Hall Meadow Brook Torrington, Conn.	East Branch Naugatuck River Torrington, Conn.	Naugatuck River Thomaston, Conn.	Northfield Brook Thomaston, Conn.	Branch Brook Thomaston and Watertown, Conn.	Hancock Brook Plymouth, Conn.	Hop Brook Waterbury and Naugatuck, Conn.
DRAINAGE AREA (sq.mi.)	17.2	9.25	97.2 (Gross) 70.75 (Net)	5.7	20.4	12.0	16.4
STORAGE USES	Flood Control	Flood Control	Flood Control	Flood Control Recreation	Flood Control Recreation	Flood Control Recreation	Flood Control Recreation
STORAGE ALLOCATIONS							
FLOOD CONTROL Capacity (ac. ft.)	3,620 (9.4")	4,350 (8.8")	42,000 (11.1" Net) (8.1" Total)	2,350 (7.7")	8,450 (7.8")	3,900 (6.1")	4,350 (7.8")
RECREATION Capacity (ac. ft.)	---	---	---	80 (0.3")	250 (0.2")	130 (0.2")	120 (0.1")
1" Runoff= ____ ac. ft.	915	495	3,775 (Net)	305	1,090	640	875
MAXIMUM RELEASE RATE (cfs)	500 (est)	300 (est)	2,500 (plus)	200 (est)	600 (est)	350 (est)	500 (est)
OPERATIONAL STATUS	Unmanned	Unmanned	Manned	Unmanned	Manned	Unmanned	Manned
BECAME OPERATIONAL	1962	1964	1960	1965	1970	1966	1968
MAXIMUM POOL LEVEL	Mar 1968-12.2 ft.	Apr 1970-23 ft.	Apr 1969-60 ft.	Apr 1969-40 ft.	Mar 1972-52 ft.	Feb 1970-14.0 ft.	June 1973-47 ft.
Percent Flood Storage Utilized	7	9	19	11	16	17	28

* Maintained by State of Connecticut

5. NATIONAL WEATHER SERVICE

The National Weather Service has no direct role in the operation of the project. However, it has the responsibility of issuing weather forecasts and flood forecasts to the general public. The National Weather Service maintains the River Forecast Center at Hartford, Connecticut and is the official agency for issuing flood watches, warnings and forecasts in the Housatonic River basin. Because of the rapid development of floods in the Naugatuck and Housatonic Rivers, the city should make arrangements with the River Forecast Center to receive their latest flood forecast. Weather forecasts and reports for the area are issued by the National Weather Service office in Hartford.

CLIMATOLOGY

6. GENERAL

A brief description of the climatology and recent flood history of the Housatonic River basin is included as background information for the benefit of the Project Superintendent and others concerned with the operation of the protection project. It is intended that this information will make the Superintendent more weather conscious, aware of the problems of weather forecasting and also more aware of the conditions that can lead to flooding in the Derby area.

The Housatonic River basin has a variable climate characterized by frequent but usually short periods of precipitation. The watershed lies in the path of the "prevailing westerlies" which often include cyclonic disturbances that cross the country from the west or southwest. It is also exposed to coastal storms, some of tropical origin, that travel up the Atlantic seaboard. The southern portion of the watershed, due to its proximity to the Atlantic coast, escapes the severity of cold and depth of snowfall experienced in the higher elevations in the northern part of the watershed.

7. PRECIPITATION

The mean annual precipitation over the Housatonic River basin is approximately 46 inches, varying from 42 inches in an area east of Candlewood Lake to more than 55 inches at higher elevations along the eastern boundary. The average runoff amounts to about 55 percent of the annual precipitation.

8. SNOWFALL

The average annual snowfall over the watersheds vary from about 35 inches near the coast to over 80 inches in the headwater region. The snowpack reaches a maximum cover in March (usually within the first two weeks) with the water content often 4 to 6 inches.

9. STORMS

The Housatonic River basin has experienced storms of three general types, namely: (a) extratropical continental storms which move across the area under the influence of the "prevailing westerlies", (b) thunderstorms produced by local convective activity or by more general frontal activity, and (c) extratropical maritime storms which originate and move northward along the Atlantic coast and maritime storms of tropical origin, some which attain hurricane magnitude.

The most severe flood producing storms which occur during late summer and early autumn usually have been of tropical origin. Five notable storms in the Housatonic River basin will be discussed under Floods of Record.

RECENT FLOOD HISTORY

10. GENERAL

Floods in the Housatonic River basin may result from intense rainfall over the watershed or from moderate to heavy rainfall in conjunction with melting snow. Historic records indicate that floods may occur during any season of the year. The intensity of the rainfall and antecedent conditions rather than the total volume determine the magnitude of the flood peaks. This was evident in the storm of August 1955 when the total rainfall was only about one-third greater than the storm of December 1948, but the flood peak was almost four times the magnitude in the Naugatuck River. The quick development of floods is due to the many short, steep tributaries which empty into the main channel concurrently. This is illustrated by the fact that major floods have crested along the entire length of the Naugatuck River within a period of 5 to 8 hours.

11. FLOODS OF RECORD

The Housatonic River basin has experienced five major floods within the past 35 years. These floods are briefly described in the following paragraphs and their respective discharges are shown in table B-2. This table is included primarily to show the effect of the seven reservoirs in a recurrence of the five major floods in the Derby area.

a. March 1936. The March 1936 floods resulted from two periods of heavy rainfall centering on 11-13 and 17-19 March associated with the extensive melting of heavy snow cover. Although the rainfall in each storm averaged about 3 inches over the basin, peak flows were much greater in the first event due to two basic factors; (1) most of the rainfall in the first storm fell within 24 hours while the second was distributed over a 48-hour period, and (2) the first flood was augmented by snowmelt and minor ice jams.

b. September 1938. A stationary weather front along the Atlantic coast was overrun by a rapidly moving tropical hurricane, producing record breaking rainfall over large areas of Connecticut, Massachusetts and New Hampshire. The storm, which started with light rain, gradually increased in intensity over a 4-day period and ended with a heavy downpour associated with the hurricane. This rainfall pattern was especially conducive to high peak discharges due to the satisfying of initial soil moisture deficiencies before the period of intense rainfall occurred. Moreover, rainfall during the previous month was heavier than normal. The total storm rainfall averaged about 9 inches for the period 17-21 September. In the Derby area the flood occurred almost simultaneously with the abnormally high hurricane tide.

c. December 1948. The storm which produced this flood deposited 4 to 10 inches of rain in approximately 48 hours over the Housatonic River basin. This flood crested at stages slightly higher than the September 1938 event and was the maximum of record prior to 1955. Runoff from the rainfall was augmented by snowmelt and frozen ground conditions.

d. August 1955. The greatest flood of record within the Housatonic River watershed occurred in August 1955. Peak discharges were 3 to 4 times the magnitude of any other flood. It also would have been the record event on the lower portion of Housatonic River

TABLE B-2

EFFECT OF NAUGATUCK RIVER RESERVOIR SYSTEM ON MAJOR FLOODS AT DERBY, CONNECTICUT

Flood	Naugatuck Discharge		Stage At Division Street		Confluence with Housatonic River		Tide
	Natural (cfs)	Modified* (cfs)	Natural (msl)	Modified* (msl)	Natural (msl)	Modified* (msl)	
Mar 1936	27,000	-	21±	-	18.0	-	-
Sep 1938	30,000	15,000	21.3	19.6	19.6	18.8	Abnormal
Dec 1948	32,700	15,600	18.8	17.4	17.2	16.0	Normal
Aug 1955	112,000	54,000	27.9	22.6	21.0	18.4	Normal
Oct 1955	40,000	23,000	23.8	21.4	21.0	20.5	Abnormal
SPF	148,000	75,000	33.0 (est)	30.0	28.3	26.0	Abnormal

* The following reservoirs modify stages at Derby: Thomaston, Hall Meadow Brook, East Branch, Northfield Brook, Black Rock, Hancock Brook and Hop Brook

except for Shepaug Dam which had just been completed and the storage provided by Lake Lillinonah. Between 11-15 August, hurricane "Connie" deposited 4 to 8 inches of rain in the basin, but little runoff occurred due to unusually dry antecedent conditions. However, when hurricane "Diane" produced record amounts of precipitation, between 10 to 13 inches, on regions previously saturated by rainfall from hurricane "Connie", runoff of record proportions occurred. Most of the rainfall occurred in a 24-hour period between 7 a.m. on 18 August to 7 a.m. on 19 August. Failure of many dams and bridges contributed substantially to peak discharges.

e. October 1955. The flood occurring as a result of the storm of 14-17 October 1955 was confined to southwestern Connecticut and western Massachusetts. Approximately 9 inches of rain were deposited during the 72-hour storm period. It was the second largest flood of record on the Naugatuck River at Ansonia, and abnormally high tides contributed to the flood stages in the communities of Ansonia and Derby.

12. ANALYSIS OF FLOODS AT DERBY

a. General. Flood stages in Derby near the confluence of the Housatonic and Naugatuck Rivers are produced by total concurrent flood discharges from the two rivers in association with tide conditions in Long Island Sound. A tabulation of high water elevations in the vicinity of the Derby pumping station during past floods is shown on table B-5.

b. Flood development. Due to the large amount of natural valley storage, the upper Housatonic basin, principally above the Massachusetts State line, contributes little to flood peaks at Derby. As a result, maximum flows on the Housatonic at Derby are largely produced by the drainage area below the Connecticut-Massachusetts State line and peak flows from this area tend to coincide with the rapid development of floods on the Naugatuck River. Naugatuck River flows will be substantially reduced by the reservoir system, however, the effect at Derby may not be as pronounced because of the runoff from the uncontrolled drainage areas.

13. PROJECT DESIGN FLOOD

The protective works at Derby are designed for the Standard Project Flood concurrent with an abnormally high tide in Long Island Sound. Maximum river stages in the Derby area were

obtained from the following conditions: (1) peak discharge in the Naugatuck River resulting from the Standard Project Storm centered over the basin, (2) concurrent floodflow in the Housatonic River from the same storm, and (3) abnormally high tide in Long Island Sound. These conditions would result in a peak discharge of 75,000 cfs in the Naugatuck River, modified by the existing reservoir system, coincident with a flow of 145,000 cfs in the Housatonic River causing an estimated water surface elevation of 26 feet msl at the Derby pumping station.

14. FREQUENCY OF FLOODING

As previously noted, river stages in the Derby area are affected by Naugatuck or Housatonic River discharges in conjunction with concurrent tide conditions. However, in order to provide the Project Superintendent with a background on frequency of river flood stages under existing conditions, the following tabulation is included.

TABLE B-3

FREQUENCY OF FLOODING

Frequency in Years	Estimated River Elevation at Pumping Station
100	21
50	19
10	15
2	11
1	9

DESCRIPTION OF OPERATIONAL ELEMENTS

15. GENERAL

This section briefly describes the elements of the flood protection works and related appurtenances that city personnel will operate prior to and during floods. These elements consist of one pumping station, 4 railroad gates and 4 sluice gate structures. A general plan of the project is shown on plate B-2.

16. DERBY PUMPING STATION

The pumping station consists of three pumps with a total discharge capacity of 200 cfs (90,000 gpm) to discharge over the top of the dike runoff from interior drainage areas 3, 4A, 4B, 4C, 5 and 7, which are delineated on plate B-9. There is sufficient pumping capacity so that with one pump inoperable the station can discharge two-thirds of the design runoff based on the existing developments in the drainage areas.

Three sump gates, one located in front of each pump will seal off the pumps except when opened for activation of the station. The gates are equipped with hand-operated floorstands (exterior of building), and are opened or closed by means of a power driven wrench or handcrank. An electric driven gravity conduit gate is provided on the riverside of the dike to close off the gravity flow conduit. If commercial power fails, an automatic transfer to an existing 170 kw emergency generator at the Derby Sewage Treatment Plant will supply power to the pumping station and sluice gate No. 2.

In addition to the interior storm drainage runoff coming into the pumping station, there is also a 24-inch line which normally discharges treated effluent from the Derby Sewage Treatment Plant. The inflows to the plant are combined storm drain and sanitary sewer influent. However, in order to avoid overtaxing the capacity of the existing plant facilities during periods of intense rainfall, an automatic flood valve bypasses a portion of the plant's untreated influent directly to the 24-inch line and into the pumping station.

The operator will proceed to activate the station according to the following steps and in conjunction with the pumping station operating schedule shown on plate B-4.

a. Open all sump gates.

b. Start pump(s) when the sump water level reaches the indicated high level on the schedule.

c. Close gravity conduit gate (sluice gate No. 2).

Site plans and station layout are shown in Appendix E.

17. SLUICE GATE STRUCTURES

All eight drainage areas contributing to interior runoff are shown on plate B-9. Subarea 3 is a low area and drainage will be collected and discharged at the pumping station by gravity or pumping, depending on the concurrent river stage. Subarea 6 drains into an existing low area and interior runoff is temporarily ponded or discharged by gravity flow depending on Naugatuck River stages. The remaining subareas are entirely above the project design flood stage and the runoff will be intercepted in drop inlets and carried by pressure conduits to the river. All gravity outlets are designed to discharge runoff from a 100-year storm.

A brief description of each sluice gate structure is given in the following paragraphs. A more detailed description is given in Section E (Drainage Structures) of the manual.

Sluice gates 1, 3 and 11 can normally be operated by a power driven wrench from a portable generator, however, in an emergency they can be hand operated with a crank. The gravity conduit gate for the pumping station is motor operated from the top of the sluice gate structure No. 2.

a. Sluice gate structure 1 is on a gravity storm drain through the Naugatuck River dike. During periods of high water the 72- by 72-inch sluice gate will be closed and interior drainage temporarily ponded.

b. Sluice gate structure 2 is on the gravity outlet at the Derby pumping station. The 96- by 72-inch gravity conduit gate for the pumping station is motor operated and can be closed from the top of the sluice gate structure No. 2.

c. Sluice gate structure 3 is on an 18-inch sanitary syphon sewerline which crosses the Naugatuck River. The 18- by 18-inch sluice gate would be closed only if a rupture occurred in the sewerline crossing and river water was backing up through the sluice gate into area 3.

d. Sluice gate structure 11 is on a 48-inch pressure conduit located about 1,200 feet downstream of Division Street. The 48- by 48-inch sluice gate will be closed only if a rupture occurred in the lower portion of the 48-inch conduit and river water was backing up through the sluice gate into the protected area.

18. RAILROAD GATES

Four openings through the dike for railroad traffic will be closed by gates in accordance with SOP, plate B-3. Section G (Closure Structures) of the manual includes a complete description of each gate, a sequence of operation for closing of railroad gates and a description of the tools and equipment needed. It is estimated that it will take 30 minutes to close each gate including the placing of sandbags. Each opening is briefly described below.

a. Railroad gate 1 is located on the north side of the Route 34 bridge on the main line tracks and on the Naugatuck River side of the project. The gate consists of one leaf about 32 feet long and 11 feet high with a sill elevation of 19.25 feet msl.

b. Railroad gate 2A is located on the west side of Route 8 on a spur track. The gate consists of one leaf about 28 feet long and 11.5 feet high with a sill elevation of 18.6 feet msl.

c. Railroad gate 2B is adjacent to gate 2A and closes off two tracks. The gate consists of one leaf about 41.5 feet long and 9.0 feet high with a sill elevation of 20.9 feet msl.

d. Railroad gate 3 is located in the Housatonic River dike at the east end of a railroad bridge over the Housatonic River. It is a single leaf gate about 32 feet in length and 11 feet high with a sill elevation of 23.35 feet msl.

OPERATIONAL CONSIDERATIONS

19. GENERAL

a. Procedure items considered. There are several items that must be considered and weighed in prescribing operational procedures for this project. The principal considerations are:

(1) Interpretation of National Weather Service "watch" and "warning" in regards to storms and floods at Derby from the Naugatuck River, Housatonic River and high tides.

(2) The time needed by the Superintendent to mobilize personnel associated with the operation of the project.

(3) Activation time at the pumping station.

(4) Allow sufficient time to notify railroad of intended closing of railroad gates.

(5) The time necessary to close and sandbag the railroad gates with consideration given to expected weather conditions such as wind, snow and ice removal, time of day, etc.

(6) Establishing and maintaining a direct line of communication with the railroad to keep them informed of the flood situation.

(7) Maintaining communications with Ansonia personnel.

b. Personnel required. Approximately 10 men, including the Superintendent, is the number that should be available for duty. A brief description of the duties follows:

(1) Pumping station operators. Two men are required at the station to operate the sluice gates, run the pumps, read the gages and maintain an operations log.

(2) Railroad gate crew. Four men are required to set out red flags and lanterns, close the gates and place sandbags on the riverside of the gates.

(3) Reserve crew. Approximately three men will help set out flags and lanterns, close railroad gates, place sandbags, close sluice gates, or stand by to meet any emergencies.

During flood periods the protective works shall be patrolled continuously to locate possible leakage at dikes, floodwalls and gate closures. Six men from the railroad gate crew and the reserve crew will become the patrol crew after the gates have been closed and sandbagged. This crew should be split into three teams of two men and the patrolmen should be thoroughly instructed as to their duties, what they are to watch for the the exact limits of their patrol.

20. STORM AND FLOOD FORECASTS

The National Weather Service issues "watch" or "warning" for storms and floods that threaten the area. The National Weather Service definitions for the terms "watch" and "warning" are as follows:

Watch: Alerts the public that a storm is approaching the area. People in the alerted area should keep listening for the latest advisories over radio and television and begin to take precautionary measures.

Warning: A storm is imminent and immediate action should be taken to protect life and property.

In the event that such a potential threat exists, the personnel responsible for the local protection should make themselves available for quick mobilization. It should also be considered that whenever moderate flows are already occurring in the river, the time required for 2 inches of rainfall to affect stages will be shorter than 2 inches of rain during low flow or dry conditions.

21. MOBILIZATION - PUMPING STATION

The actual time required to mobilize personnel and activate the pumping station for a flood is dependent on many items and presently can only be estimated. In order to provide sufficient time to overcome unforeseeable personnel and mechanical difficulties, mobilization and staffing will begin when the river stage is 6 feet msl at the pumping station and is expected to go above 8 feet coincident with interior runoff.

The activation time for the sump gates to be operated by a single portable power driven wrench takes 10 minutes per gate or 30 minutes to close. If manual operation is necessary, it is estimated that it will take 20 minutes to open each sump gate. The gravity conduit gate would take about three hours or 5,100 turns to close manually.

22. MOBILIZATION - RAILROAD GATE STRUCTURES

Determination of the time at which the closures should be started must be based upon weather conditions, the rate of rise of stage, predicted peak and the time to complete the closures.

It is estimated that it will take a crew of 4 men about 30 minutes to close each railroad gate, including the placing of sandbags on the riverside of the gates. This means approximately 2 hours to complete the operation.

23. NOTIFICATIONS

A telephone directory, table B-4, is included for the convenience of the Project Superintendent. Notifications, if possible, will begin at least 3 hours before the start of the railroad gate closure operation and will include the following:

a. The city of Ansonia will be notified of the intended closing of railroad gates.

TABLE B-4
TELEPHONE DIRECTORY
(As of August 1973)

I CITY OF DERBY PERSONNEL

Mayor's Office	734-9203
Francis J. Gallo	734-9203
Public Works Department	734-7345
Raymond Margiano	734-7345 (Office)
60 Chestnut Drive	734-9365 (Home)
Police Department	734-1651

II CITY OF ANSONIA PERSONNEL

Supervisor of Flood Control-William LaRovera 735-9531, Home 734-3924
Foreman, Dept. of Public Works-Robert D'Mauro 734-1658
Mayor's Office - 735-6448
Police Department - 735-1885 Emergency Call 911
Civil Defense - Office 735-3668 Radio Room 735-2357

III RAILROAD PERSONNEL

Chief Train Dispatcher, Metropolitan Region (Passengers)
466 Lexington Ave., New York, N.Y. 10017
Telephone - 212-340-2381, 2382 or 2383

Chief Train Dispatcher, Northeastern Region (Freight)
54 Meadow St., New Haven, Conn.
Telephone - 203-497-2271 or 2272

IV OTHERS - NEWS MEDIA

Newspapers - Ansonia Evening Sentinel	734-2546
New Haven Register	734-2813

Radio Station WADS 735-4606

V CORPS OF ENGINEERS PERSONNEL

Reservoir Control Center
Office Hours* - 617-894-2400, X 627, 628, 629, 630
Nonoffice Hours** - 617-894-2414, 2415, 2418
Home Numbers:

Saul Cooper	Hull, Mass.	617-925-0984
Joseph Finegan	Peabody, Mass.	617-535-0586
Robert Mirick	Concord, Mass.	617-369-5259

Operations Division - 617-894-2400, X 478 or 306

Thomaston Dam, Thomaston, Conn. - 203-283-5540
Bernard Manor - Basin Manager
Allan Hoffman - Project Manager

VI NATIONAL WEATHER SERVICE

District Forecaster, Hartford, Conn.	203-623-1601 or 3888
River Forecast Center, Hartford, Conn.	203-244-2042 or 2014

* Monday through Friday, 0800 to 1630 hours
** Nights, holidays and weekends when switchboard is unmanned

b. Penn Central Transportation Company, New York and New Haven offices, will be notified of the intended closing of the railroad gates. Concurrence by the Penn Central Transportation Company of the halting of trains through Derby will be obtained before closing of the gates.

OPERATIONAL PHASES AND INSTRUCTIONS FOR FLOODS

24. GENERAL

It is anticipated that the city will establish a Flood Operations Headquarters at the Public Works Department offices. The Project Superintendent will be responsible for alerting and mobilizing work crews for storms that are predicted to be severe enough to produce heavy rain in excess of 2 inches or for other hydrologic conditions such as rainfall and snowmelt that could cause high riverflows. The operational functions have been divided into "phases" to assure a clear delineation of actions to be taken prior to or during flood conditions and are outlined as follows:

Phase 1 - Alert all personnel of possible flood

Phase 2 - Begin staffing operations

Phase 3 - Begin flood operations

Phase 4 - Cessation - rain ends, river recedes to nondamaging stage.

In order to simplify operational phases, all river stages referred to in the instructions (paragraph 25) are based on stages at the Derby pumping station. Stages can be read from either the staff gage or a recorder in the station.

25. INSTRUCTIONS

This section contains the instructions to be followed by personnel of the city of Derby during flood operations. The instructions have been condensed into chart form and are shown on plates B-3 and B-4.

a. Phase 1. The National Weather Service locates a storm and issues a storm watch for southern New England. The city will alert all personnel connected with the operation of the project

and will closely follow National Weather Service reports on the movements of the storm. Phase 1 may also be initiated for other conditions such as moderate riverflows, melting snow or the occurrence of 2 inches of rain in a 24-hour period.

b. Phase 2. Begin staffing operations at the pumping station when any of the following conditions develop:

(1) The NWS issues a flood warning for southern New England.

(2) Information received from the Corps of Engineers indicates that high flows could occur in the Naugatuck or Housatonic Rivers.

(3) The Housatonic River level reaches a stage of 6 feet msl with interior runoff and is expected to go above 8 feet.

Mobilize railroad gate crews when the river rises to 11 feet. If river stages are expected to continue rising, then notify effected parties of intended time of railroad gate closings and receive confirmation from railroad that all trains are stopped before gate closures are initiated.

It is possible that the rain will end and the riverflow will recede during this phase of the operation. In this case, phase 2 will remain in effect until the river falls below 11 feet for the railroad gate crews or below 6.5 feet without interior runoff for the pumping station crew.

c. Phase 3.

(1) Activate the pumping station when the river reaches 6.0 feet msl with interior runoff. Start the pump engines, open the sump gates, close gravity conduit gate and operate in accordance with the schedule on plate B-4. 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 while the river is still in flood. In this event, the gravity conduit gate will be kept closed and the engine(s) and pump(s) operated only as necessary to keep stages in the sump within operating limits. Alternate the operating of pumps during this period.

(2) Close gate at sluice gate structure No. 1 when the river stage reaches 8 feet msl.

(3) Begin railroad gate closure operations when the river rises to elevation 15 feet.

(a) If confirmation has not been received that all trains are stopped, it will be necessary to place two double-staff red flags and two lanterns on the mainline tracks at each of the following locations: (1) across the Housatonic River approximately 1,500 feet and one mile west of gate 3, (2) across the Naugatuck River approximately 1,500 feet and one mile southeast of gates 1, 2A and 2B, and (3) approximately 1,500 feet and one mile north of railroad gate 1 if Ansonia is not having railroad gate closures.

(b) One man will remain at each of the outermost points until confirmation is received that the trains are stopped.

(c) Close railroad gates in the following order: 1, 2A, 2B and 3.

d. Phase 4.

(1) When the river recedes to elevation 15 feet and is expected to continue falling, railroad gate cessation operations will commence as follows:

(a) Open and secure railroad gates in the reverse order.

(b) Notify Penn Central Transportation Company when all gates are secured and tracks are clear.

(2) Open sluice gate No. 1 when the river falls below 8 feet or when the river falls below the interior pond level.

(3) When the river level falls to about 6.5 feet, deactivate the pumping station in accordance with schedule on plate B-4.

At the completion of phase 4 the operation will revert back to phase 1 until the rain ends and the storm no longer poses a threat to the area.

26. RIVER LEVEL GAGES

a. Staff gage. Two sections of tile gage are located on sluice gate structure No. 2 near the Derby pumping station. The lower

section reads from -2.0 to 19.5 feet msl and is located on the wingwall of the conduit. The upper section reads from 18.5 to 31.0 feet and is located on the corner of the sluice gate structure.

b. Recorder gage. The pumping station is equipped with a river level indicator and recorder operated by a diaphragm box-type instrument located in the wingwall at the end of the gravity outlet. The indicator and recorder are located on the wall of the pumping station.

The diaphragm box measures pressure, caused by liquid above it, by compressing the air in the diaphragm and the capillary tubing that connects the diaphragm with the indicator. Pressure changes actuate a pressure spring in the indicator which causes the recording pen or pointer to move to the position corresponding to the river level. The diaphragm is subject to silting, therefore it should be inspected periodically and cleaned as necessary.

The 12-inch circular chart recorder has a chart drive mechanism for a 24-hour or a 7-day record. The recorder charts have a range of -10 to +40 feet with divisions of one-half foot. It is calibrated to show river elevations in feet above mean sea level. The indicator should be checked with the tile gage periodically for correct calibration.

During normal periods when the pumping station is not staffed, a new 7-day chart will be installed in the recorder each week. During periods of operation, a 24-hour chart will be installed and this will be used to evaluate the actual operating conditions. Upon staffing the pumping station, the operator will remove the 7-day and install a 24-hour chart. When changing charts (7-day to 24-hour) make sure the chart will be removed and mailed to RCC along with the previous 7-day chart and reports of the operation. A new 7-day chart will then be installed.

27. SUMP LEVEL GAGE

The pumping station is also equipped with a water level indicator for the station sump. The indicator is a Bristol float and cable-type similar to figure 2 as shown in Bulletin L 701 of the Bristol Company. A circular dial indicates the water level in feet above mean sea level and should be checked periodically for correct calibration with water depth in sump chamber.

28. LOCKS AND KEYS

Only two types of keys are necessary for all locks on the project. One type of key is for the pumping station door. The other is for all railroad gates, fence gates and other locks. Arrangements have been made such that a double lock with a chain will allow access through the lumber company yard to railroad gates 2A and 2B.

REPORTS

29. GENERAL

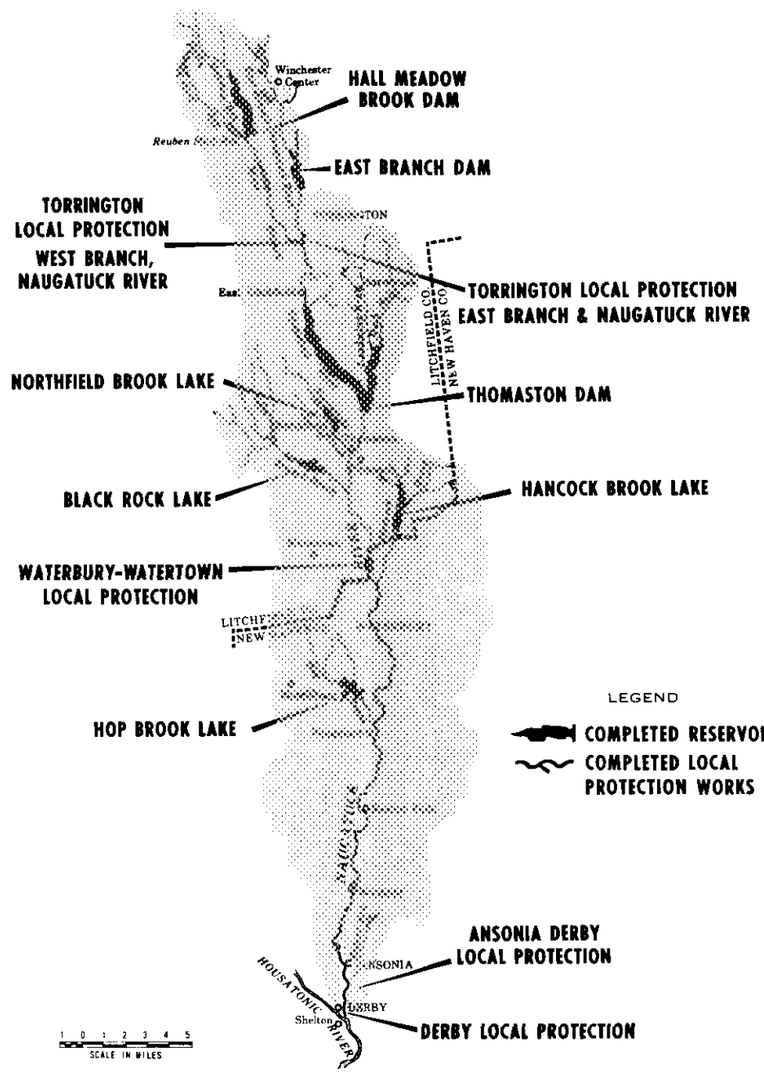
Prior to and during the operation of the project, information pertinent to any operation will be entered on a log or on a suggested form as shown on plates B-5 and B-6. The flood report will include times of railroad notifications, gate openings and closings, pumping operations, river elevations, and any other information or observations that would help in describing the entire operation.

During flood periods the pumping station operator will record river levels from the gages at half-hour intervals while on duty if for any reason the recorder chart is not functioning properly. Also, a record of rainfall increments or total rainfall at each hour will be made. These records will aid RCC in evaluating the operation procedures, adjusting the prescribed regulations and improving the function of the protection system. A copy of all charts, records and flood reports will be mailed to the Reservoir Control Center within a week after the operation. The normal maintenance and semi-annual inspection reports will be forwarded to the Division Engineer as required by paragraph 12, Section A (General) of the manual.

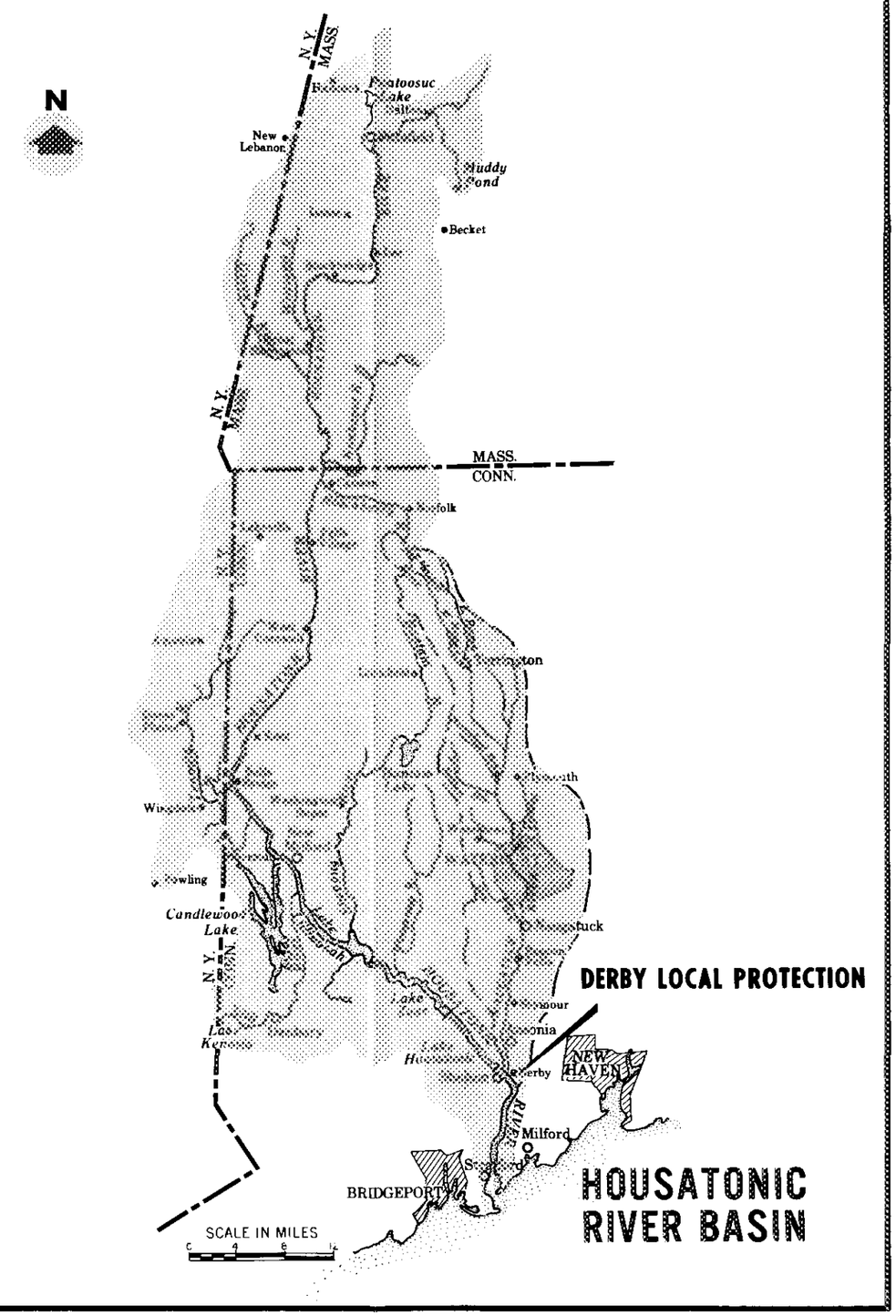
TABLE B-5

HIGH WATER ELEVATIONS
DERBY, CONNECTICUT

Date	Elevation Above Mean Sea Level
19 August 1955	21.0
15 October 1955	21.0
21 September 1938	19.6
March 1936	18.0
31 December 1948	17.2
25 November 1950	14.4
November 1953	12.4
February 1973	12.0



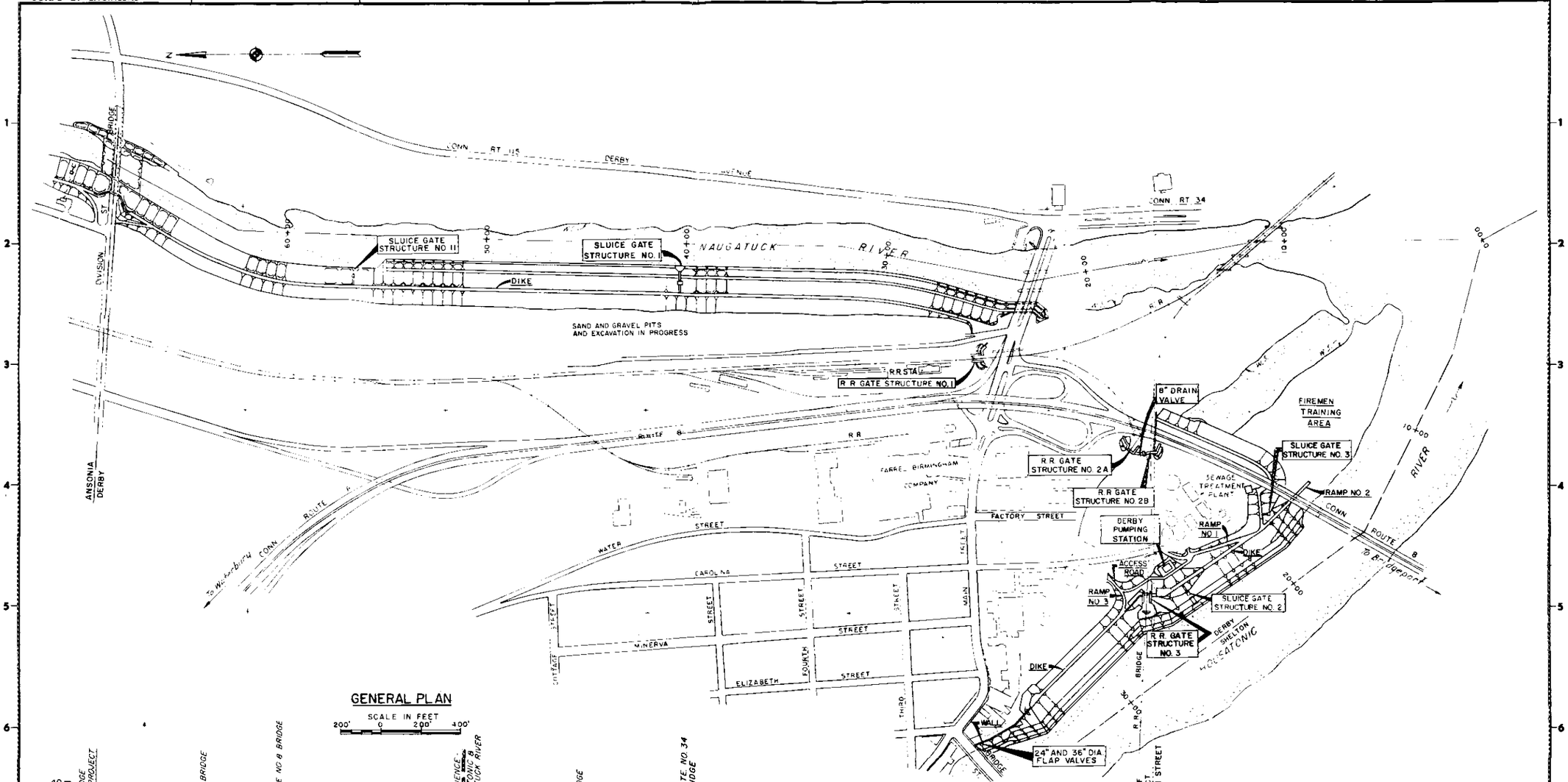
NAUGATUCK RIVER WATERSHED



HOUSATONIC RIVER BASIN

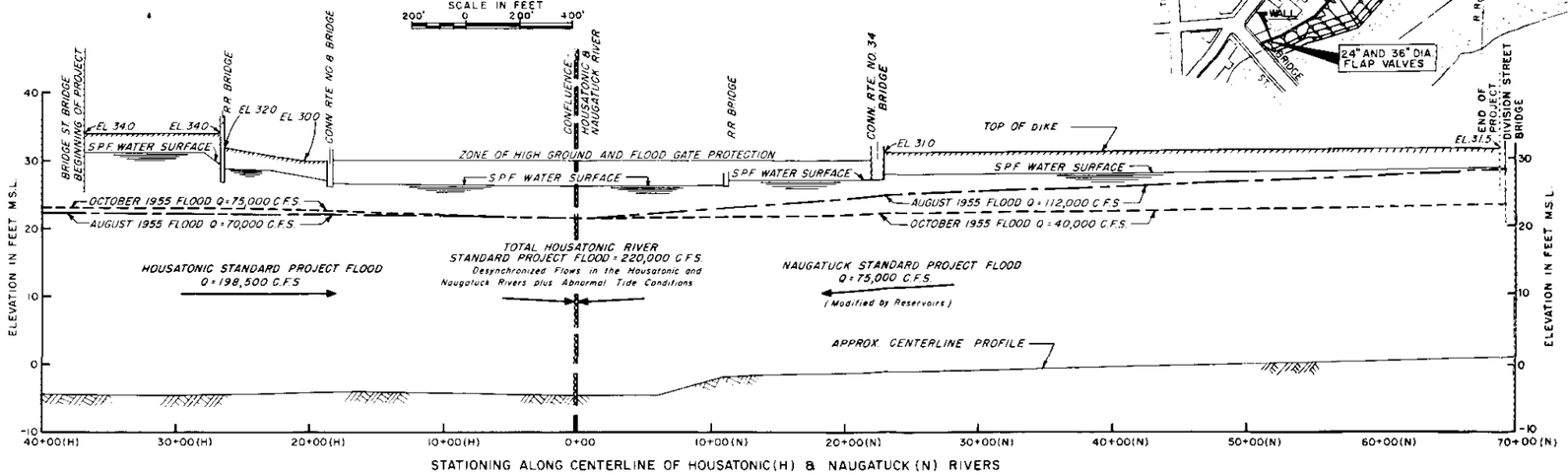
PLATE B-1

CORPS OF ENGINEERS U. S. ARMY



GENERAL PLAN

SCALE IN FEET 200' 0 200' 400'



PROFILE

REVISION	DATE	DESCRIPTION	BY

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

DR BY | TR BY | CK BY

PROJECT ENGINEER

CHIEF, HYD & HYD SECTION

SUBMITTED BY

CHIEF, PLANN & RPTS BRANCH

HOUSATONIC RIVER FLOOD CONTROL
LOCAL PROTECTION - DERBY, CONN.

PLAN & PROFILES

HOUSATONIC & NAUGATUCK RIVERS, CONN.

APPROVED DATE

CHIEF, ENGINEERING DIVISION

SCALE: AS NOTED

DRAWING NUMBER

SHEET

STANDARD OPERATING PROCEDURES
DERBY FLOOD PROTECTION WORKS

Phase	Condition	Personnel	Railroad Gates	Sluice Gate Structures #1, 3, 11	Derby Pumping Station Gates	Derby Pumping Station Pumps
	Normal	Inactive	Open	Open	Gravity Conduit - Open Sump - Closed	Idle
1 (ALERTING)	a. National Weather Service issues a flood watch for southern New England b. Rainfall 2 inches in a 24-hour period c. Moderate riverflow	All personnel will be alerted	Open	Normal	Normal	Idle
2 (STAFFING)	a. NWS issues flood warning for southern New England b. Information from the Corps of Engineers indicates high riverflows could occur c. Stage at pumping station is 6 feet with interior runoff and expected to go above 8 feet.	Staff pumping station	Open	Normal	Normal	Idle
	d. Stage at the pumping station 11 feet and rising	Mobilize railroad gate crews Notify railroad of intended closure and subsequently receive confirmation that trains are stopped	Open	(See 3b)	(See 3a)	(See 3a)
3 (OPERATION)	a. Stage 6.0 feet with interior runoff	Activate the pumping station	Open	--	Open sump gates Close gravity conduit	Operate by schedule (plate B-4)
	b. Stage 8 feet and rising		Open	Close sluice gate #1 *	--	--
	c. Stage 15 feet and rising	Begin railroad gate closing operations. Close 8-inch drain valve at gate 2B.	Close gates 1, 2A, 2B & 3	*	--	--
4 (CESSATION)	a. Stage recedes below 15 feet with both the Naugatuck and Housatonic Rivers expected to continue falling	Begin railroad gate opening operations. Open 8-inch drain valve at gate 2B. Notify railroad when gates are all open and secured	Open gates 3, 2B, 2A & 1	Open sluice gate #1 when river falls below the interior pond level or 8 feet *	--	Operating
	b. Stage recedes to about 6.5 feet.		--	Normal	Open sump gates Open gravity conduit by schedule (see plate B-4)	Stop by schedule (see plate B-4)
1	Phase 1 remains in effect until storm no longer threatens area and stage recedes below 6.0 feet	All personnel remain on ALERT status	Open	Normal	Normal	Idle

* Sluice gates 3 and 11 to be closed only if a rupture occurs in the conduit and river water is backing up into protected areas.

DERBY PUMPING STATION OPERATING SCHEDULE

Normal Conditions

During nonflood times the station will be in the following status:

1. Sump gates closed
2. Gravity conduit gate open
3. Seven-day recording chart operating
4. Automatic sump pump on

Flood Operations

Activate Station

When the river stage rises to elevation 6.0 feet msl with interior runoff occurring the operators will:

1. Start pump engines
2. Shut off automatic sump pump
3. Open sump gates
4. Operate pump(s)
5. Close gravity conduit gate
6. Replace 7-day stage chart with 24-hour chart (change chart drive mechanism)

Pump Operations

Operate engine(s) and pump(s) according to the following schedule:

	Pumps*		
	No. 1	No. 2	No. 3
	(sump gage elevation in feet)		
Start	6.0	6.5	7.0
Stop	4.0	3.5	3.0

* This schedule was established because the minimum catch basin elevation in drainage area #3 is about 8 feet msl. Therefore because of the possibility of untreated sewage from the treatment plant, it is considered necessary to try and keep the level at or below 6 feet during periods of interior runoff in order that the sewage treatment plant may stay in operation.

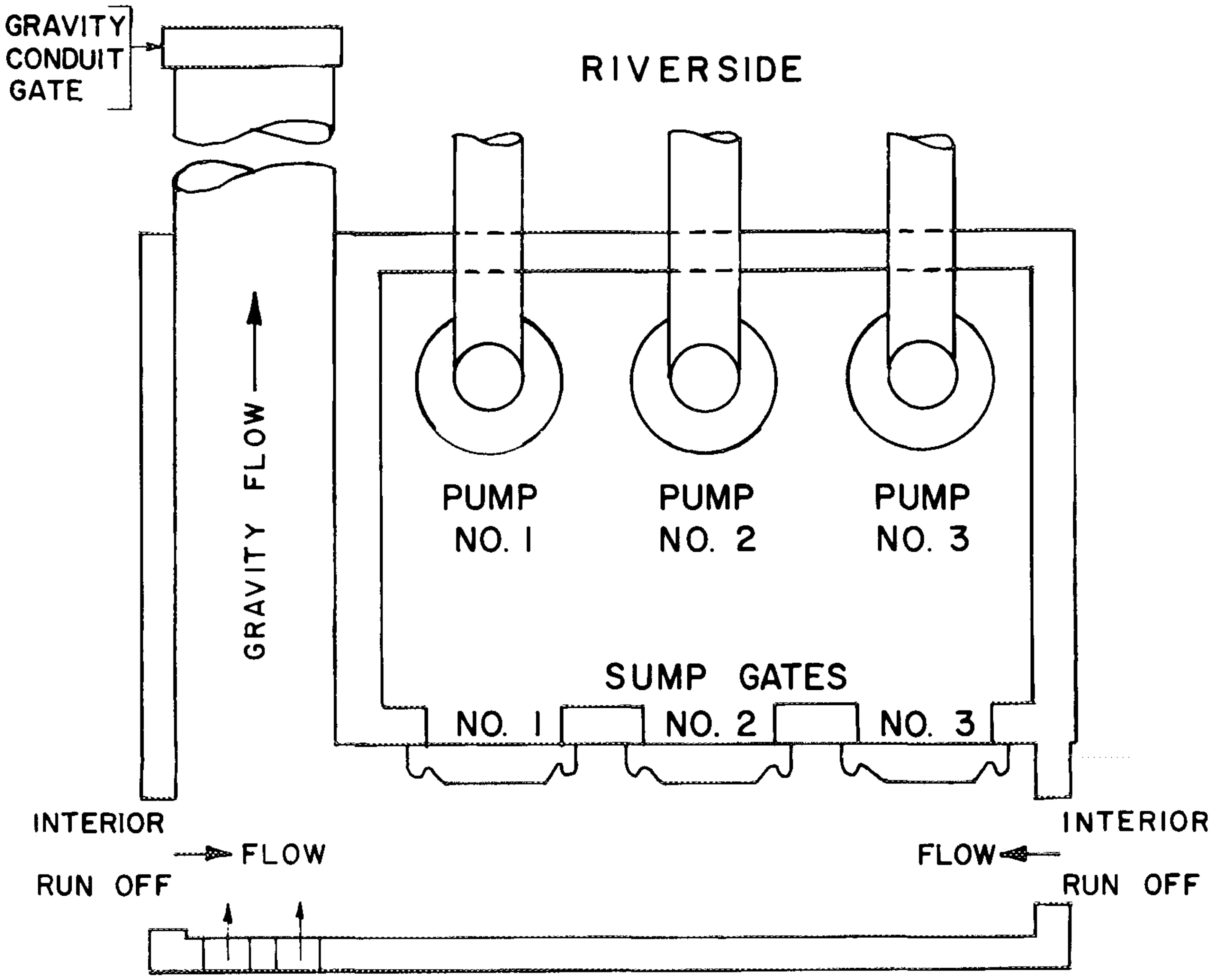
Deactivate Station

When the river stage recedes to about 6.5 feet the operator will:

1. Open the gravity conduit gate
2. Close sump gates and stop pumps and engines
3. Turn on automatic sump pump
4. Complete station log
5. Replace new 7-day stage chart (Change chart drive mechanism back to 7 day)

DERBY PUMPING STATION

OPERATION LOG



TIME	RIVER EL.	SUMP EL.	SUMP GATES			GRAV. COND. GATE	PUMPS			REMARKS
			NO. 1	NO. 2	NO. 3		NO. 1	NO. 2	NO. 3	

DERBY OPERATION LOG-RAILROAD GATES
FLOOD OF _____

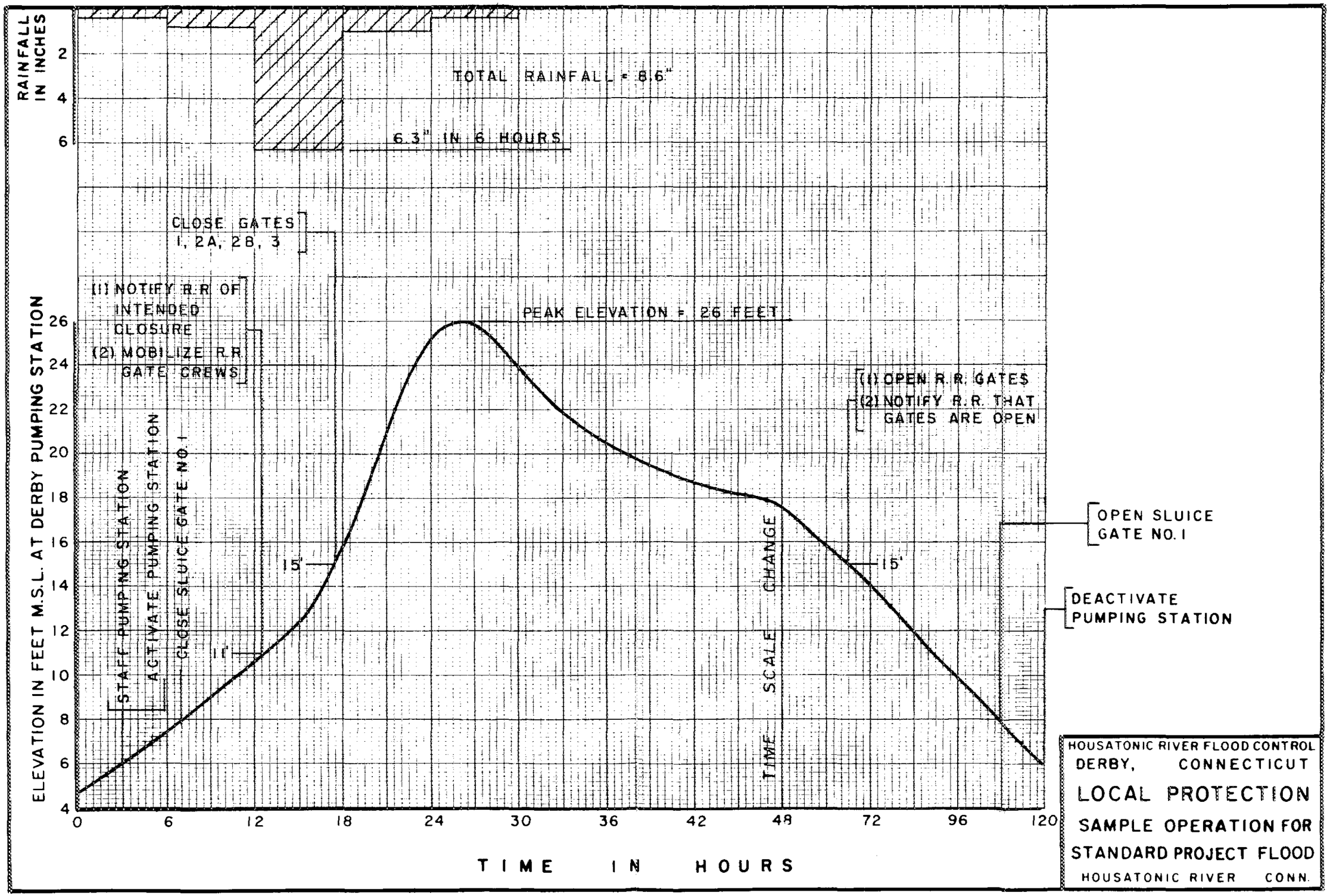
ACTIVITY	TIME IN HOURS	REMARKS
NOTIFY RAILROAD OF INTENDED CLOSURES		
SET FLAGS AND LANTERNS		
RECEIVED CONFIRMATION THAT TRAINS HAVE STOPPED		

	TIME OF GATE OPERATION			
	NO. 1	NO. 2A	NO. 2B*	NO. 3
GATE CLOSED				
SANDBAGS PLACED				
GATE OPENED				
*CLOSE 8" DRAIN VALVE WHEN CLOSING GATE 2B				
NOTIFY RAILROAD THAT TRACKS ARE CLEAR AND GATES SECURED				

SUPERINTENDENT: _____

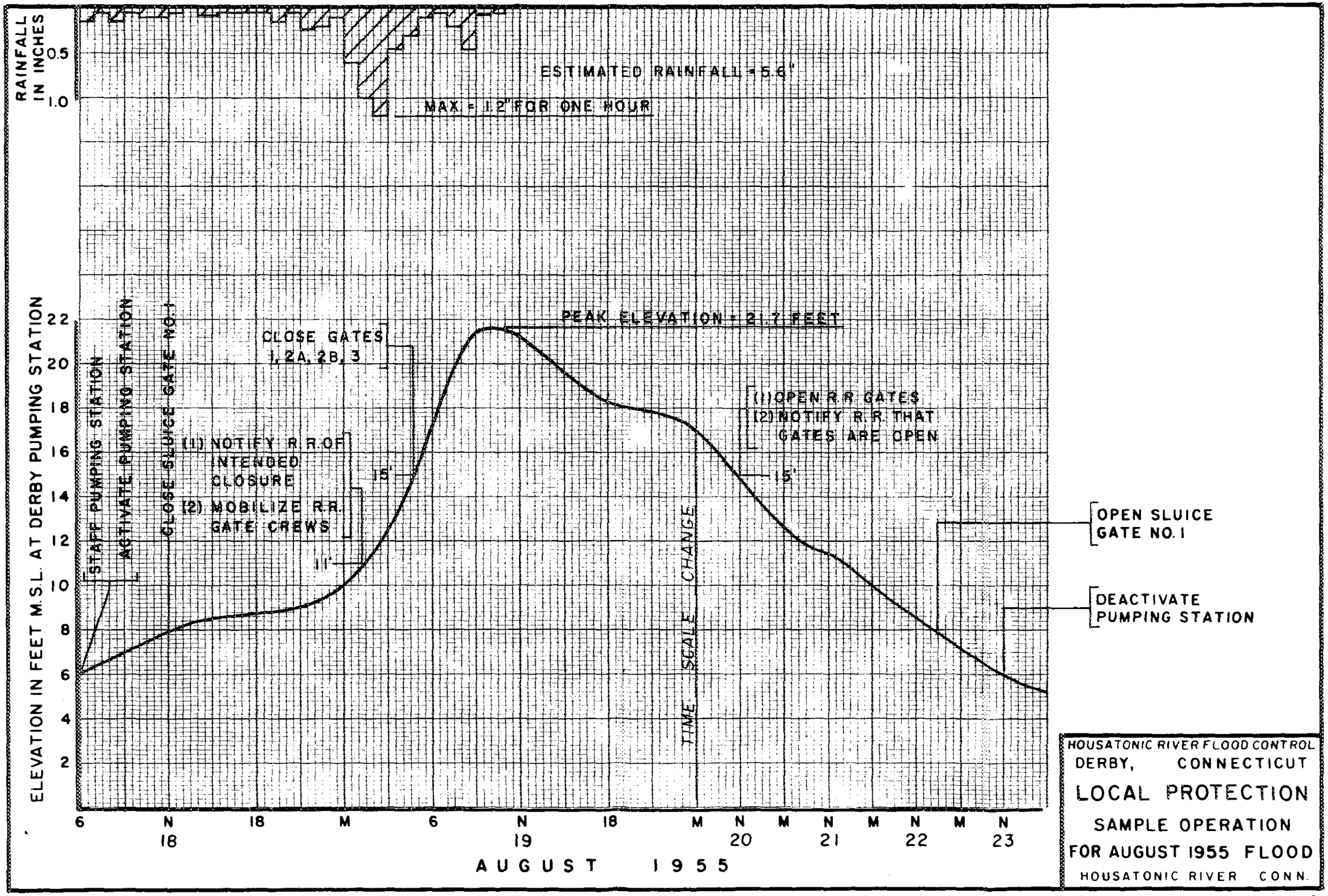
DATE: _____

PLATE B-6



HOUSATONIC RIVER FLOOD CONTROL
DERBY, CONNECTICUT
LOCAL PROTECTION
SAMPLE OPERATION FOR
STANDARD PROJECT FLOOD
HOUSATONIC RIVER CONN.

PLATE B-7



HOUSATONIC RIVER FLOOD CONTROL
DERBY, CONNECTICUT

LOCAL PROTECTION

SAMPLE OPERATION
FOR AUGUST 1955 FLOOD

HOUSATONIC RIVER CONN.

PLATE B-8

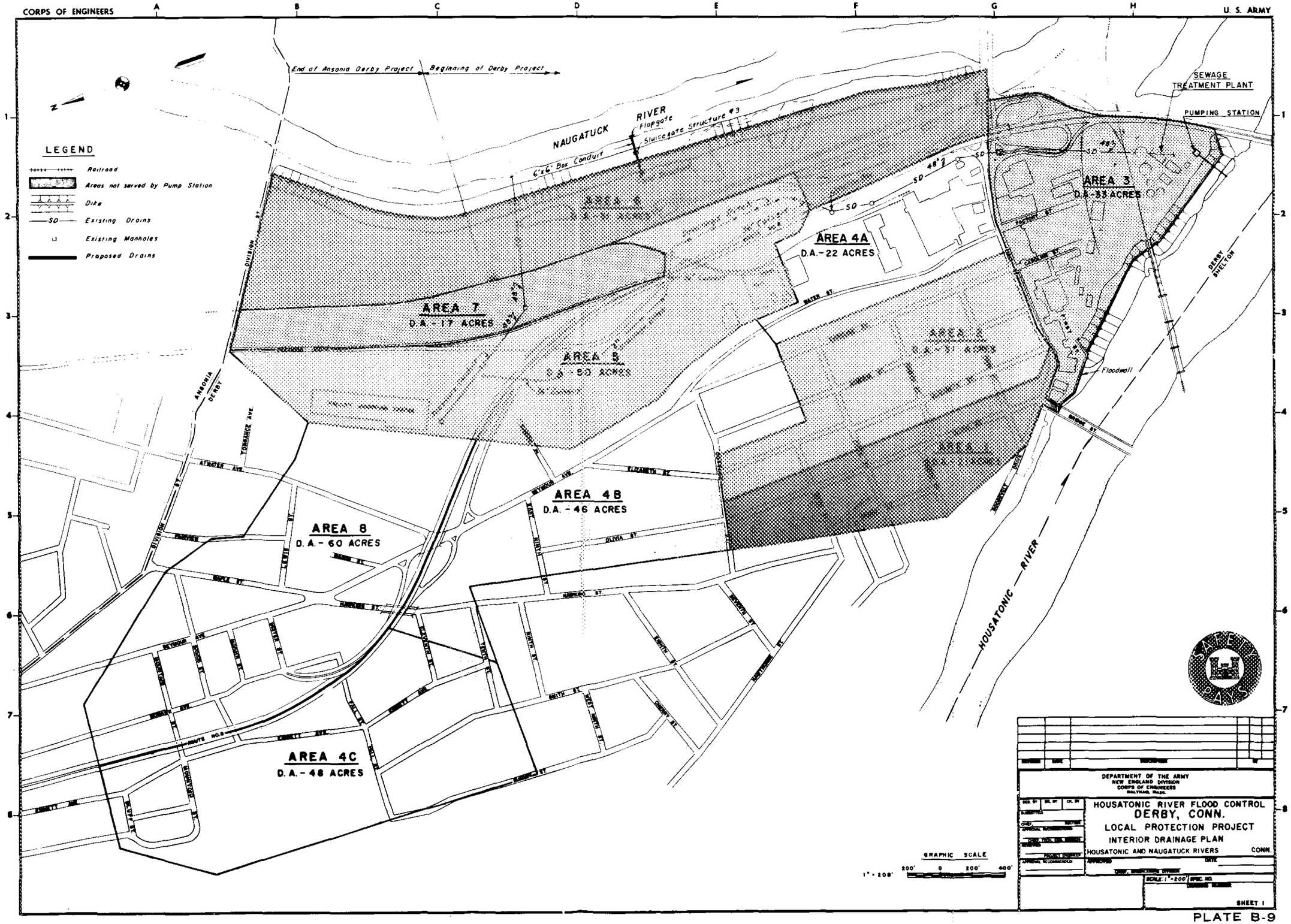

CORPS OF ENGINEERS
U. S. ARMY
End of Ansonia Derby Project
Beginning of Derby Project
LEGEND
Railroad
Areas not served by Pump Station
Dike
Existing Drains
Existing Manholes
Proposed Drains
NAUGATUCK RIVER
Flapgate
Sluicegate Structure #3
6'x6' Box Conduit
SEWAGE TREATMENT PLANT
PUMPING STATION
AREA 3
D.A.-33 ACRES
AREA 4A
D.A.-22 ACRES
AREA 7
D.A.-17 ACRES
AREA 5
D.A.-80 ACRES
AREA 4B
D.A.-46 ACRES
AREA 8
D.A.-60 ACRES
AREA 4C
D.A.-48 ACRES
Floodwall
HOUSATONIC RIVER
DERBY
SHELTON
ANSONIA
GRAPHIC SCALE
1" = 200'
200' 0 200' 400'
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY, CONN.
LOCAL PROTECTION PROJECT
INTERIOR DRAINAGE PLAN
HOUSATONIC AND NAUGATUCK RIVERS
CONN.
SCALE: 1" = 200'
SHEET 1

PLATE B-9

APPENDIX C

INSPECTION REPORT FORMS

Check List C-1 thru C-4

Form 513

Standard letter to Superintendent of
Local Flood Protection System
with four exhibits

FLOOD PROTECTIVE WORKS
DERBY LOCAL PROTECTION PROJECT
INSPECTION REPORT

CHECK LIST
Use with NED Form 513 - Inspection Report

1. Pumping Station

a. Structures

(1) Walls _____
(2) Roofs _____
(3) Painting _____

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, Sluice Gate and Drainage, Structures

a. Sluice Gates and Flap Gates

(1) When trial operated _____
(2) General condition _____
(3) Leaks _____
(4) Lubrication _____
(5) Painting _____

b. Sluice Gate and 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 stone protection _____
i. Condition of underdrains _____
j. Describe deficiencies, including location, and corrective measures planned _____

_____
_____
_____

4. Stop-Logs (Pumping Station) N/A (not applicable)

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 stone protection _____
e. Has there been any removal of stone? _____
f. Has there been any movement of the stone protection? _____
g. Describe deficiencies, including location, and corrective measures planned _____

_____
_____
_____

7. Concrete Structures (Floodwalls, pressure manholes and conduit, drainage and sluice gate structures, 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 underdrains _____
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 structrues? _____

i. Describe deficiencies, including location, and corrective measures planned _____

_____
_____
_____

8. Railroad Gates (Closure Structures)

a. When trial operated _____
b. General condition _____
c. Painting _____
d. Rubber seals _____
e. Concrete walls _____

9. 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? _____
f. Have the underdrains and observation risers been checked for proper functioning? List deficiencies, including location and corrective measures planned _____

_____
_____

10. 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, describe briefly, including dates, height of water, and effect on protective works. _____

_____

_____

_____

11. 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			

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.)

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

DATE	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.

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

/ALLACE W. WYMAN
TOWN ENGINEER
OHN 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 1984

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 initiated.
POWER SOURCE	X		
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			

ED FORM JAN 66 5-3

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-pointing.

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

DATE	INSPECTED BY: TYPED NAME & TITLE	SIGNATURE
5 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			

FORM

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.)

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

DATE	INSPECTED BY: TYPED NAME & TITLE	SIGNATURE
[illegible]	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 placed 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 [illegible] may be found to be desirable [illegible] be [illegible] or private showing [illegible] improvements or alterations as [illegible] shall be furnished the District Engineer after completion of the 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.

(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) The 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 [illegible] roadway thereon, if any, is well shaped and maintained;

(xi) There is no [illegible] 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) The 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 another vessel 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 in 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. 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.]

APPENDIX B

ASSURANCES OF LOCAL COOPERATION

CITY OF DERBY, CONNECTICUT

ASSURANCE
OF THE
CITY OF DERBY, CONNECTICUT

WHEREAS, the project for local flood protection on the Housatonic and Naugatuck Rivers at Derby, Connecticut, is authorized by Act of Congress approved 27 October 1965, Public Law 89-298, 89th Congress, 1st Session, substantially as recommended by the Chief of Engineers in House Document No. 324, 88th Congress; and

WHEREAS, the current estimate of the total project cost is $5,370,000.00; and

WHEREAS, local interests desiring the prosecution of this project are agreeable that certain assurances satisfactory to the Secretary of the Army for local co-operation will be executed.

NOW, THEREFORE, the City of Derby, Connecticut, hereby assures the United States of America that it will:

a. Provide without cost to the United States all lands, easements, and rights of way necessary for construction of the project including lands for spoil disposal, storm water pondage, and collector ditches together with necessary changes to sewer systems, highway bridges and roads, railroad track except railroad bridges and approaches, and other utilities;

b. Hold and save the United States free from damages due to the construction works;

c. Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army;

d. Prevent encroachment on improved channels and on ponding areas and if capacity of the latter is impaired, provide equally effective storage, pumping capacity, or both, without cost to the United States; and

e. Prevent encroachment within 20 feet of the top of the west bank of the Naugatuck River at the proposed channel widening upstream from the highway bridge at Derby.

IN WITNESS WHEREOF, the City of Derby, Connecticut, acting by and through its Mayor and with the approval and consent of its Board

of Aldermen, has executed the within Assurance and affixed its seal this

26th day of June, 1968.

CITY OF DERBY, CONNECTICUT

By /s/ R. J. Romano
MAYOR (ACTING)

SEAL

APPROVED BY
BOARD OF ALDERMEN
CITY OF DERBY, CONNECTICUT

/s/ Fardi Benanto

/s/ Casimer Piorkowski

/s/ Harry W. Ogle

/s/ Fred Bottone

ACCEPTANCE

24 September, 1968

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

/s/ F. R. Day
F. R. DAY
Colonel, Corps of Engineers
Acting Division Engineer

CERTIFICATE

I, /s/ Harry Colwell, do hereby certify that I am the City Clerk of the City of Derby of the State of Connecticut named herein; that Ralph J. Romano who signed this Assurance on behalf of the City of Derby was then and there the duly elected and qualified Mayor of the City of Derby; that said Assurance was duly signed for and on behalf of the City of Derby by virtue of his authority as Mayor, and is within the scope of his statutory powers. I also certify that Nardi Benanto, Harry W. Ogle, Fred Bottone, Casimir Piorkowski, _____, and _____, who approved this Assurance on behalf of the City of Derby were then and there the duly elected and qualified Aldermen of the City of Derby; that said Assurance was duly approved for and on behalf of the City of Derby, by virtue of their authority as Aldermen, and is within the scope of their statutory powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of the City of Derby, this 27 th day of June, 1968.

/s/ Harry F. Colwell
CITY CLERK

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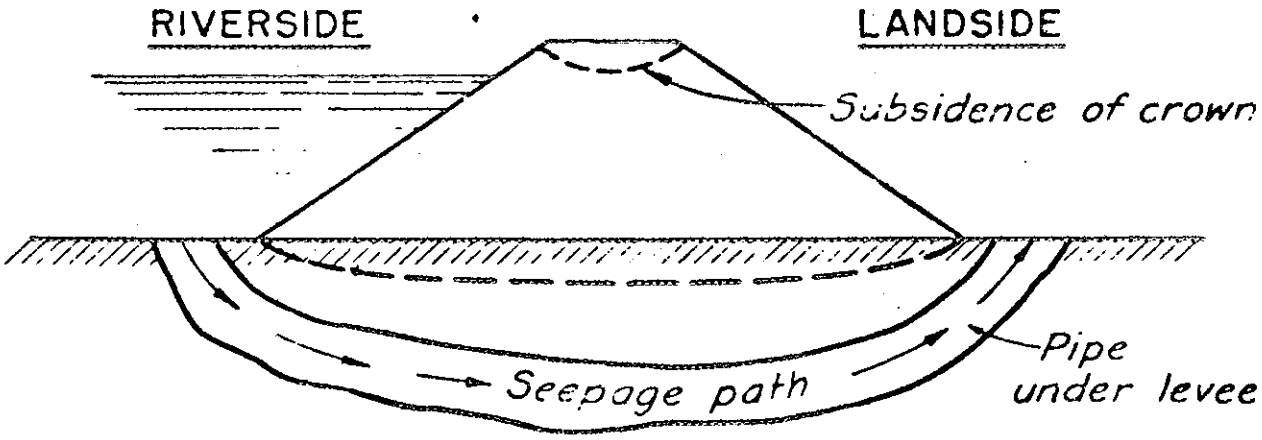
CITY SEAL

APPENDIX E

FLOOD EMERGENCY MEASURES

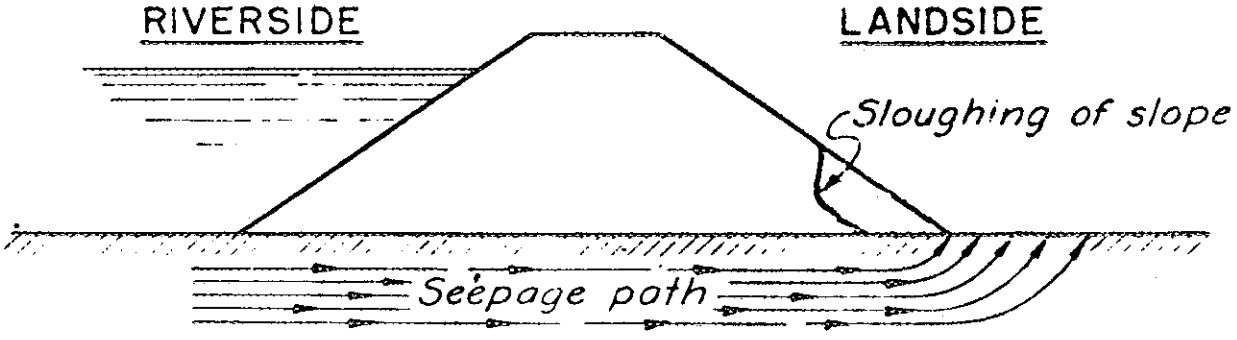
Plate No.	Title
I	Effect of Sand Boils
II	Sand Boil
III	Sacking Sloughs
IV	Sack Dike or Topping
V	Model Sack Dike or Topping
VI	Lumber and Sack Topping
VII	Flashboards

EFFECTS OF SAND BOILS ON LEVEE



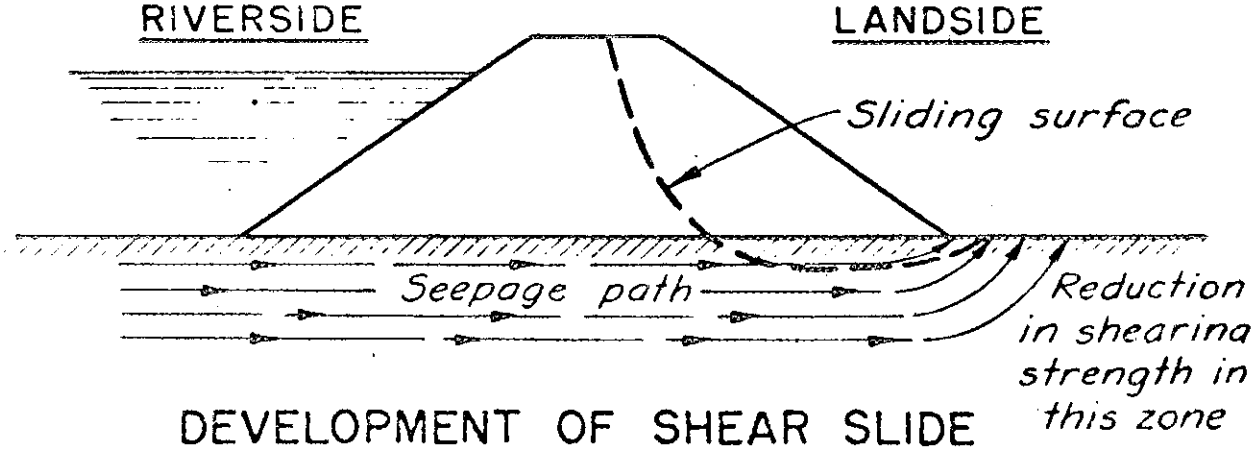
DEVELOPMENT OF PIPE UNDER LEVEE

Fig. 1



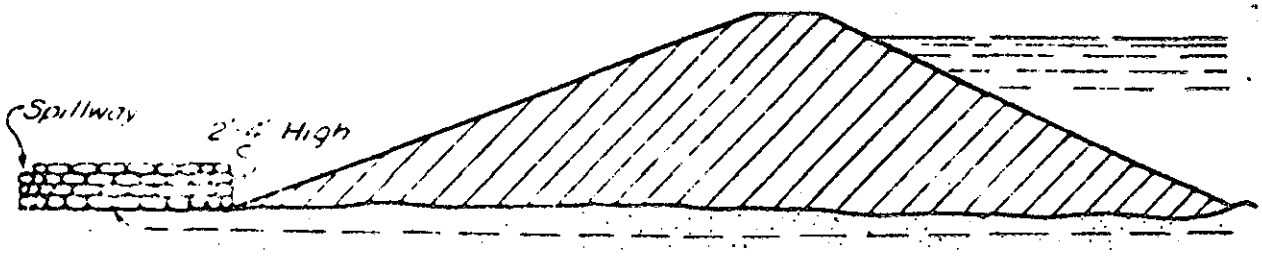
SLOUGHING OF LANDSLIDE SLOPE DUE TO RAVELLING AND UNDERCUTTING OF TOE

Fig. 2



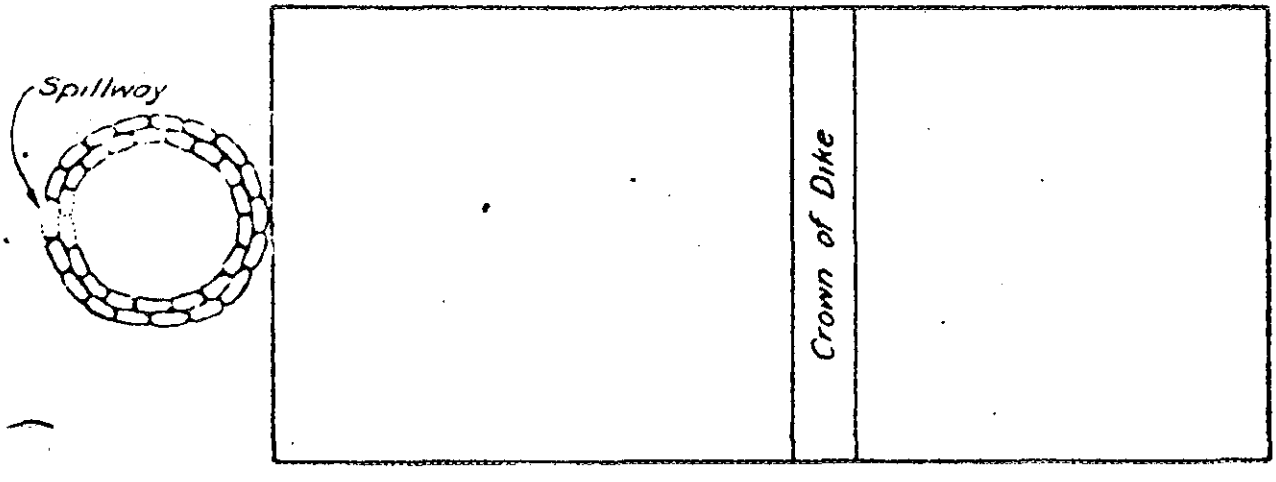
DEVELOPMENT OF SHEAR SLIDE

Fig. 3.



Wall should be built on firm 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.

ELEVATION



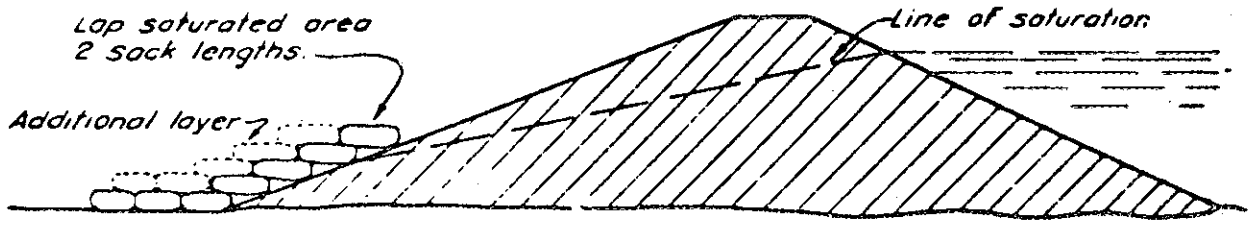
PLAN

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

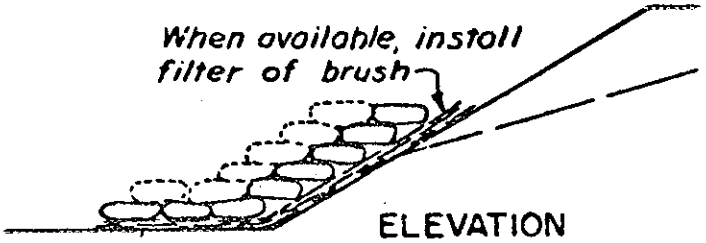
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. II

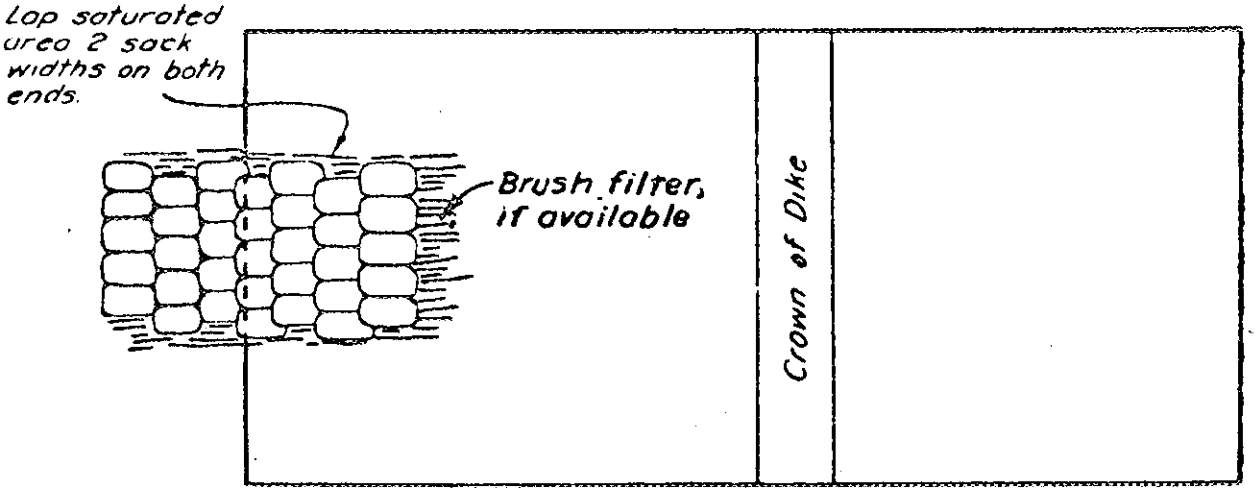


ELEVATION

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



ELEVATION



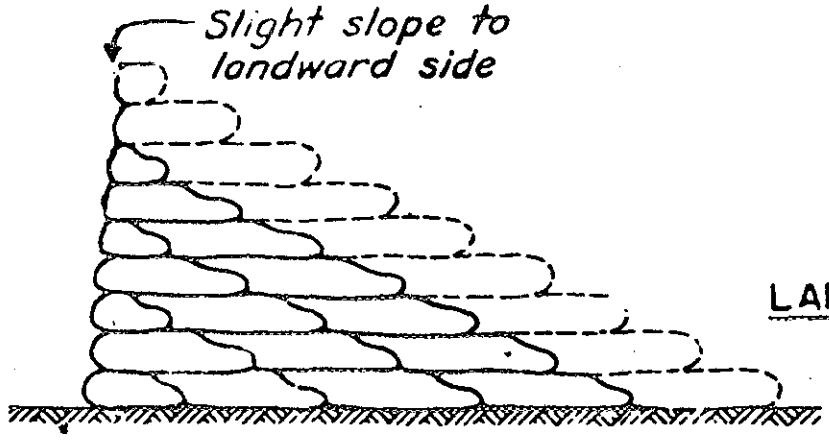
PLAN

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.

PLATE NO. III

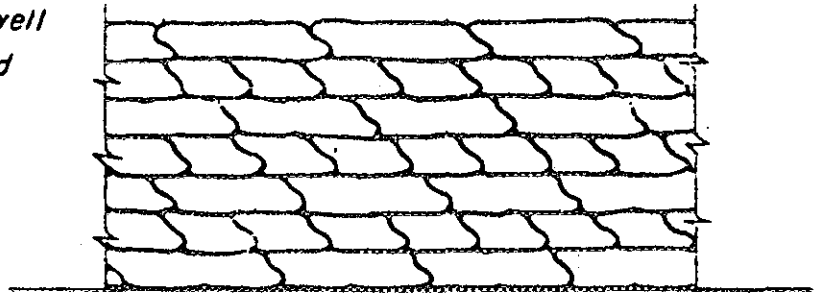


RIVERSIDE

LANDSIDE

SECTION

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



RIVERSIDE ELEVATION

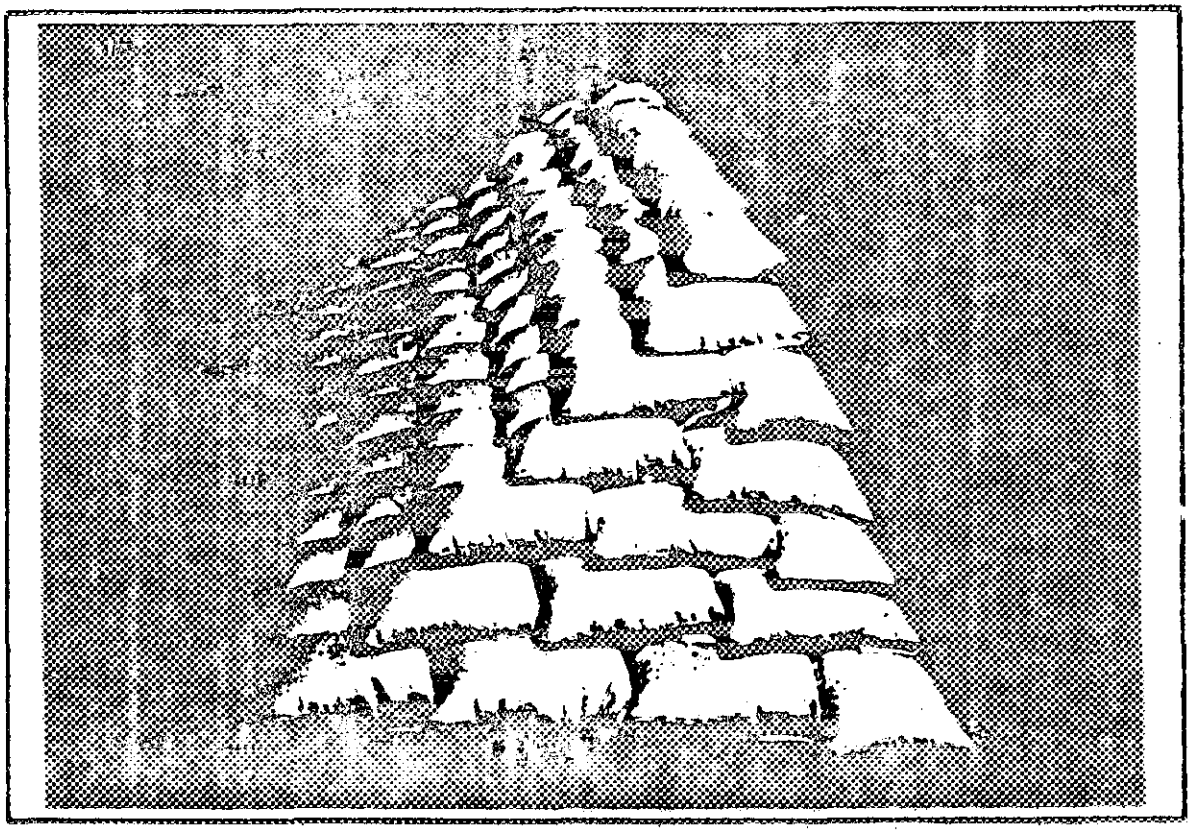
SACKS REQUIRED PER 100' STA.
100 lb. "Feed" Sacks - 1 Cu. Ft. Each

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

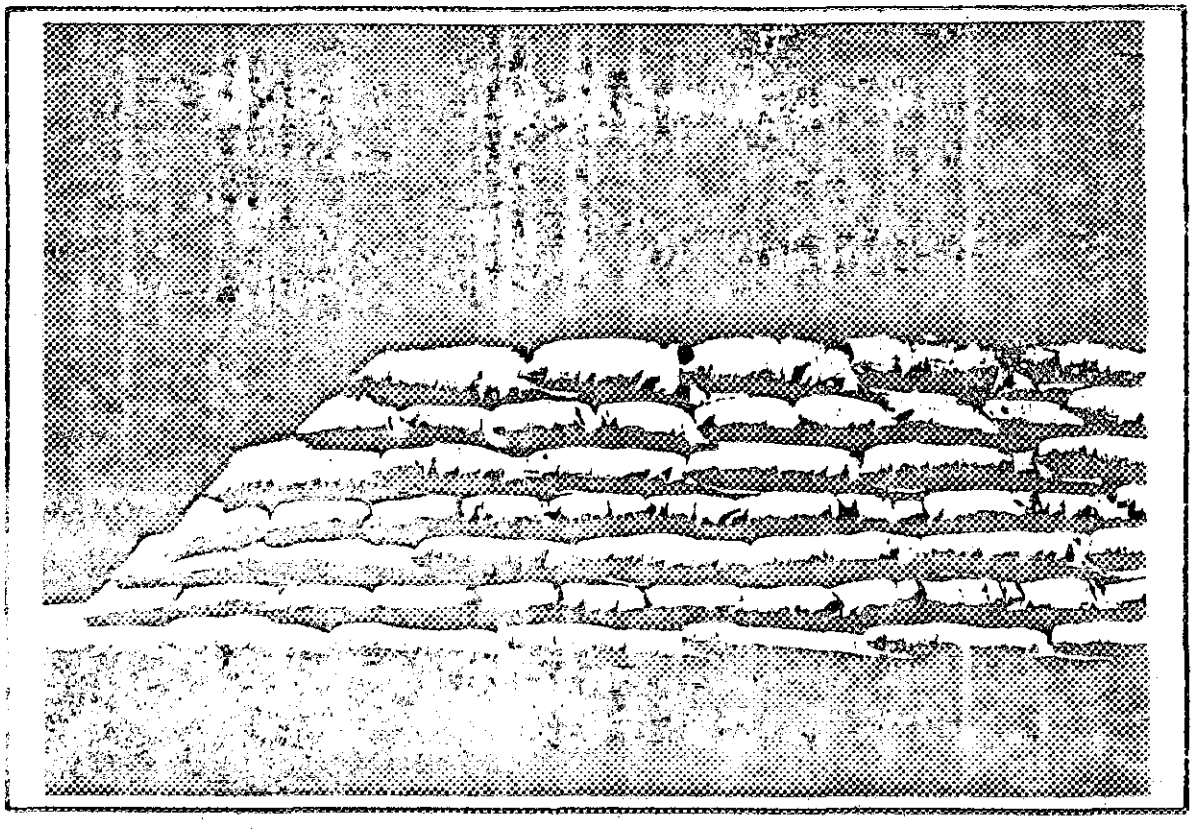
SACK DIKE OR TOPPING
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

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

PLATE NO. IV

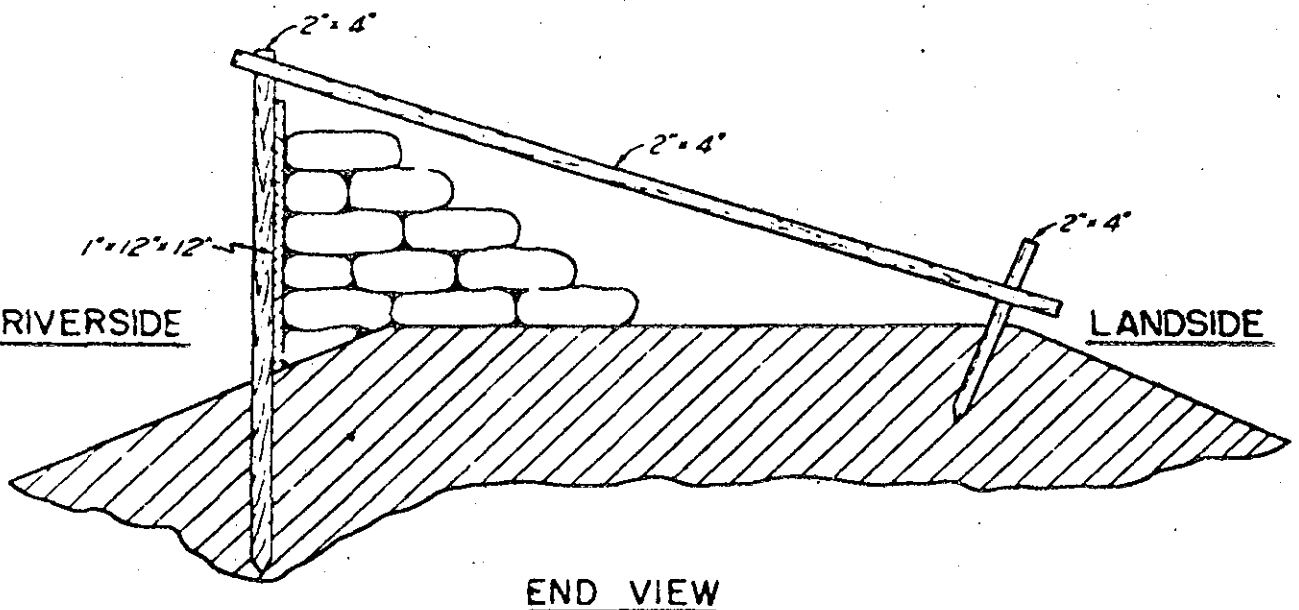


MODEL SACK DIKE OR TOPPING
Typical Section

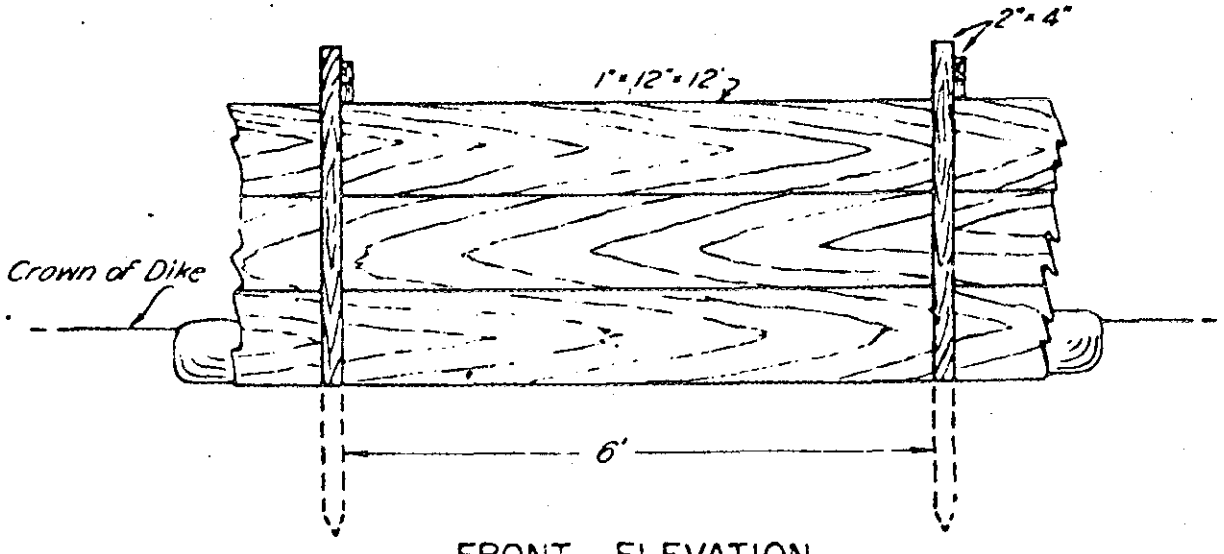


MODEL SACK DIKE OR TOPPING
Riverside View

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'

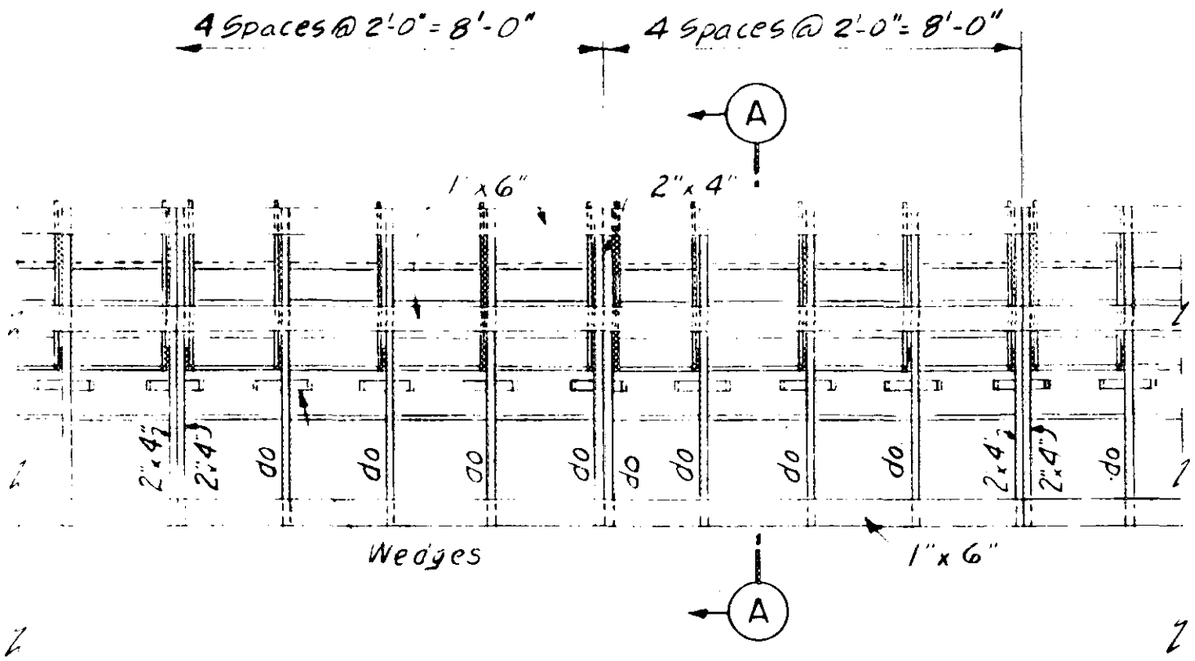
LUMBER AND SACK TOPPING
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

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

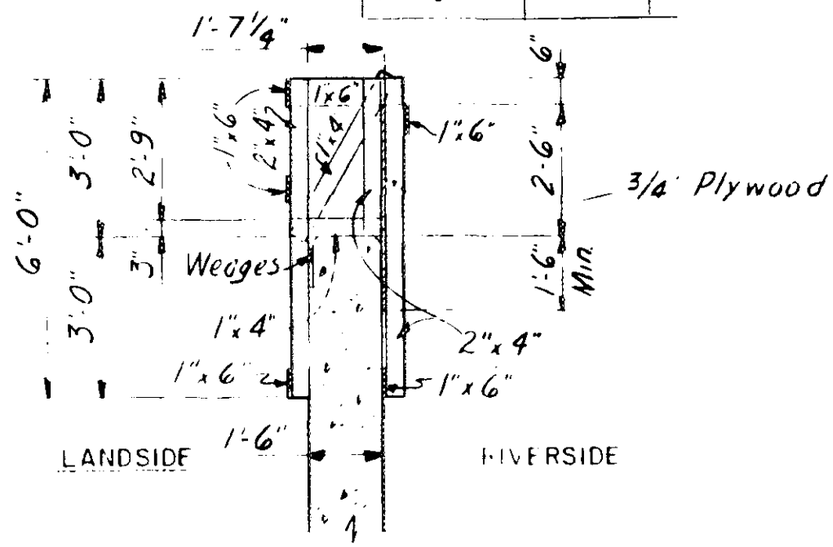
PLATE NO. VI

BILL OF MATERIALS

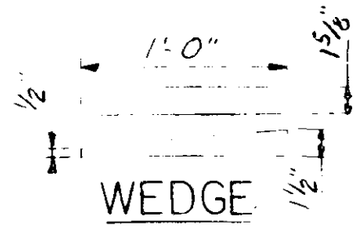
For One 8'-0" Panel		Regular Wall Section
Uprights	10 pcs	2" x 4" x 6'-0"
Vert. Brace	5 "	2" x 4" x 3'-0"
Stringers	5 "	1" x 6" x 8'-0"
Upper Ties	5 "	1" x 6" x 2'-3"
Lower Ties	5 "	1" x 4" x 2'-0"
Diagonals	5 "	1" x 4" x 3'-6"
Plywood	1 "	3/4" x 4' x 8'
Wedges	4 "	1/2" to 1-1/2" x 2" x 1'-0"



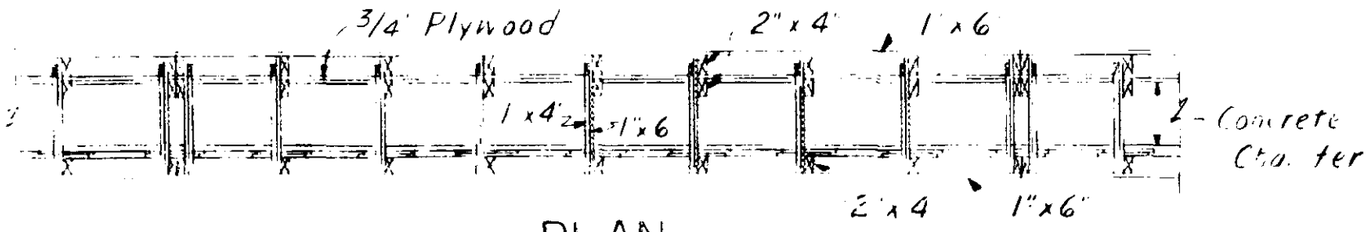
LANDSIDE ELEVATION



SECTION A-A



WEDGE



PLAN

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

EMERGENCY FLASH BOARDS
FOR FLOOD WALLS

DATE:

PLATE NO. XII

APPENDIX F

MAPS

AND

LIST OF MAPS

Sheet No.	Title	Plate No.

Drawing No. HOU-15
Contract No. DACW33-70-C-0147
Construction of Derby Local Protection
Project (Inv. No. DACW33-70-B-0016)

2.	General Plan	1
3.	Naugatuck River Protection - Plan, Section and Profile Sta. 0+00 to Sta. 11+00	2
4.	Naugatuck River Protection - Plan and Profile Sta. 11+00 to Sta. 25+00	3
5.	Naugatuck River Protection - Plan, Sections and Profile Sta. 25+00 to Sta. 31+40	4
6.	Naugatuck River Protection - Dike Sections	5
7.	Naugatuck River Protection - Dike Sections and Sluice Gate Structure No. 1 & Dike Sections	6
8.	Naugatuck River Protection - Railroad Gate No. 1 Plan, Elevation and Sections	7
9.	Naugatuck River Protection - Railroad Gate No. 1 Details & Reinforcement	8
10.	Naugatuck River Protection - Railroad Gate No. 1 - I Walls Details and Reinforcement	9
11.	Housatonic River Protection - Alinement and Excavation-Plans	10
12.	Housatonic River Protection - Plan and Profile	11
13.	Housatonic River Protection - Plan, Profile and Sections	12
14.	Housatonic River Protection - Plan, Elevation and Sections Sta. 1+03 to Sta. 6+00	13
15.	Housatonic River Protection - Plan and Sections Sta. 9+50 to Sta. 16+00	14
16.	Housatonic River Protection - Plan-Sta. 16+00 to Sta. 20+38	15
17.	Housatonic River Protection - Sections No. 1	16
18.	Housatonic River Protection - Sections No. 2	17
19.	Housatonic River Protection - Sections No. 3	18
20.	Housatonic River Protection - Sections No. 4	19
21.	Housatonic River Protection - Sections No. 5	20
22.	Housatonic River Protection - Access Road and Ramps - Profiles	21
23.	Housatonic River Protection - Railroad Gates Nos. 2A and 2B Plan	22
23A.	Housatonic River Protection - Railroad Gates Nos. 2A and 2B Excavation Plan and Section	23
24.	Housatonic River Protection - Railroad Gates Nos. 2A and 2B Elevation and Sections	24
25.	Housatonic River Protection - Railroad Gate No. 2A Shoring Details	25
26.	Housatonic River Protection - Railroad Gate No. 2B Shoring Details	26

SHEET NO.	TITLE	PLATE NO.
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29.	Housatonic River Protection - Railroad Gate No. 2B Details and Reinforcement No. 2	29
30.	Housatonic River Protection - Railroad Gates Nos. 2A & 2B - Structural Floodwalls-Plans, Elevations and Details	30
31.	Housatonic River Protection - Railroad Gate No. 3 Plans and Sections	31
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Drawing No. HOU-11
Contract No. DACW33-69-C-0027
Construction of Ansonia-Derby Local Protection
Project (Inv. No. DACW33-69-B-0004)

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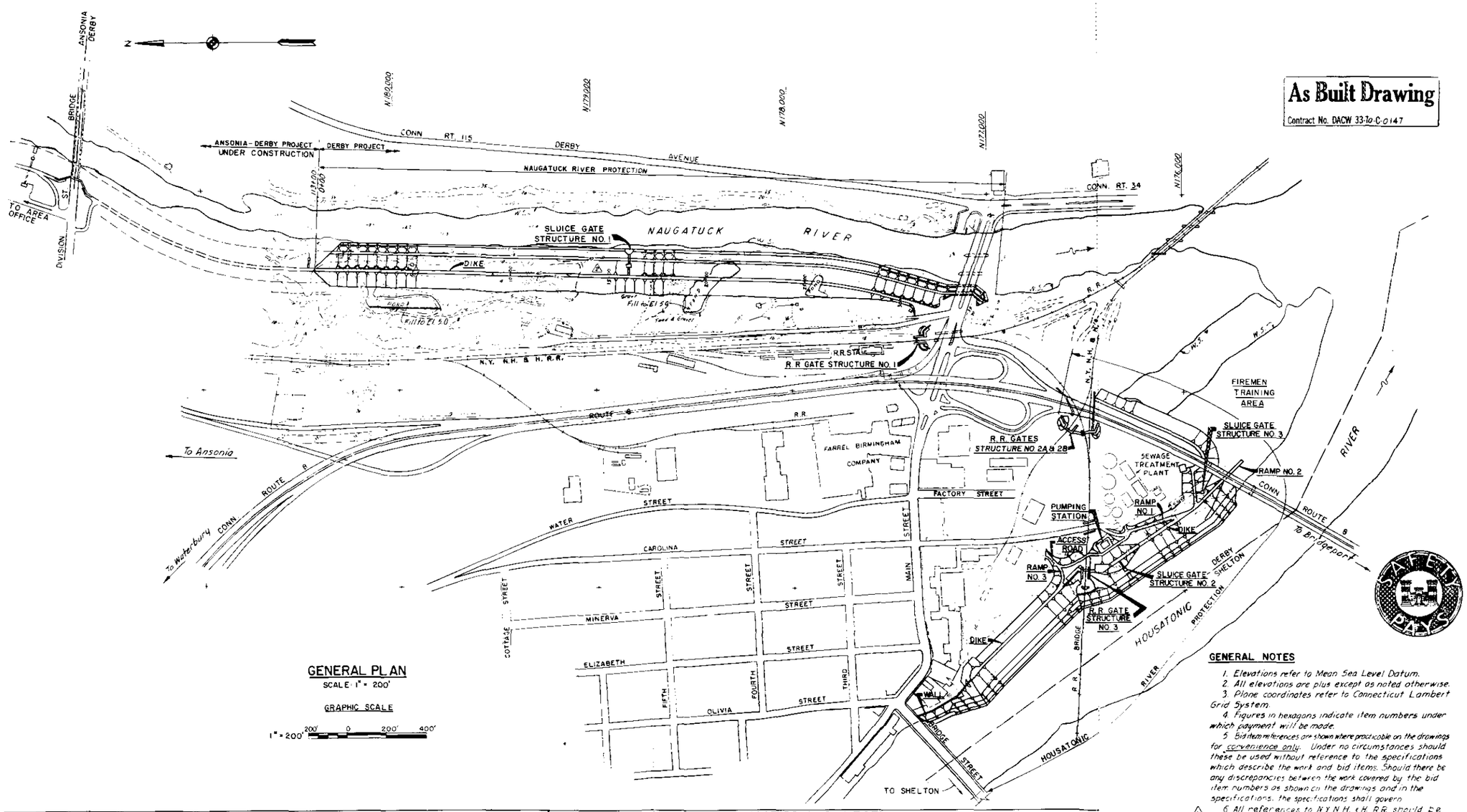
CORPS OF ENGINEERS — U. S. ARMY

As Built Drawing
Contract No. DACW 33-70-C-0147



GENERAL PLAN

SCALE 1" = 200'

GRAPHIC SCALE

1" = 200' — 200' 0 200' 400'

GENERAL NOTES

1. Elevations refer to Mean Sea Level Datum.
2. All elevations are plus except as noted otherwise.
3. Plane coordinates refer to Connecticut Lambert Grid System.
4. Figures in hexagons indicate item numbers under which payment will be made.
5. Bid item references are shown where practicable on the drawings for convenience only. Under no circumstances should these be used without reference to the specifications which describe the work and bid items. Should there be any discrepancies between the work covered by the bid item numbers as shown on the drawings and in the specifications, the specifications shall govern.
6. All references to N.Y.N.H. & H. R.R. should be Penn. Central Transportation Company.

LEGEND-EXTERIOR FEATURES

NEW	EXISTING	DESCRIPTION	NEW	EXISTING	DESCRIPTION
20	20	CONTOURS			EARTH FILL
x14.7	14.7	ELEVATIONS			EARTH FILL WITH STONE PROTECTION
F	EF	FENCE			EARTH SURFACE (SECTION)
		ROADS OR WALKS			APPROXIMATE LIMITS OF EXCAVATION
		PAVED AREA			
		TREE LINE	NSD	SD	STORM DRAIN
		GRADE TO DRAIN	NUD	UD	UNDERDRAIN
		STONE WALL	NSS	SS	SANITARY SEWER
		BUILDINGS			MANHOLES
		LIMIT OF CONTRACTOR'S WORK AREA	NW	W	WATER
E	E	ELECTRIC LINE OVERHEAD		G	GAS LINE
T	T	TELEPHONE LINE OVERHEAD			RELIEF WELL
		EARTH CUT			
		EARTH CUT WITH STONE PROTECTION			

MATERIALS LEGEND

DESIGNATION	TYPE OF MATERIAL	PAYMENT ITEM NO.	DESIGNATION	TYPE OF MATERIAL	PAYMENT ITEM NO.
1	CLASS I STONE PROTECTION	15	10	ROAD GRAVEL	11
2	CLASS II STONE PROTECTION	16	11	COMPACTED SAND FILL	8
3	CLASS III STONE PROTECTION	17	11U	UNCOMPACTED SAND FILL	8
4	CLASS IIIA STONE PROTECTION	18	12	FILTER SAND FILL	9
5	CLASS IV STONE PROTECTION	19	13	COMPACTED RANDOM FILL	5
6	CLASS I GRAVEL BEDDING	13	13D	DUMPED RANDOM FILL	5
7	CLASS II GRAVEL BEDDING	14	14	CLASS "A" COMP. IMPERVIOUS FILL	4
8	COMPACTED PROCESSED GRAVEL FILL	7	14U	CLASS "A" UNCOMP. IMPERVIOUS FILL	4
8U	UNCOMPACTED PROCESSED GRAVEL FILL	7	15	ROLLED GRAVEL BASE	12
9	COMPACTED GRAVEL FILL	6	16	TOPSOIL	9U
9D	DUMPED GRAVEL FILL	6	17	CLASS "B" COMP. IMPERVIOUS FILL	4A

REVISION	DATE	DESCRIPTION	BY
2	11-30-70	Sluice Gate Structure No. 1 relocated	
1	4-17-70	Note Revised (RM # 1)	

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

DES. BY J.C. — DR. BY C.T.M. — CK. BY M.Z.

SUBMITTED: CHIEF, CIVIL DESIGN SECTION

APPROVED & RECOMMENDED: CHIEF, TECH. DIV. MANAGER

REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
GENERAL PLAN

HOUSATONIC AND NAUGATUCK RIVERS — CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION

DATE MAR. 1970

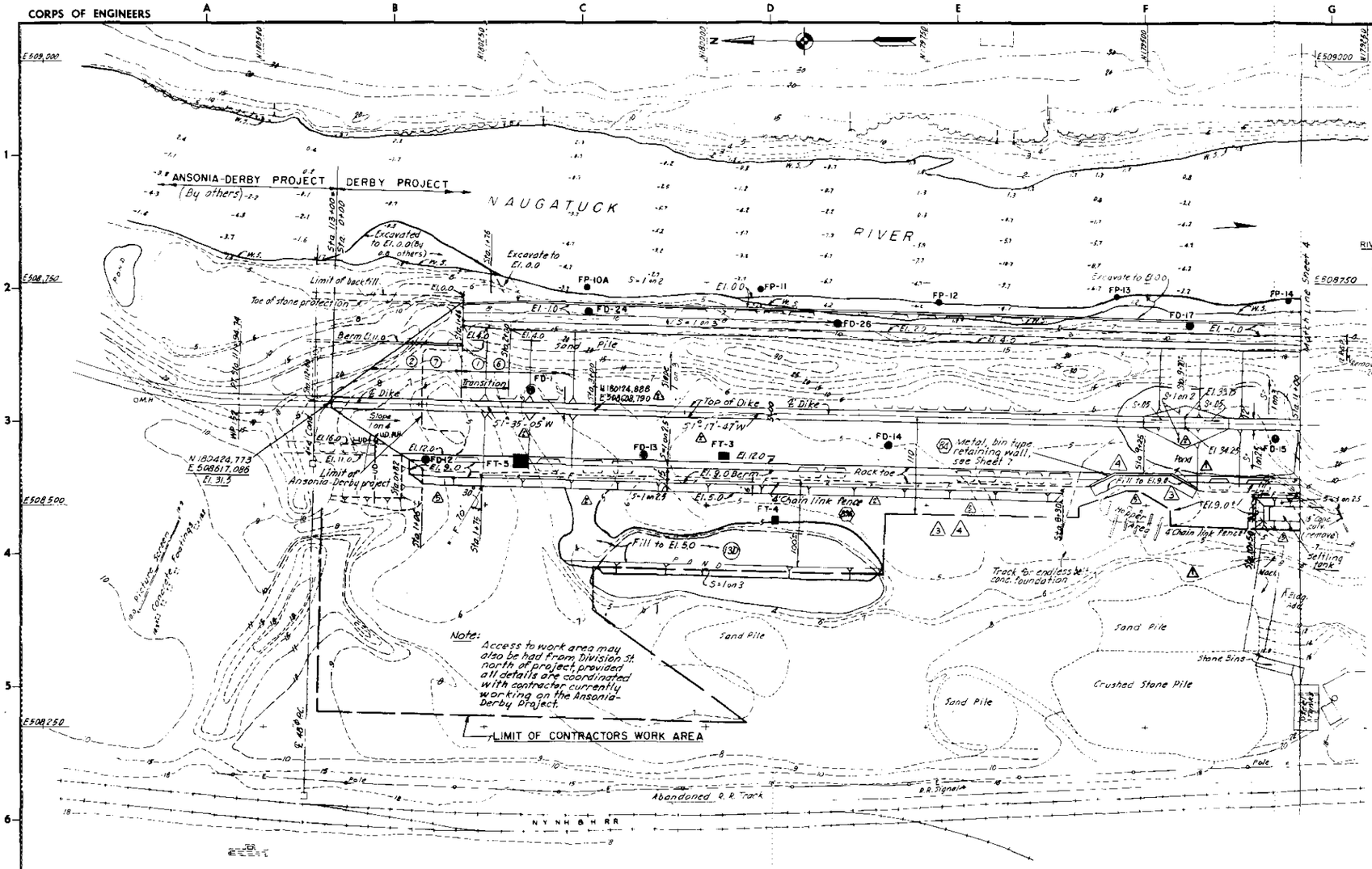
SCALE 1" = 200' — SPEC. NO. DACW 33-70-B-0016

DRAWING NUMBER HOU-15

SHEET 2

PLATE 1

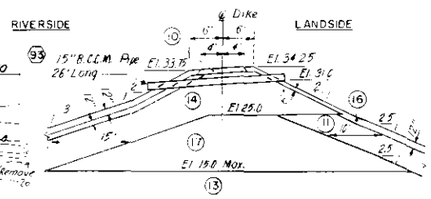
CORPS OF ENGINEERS — U. S. ARMY



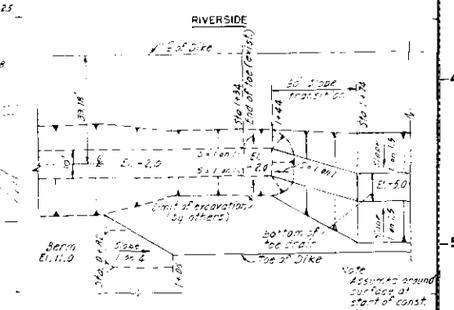
PLAN
SCALE: 1" = 50'

NOTES

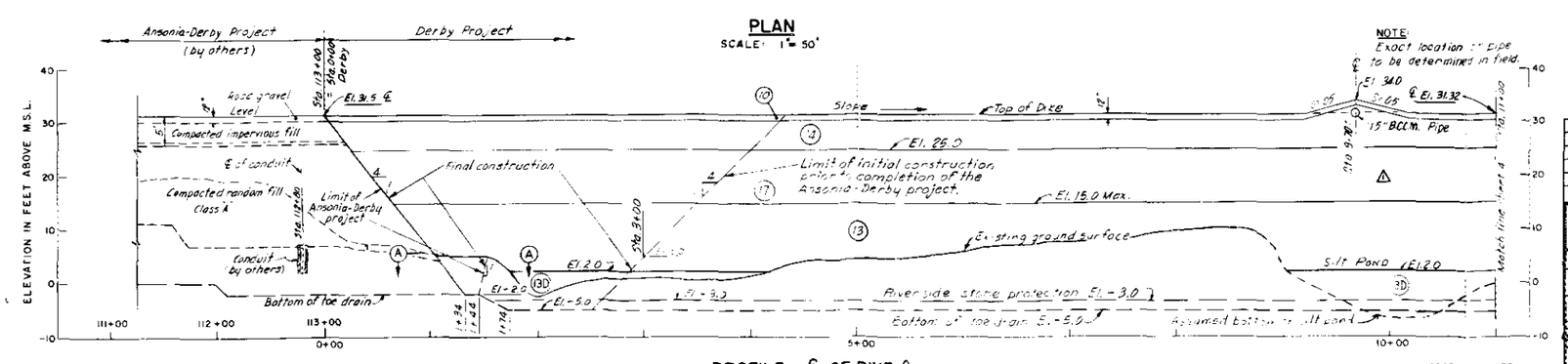
1. For General Notes applying to this sheet, see Sheet 2
2. For Materials Legend, see Sheet 2
3. Survey in this area was made in 1962 and does not necessarily indicate present conditions
4. The design and the estimated quantities have been based on the assumption that materials in this area have been generally removed to about elevation 5.0
5. Prior to construction the contractor will cross section this area in order that any required changes in the design of the structures may be made by the Contracting Officer with related adjustments in the quantity estimates
6. Water surface (W.S.) is water level at time of survey, see Note 3 above.



△ STA 9+70±
SCALE 1" = 10'



SECTION A-A
SCALE: 1" = 20'



NOTE: Exact location of pipe to be determined in field.

PROFILE – ℄ OF DIKE △
SCALE: HOR. 1" = 50'
VERT. 1" = 10'

GRAPHIC SCALES

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
△	11-17-71	Exit [illegible] added.	[illegible]
△	3-19-71	Partial Rock spec. retaining wall instead, Note deleted	[illegible]
△	1-21-70	Note added, Plan and Profile revised	[illegible]
△	10-8-70	[illegible] contractor work area revised.	[illegible]
△	6-11-70	Sect. on added. Plan & Profile revised (Am. 1)	[illegible]

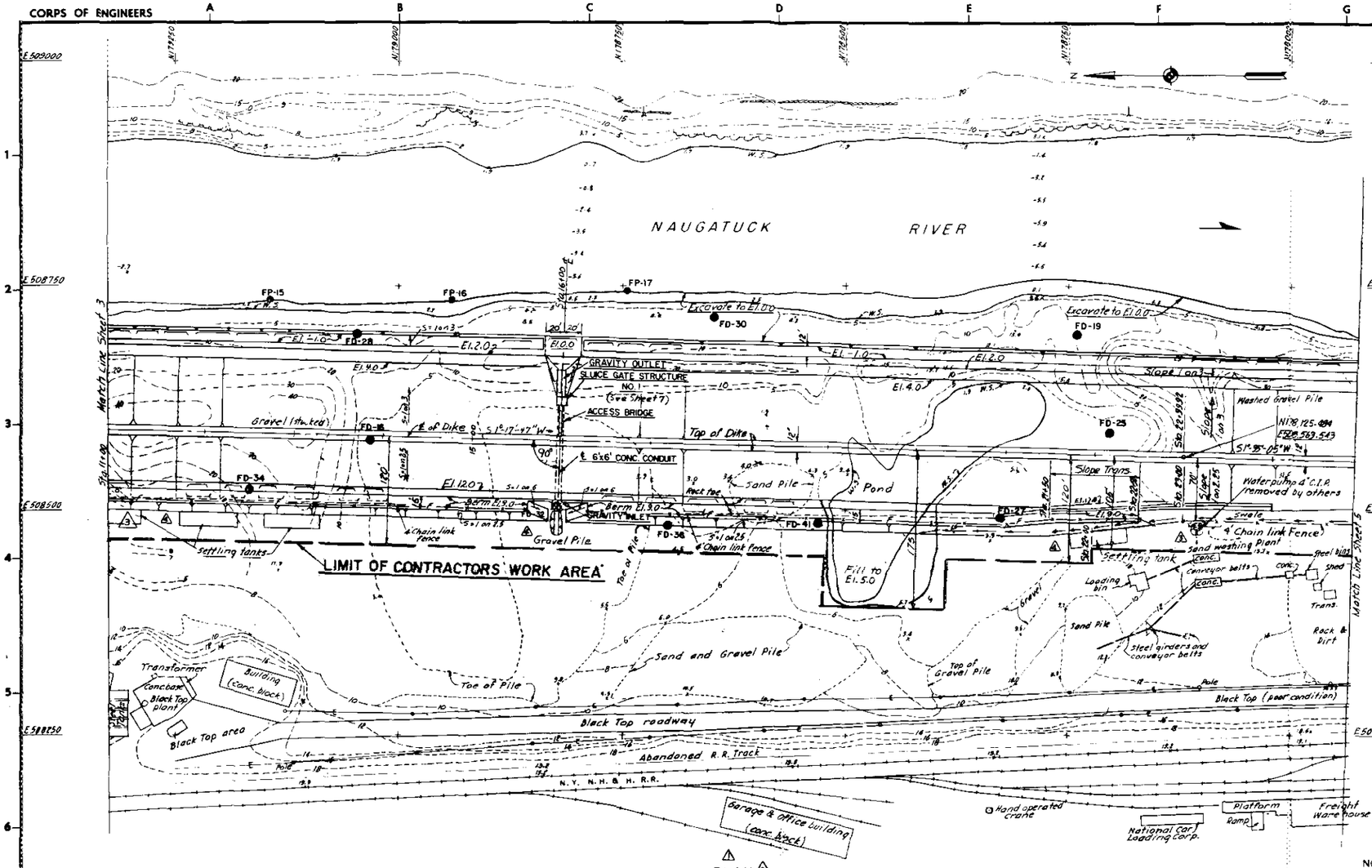
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY J. J. C. — DR. BY J. A. M. — CK. BY R. E.
SUBMITTED: [illegible] CHIEF, ENGINEERING DIVISION
APPROVED: [illegible] CHIEF, ENGINEERING DIVISION
RECOMMENDED: [illegible] CHIEF, ENG. BRANCH
REVIEWED: [illegible] PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
NAUGATUCK RIVER PROTECTION
PLAN, SECTION AND PROFILE
STA. 0+00 TO 11+00
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
APPROVED: [illegible] CHIEF, ENGINEERING DIVISION
DATE: MAR. 1970
SPEC. NO. DACW 33-70-B-0016
SCALE AS NOTED
DRAWING NUMBER HOU-15
SHEET 3

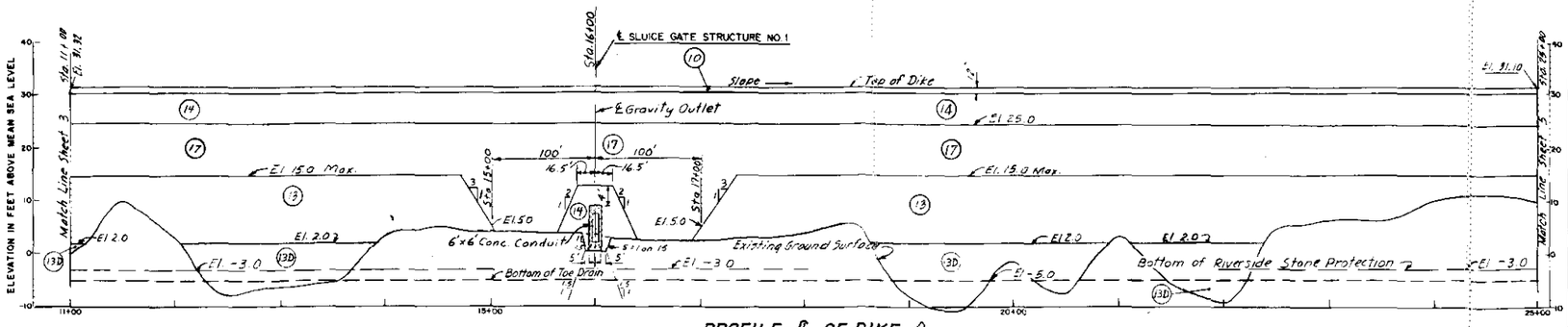
PLATE 2

CORPS OF ENGINEERS — U. S. ARMY



PLAN

SCALE: 1" = 50'



PROFILE - ℄ OF DIKE

SCALE: HOR. 1" = 50' VERT. 1" = 10'

GRAPHIC SCALE

1" = 10'

1" = 50'

As Built Drawing

Contract No. DACW 33-70-C-0147

NOTES

For notes applying to this sheet, see Sheet 3

For Materials Legend see Sheet 2

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	11-19-71	15' Berm & fencing added.	
3	3-9-71	Length of 4' Chain link fence reduced	
2	11-30-70	Plan and profile revised, sect deleted	
1	11-3-70	℄ Dike, fence, Limit of Contractors work Area ℄ slope of dike revised	

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

DES. BY J.J.C. DR. BY J.A.M. CK. BY F.E.

SUBMITTED: CHIEF, LAYOUT SECTION

APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

REVIEWED: PROJ. ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
NAUGATUCK RIVER PROTECTION
PLAN AND PROFILE
STA. 11+00 TO 25+00

HOUSATONIC AND NAUGATUCK RIVERS CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION

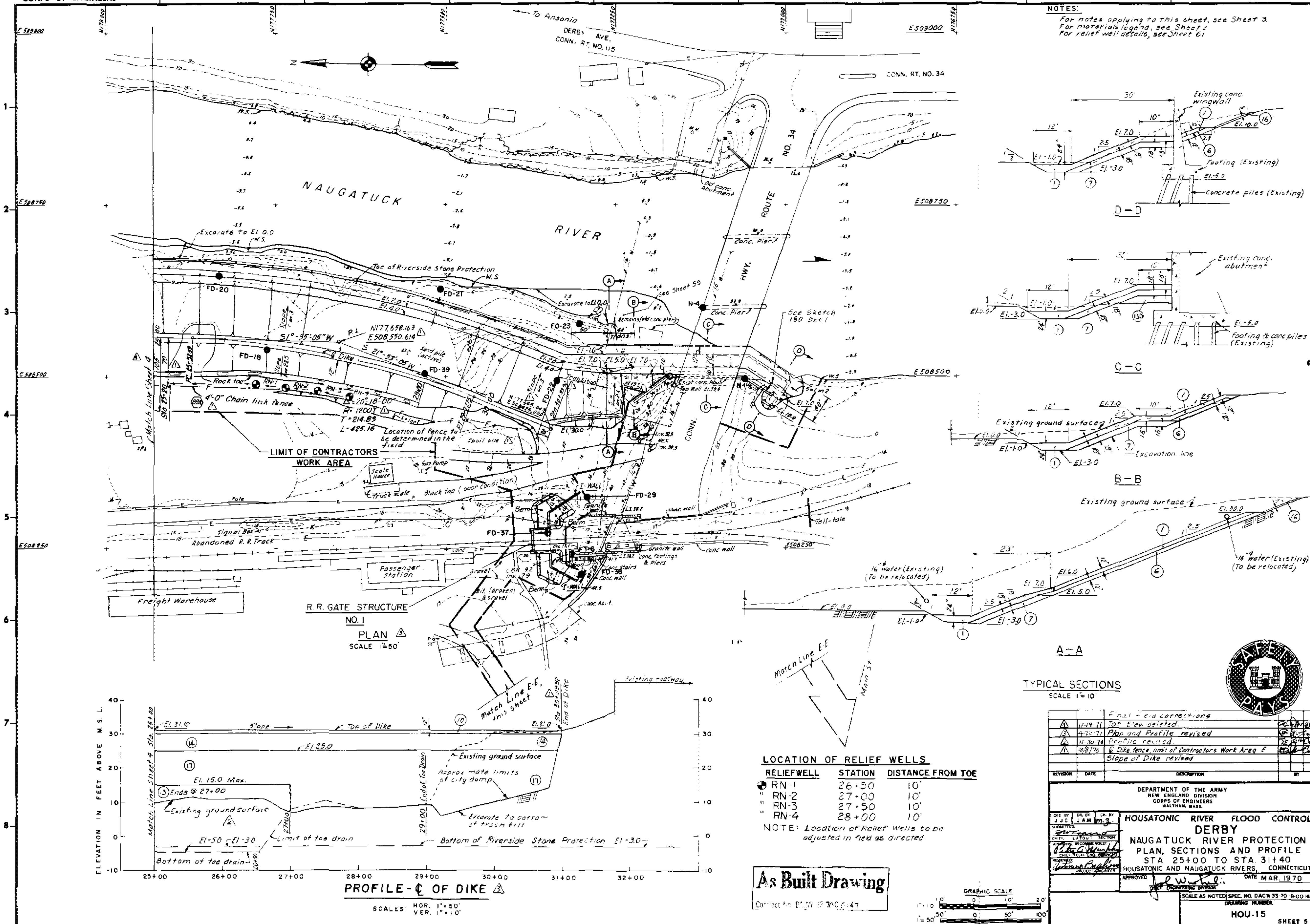
DATE MAR. 1970

SCALE 1" = 50' SPEC. NO. DACW 33-70-B-0016

DRAWING NUMBER HOU-15

SHEET 4

PLATE 3



LOCATION OF RELIEF WELLS

RELIEF WELL	STATION	DISTANCE FROM TOE
RN-1	26+50	10'
RN-2	27+00	10'
RN-3	27+50	10'
RN-4	28+00	10'

NOTE: Location of Relief Wells to be adjusted in field as directed.

As Built Drawing
Contract No. DACW 33-70-C-0047

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
4	11-19-71	Toe Elev. deleted.	
3	4-29-71	Plan and Profile revised	
2	11-30-70	Profile revised	
1	10/8/70	℄ Dike fence, limit of Contractors Work Area & Slope of Dike revised	

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

DES. BY J J C | DR. BY J A M | CK. BY m.3.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: PROJECT ENGINEER
APPROVED: CHIEF, ENGINEERING DIVISION

HOUSATONIC RIVER FLOOD CONTROL
DERBY
NAUGATUCK RIVER PROTECTION
PLAN, SECTIONS AND PROFILE
STA 25+00 TO STA. 31+40
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

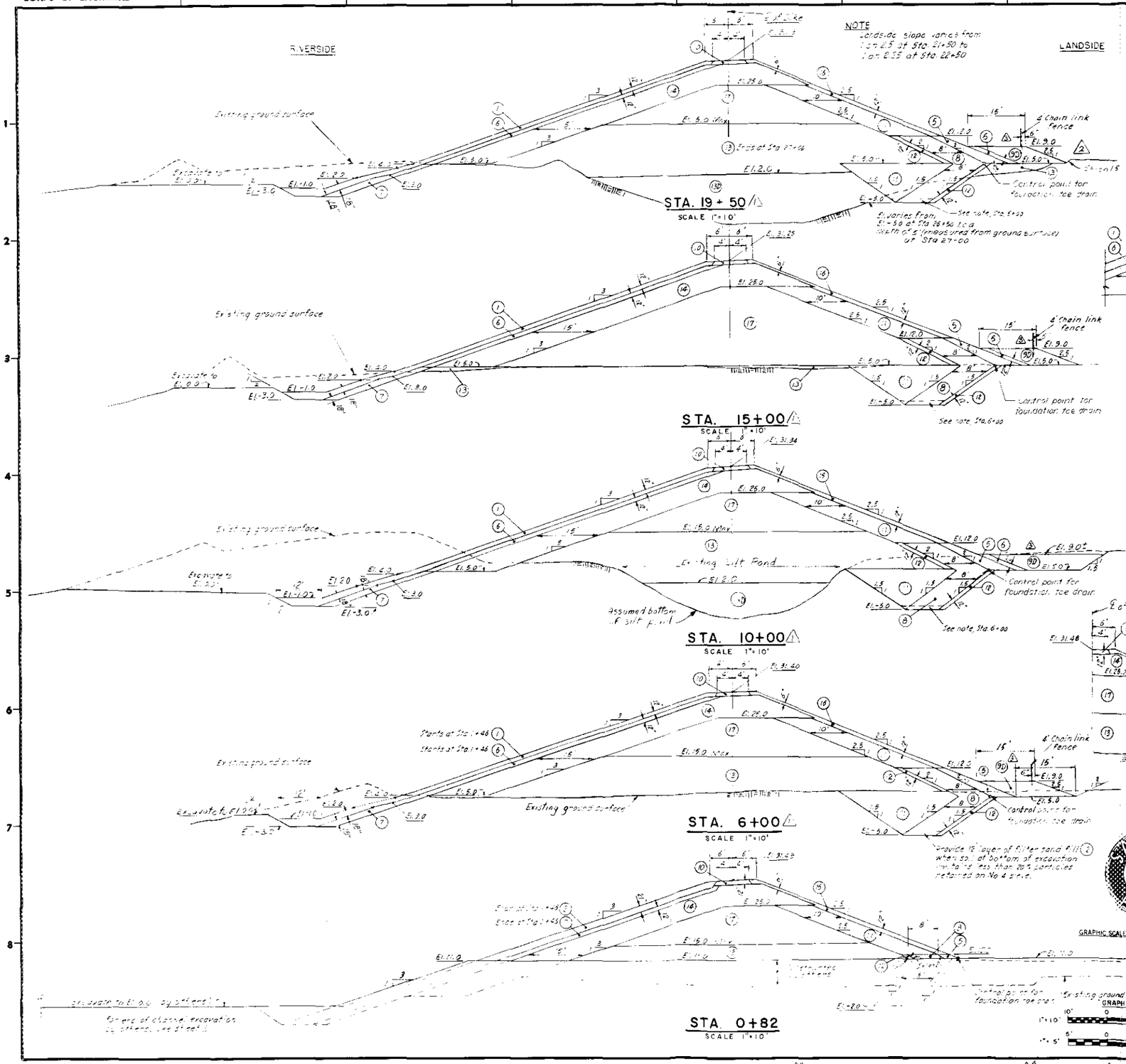
DATE MAR. 1970
SCALE: AS NOTED | SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 5

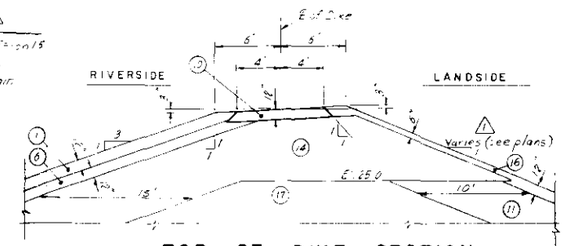
PLATE 4

CORPS OF ENGINEERS — U. S. ARMY

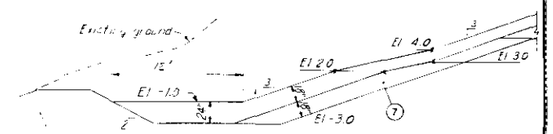
NOTE
Landside slope varies from 1 on 2.5 at Sta. 21+50 to 1 on 2.25 at Sta. 22+50

NOTES
1. For notes applying to this sheet see sheet 3
2. For material legend see sheet 2

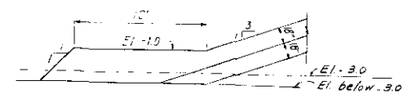




TOP OF DIKE SECTION
SCALE 1" = 5'

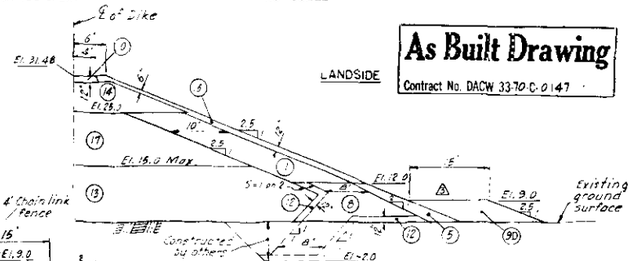


TYPICAL WHERE GROUND IS ABOVE EL.-1.0



TYPICAL WHERE GROUND IS BELOW EL.-3.0

RIVERSIDE TOE DETAILS
NO SCALE



STA. 1 + 06 (HALF - SECTION)
SCALE 1" = 10'

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
4	11-17-71	Sections revised	
2	3-9-71	Fence deleted	
1	3-30-70	Sections revised	

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

DES. BY J. J. C. | DR. BY J. A. M. | CK. BY A. E.
SUBMITTED: CHIEF, CATOLE SECTION
APPROVED & RECOMMENDED: CHIEF, TECH. ENG. DIVISION
REVIEWED: CHIEF, ENGINEERING DIVISION

HOUSATONIC RIVER FLOOD CONTROL
DERBY
NAUGATUCK RIVER PROTECTION
DIKE SECTIONS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: MAR. 1970
SCALE: AS NOTED
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER: HOU - 15
SHEET 6

PLATE 5

CORPS OF ENGINEERS — U. S. ARMY

PLAN - SLUICE GATE STRUCTURE NO. 1
SCALE: 1" = 10'

SECTION B-B
SCALE: 1" = 5'

SECTION C-C
SCALE: 1" = 5'

SECTION A-A
SCALE 1" = 10'

PLAN
SCALE: 1" = 10'

DEVELOPED ELEVATION BIN TYPE RETAINING WALL
SCALE: HOR. 1" = 10'
VERT. 1" = 5'

SECTION D-D
SCALE 1" = 5'

STA. 29+50
SCALE 1" = 10'

STA. 27+00
SCALE 1" = 10'

SECTION E-E
SCALE: 1" = 5'

NOTES:
For notes applying to this sheet, see sheet 3
For material legend see sheet 2

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
6	11-19-71	Plans, elevations and sections revised.	
5	4-20-71	Sections and Note revised	
4	3-9-71	Plan & Elev at Bin type retaining wall revised	
3	11-30-70	Plans and sections revised.	
2	4-20-70	Bin Type Retaining wall lengthened (Am #3)	
1	4-20-70	Bin Type Retaining wall dimensions deleted and grades revised (Am # 1)	

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

DES. BY J. J. C. — DR. BY J. A. M. — CK. BY

SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH
APPROVED: PROJECT ENGINEER

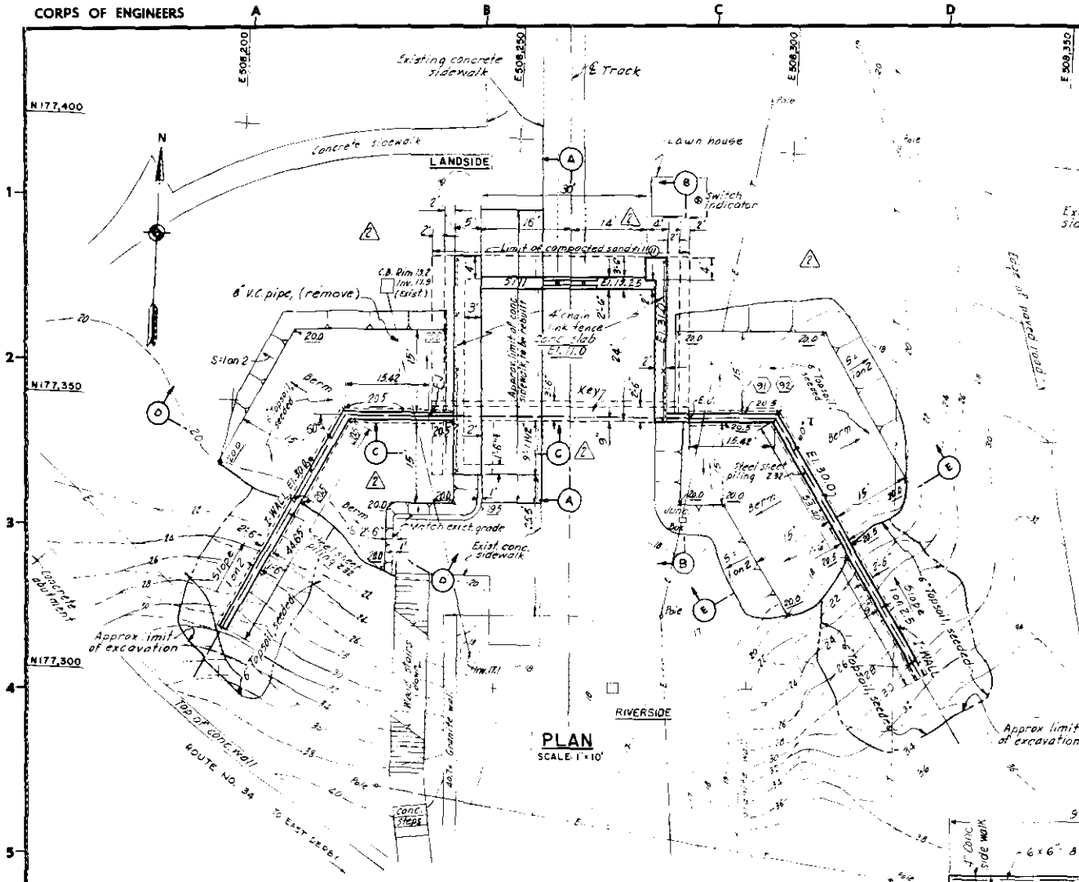
HOUSATONIC RIVER FLOOD CONTROL
DERBY
NAUGATUCK RIVER PROTECTION
DIKE SECTIONS AND SLUICE
GATE STRUCTURE NO I
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: MAR. 1970

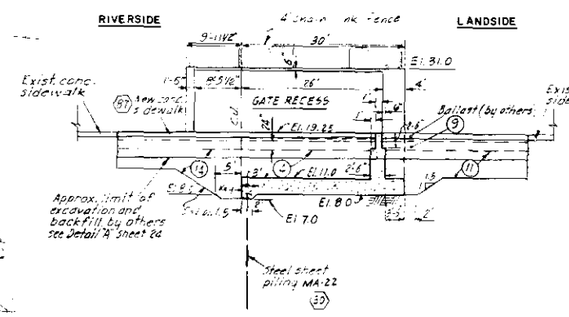
SCALE AS NOTED — SPEC. NO. DACW-33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 7

PLATE 6

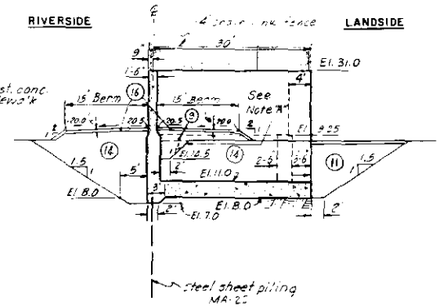
CORPS OF ENGINEERS U. S. ARMY



PLAN
SCALE: 1" = 10'



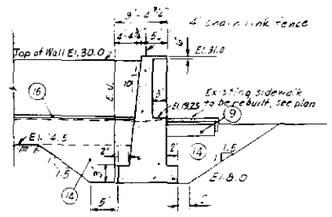
SECTION A-A
SCALE: 1" = 10'



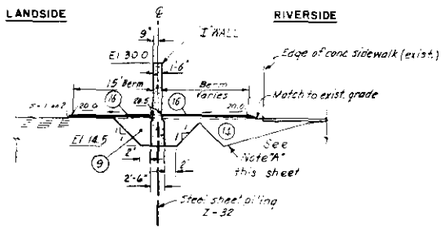
SECTION B-B
SCALE: 1" = 10'

NOTE "A"

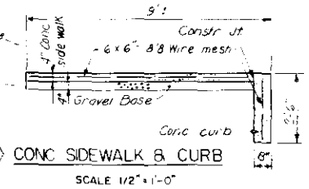
Construct fills to limits shown prior to driving 2nd stage sheet piling. Excavate fill as indicated to bottom of "I" WALL. After "I" WALL has been constructed backfill with compacted impervious fill (14) on the ends of the "I" WALL and on the Riverside and with compacted gravel fill (9) on Landside of the "I" WALL.



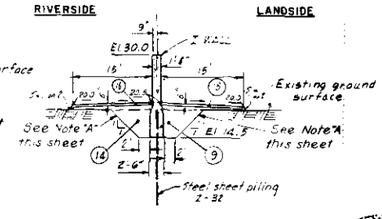
SECTION C-C
SCALE: 1" = 10'



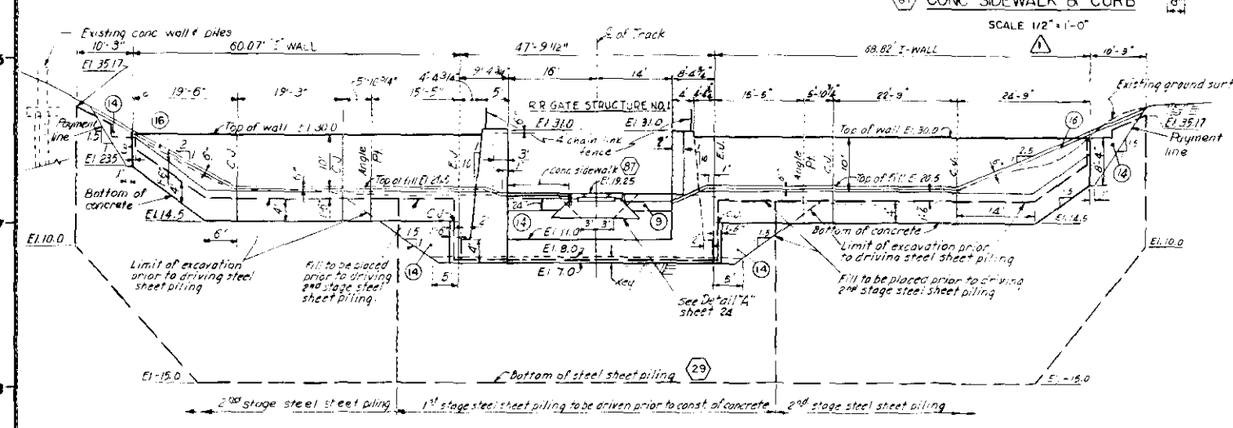
SECTION D-D
SCALE: 1" = 10'



CONC. SIDEWALK & CURB
SCALE 1/2" = 1'-0"



SECTION E-E
SCALE: 1" = 10'



RIVERSIDE ELEVATION DEVELOPED
SCALE: 1" = 10'

As Built Drawing
Contract No. DACW 33-70-C-0147

NOTES

1. For notes applying to this sheet, see sheet 14.
2. For materials legend see sheet 2.
3. All concrete for R.R. Gate Structure No. 1 will be paid for under Item No. 34.
4. All concrete for "I" walls will be paid for under Item No. 31.
5. For concrete details of R.R. Gate Structure No. 1 see sheets 9 and 10.

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
2	5-24-71	Construction sheeting Metal deleted	
1	6-2-70	Scale revised (Am #1)	

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

DES. BY M.Z. DR. BY L.R.L. CK. BY M.Z.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. DIVISION
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
NAUGATUCK RIVER PROTECTION
RAILROAD GATE NO. 1
PLAN, ELEVATION AND SECTIONS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970
SCALE 1" = 10'
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU - 15
SHEET 8

PLATE 7

CORPS OF ENGINEERS — U. S. ARMY

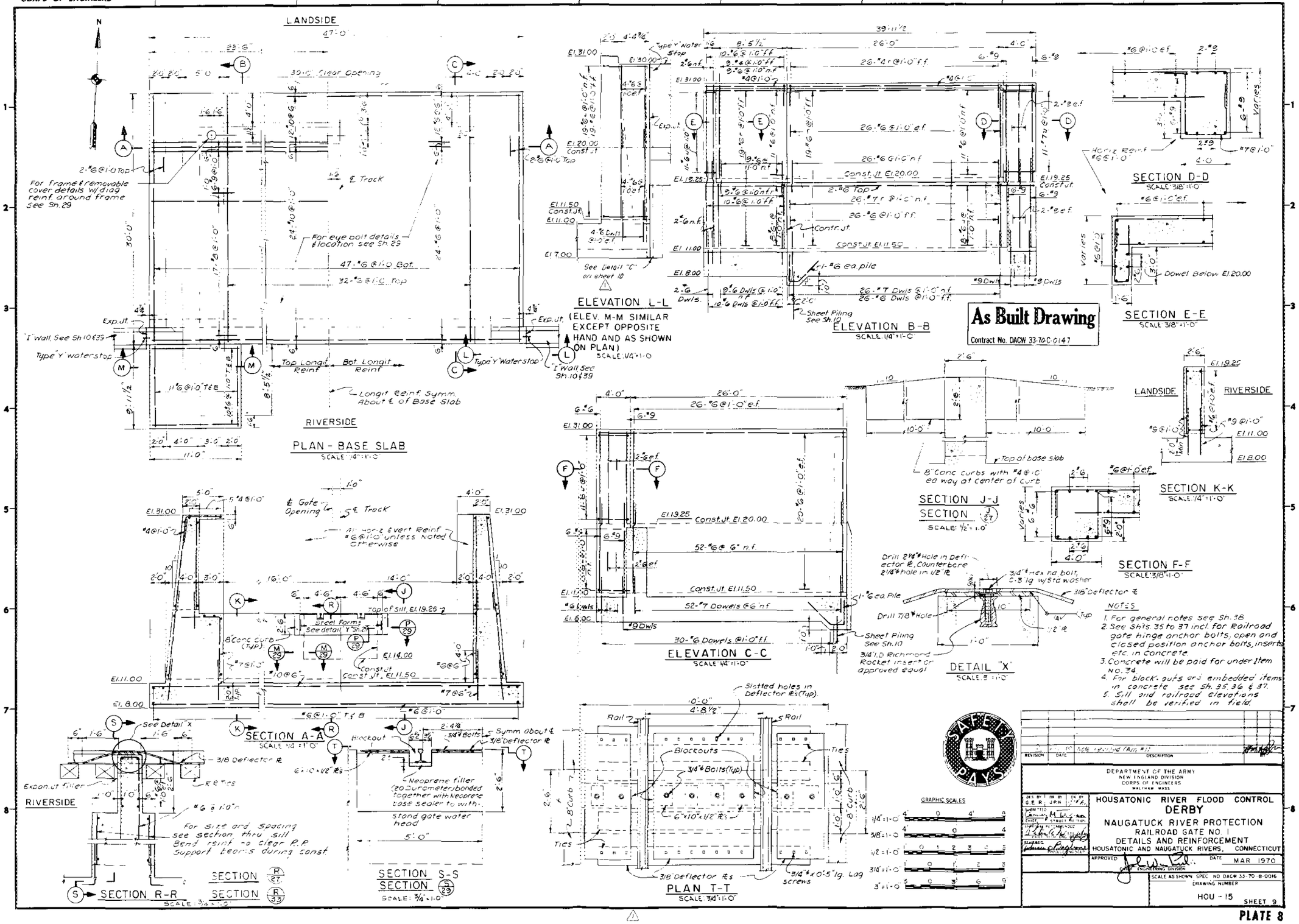


PLATE 8

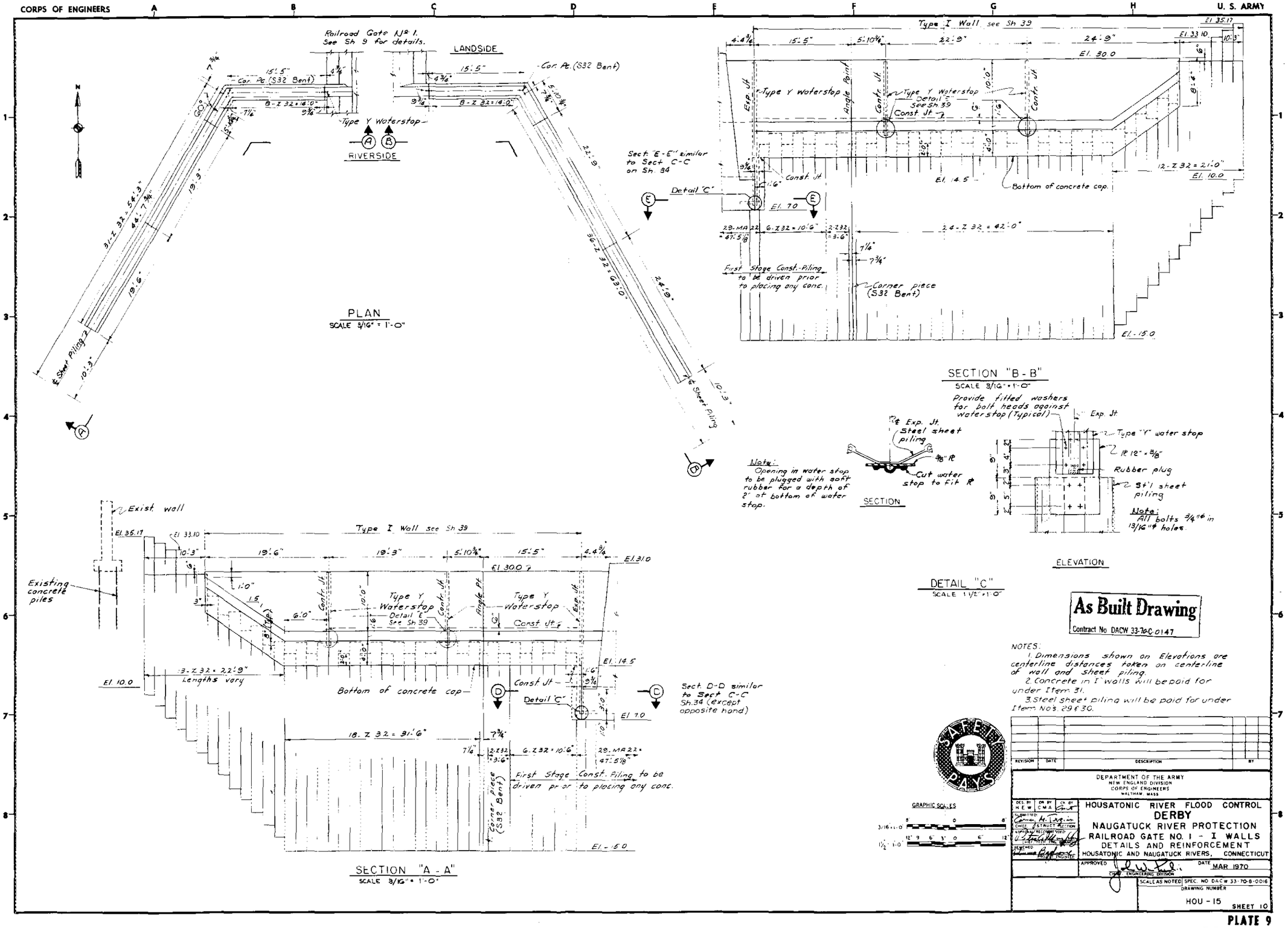
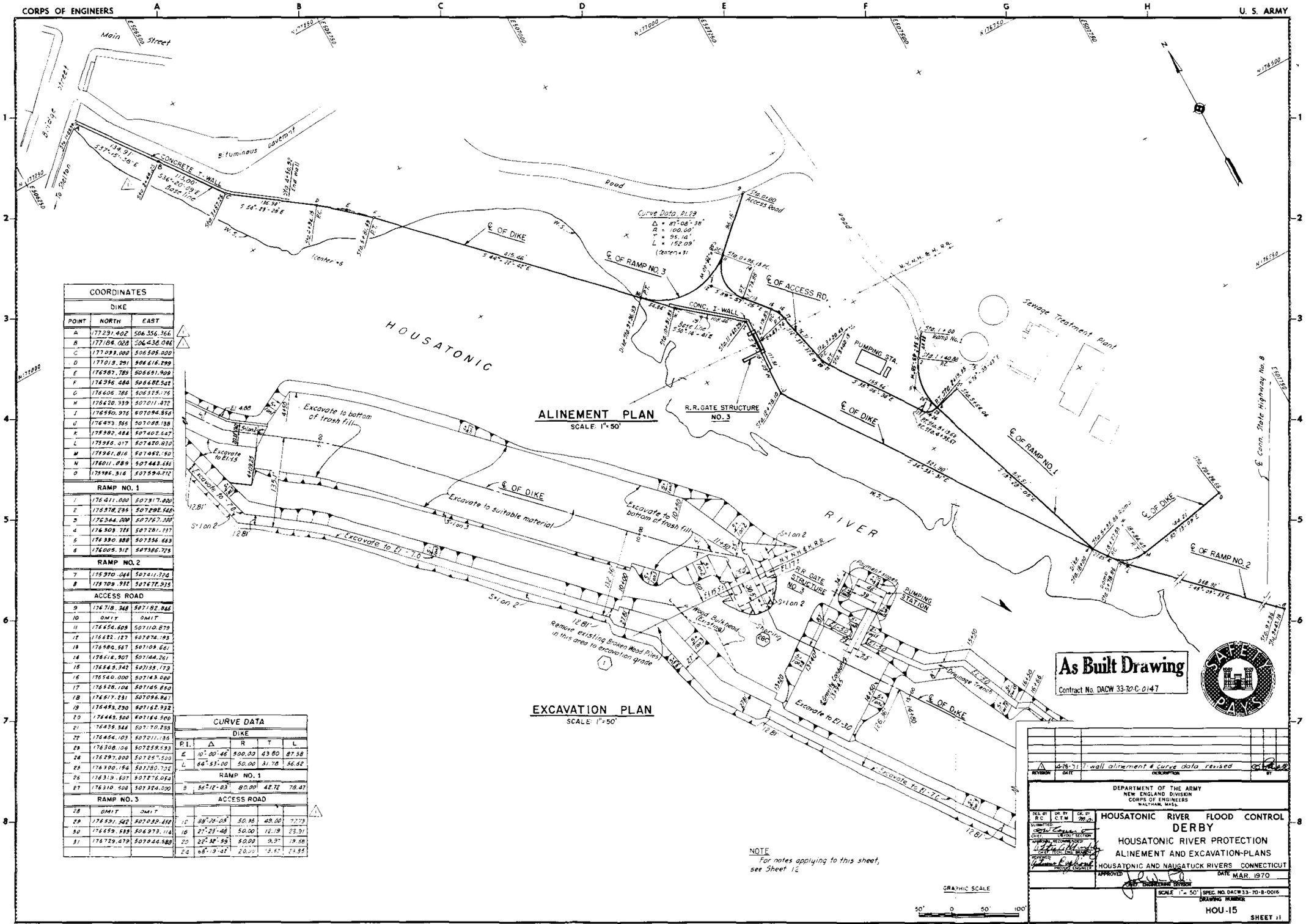

CORPS OF ENGINEERS
U. S. ARMY
Railroad Gate No. 1. See Sh 9 for details.
LANDSIDE
RIVERSIDE
Type Y Waterstop
Cor. Pc. (S32 Bent)
Sect. "E-E" similar to Sect. C-C on Sh. 34
Detail "C"
Type I Wall see Sh 39
Type Y Waterstop
Detail "E" See Sh 39
Const. Jt.
Bottom of concrete cap.
First Stage Const. Piling to be driven prior to placing any conc.
Corner piece (S32 Bent)
PLAN
SCALE 3/16" = 1'-0"
SECTION "B-B"
SCALE 3/16" = 1'-0"
Provide fitted washers for bolt heads against waterstop (Typical)
Steel sheet piling
Cut water stop to fit
Note: Opening in water stop to be plugged with soft rubber for a depth of 2" at bottom of water stop.
SECTION
Type "Y" water stop
Rubber plug
St'l sheet piling
Note: All bolts 3/4"φ in 13/16"φ holes.
ELEVATION
DETAIL "C"
SCALE 1 1/2" = 1'-0"
Exist. wall
Existing concrete piles
Type I Wall see Sh 39
Type Y Waterstop
Detail "E" See Sh 39
Const. Jt.
Bottom of concrete cap
Sect. D-D similar to Sect. C-C Sh. 34 (except opposite hand)
First Stage Const. Piling to be driven prior to placing any conc.
Corner piece (S32 Bent)
SECTION "A-A"
SCALE 3/16" = 1'-0"
As Built Drawing
Contract No. DACW 33-70-C-0147
NOTES:
1. Dimensions shown on Elevations are centerline distances taken on centerline of wall and sheet piling.
2. Concrete in I walls will be paid for under Item 31.
3. Steel sheet piling will be paid for under Item Nos. 29 & 30.
SAFETY PAYS
GRAPHIC SCALES
REVISION
DATE
DESCRIPTION
BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
NAUGATUCK RIVER PROTECTION
RAILROAD GATE NO. 1 - I WALLS
DETAILS AND REINFORCEMENT
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
APPROVED
DATE MAR 1970
SCALE AS NOTED
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 10

PLATE 9

CORPS OF ENGINEERS — U. S. ARMY



ALINEMENT PLAN

SCALE: 1" = 50'

EXCAVATION PLAN

SCALE: 1" = 50'

COORDINATES		
DIKE		
POINT	NORTH	EAST
A	177291.402	506356.366
B	177184.028	506438.046
C	177093.000	506505.000
D	177013.291	506616.299
E	176987.789	506651.909
F	176956.484	506682.542
G	176606.786	506325.175
H	176620.339	507011.472
I	176550.976	507094.856
J	176493.365	507088.138
K	175982.484	507402.647
L	175956.417	507420.830
M	175961.816	507452.150
N	176011.089	507443.656
O	175986.316	507594.272
RAMP NO. 1		
1	176411.000	507317.000
2	176378.235	507292.548
3	176344.000	507267.000
4	176303.725	507281.237
5	176330.388	507356.663
6	176005.312	507386.725
RAMP NO. 2		
7	175970.044	507411.324
8	175709.932	507672.935
ACCESS ROAD		
9	176718.348	507182.846
10	OMIT	OMIT
11	176654.609	507110.879
12	176622.127	507074.193
13	176584.567	507109.661
14	176616.907	507144.261
15	176543.342	507133.173
16	176540.000	507143.000
17	176528.104	507145.650
18	176517.231	507096.847
19	176453.230	507162.932
20	176443.500	507164.500
21	176439.346	507170.233
22	176464.103	507211.136
23	176308.104	507259.593
24	176297.000	507257.500
25	176300.154	507280.702
26	176319.607	507276.054
27	176310.500	507324.000
RAMP NO. 3		
28	OMIT	OMIT
29	176591.542	507039.458
30	176659.539	506973.114
31	176729.479	507044.588

CURVE DATA				
DIKE				
P.I.	Δ	R	T	L
E	10°-00'-46"	500.00	43.80	87.38
L	64°-53'-00"	50.00	31.78	56.62
RAMP NO. 1				
3	56°-12'-03"	80.00	42.72	78.47
ACCESS ROAD				
12	88°-26'-05"	50.36	49.00	77.73
16	27°-23'-48"	50.00	12.19	23.91
20	22°-32'-59"	50.00	9.97	19.58
24	68°-19'-42"	20.00	13.62	23.85

NOTE
For notes applying to this sheet, see Sheet 12

GRAPHIC SCALE
50' 0 50' 100'

As Built Drawing
Contract No. DACW 33-70-C-0147

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY
1	4-28-71	T-wall alinement & curve data revised	

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

DES. BY R.C. — DR. BY C.T.M. — CK. BY M.A.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
ALINEMENT AND EXCAVATION-PLANS
HOUSATONIC AND NAUGATUCK RIVERS CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION — DATE MAR. 1970

SCALE 1" = 50' — SPEC. NO. DACW33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 11

PLATE 10

CORPS OF ENGINEERS — U. S. ARMY

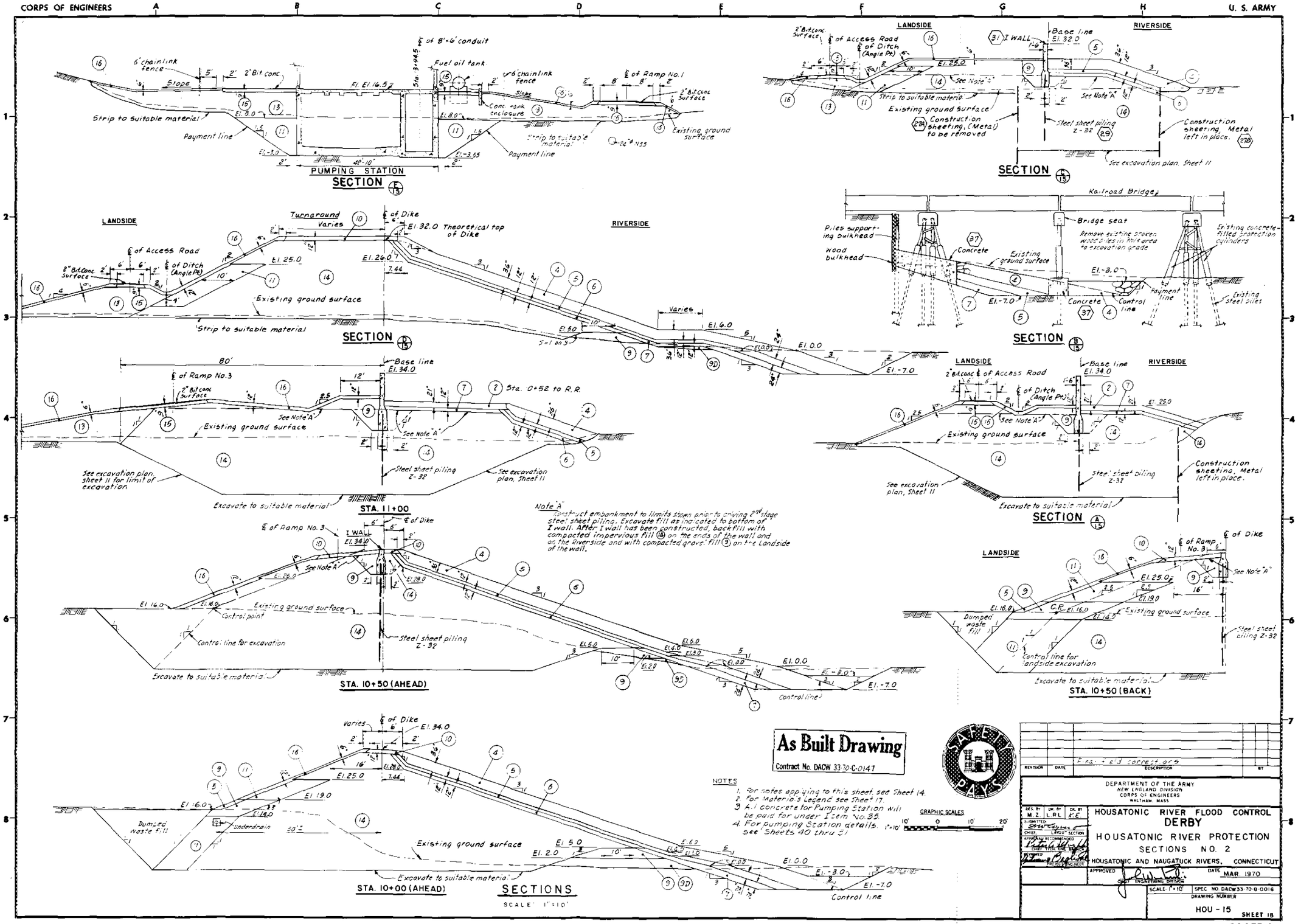
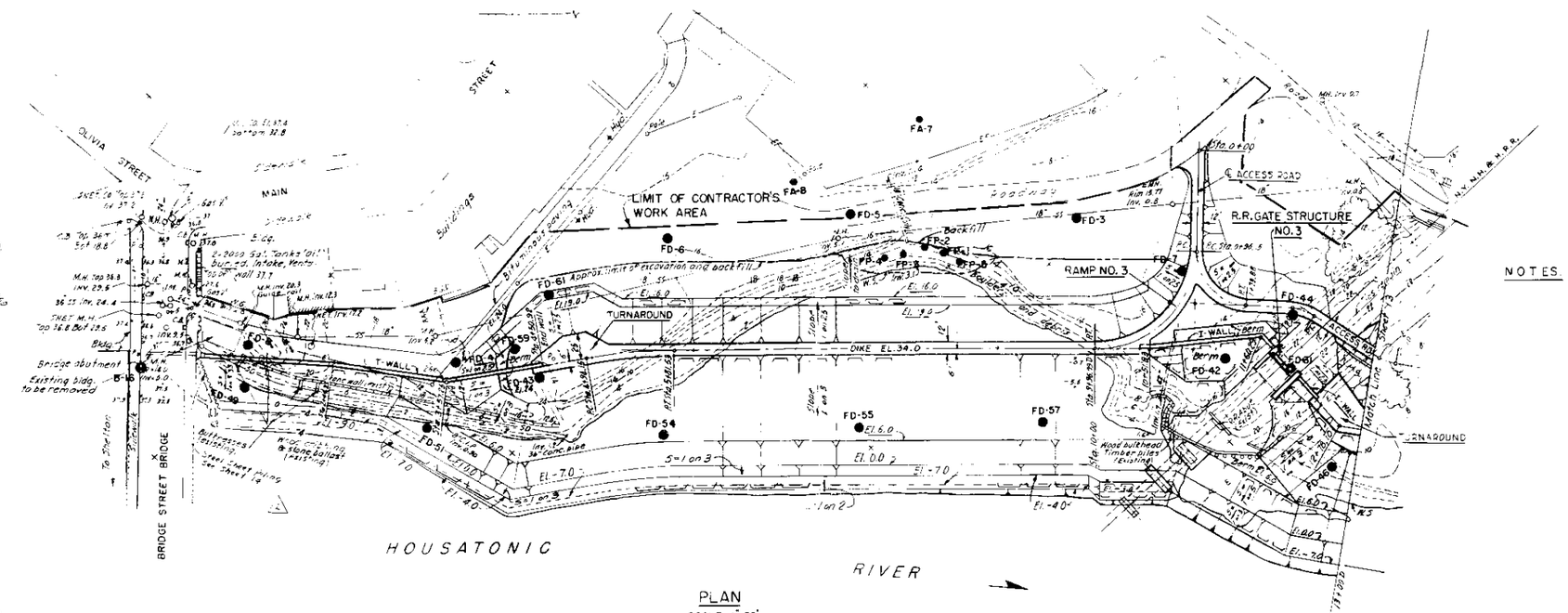
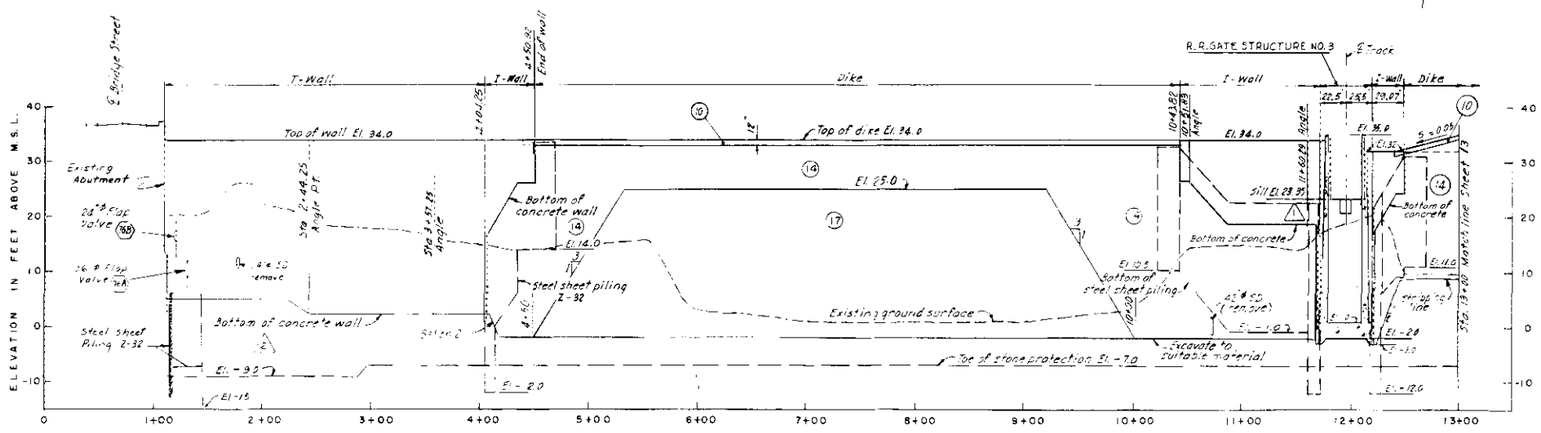


PLATE 17

CORPS OF ENGINEERS U. S. ARMY



PLAN
SCALE 1"=50'



PROFILE
SCALES: HOR. 1"=50' VER. 1"=10'

NOTES

For General notes, sheet 2
For Alinement control, sheet 11
For Materials legend, sheet 17
For Utility layouts, sheets 52 and 53.
For Lamps and Access Roadways, sheet 22.
For Railroad Gate No. 3 details, sheet 31.

REVISION	DATE	DESCRIPTION	BY
2	4-28-71	Plan and profile revised	
1	[illegible]	Note revised (Ant#1)	

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

DES. BY K.E. | DR. BY J.A.M. | LK. BY

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
PLAN AND PROFILE
HOUSATONIC AND NAUGATUCK RIVERS CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970

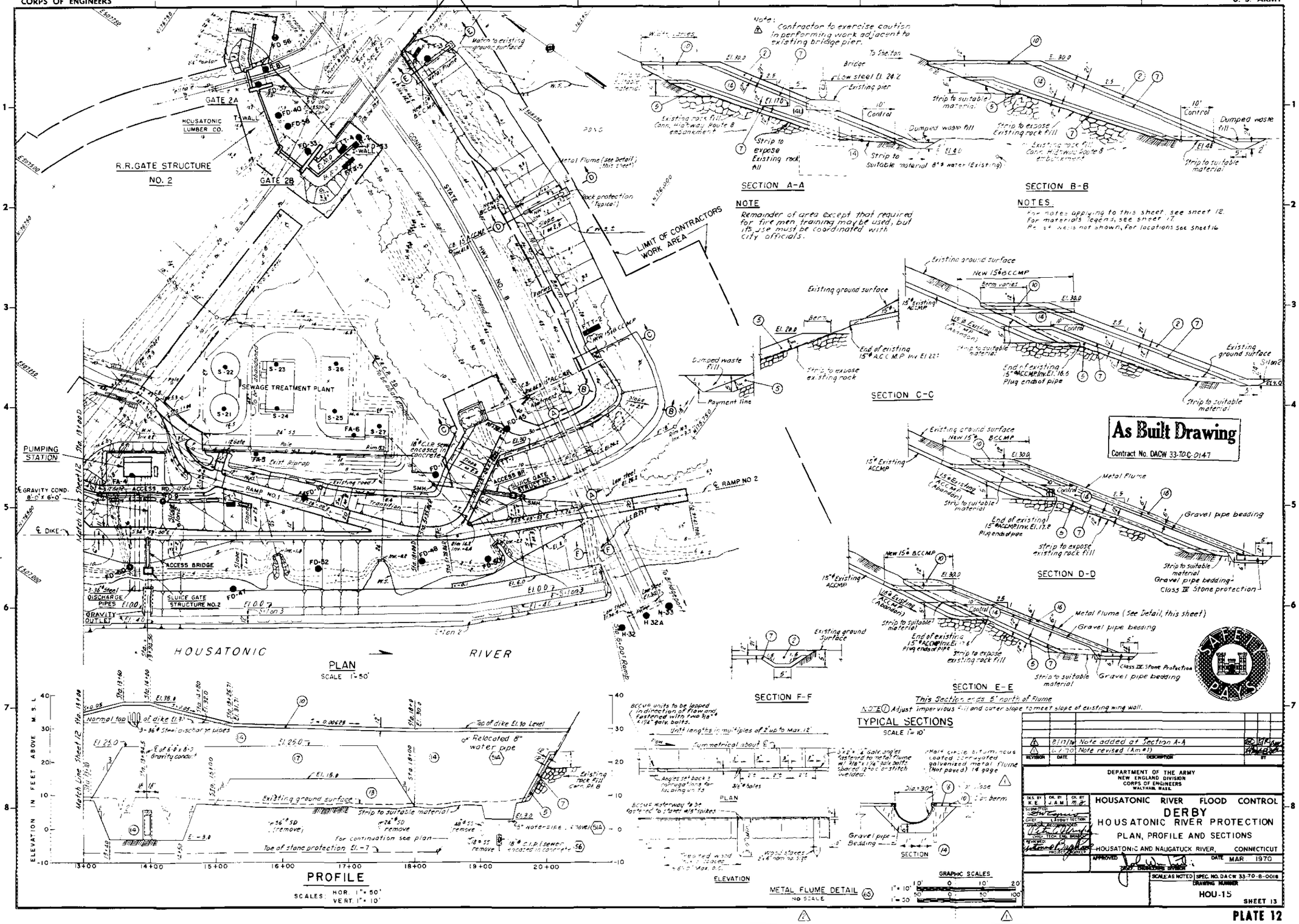
SCALE AS NOTED | SPEC. NO. DACW33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 12

As Built Drawing
Contract No. DACW 33-70-C-0014

GRAPHIC SCALES
1"=10' 10' 0 10' 20'
1"=50' 50' 0 50' 100'

PLATE 11

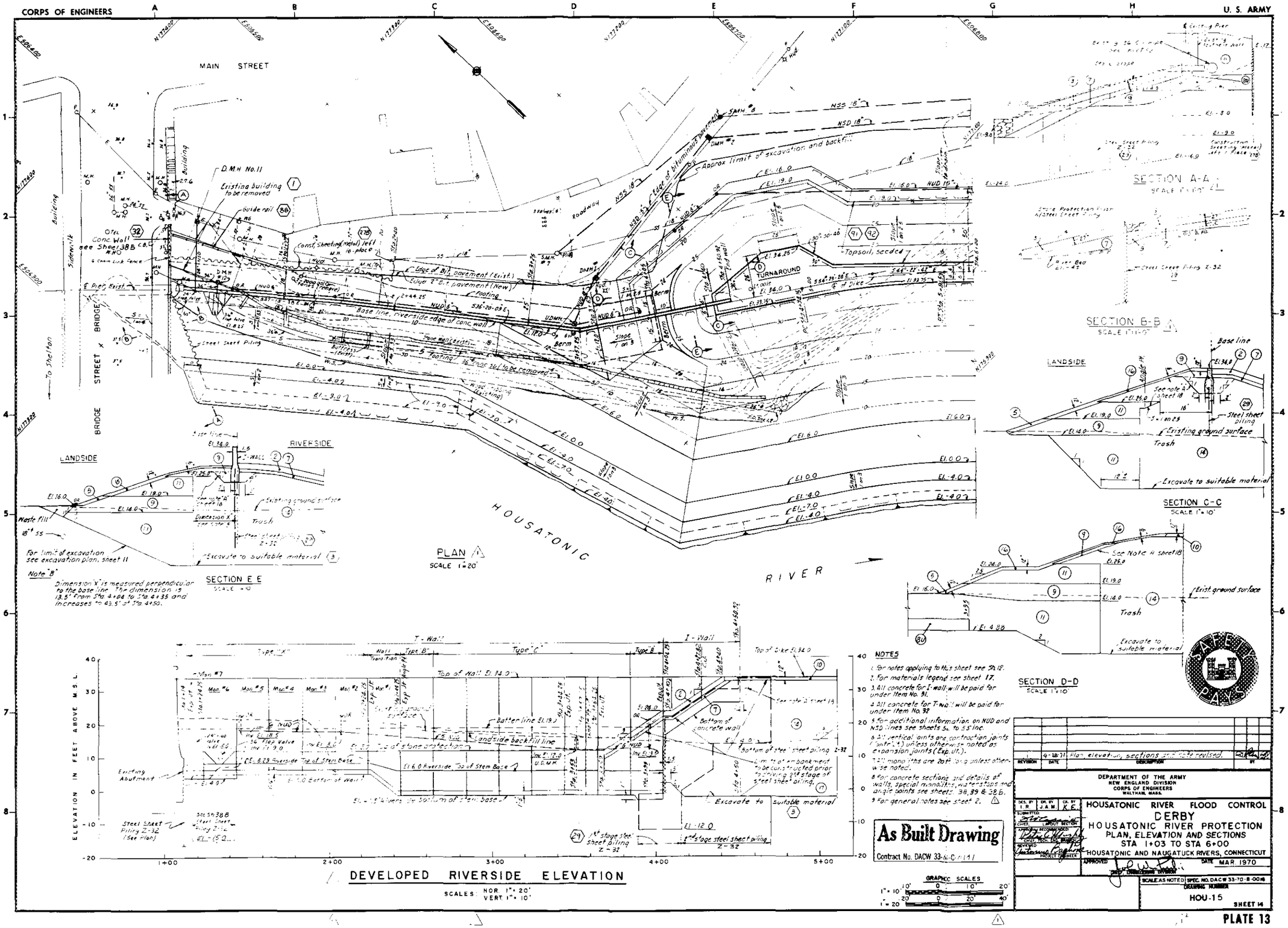
CORPS OF ENGINEERS — U. S. ARMY



REVISION	DATE	DESCRIPTION	BY
4	8/17/70	Note added at Section A-A	
3	6-4-70	Note revised (Am #1)	

PLATE 12

CORPS OF ENGINEERS — U. S. ARMY



NOTES

1. For notes applying to this sheet see Sh. 18.
2. For materials legend see sheet 17.
3. All concrete for I-wall will be paid for under Item No. 31.
4. All concrete for T-wall will be paid for under Item No. 32.
5. For additional information on NUD and NSD lines see sheets 54 to 55 inc.
6. All vertical joints are contraction joints (unless otherwise noted as expansion joints (Exp. Jt.).
7. All monoliths are 20' long unless otherwise noted.
8. For concrete sections and details of walls, special monoliths, waterstops and air-jet points see sheets 38, 39 & 38B.
9. For general notes see sheet 2.

As Built Drawing
Contract No. DACW 33-70-C-0141

REVISION	DATE	DESCRIPTION	BY
	4-28-71	Plan, elevation, sections and note revised.	

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

DES. BY I.R. — DR. BY J.A.M. — CK. BY K.E.

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
PLAN, ELEVATION AND SECTIONS
STA 1+03 TO STA 6+00
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

DATE MAR. 1970
SCALE: AS NOTED — SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 14

PLATE 13

CORPS OF ENGINEERS U. S. ARMY

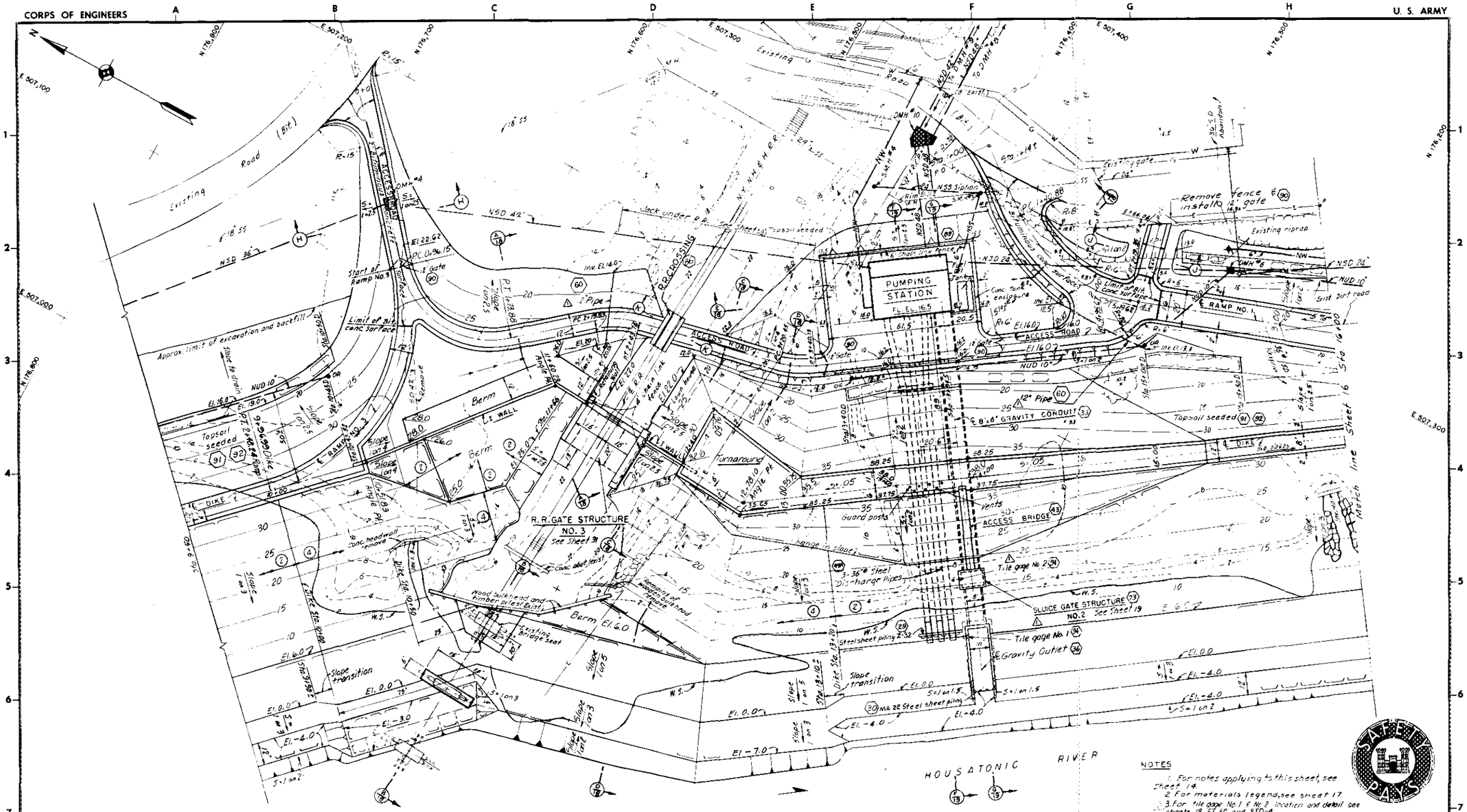
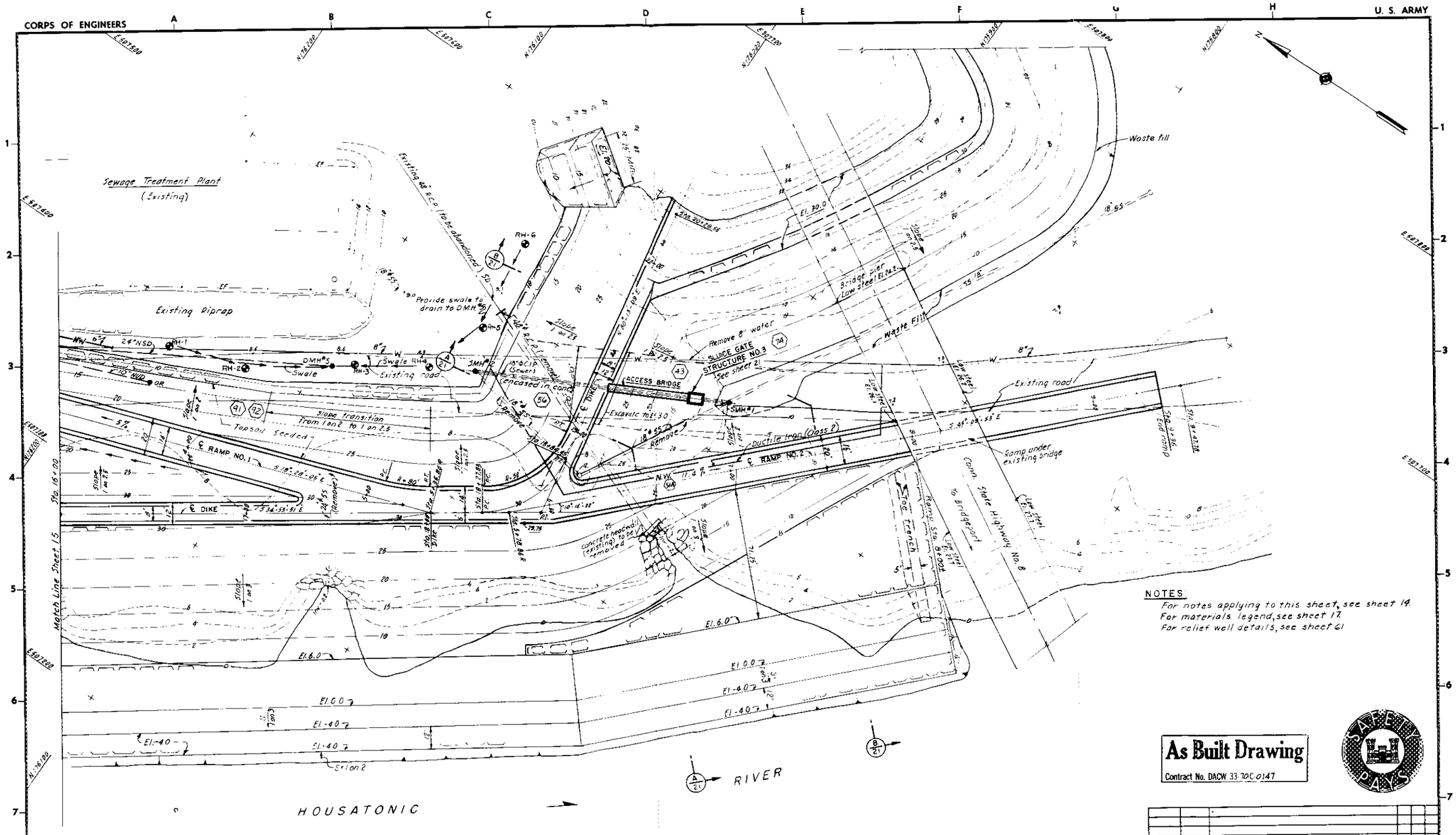


PLATE 14

CORPS OF ENGINEERS

U. S. ARMY



NOTES:

For notes applying to this sheet, see sheet 14.
For materials legend, see sheet 17.
For relief well details, see sheet 61.

As Built Drawing

Contract No. DACW 33-70C-0147

PLAN
SCALE 1"=20'

LOCATION OF RELIEF WELLS

RELIEF WELL	STATION	DISTANCE FROM TOE
RH-1	16+60	10'
RH-2	17+00	5'
RH-3	17+60	10'
*RH-4	18+00	10'
*RH-5	19+30	10'
*RH-6	19+80	10'

NOTE: Location of Relief Wells to be adjusted in field as directed.

GRAPHIC SCALE
1"=20' 20' 0 20' 40'

REVISION	DATE	DESCRIPTION	BY
		Final Field Corrections	

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

DES. BY R.E. | DR. BY J.A.M. | CK. BY

SUBMITTED: CHIEF, LAYOUT SECTION
RECOMMENDED: CHIEF, TECH. ENG. BRANCH
SUBMITTED: PROJECT ENGINEER

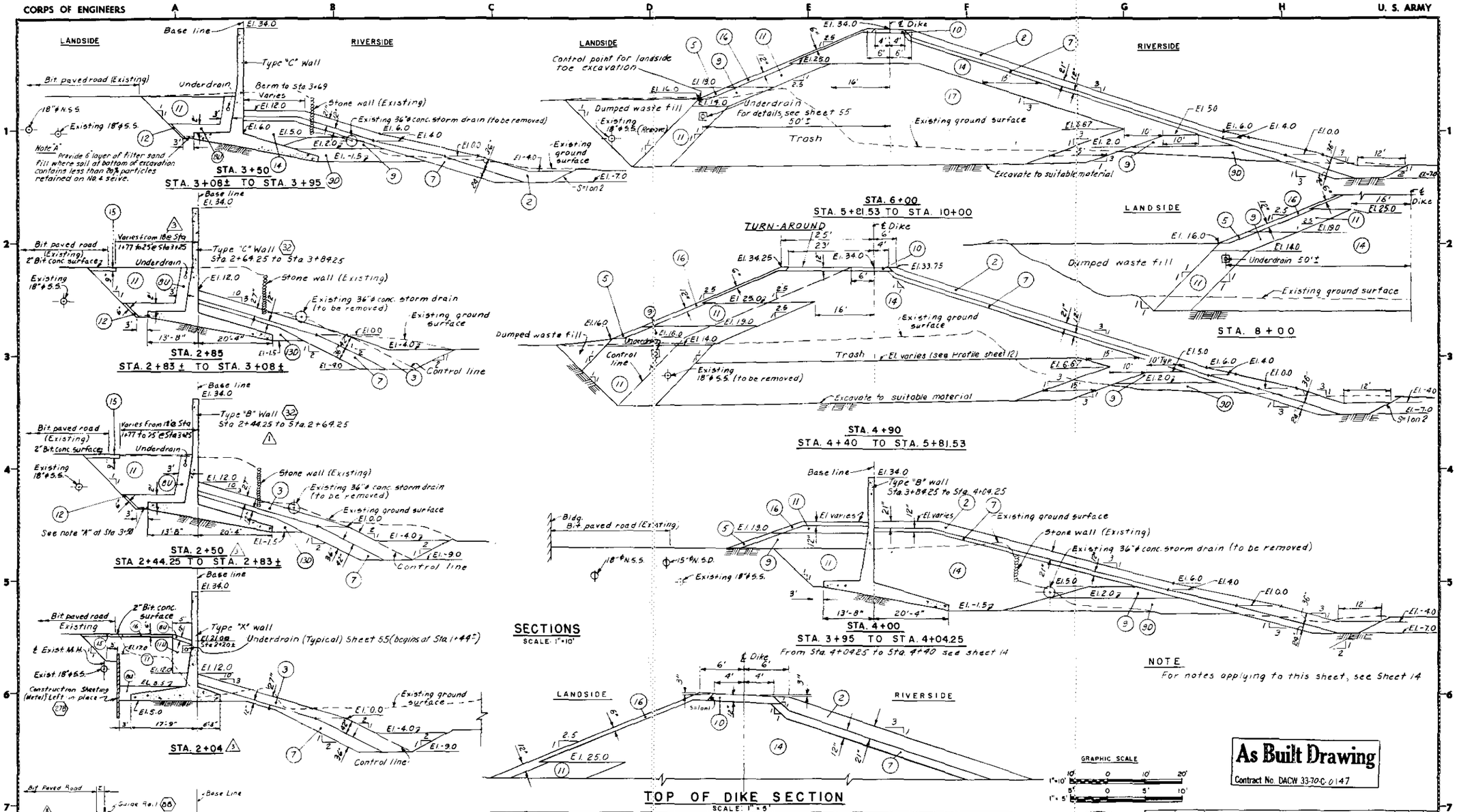
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
PLAN – STA. 16+00 TO STA. 20+38
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970

SCALE 1"=20' | SPEC. NO. DACW 33-70-B-0018
DRAWING NUMBER HOU-15
SHEET 16

PLATE 15

CORPS OF ENGINEERS — U. S. ARMY



SECTIONS

SCALE: 1"=10'

TOP OF DIKE SECTION

SCALE: 1"=5'

NOTE

For notes applying to this sheet, see Sheet 14

GRAPHIC SCALE

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

1"=5' 5' 0 5' 10'

As Built Drawing

Contract No. DACW 33-70-C-0147

MATERIALS LEGEND

DESIGNATION	TYPE OF MATERIAL	PAYMENT ITEM NO.	DESIGNATION	TYPE OF MATERIAL	PAYMENT ITEM NO.
1	Class I Stone Protection	15	10	Road Gravel	1
2	Class II Stone Protection	16	11	Compacted Sand Fill	8
3	Class III Stone Protection	17	11U	Uncompacted Sand Fill	8
4	Class IIIA Stone Protection	18	12	Filter Sand Fill	9
5	Class IV Stone Protection	19	13	Compacted Random Fill	5
6	Class I Gravel Bedding	13	13D	Dumped Random Fill	5
7	Class II Gravel Bedding	14	14	Class "A" Comp. Impervious Fill	4
8	Compacted Processed Gravel Fill	7	14U	Class "A" Uncomp. Impervious Fill	4
8U	Uncompacted Processed Gravel Fill	7	15	Rolled Gravel Base	12
9	Compacted Gravel Fill	6	16	Topsoil	91
9D	Dumped Gravel Fill	6	7	Class "B" Comp. Impervious Fill	44

REVISION	DATE	DESCRIPTION	BY
2	4-28-71	Sections revised	
1	6-2-70	Note revised (AM #4)	
1	6-2-70	Note revised (Am. #1)	

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

DES. BY K.E. | DR. BY L.R.L. | CK. BY M.Z.

SUBMITTED: CHIEF, LAYOUT SECTION

APPROVAL RECOMMENDED: CHIEF, TECH. ENG. SECTION

REVIEWED: PROJECT ENGINEER

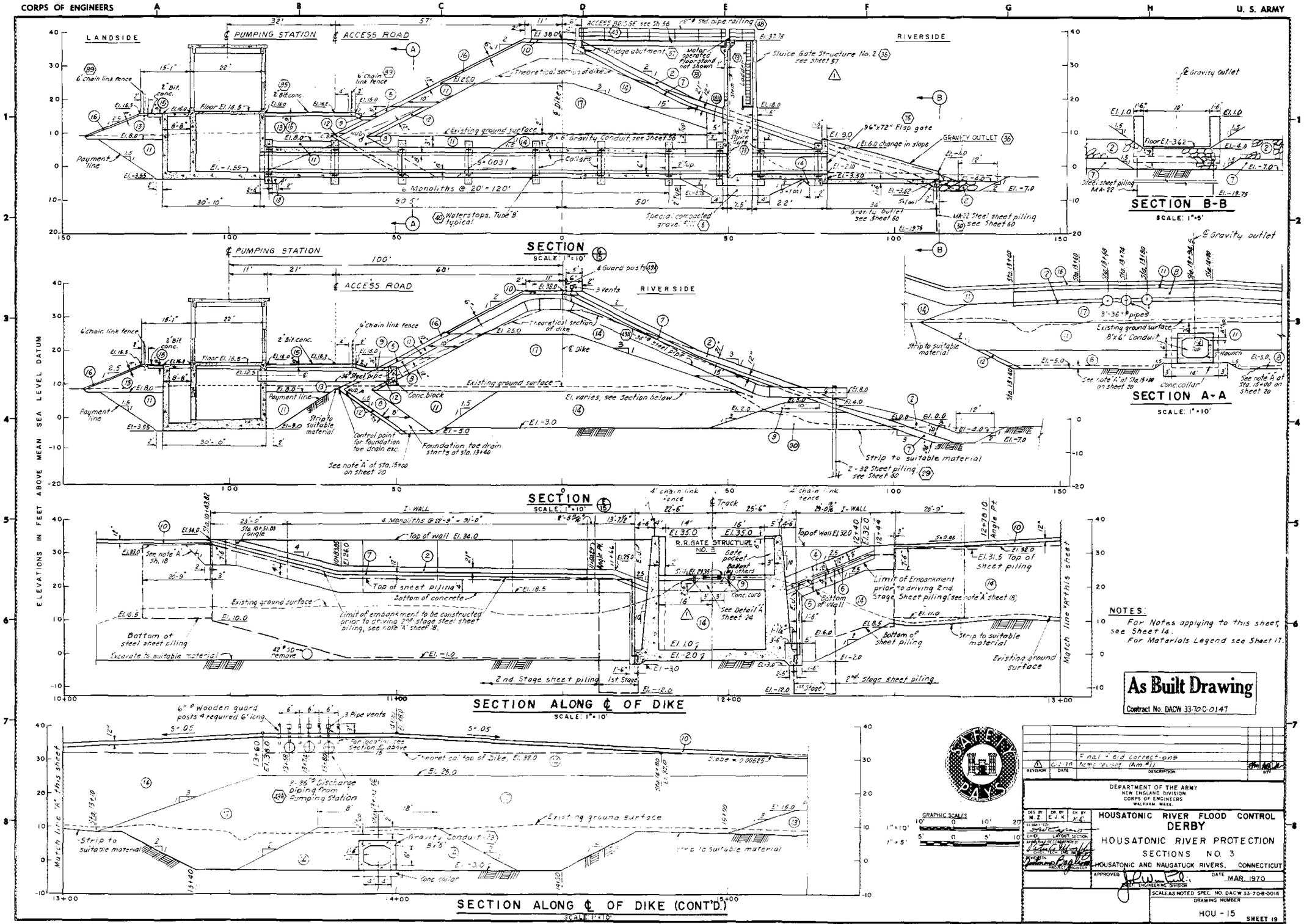
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
SECTIONS NO. 1
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION — DATE MAR. 1970

SCALE AS NOTED — SPEC. NO. DACW 33-70-B-0018

DRAWING NUMBER HOU-15 — SHEET 17

PLATE 16



NOTES:
For Notes applying to this sheet, see Sheet 14.
For Materials Legend see Sheet 17.

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
1	6-2-70	Final field corrections. Notes revised (Am. #1)	

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

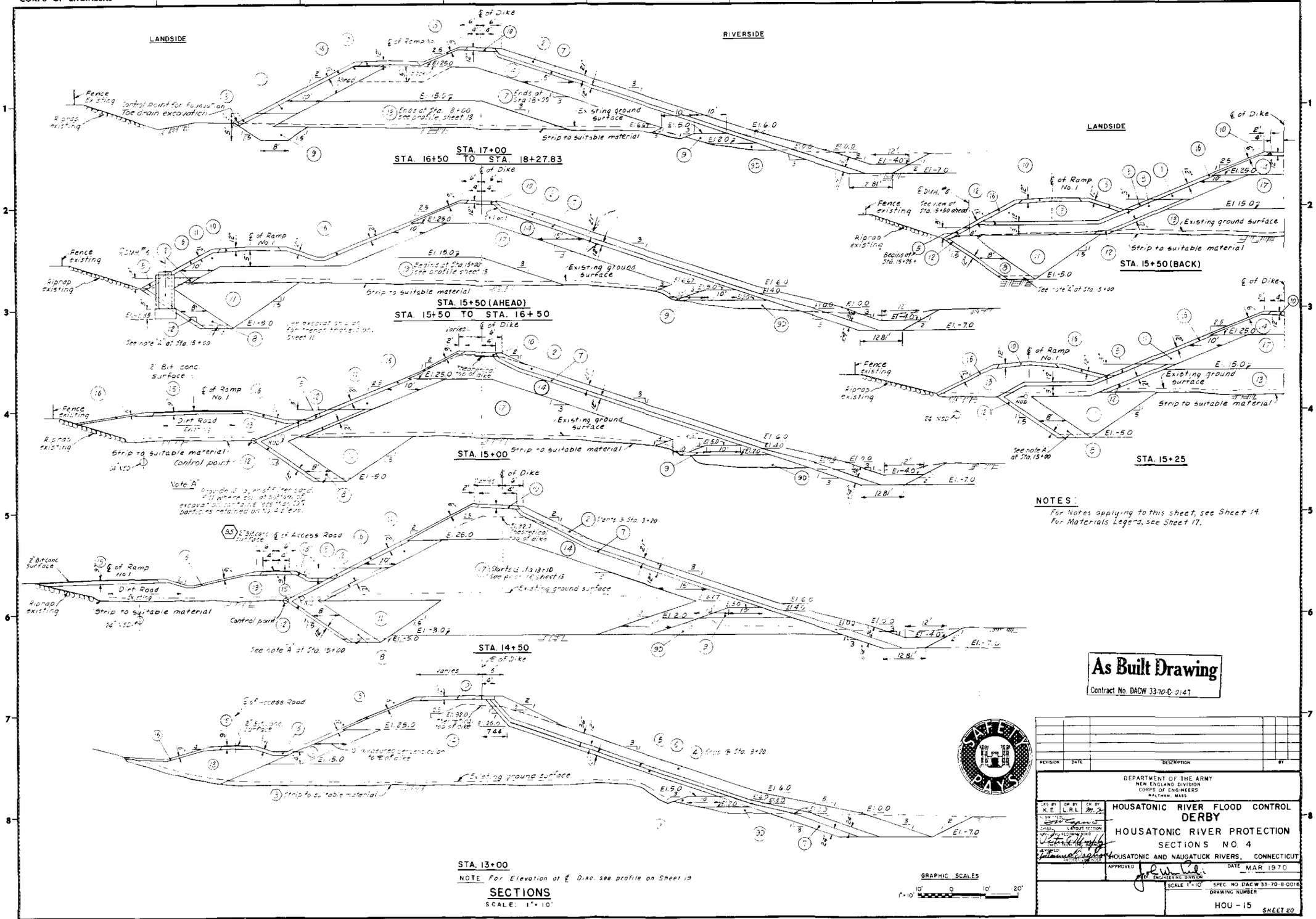
DES. BY M.Z. | DR. BY E.J.K. | CK. BY K.E.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
SECTIONS NO. 3
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: MAR. 1970
SCALE AS NOTED SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER: HOU - 15
SHEET 19

PLATE 18

CORPS OF ENGINEERS — U. S. ARMY



NOTES:

For Notes applying to this sheet, see Sheet 14.
For Materials Legend, see Sheet 17.

NOTE For Elevation at ℄ Dike, see profile on Sheet 19

SECTIONS

SCALE: 1" = 10'

GRAPHIC SCALES

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

As Built Drawing

Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY

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

DES. BY K.E. | DR. BY L.R.L. | CK. BY

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
SECTIONS NO. 4
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED — CHIEF, ENGINEERING DIVISION

DATE MAR 1970

SCALE 1" = 10'

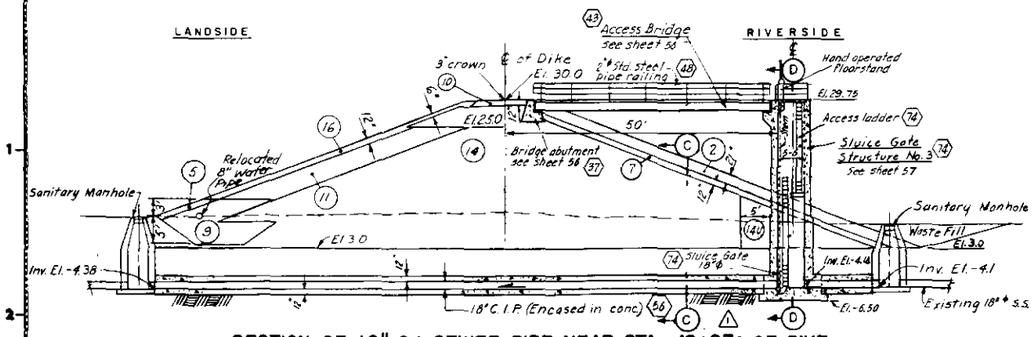
SPEC NO DACW 33-70-B-0016

DRAWING NUMBER HOU - 15

SHEET 20

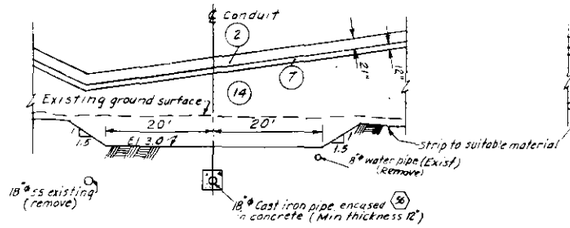
PLATE 19

CORPS OF ENGINEERS U. S. ARMY



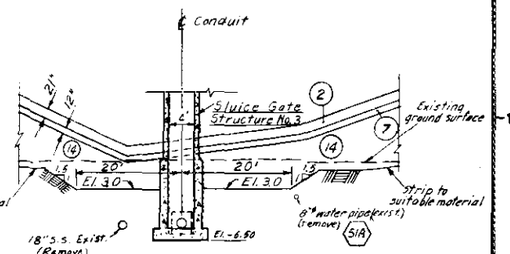
SECTION OF 18" C.I. SEWER PIPE NEAR STA. 19+27± OF DIKE

SCALE: 1" = 10'



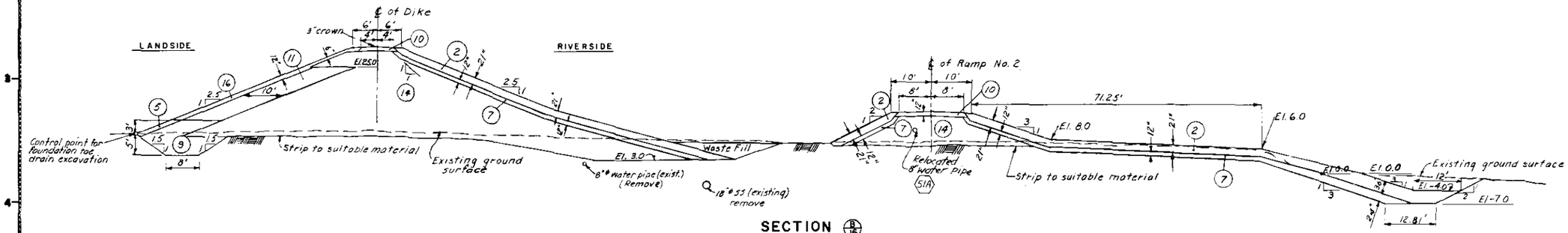
SECTION C-C

SCALE: 1" = 10'



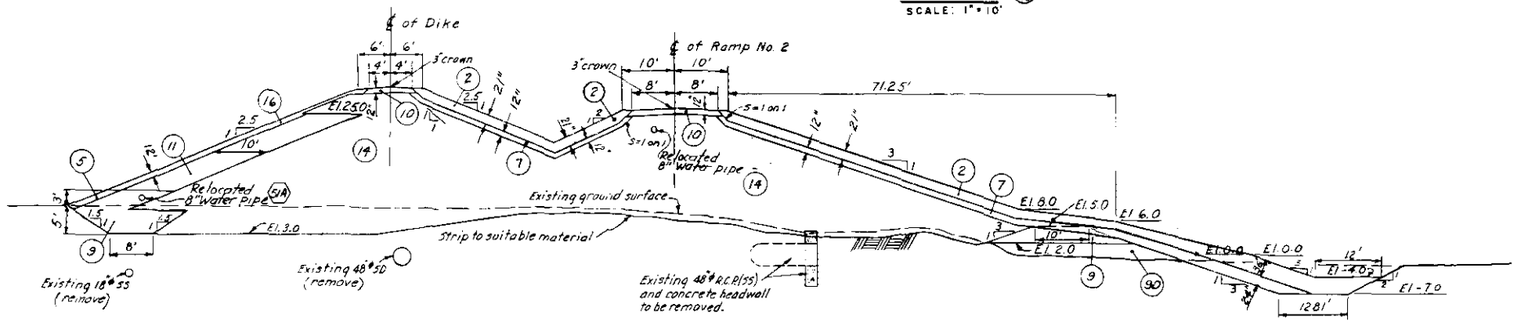
SECTION D-D

SCALE: 1" = 10'



SECTION B/16

SCALE: 1" = 10'



SECTION A/16

SCALE: 1" = 10'

NOTES:

1. For notes applying to this sheet, see Sheet 14.
2. For Materials Legend, see Sheet 17.

As Built Drawing

Contract No. DACW 33-70-C-0147

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

REVISION	DATE	DESCRIPTION	BY
1	6-2-70	Note revised (Am #1)	

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

DES BY K.E. | DR BY E.J.K. | CK BY

SUBMITTED: CHIEF, LAYOUT SECTION

APPROVED: RECOMMENDED: CHIEF, DESIGN BRANCH

REVIEWED: CHIEF, PROJECT DESIGN

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
SECTIONS NO. 5
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION

DATE MAR 1970

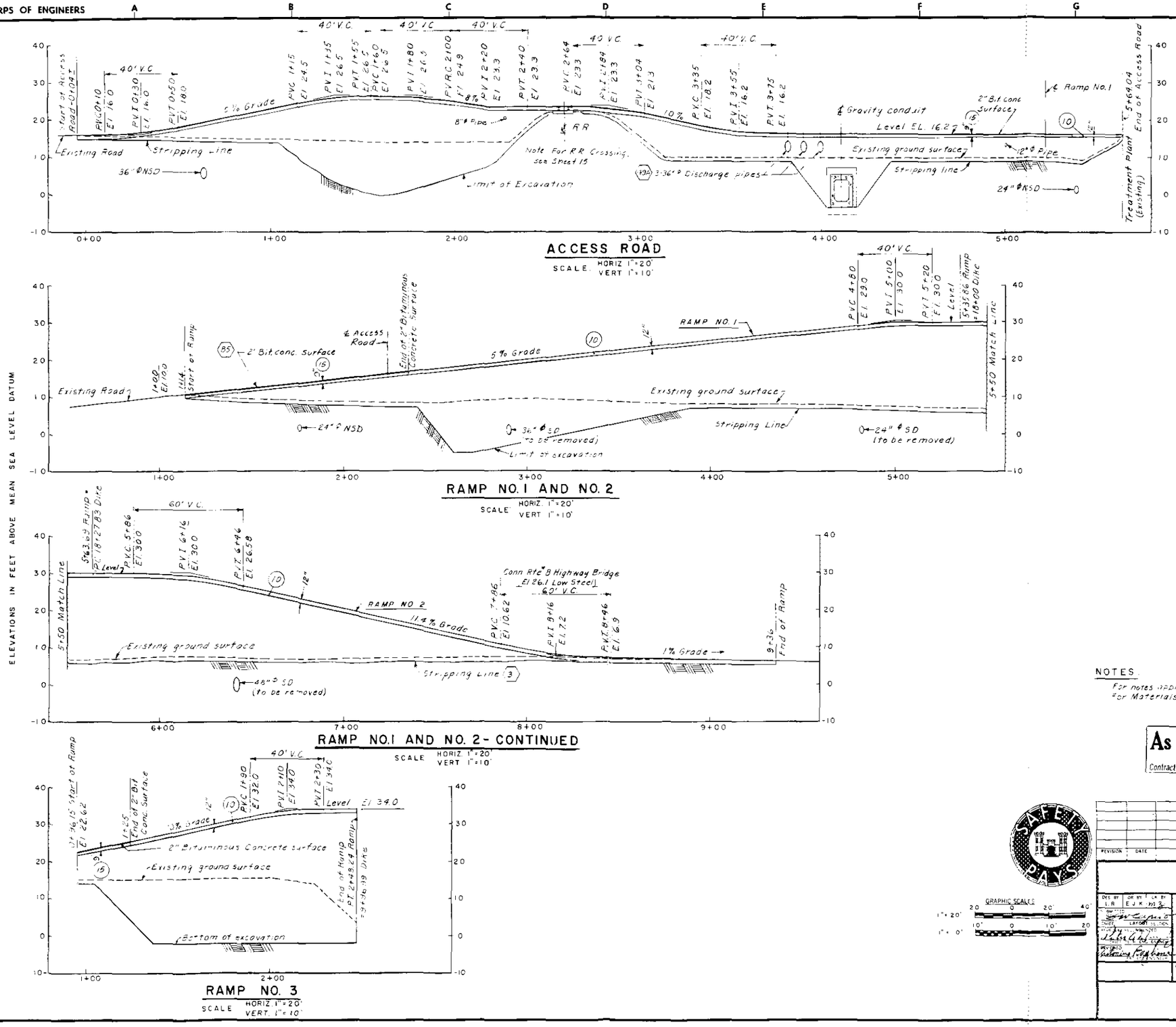
SCALE 1" = 10' | SPEC. NO. DACW 33-70-B-0016

DRAWING NUMBER HOU - 15

SHEET 21

PLATE 20

CORPS OF ENGINEERS U. S. ARMY



NOTES

For notes applying to this sheet, see sheet 14
For Materials Legend see sheet 17

As Built Drawing

Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY

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

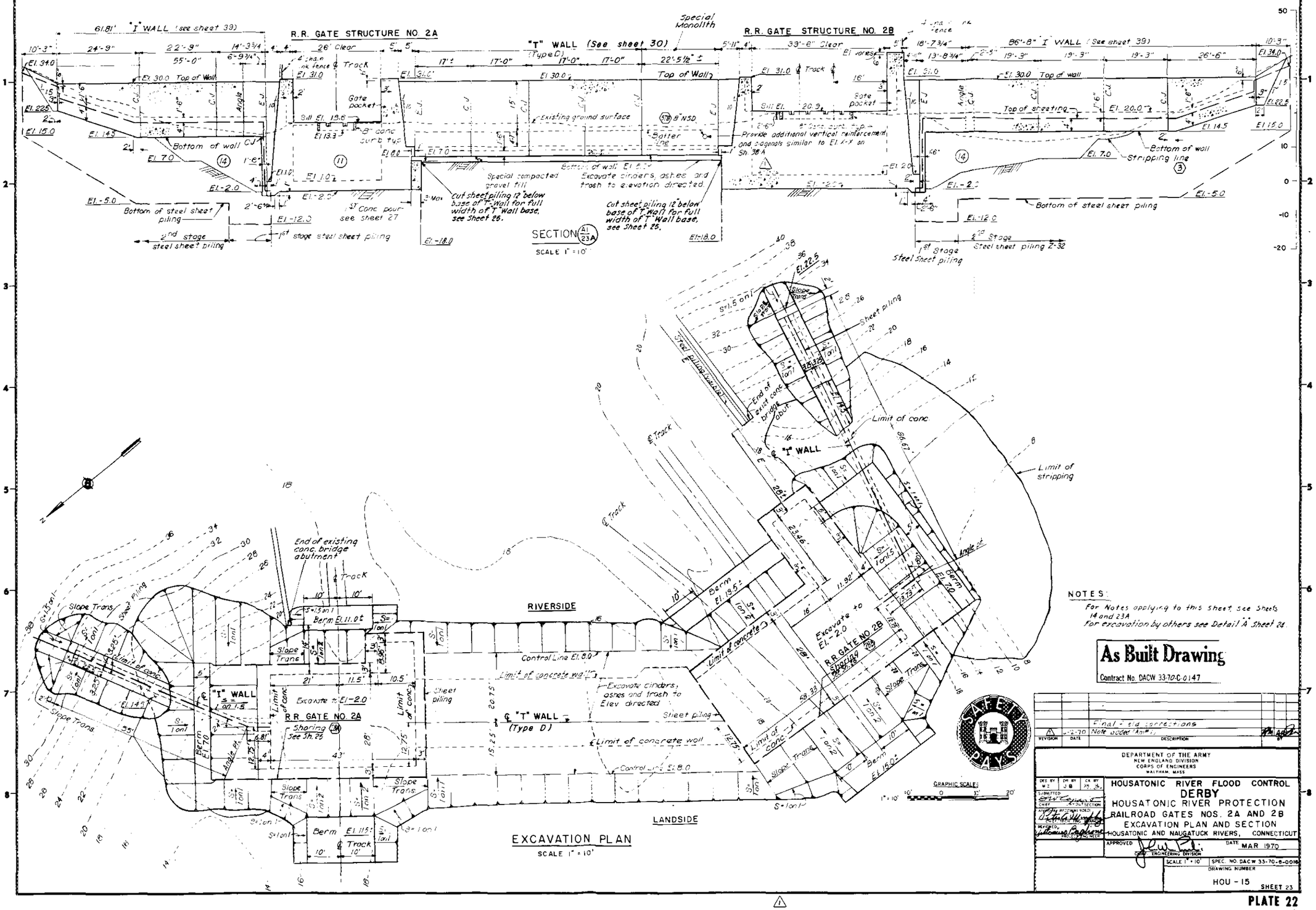
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
ACCESS ROAD AND RAMPS - PROFILES
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED
CHIEF, ENGINEERING DIVISION
DATE MAR 1970

SCALE AS NOTED SPEC NO DACW 33-70-B-00-6
DRAWING NUMBER
HOU - 15
SHEET 22

PLATE 21

CORPS OF ENGINEERS U. S. ARMY



NOTES:

For Notes applying to this Sheet, see Sheets 14 and 23A

For excavation by others see Detail 'A' Sheet 24.

As Built Drawing

Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
1	1-2-70	Final - as corrections Note added "Anl"	

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

DES BY M.Z. | DR BY J.B. | CK BY

SUBMITTED: CHIEF, DESIGN SECTION

APPROVED AND RECOMMENDED: CHIEF, DESIGN BRANCH

REVIEWED: CHIEF, PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATES NOS. 2A AND 2B
EXCAVATION PLAN AND SECTION
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION

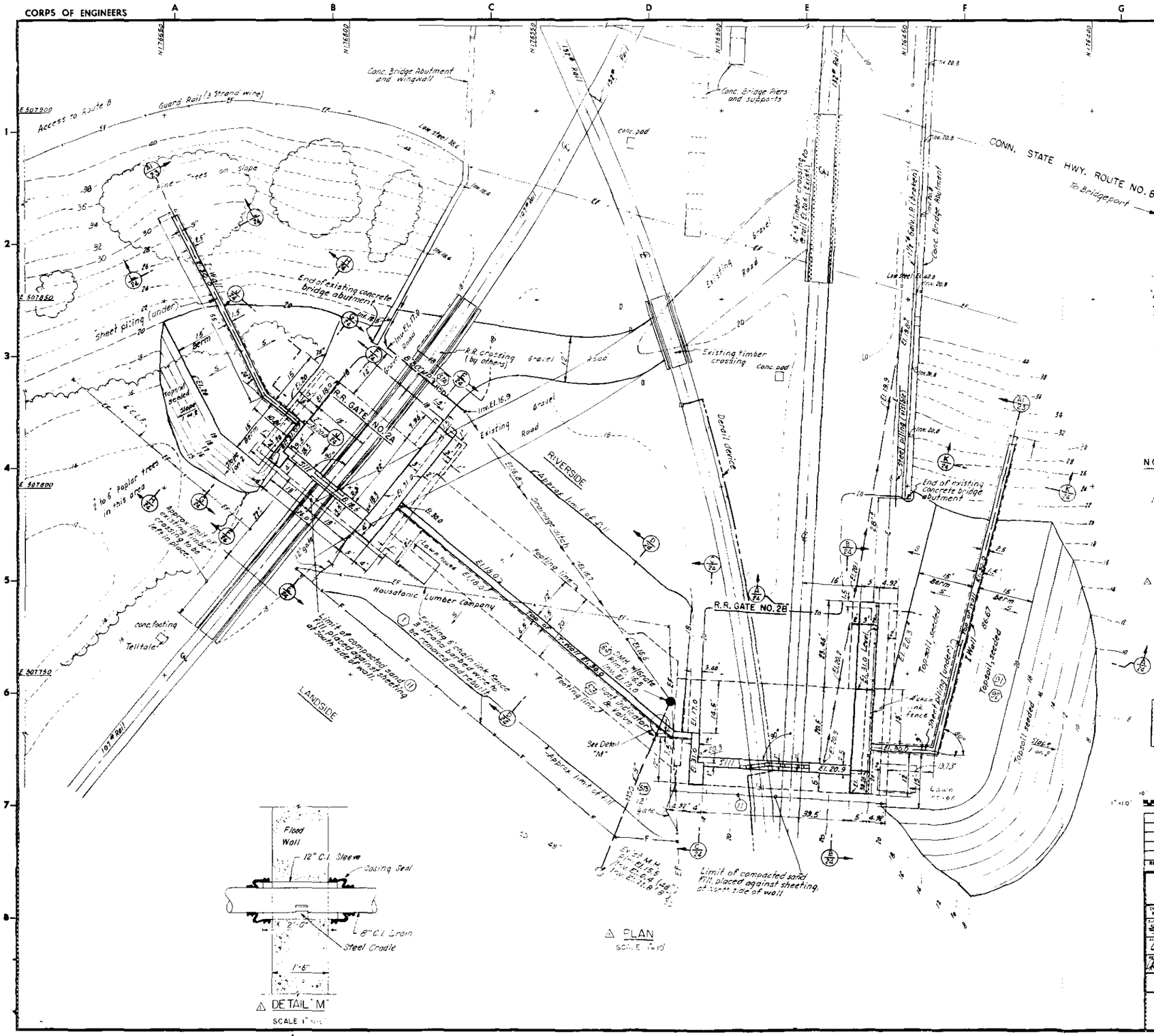
DATE MAR 1970

SCALE 1" = 10' | SPEC. NO. DACW 33-70-B-0016

DRAWING NUMBER HOU - 15 SHEET 23

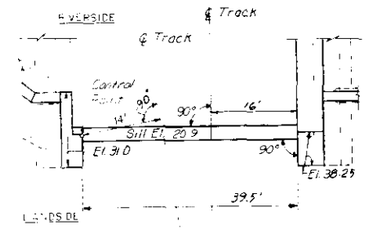
PLATE 22

CORPS OF ENGINEERS U. S. ARMY



PLAN
SCALE 1"=10'

DETAIL "M"
SCALE 1"=10'



CONTROL FOR R.R. GATE NO. 2B
SCALE 1"=10'

NOTES:

1. For Notes applying to this sheet see sheet 14.
2. All concrete for R.R. Gate Structure No. 2A & 2B will be paid for under Item No. 32.
3. For concrete details, see sheet 24.
4. For railroad gates, Nos. 2A and 2B details, see sheets 25 thru 30.
5. For materials legend see sheet 17.
6. All concrete for "I" walls will be paid for under Item No. 31.
7. All concrete for "T" walls will be paid for under Item No. 32.
8. Buried timber structures, including piling, may be encountered in the excavation for R.R. Gate No. 2B.
9. Drainage Man Hole (D.M.H.) to be located in field away from "T" Wall Expansion Joint, as directed.

As Built Drawing
Contract No. DACW 33-70-C-0147

GRAPHIC SCALE
1"=10'

REVISION	DATE	DESCRIPTION	BY
		Old corrections	
1	1-1-1	Note and detail added. Grading revised (Am #1)	

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

DES. BY K.E. | DR. BY J.A.M. | CK. BY M.Z.

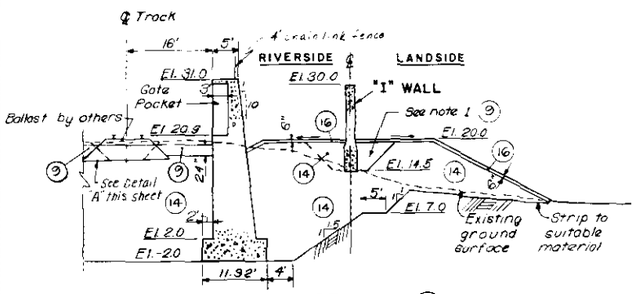
SUBMITTED: LAYOUT SECTION
APPROVED: CHIEF, ENGINEERING DIVISION
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATES NOS. 2A AND 2B
PLAN
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

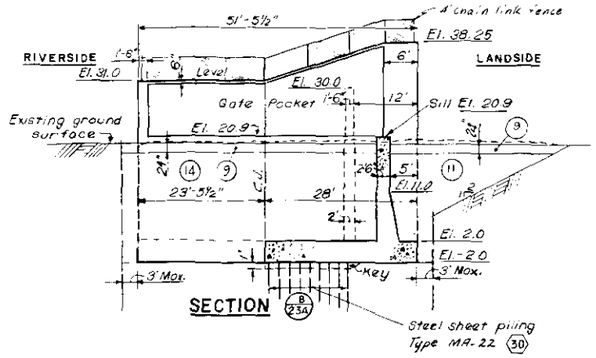
APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR 1970
SCALE 1"=10'
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 23A

PLATE 23

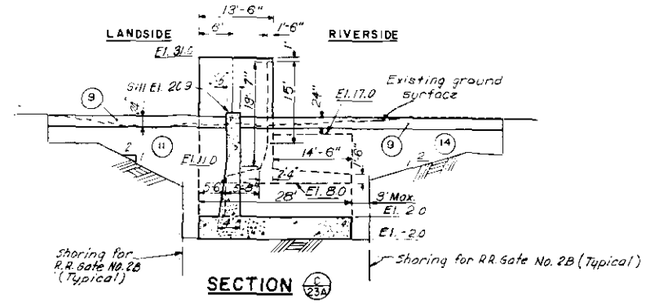
CORPS OF ENGINEERS — U. S. ARMY



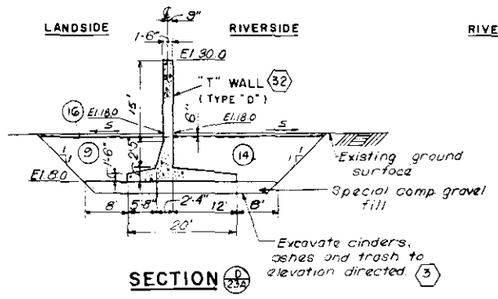
SECTION A/23A



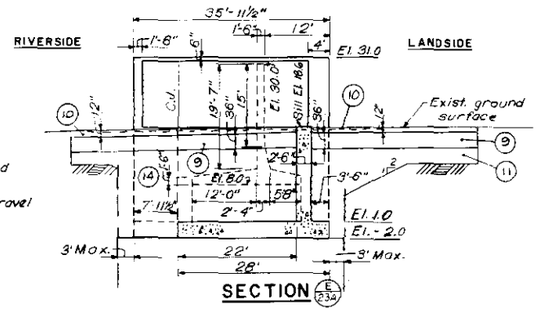
SECTION B/23A



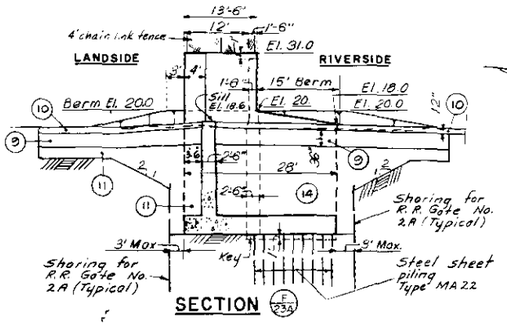
SECTION C/23A



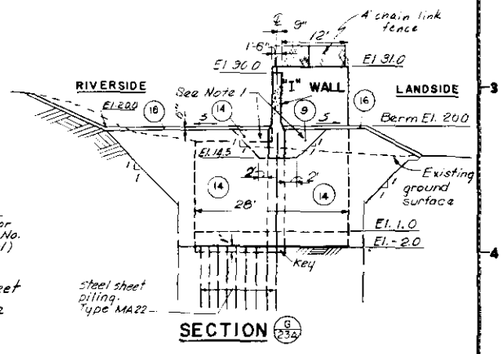
SECTION D/23A



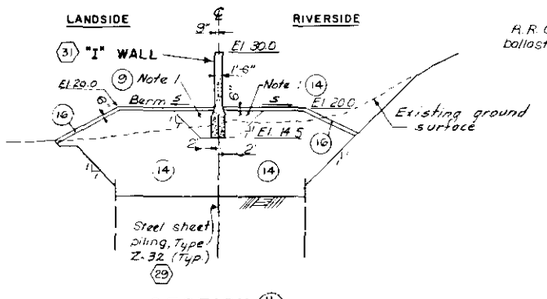
SECTION E/23A



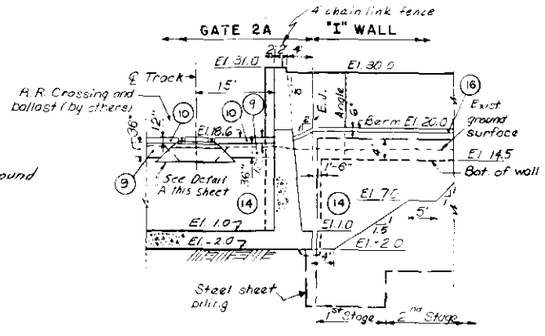
SECTION F/23A



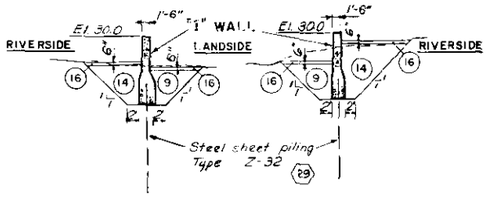
SECTION G/23A



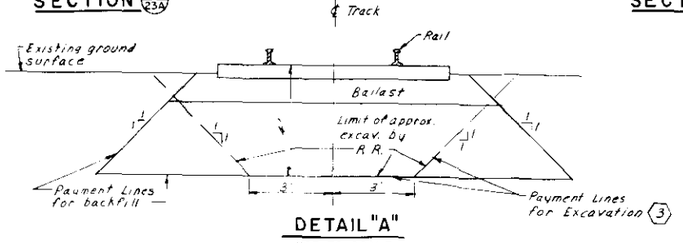
SECTION H/23A



SECTION J/23A



SECTION K/23A SECTION L/23A



DETAIL "A"
NOT TO SCALE

NOTE:

1. Compacted impervious fill to be placed in this area to El 19.5 prior to driving 2nd stage sheet piling. Excavate fill to elevation of bottom of concrete "I" Wall and construct concrete wall. Place compacted impervious fill on the end of "I" walls and on Riverside of wall and compacted gravel fill on Landside.
2. For Materials Legend, see Sheet 17
3. For notes applying to this sheet see Sheet 14 & 23.
4. All concrete for Railroad Gate Structure No. 2A and 2B will be paid for under Item 34
5. Shoring for R.R. Gate 2A will be paid for under Item No. 28A. For Details see Sheet 25
6. Shoring for R.R. Gate 2B will be paid for under Item No. 28B. For Details see Sheet 26
7. For Excavation Plan see Sheet 23.

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	

GRAPHIC SCALES

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

DES. BY M.Z. | DR. BY J.B. | CK. BY K.E.

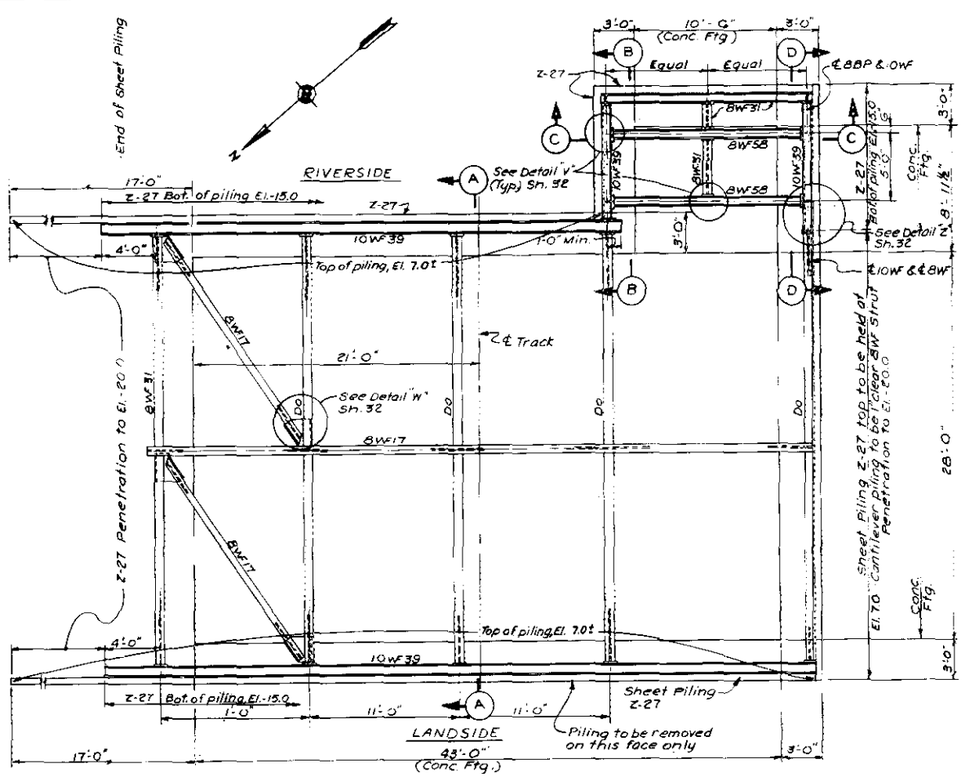
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH
PROVISIONALLY APPROVED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATES NOS. 2A AND 2B
SECTIONS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

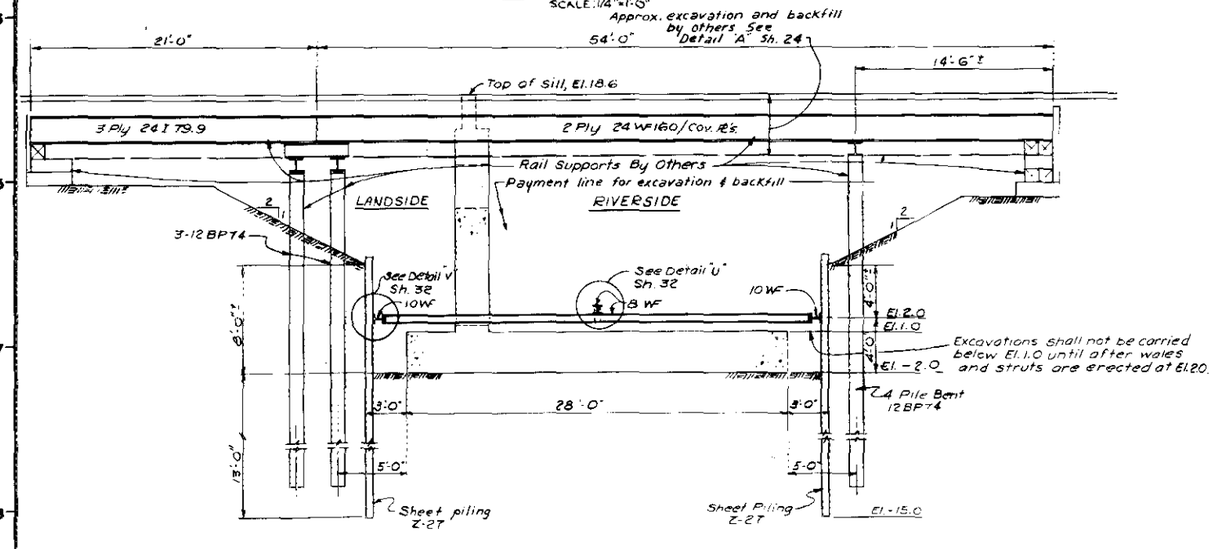
APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970
SCALE 1" = 10'
SPEC NO DACW 33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 24

PLATE 24

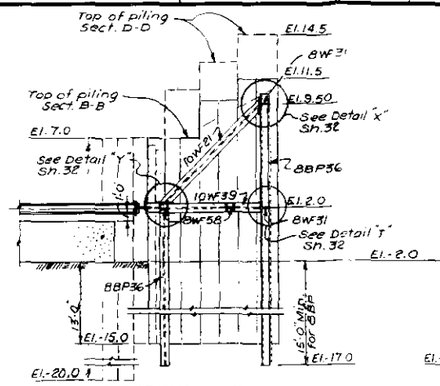
CORPS OF ENGINEERS U. S. ARMY



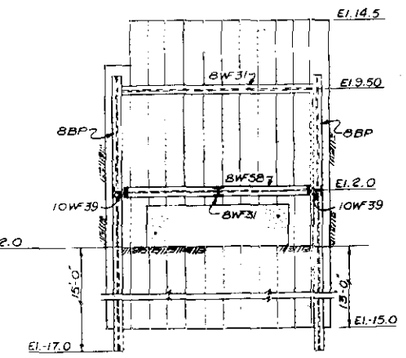
PLAN AT EL.2.0
SCALE: 1/4"=1'-0"



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



SECTION B-B
(SECTION D-D SIMILAR EXCEPT OPPOSITE HAND AND AS NOTED)
SCALE: 1/4"=1'-0"



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

CONSTRUCTION PROCEDURE

1. For initial sheet pile work see specifications.
2. Timber piles and trestles may be encountered when driving piling.
3. After completion of work by the Railroad, the contractor shall excavate to grades required for driving piling and piles. This shall be approximately to top of sheet piling.
4. Excavate and trench as required to install steel wales and bracing. At gate pocket corner of each gate where bracing slopes to two levels, the sloped earth shall be removed in careful stages to install wales and bracing from top to bottom. Temporary bracing shall be provided if excavations are such that sheet piling is overloaded before erection of wales and struts shown on drawings.
5. Excavate to foundation grades shown. Extra depth for pumping shall require sheet piling to be driven further than shown. After first concrete pour at gates 2A and 2B, wales shall be braced at a maximum spacing of 5'-6" to concrete footings before struts are removed. Concrete shall have attained sufficient strength so as not to be damaged by temporary brace load. Additional concrete pours and backfilling shall be completed so that sheet piling can be removed. At gate No. 3, no bracing to concrete is necessary. After the first and second concrete pours, backfilling shall be completed so that bracing and sheet piling can be removed.

SHORING DETAILS NOTES CONT.

6. For Excavation Plan see Sh. 23

SHORING DETAIL NOTES

1. All structural steel shall be A.S.T.M. A36. Shop connections shall be bolted or welded as shown. Field connections shall be bolted. Bolted connections shall be high strength steel bolts, nuts and washers.
2. Steel sheet piling shall A.S.T.M. A-328, Type A (yield strength 38,500 #/□").
3. Shop drawings of all work including temporary brackets and braces shall be submitted for approval.
4. All connections shall be 3/4" ϕ bolts except as noted.
5. All work shown, except concrete and excavation, shall be paid for under Item No. 28A.

GRAPHIC SCALES

As Built Drawing
Contract No. DACW 33-70-C-0141

REVISION	DATE	DESCRIPTION	BY
1	6-2-70	Notes revised (Am #1)	

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

DES. BY G.E.R. | DR. BY J.P.H. | CK. BY

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATE NO. 2A
SHORING DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

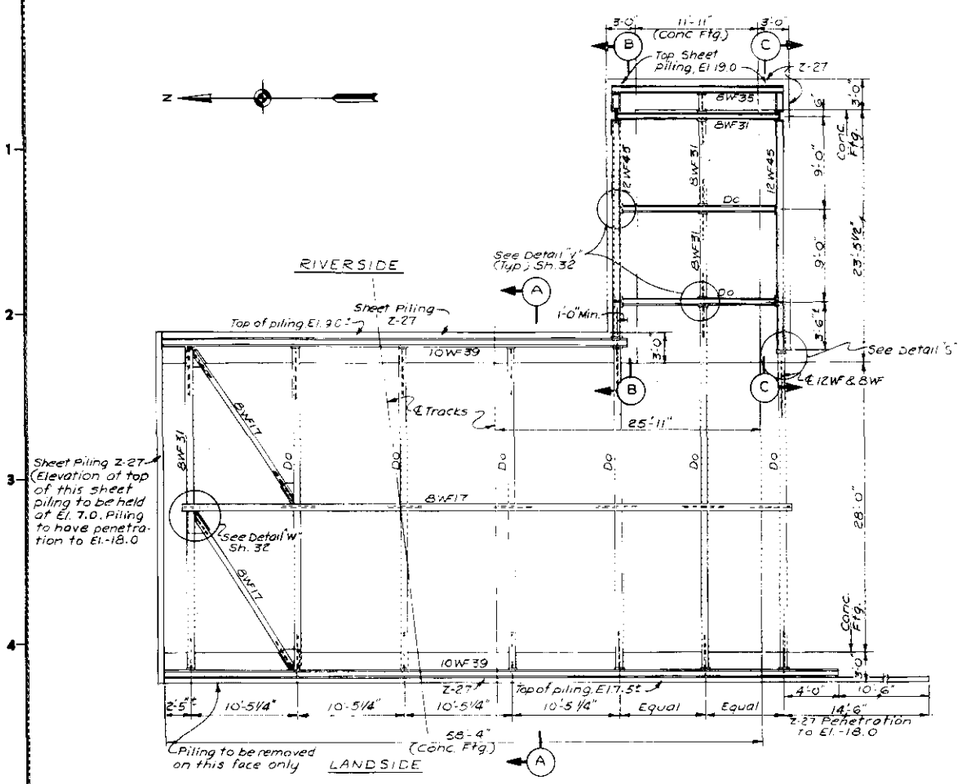
APPROVED — CHIEF, ENGINEERING DIVISION — DATE MAR. 1970

SCALE — SPEC. NO. DACW-33-70-B-0016

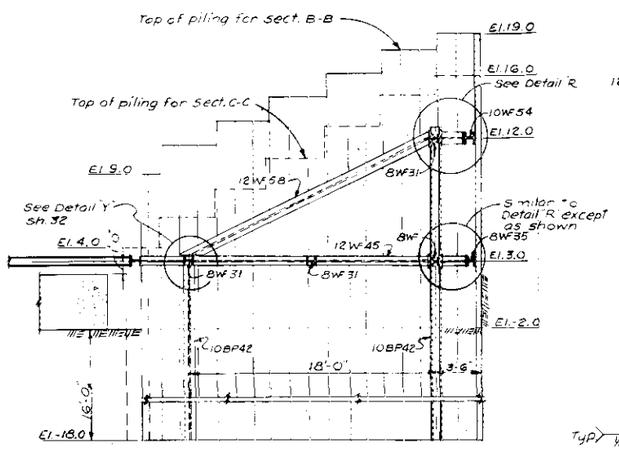
DRAWING NUMBER HOU - 15 SHEET 25

PLATE 25

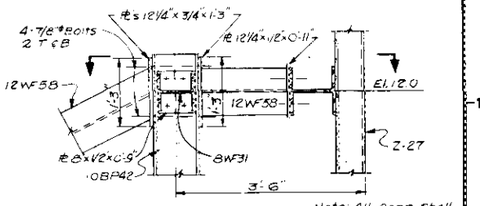
CORPS OF ENGINEERS U. S. ARMY



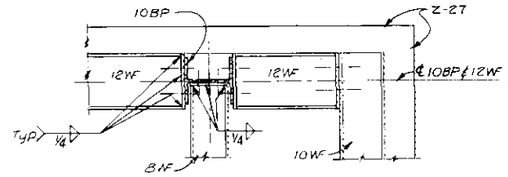
PLAN AT EL.3.0
SCALE: 3/16"=1'-0"



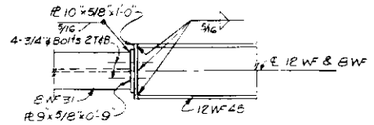
SECTION B-B
(SECTION C C SIMILAR EXCEPT OPPOSITE HAND AND AS NOTED)
SCALE: 1/4"=1'-0"



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

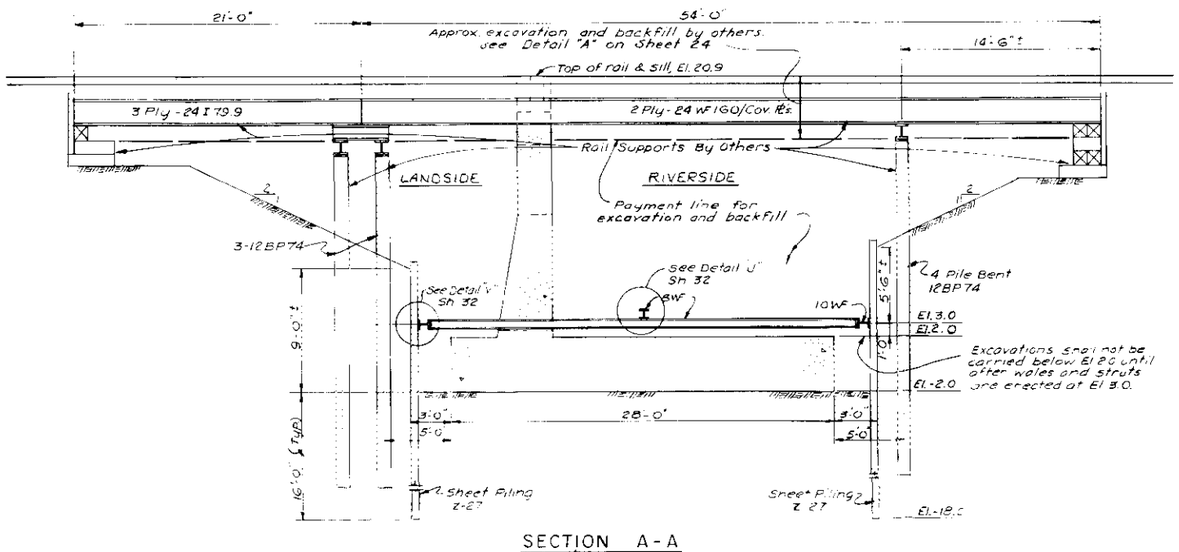


PLAN
SCALE: 1"=1'-0"



DETAIL "S"
SCALE: 1"=1'-0"

Notes:
1. For Excavation Plan see Sh. 23
2. All work shown, except concrete and excavation, shall be paid for under Item No. 28 B
3. For construction procedure and shoring detail notes, see Sh. 25.



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

As Built Drawing
Contract No. DACW 33-70-C-0147

GRAPHIC SCALES
1/4"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	1-2-70	Note 3 added. Note revised (Am. #1)	

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

DES. BY G.E.R. DR. BY J.P.H. CK. BY
SUBMITTED: CHIEF, STRUCT. SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATE NO. 2B
SHORING DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR 1970
SCALE
SPEC. NO. DACW-33-70-B-0016
DRAWING NUMBER HOU - 15
SHEET 26

PLATE 26

CORPS OF ENGINEERS — U. S. ARMY

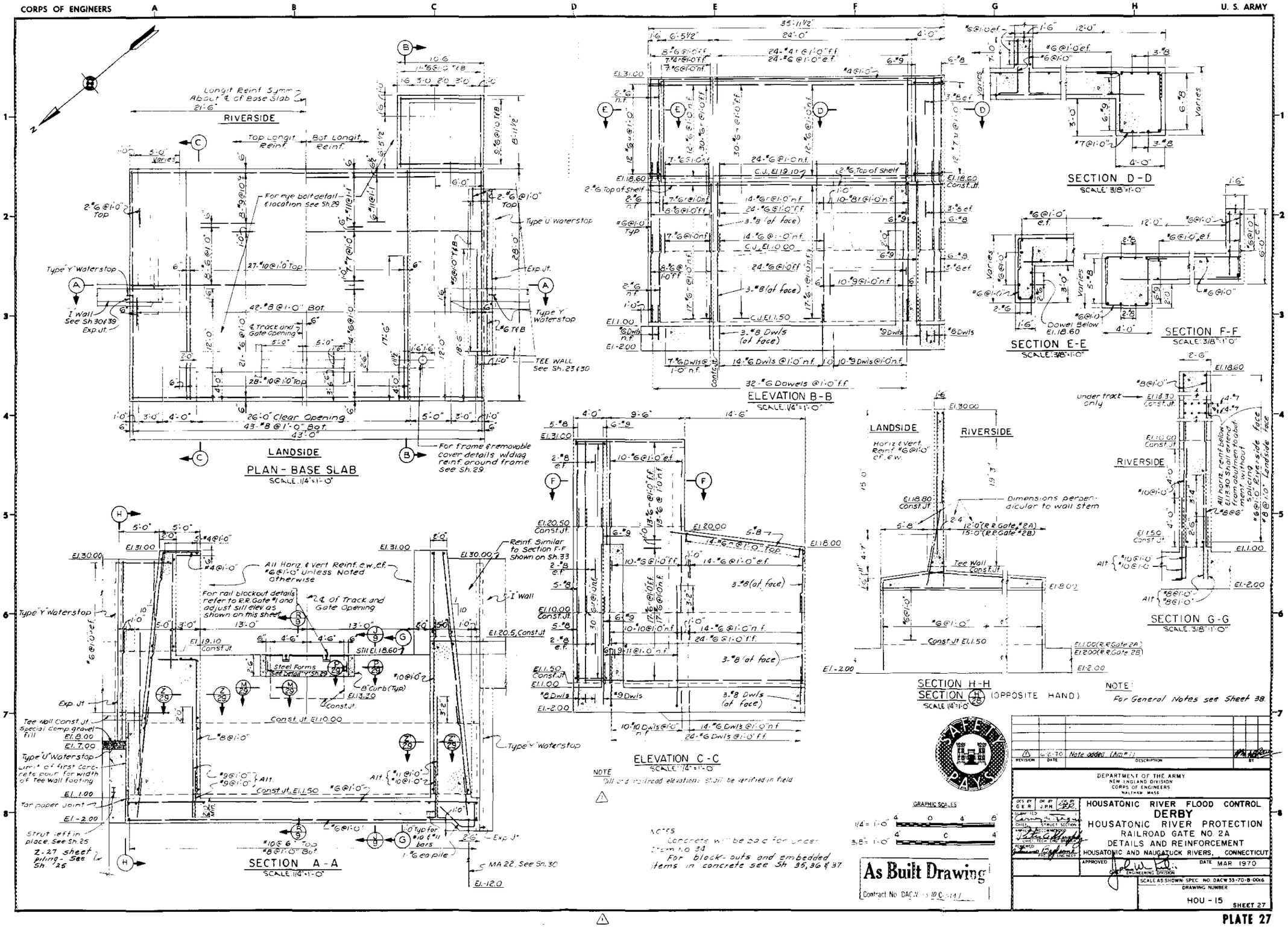


PLATE 27

CORPS OF ENGINEERS U. S. ARMY

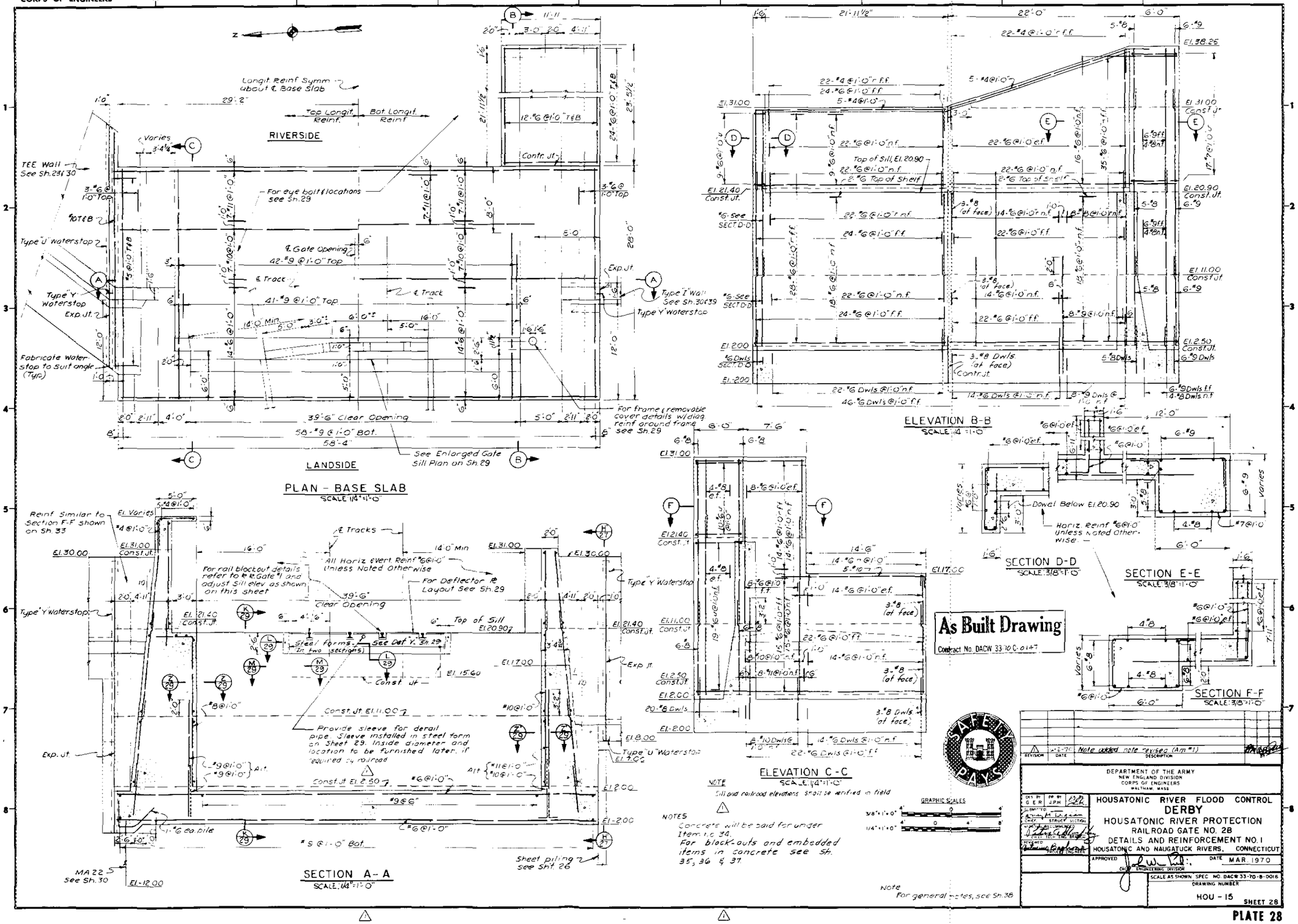
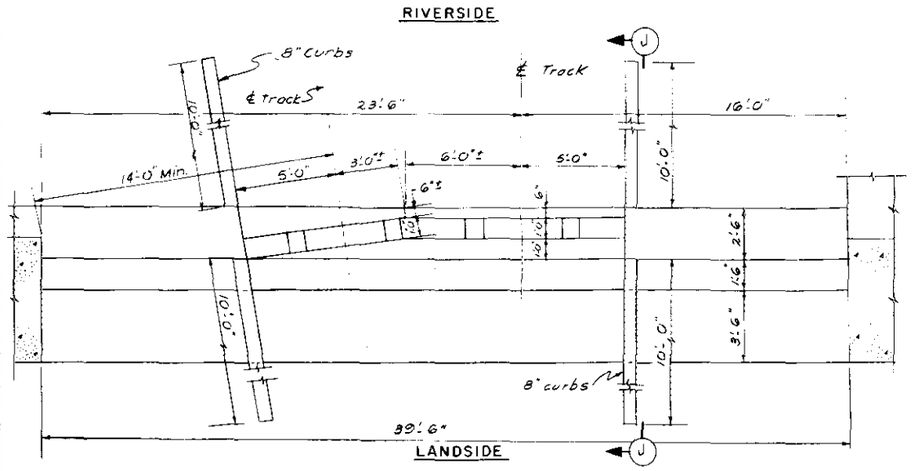
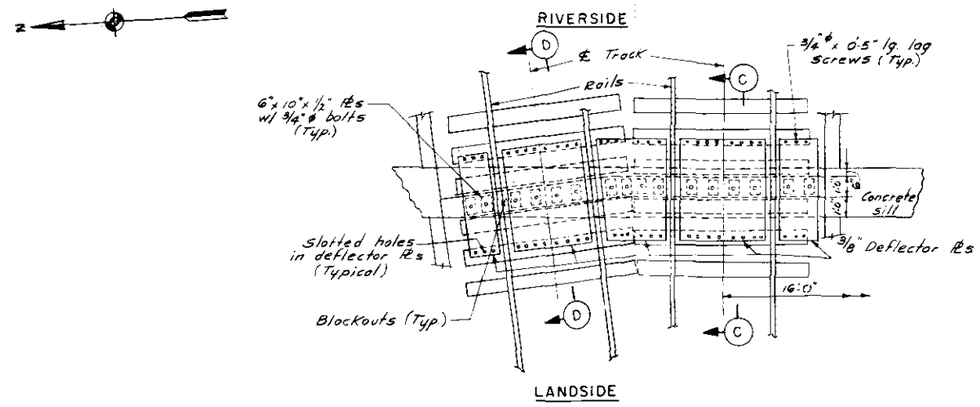


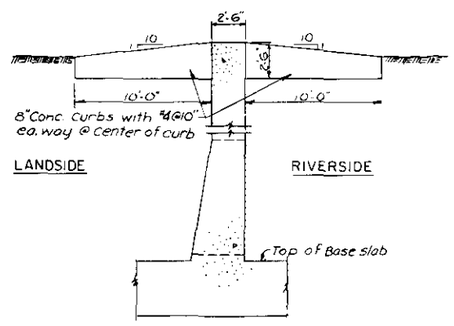
PLATE 28



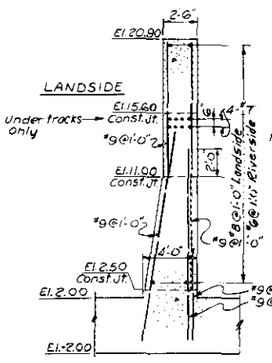
PLAN - GATE SILL
RR GATE NO.2B
SCALE: 3/8"=1'-0"



PLAN - DEFLECTOR PLATE LAYOUT AT SILL
RR GATE NO.2B
SCALE: 3/8"=1'-0"

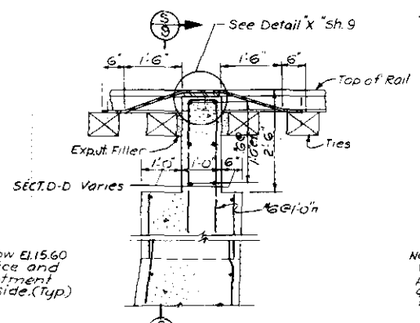


SECTION J-J
SECTION J/33
SCALE: 1/4"=1'-0"

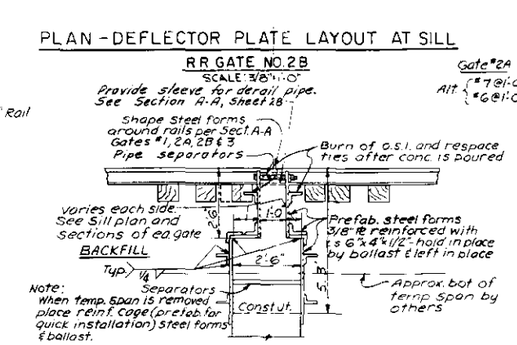


Note:
Horiz. reinf. below El. 15.60 shall have no splice and extend into abutment walls at each side. (Typ.)

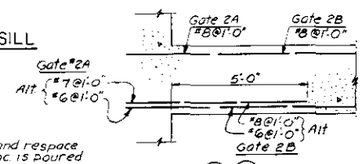
SECTION K/28
SCALE: 1/4"=1'-0"



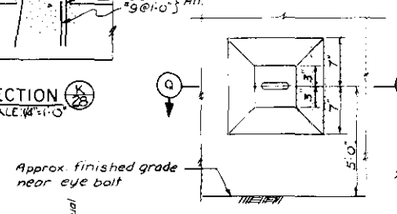
SECTION C-C
SECTION D D (SIMILAR EXCEPT AS NOTED)
SCALE: 3/4"=1'-0"



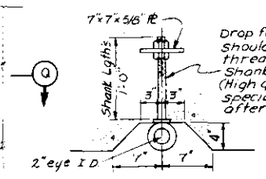
DETAIL "Y"
TYPICAL SILL CONSTRUCTION - STEEL FORMS
SCALE: 1/2"=1'-0"



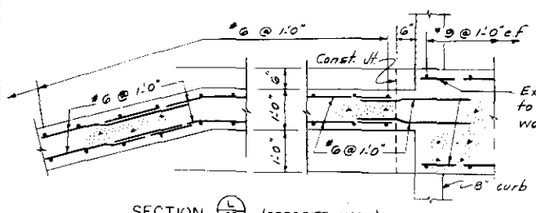
SECTION 2/27 2/28
SECTION 2/27 2/28 (OPPOSITE HAND)
SCALE 1/2"=1'-0"



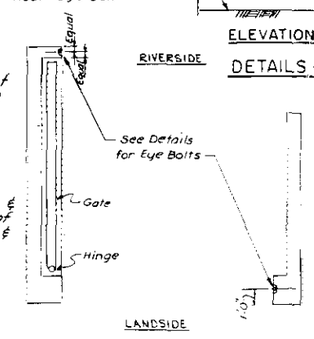
ELEVATION



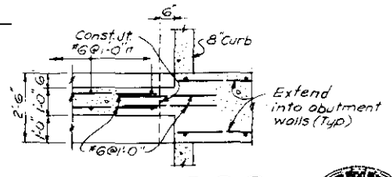
SECTION Q-Q



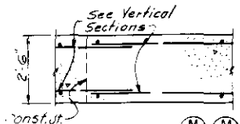
SECTION L/28 (OPPOSITE HAND)
SCALE: 3/4"=1'-0"



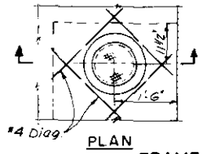
DETAILS - EYE BOLT (8 REQ'D.)
SCALE: 1 1/2"=1'-0"



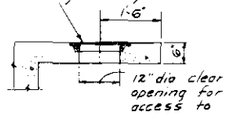
SECTION P/9 P/27 P/33
SCALE: 1/2"=1'-0"



SECTION M/9 M/27 M/28 M/33
SCALE 1/2"=1'-0"



PLAN

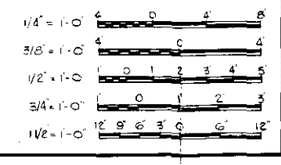


SECTION

FRAME AND COVER DETAILS (4 REQ'D.)
SCALE: 3/4"=1'-0"

R.R. GATES NO'S. 1, 2A, 2 & 3
EYE BOLT LOCATIONS
NOT TO SCALE

GRAPHIC SCALES



As Built Drawing
Contract No. DACW 33-70-C-0147

Note:
For general notes, see Sh. 38.

REVISION	DATE	DESCRIPTION	BY

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

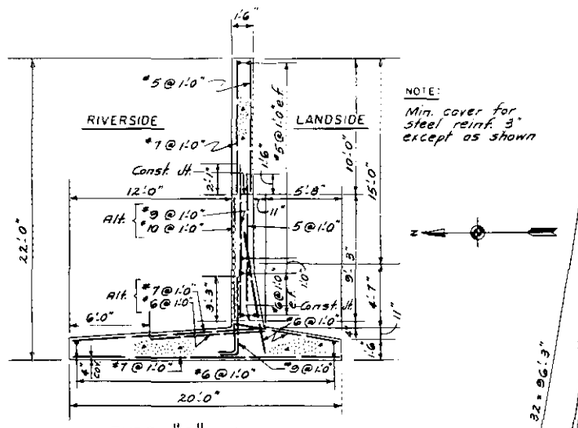
DES. BY G.E.R. DR. BY J.P.H. CHK. BY
SUBMITTED: CHIEF, STRUCT. SECTION
APPROVED & RECOMMENDED: CHIEF, DESIGN BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATE NO. 2B
DETAILS AND REINFORCEMENT NO. 2
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

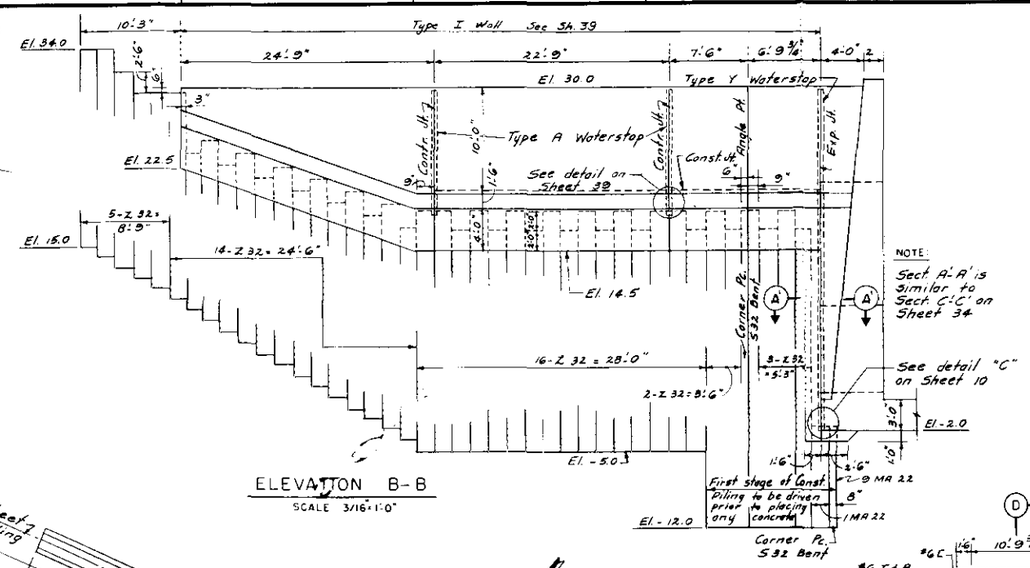
APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970
SCALE: AS NOTED
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU - 15
SHEET 29

PLATE 29

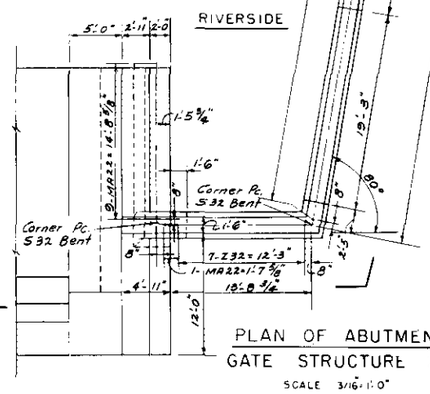
CORPS OF ENGINEERS U. S. ARMY



TYPE "D" WALL
SCALE 1/4"=1'-0"

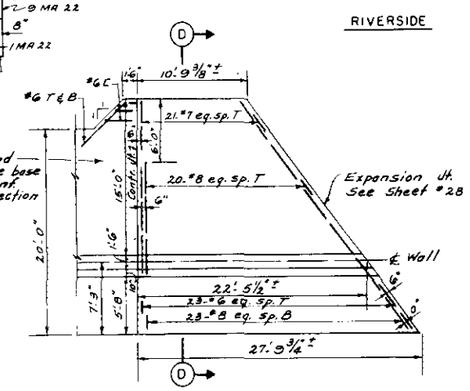


ELEVATION B-B
SCALE 3/16"=1'-0"

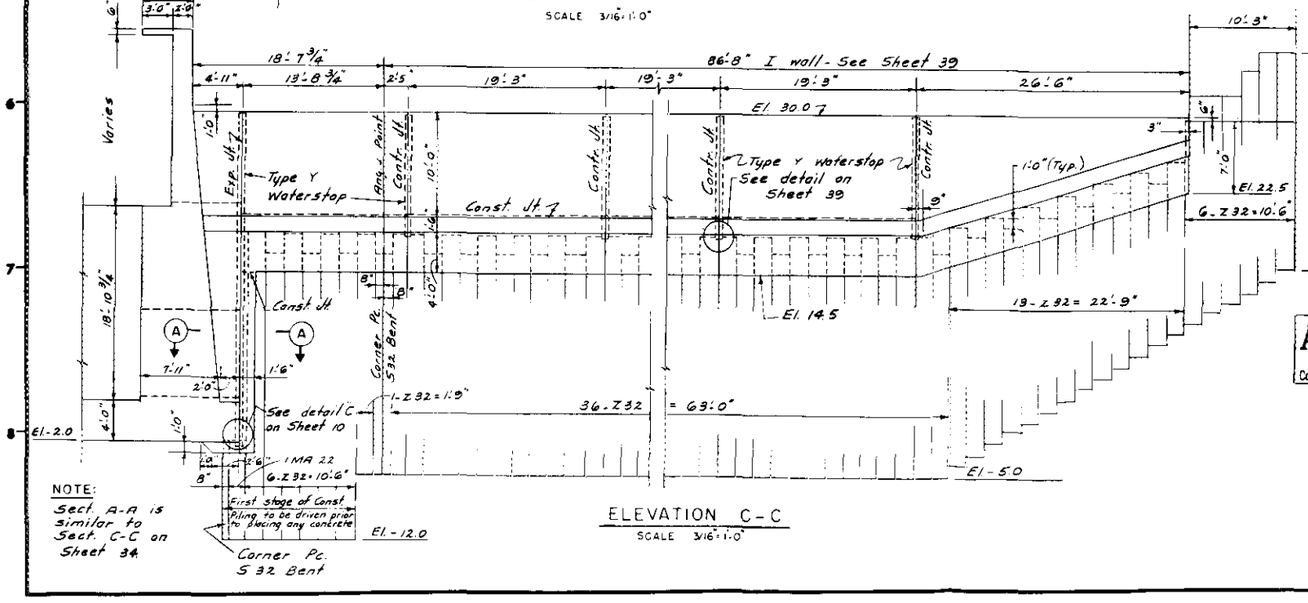


PLAN OF ABUTMENT
GATE STRUCTURE 2B
SCALE 3/16"=1'-0"

PLAN OF ABUTMENT
GATE STRUCTURE 2A
SCALE 3/16"=1'-0"

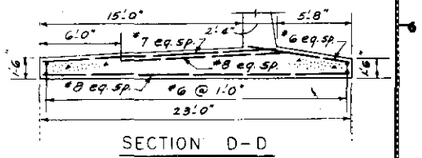


SPECIAL MONOLITH
ADJ. TO R.R. GATE 2B
SCALE 3/16"=1'-0"



ELEVATION C-C
SCALE 3/16"=1'-0"

NOTES:
1. Dimensions shown on Elevations are centerline distances taken on centerline of wall and sheet piling.
2. Concrete in I walls will be paid for under Item No. 31.
3. Steel Sheet piling will be paid for under Item Nos. 29 & 30.
4. Concrete in TEE Walls will be paid for under Item No. 32.
5. For General Notes see Sh. 38



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

As Built Drawing
Contract No. DACW 33-70-C-0147

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY

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

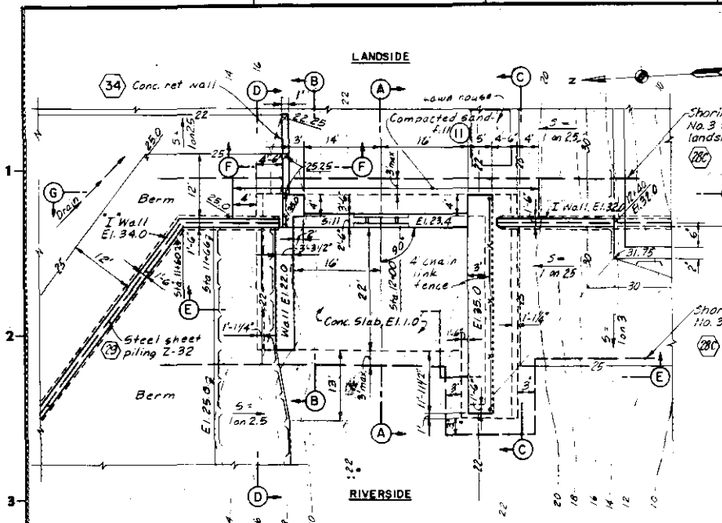
DES. BY H.E.W. DR. BY C.M.A. CK. BY
SUBMITTED: CHIEF, STRUCT. SECTION
RECOMMENDED: CHIEF, FLOOD CONTROL BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATES NOS. 2A AND 2B - STRUCTURAL
FLOODWALLS - PLANS, ELEVATIONS AND DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

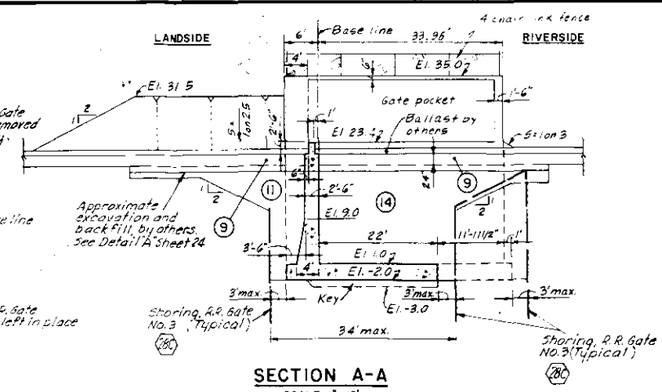
APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970
SCALE AS NOTED
SPEC. NO. DACW 33-70-B-0018
DRAWING NUMBER HOU - 15
SHEET 30

PLATE 30

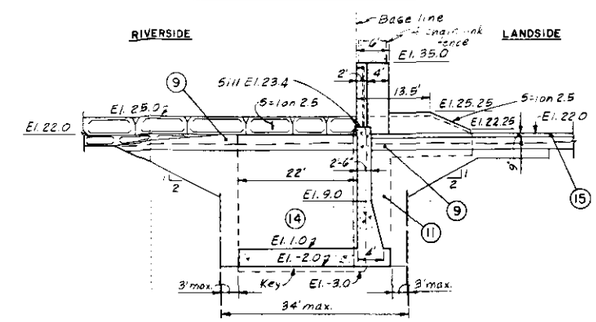
CORPS OF ENGINEERS U. S. ARMY



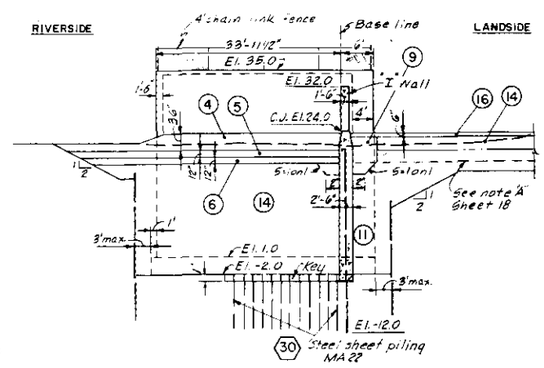
PLAN
SCALE: 1" = 10'



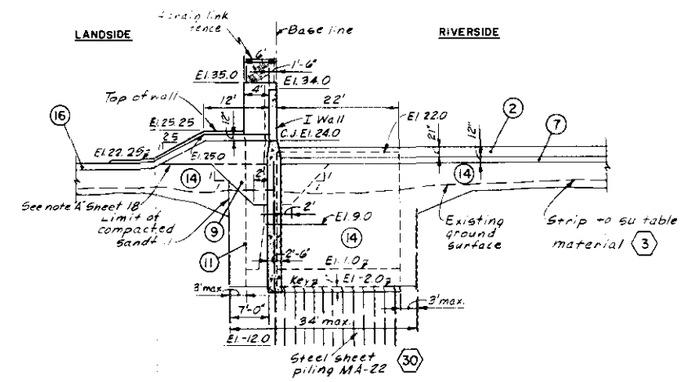
SECTION A-A
SCALE: 1" = 10'



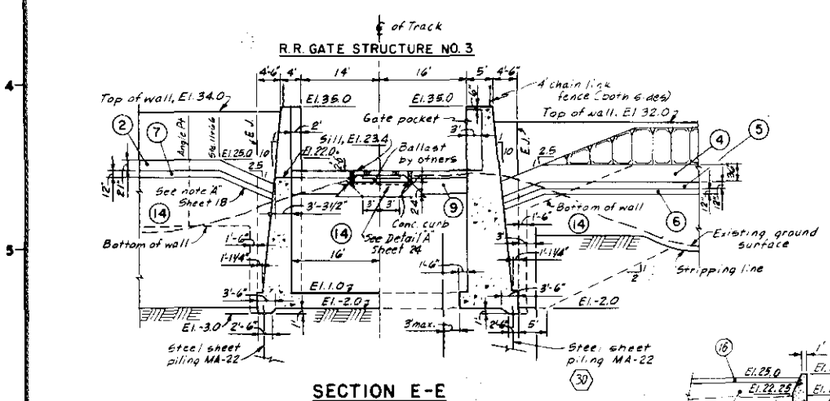
SECTION B-B
SCALE: 1" = 10'



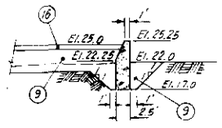
SECTION C-C
SCALE: 1" = 10'



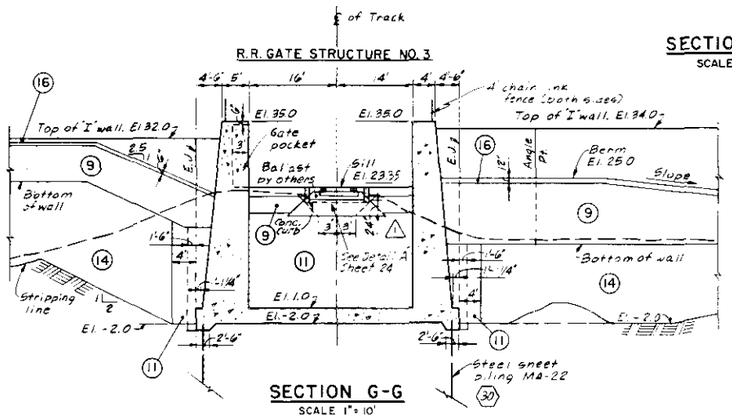
SECTION D-D
SCALE: 1" = 10'



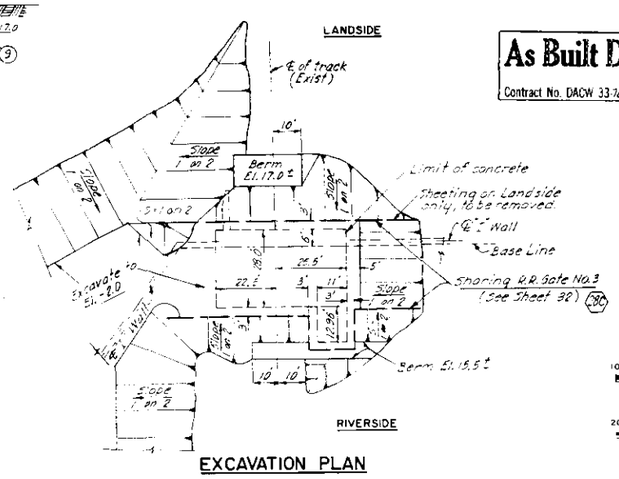
SECTION E-E
SCALE: 1" = 10'



SECTION F-F
SCALE 1" = 10'



SECTION G-G
SCALE 1" = 10'



EXCAVATION PLAN
SCALE 1" = 20'

As Built Drawing
Contract No. DACW 33-70-C-0147

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

NOTES:

For notes applying to this sheet, see Sheet 14.

For Materials Legend, see Sheet 17.

All concrete for R.R. Gate Structure No. 3 will be paid for under Item No. 34.

All concrete for I-wall will be paid for under Item No. 31.

Buried timber structures, including piling, may be encountered in the excavation for construction of Railroad Gate No. 3.

REVISION	DATE	DESCRIPTION	BY
		For field corrections	
△	12-70	Note revised (Am#1)	

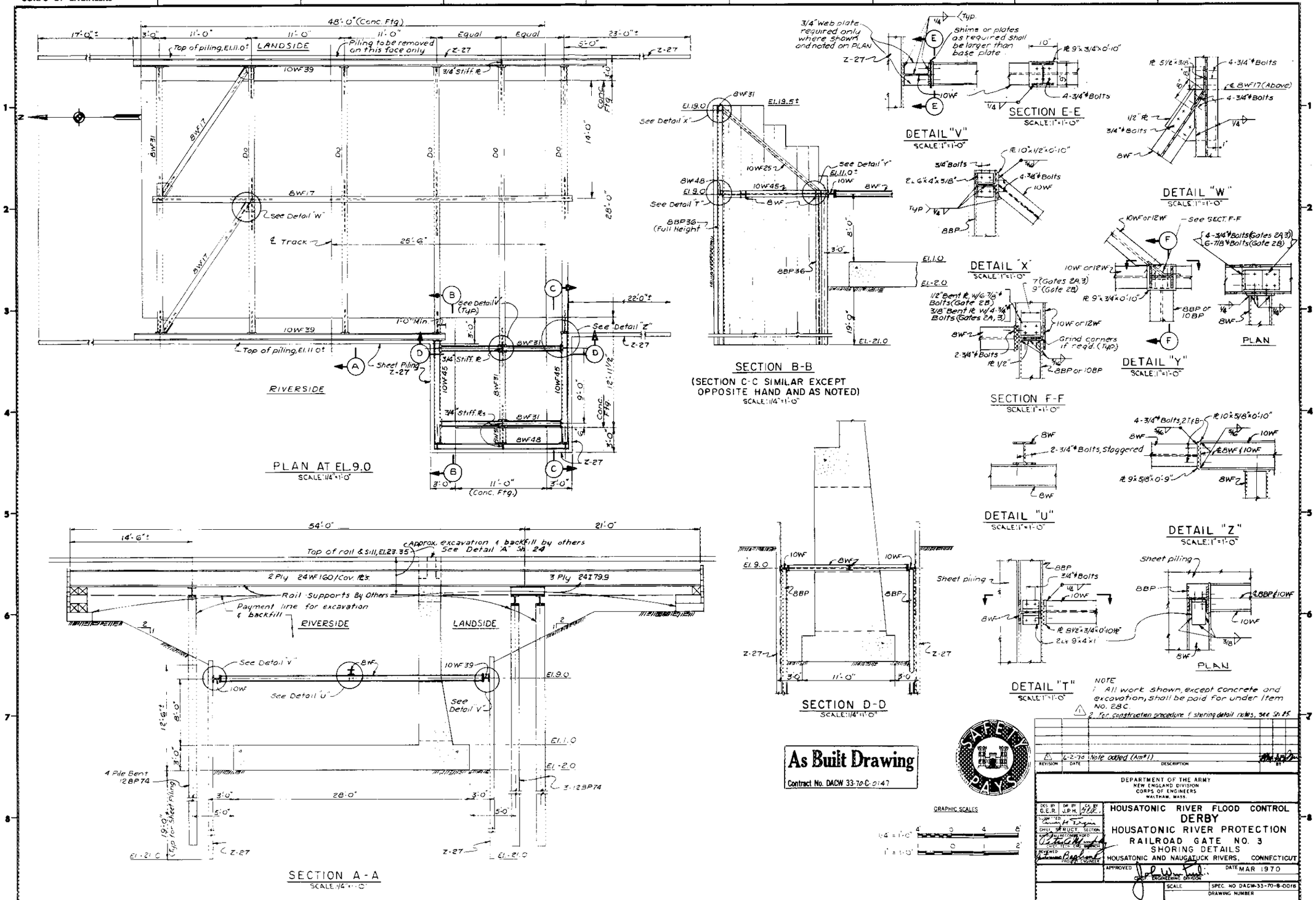
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY M. Z. | DR. BY J. B. | CK. BY M. Z.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVED & RECOMMENDED: CHIEF, TECH. ENG. BRANCH
APPROVED: CHIEF, PROJECT MANAGER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATE NO. 3
PLAN AND SECTIONS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: MAR 1970
SCALE 1" = 10' | SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 31

PLATE 31



NOTE
1. All work shown, except concrete and excavation, shall be paid for under Item No. 28C
2. For construction procedure & shoring detail notes, see Sh. 25

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
1	6-2-70	Note added (Am#1)	

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

DES. BY G.E.R. DR. BY J.P.H. CHIEF, STRUCT. SECTION CHIEF, TECH. ENG. BRANCH REVIEWED PROJ. ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATE NO. 3
SHORING DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED CHIEF, ENGINEERING DIVISION
DATE MAR 1970
SCALE
SPEC. NO. DACW-33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 32

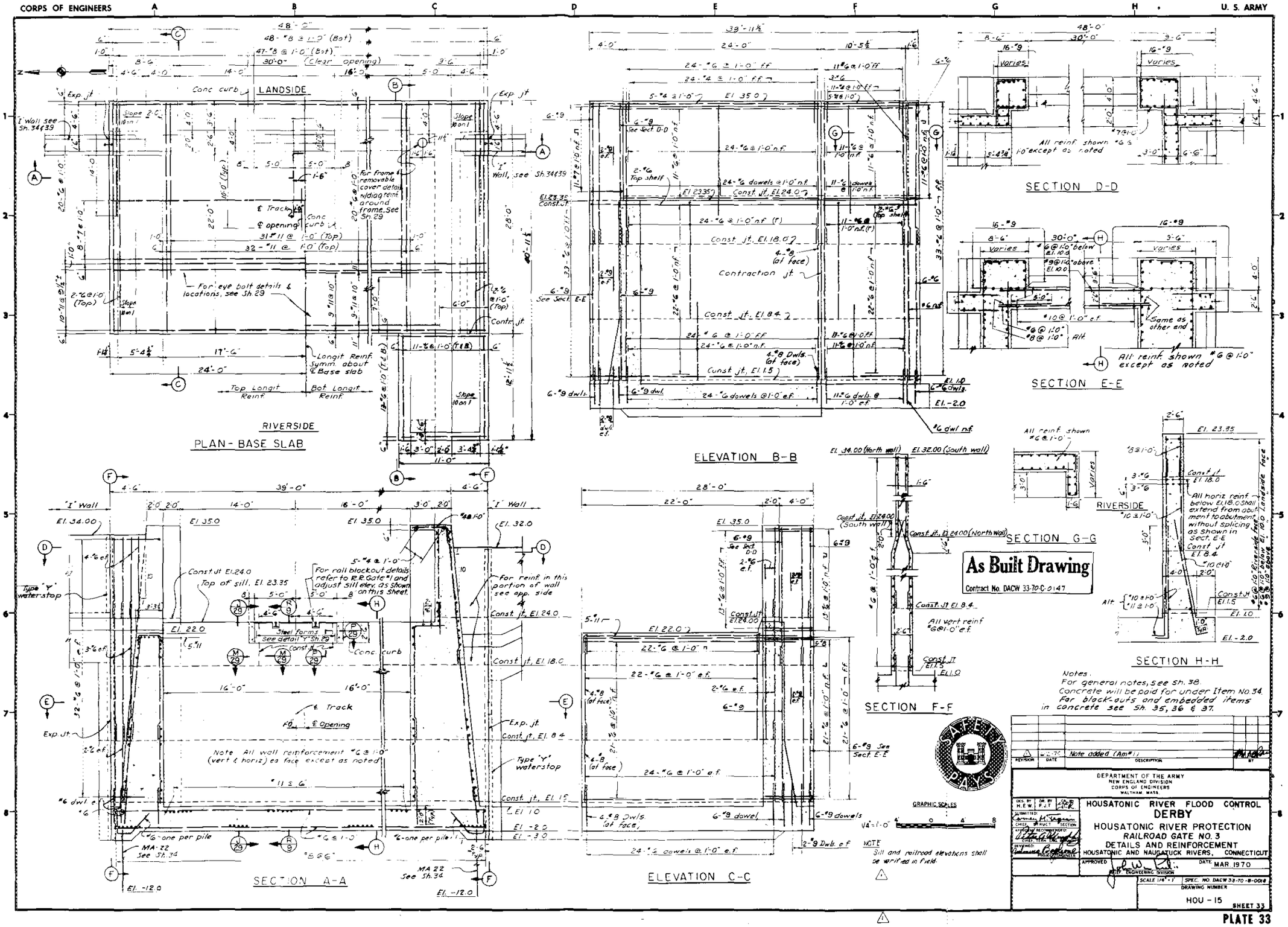
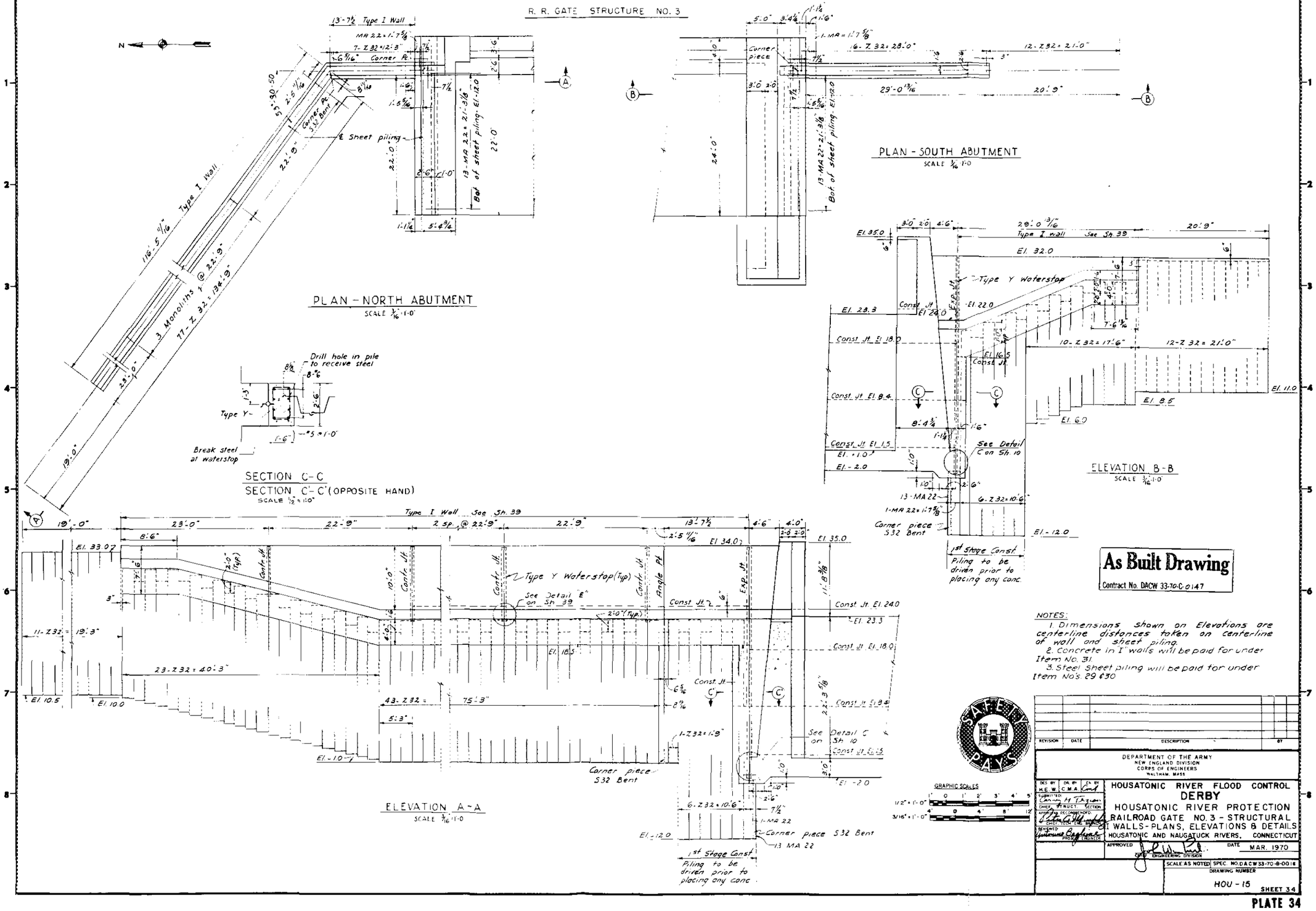

PLAN - BASE SLAB
LANDSIDE
RIVERSIDE
SECTION A-A
ELEVATION B-B
ELEVATION C-C
SECTION D-D
SECTION E-E
SECTION F-F
SECTION G-G
SECTION H-H
Note All wall reinforcement #6 @ 1'-0" (vert & horiz) ea face except as noted
Notes:
For general notes, see Sh. 38.
Concrete will be paid for under Item No. 34.
For black-outs and embedded items in concrete see Sh. 35, 36 & 37.
As Built Drawing
Contract No. DACW 33-70-C-0147
Note added (Am#1)
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATE NO. 3
DETAILS AND REINFORCEMENT
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
MAR. 1970
HOU - 15
SHEET 33

PLATE 33

CORPS OF ENGINEERS U. S. ARMY



As Built Drawing
Contract No. DACW 33-70-C-0147

NOTES:
1. Dimensions shown on Elevations are centerline distances taken on centerline of wall and sheet piling.
2. Concrete in "I" walls will be paid for under Item No. 31.
3. Steel Sheet piling will be paid for under Item No's. 29 & 30

REVISION	DATE	DESCRIPTION	BY

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

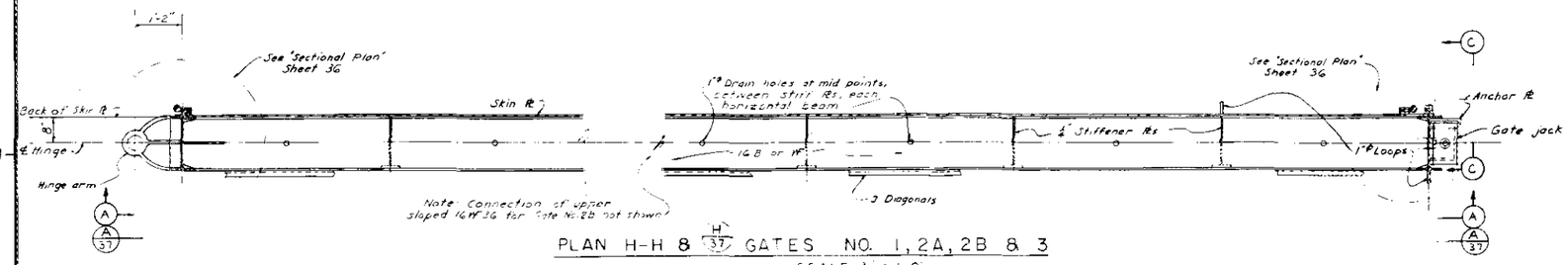
DES. BY H.E.W. DR. BY C.M.A. CK. BY Conf.
SUBMITTED: Carmen M. Tagiani
CHIEF, STRUCT. SECTION
APPROVAL RECOMMENDED: Peter C. Mills
CHIEF, TECH. ENG. BRANCH
REVIEWED: Yoshimura Baglione
PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATE NO. 3 - STRUCTURAL
I WALLS - PLANS, ELEVATIONS & DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: [signature] CHIEF, ENGINEERING DIVISION
DATE MAR. 1970
SCALE AS NOTED
SPEC. NO. DACW33-70-B-0016
DRAWING NUMBER HOU - 15
SHEET 34

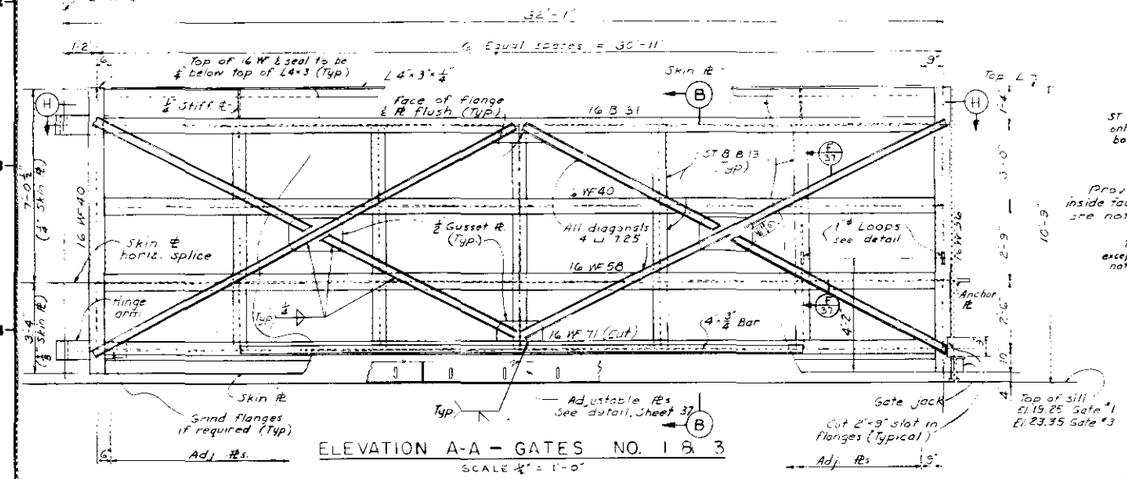
PLATE 34

CORPS OF ENGINEERS — U. S. ARMY



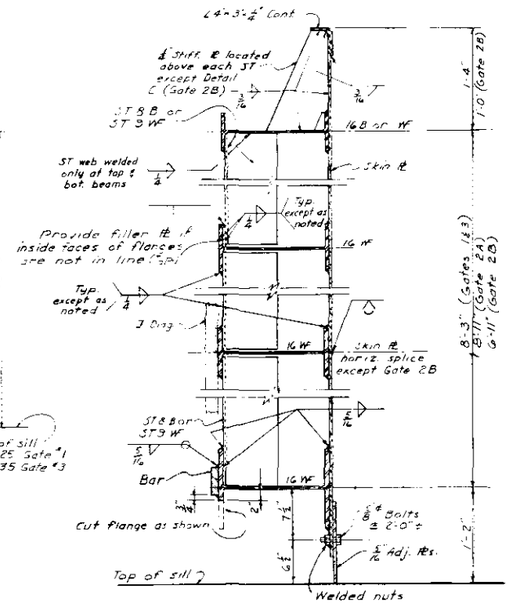
PLAN H-H & H/37 GATES NO. 1, 2A, 2B & 3

SCALE ¼" = 1'-0"



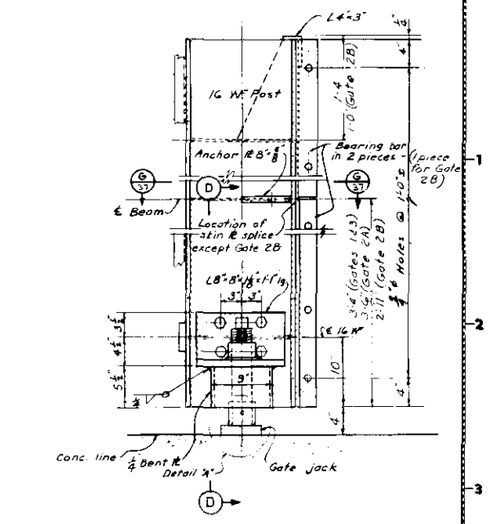
ELEVATION A-A — GATES NO. 1 & 3

SCALE ¼" = 1'-0"



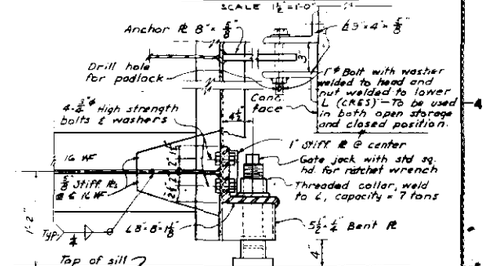
SECTION B-B & B/37

SCALE 1½" = 1'-0"



ELEVATION C-C

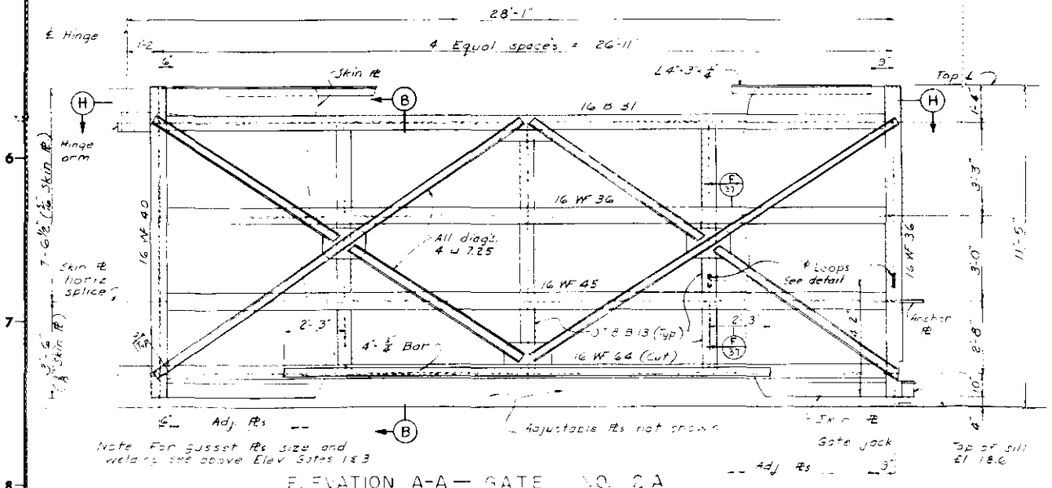
SCALE 1½" = 1'-0"



Notes: For additional gate jack data see "Sectional Plan", Sheet 36. For hood over gate jack see Sheet 37.

SECTION D-D

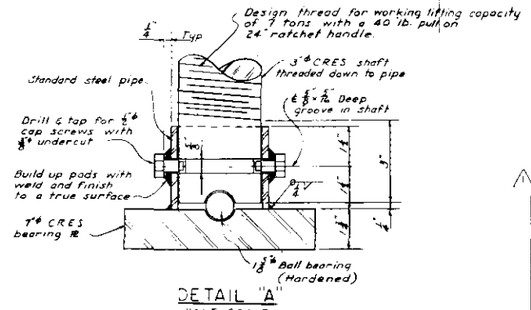
SCALE 1½" = 1'-0"



Note: For gusset Pls size and weld as see above Elev. Gates 1 & 3

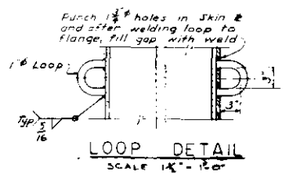
ELEVATION A-A — GATE NO. 2A

SCALE ½" = 1'-0"



DETAIL "A"

HALF SCALE



LOOP DETAIL

SCALE 1½" = 1'-0"

GRAPHIC SCALES

12"=1'-0" 6"=1'-0" 4"=1'-0" 3"=1'-0"

As Built Drawing

Contract No. DACW 33-70-C-0147

NOTE
For Railroad Gate Notes see Sh 37.

REVISION	DATE	DESCRIPTION	BY
1	5-6-70	Note added (Item #1)	

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

DES. BY G.E.R. — DR. BY F.J.T. — CK. BY

SUBMITTED: Carroll H. Tagman, CHIEF, STRUCT. SECTION

APPROVED AND RECOMMENDED: Chief, Tech. Eng. Division

REVIEWED: Project Engineer

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATES
STRUCTURAL STEEL - DETAILS NO. 1
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: Chief, Engineering Division — DATE MAR. 1970

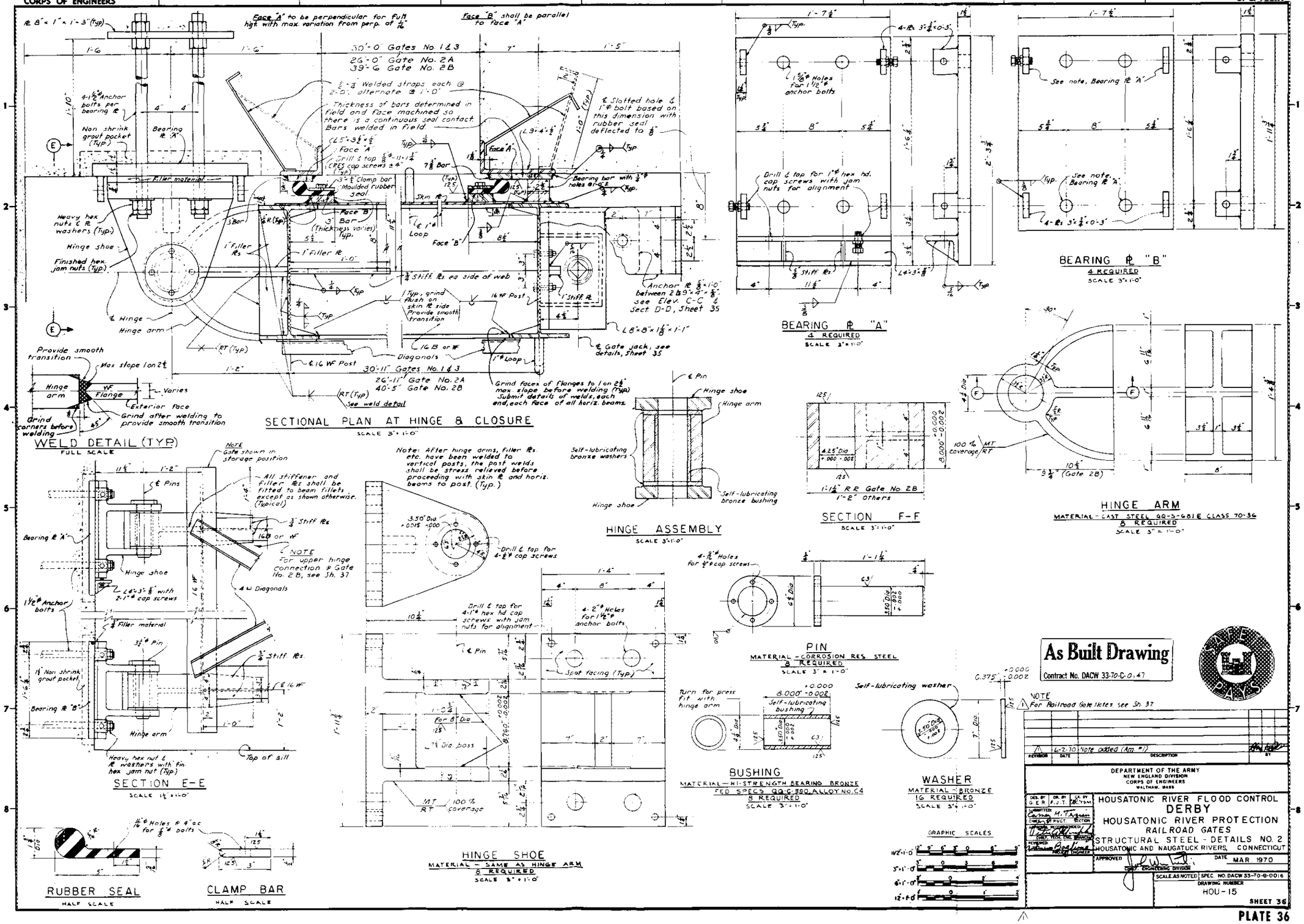
SCALE AS NOTED — SPEC. NO. DACW33-70-B-0016

DRAWING NUMBER HOU-15

SHEET 35

PLATE 35

CORPS OF ENGINEERS — U. S. ARMY



As Built Drawing
Contract No. DACW 33-70-C-0147

NOTE
1 For Railroad Gate Hinges, see Sh. 37

REVISION	DATE	DESCRIPTION	BY
1	6-2-70	Note added (Am. "1")	

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

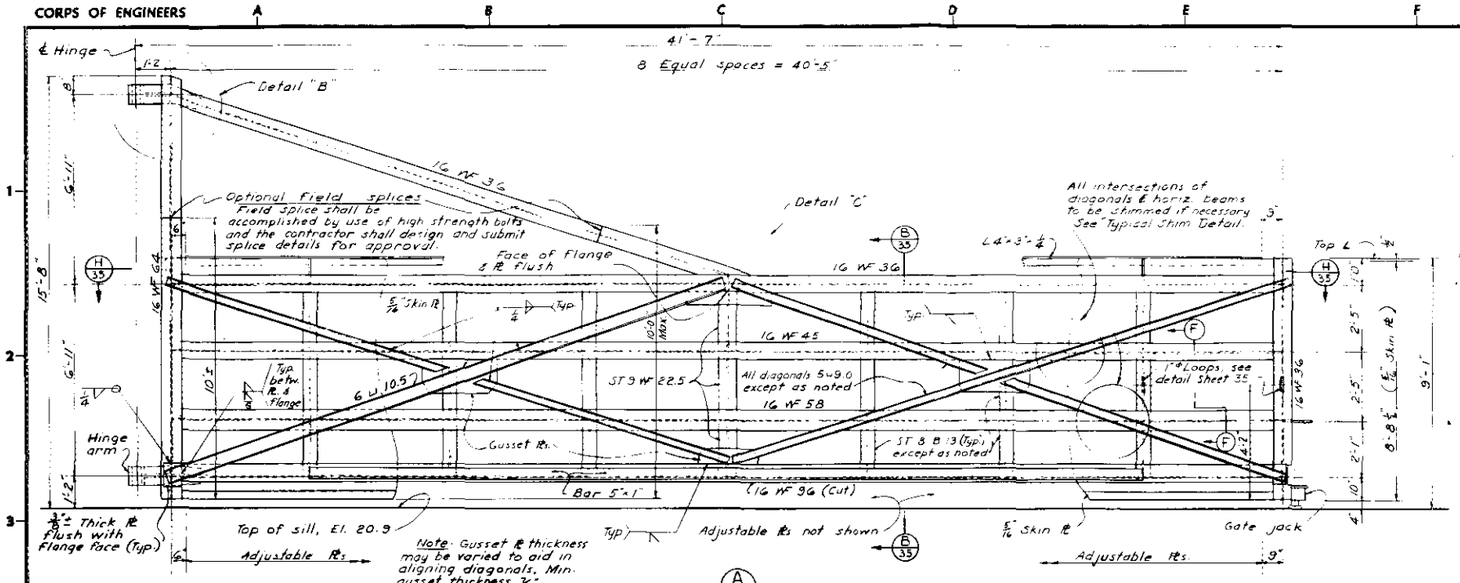
DES. BY G.E.R. | DR. BY R.J.T. | CK. BY

SUBMITTED: Carmen M. Tagliente
CHIEF, STRUCT. SECTION
RECOMMENDED: [signature]
CHIEF, TECH. ENG. BRANCH
REVIEWED: William Bradford
CHIEF, PROJECT DESIGN
APPROVED: [signature]
CHIEF, ENGINEERING DIVISION

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATES
STRUCTURAL STEEL - DETAILS NO. 2
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

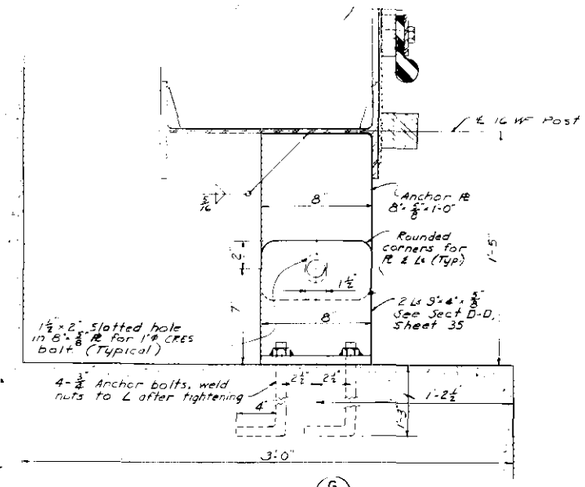
DATE MAR. 1970
SCALE AS NOTED | SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 36

PLATE 36



ELEVATION (A/35) — GATE NO. 2B

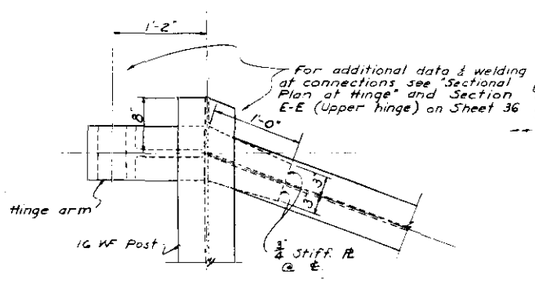
SCALE 1/4" = 1'-0"



SECTION (G/35)

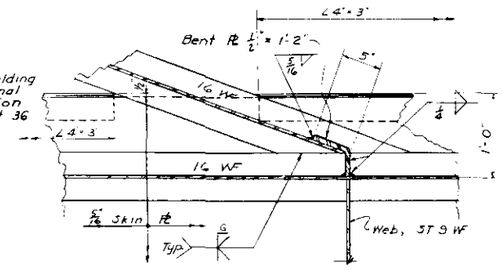
GATE SHOWN IN OPEN STORAGE POSTION

SCALE 3"=1'-0"



DETAIL "B"

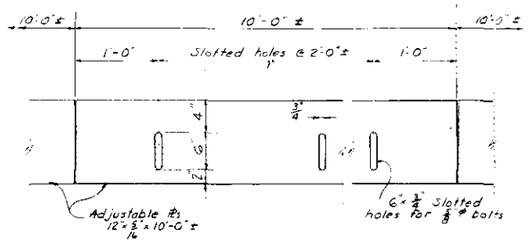
SCALE 1 1/2"=1'-0"



SECTION

DETAIL "C"

SCALE 1 1/2"=1'-0"



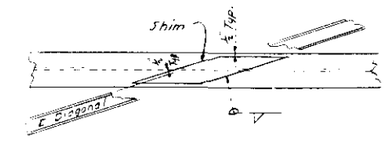
ADJUSTABLE PLS. DETAIL

SCALE 1 1/2"=1'-0"

RAILROAD GATE NOTES

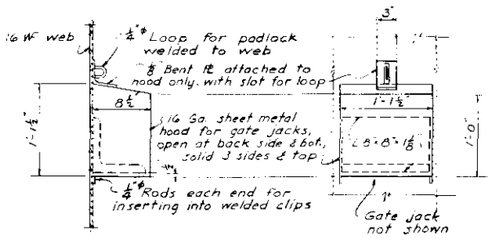
1. All structural steel shall conform to ASTM A36, except as otherwise noted
2. Anchor bolts shall conform to ASTM A325 or cold drawn AISI C1018.
3. Each gate jack shall have a 7-ton working capacity.
4. Groove welds shall have complete penetration welds unless shown otherwise.
5. RT & MT indicates joints and parts in which weld soundness shall be established by non-destructive testings. Symbols are in accordance with MIL-STD-23A.
6. Hinge shoe pockets shall be sand blasted before erection of bearing Pls.
7. The fill material under hinge shoes shall not be poured until gate leaves have been properly aligned at closure and rubber seals have been properly positioned. Non-shrink grout shall not be poured under bearing Pls. until after fill operation above has been completed.
8. Provide one set of wrenches for each gate leaf to operate bolts for gate storage and gate jack. Store wrenches at designated locations.
9. All items shown on Sheets 35 to 37 inclusive plus frames and covers, deflector plates, eye bolts attached to concrete and steel forms shown on Sheets 9, 27 to 29 inclusive and 33 shall be included for payment under the following items:

Railroad Gate No. 1 — Item No. 44
" " 2A — " 45
" " 2B — " 46
" " 3 — " 47



TYPICAL SHIM DETAIL

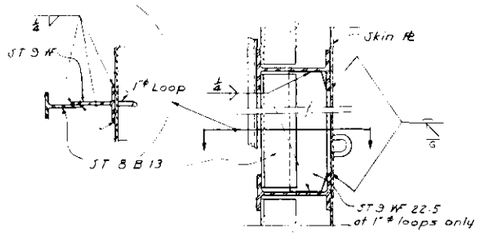
NO SCALE



GATE JACK HOOD DETAIL

4 REQUIRED

SCALE 1 1/2"=1'-0"



SECTION F-F & (F/35)

SCALE 1 1/2"=1'-0"

As Built Drawing

Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY

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

DES. BY G.E.R. DR. BY F.J.T. CK. BY

SUBMITTED: Chief, Struct. Section
APPROVED AND RECOMMENDED: Chief, Eng. Div.
APPROVED: Prof. Eng.

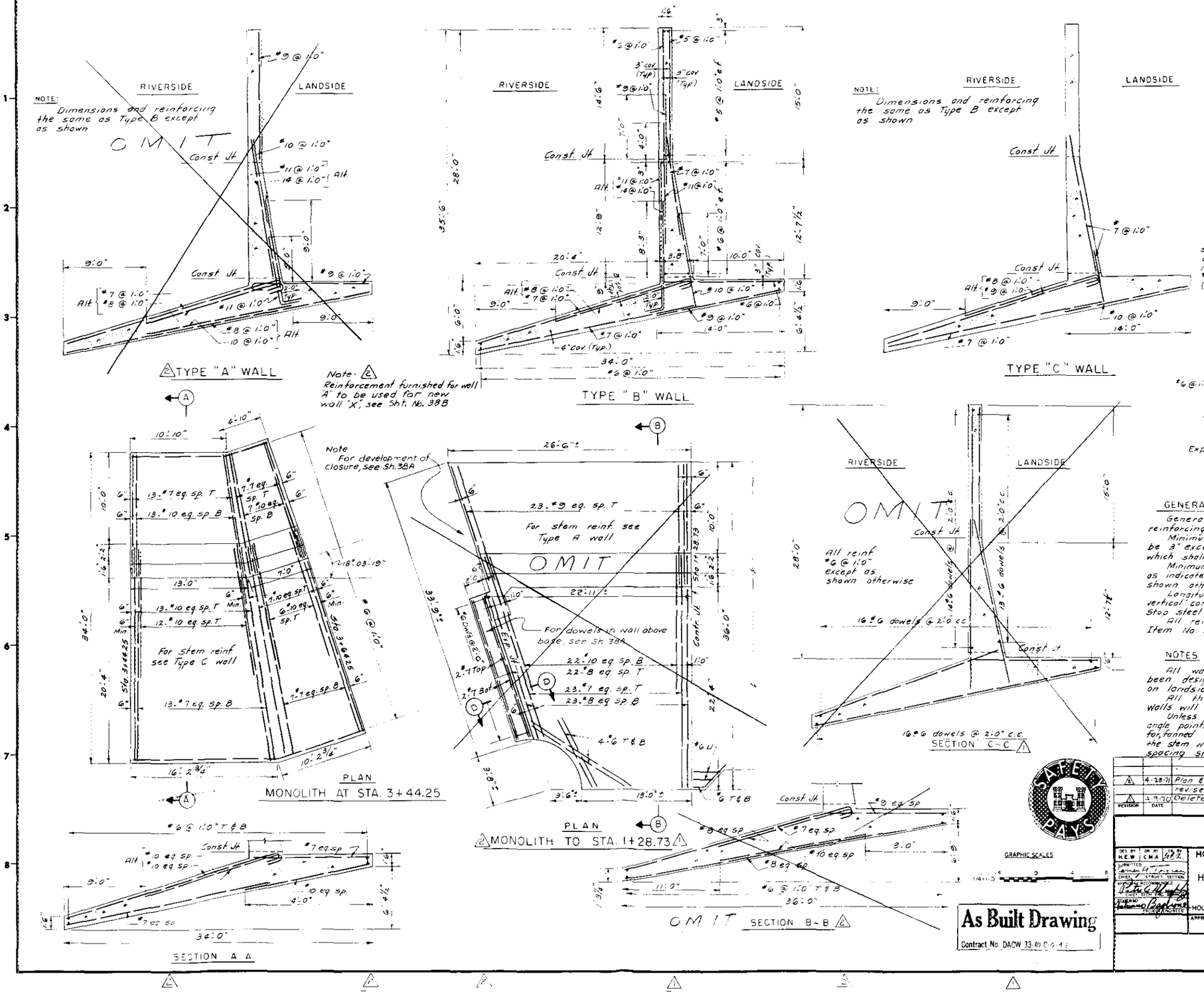
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
RAILROAD GATES
STRUCTURAL STEEL - DETAILS NO. 3
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED Chief, Engineering Division
DATE MAR 1970

SCALE AS NOTED | SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 37

GRAPHIC SCALES

1/2"=1'-0" 1' 0 1' 2' 3' 4' 5'
1"=1'-0" 1' 0 1' 2'
1 1/2"=1'-0" 12" 9" 6" 3" 0 6" 12"
3"=1'-0" 3' 0 3' 6' 9'



REINFORCING LAP SPLICES							
BAR SIZE							
4	5	6	7	8	9	10	11
** COMPRESSION LAP SPLICE—INCHES							
12	13	15	18	20	23	25	28
TENSION LAP SPLICE—TOP BARS*—INCHES							
14	18	24	33	43	55	69	85
TENSION LAP SPLICE—OTHER BARS—INCHES							
14	18	22	25	30	39	49	61

* Top bars are horizontal bars so placed that more than 12" of concrete is cast in the member below the bar.
** Location of compression laps (if any) are noted by "Comp lap."

GENERAL NOTES

General notes are applicable to all reinforcing steel drawings.

Minimum cover to steel reinf. shall be 3" except for bottom of base slab which shall be 4" unless noted otherwise.

Minimum bar lap for splices shall be as indicated in the table except as shown otherwise.

Longitudinal steel must not run through vertical contraction or expansion joints. Stop steel 3" back from joint.

All reinforcing will be paid for under Item No. 39.

NOTES

All walls shown on this sheet have been designed for a 300#/□' surcharge on landside.

All the concrete shown in the Tee Walls will be paid for under Item No. 32.

Unless shown otherwise, monoliths with flat angle points will have the type wall steel called for, fanned out in base slab. The riverside face of the stem will be used as a base line for spacing steel.

REVISION	DATE	DESCRIPTION	BY
2	4-28-71	Plan & sections deleted, section revised, note added	
1	4-9-70	Deleted sect., revised plan. (Am #1)	

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

DES. BY H.E.W. DR. BY C.M.A. CK. BY

SUBMITTED: CHIEF, STRUCT. SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. DIVISION
REVIEWED: PROJECT ENGINEER

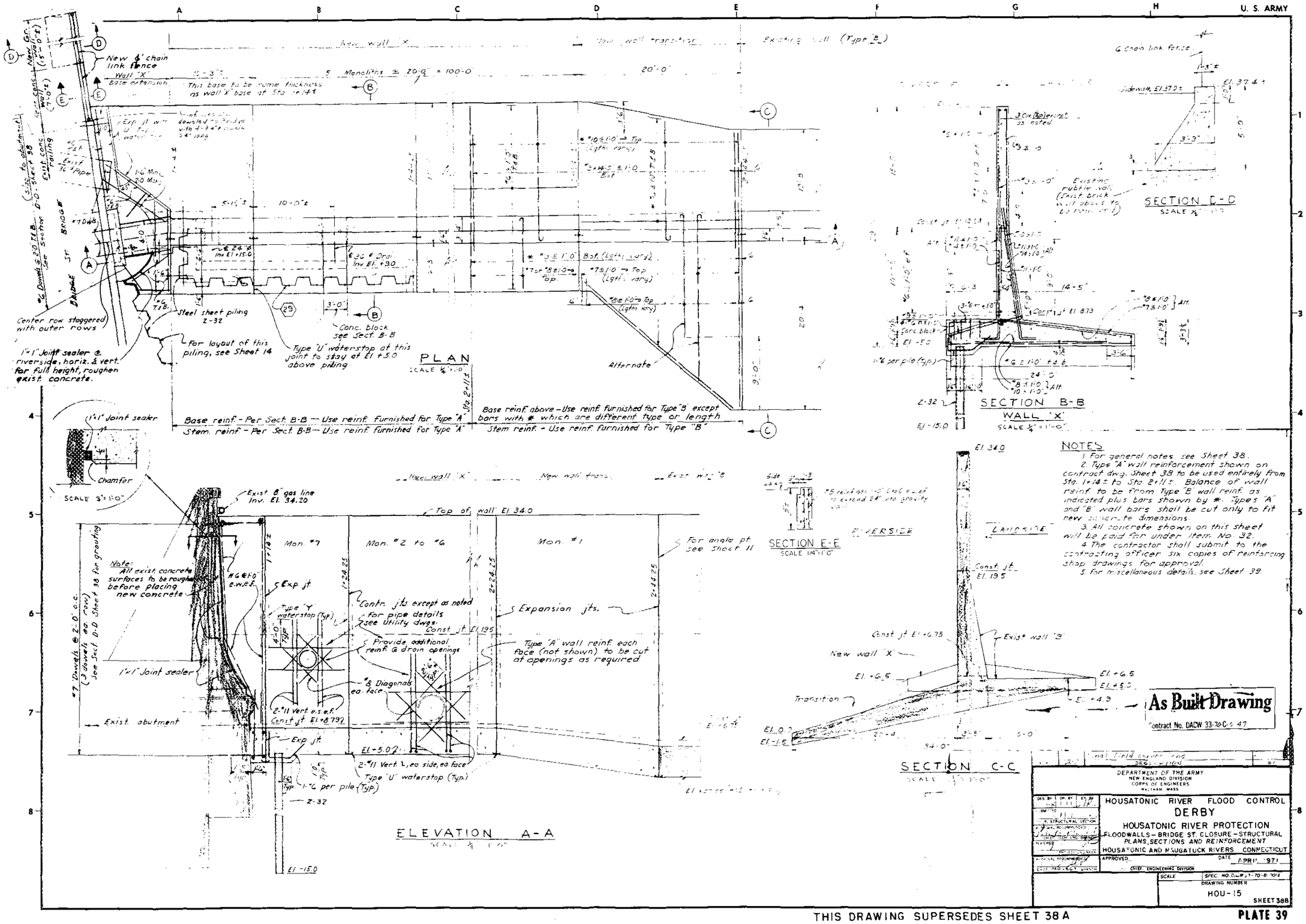
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
FLOODWALLS
DETAILS AND REINFORCEMENT
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION DATE MARCH 1970

SCALE 1/4" = 1' SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU - 15 SHEET 38

As Built Drawing
Contract No. DACW 33-70-C-0-4

PLATE 38



NOTES

1. For general notes see Sheet 38.
2. Type "A" wall reinforcement shown on contract dwg. Sheet 38 to be used entirely from Sta. 1+14 ± to Sta. 2+11 ±. Balance of wall reinf. to be from Type "B" wall reinf. as indicated plus bars shown by *. Types "A" and "B" wall bars shall be cut only to fit new concrete dimensions.
3. All concrete shown on this sheet will be paid for under Item No. 32.
4. The contractor shall submit to the contracting officer six copies of reinforcing shop drawings for approval.
5. For miscellaneous details, see Sheet 39.

As Built Drawing
Contract No. DACW 33-70-C-0147

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

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
FLOODWALLS - BRIDGE ST. CLOSURE - STRUCTURAL
PLANS, SECTIONS AND REINFORCEMENT
HOUSATONIC AND NAUGATUCK RIVERS CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: APRIL 1971
SCALE
SPEC. NO. DACW 33-70-B-1016
DRAWING NUMBER
HOU-15
SHEET 38B

THIS DRAWING SUPERSEDES SHEET 38A

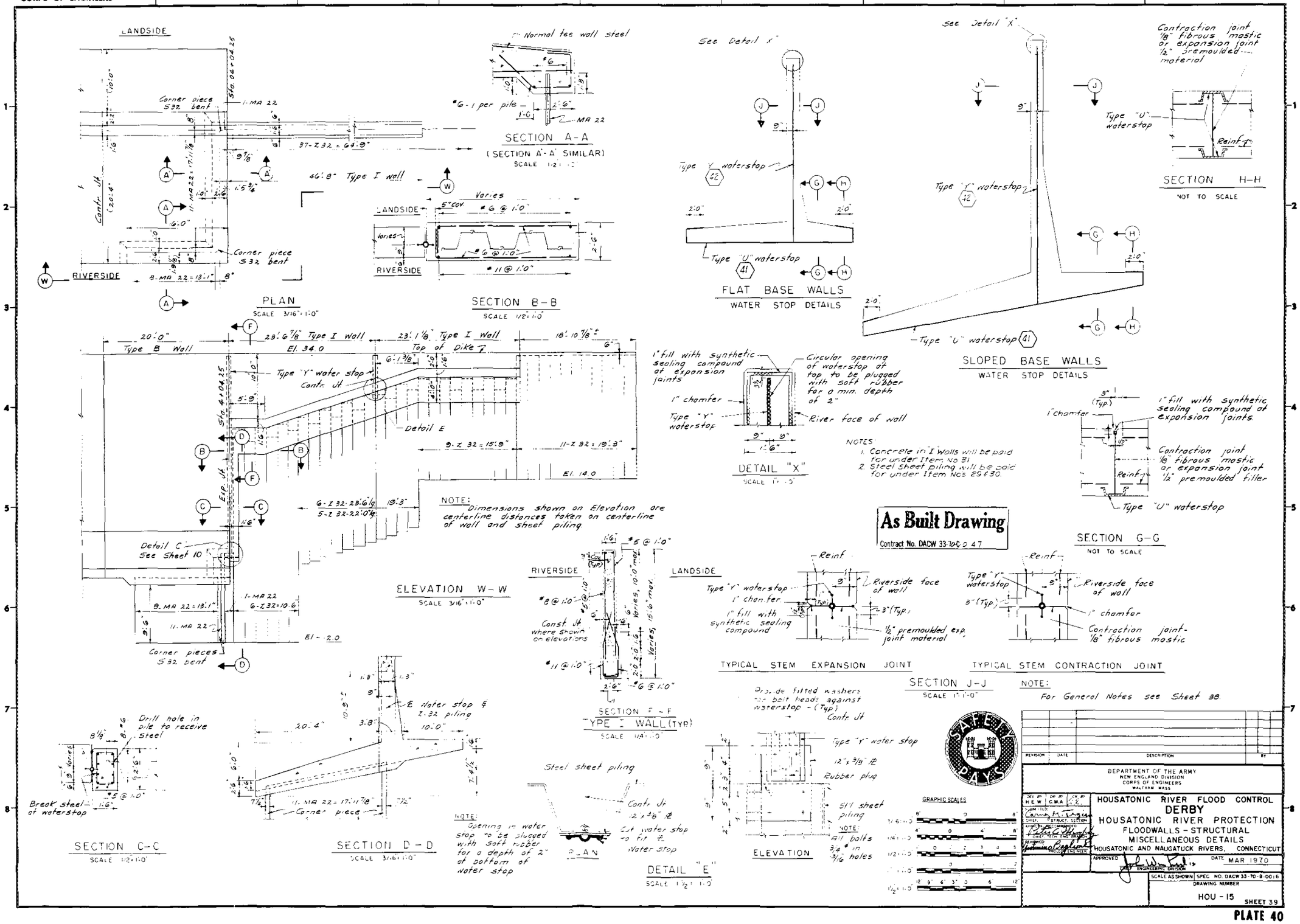
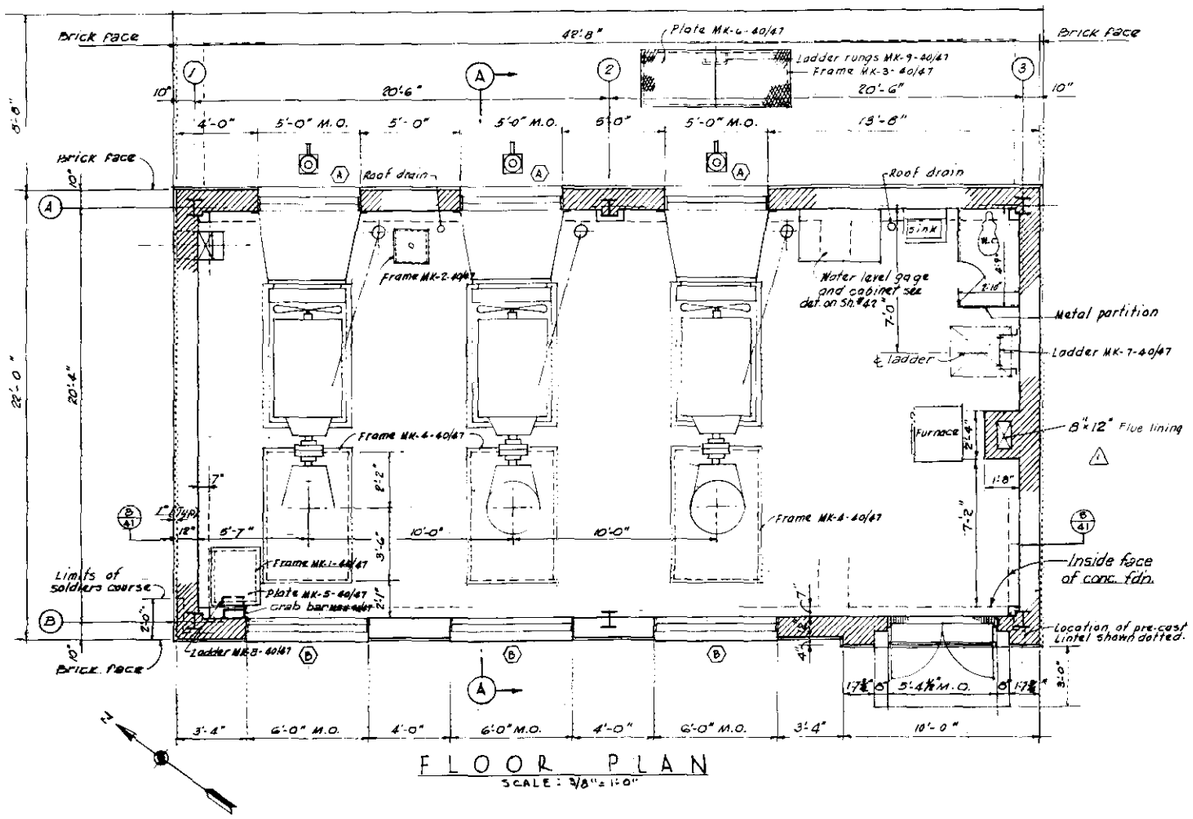
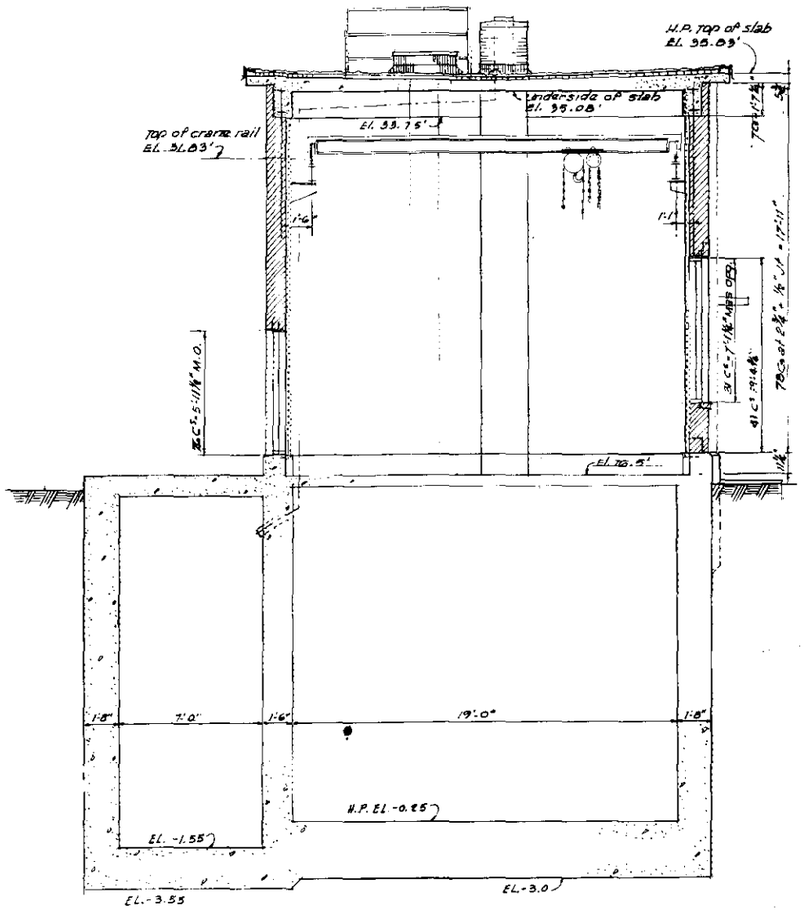

CORPS OF ENGINEERS
U. S. ARMY
LANDSIDE
RIVERSIDE
PLAN
SCALE 3/16" = 1'-0"
SECTION A-A
(SECTION A'-A' SIMILAR)
SECTION B-B
SCALE 1/2" = 1'-0"
ELEVATION W-W
SCALE 3/16" = 1'-0"
NOTE: Dimensions shown on Elevation are centerline distances taken on centerline of wall and sheet piling.
FLAT BASE WALLS
WATER STOP DETAILS
SLOPED BASE WALLS
WATER STOP DETAILS
SECTION H-H
NOT TO SCALE
DETAIL "X"
NOTES:
1. Concrete in "I" Walls will be paid for under Item No 31
2. Steel sheet piling will be paid for under Item Nos 29 & 30.
SECTION G-G
NOT TO SCALE
As Built Drawing
Contract No. DACW 33-70-C-0 47
TYPICAL STEM EXPANSION JOINT
TYPICAL STEM CONTRACTION JOINT
SECTION J-J
SCALE 1" = 1'-0"
NOTE: For General Notes see Sheet 38.
SECTION F-F
TYPE I WALL (TYP)
SCALE 1/4" = 1'-0"
SECTION C-C
SCALE 1/2" = 1'-0"
SECTION D-D
SCALE 3/16" = 1'-0"
NOTE: Opening in water stop to be plugged with soft rubber for a depth of 2" at bottom of water stop
DETAIL "E"
SCALE 1 1/2" = 1'-0"
ELEVATION
GRAPHIC SCALES
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
FLOODWALLS - STRUCTURAL
MISCELLANEOUS DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
APPROVED
DATE MAR 1970
SCALE AS SHOWN
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 39

PLATE 40

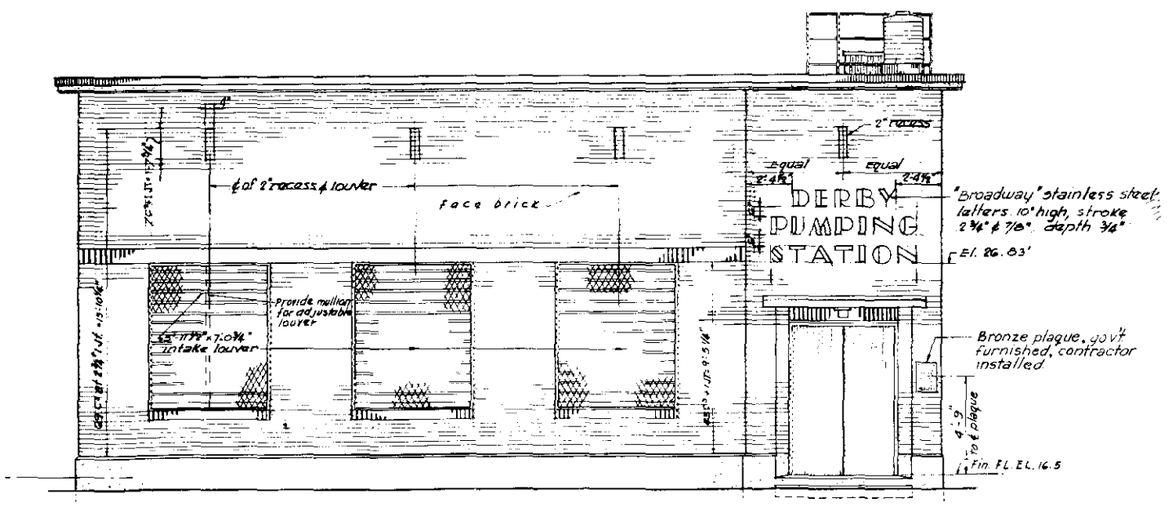
CORPS OF ENGINEERS U. S. ARMY



FLOOR PLAN
SCALE: 3/8" = 1'-0"



SECTION "A-A"
SCALE: 3/8" = 1'-0"



WEST ELEVATION
SCALE: 3/8" = 1'-0"

NOTE
Misc. metal mark numbers:
MK- 1 - 40/47
Piece No. — Sheet where piece is detailed — Sheet where piece is shown

SAFETY PAYS

As Built Drawing
Contract No. DACW 33-70-C-0147

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

REVISION	DATE	DESCRIPTION	BY
1	6-2-70	Note Revised (Am #1)	

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

DES. BY J.S. DR. BY W.C. CK. BY W.C.
SUBMITTED: J.C. Roberts, CHIEF, ARCH. SECTION
APPROVAL RECOMMENDED: Peter Allen, CHIEF, TECH. ENG. BRANCH
REVIEWED: Antonio Baglione, PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION-ARCHITECTURAL
PLAN, ELEVATION AND SECTION
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: [signature], CHIEF, ENGINEERING DIVISION
DATE MAR. 1970
SCALE 3/8" = 1'-0" SPEC. NO. DACW33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 40

PLATE 41

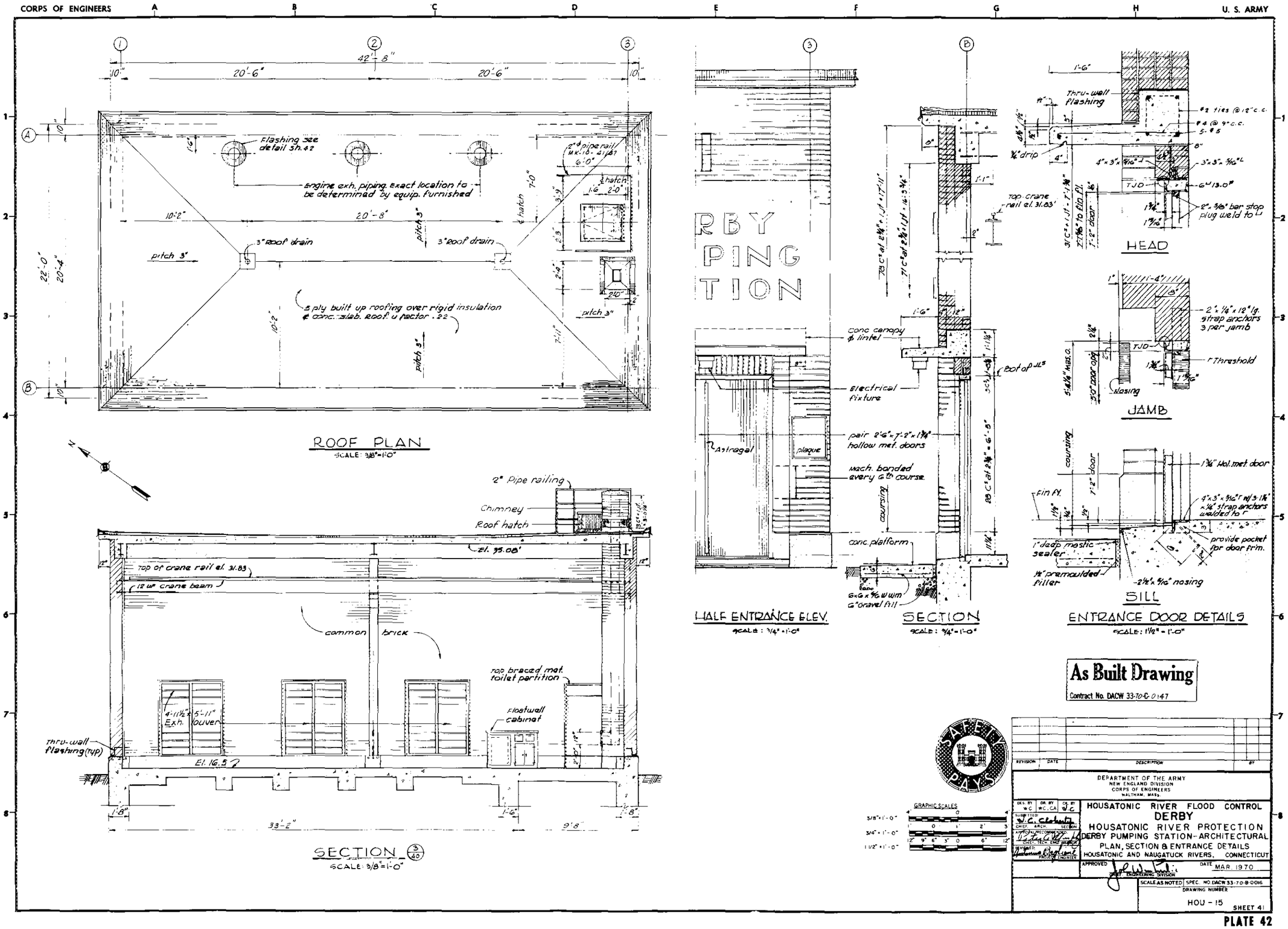
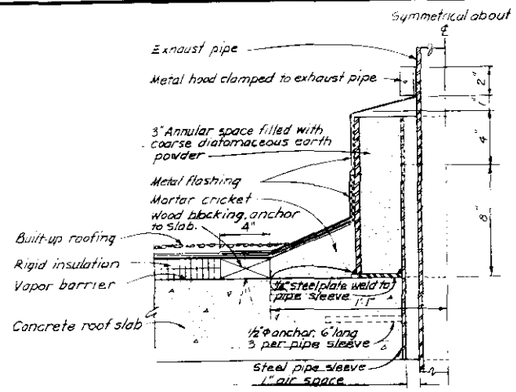
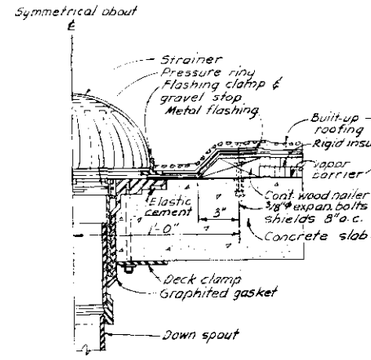

CORPS OF ENGINEERS
U. S. ARMY
ROOF PLAN
SCALE: 3/8"=1'-0"
Flashing see detail Sh. 42
Engine exh. piping. Exact location to be determined by equip. furnished
3" Roof drain
5 ply built up roofing over rigid insulation & conc. slab. Roof u factor .22
2" Pipe railing
Chimney
Roof hatch
Top of crane rail el. 31.83
12 wf crane beam
common brick
Top braced met. toilet partition
Floatwell cabinet
Thru-wall flashing (typ)
SECTION 3/40
SCALE: 3/8"=1'-0"
HALF ENTRANCE ELEV.
SCALE: 3/4"=1'-0"
Conc canopy & lintel
Electrical fixture
Astragal
plaque
pair 2'-6"x7'-2"x1¾" hollow met. doors
mech. bonded every 6th course
coursing
conc. platform
6"x6"x5/16" W.W.M.
6" Gravel fill
SECTION
SCALE: 3/4"=1'-0"
Thru-wall flashing
HEAD
JAMB
SILL
ENTRANCE DOOR DETAILS
SCALE: 1½"=1'-0"
As Built Drawing
Contract No. DACW 33-70-C-0147
GRAPHIC SCALES
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION-ARCHITECTURAL
PLAN, SECTION & ENTRANCE DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
DATE MAR. 1970
SCALE AS NOTED
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 41

PLATE 42

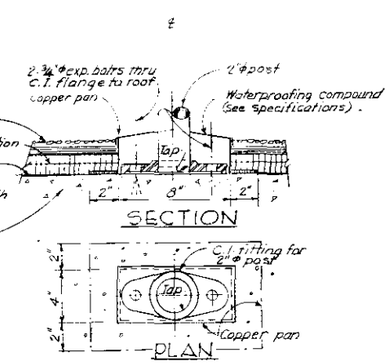
CORPS OF ENGINEERS — U. S. ARMY



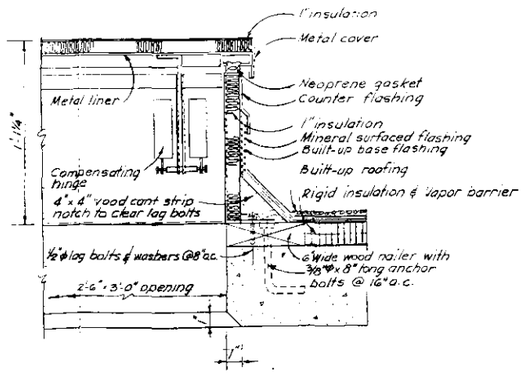
ENGINE EXHAUST DETAIL
SCALE: 3" = 1'-0"



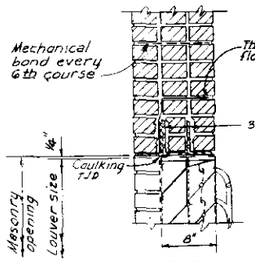
ROOF DRAIN
SCALE: 3" = 1'-0"



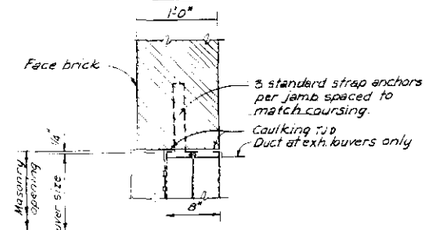
DETAIL OF POST ANCHORS @ ROOF
SCALE 3" = 1'-0"



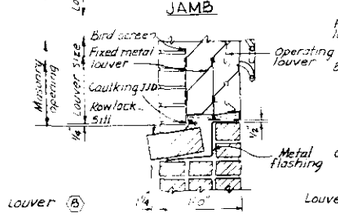
ROOF HATCH DETAIL
SCALE 3" = 1'-0"



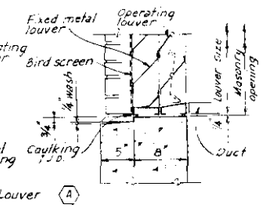
HEAD



JAMB



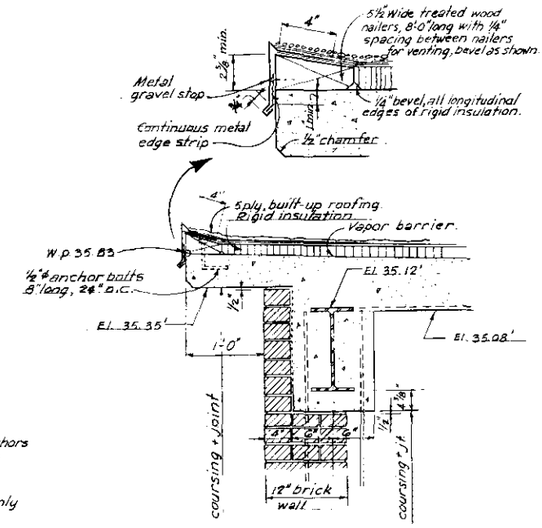
SILL



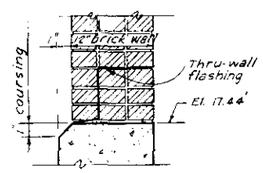
SILL

LOUVER DETAILS
SCALE: 1/2" = 1'-0"

For masonry openings, horizontal & vertical, see plan section & elevations

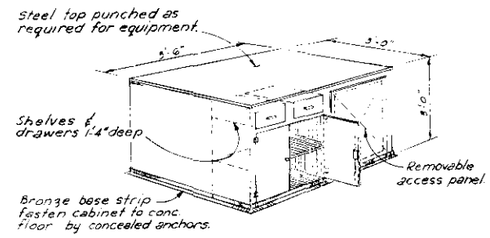


TYPICAL EAVES
SCALE: 1 1/2" = 1'-0"

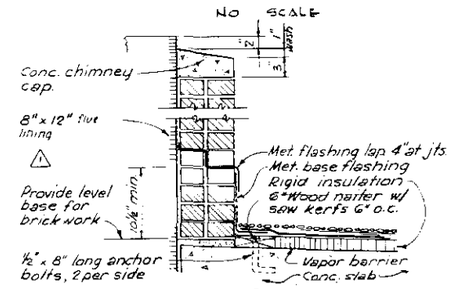


SILL

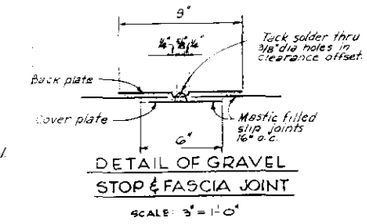
TYPICAL WATER TABLE
SCALE: 1/2" = 1'-0"



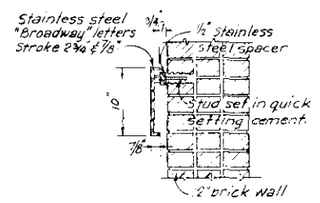
METAL FLOATWELL CABINET
NO SCALE



CHIMNEY DETAIL
SCALE: 1 1/2" = 1'-0"



DETAIL OF GRAVEL STOP & FASCIA JOINT
SCALE: 3" = 1'-0"



LETTER DETAIL
SCALE: 1 1/2" = 1'-0"

GRAPHIC SCALES
1 1/2" = 1'-0"
3" = 1'-0"

NOTES
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 brick are based on standard brick 2 1/4" x 3 3/4" x 8" with 1/2" joint.
3. All items on this sheet will be paid under Item (49), unless otherwise noted.
4. Exterior withe to be face brick. All others to be common brick.

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
1	2-70	Note revised (Am. #1)	

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

DES. BY N.C. | DR. BY C.A. | CK. BY W.C.

SUBMITTED W. C. Clements, CHIEF, ARCH. SECTION

APPROVED: NEDIVISION, CHIEF, CON. ENG. BRANCH

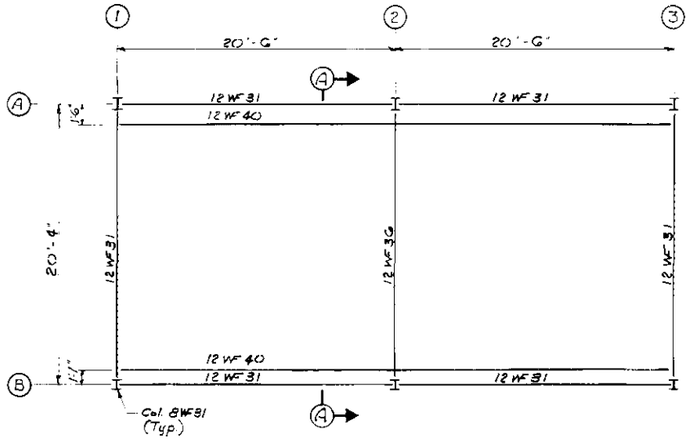
RECOMMENDED Lawrence Bryant, CHIEF, PLANNING & REPORTS BRANCH

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION-ARCHITECTURAL DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

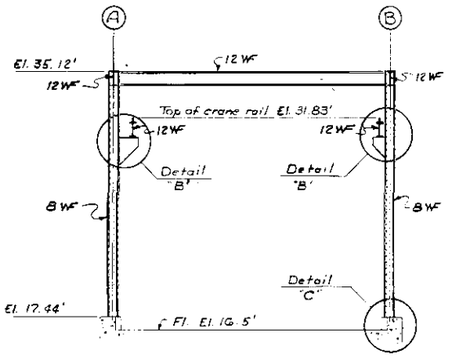
APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR 1970

SCALE AS SHOWN | SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU - 15
SHEET 42

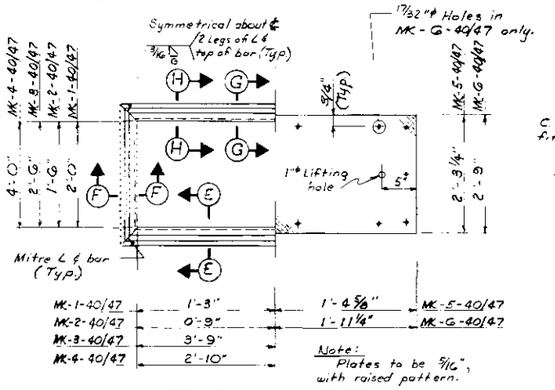
PLATE 43



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

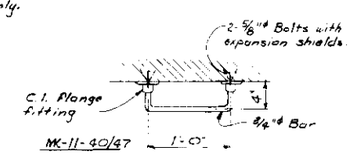


SECTION "A-A"
SCALE 1/4" = 1'-0"

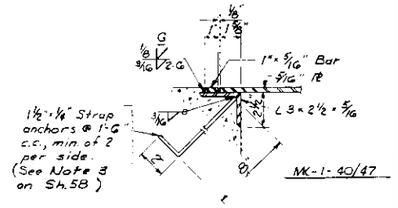


Note: Plates to be 5/16", with raised pattern.

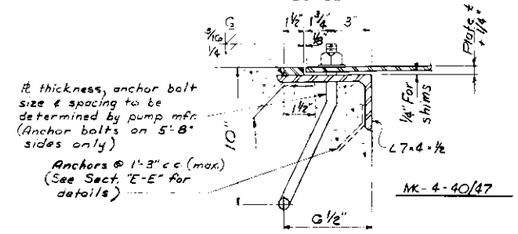
FRAME PLATE



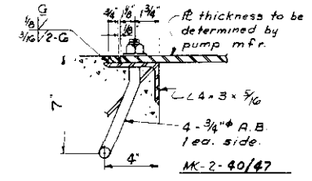
GRAB BAR
SCALE 1 1/2" = 1'-0"



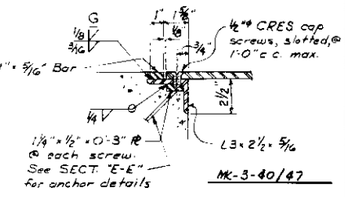
SECTION "E-E"
SCALE 3" = 1'-0"



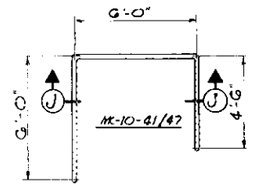
SECTION "F-F"
SCALE 3" = 1'-0"



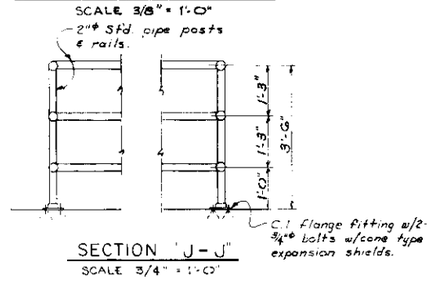
SECTION "G-G"
SCALE 3" = 1'-0"



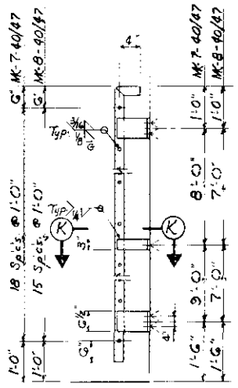
SECTION "H-H"
SCALE 3" = 1'-0"



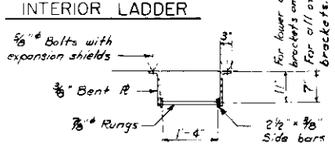
PLAN — ROOF GUARD RAIL
SCALE 3/8" = 1'-0"



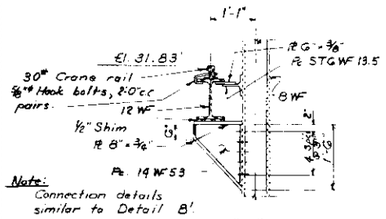
SECTION "J-J"
SCALE 3/4" = 1'-0"



INTERIOR LADDER

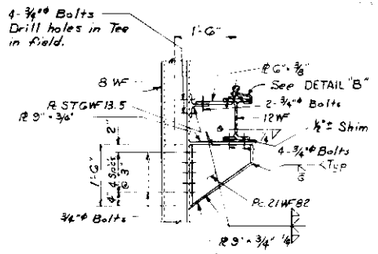


SECTION "K-K"
SCALE 3/4" = 1'-0"



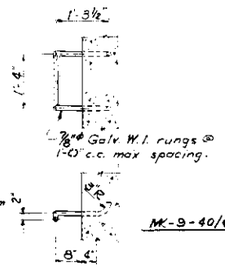
Note: Connection details similar to Detail 'B'

DETAIL "B"
SCALE 3/4" = 1'-0"



DETAIL "B'"
SCALE 3/4" = 1'-0"

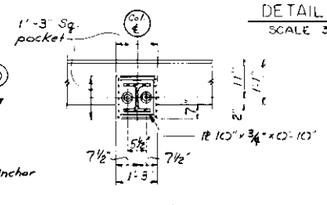
Note: Bolts to conform to ASTM A325.



LADDER RUNG DETAILS
SCALE 3/4" = 1'-0"

Note: Pockets and anchors for corner columns similar.

DETAIL "C"
SCALE 3/4" = 1'-0"



SECTION "D-D"
SCALE 3/4" = 1'-0"

MISC. METALS		
Mk. No.	Description	No. Req.
1	Frame	1
2	Frame	1
3	Frame	1
4	Frame	3
5	Plate	1
6	Plate	2
7	Ladder	1
8	Ladder	1
9	Ladder Rung	16
10	Roof Guard Rail	1
11	Grab Bar	1

Note:
1. For notes see Sh. 58.
2. All items on this sheet to be paid for under Item 49

As Built Drawing
Contract No. DACW 33-70-C-0147

GRAPHIC SCALES
1/4" = 1'-0" 4' 0 4' 8'
3/8" = 1'-0" 4' 0 4'
3/4" = 1'-0" 1' 0 1' 2'
1 1/2" = 1'-0" 12" 9" 6" 3" 0 6" 12"
3" = 1'-0" 3' 0 3' 6' 9'

REVISION	DATE	DESCRIPTION	BY

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

DES. BY L.S.P. | DR. BY R.F.M. | CK. BY

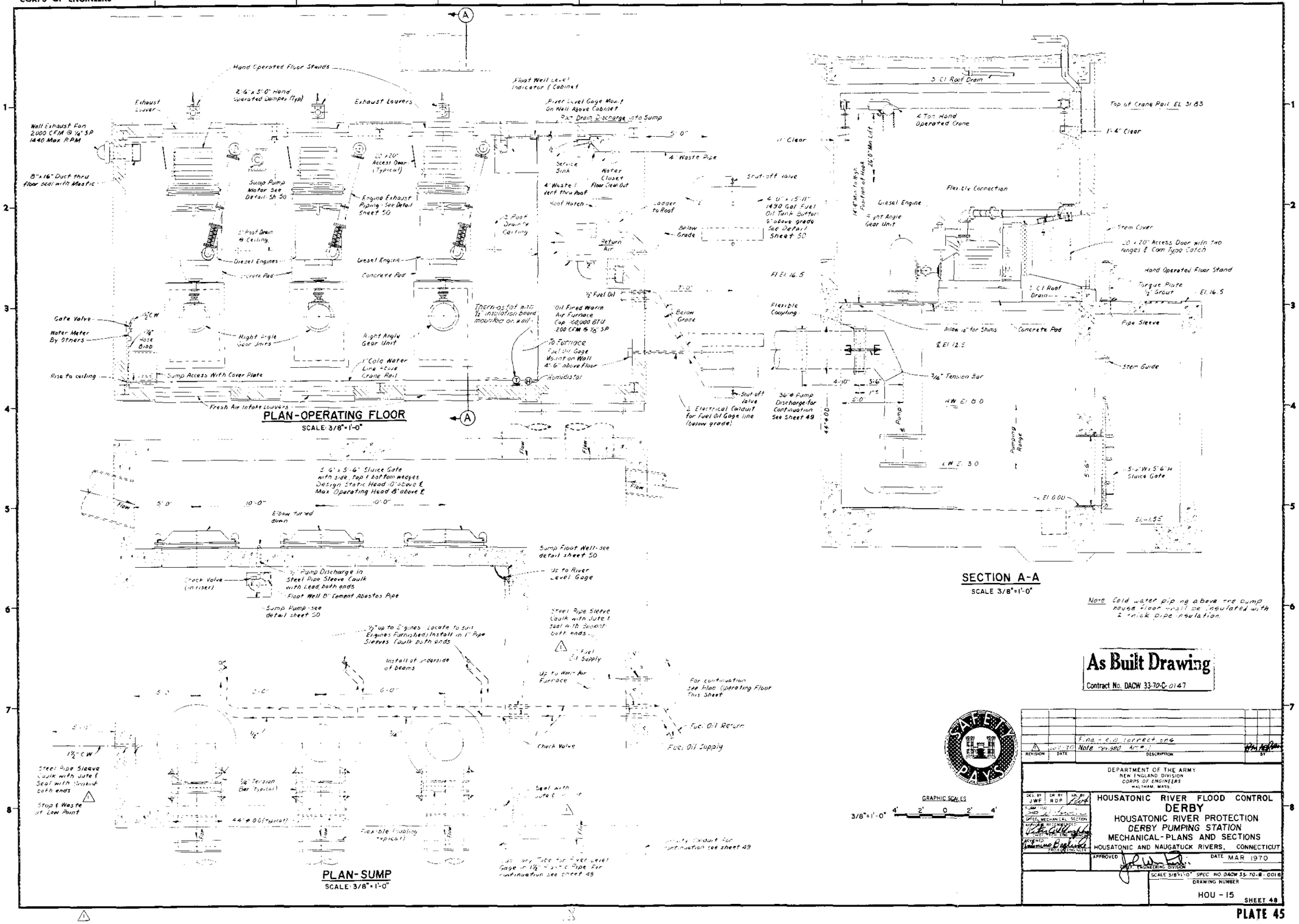
SUBMITTED: CHIEF, STRUCT. SECTION
APPROVED & RECOMMENDED: CHIEF, DESIGN BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION
STRUCTURAL STEEL AND MISCELLANEOUS DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE: MAR. 1970

SCALES NOTED | SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 47

CORPS OF ENGINEERS — U. S. ARMY



Note Cold water piping above the pump house floor shall be insulated with 2" thick pipe insulation.

As Built Drawing
Contract No. DACW 33-70-C-0147

GRAPHIC SCALES
3/8" = 1'-0" 4' 2' 0 2' 4'

REVISION	DATE	DESCRIPTION	BY
1	10-70	Final - Revised Correct eng Note per 980 Arch.	

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

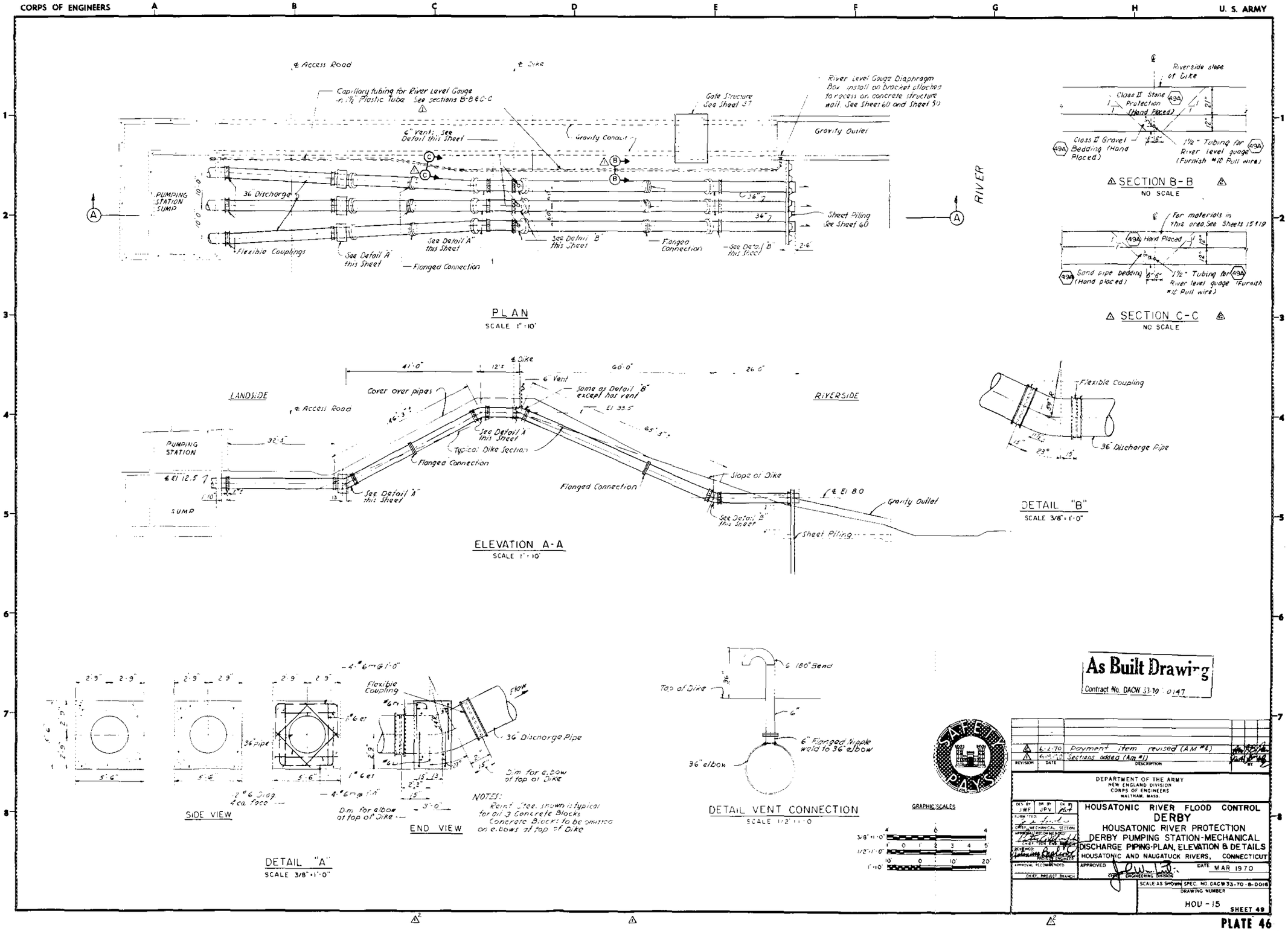
DES. BY JWF | DR. BY RDP | CK. BY

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION
MECHANICAL - PLANS AND SECTIONS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

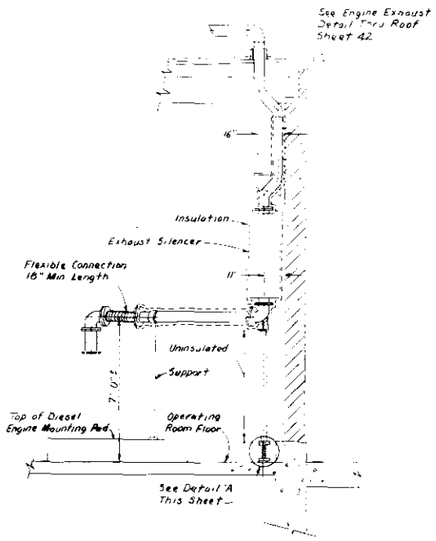
APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR 1970

SCALE 3/8" = 1'-0" SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 48

PLATE 45

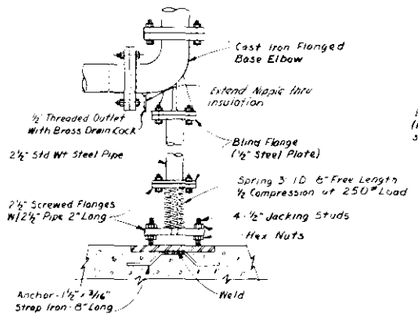

CORPS OF ENGINEERS
U. S. ARMY
PLAN
SCALE 1" = 10'
ELEVATION A-A
SCALE 1" = 10'
SECTION B-B
NO SCALE
SECTION C-C
NO SCALE
DETAIL "B"
SCALE 3/8" = 1'-0"
DETAIL "A"
SCALE 3/8" = 1'-0"
DETAIL VENT CONNECTION
SCALE 1/2" = 1'-0"
SIDE VIEW
END VIEW
LANDSIDE
RIVERSIDE
RIVER
PUMPING STATION SUMP
36" Discharge
Flexible Couplings
Flanged Connection
Gravity Conduit
Gravity Outlet
Sheet Piling
Typical Dike Section
Slope of Dike
Flexible Coupling
36" Discharge Pipe
NOTES:
Reinf. Steel shown is typical for all 3 Concrete Blocks
Concrete Blocks to be omitted on elbows at top of Dike
GRAPHIC SCALES
As Built Drawing
Contract No. DACW 33-70-0147
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION-MECHANICAL
DISCHARGE PIPING-PLAN, ELEVATION & DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
MAR 1970
SCALE AS SHOWN
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU-15
SHEET 49
PLATE 46

CORPS OF ENGINEERS — U. S. ARMY



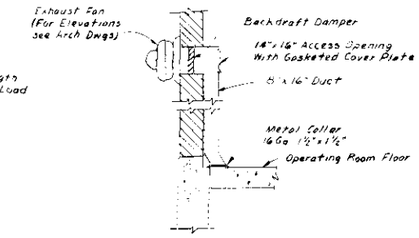
DETAIL OF ENGINE EXHAUST PIPING

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



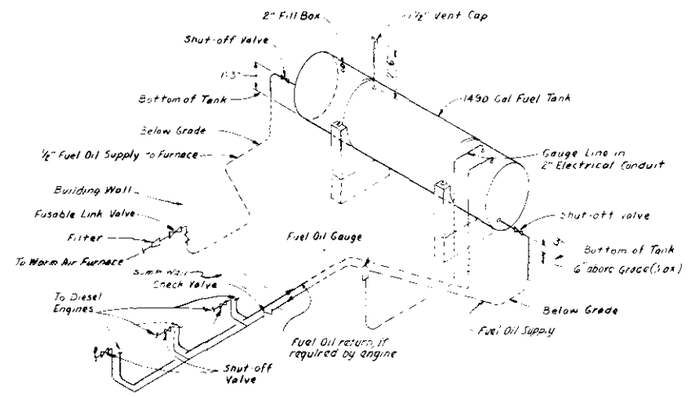
DETAIL "A"

NOT TO SCALE



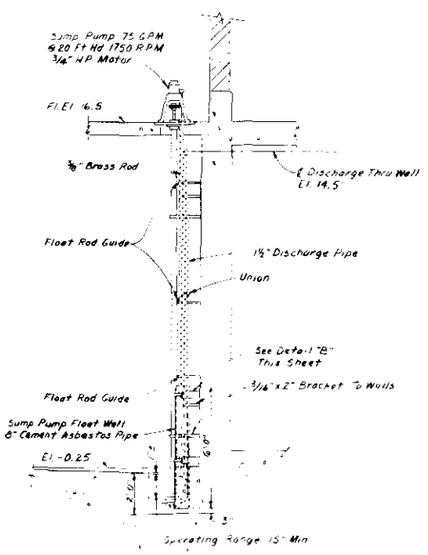
DETAIL EXHAUST FAN

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



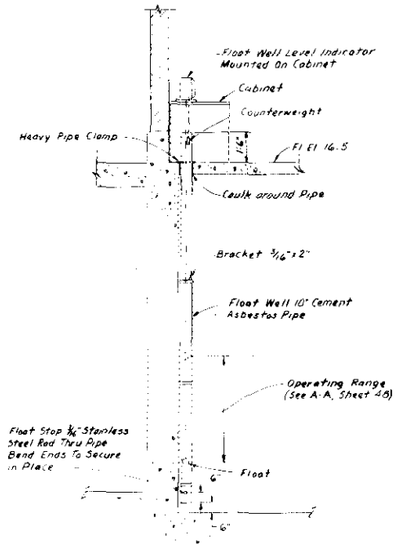
DETAIL-FUEL OIL PIPING

NOT TO SCALE



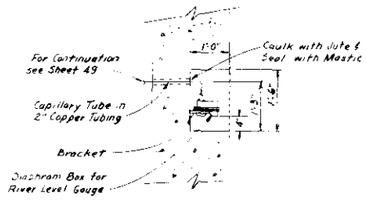
DETAIL-SUMP PUMP

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



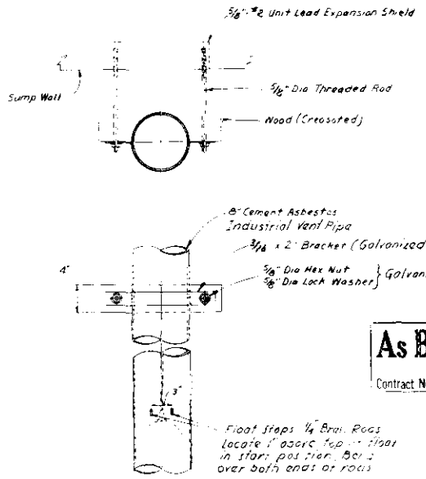
DETAIL-SUMP FLOAT WELL

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



DETAIL-RIVER LEVEL GAUGE

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



DETAIL "B"

NOT TO SCALE

As Built Drawing

Contract No. DACW 33-70-C-0147

GRAPHIC SCALES

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

3/4" = 1'-0" 2' 0 2'

REVISION	DATE	DESCRIPTION	BY

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

DES. BY JWF | DR. BY RDP | CK. BY JHF

SUBMITTED: [signature] CHIEF, MECHANICAL SECTION

APPROVED: [signature] CHIEF, DESIGN BRANCH

REVIEWED: [signature] CHIEF, DESIGN DIVISION

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION
MECHANICAL-MISCELLANEOUS DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: [signature] CHIEF, ENGINEERING DIVISION

DATE MAR. 1970

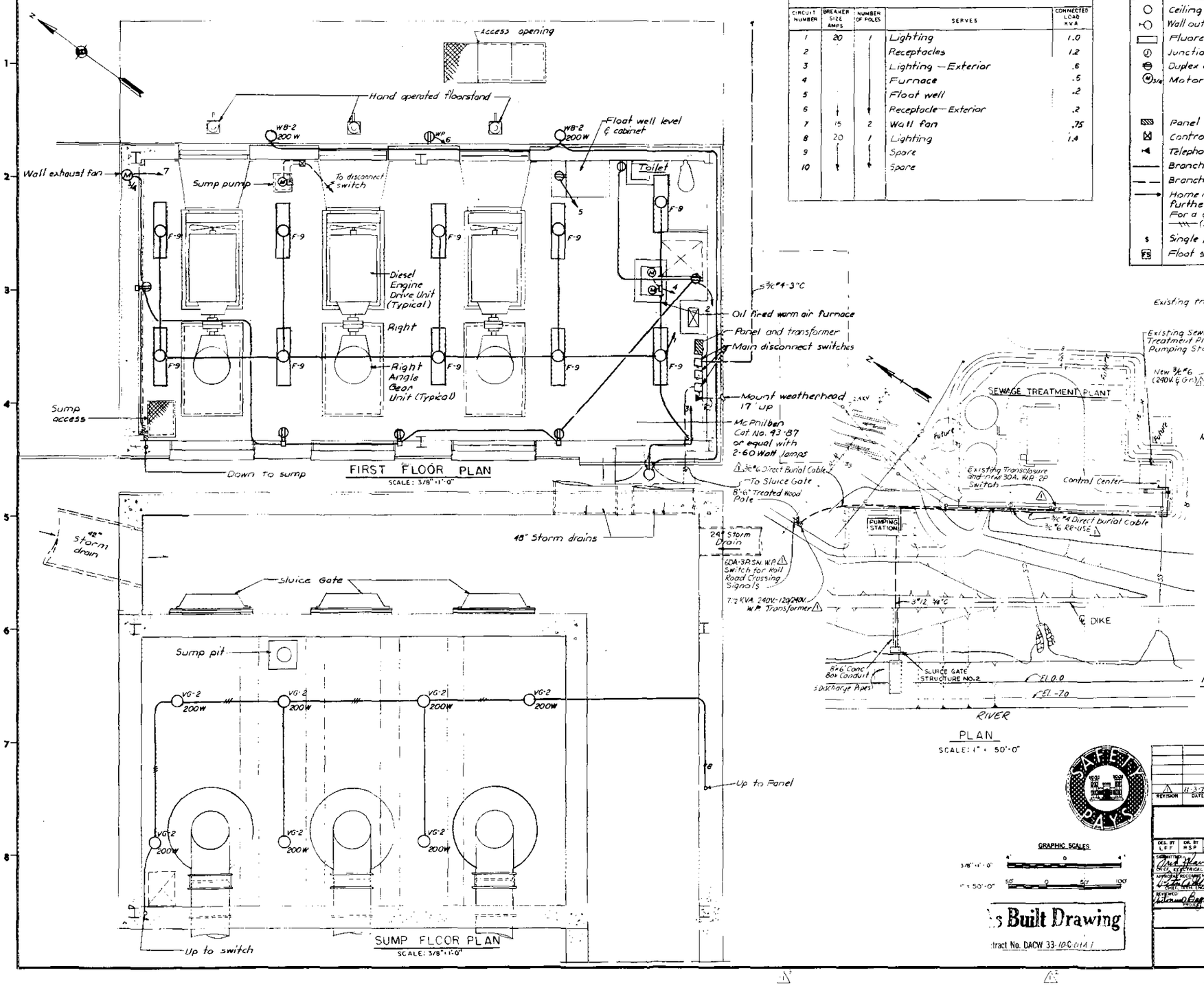
SCALE AS SHOWN SPEC. NO. DACW 33-70-B-0016

DRAWING NUMBER HOU - 15

SHEET 50

PLATE 47

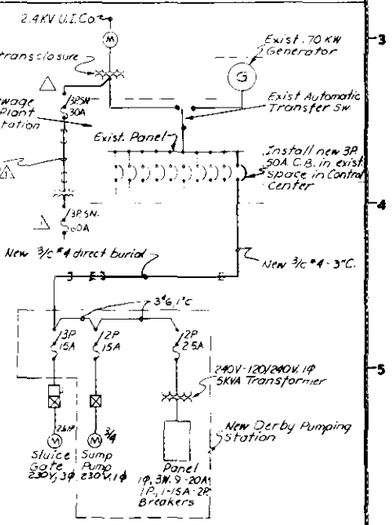
CORPS OF ENGINEERS — U. S. ARMY



FIRST FLOOR PLAN
SCALE: 3/8" = 1'-0"

SUMP FLOOR PLAN
SCALE: 3/8" = 1'-0"

PLAN
SCALE: 1" = 50'-0"



WIRING DIAGRAM
NO SCALE

PANEL

120 240 V 1φ 3 WIRE

CIRCUIT NUMBER	BREAKER SIZE AMPS	NUMBER OF POLES	SERVES	CONNECTED LOAD KVA
1	20	1	Lighting	1.0
2			Receptacles	1.2
3			Lighting — Exterior	.6
4			Furnace	.5
5			Float well	.2
6			Receptacle — Exterior	.2
7	15	2	Wall fan	.75
8	20	1	Lighting	1.4
9			Spare	
10			Spare	

LEGEND

SYMBOL	DESCRIPTION
○	Ceiling outlet
⊢○	Wall outlet
▭	Fluorescent fixture - 2-40 W.
Ⓙ	Junction box
⊖	Duplex convenience outlet - W.P. indicates weatherproof
Ⓜ 3/4	Motor - HP as indicated
▨	Panel
⊠	Controller
⊣◄	Telephone outlet, 1'-0" up
——	Branch circuit concealed in ceiling or wall.
— —	Branch circuit in floor
——►	Home run to panelboard. Note: Any circuit without further designation indicates a two wire circuit. For a greater number of wires indicate as follows —\\\— (3 wires) —\\\— (4 wires), etc.
S	Single pole switch, 4'-0 up.
FS	Float switch

NOTES:

1. Items at Sluice Gate Structure No. 2 and service thereto will be paid for under Item (73)
2. All Items on this sheet except those for Sluice Gate Structure No. 2 will be paid for under Pumping Station Item (49)

REVISION	DATE	DESCRIPTION	BY
		Final field connections	
△	11-3-70	Railroad signal service added.	

GRAPHIC SCALES
3/8" = 1'-0"
1" = 50'-0"

As Built Drawing
Contract No. DACW 33-10C-0141

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

DES. BY LFF | DR. BY RSP | CK. BY

SUBMITTED: Chief, Electrical Section
APPROVAL RECOMMENDED: Chief, Tech. Eng. Section
REVIEWED: Project Engineer

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DERBY PUMPING STATION - ELECTRICAL
PLANS, SCHEDULE AND DIAGRAM
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: Chief, Engineering Division
DATE: MAR. 1970
SCALE AS SHOWN | SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 51

PLATE 48

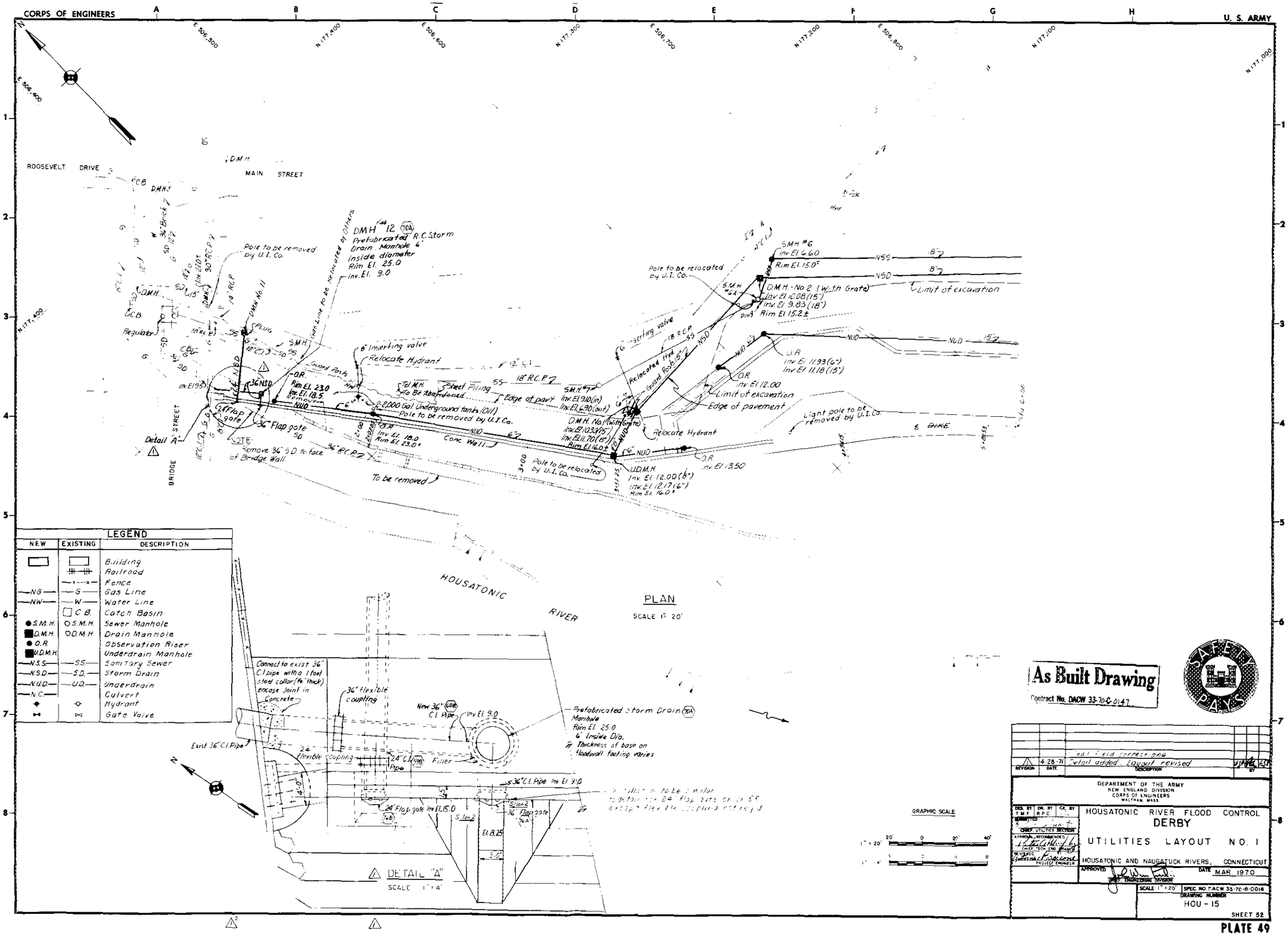

CORPS OF ENGINEERS
U. S. ARMY
ROOSEVELT DRIVE
MAIN STREET
BRIDGE STREET
HOUSATONIC RIVER
PLAN
SCALE 1" = 20'
DETAIL "A"
SCALE 1" = 4'
LEGEND
NEW
EXISTING
DESCRIPTION
Building
Railroad
Fence
Gas Line
Water Line
Catch Basin
Sewer Manhole
Drain Manhole
Observation Riser
Underdrain Manhole
Sanitary Sewer
Storm Drain
Underdrain
Culvert
Hydrant
Gate Valve
Pole to be removed by U.I. Co.
Pole to be relocated by U.I. Co.
Relocate Hydrant
Limit of excavation
Edge of pavement
Light pole to be removed by U.I. Co.
Conc. Wall
To be removed
Remove 36" S.D. to face of Bridge Wall
Prefabricated Storm Drain Manhole
Rim El. 25.0
6" Inside Dia.
Thickness of base on floodwall footing varies
Exist 36" C.I. Pipe
Connect to exist 36" C.I. pipe with a 1 foot steel collar (1/4" thick) encase joint in Concrete
36" flexible coupling
24" flexible coupling
Filler
GRAPHIC SCALE
As Built Drawing
Contract No. DACW 33-70-C-0147
SAFETY PAYS
REVISION
DATE
DESCRIPTION
BY
4-28-71
Detail added. Layout revised
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
UTILITIES LAYOUT NO. 1
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
APPROVED
DATE MAR. 1970
SCALE 1" = 20'
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 52

PLATE 49

CORPS OF ENGINEERS

U. S. ARMY

As Built Drawing

Contract No. DACW 33-70-C-0147

Note
1. For Legend See Sheet No. 52.
2. Buried timber structures, including piling maybe encountered while jacking the 42 inch storm drain pipe through the railroad embankment.

PLAN
SCALE 1" = 50'

GRAPHIC SCALES

1" = 50' 50' 0 50' 100'

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	

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

DES. BY T.M.F. | DR. BY R.P.C. | CK. BY

SUBMITTED: Bruce H. Steinert, CHIEF, UTILITIES SECTION

APPROVAL RECOMMENDED: CHIEF, TECH. ENG. DIVISION

REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY

UTILITIES LAYOUT NO. 2

HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION

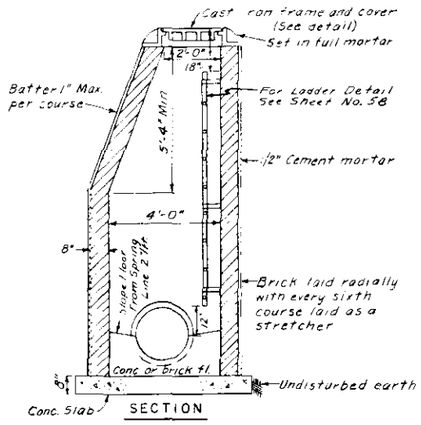
DATE MAR. 1970

SCALE 1" = 50' | SPEC. NO. DACW 33-70-B-0016

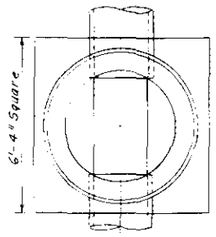
DRAWING NUMBER HOU - 15

SHEET 53

PLATE 50



SECTION

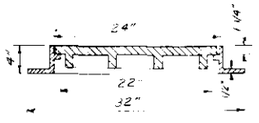


PLAN

STANDARD SANITARY SEWER MANHOLE

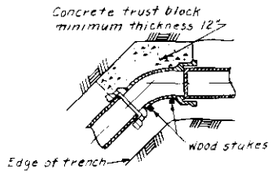
SCALE: 1 1/2" = 1'-0"

PLAN

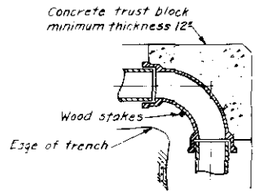


CAST IRON FRAME & COVER

SCALE: 1 1/2" = 1'-0"



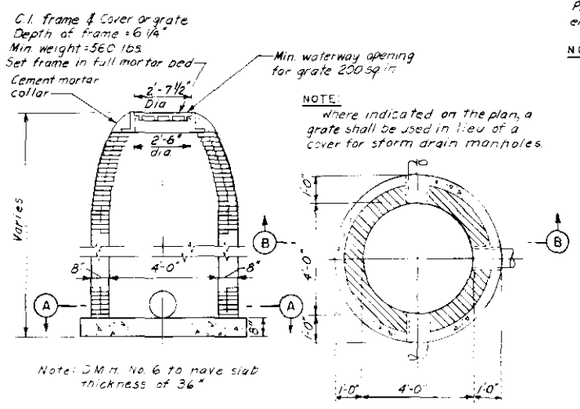
STANDARD 1/8 BEND



STANDARD ELBOW

WATER PIPE THRUST BLOCK

NOT TO SCALE



NOTE: Where indicated on the plan, a grate shall be used in lieu of a cover for storm drain manholes.

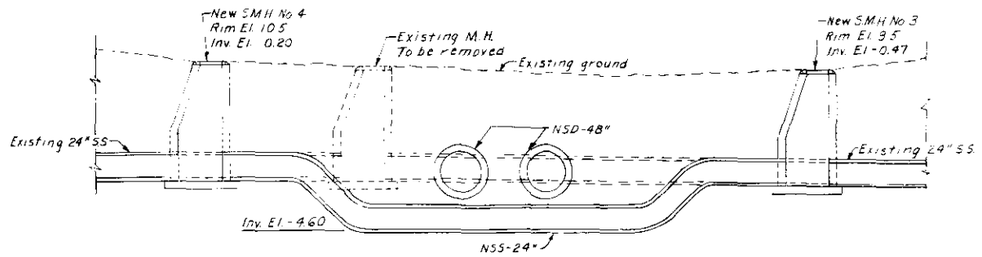
SECTION B-B

PLAN

SECTION A-A

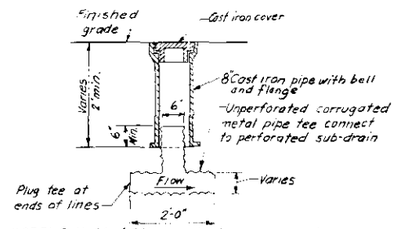
STANDARD MANHOLE-DRAIN AND UNDERDRAIN

SCALE: 1 1/2" = 1'-0"



PROFILE-24" SEWER

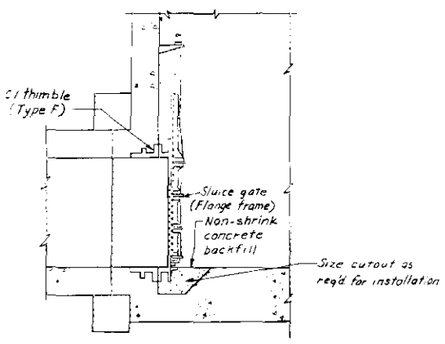
SCALE: 1" = 5'



NOTE: Suitable fittings, adaptors or specials shall be furnished to provide for conditions of the underdrain indicated.

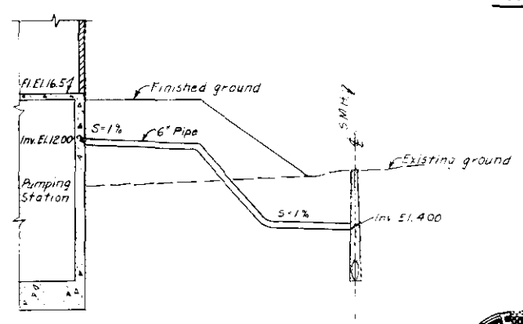
OBSERVATION RISER

SCALE 3/4" = 1'-0"



TYPICAL SLUICE GATE INSTALLATION FLUSH BOTTOM CLOSURE

NO SCALE



SEWER SERVICE TO PUMPING STATION

SCALE HORZ 1" = 10'
VERT. 1" = 5'

As Built Drawing

Contract No. DACW 33-70-C 0147

REVISION	DATE	DESCRIPTION	BY

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

DES. BY T.M.F. | DR. BY E.J.K. | CK. BY J.E.S.

SUBMITTED: CHIEF, UTILITIES SECTION
APPROVED AND RECOMMENDED: CHIEF, DESIGN BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY

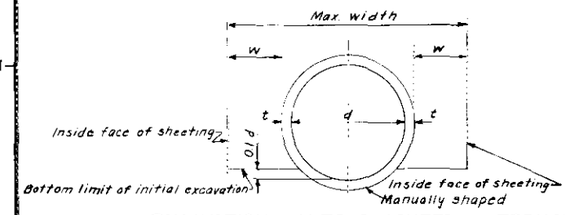
UTILITIES DETAILS NO. 1

HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR 1970

SCALE AS NOTED SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 54

GRAPH. SCALES: 1 1/2" = 1'-0"; 1" = 1'-0"; 1 1/2" = 1'-0"; 1" = 5'; 1" = 10'; 3/4" = 1'-0"

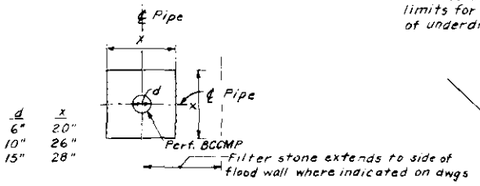


EXCAVATION LIMITS OF SHEETED TRENCHES FOR R.C. AND V.C. PIPES

NOT TO SCALE

LEGEND

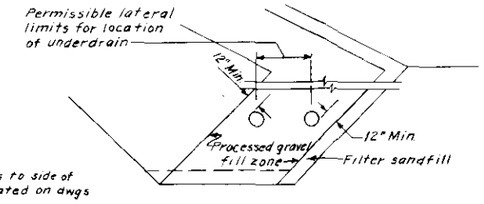
d = Nominal diameter of pipe
t = Thickness of barrel
w = 12" for d ≤ 30"
w = 18" for 36" and 42" d
w = 24" for 48" d and larger
T = Width of trench at top of pipe



d	x
6"	20"
10"	26"
15"	28"

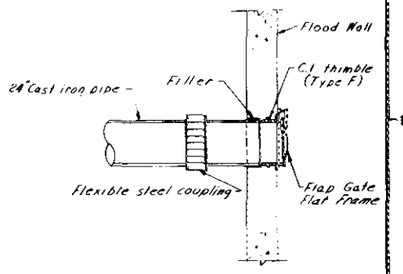
TYPICAL UNDERDRAIN DETAIL IN SAND FILL SECTION

NOT TO SCALE



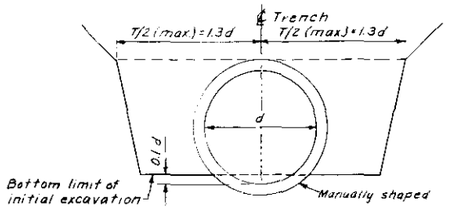
UNDERDRAIN LOCATION DETAIL IN DIKE PROCESSED GRAVEL FILL SECTION

NOT TO SCALE



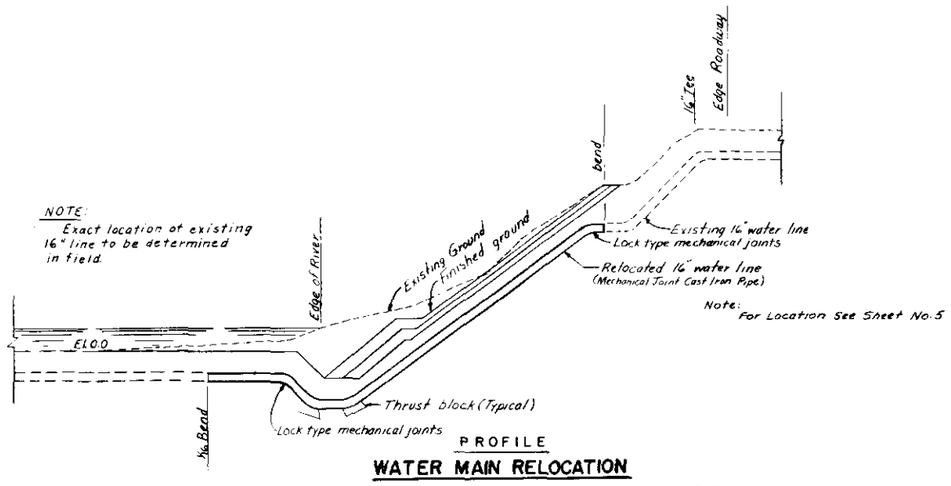
DETAIL AT FLOODWALL

NO SCALE



EXCAVATION LIMITS OF UNSHEETED TRENCHES FOR R.C. AND V.C. PIPES

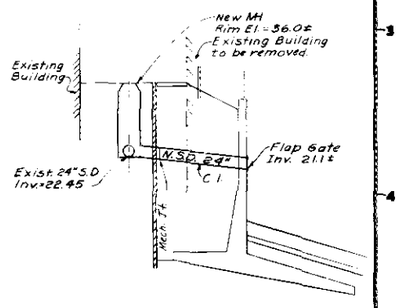
NOT TO SCALE



PROFILE

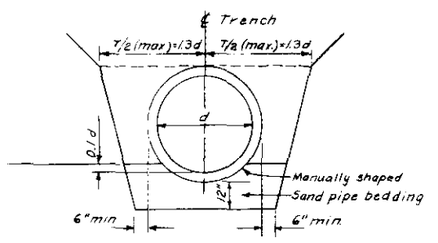
WATER MAIN RELOCATION RIGHT BANK OF NAUGATUCK RIVER

SCALE: HORZ. 1" = 20'
VERT. 1" = 10'



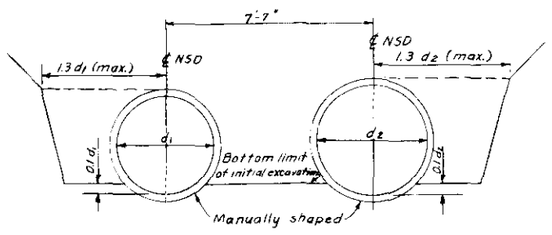
NEW STORM DRAIN STA. 1 + 14

SCALE: 1" = 10'



EXCAVATION LIMITS AND TYPICAL SAND BEDDING DETAIL FOR NSD AND NSS HOUSATONIC DIKE STA. 3+40 LEFT TO EDGE OF RAILROAD EMBANKMENT

NOT TO SCALE



EXCAVATION LIMITS FOR 42" Ø AND 48" Ø NSD BETWEEN DMH #9 AND PUMPING STATION

NOT TO SCALE

As Built Drawing

Contract No. DACW 33-70-C-0147

GRAPHIC SCALES

1" = 20' 20' 0 20' 40'

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

REVISION	DATE	DESCRIPTION	BY

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

DES. BY T.M.F. | DR. BY E.J.K. | CK. BY

SUBMITTED: Arthur H. Stewart, CHIEF, UTILITIES SECTION

APPROVED: CHIEF, DESIGN BRANCH

APPROVED: CHIEF, PROJ. ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY

UTILITIES DETAILS NO. 2

HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

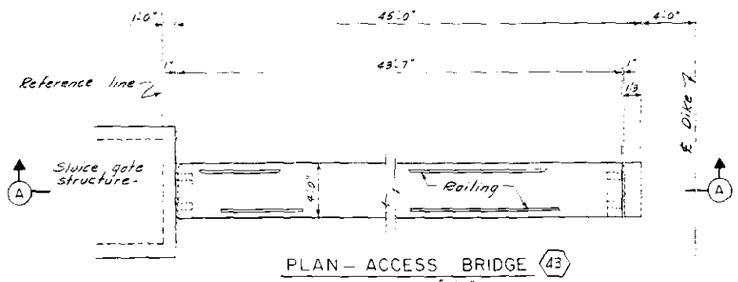
APPROVED: CHIEF, ENGINEERING DIVISION

DATE: MAR. 1970

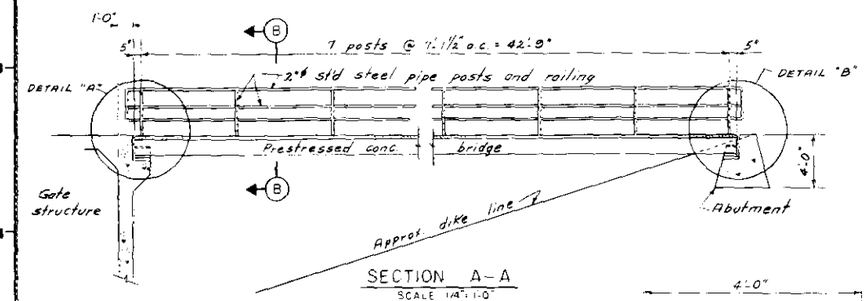
SCALE: AS NOTED | SPEC. NO. DACW 33-70-B-0066

DRAWING NUMBER: HOU - 15

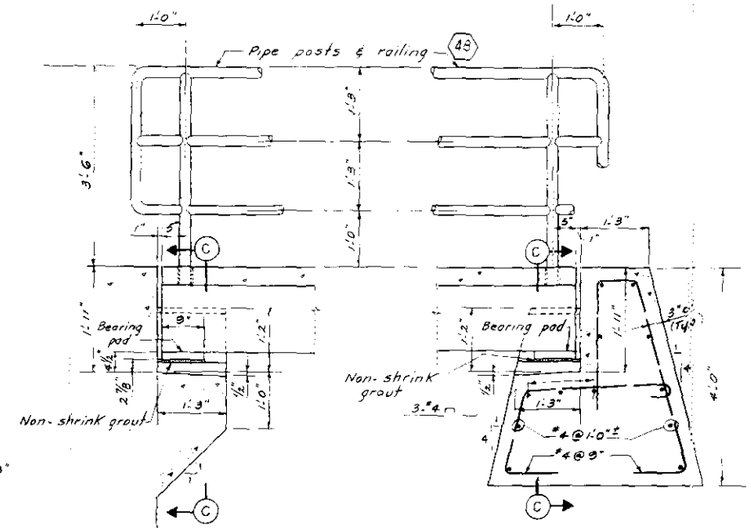
SHEET 55



PLAN – ACCESS BRIDGE (43)
SCALE 1/4" = 1'-0"

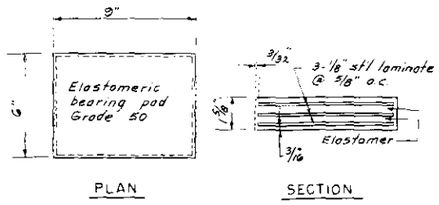


SECTION A–A
SCALE 1/4" = 1'-0"

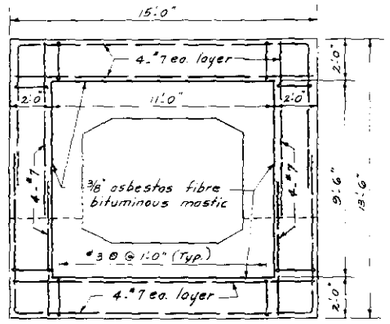


DETAIL "A"
SCALE 1" = 1'-0"

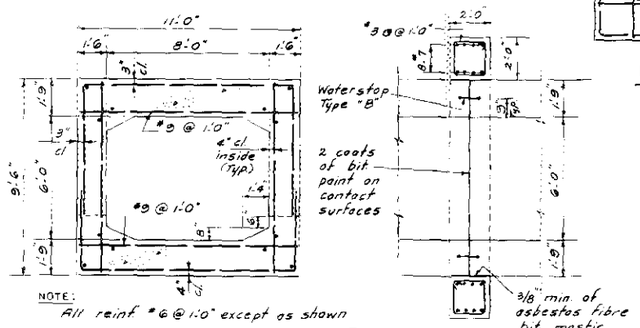
DETAIL "B"
SCALE 1" = 1'-0"



PLAN SECTION
BEARING PAD DETAILS
NOT TO SCALE



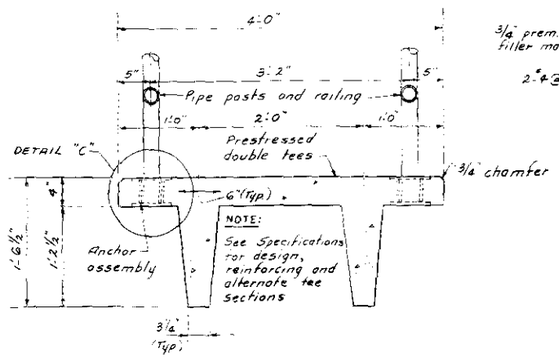
ELEVATION OF COLLAR (33)
SCALE 3/8" = 1'-0"



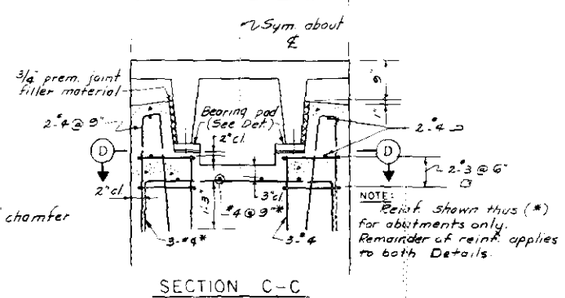
NOTE:
All reinf. #6 @ 1'-0" except as shown

PUMPING STATION CONDUIT (33) SECTION AT COLLAR
SCALE 3/8" = 1'-0"

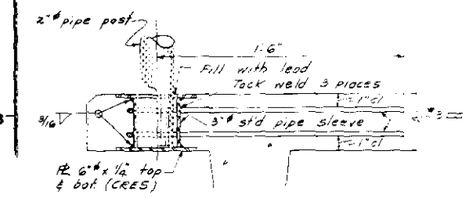
NOTE:
For General Notes see Sh. 38



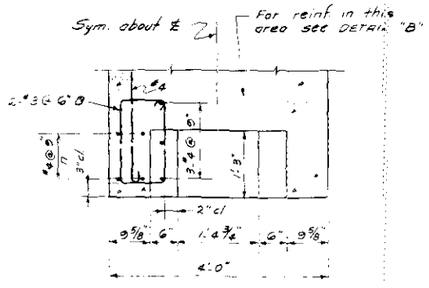
SECTION B–B
SCALE 1/2" = 1'-0"



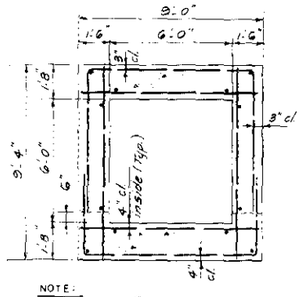
SECTION C–C
SCALE 1" = 1'-0"



DETAIL "C"
SCALE 3" = 1'-0"



SECTION D–D
SCALE 1" = 1'-0"



NOTE:
All reinf. #6 @ 1'-0"

DRAINAGE CONDUIT (33)

NOTE:
Collar details similar to details shown on this sheet for Pumping Station Conduit

GRAPHIC SCALES

1/4" = 1'-0" 1/2" = 1'-0" 3/4" = 1'-0" 1" = 1'-0" 1 1/2" = 1'-0" 3" = 1'-0" 3/8" = 1'-0"

As Built Drawing
Contract No. DACW 33-70-C-0147

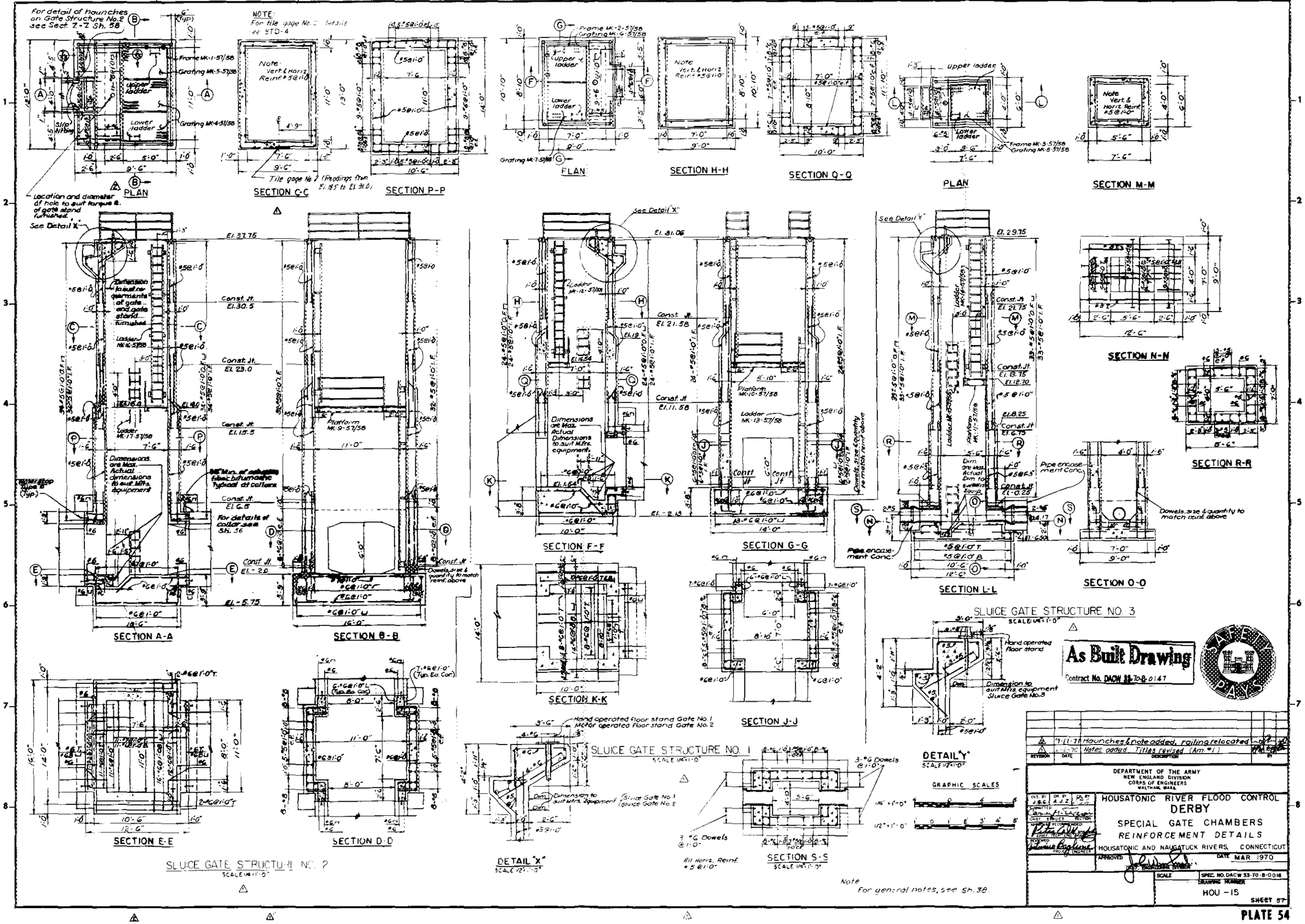
REVISION	DATE	DESCRIPTION	BY

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

HOUSATONIC RIVER FLOOD CONTROL
DERBY
DISCHARGE CONDUITS AND ACCESS BRIDGES
STRUCTURAL
PLANS, SECTIONS AND DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

DES. BY R.B.W. DR. BY C.W.A. CK. BY
SUBMITTED
CHIEF, STRUCT. SECTION
CHIEF, ENGR. DIVISION
RECOMMENDED
CHIEF, ENGINEERING DIVISION
APPROVED
CHIEF, ENGINEERING DIVISION
DATE MAR 1970
SCALE AS SHOWN SPEC. NO. DACW 33-70-B-0018
DRAWING NUMBER HOU-15
SHEET 56

CORPS OF ENGINEERS — U. S. ARMY



As Built Drawing

Contract No. DACW 33-70-B-0147

REVISION	DATE	DESCRIPTION	BY
2	9-11-71	Haunches & note added, railing relocated	
1	6-6-70	Notes added. Titles revised (Am. #1)	

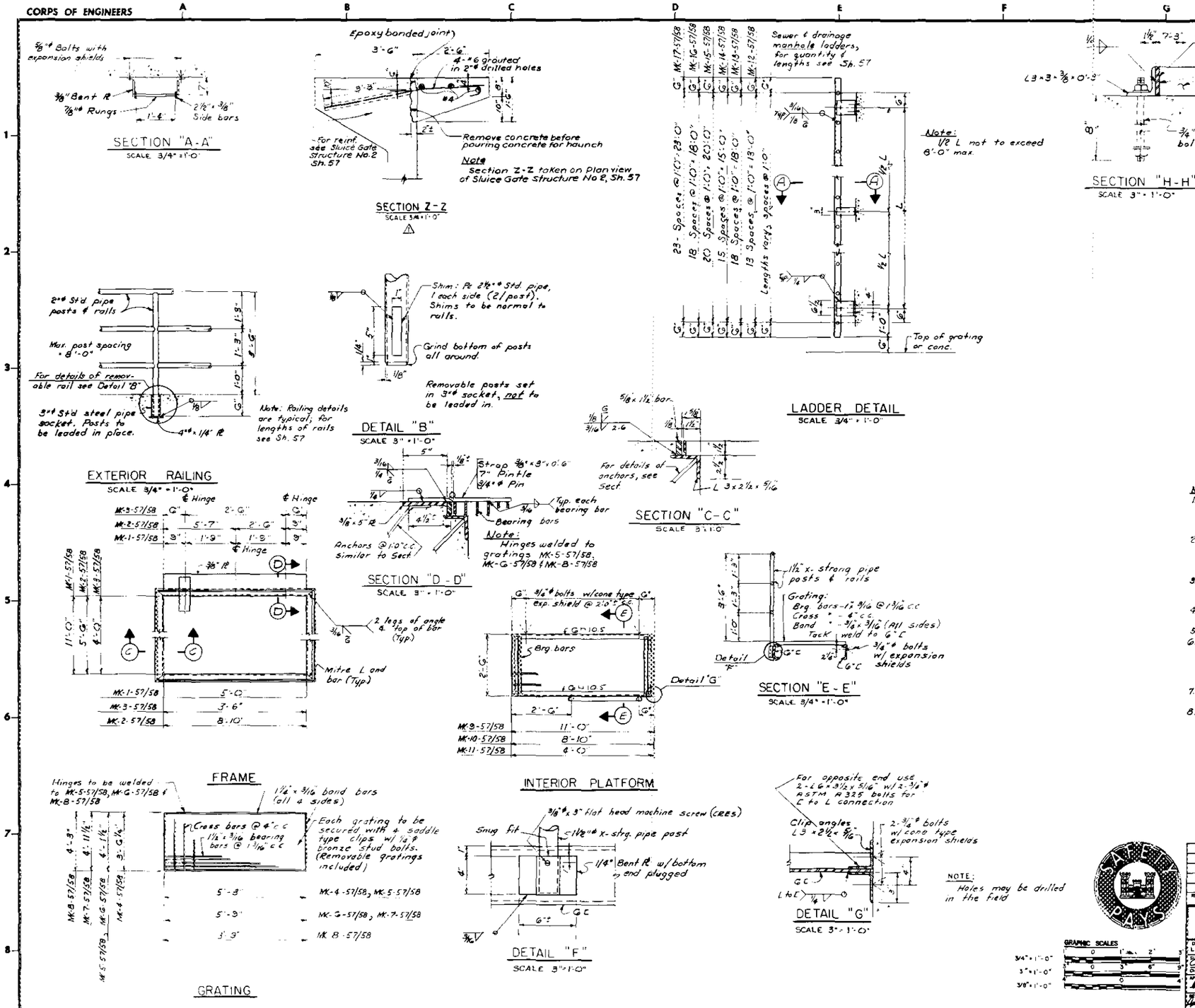
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

HOUSATONIC RIVER FLOOD CONTROL
DERBY
SPECIAL GATE CHAMBERS
REINFORCEMENT DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

DATE MAR. 1970

SCALE — SPEC. NO. DACW 33-70-B-0016 — DRAWING NUMBER HOU-15 — SHEET 87

PLATE 54



Notes:

1. Misc. metal mark numbers: MK-(5)-(26)(32) — Piece No. — Sheet where piece is shown — Sheet where piece is detailed.
2. The connection of roof beams to columns shall be made with 3/4"ϕ ASTM A325 bolts and shall conform to "Framed Beam Connections", 3 rows as detailed in AISC's Manual of Steel Construction, 6th Edition.
3. Headed anchors having a shank diameter of 5/8"ϕ and a head of 1 1/4"ϕ with a length of 6"± may be used in lieu of strap anchors.
4. All groove welds to have full penetration unless noted otherwise.
5. All sharp corners to be broken.
6. Steel frames to be straightened by heat treating if necessary. Bearing surfaces shall not deviate from a true flat plane by 1/16"±. Gratings and plates to be seated with uniform bearing along edges and free from wobbling.
7. All items on Sheet 58 to be galvanized after fabrication.
8. All items on Sheet 58 to be paid for under the payment item number associated with the structure where the item is located.

...s Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
1	9-17-71	Section Z-Z added	

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

HOUSATONIC RIVER FLOOD CONTROL
DERBY
SPECIAL GATE CHAMBERS
MISCELLANEOUS STEEL DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED — CHIEF, ENGINEERING DIVISION — DATE MAR. 1970

SCALE AS NOTED — SPEC. NO. DACW33-70-B-0016
DRAWING NUMBER HOU-15
SHEET 58

PLATE 55

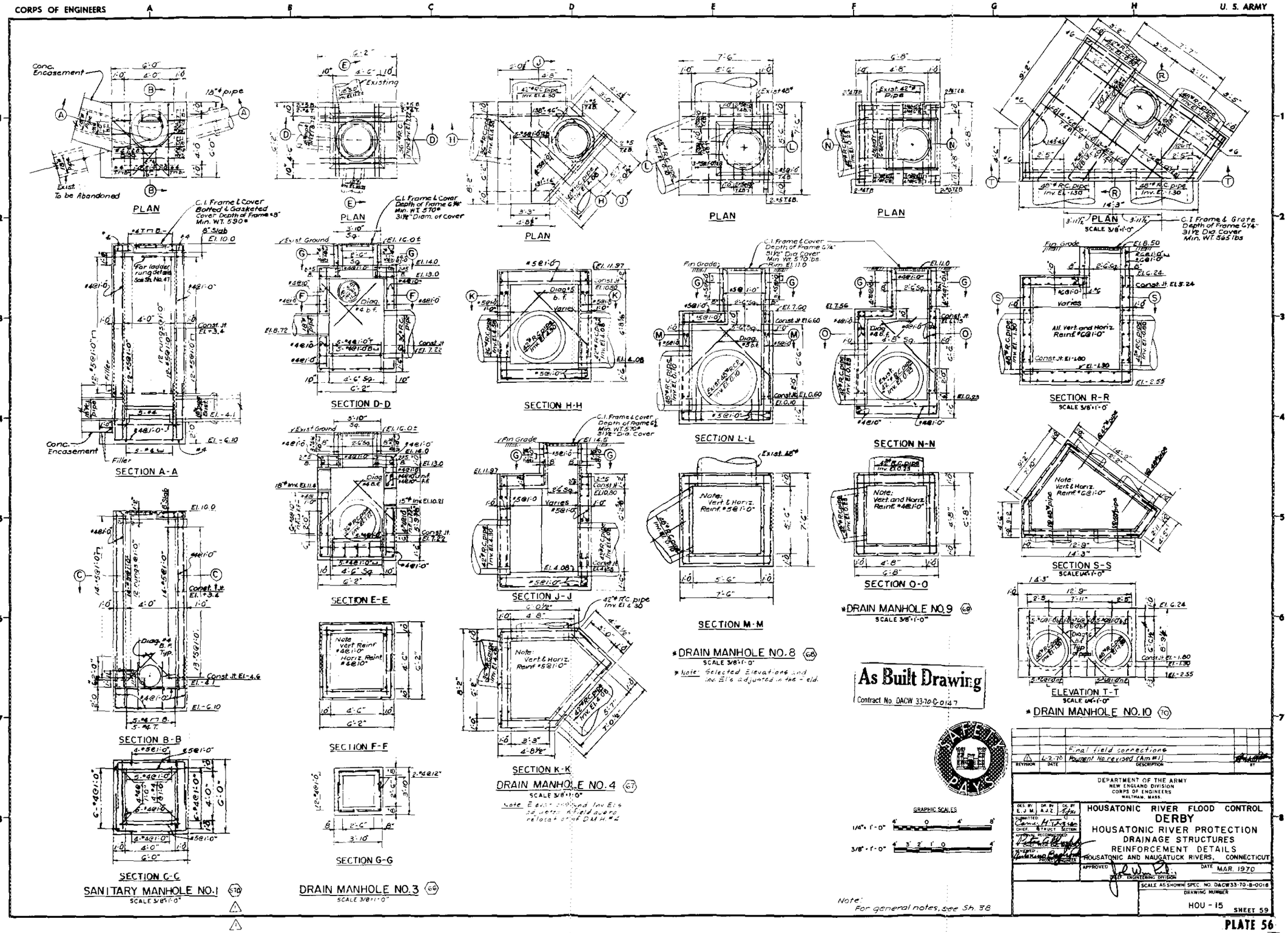

PLAN
SECTION A-A
SECTION B-B
SECTION C-C
SANITARY MANHOLE NO.1
SCALE 3/8"=1'-0"
SECTION D-D
SECTION E-E
SECTION F-F
SECTION G-G
DRAIN MANHOLE NO.3
SECTION H-H
SECTION J-J
SECTION K-K
DRAIN MANHOLE NO.4
SECTION L-L
SECTION M-M
*DRAIN MANHOLE NO.8
SECTION N-N
SECTION O-O
*DRAIN MANHOLE NO.9
SECTION R-R
SECTION S-S
ELEVATION T-T
*DRAIN MANHOLE NO.10
As Built Drawing
Contract No. DACW 33-70-C-0147
SAFETY PAYS
GRAPHIC SCALES
Note: For general notes, see Sh. 38
Final field corrections
Pavement No. revised (Am #1)
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HOUSATONIC RIVER PROTECTION
DRAINAGE STRUCTURES
REINFORCEMENT DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
DATE MAR. 1970
SCALE AS SHOWN SPEC. NO. DACW33-70-B-0016
DRAWING NUMBER
HOU - 15
SHEET 59

PLATE 56

CORPS OF ENGINEERS — U. S. ARMY

PLAN OF OUTLET AT SLUICE GATE STRUCTURE NO. 1
SCALE ¼"=1'-0"

PLAN OF INLET FOR DRAINAGE CONDUIT
SCALE ¼"=1'-0"

SECTION L-L
SCALE ½"=1'-0"

DISCHARGE PIPES
PLAN OF SHEET PILING
SCALE ¼"=1'-0"

SECTION E-E
SCALE ¼"=1'-0"

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

SECTION G-G
SCALE ¼"=1'-0"

PUMPING STATION GRAVITY OUTLET

ELEVATION H-H
SCALE ¼"=1'-0"

SECTION A-A
SCALE ¼"=1'-0"

SECTION F-F
SCALE ¼"=1'-0"

PLAN OF OUTLET BASE SLAB
PUMPING STATION CONDUIT
SCALE ¼"=1'-0"

ELEVATION K-K
SCALE ¼"=1'-0"

NOTE: Bottom Elev of Sheeting, -14.5

Support arrangements typical at all 3 pipes

NOTE: Band vert & horiz. back of tile gage as required.

NOTE: All concrete will be paid for under Item No. 36. For General Notes see Sh. 38

As Built Drawing
Contract No. DACW 33-70-C-0147

SECTION B-B
SCALE ¼"=1'-0"

OUTLET - SLUICE GATE STRUCTURE #1
INLET - DRAINAGE CONDUIT

PLAN OF SHEET PILING
SCALE ¼"=1'-0"

SECTION C-C
SCALE ¼"=1'-0"

NOTE: For Location of tile gage No 2 see sheet 57

SECTION J-J
SCALE ¼"=1'-0"

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
2		Section and elevation revised (Am #2)	
1	4-29-70	Notes added, sections revised (Am #1)	

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

DES. BY J.B.G. DR. BY A.J.D. CK. BY

SUBMITTED: CHIEF, STRUCT. SECTION
RECOMMENDED: CHIEF, ENG. DIVISION
APPROVED: PROJECT ENGINEER

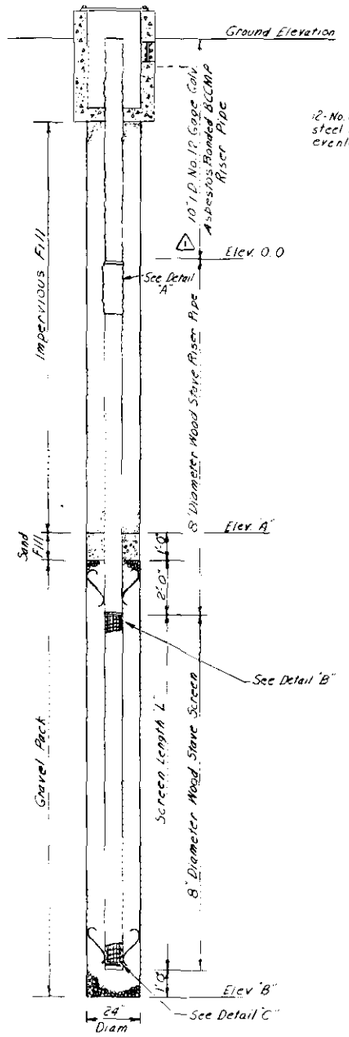
HOUSATONIC RIVER FLOOD CONTROL
DERBY
OUTLET AND INTAKE STRUCTURES
REINFORCEMENT DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION — DATE MAR 1970

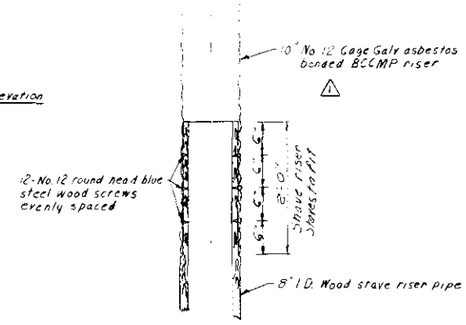
SCALE AS SHOWN SPEC. NO. DACW33-70-B-0016
DRAWING NUMBER HOU - 15
SHEET 60

PLATE 57

CORPS OF ENGINEERS U. S. ARMY

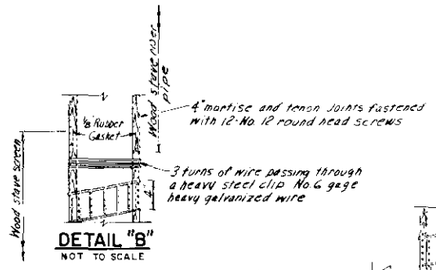


RELIEF WELL ELEVATION
SCALE 1/2"=1'-0"

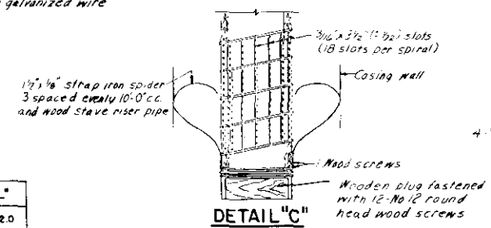


DETAIL "A"
NOT TO SCALE

NOTE:
An alternate type of Joint between wood and metal pipes may be used if the contractor so desires by submitting shop drawings and receiving the approval of the contracting officer.



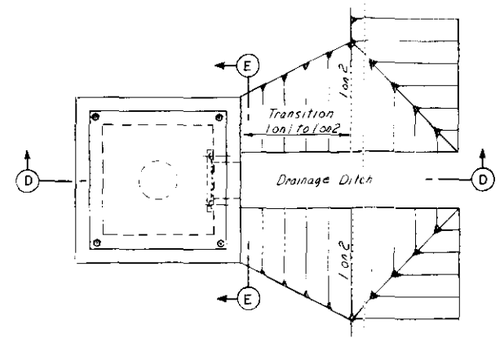
DETAIL "B"
NOT TO SCALE



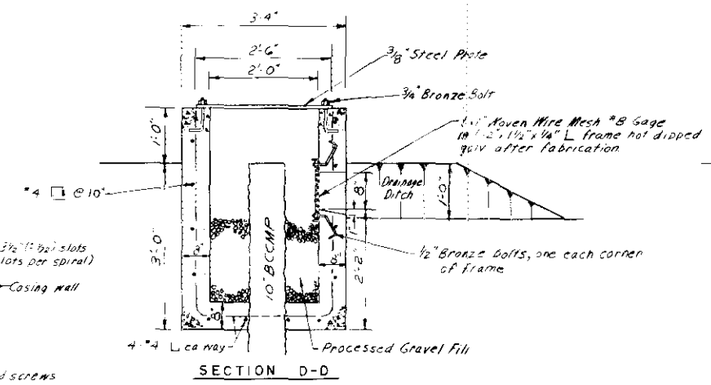
DETAIL "C"
NOT TO SCALE

NOTE:
An alternate type of spider may be used if the contractor so desires by submitting shop drawings and receiving the approval of the contracting officer.

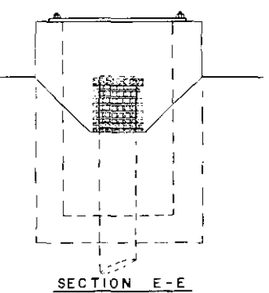
Well Number	Ground Elev.	Elev. "A"	Elev. "B"	"L"
RH-1	+9±	-10.0	-26.0	12.0
RH-2	+9±	-10.0	-23.0	9.0
RH-3	+9±	-10.0	-20.0	6.0
RH-4	+9±	-10.0	-18.0	4.0
RH-5	+9±	-10.0	-18.0	4.0
RH-6	+9±	-10.0	-18.0	4.0
RN-1	+12±	-2.0	-18.0	12.0
RN-2	+15±	-2.0	-18.0	12.0
RN-3	+17±	-2.0	-18.0	12.0
RN-4	+20±	-2.0	-18.0	12.0



PLAN



SECTION D-D



SECTION E-E

RELIEF WELL OUTLET DETAILS
SCALE 1"=1'-0"

NOTES:
Elevations refer to Mean Sea Level Datum
Locations of Wells shown on Sheet 5 & 16

As Built Drawing
Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY
2	6-2-70	Note revised (Am. #2)	
1	6-2-70	Note revised (Am. #1)	

GRAPHIC SCALES
1"=1'-0"
1/2"=1'-0"

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

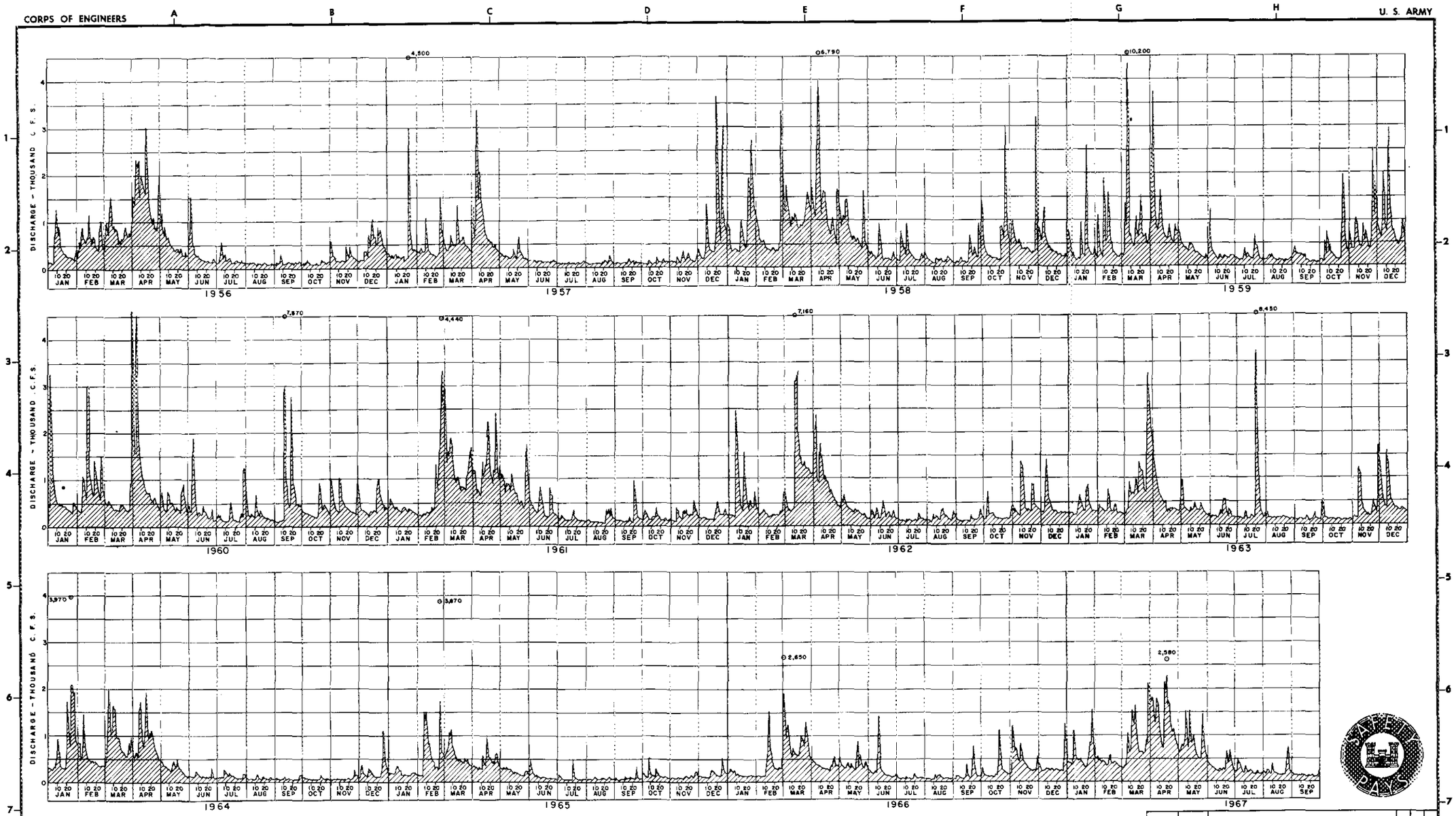
DES. BY H.H.B. DR. BY WEST CK. BY
SUBMITTED: SOLD ENGINEER
APPROVAL RECOMMENDED: ACT'G CHIEF, T & M BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
RELIEF WELL DETAILS
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970
SCALE: AS NOTED
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER HOU - 15
SHEET 61

PLATE 58

CORPS OF ENGINEERS U. S. ARMY



NOTES:

1. These hydrographs are the daily average stream flow of Naugatuck River at Beacon Falls, Connecticut, from the tributary drainage area of 261 square miles. The tributary drainage area of the Naugatuck at Ansonia is 306 square miles. Some instantaneous peak discharges are shown by ⊙. (High flows reduced by Thomaston since December 1960).

2. Regulation of the system of upstream reservoirs will have no appreciable effect on river flows below approximately 5,000 c.f.s. Regulation of reservoirs will reduce larger flows.

3. The data contained hereon are not intended as representations or warranties but are furnished as information only. It is expressly understood that the Government will not be responsible for any deduction, interpretation or conclusion therefrom made by any bidder or contractor.

As Built Drawing

Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY

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

DES. BY E.P.S. | DR. BY E.J.K. | CK. BY P.L.M.

SUBMITTED: HYDR. ENGINEER

APPROVAL RECOMMENDED: CHIEF, HYD. & HYD. BRANCH

REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HYDROGRAPHS
NAUGATUCK RIVER AT BEACON FALLS

HOUSATONIC AND NAUGATUCK RIVERS CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION

DATE MAR 1970

SCALE AS SHOWN | SPEC. NO. DACW 33-70-B-0016

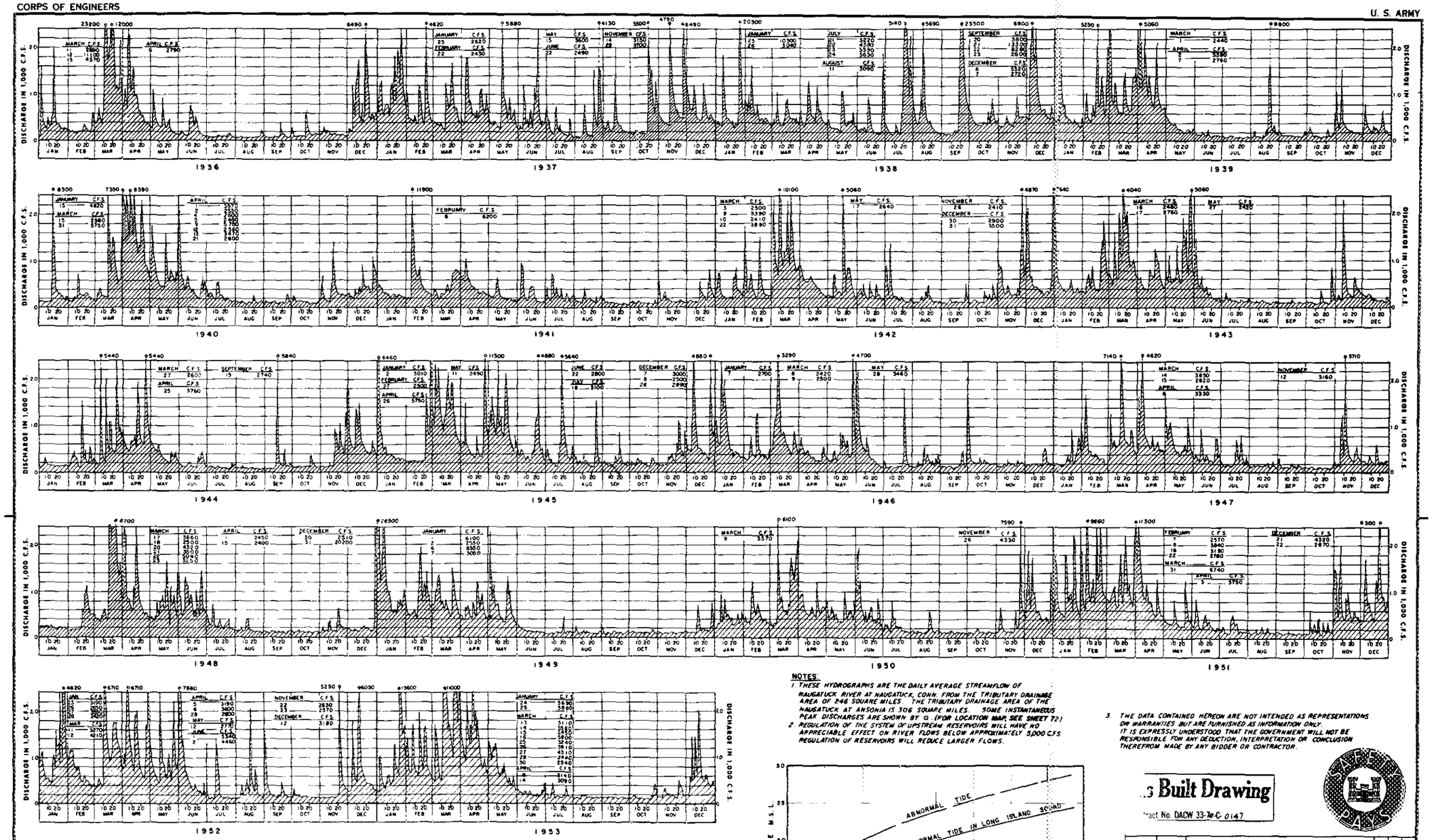
DRAWING NUMBER
HOU-15

SHEET 68

PLATE 59

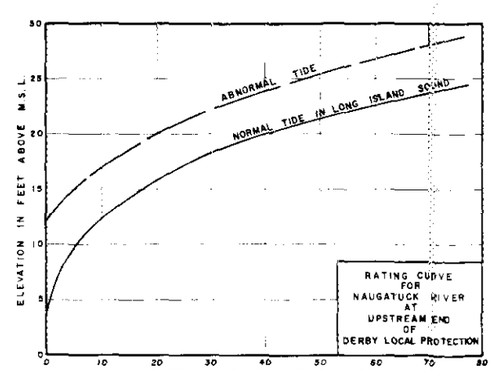
CORPS OF ENGINEERS

U. S. ARMY



NOTES:

1. THESE HYDROGRAPHS ARE THE DAILY AVERAGE STREAMFLOW OF NAUGATUCK RIVER AT NAUGATUCK, CONN. FROM THE TRIBUTARY DRAINAGE AREA OF 246 SQUARE MILES. THE TRIBUTARY DRAINAGE AREA OF THE NAUGATUCK AT ANSONIA IS 306 SQUARE MILES. SOME INSTANTANEOUS PEAK DISCHARGES ARE SHOWN BY ⊙. (FOR LOCATION MAP, SEE SHEET 72)
2. REGULATION OF THE SYSTEM OF UPSTREAM RESERVOIRS WILL HAVE NO APPRECIABLE EFFECT ON RIVER FLOWS BELOW APPROXIMATELY 5,000 C.F.S. REGULATION OF RESERVOIRS WILL REDUCE LARGER FLOWS.
3. THE DATA CONTAINED HEREON ARE NOT INTENDED AS REPRESENTATIONS OR WARRANTIES BUT ARE FURNISHED AS INFORMATION ONLY. IT IS EXPRESSLY UNDERSTOOD THAT THE GOVERNMENT WILL NOT BE RESPONSIBLE FOR ANY DEDUCTION, INTERPRETATION OR CONCLUSION THEREFROM MADE BY ANY BIDDER OR CONTRACTOR.



As Built Drawing

Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY

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

DES. BY P.L.M. | DR. BY L.A.L. | CK. BY PLM

SUBMITTED: RIVER ENGINEER

APPROVAL RECOMMENDED: CHIEF, DIV. & INVT. BRANCH

REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HYDROGRAPHS

NAUGATUCK RIVER AT NAUGATUCK

HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION

DATE MAR. 1970

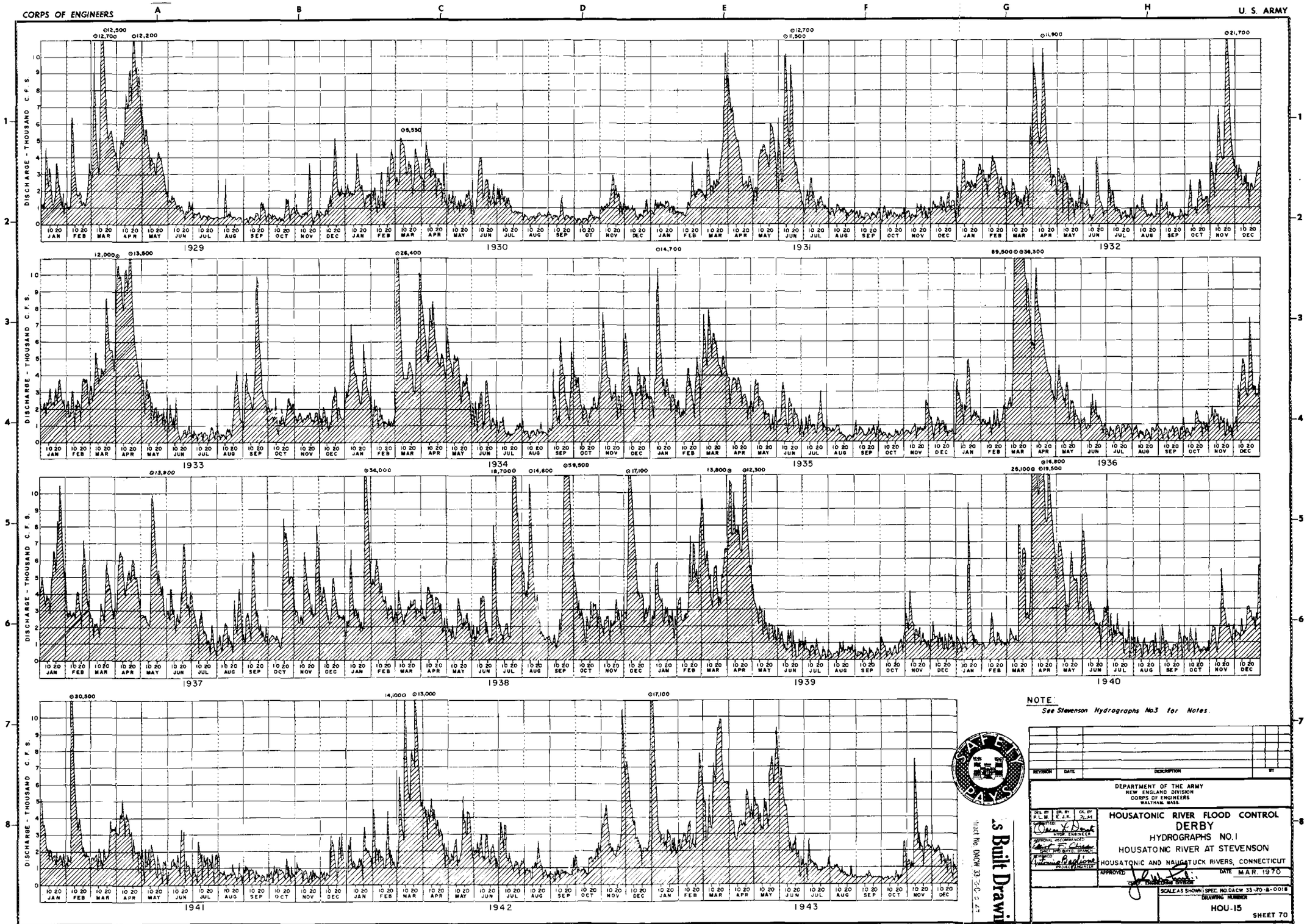
SCALE AS SHOWN | SPEC. NO. DACW 33-70-B-0016

DRAWING NUMBER HOU-15

SHEET 69

PLATE 60

CORPS OF ENGINEERS U. S. ARMY



NOTE:
See Stevenson Hydrographs No.3 for Notes.

REVISION	DATE	DESCRIPTION	BY

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

DES. BY P.L.M. DR. BY E.J.K. CK. BY

SUBMITTED: HYDR. ENGINEER
APPROVAL RECOMMENDED: CHIEF, HYD. BRANCH
REVIEWED: PROJECT ENGINEER

HOUSATONIC RIVER FLOOD CONTROL
DERBY
HYDROGRAPHS NO. 1
HOUSATONIC RIVER AT STEVENSON
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION
DATE MAR. 1970

SCALE AS SHOWN SPEC. NO. DACW 33-70-B-0018
DRAWING NUMBER HOU-15
SHEET 70

PLATE 61

As Built Drawing
Contract No. DACW 33-70-C-0-47

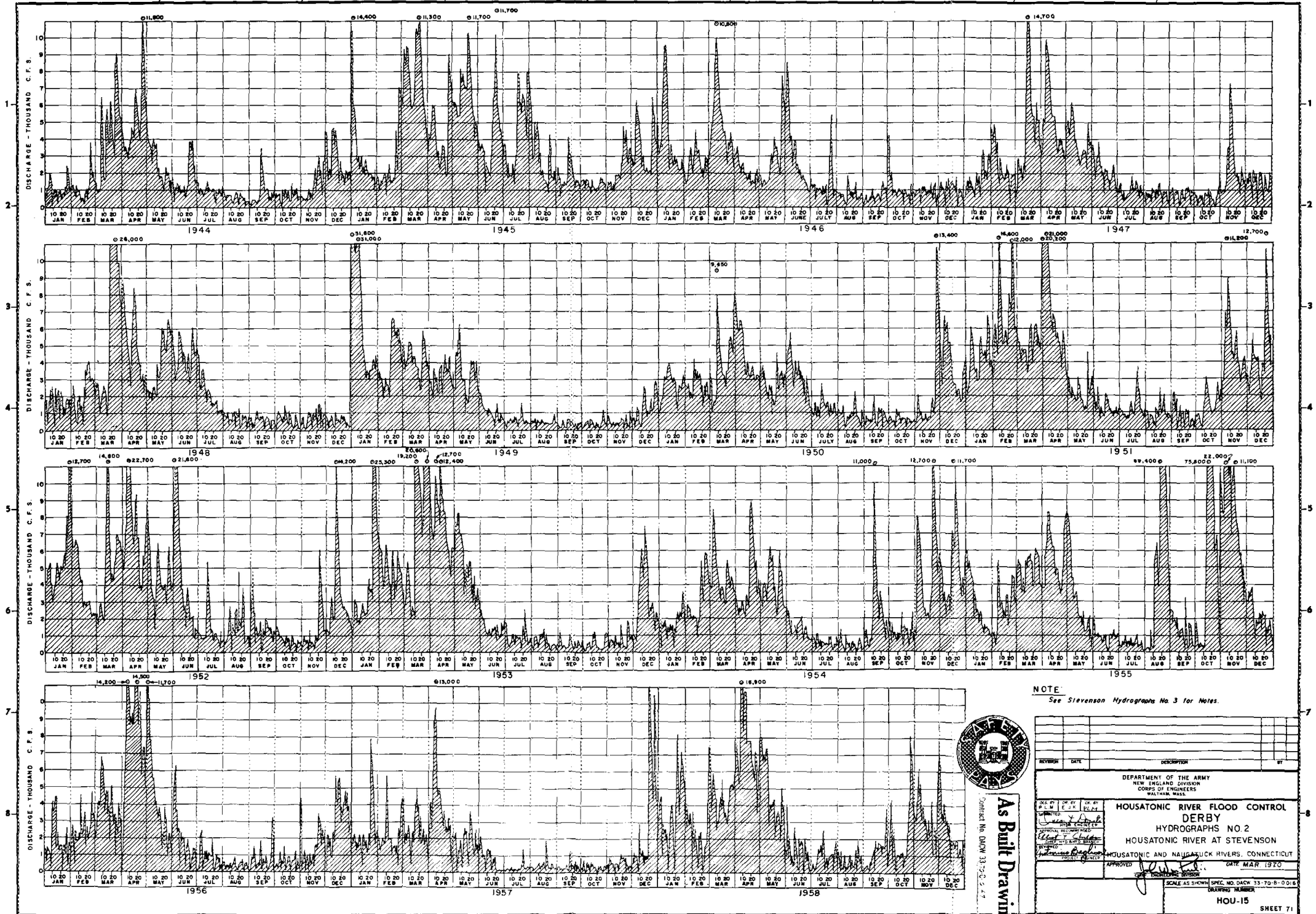
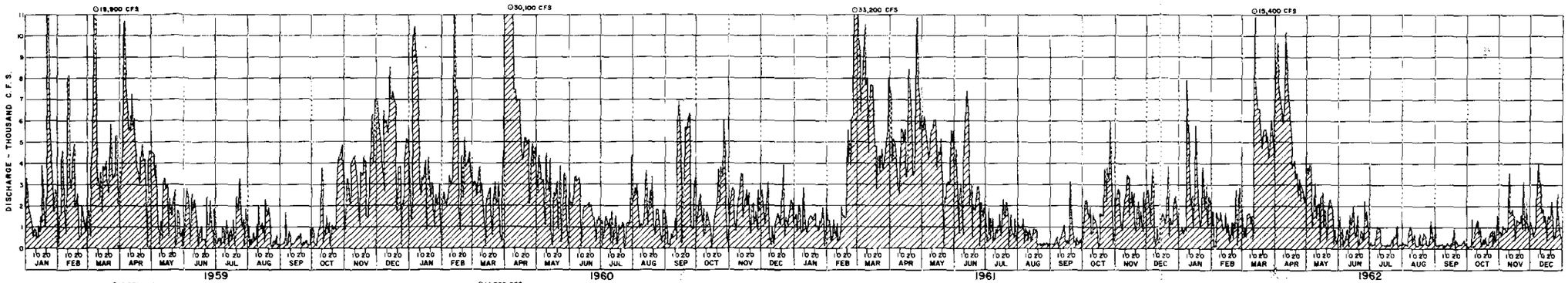
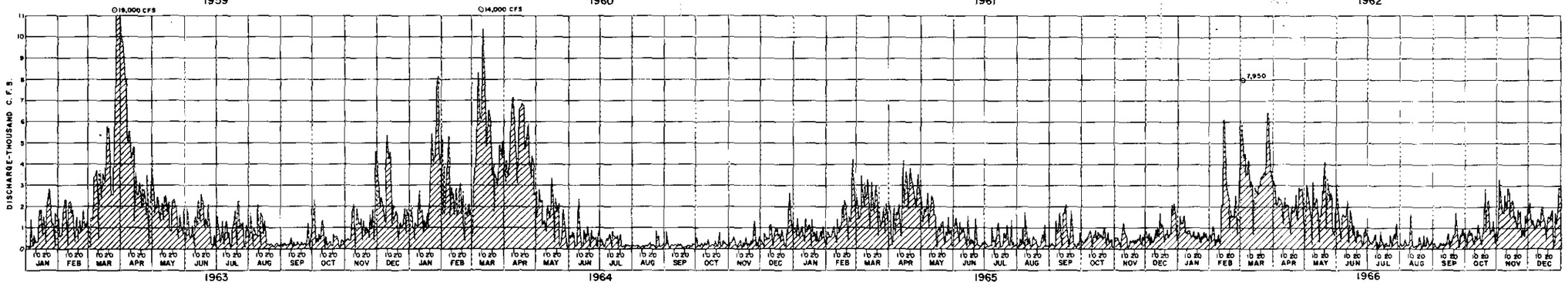
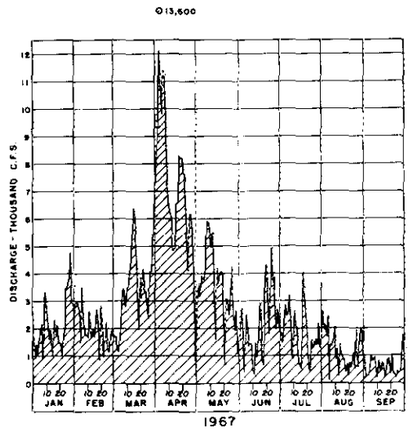

CORPS OF ENGINEERS
U. S. ARMY
DISCHARGE - THOUSAND C. F. S.
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
NOTE
See Stevenson Hydrographs No. 3 for Notes.
As Built Drawing
Contract No. DACW 33-70-C-0147
REVISION
DATE
DESCRIPTION
BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HYDROGRAPHS NO. 2
HOUSATONIC RIVER AT STEVENSON
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT
APPROVED
DATE MAR. 1970
SCALE AS SHOWN
SPEC. NO. DACW 33-70-B-0016
DRAWING NUMBER
HOU-15
SHEET 71

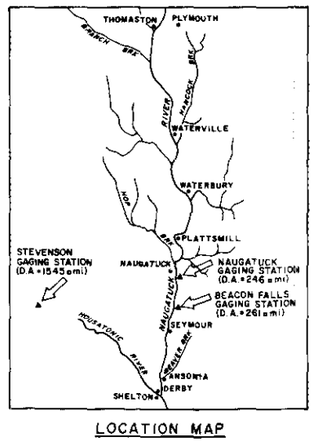
PLATE 62

CORPS OF ENGINEERS — U. S. ARMY

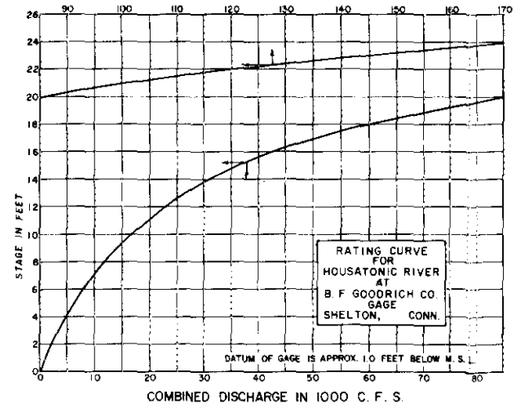








LOCATION MAP



COMBINED DISCHARGE IN 1000 C.F.S. OF HOUSATONIC AND NAUGATUCK RIVERS

NOTES

1. These hydrographs are the daily average stream flow at the Housatonic River at Stevenson Conn. from the tributary drainage area of 1545 square miles. Some instantaneous peak discharges are shown by ⊙.

2. The data contained hereon are not intended as representations or warranties but are furnished as information only. It is expressly understood that the Government will not be responsible for any deduction, interpretation or conclusion therefrom made by any bidder or contractor

As Built Drawing

Contract No. DACW 33-70-C-0147

REVISION	DATE	DESCRIPTION	BY

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

DES. BY E.P.S. | DR. BY C.T.M. | CK. BY D.L.M.

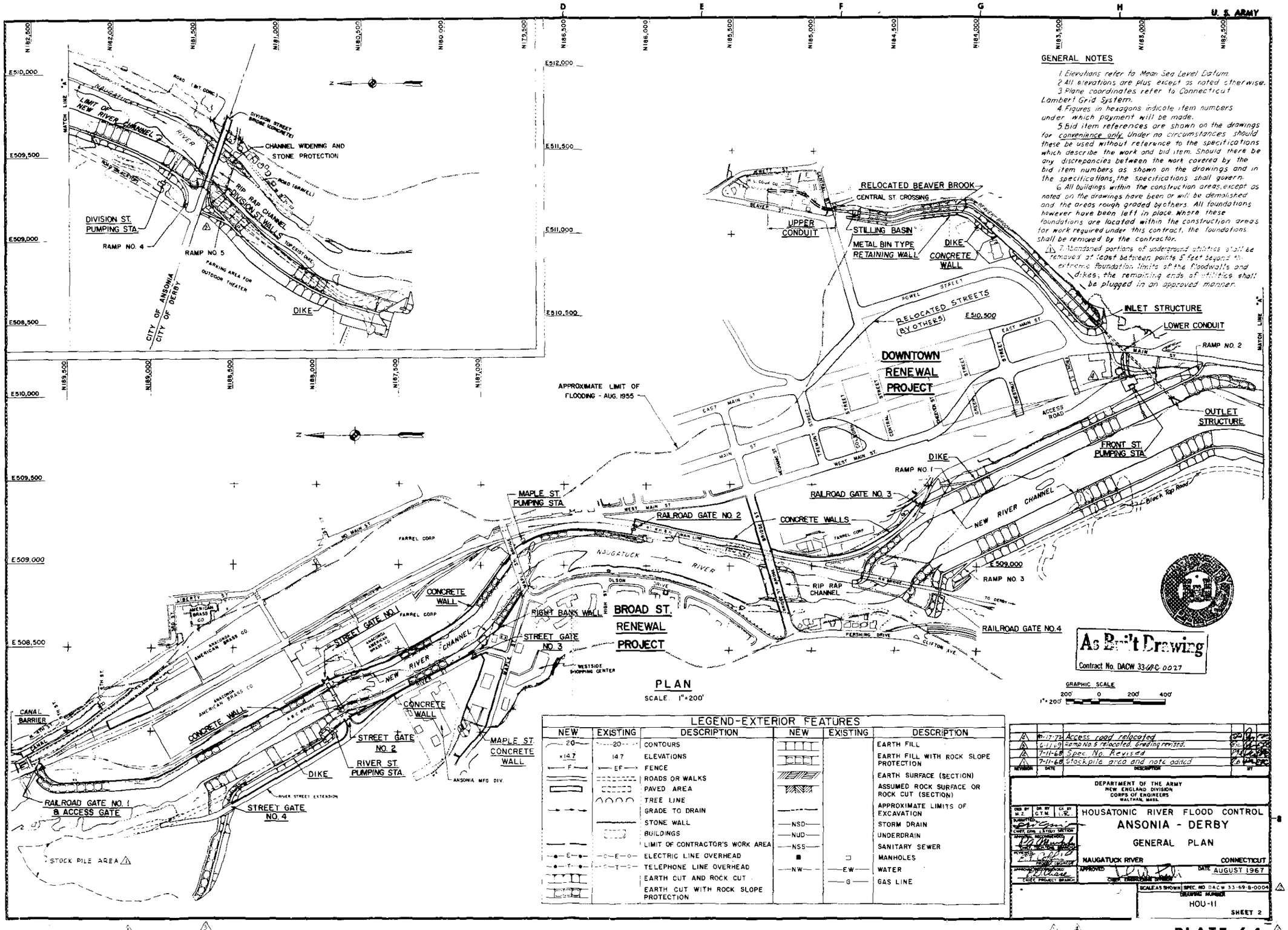
HOUSATONIC RIVER FLOOD CONTROL
DERBY
HYDROGRAPHS NO. 3
HOUSATONIC RIVER AT STEVENSON
HOUSATONIC AND NAUGATUCK RIVERS, CONNECTICUT

APPROVED — CHIEF, ENGINEERING DIVISION — DATE MAR. 1970

SCALE AS SHOWN | SPEC. NO. DACW 33-70-B-0018
DRAWING NUMBER HOU-15
SHEET 72

PLATE 63

U. S. ARMY



GENERAL NOTES

1. Elevations refer to Mean Sea Level Datum.
2. All elevations are plus except as noted otherwise.
3. Plane coordinates refer to Connecticut Lambert Grid System.
4. Figures in hexagons indicate item numbers under which payment will be made.
5. Bid item references are shown on the drawings for convenience only. Under no circumstances should these be used without reference to the specifications which describe the work and bid item. Should there be any discrepancies between the work covered by the bid item numbers as shown on the drawings and in the specifications, the specifications shall govern.
6. All buildings within the construction areas, except as noted on the drawings have been or will be demolished and the areas rough graded by others. All foundations however have been left in place. Where these foundations are located within the construction areas for work required under this contract, the foundations shall be removed by the contractor.
7. Abandoned portions of underground utilities shall be removed at least between points 5 feet beyond the extreme foundation limits of the floodwalls and dikes; the remaining ends of utilities shall be plugged in an approved manner.

PLAN

SCALE 1"=200'

As Built Drawing
Contract No. DACW 33-69-C-0027

GRAPHIC SCALE
200' 0 200' 400'
1"=200'

LEGEND-EXTERIOR FEATURES

NEW	EXISTING	DESCRIPTION	NEW	EXISTING	DESCRIPTION
20	20	CONTOURS			EARTH FILL
x14.7	14.7	ELEVATIONS			EARTH FILL WITH ROCK SLOPE PROTECTION
F	EF	FENCE			EARTH SURFACE (SECTION)
		ROADS OR WALKS			ASSUMED ROCK SURFACE OR ROCK CUT (SECTION)
		PAVED AREA			APPROXIMATE LIMITS OF EXCAVATION
		TREE LINE			
		GRADE TO DRAIN			
		STONE WALL	NSD		STORM DRAIN
		BUILDINGS	NUD		UNDERDRAIN
		LIMIT OF CONTRACTOR'S WORK AREA	NSS		SANITARY SEWER
E	E	ELECTRIC LINE OVERHEAD			MANHOLES
T	T	TELEPHONE LINE OVERHEAD	NW	EW	WATER
		EARTH CUT AND ROCK CUT		G	GAS LINE
		EARTH CUT WITH ROCK SLOPE PROTECTION			

REVISION	DATE	DESCRIPTION	BY
4	10-17-72	Access road relocated	
3	6-11-69	Ramp No. 5 relocated. Grading revised.	
2	7-11-68	Spec. No. Revised	
1	7-11-68	Stockpile area and note added	

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

HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
GENERAL PLAN

NAUGATUCK RIVER — CONNECTICUT

DATE AUGUST 1967

SCALE AS SHOWN — SPEC. NO. DACW 33-69-B-0004

DRAWING NUMBER HOU-11

SHEET 2

PLATE 64

CORPS OF ENGINEERS — U. S. ARMY

LIMIT OF CONTRACTOR'S WORK AREA

LIMIT OF CONTRACTOR'S WORK AREA

Right bank - Edge of New Channel Bottom

Right bank - Control line for Channel Bottom & Slope

Right bank & Dike

Bottom of stone protection

Limit of backfill

Discharge Pipes

Discharge conduit

DIVISION STREET WALLS

DIVISION STREET PUMPING STATION

RAMP NO. 4

RAMP NO. 5 see Sheet 42

Topsoil Seeded

Waste Fill

Landside toe of Dike

Limit of excavation El. 22.0

Match Line Sheet 16

Match Line Sheet 18

Control line for Channel bottom and slope

Slope 1 on 1.5 to existing Channel Bottom

Left bank - Limit of channel excavation

New Channel bottom

Bottom of stone protection

Berm El. 11.0

Limit of backfill

Limit of Topsoil

Existing 8" twin sewer syphon in conc. overlape

Right bank & Dike

Special Planned Structures

Double Gate 4' High

Existing 22"x30" BCCM pipe arch

Relocate sewer pipes

RIVER

As Built Drawing

Contract No. DACW 33-69-C-0027

For location of Government Field Office and area for contractors use see SK-127

NOTES

UC denotes Left Course Line.
For details of retaining walls at Division St. see Sheets 34
For Ramps No. 4&5 see Sheet 42.
For Division Street Pumping Station details see Sheets 56
For Division Street Walls see Sheet 39

GRAPHIC SCALE 1" = 40'

REVISION	DATE	DESCRIPTION	BY
		Line and grade corrections	
6	6-17-69	Ramp No. 5 relocated. Grading revised.	
5	3-25-69	Grading revised.	
4	9-27-68	Working Points revised	
3	7-11-68	Spec No Revised	
2	1-26-67	Work area revised, field office relocated	
1	1-26-67	Work limit revised, borings deleted	

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

DES. BY I.R. DR. BY J.A.M. CK. BY

SUBMITTED: CHIEF, CIVIL LAYOUT BRANCH

APPROVAL RECOMMENDED: CHIEF, ELEC. ENG. BRANCH

RECOMMENDED: CHIEF, PROJECT BRANCH

APPROVED: CHIEF, ENGINEERING DIVISION

HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY

PLAN NO. 7

NAUGATUCK RIVER — CONNECTICUT

APPROVED — DATE AUGUST 1967

SCALE 1" = 40'

SPEC. NO. DACW 33-69-B-0004

DRAWING NUMBER HOU-11

SHEET 17

PLATE 65

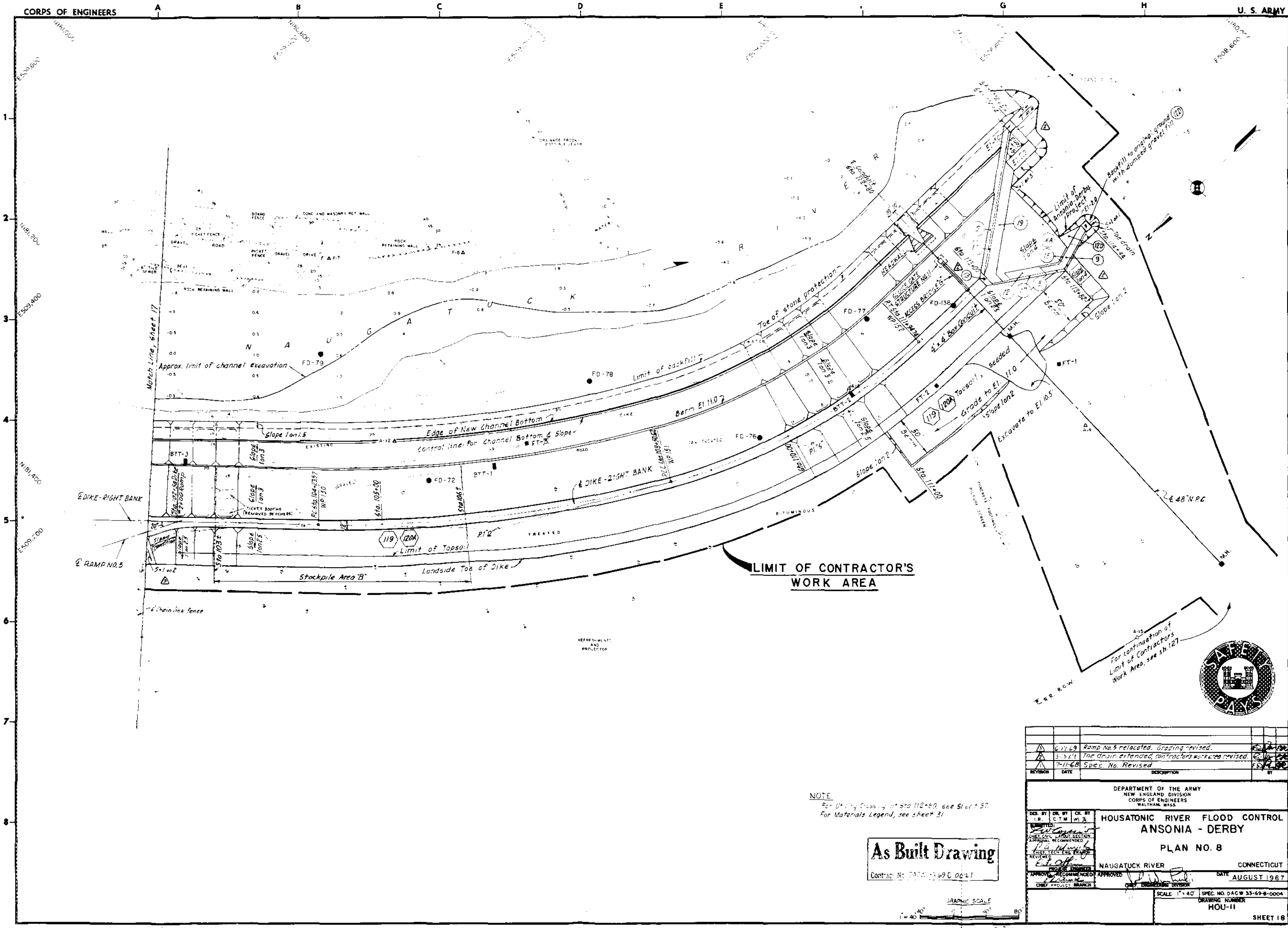
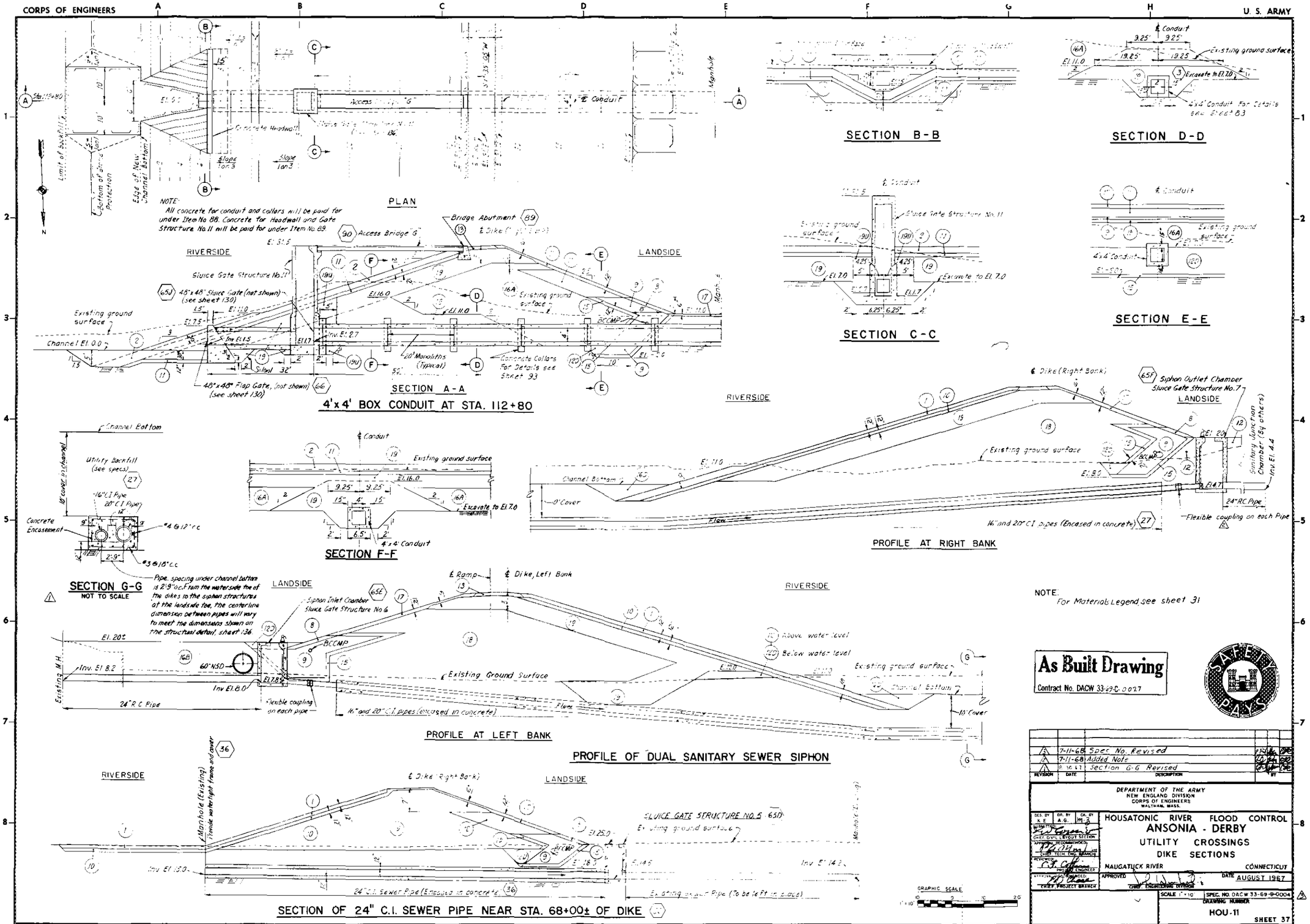

CORPS OF ENGINEERS
U. S. ARMY
Match Line, sheet 17
Approx. limit of channel excavation
NAUGATUCK RIVER
FD-79
FD-78
FD-77
FD-76
FD-72
FD-138
Limit of backfill
Toe of stone protection
Edge of New Channel Bottom
Control line for Channel Bottom & Slope
Berm El 11.0
Slope 1 on 1.5
Slope 1 on 3
Slope 1 on 2.5
Slope 1 on 2
Slope 1 on 4
Slope 1 on 5
BTT-3
BTT-1
BTT-2
FT-1
FT-2
℄ DIKE-RIGHT BANK
℄ RAMP NO. 5
Sta. 102+58 Dike = 2+00 Ramp
Sta 103±
PC Sta. 104+23.57 WP 150
Sta. 105+00
Sta 106±
PC Sta. 108+50.62 WP 151
Sta. 110+00
Sta. 111+00
PT Sta. 111+34.74 WP 152
Sta 113+00
Sta 113+82
Sta. 114+44
Ticket booths (removed by others)
Slope transition
5:1 on 2
Stockpile Area "B"
6' Chain link fence
Limit of Topsoil
Landside Toe of Dike
PI "2"
PI "5"
119
120A
Topsoil, seeded
Grade to El. 11.0
Excavate to El. 10.5
50' Berm
HEADWALL
SLUICE GATE STRUCTURE NO. 11
ACCESS BRIDGE "G"
4'x4' Box Conduit
℄ Conduit Sta 112+80
Limit of Ansonia-Derby Project
Backfill to original ground with dumped gravel fill
Toe drain
M.H.
℄ 48" N.P.C.
℄ R.R. R.O.W.
LIMIT OF CONTRACTOR'S WORK AREA
For continuation of Limit of Contractors Work Area, see sh. 127
NOTE
For Utility Crossing at Sta 112+60, see Sheet 37.
For Materials Legend, see sheet 31
As Built Drawing
GRAPHIC SCALE
1" = 40'
SAFETY PAYS
3 | 6-17-69 | Ramp No. 5 relocated. Grading revised.
2 | 3-5-69 | Toe drain extended, contractor's work area revised.
1 | 7-11-68 | Spec. No. Revised
REVISION | DATE | DESCRIPTION | BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
PLAN NO. 8
NAUGATUCK RIVER
CONNECTICUT
DATE AUGUST 1967
SCALE 1" = 40'
SPEC. NO. DACW 33-69-B-0004
DRAWING NUMBER HOU-11
SHEET 18

PLATE 66

CORPS OF ENGINEERS — U. S. ARMY



NOTE:
For Materials Legend, see sheet 31

As Built Drawing
Contract No. DACW 33-69-C-0027

REVISION	DATE	DESCRIPTION	BY
3	7-11-68	Spec. No. Revised	
2	7-11-68	Added Note	
1	8-16-67	Section G-G Revised	

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

DES. BY K.E. — DR. BY A.G. — CK. BY M.J.

HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
UTILITY CROSSINGS
DIKE SECTIONS

NAUGATUCK RIVER — CONNECTICUT

DATE AUGUST 1967

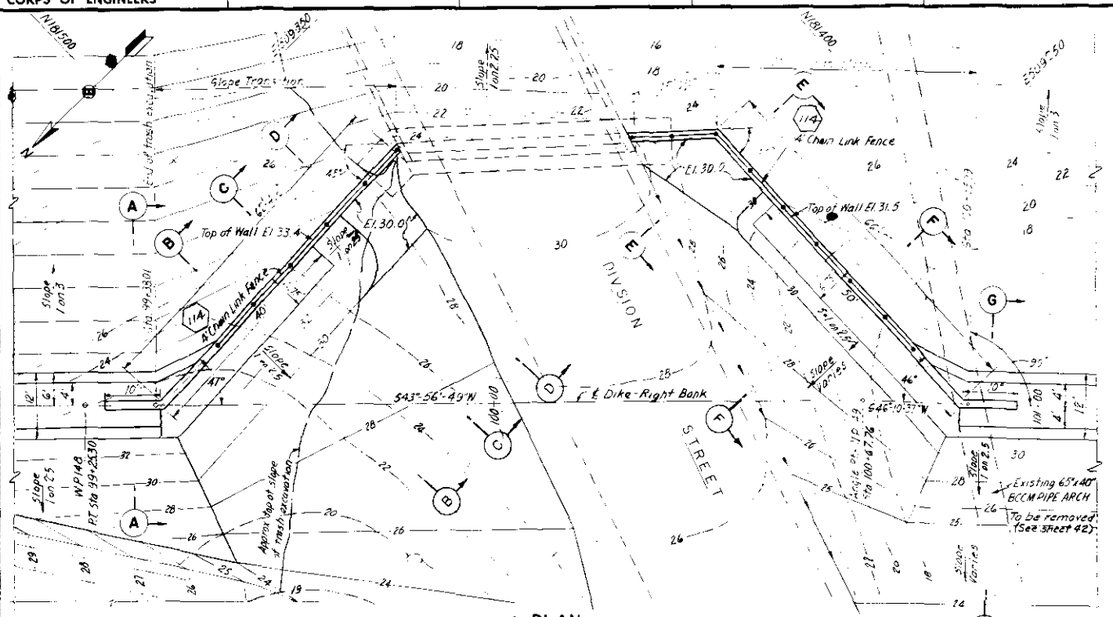
SCALE 1" = 10' — SPEC. NO. DACW 33-69-9-0004

DRAWING NUMBER HOU-11

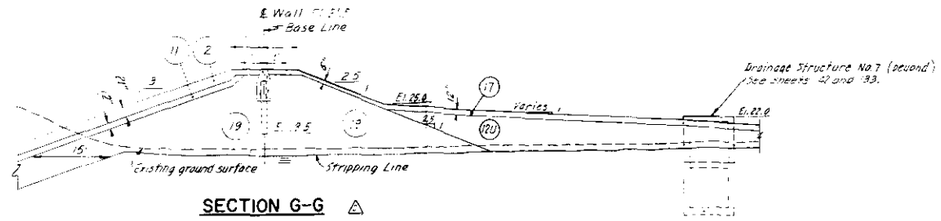
SHEET 37

PLATE 67

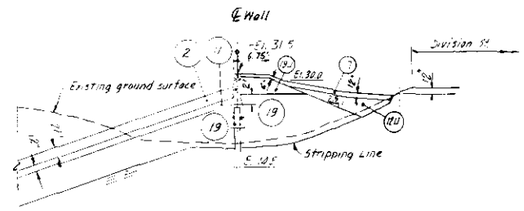
CORPS OF ENGINEERS U. S. ARMY



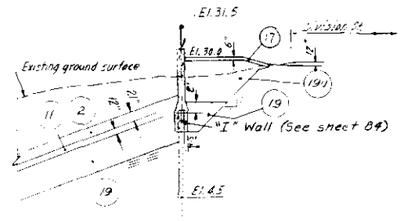
PLAN



SECTION G-G



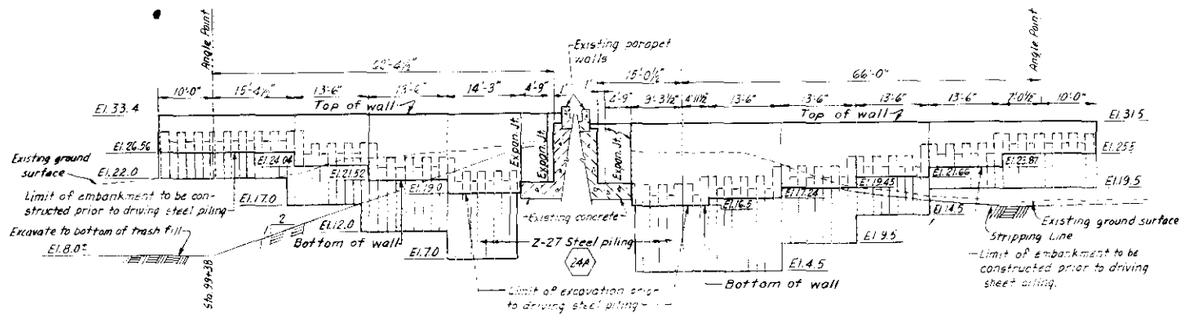
SECTION F-F



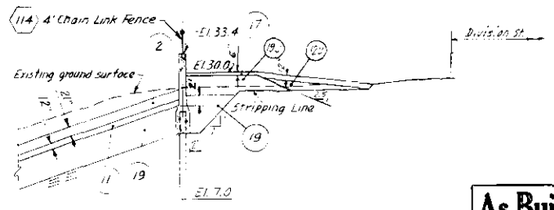
SECTION E-E

NOTES

All conc for "I" Wall will be paid for under Item No 85
For Materials Legend, see Sheet 31
For Concrete and Sheet piling Details see Sheet 84.

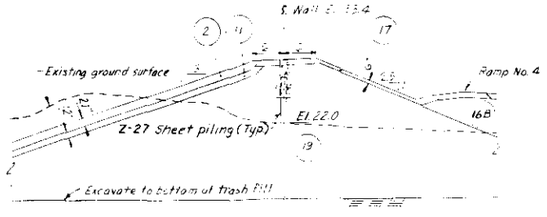


DEVELOPED ELEVATION ALONG RIVERSIDE FACE OF WALL

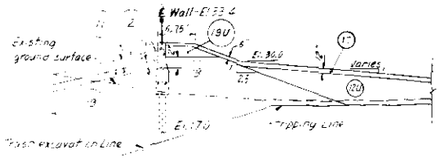


SECTION D-D

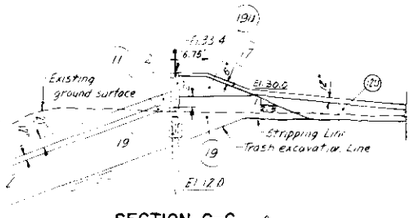
As Built Drawing
Contract No. DACW 33-69-C-0027



SECTION A-A



SECTION B-B



SECTION C-C

GRAPHIC SCALE 1" = 10'

REVISION	DATE	DESCRIPTION	BY
2	7-11-68	Plan and Sections revised. Spec. No. Revised	

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

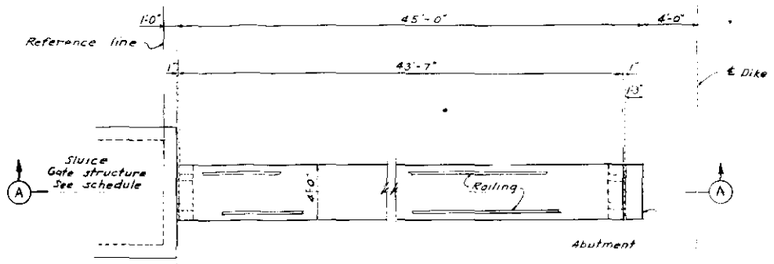
HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
DIVISION STREET WALLS
PLAN, ELEVATIONS AND SECTIONS
NAUGATUCK RIVER CONNECTICUT

DES. BY R.T.C. DR. BY B.F. CK. BY
SUBMITTED: CHIEF, CIVIL JUDICIAL SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: CHIEF, ENGINEERING DIVISION
APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION

DATE AUGUST 1967
SCALE: 1" = 10'
SPEC. NO. DACW 33-69 B-0004
DRAWING NUMBER HOU-11
SHEET 39

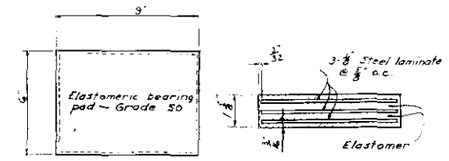
PLATE 68

CORPS OF ENGINEERS — U. S. ARMY



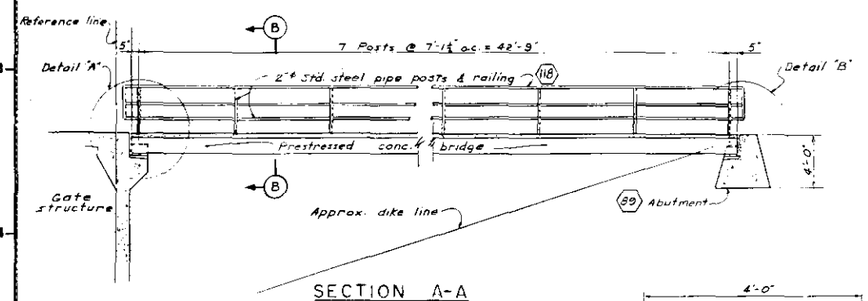
PLAN - ACCESS BRIDGE "D", "E", "F" & "G"

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



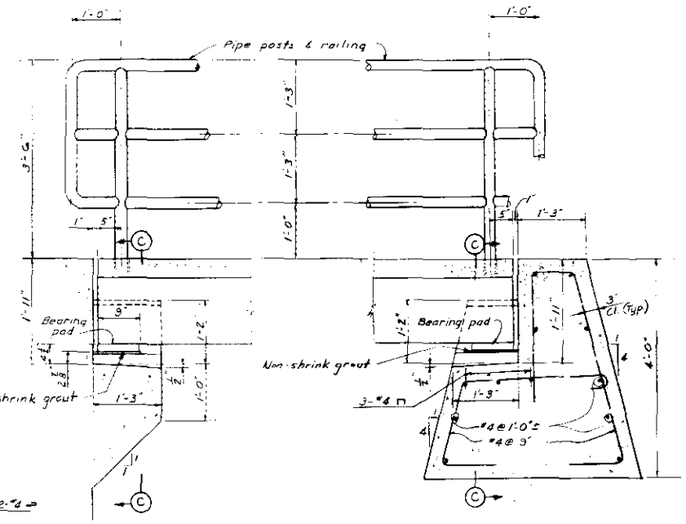
BEARING PAD DETAILS

NOT TO SCALE



SECTION A-A

SCALE 1/4"=1'-0"



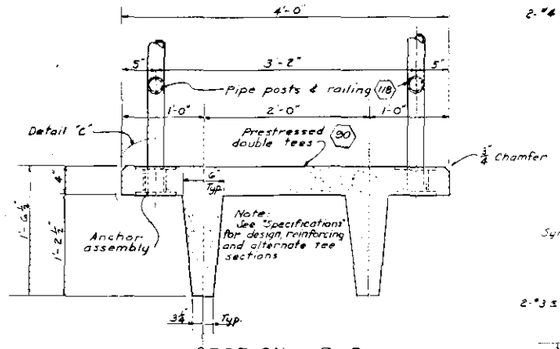
DETAIL "A"

SCALE: 1"=1'-0"

DETAIL "B"

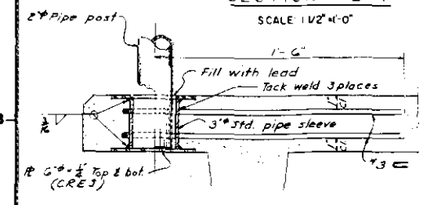
SCALE: 1"=1'-0"

SLUICE GATE STRUCTURE SCHEDULE		
GATE STRUCTURE		BRIDGE
No. 8	20" CI Sewer	D
No. 9	Front St.	E
No. 10	Division St.	F
No. 11	4'×4' Box Cond.	G



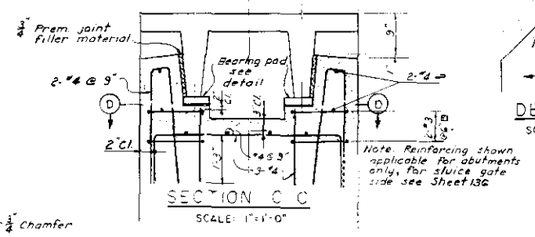
SECTION B-B

SCALE: 1 1/2"=1'-0"



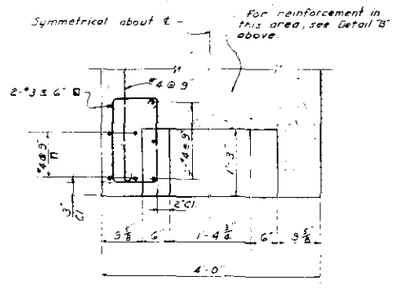
DETAIL "C"

SCALE: 3"=1'-0"

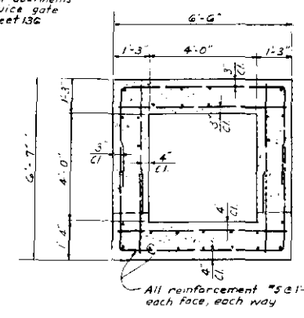


SECTION C-C

SCALE: 1"=1'-0"

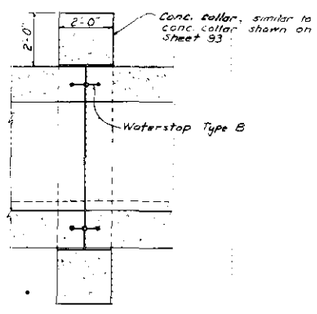


SCALE: 1"=1'-0"



CONDUIT SECTION

SCALE: 1/2"=1'-0"



CONDUIT SECTION AT JOINT

SCALE: 1/2"=1'-0"

NOTES:

1. Access bridges will be paid for under Item No. 90.
2. Steel reinforcement will be paid for under Item No. 92.
3. Concrete in conduit and collars will be paid for under Item No. 88.
4. See Sh. 43 for double tee slab required at canal barrier.

GRAPHIC SCALES

1 1/2" = 1'-0" 1 0 1 2
1" = 1'-0" 1 0 1 2
3" = 1'-0" 3 0 3 6 9
3/4" = 1'-0" 1 0 1 2 3 4
1/2" = 1'-0" 1 0 1 2 3 4
1/4" = 1'-0" 4 0 4 8

As Built Drawing

Contract No. DACW 33-69-C-0027

REVISION	DATE	DESCRIPTION	BY
1	7-11-68	Spec. No. revised.	[illegible]

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

DES. BY L.S.P. | DR. BY F.J.T. | CK. BY [illegible]

SUBMITTED: CHIEF, STRUCT. SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: CHIEF, PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
FOOTBRIDGE AND CONDUIT
REINFORCEMENT DETAILS

NAUGATUCK RIVER — CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION — DATE AUGUST 1967

SCALE: AS SHOWN | SPEC. NO. DACW 33-69-B-0004

DRAWING NUMBER HOU-11

SHEET 83

PLATE 69

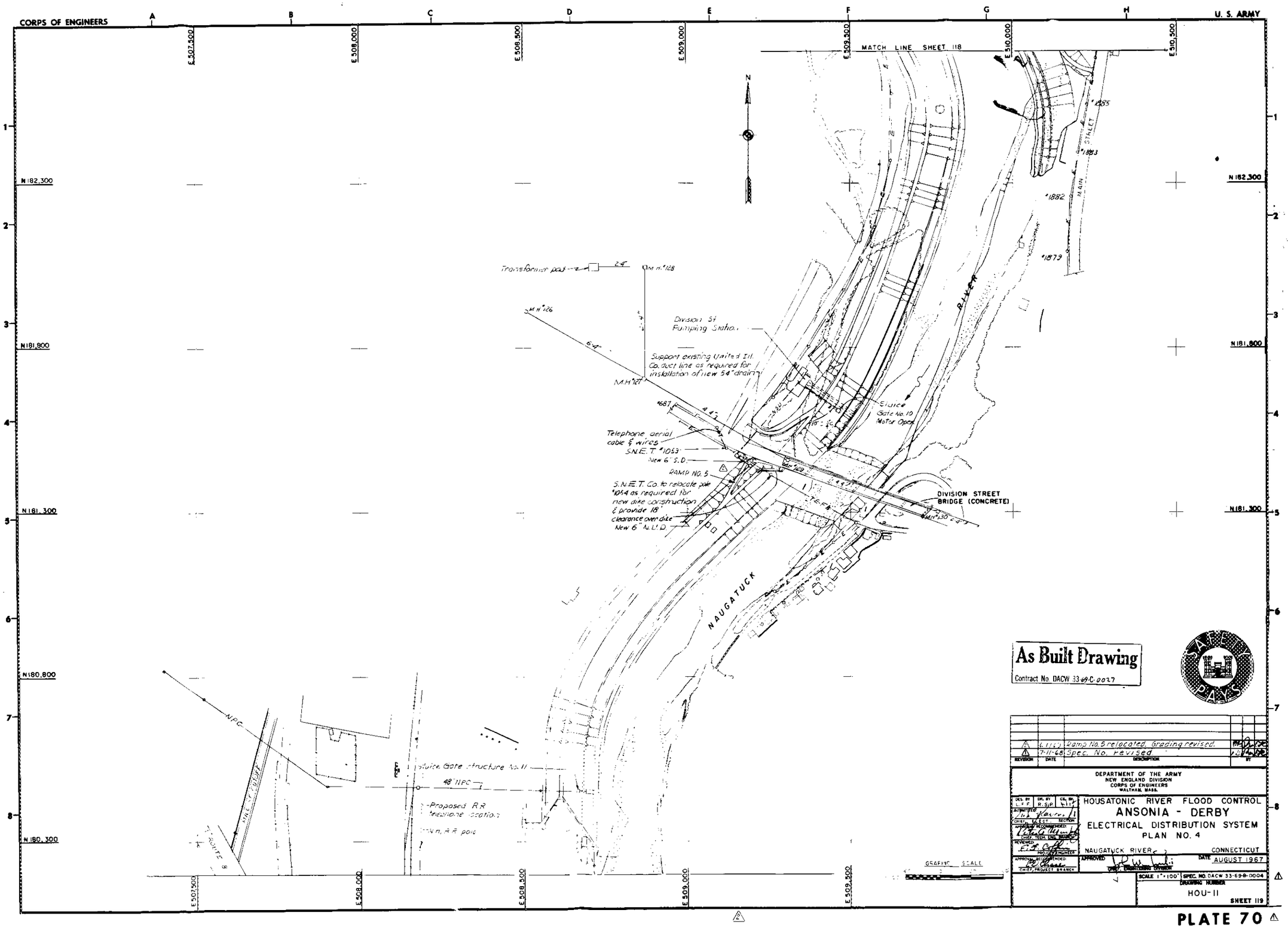

CORPS OF ENGINEERS
U. S. ARMY
MATCH LINE SHEET 118
N
N 182,300
N 181,800
N 181,300
N 180,800
N 180,300
E 507,500
E 508,000
E 508,500
E 509,000
E 509,500
E 510,000
E 510,500
MAIN STREET
RIVER
NAUGATUCK
Transformer pad
Division St Pumping Station
Support existing United Ill. Co. duct line as required for installation of new 54" drain
Telephone aerial cable & wires
S.N.E.T. #1053
New 6" S.D.
RAMP NO. 5
S.N.E.T. Co. to relocate pole #1054 as required for new dike construction & provide 18' clearance over dike
New 6" N.U.D.
Sluice Gate No. 10 Motor Open
DIVISION STREET BRIDGE (CONCRETE)
Sluice Gate structure No. 11
48" NPC
Proposed R.R. telephone location
N.H. R.R. pole
NPC
GRAPHIC SCALE
As Built Drawing
Contract No. DACW 33-69-C-0027
SAFETY PAYS
Ramp No. 5 relocated. Grading revised.
7-11-68 Spec. No. revised
REVISION DATE DESCRIPTION BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
ELECTRICAL DISTRIBUTION SYSTEM
PLAN NO. 4
NAUGATUCK RIVER
CONNECTICUT
DATE AUGUST 1967
SCALE 1" = 100'
SPEC. NO. DACW 33-69-B-0004
DRAWING NUMBER
HOU-11
SHEET 119

PLATE 70

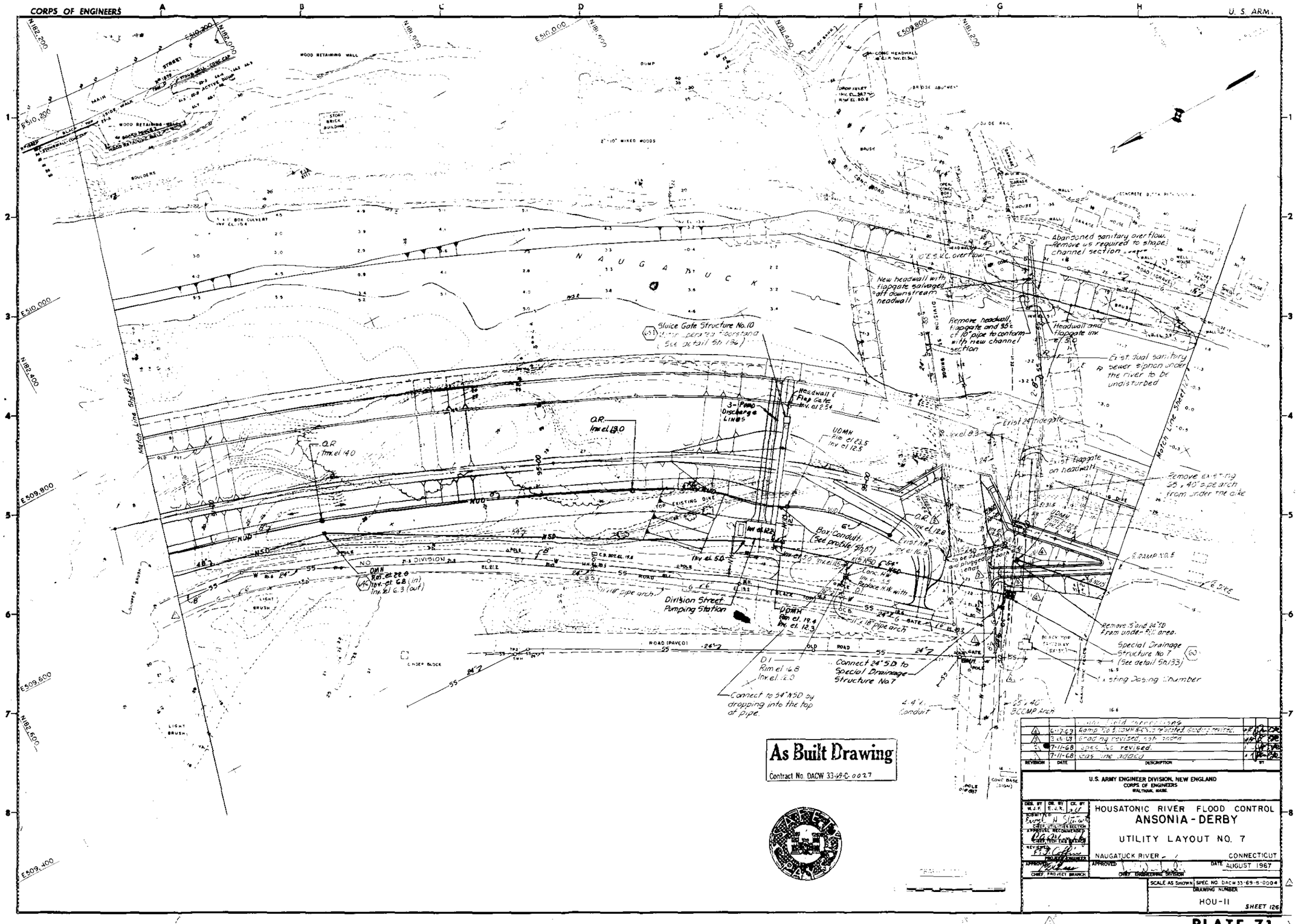

CORPS OF ENGINEERS
U. S. ARMY
NAUGATUCK
Sluice Gate Structure No. 10
Abandoned sanitary overflow. Remove as required to shape channel section
New headwall with flapgate salvaged off downstream headwall
Remove headwall, flapgate and 35± of 10" pipe to conform with new channel section
Headwall and flapgate inv. el. 5.0
Exist. dual sanitary sewer siphon under the river to be undisturbed
Exist. 24" tidegate
Exist. flapgate on headwall
Remove existing 65 x 40" pipe arch from under the dike
Headwall & Flap Gate Inv. el. 2.54
3-Pump Discharge Lines
O.R. Inv. el. 13.0
O.R. Inv. el. 14.0
UDMH Rim el. 23.5 Inv. el. 12.5
Box Conduit (See profile Sh. 57)
Division Street Pumping Station
Connect 24" S.D. to Special Drainage Structure No. 7
Connect to 54" NSD by dropping into the top of pipe
Special Drainage Structure No. 7 (See detail Sh. 133)
Existing Dosing Chamber
Remove 15" and 24" SD from under fill area.
Match Line Sheet 125
Match Line Sheet 127
As Built Drawing
Contract No. DACW 33-69-C-0027
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
UTILITY LAYOUT NO. 7
NAUGATUCK RIVER
CONNECTICUT
DATE AUGUST 1967
SCALE AS SHOWN
SPEC. NO. DACW 33-69-B-0004
DRAWING NUMBER
HOU-11
SHEET 126

PLATE 71

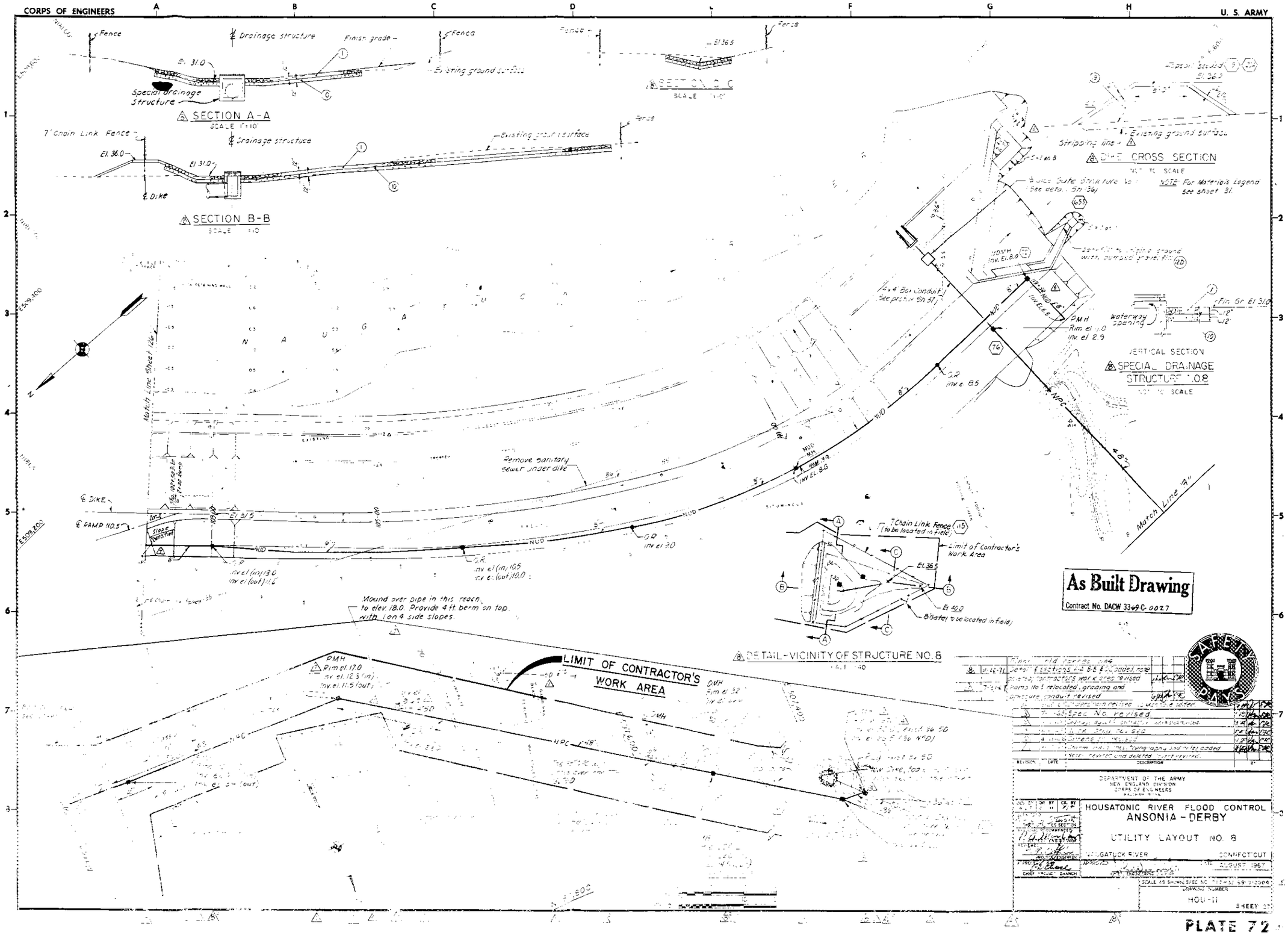
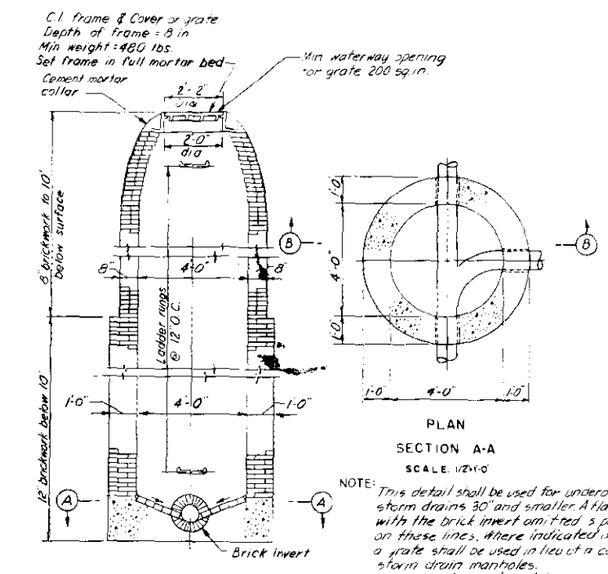

CORPS OF ENGINEERS
U. S. ARMY
SECTION A-A
SCALE 1"=10'
SECTION B-B
SCALE 1"=10'
SECTION C-C
DIKE CROSS SECTION
NOT TO SCALE
VERTICAL SECTION
SPECIAL DRAINAGE STRUCTURE NO. 8
NOT TO SCALE
DETAIL-VICINITY OF STRUCTURE NO. 8
LIMIT OF CONTRACTOR'S WORK AREA
Remove sanitary sewer under dike
Mound over pipe in this reach, to elev. 18.0. Provide 4 ft. berm on top, with 1 on 4 side slopes.
Match Line "A"
Match Line Sheet 126
As Built Drawing
Contract No. DACW 33-69-C-0027
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
UTILITY LAYOUT NO. 8
NAUGATUCK RIVER
CONNECTICUT
AUGUST 1967
HOU-11
SHEET 27

PLATE 72

CORPS OF ENGINEERS — U. S. ARMY



SECTION B-B

SCALE: 1/2" = 1'-0"

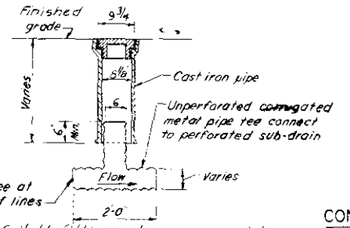
PLAN

SECTION A-A

SCALE: 1/2" = 1'-0"

NOTE: This detail shall be used for underdrains and storm drains 30" and smaller. A flat bottom with the brick invert omitted is permissible on these lines. Where indicated on the plan, a grate shall be used in lieu of a cover for storm drain manholes.
When used as a detail for a sanitary manhole the brick invert shall be provided along with ½" of cement mortar plastered to the exterior brick surface.

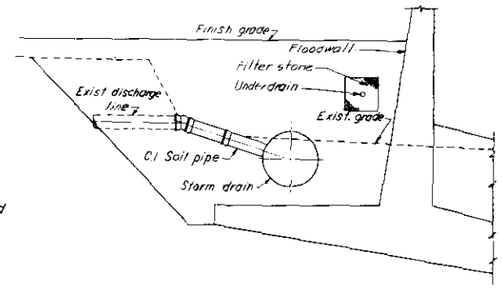
STANDARD MANHOLE
SANITARY DRAIN AND UNDERDRAIN



NOTE: Suitable fittings, adaptors or specials shall be furnished to provide for conditions of the underdrain indicated.

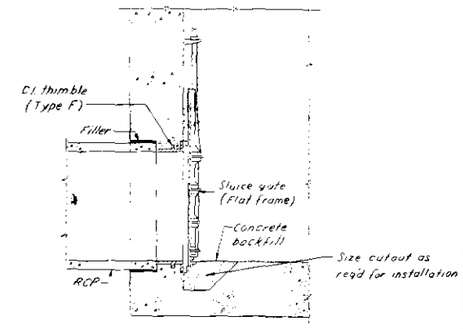
OBSERVATION RISER

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



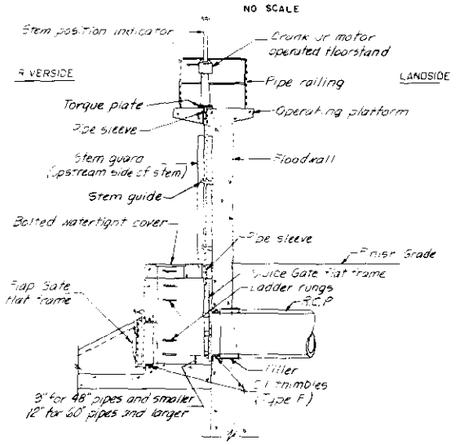
CONNECTION TO DRAINS AND BLDG. DISCHARGE LINES
CONDITION NO. 2

NO SCALE



TYPICAL SLUICE GATE INSTALLATION
FLUSH BOTTOM CLOSURE

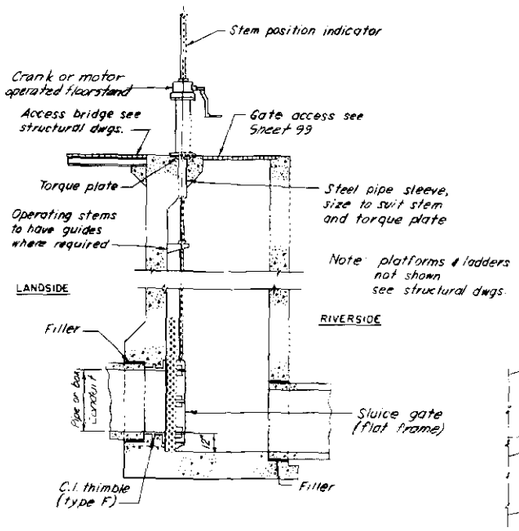
NO SCALE



NOTE: Access ladders to operating platform not shown. For other construction details see structural drawings for Sluice Gate structures.

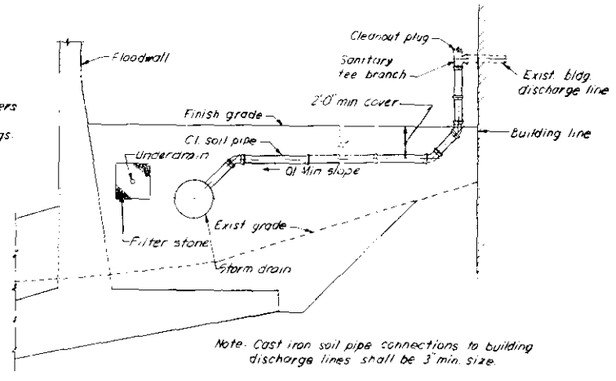
TYPICAL SLUICE GATE STRUCTURE AT FLOODWALL

NOT TO SCALE



TYPICAL SLUICE GATE INSTALLATION IN DIKE

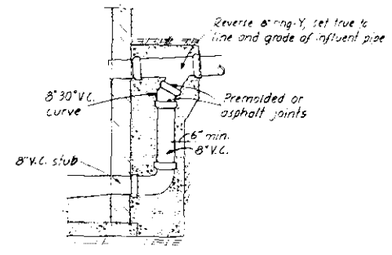
NO SCALE



Note: Cast iron soil pipe connections to building discharge lines shall be 3" min. size.

CONNECTION TO DRAINS AND BLDG DISCHARGE LINES
CONDITION NO. 1

NO SCALE



DROP MANHOLE DETAIL

NO SCALE

As Built Drawing
Contract No. DACW 33-69-C-0027

REVISION	DATE	DESCRIPTION	BY
2	3-18-69	SCHED & DRAWN - INLET DETAILS DELETED	
1	7-11-68	Spec No. Revised	

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

DES. BY W.J.F. — DR. BY R.P.C. — CK. BY
SUBMITTED: CHIEF, UTILITIES SECTION
APPROVED: CHIEF, STORE DRAINAGE BRANCH
REVIEWED: CHIEF, ENGINEER
APPROVED: CHIEF, PROJECT BRANCH

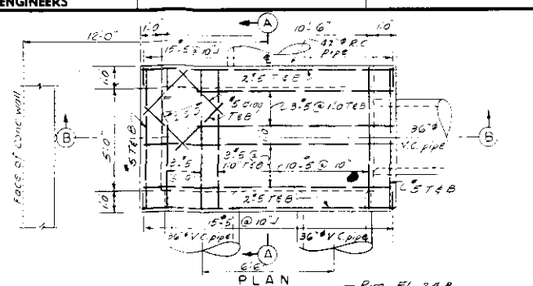
HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
UTILITY DETAILS NO. 1

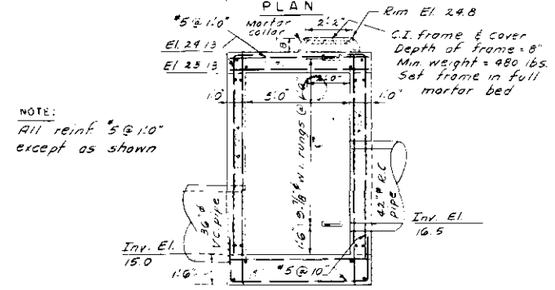
NAUGATUCK RIVER — CONNECTICUT

APPROVED: CHIEF, ENGINEERING DIVISION — DATE AUGUST 1967

SCALE: AS SHOWN — SPEC. NO. DACW 33-69-B-0004
DRAWING NUMBER HOU-11
SHEET 130

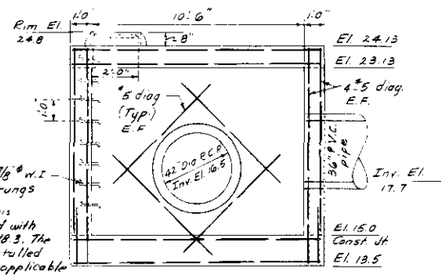
PLATE 73





NOTE:
All reinf. #5 @ 1'-0" except as shown

SECTION A-A

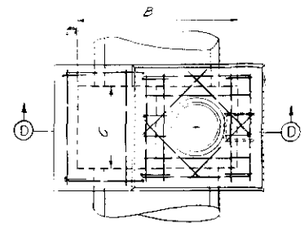


The floor and sides of this structure shall be lined with acid proof brick to El. 18.3. The brick lining shall be installed in accordance with the applicable details shown on Sh. 136 for Sluice Gate Structure No. 2.

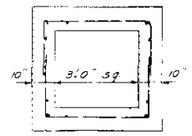
SECTION B-B

SPECIAL DRAINAGE STRUCTURE NO. 6 (59)

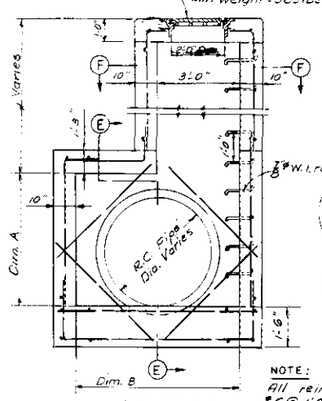
SCALE 3/8" = 1'-0"



PLAN

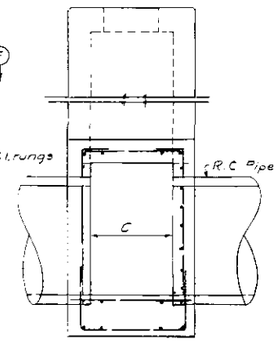


SECTION F-F



NOTE:
All reinf. #5 @ 1'-0"

SECTION D-D



SECTION E-E

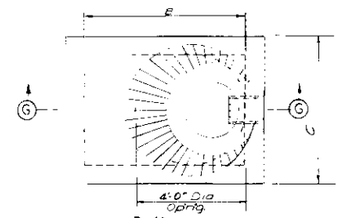
TYPICAL PRESSURE MANHOLE (74)(75)(76)(77)

SCALE 1/2" = 1'-0"

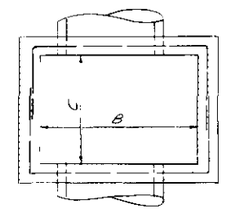
PIPE DIA.	DIM. A	DIM. B	DIM. C	
36"	3'-9"	4'-9"		SEE NOTE 1 BELOW
48"	4'-10"	6'-0"		
60"	5'-11"	7'-7"		

Notes:

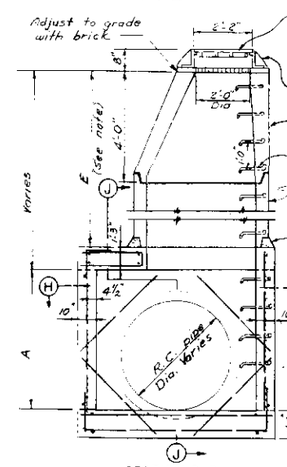
1. When pipes enter the structure and continue through the opposite wall, the dimension "C" shall be 3'-0". When pipes enter the wall and continue through an adjacent wall, the dimension "C" shall be made equal to dimension "B".
2. On drop manholes the "A" dimension will be equal to the difference in elevation between the invert of the effluent pipe and the crown of the influent pipe plus 1'-0".
3. At turning points in pipe line where, in plan view, angle of centerline intersection is more than 90°, the structure shall be skewed so that corresponding angles, in Hor. plane, between opposite wall faces and centerline of pipes shall be equal.



PLAN

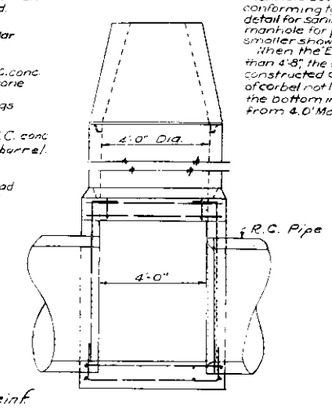


SECTION H-H



NOTE:
All reinf. #5 @ 1'-0"

SECTION G-G



SECTION J-J

Note:
It is optional to construct manhole access of brick conforming to the top part of detail for sanitary and drain manhole for pipes 30" and smaller shown on Sh. 130.
When the "E" dimension is less than 4'-8", the access shall be constructed of brick with slope of corbel not less than 4 on 1, the bottom inside dia. varying from 4.0' Max.

TYPICAL DRAIN MANHOLE FOR PIPES 36" DIA AND LARGER

SCALE 1/2" = 1'-0"

Note: Where indicated on the plans a grate shall be used in lieu of a cover. Min. Wt. = 475#. Waterpass area = 200 sq. in. min.

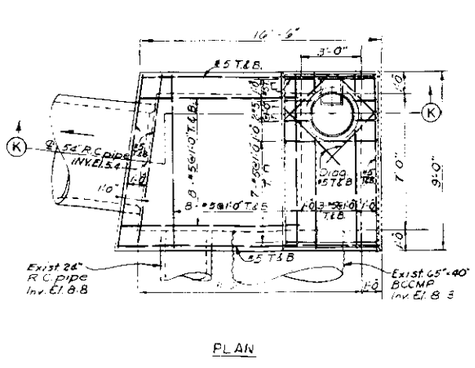
For payment item No's see utility sheets and specifications.

PIPE DIA.	DIM. A	DIM. B	DIM. C
36"	3'-9"	4'-8"	4'-0"
42"	4'-4"	5'-5"	4'-0"
48"	4'-10"	6'-0"	4'-0"
54"	5'-5"	6'-5"	4'-0"
60"	5'-11"	6'-11"	4'-0"

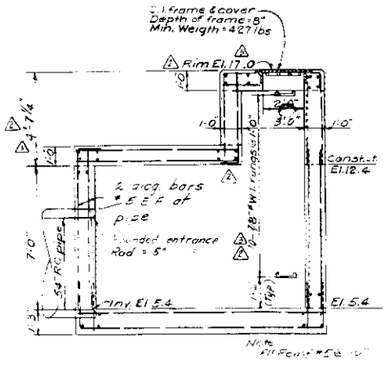
NOTE:
For drain M.H. for pipe dia. less than 36" see detail Sheet 130

NOTES:
Where acid proofing for drain manholes is indicated on the utility plan, construction data is as follows:

1. The height of acid resistant brick on the walls is indicated on the utility plans.
2. The placement of bricks on the walls, floor and around pipes shall be as shown on the details for Sluice Gate Structure No. 3 on Sh. 134.
3. The limits of the monolithic coating shall be the same as those shown for Sluice Gate Structure No. 2.



PLAN

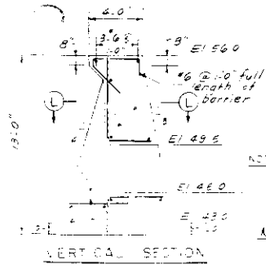


SECTION K-K

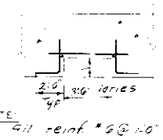
SPECIAL DRAINAGE STRUCTURE NO. 7

VICINITY DIVISION ST. PUMPING STA. (60)

SCALE 3/8" = 1'-0"



VERT. CAL. SECTION



SECTION L-L

NOTE:
All reinf. #5 @ 1'-0"

Note:
For plan and sections, see Sh. 48.

GATE OPENING CANAL BARRIER (82)

SCALE 1/4" = 1'-0"

As Built Drawing

Contract No. DACW 33-69-C-0027

GRAPHIC SCALES

1/4" = 1'-0"

3/8" = 1'-0"

1/2" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
		Final field corrections	
1	1-1-69	Section K-K, Rim El. & dimensions revised.	
2	1-1-67	Section K-K revised.	
3	7-11-68	Spec. No. revised	

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

DES. BY A.P. DR. BY A.J.Z. CK. BY J.V.M.

SUBMITTED: STAFF SECTION

RECOMMENDED: CHIEF, DESIGN SECTION

REVIEWED: CHIEF, PROJECT BRANCH

APPROVED: CHIEF, ENGINEERING DIVISION

HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
STRUCTURAL
DRAINAGE STRUCTURES NO. 1

NAUGATUCK RIVER CONNECTICUT

DATE AUGUST 1967

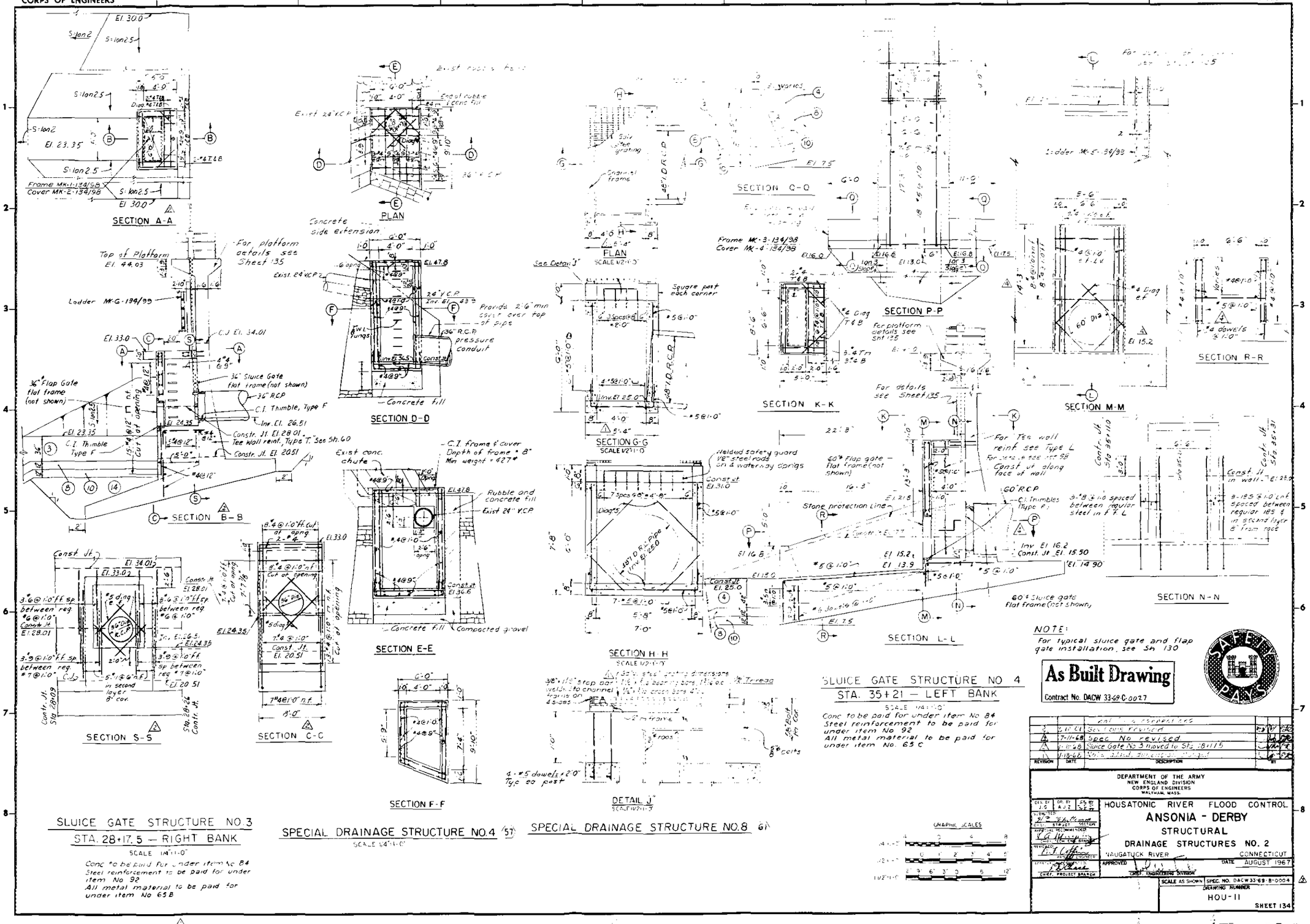
SCALE AS SHOWN SPEC. NO. DACW 33-69-B-0004

DRAWING NUMBER HOU-11

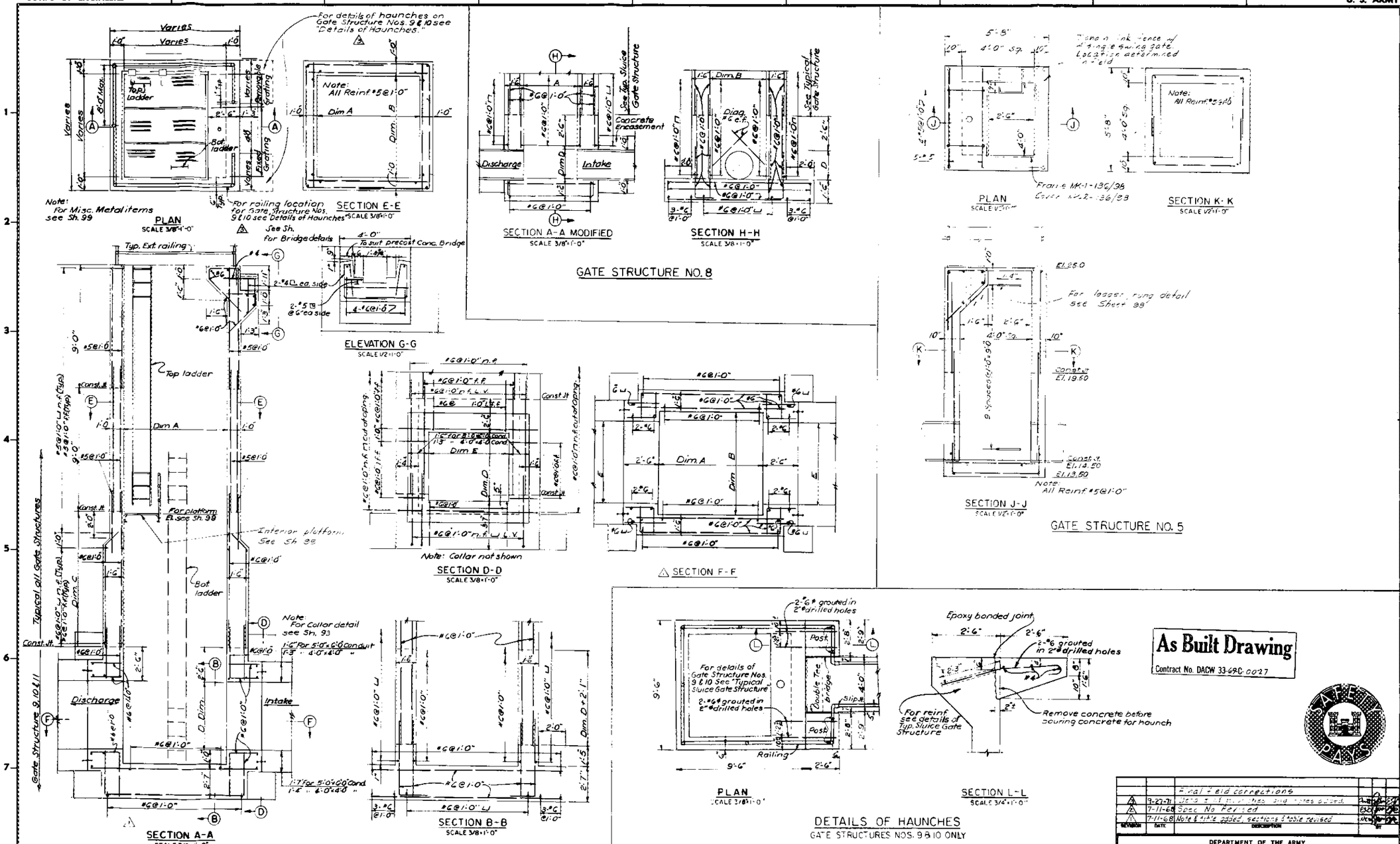
SHEET 133

PLATE 74

CORPS OF ENGINEERS — U. S. ARMY



CORPS OF ENGINEERS — U. S. ARMY



GATE STRUCTURE	EL. TOP OF STRUCT	INTAKE INV. EL.	DISCHARGE INV. EL.	DIM. "A"	DIM. "B"	DIM. "C"	DIM. "D"	DIM. "E"	ACCESS BRIDGE
NO. 5 24" C.I. SEWER	25.0	14.50	14.50	(See	Sheet	98)			
NO. 8 20" C.I. SEWER	40.0	6.15	6.15	5'-6"	4'-0"	11'-8 1/4"	1'-8 1/2"	1'-8 1/2"	D
NO. 9 (FRONT ST.)	39.3	5.65	4.65	7'-6"	7'-6"	8'-1 3/4"	5'-0"	6'-0"	E
NO. 10 (DIVISION ST.)	39.0	3.60	2.60	7'-6"	7'-6"	9'-10 3/4"	5'-0"	6'-0"	F
NO. 11 4X4 BOX COND.	31.5	2.70	1.90	5'-6"	5'-6"	4'-3 5/8"	4'-0"	4'-0"	G

Note: △ For sluice gates with flush cement closures, provide concrete backfill in the bottom of gate structure to the elevation of the invert, after installation of the gate.

As Built Drawing
Contract No. DACW 33-69-C-0027

REVISION	DATE	DESCRIPTION	BY
		Final field connections	
3	9-22-71	Gate Structure Nos. 9 & 10 notes added.	
2	7-11-68	Spec. No. Revised	
1	7-11-68	Note & title added, sections & table revised	

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

HOUSATONIC RIVER FLOOD CONTROL
ANSONIA - DERBY
STRUCTURAL
DRAINAGE STRUCTURES NO. 4
NAUGATUCK RIVER — CONNECTICUT

DES. BY A.P. — DR. BY A.J.Z. — CK. BY
SUBMITTED: CHIEF, STRUCT. SECTION
RECOMMENDED: CHIEF, DESIGN BRANCH
REVIEWED: CHIEF, ENGINEERING DIVISION
APPROVED: CHIEF, PROJECT BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION
DATE AUGUST 1967

SCALES AS SHOWN — SPEC. NO. DACW 33-69-B-0004
DRAWING NUMBER HOU-11
SHEET 136

PLATE 76