WATER RESOURCES DEVELOPMENT PROJECT

OPERATION AND MAINTENANCE MANUAL

FOR

SAXONVILLE LOCAL PROTECTION PROJECT
FRAMINGHAM, MASSACHUSETTS

SUDBURY RIVER

COMPLETED PROJECT

NEW ENGLAND DIVISION
WALTHAM, MASS.

SEPTEMBER 1979

OPERATION AND MAINTENANCE MANUAL

FOR

FLOOD PROTECTION WORKS

ON

SUDBURY RIVER

AT

FRAMINGHAM, MASSACHUSETTS
(SAXONVILLE)

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
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OPERATION AND MAINTENANCE MANUAL
FLOOD PROTECTION WORKS
FRAMINGHAM (SAXONVILLE), MASSACHUSETTS

FOREWORD

The successful functioning of the Saxonville flood protective works is not assured solely by construction of the system of dikes and floodwalls, channel improvements, and pumping station. 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.

OPERATION AND MAINTENANCE MANUAL

for

LOCAL PROTECTIVE WORKS

at

Framingham (Saxonville) Massachusetts

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A. GENERAL

1. PURPOSE 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 Saxonville 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.

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 31 December 1974 furnished to the Government by the Commonwealth of Massachusetts and assurances dated 25 June 1975 furnished by the town of Framingham. The Commonwealth of Massachusetts and the town of Framingham have agreed to meet these conditions, and in particular, the operation and maintenance of the project after its completion. A copy of the above assurances is included in Appendix "D" of this Manual.

2. PROJECT AUTHORIZATION. The Saxonville Local Protection Project plans and specifications were approved by the Chief of Engineers on 12 May 1975. The project was authorized by Congress in the 1966 Flood Control Act.

3. PROJECT LOCATION. The Saxonville local protection project is located on the left bank of the Sudbury River in the town of Framingham, in the section called Saxonville, and extends from the Saxonville Pond Dam at Central Street to the Danforth Street Bridge, a distance of about 3,800 feet.

4. DESCRIPTION OF PROJECT. Project features consist of about 2,500 feet of earth dikes, 1,340 feet of concrete floodwalls, 1,000 feet of channel realignment, a pumping station, a vehicular flood gate, interior drainage and other appurtenant works.

5. EFFECTIVENESS OF PROTECTION. The protective works on the Sudbury River was designed for a Standard Project Flood.

6. CONSTRUCTION HISTORY. The construction of the Saxonville Local Protection Project was accomplished under one construction contract awarded in the amount of $2,940,036.00 to Hanover Contracting Company, Inc. of Malden, Massachusetts. Notice to proceed with the work was given on 1 March 1977 and the project was placed in operation September 1979.

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 town of Framingham.

8. LOCAL COOPERATION. The authorizing legislation for the Saxonville project was the Flood Control Act of 1966, approved 7 November 1966, Public Law 89-789, 89th Congress, 2d Session and reads as follows:

"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 areas, pumping station, and drainage system;

"b. Hold and save the United States free from damages due to the construction works; except damages which are attributable to the fault or negligence of the United States or its contractors;

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

"d. Provide without cost to the United States all alterations and replacements of existing utilities, including bridges, highways, sewers, and railroad modifications and relocations other than bridges and bridge approaches, which may be required for the construction of the Project;

"e. Prescribe and enforce regulations to prevent encroachment on both the improved and unimproved channel through Saxonville; and

"f. Prohibit encroachment on ponding areas and, if the capacity of these areas is impaired, promptly provide substitute ponding capacity or equivalent pumping capacity without cost to the United States."

The assurances of the town of Framingham are contained in Appendix "D" of this manual. This manual is to assist the town of Framingham in fulfilling the above 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 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 town 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 committe shall be composed of competent members, preferably persons 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."

The town of Framingham shall procure approximately 2,500 grain or feed type bags, 200 cubic yards of sand for these bags and an adequate number of tools such as picks and shovels. Sufficient personnel shall be designated to implement the filling and placing of these sand bags in order to control sand boils and seepage behind the dikes and walls. Sand, bags and tools shall be stored in a central location with the sand stored separately. Borrow pits for embankment materials shall be

secured and sources of additional supplies of materials shall be established in order that these articles can be obtained quickly in case of emergency.

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

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

"(5) No improvement shall be passed over, under, or through the walls, 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 District 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 District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work."

Any contemplated improvements or alterations as outlined above must be submitted to the Corps of Engineers, Waltham, Massachusetts, and the approval of the Division Engineer obtained prior to the town 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 town 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 town shall furnish the Division Engineer as-built drawings, in sextuplicate, of the completed work.

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

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

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

The Division Engineer or his representatives will make periodic inspections of the protective works to determine if the project is being properly maintained and operated by the town. "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 town of Framingham for appropriate action.

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

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

"(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project 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 town 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 town'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 Government and turned over to the town of Framingham. If the work is neglected there will be deterioration and possible failure during a potential flood when there is 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 need.

c. Maintenance includes regular inspection of the entire system. The purpose of an inspection is to detect any deterioration of faulty operation that indicates a need for repair or replacement. Inspection should be accomplished by persons walking from one extreme of the system to the other and visually inspecting each feature at close quarters.

d. In addition to inspection, sluice gates, pumping station equipment and street gates require testing at stated intervals to insure proper operation of all components.

e. During the winter months it may be necessary to inspect certain project features in order to insure 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 potential problems. This list should provide that:

(1) Pumping station gates are free of ice and debris.
(2) Conduit and drainage structures, entrances and openings are free of debris, leaves, snow and ice.
(3) Sluice gate structures are accessible.
(4) Street gate structure is free of ice and debris.

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 outlines herein under Appendix "B" will be sufficient to insure protection from floods to the design stage. However, advice relative to operation may be obtained, during working hours, 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 town of Framingham in the operation of the project. This in no way lessens the responsibility of the town of Framingham in operating the project.

c. When high river flows and stages are expected it is important that the Superintendent make immediate decisions, take prompt action and 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; (5) Know what men and tools can be mobilized for the patrolling and repair work.

e. Arrangements should be made with the National Weather Service in Boston, Massachusetts to keep the town informed on storm warnings.

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 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, Attention: Project Operations 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 but the inclusion of such data is not required.

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

B. CHANNEL IMPROVEMENT

13. DESCRIPTION. The channel improvement covers the relocation and straightening of the Sudbury River between the Penn Central and Danforth Street Bridges. The new trapezoidal channel has a 60-foot bottom width and excavation averaged about 6 feet.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Rules and instructions for emergency 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 left bank of the Sudbury 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. Some Class I stone protection was placed along the land side toe between Stations 6+70 and 34+00 ± to control seepage emerging from the foundation toe drains. The thickness of the stone protection varies as required by the various velocities in the channels. The land side slopes and the river side slopes are 1 on 2.5 from Sta 6+70 to 18+90 and 1 on 2 downstream from Sta 23+80 to 34+80.

17. MAINTENANCE. Paragraph 208.10(b)(1) of 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 Saxonville 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.

"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 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 an observation riser or manhole. 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, by excavation or by replacement. For other runs, inspection shall be as outlined in paragraph 21 when the river is at least five feet above 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) . . . NA . . .;

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

"(x) There is no unauthorized . . . vehicular traffic on the levees;

"(xi) 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	Percentage by Weight In Mixture	Minimum Percentage Purity	Minimum Percentage Germination
For slopes graded at the rate of 4:1 and steeper.			
Creeping Red Fescue	50	95	85
Kentucky 31	30	95	85
Red Top	5	92	85
Ladino Clover	5	96	85
Domestic Rye	10	98	90
For all other grass plots.			
Creeping Red Fescue	50	95	85
Kentucky Blue	25	90	85
Domestic Rye	10	98	90
Red Top	10	92	85
Ladino Clover	5	96	85

Note: Weed seed shall not exceed 1.0% of total mixture by weight.

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. All observation risers shall be properly maintained.

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 Saxonville 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 river and/or brook 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 and the constriction should be cleaned out.

The water level in observation risers shall be recorded at least twice daily to determine proper functioning of the underdrains whenever the river rises 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 combating 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 slopes of the dikes. 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 attached 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 the 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 one 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 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 sack 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, willhold 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. The floodwalls are Type "I," "L" and "T" of reinforced concrete construction with waterstops at all joints. Only the upper parts of the walls are visible since the fill and drainage materials placed on both sides of the wall have been backfilled 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 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. 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

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 gravity conduit, special drainage structures and standard underdrain, drain and sewer manhole structures not included as a sluice gate structure. The sluice gate structures are provided with gates, access covers, ladders, pipe railings, etc. as applicable to make a reliable, workable and complete installation.

a. Pertinent Data

(1) Sluice Gate Structures

Intake Structure	48" x 72"	Manually Operated
Gravity Structure	48" x 48"	Manually or Electrically Operated
Pumping Station	2 36" x 42"	Manually or Electrically Operated
(2) Flap Gate: (Danforth St)	12"	

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

c. Sluice Gate Operation. Sluice gate can be manually or electrically operated as stated above. The design of the project is such that the gate in Gravity Conduit Structure will be required to be closed in time of flood control operations. Intake Gate Structure will be required to be closed as stated in Appendix B.

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, driftwood, or debris is not allowed to accumulate near drainage structures. Gates at drainage

structures shall be examined, greased, 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."

Location where storm drain effluents are discharged should be examined periodically to insure that there is no problem occuring.

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.

Flap gate shall be inspected to make sure no debris is building up behind valve which would prevent it from closing properly during flood periods.

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.

Refer to Rodney Hunt Instruction Manual for recommended maintenance requirements for sluice gates and gate operators.

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. Manually operated gates 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 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 the 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 gates shall be thoroughly cleaned and equipment thoroughly inspected, oiled and greased. A record or log of operation shall be kept for each operation, a copy of which shall be furnished the Reservoir Control Center following each flood.

Refer to Rodney Hunt Instruction Manual which was supplied the city for operating instructions for the gates.

F. PUMPING STATION

27. DESCRIPTION. The purpose of the pumping station, constructed by the Corps of Engineers in the town of Saxonville, is 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, steel discharge elbow, steel pump bowls, steel suction bells, stainless steel impellers, stainless steel pump shafts, and bronze bearings. Each pump is provided with an electric motor operated centralized lubrication system. The station is provided with other facilities, such as louvers, sluice gates, vent fan, sump pump, etc., to make a reliable, workable and complete installation.

a. Pertinent Data - Saxonville Pumping Station.

(1) Drainage Area - 35 Acres

(2) Pumping Station

Number of Pumps	2
Capacity (each)	10,500 gpm 17.0′ Static Head
Horsepower	113
Building Size	17′-8" x 25′ -0"

(3) Ponding Area 1.3 acre-feet at elevation 121 feet msl

b. Pumping Station. The station is located behind the dike. The outside dimensions of the brick and concrete structure are 26′ -0" x 25′ -0". The intake chamber is 4′ -0" wide, while the gravity flow discharge is in a 4′ -0" wide chamber leading to a 48" gravity conduit pipe.

Pumped flood discharge enters the station sump from the intake chamber through two 36" x 42" gated openings and will be discharged over the dike through two (2) 18" discharge pipes.

(1) Pumping Equipment. Two pumps are provided, with each pump having a capacity of 23.3 cfs (10,500 gpm), two-thirds of the required station capacity, against a 17′ static head. Each pump is driven by a diesel engine through a right angle gear unit. The pumps are vertical,

fixed blade, propeller type of standard construction using steel columns, discharge elbows, pump bowls and suction bells, stainless steel impellars, stainless steel pump shafts and bronze bearings. Each pump is provided with an electric motor operated centralized lubrication system. Each pump is capable of operation against all river stages up to the top of the dike. Each pump discharges over the top of the dike. Two sluice gates, one located in front of each pump, will seal off the pump station 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.

(2) Sluice gates. Each sluice gate at the pumping station is a seating pressure type of standard cast iron construction with bronze seals. Floor stands have been installed for operation of each gate. Each sluice gate can be manually or electrically operated.

(3) 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.

(4) Heating. The pumping station is equipped with an oil fired, forced warm air furnace, thermostatically controlled to maintain an inside temperature of 55°F. The furnace shall be maintained operational to insure that this minimum temperature is maintained in the pumping station throughout the year. In addition, a humidistat overrides the thermostat to operate the heater as necessary to maintain the relative humidity at not higher than 50%.

(5) 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.

(6) Water level indicators. Indicators for both the station sump and the river water levels are provided. An alarm will sound when the water level in the sump drops to a depth of 3 feet (el. 118.) and the pumps will automatically shut off when the water drops to a depth of 2 feet (el. 117.)

(7) Electric service. Electric service is obtained from the Boston Edison Company. Service is 120/208 V, three phase, 4 wire. The service is extended from existing lines along Watson Place and run underground along the new access road to the station. All interior conductors have heat and moisture resisting type insulation and are installed in rigid steel conduit. Conduit has been installed for use by New England Telephone Company for providing future telephone service.

(8) Emergency electric service. A 10 KW emergency generator is available to supply power for operation of all lights and electrical equipment in the pumping station. The unit is equiped with manual electric starting.

28. MAINTENANCE

a. Regulations. Paragraph 208.10 (f)(1) of the prescribed regulations governs the maintenance of the pumping station, "Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for diesel powered equipment, and flashlights or lanterns for emergency lighting shall be kept on hand at all times. An empty conduit has been provided at the station so that telephone service can be provided by the town at the pumping plant. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Meggar 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: Project Operations 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 emergeny. 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 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 under load. 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, it will be required to fill the station sump with water and then install the 1/4" steel blind plate, which was supplied the city, onto one of the 18 inch discharge pipes. This is accomplished by disconnecting one the dresser style couplings in the valve pit and inserting the blind plate in this location. The corresponding 14" knife valve now must be opened. The pump unit can now be operated by recirculating the water into the station sump. After the first pump has been tested the blind plate can be transferred to the second discharge pipe and this pump unit tested.

An alternative method for testing the diesel engines and pumps would be to schedule testing during periods of high river flow. If the river is between elevations 119 and 120 then the gravity sluice gate and the two sump sluice gates should be opened, allowing the river to fill the station sump. One diesel engine can be started and test operated for two hours allowing river water to flow through the 48" gravity conduit into the pump station sump. After testing the first pump unit the second can be tested. At the end of the test cycle for the second pump, the sump sluice gates should be closed. While the pump is still operating so that the sump will be lowered to elevation 117 and can then be dewatered using the sump pump.

(b) Once <u>each month</u>, each engine shall be operated for a sufficient period of time to allow the diesel engine to attain normal operating temperatures. For this test operation, just the diesel engines shall be operated. The engines shall be separated from the right angle gear unit and pump by disconnecting the flexible coupling located between the right angle gear and the engine. The ring from the coupling which is over the engine drive stub shall be secured to the stub so that it doesn't rattle during operation of the engine.

After completion of this test operation, the flexible coupling between the engine and right angle gear unit shall be reconnected. Now the

engine shall be restarted and the engine, right angle gear and pump shall be operated as a unit 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 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 initiated.

(c) Oil in the engines should be changed once 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 a new filter element.

(d) The drain plug at the base of the vertical exhaust pipes should be opened once a month prior to engine 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 the performance of scheduled Preventative Maintenance Service on the engine. Rust inhibitor shall be added annually. Permanent type antifreeze shall be used at all times and shall be adequate for protection against freezing at minus 30°F.

(f) All other routine maintenance required to be performed on the diesel engines shall be as stated in the John Deere Diesel Operation and Maintenance manuals furnished by the Schmidt Equipment Co., copies of which were given to the town of Framingham.

(3) Pumps. No maintenance of the propeller pumps is ordinarily required except that necessary to keep them painted and lubricated. The Lincoln 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 of running 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 a hose using water from a tank truck.

(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 & Knife Valves. Electrically operated gates and valves should be moved through a complete closing and opening cycle each month. There are on each electrically operated gate hoist and

valve operator 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 and knife valves 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 and valves should be kept completely coated with a water resistant lubricant at all times to prevent corrosion and provide lubrication. The lubricant level of the electric gate and valve operators should be checked annually and filled with manufacturers approved lubricant as necessary. Refer to the Electrodyne Automatic Valve Actuator Service Instructions which were furnished the city for recommended lubricants for the knife valves and Rodney Hunt Instruction Manual for the sluice gates.

(6) Sump pumps. The pumping station is provided with a sump pump to handle any seepage into the sump and to evacuate the sump after each pumping operation. The pumps and motors should be lubricated annually and the float mechanism checked monthly by manually raising and lowering the float to start and stop the pump. Refer to Sump Pump Operation and Maintenance Manual furnished by Weil-Pump Company for routine maintenance requirements. 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, hoist housings, and flap valves will require frequent painting because of exposure to the weather.

(8) Sump cleanup. After each period of high water during which the propeller pumps have been used, the sump should be emptied of water and the sump cleaned of all silt and debris. Most of the deposit on the floor can be washed into the pump sump 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) Fans & Louvers. The fans and louvers shall be inspected, lubricated and test operated annually, preferably in April.

(10) Hot Air Furnance. The oil fired furnance shall be inspected and cleaned annually by personnel experienced in servicing oil fired furnances. Filters shall be cleaned or replaced as necessary.

(11) Emergency Generator. Scheduled maintanance checks for the emergency generator set shall be carried out in accordance with maintenance requirements as stated in the Onan Operator's Manual which was supplied to city. The generator should be run monthly for a minimum period of 10 minutes under available load.

(12) Level Indicators. It is essential that the level indicators be operating properly at all times. Every 6 months the level indicators should be checked for correct calibration. Refer to Bristol Instruments Instruction Manual which was supplied to the city for calibration and maintenance of level recorders.

(13) 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.

(14) 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.

(15) Manufacturer's drawings and recommendations. The Corps of Engineers has furnished the town of Framingham a complete set of manufacturer's drawings pertaining to the mechanical and electrical good condition by the town of Framingham 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.

(16) The ponding area shall be checked every 90 days to be certain that it is free from debris and no fill is being dumped which would decrease the size of the area. It is extremely important that the ponding area be maintained to insure maximum project operation and efficiency.

29. OPERATION.

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

"Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The 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 the project. 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 sump flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the Division Engineer following each flood."

b. Sequence of Operation: For sequence of operation of the pumping station whenever a flood is imminent, see Appendix "B".

c. Mechanical Equipment Operation.

(1) Sluice gates. The sluice gates can be operated either electrically or manually. The gates will normally be operated electrically from the remote push button station controls located to the left of the door as you enter the pump station.

(a) Normal operation from remote push button station.

((1)) Unfused disconnect switch located on operator floor stand in "ON" position.

((2)) "Local OFF Remote" selector switch at unit to "Remote" position.

((3)) Push appropriate button to in the control panel to open or close sluice gate as required, corresponding indicating light comes on to indicate the final position of gate.

(b) Electrical operation from gate floorstand.

((1)) Unfused disconnect switch at gate floorstand "ON".

((2)) "Local OFF Remote" selector switch at unit to "Local" position.

((3)) Turn red dial on operator to position required to either open or close gate, dial will return to neutral position, and gate can be stopped by pressing in on red dial.

((10)) Open cover plate over sump access before starting diesel engines.

(b) Diesel starting - Refer to John Deere Diesel O&M Manual which was supplied the city for diesel engine starting and operating procedure.

((1)) Check level of Farval type lubricator during operation.

((2)) Check gear lube oil level during operation.

((3)) Check engine temp. etc. during operation.

(c) Diesel stopping procedure - Refer to John Deere Diesel O&M Manual for diesel shut-down procedure.

(5) Sump Fan - After pumping operations are completed, the sump fan should be turned on by putting the switch next to the door "on" and ventilate the sump while it is being cleaned.

(6) Emergency generator - Refer to the Onan operators' manual for pre-start checks and starting procedure for unit.

G. VEHICULAR GATE

30. DESCRIPTION. Steel swing street gate has been constructed on Concord Street as part of the flood control protection. The clear opening of the gate is 55 feet with the top of the gate at elevation 136.0 and top of the concrete gate abutments at elevation 137.0. The gate is normally stored in the concrete abutments when not in use. The requirement for closing gate 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 gate on the river side to seal off space between the bottom of gate and surface of roadway. When in storage the gate leafs are locked into the abutment cavities by means of bolts attached to clip angles set into concrete abutment and by a fixed jack which is cranked into place. The jack is also utilized in the maintenance of gate hinges or other gate repairs. Construction details are shown on the drawings in Appendix F.

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 vehicular gates and applicable portions are quoted below. Following this a few of the points that apply particularly to the Saxonville project are discussed.

"(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.

b. Trial closure of structures shall be made at least once a year, and whenever a change is made in key operating personnel. Trial

erection of sand bag closures is not required. Closure materials will be checked prior to and following flood periods. Damaged or missing parts shall be repaired and or replaced immediately.

c. Gate hinge pin bearings shall be greased semi-annually and prior to any operation of the vehicular gate sections.

32. OPERATION. The gate across Concord Street is an integral part of the protective works along the Sudbury River. Closure of 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.

a. Timing of the closure of these openings should be related to the height of water on the river level gauge, refer to Appendix "B". Earlier closing may be necessary if increasing wind velocities and rainfall will make closure difficult if delayed.

b. Warning should be given to the police and fire departments that the gate will be closed to traffic for the duration of the flood. After the flood has subsided the police and fire departments should be notified that the gate is open for traffic. Warning signs to detour around the gate should be set up. Signs to read, "FLOOD GATES CLOSED - DETOUR" (with an arrow pointing in direction of travel).

c. When the emergency crew is assembled they should immediately take steps to start closing the gate. First, to clean any obstructions out of highway; second, to fill sand bags from storage box; third, close the gate and place sand bags at the bottom of the gates. When the flood has subsided, this procedure would be reversed and the sand bags emptied and placed in storage after being dried out. A bin for the storage of sand should be provided in a location handy to the gate structure. Sand bags should be stored separately and kept dry.

d. In closing the vehicular gate the first step will involve the unlocking of padlocks and removal of bolts which lock gate leafs to the gate abutment wall. These bolts are located at the mitre end of the gate. Subsequently, the gate jack which also acts as a lock, must be released. In the event that high winds are experienced, provisions have been made to place guide ropes through eyelets provided on the gate. The ropes should be stored in the pump station. A chain is supplied to allow the gate to open and will keep gate sections from bypassing the desired location for the locking operation. Once the

gates have been closed, the two eyebolts and pins are inserted to hold the gate leafs together. The turnbuckle assemblies at top and bottom of the gate are then tightened to achieve final closure. Now the two jacks on each gate section can be engaged by cranking the jacks down. The movable plate at the bottom of each gate leaf shall be lowered to place the seals in contact with the roadway. Place sand bags on riverside of gate.

When flood conditions have subsided, the above procedure should be reversed and all parts cleaned prior to being buttoned up.

H. MISCELLANEOUS FACILITIES

33. DESCRIPTION. Miscellaneous structures and facilities constructed as part of the protective works include pavements, chain link fencing, and railings.

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 unservicable parts shall be repaired or replaced without delay."

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 dike stone protection. Debris could block the flow of water 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 Watson Place Pumping Station 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 town in the operation of the project. This in no way lessens the responsibility of the State of Massachusetts or the town of Framingham in the operation of the project.

J. DRAWINGS AND SPECIFICATIONS

38. DRAWINGS AND SPECIFICATIONS. A complete set of contract drawings and specifications was furnished the town of Framingham at the time of initiation of project construction. A full size set of drawings showing the project as actually constructed will be furnished the town of Framingham 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".

39. OPERATION AND MAINTENANCE MANUALS. Below is a list of Operation and Maintenance manuals for various pieces of Mechanical Equipment which were furnished the town of Framingham. These manuals should be used to supplement this O&M manual in the operation and maintenance of the project.

a. John Deere Diesel Engine O&M manual.

b. Electrodyne Automatic Valve Actuator Service Instructions.

c. Onan Operator's Manual for Electric Generating Sets.

d. Operating and Maintenance Instructions for Weil Sump Pump.

e. Bristol Instruments Instruction Manual.

f. Rodney Hunt Instruction Manual.

g. Operator's Manual for the Johnson Right Angle Turbine Pump Drive.

h. Operating Instructions and Parts List Model EC-320 Vertical Axial Flow Pumps.

APPENDIX A

REGULATIONS PRESCRIBED BY THE SECRETARY OF WAR

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 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. 44-12286; Filed, August 16, 1944; 9:41 a. m.]

APPENDIX B

SAXONVILLE LOCAL PROTECTION PROJECT

STANDARD OPERATING PROCEDURES 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 flood control features of the Saxonville (Framingham, Massachusetts), Local Protection Project prior to and during flood periods. Climatologic and hydrologic data are included for background information.

RESPONSIBILITIES

2. TOWN OF FRAMINGHAM. The town is responsible for the operation, maintenance and protection of the entire flood protection works. Instructions for the operation are presented in this appendix. Areas of responsibility include:

a. Complete operation of the project during flood periods.

b. Determining phases of preparedness, mobilization and operations based on: National Weather Service river and weather forecasts, and Sudbury River stages at Watson Place Pumping Station.

c. Training personnel in specific duties and holding periodic practice sessions to insure efficient and effective maintenance and operation.

d. Maintaining adequate contact with the National Weather Service to obtain weather and flood forecasts.

3. CORPS OF ENGINEERS. The Reservoir Control Center (RCC) of the Corps of Engineers continually monitors rainfall and runoff conditions in much of New England. This climatologic and hydrologic information is available upon request. RCC will review operational procedures following major floods to determine whether the prescribed regulation instructions need revision.

4. NATIONAL WEATHER SERVICE. The National Weather Service (NWS) has no direct role in the operation of the project. However, it has the responsibility of issuing weather and flood forecasts to the general public. Flood forecasts for the eastern Massachusetts area are issued by the NWS office at Boston, Massachusetts.

CLIMATOLOGY

5. GENERAL. The climate of the Sudbury River watershed is characterized by variable weather, with frequent but usually short periods of precipitation. The basin is exposed to intense rainfall due to coastal

storms of tropical origin that travel up the Atlantic seaboard or storms of an extratropical nature, often called "northeasters." The watershed also lies in the path of the "prevailing westerlies" and with air masses moving predominantly from the interior of the country, this west to southwest airflow brings the hot, dry weather which is responsible for occasional summer droughts.

6. PRECIPITATION. The average annual precipitation at Framingham for 103 years of record is about 44 inches, distributed rather uniformly throughout the year. The maximum and minimum annual percipitation totals are nearly 60 inches and 29 inches, respectively. Occasionally during the summer, a prolonged period of very moist maritime tropical air will invade New England from the south producing frequent heavy showers and thunderstorms over hilly areas. This monsoon type of condition produced the flood of July 1938 when about 8" of rain fell in a 4 day period, during a record month of 11.8 inches recorded at Framingham.

During August 1955, a total rainfall of 15.69 inches established the record monthly maximum. During the passage of the tropical storm "Diane," (17 to 21 August), over 12 inches were recorded and caused the flood of record at Saxonville. Table B-1 summarizes monthly precipitation records for Framingham.

7. SNOWFALL AND SNOWCOVER. The average annual snowfall at Framingham is about 50 inches. Snowfall usually occurs over the 6-month period from November through April with the amounts for the months of December, January and February accounting for over 70 percent of the annual total. Monthly and annual average snowfall for 43 years of record at Framingham are tabulated in Table B-1.

Water content of the snow cover in the region may reach a maximum depth ranging up to 6 inches about the first of March. Heavy rainfall combined with snowmelt caused floods in March 1936 and 1968, and January 1979.

8. STORMS. Storms of three different types occur in the watershed, namely, cyclonic storms of continental origin, coastal storms and thunderstorms. Cyclonic storms can occur during the summer season; however, fall and early spring storms are more generally associated with this type of disturbance. These storms are usually of greater areal extent but do not produce such intense precipitation as storms of the other two types. Thunderstorms are usually of the convective type and are, therefore, generally limited to summertime occurrences. These storms are usually characterized by intense rainfall of short duration and limited areal extent which are often conducive to small tributary flooding. The coastal storms consist of two types: (a) the extratropical maritime storms which originate in warm moist air of the Gulf of Mexico and move northward along the eastern seaboard, and (b) the storms of tropical origin, some of which attain hurricane

TABLE B-1

PRECIPITATION DATA

Framingham, Mass. observed by Metropolitan District Water Commission

Month	Monthly Precipitation[1] (inches) Mean	Maximum	Minimum	Average Monthly Snowfall[2] (inches)
January	3.86	12.97(1979)	.75	14.5
February	3.77	8.82(1900)	.26	14.2
March	4.16	9.61(1936)	.04	10.1
April	3.65	8.78(1904)	.85	1.7
May	3.26	7.01(1901)	.72	0.1
June	3.28	9.33(1922)	.38	--
July	3.47	11.80(1938)	.73	--
August	3.62	15.69(1955)	.54	--
September	3.53	10.65(1933)	.18	--
October	3.29	10.26(1840)	.10	Trace
November	4.04	7.94(1845)	.89	2.6
December	3.91	10.87(1901)	.92	9.6
Annual	43.82	59.94(1888)	28.96	52.8

(1) 103 Years of Record

(2) 43 Years of Record

magnitude. Of the two, the tropical storms constitute the greater potential for flood producing precipitation. They occur most often between the months of July and October.

Six flood producing storms in the Sudbury River watershed occurred in March 1936, July 1938, September 1954, August 1955, March 1968 and January 1979. Floods in March 1936, 1968, and January 1979 were caused by a combination of rainfall and snowmelt, whereas the other three were the results of prolonged intense rainfall, two of which were of tropical origin. Record rainfall from hurricane "Diane" (August 1955), produced the flood of record in the Sudbury River basin, and it occurred after the soil conditions had been saturated with over 3" from the preceding tropical storm "Connie."

Storm totals in the vicinity of the Sudbury watershed for the six storms are as follows:

March 1936	4.0	inches	
July 1938	8.0	"	
September 1954	8.5	"	
August 1955	12.5	"	(Diane)
March 1968	4.9	"	
January 1979	7.0	"	*

* Two storms - 4 days apart.

RUNOFF & HISTORICAL FLOODS

9. RUNNOFF IN SUDBURY RIVER WATERSHED. Records of river stages at Framingham Center and pool elevations of Framingham Reservoir No. 1 have been maintained by the Metropolitan District Commission since 1875. The runoff data has been adjusted for change in reservoir contents and diversions from the basin. Table B-2 shows monthly mean, maximum and minimum flows in cubic feet per second (cfs) for the Sudbury River at Framingham.

10. HISTORY OF FLOODING. Flooding may occur in New England during any month of the year. Early spring rains accompanied by melting snow resulted in the floods of March 1936 and 1968. Heavy rain showers during the summer months caused the flood of July 1938 and tropical storms caused the flood of September 1954 and the record flood of August 1955. During the last century, noteworthy floods occurred in February 1886 and March 1888. Table B-3 lists flow data for six past floods.

11. FREQUENCY OF FLOODING. Table B-4 provides the Project Superintendent with a background on frequency of flooding at the Saxonville Pumping Station.

TABLE B-2

MONTHLY DISCHARGES
(c.f.s.)

Sudbury River at Framingham Center, Mass.
(D.A. = 75.2 sq. mi.)

102 Years of Record through W.Y. 1977

Month	Mean	Maximum	Minimum *
January	136	352	12.4
February	171	559	34.9
March	302	753	69
April	236	489	68.6
May	126	344	29.7
June	68	322	-24.9
July	23	401	-36.7
August	23	532	-39.0
September	30	345	-42.1
October	42	264	-24
November	93	468	1.7
December	121	382	15.8
Annual	113	188	42.0

*Negative values due to evaporation from reservoirs.

TABLE B-3

MAXIMUM FLOODS
SUDBURY RIVER AT SAXONVILLE L.P.P.
(DA = 86 sq. mi.)

Flood Event	Estimated Discharge (cfs)
August 1955	4,400
January 1979	3,100
September 1954	2,850
March 1968	2,100
March 1936	2,050
July 1938	1,800

TABLE B-4

FREQUENCY OF FLOODING
SUDBURY RIVER AT SAXONVILLE PUMPING STATION
(DA = 86 sq. mi.)

Estimated Frequency (Years)	Sudbury River Level: Mean Sea Level Datum of 1929 (ft.)	Sudbury River Level: Circular Gage* in Pumping Station (ft.)	Sudbury River Level: Metal Staff Gage on Wingwall (ft.)	Discharge (cfs)
Design Flood	134	34	21.5	10,000
100	129.4	29.4	16.9	4,600
50	127.9	27.9	15.4	3,500
20	125.8	25.8	13.3	2,400
10	124.3	24.3	11.8	1,750
5	122.8	22.8	10.3	1,220
2	121.0	21.0	8.5	770

*All references in this appendix associated with river levels and operational phases are based upon readings at this gage which measures the river level. The circular gage reading is 12.5 feet higher than the metal staff gage reading.

12. ANALYSIS OF FLOODING. The flood of August 17-19, 1955, resulting from hurricane "Diane," caused the largest flood of record in the Sudbury River. Rainfall varied from about 10 inches in the lower portions of the watershed near the local protection area to 13 inches in portions of the headwater area. The storm averaged about 12 inches in the watershed resulting in a flow at Saxonville of 4,400 cfs.

13. DESIGN FLOOD. The protective works at Saxonville are designed (with 3 feet of freeboard) for a Standard Project Flood discharge of 10,000 cfs above Cochituate Brook and 11,880 cfs below. Plate B-3 demonstrates a complete operation using the standard project flood as an example.

DESCRIPTION OF OPERATIONAL ELEMENTS

14. GENERAL. This section briefly describes the elements of flood protection works and related equipment that town personnel will operate prior to and during floods. These elements consist of a pumping station, sluice gate structure, and a road barrier. A general plan of the project is shown on sheets 2, 4, 5 and 6 of the as-built drawings.

15. INTERIOR DRAINAGE SYSTEM. Interior drainage from about 35 acres is intercepted by the protective works. When river levels are low the interior runoff flows by gravity through the 48-inch conduit and gate structures into the river. This conduit is designed to discharge runoff from a 100 year rainstorm.

16. PUMPING STATION. Watson Place Pumping Station is required to pump the interior storm runoff when the river levels are high. When rising river levels approach flood stage, the 48 inch conduit is closed off at the sluice gate structure. The two sump gates are then opened, allowing the runoff to enter the pumping station, where it is pumped through two 18-inch pipes over the top of the dike. Each pump has a discharge capacity of 10,500 g.p.m. (or about 23 cu. ft. per sec.) This is equivalent to a total interior runoff of 1.3 inches per hour.

The two 36 x 42 inch sump gates are normally closed and the 48 inch gravity sluice gate is fully open. When the pumping station is activated, the sump gates, located in front of each pump, are electrically or manually operated. It takes about 4 minutes to electrically open each sump gate. The 48-inch sluice gates is also operated electrically or manually, and taking about 5 minutes to close electrically.

17. STREET GATE. Concord Street has two swinging gate leafs that will close and seal at the centerline of the street forming a wide "V". When the leafs are closed, adjustable steel plates with seals attached to the bottom of each gate must be lowered to the concrete sill to prevent leakage. Sandbags should also be placed along the river side of the gate.

OPERATIONAL CONSIDERATIONS

18. GENERAL. Factors that must be considered in the operation of this project area:

a. National Weather Service forecasts of possible flooding.

b. The time needed by the Superintendent to mobilize personnel associated with operation of the project.

c. Activation time required at the pumping station, and street gates.

d. Observations along the walls, dikes and street closures during flood flows to detect leaks, obstructions or problem areas.

e. The possibility of placing sandbags diagonally across Danforth Street during a major flood.

19. MOBILIZATION. The 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 weather, mechanical or personnel difficulties, mobilization and staffing of the pumping station will be completed when a rising river stage reaches 19.0 feet. Mobilization of crews for street gate closure and sandbagging will begin at 24.5 feet.

OPERATIONAL PHASES AND INSTRUCTIONS FOR FLOODS

20. OPERATIONAL PHASES. The Project Superintendent should be watchful during late winter for warm days with rainfall that could start runoff from snow melt which would keep stages near the alert stage for about a week. The operational functions have been divided into 'phases' to assure a clear delineation of actions to be taken prior to and during flood conditions and are outlined below:

Phase 1 - Project Superintendent alerts crew of possible flood operations.
Phase 2 - Begin staffing operations.
Phase 3 - Begin flood operations.
Phase 4 - Cessation.

For sample flood operations refer to Plate B-3 which demonstrates a standard project flood operation.

21. INSTRUCTIONS. This section contains instructions to be followed by personnel operating the project during flood periods. The instructions have been summarized and are shown on Plates B-1 and B-2.

a. Phase 1. The National Weather Service issues a "flood watch" for eastern Massachusetts. The Superintendent will alert his crew and commence recording river water levels at least twice a day. Phase 1 may also be initiated for: (1) heavy rain or melting snow with warm temperatures, (2) river level at pumping station reaches 18.5 feet and rising. During this phase the river level indicator gage in the pumping station will be checked with the metal staff gage reading and calibrated if necessary. (See Section 22).

b. Phase 2. Complete staffing operations at the pumping station when the following conditions develop:

(1) A "flood warning" has been issued by the National Weather Service for eastern Massachusetts.

(2) Staff pumping station when the river water level reaches 19.0 feet.

Mobilize road closure crew for Concord Street when water level reaches 24.5 feet; also mobilize sandbag crew for Danforth Street.

c. Phase 3. Activate the pumping station when the rising river level reaches 20 feet, in accordance with schedule on Plate B-2. Also close 48" x 72" sluice gate at Saxonville Pond, (see Para. 24 of main report). Begin Concord Street closure when the river level reaches 26 feet and rising and also place sandbags on the river side of the gate. Place sandbags diagonally across Danforth Street when the river level reaches 29 feet and rising.

d. Phase 4. Remove sandbags from Danforth Street when the river level recedes to 29 feet. Remove sandbags, open Concord Street gates and secure when the river level recedes to 26 feet. When the river level recedes to a stage of 20 feet and is expected to continue falling, deactivate the pumping sation in accordance with schedule on Plate B-2. The operation will then revert to Phase 1 until the river level falls below 18.5 feet.

22. WATER LEVEL GAGES AT THE PUMPING STATION.

a. Circular Gages - River Level and Sump Level. When it is necessary to operate the pumps to discharge runoff into the Sudbury River, the operator must continually monitor both the river level and the sump level. Therefore, two circular gages have been installed in the pumping station to indicate the water level in the river and the water level in the sump. Both gages should be periodically checked and, if necessary, calibrated to insure accurate stage readings and should read the same when all gates are open and insignificant interior runoff is occurring. Refer to Bristol Instruments Instruction Manual for calibration procedure.

ALL REFERENCES IN THIS APPENDIX ASSOCIATED WITH RIVER LEVELS AND OPERATIONAL PHASES ARE BASED UPON READINGS AT THE RIVER LEVEL GAGE IN THE PUMPING STATION.

b. Staff Gage. A metal staff gage (0-14 feet) is located on the inside wing wall of the gravity conduit outlet. Another segment (14-24 feet) is located on the outside wall of the sluice gate structure. This combined gage was installed to directly indicate the river stage above the invert of the gravity conduit. In the event the circular river level indicator in the pumping station could not be read properly or it became necessary to reset it, the reading of the staff gage plus 12.5 feet, gives the correct setting for the river level indicator. The staff gage should be checked periodically for cleaning and maintenance.

23. REPORTS. Prior to and during the operation of the project, information pertinent to a flood operation will be entered in a log of reports (Plate B-4). The flood report will include gate openings and closings, pumping operations, hourly river levels, sump levels, street gate closures, and any problems or observations that would help in evaluating the operational procedures and prescribed regulations. A copy of flood reports will be mailed to RCC within one week after completion of an operation:

New England Division, Corps of Engineers
c/o Reservoir Control Center
424 Trapelo Road
Waltham, Massachusetts 02154

STANDARD OPERATING PROCEDURE FOR FLOODS

SAXONVILLE LOCAL PROTECTION PROJECT

PHASE		CONDITION	PERSONNEL	PUMPING STATION	
				GATES	PUMPS
		Normal	Inactive	Gravity Conduit - Open Sump - Closed	Idle
1	ALERTING	a. National Weather Service (N.W.S.) issues a "flood watch" for eastern Massachusetts b. Heavy rain or melting snow with warm temperatures c. River level at pumping station reaches 18.5 feet and rising (1)	All personnel will be alerted	Normal	Idle
2	STAFFING	a. N.W.S. issues a "flood warning" for eastern Massachusetts or b. River level reaches 19.0 feet and rising	Staff pumping station	Normal	Idle
		c. River level reaches 24.5 feet and rising	Mobilize streetgate and sand-bag crews	(See Phase 3a)	(See Phase 3a)
3	OPERATING	a. River level reaches 20 feet and rising	Activate the pumping station Close 48" x 72" sluice gate at Saxonville Pond	Open sump gates Close gravity conduit gate	Operate by schedule (plate B-2)
		b. River level reaches 26 feet and rising	Begin closure of Concord Street gate (2)	--	Operating
		c. River level reaches 29 feet and rising	Begin sandbag closure of Danforth Street from floodwall to 2-story wood building	--	Operating
4	CESSATION	a. River level recedes to 29 feet and falling	Remove sandbags on Danforth St.	--	Operating
		b. River level recedes to 26 feet and falling	Begin opening of Concord Street gate and secure	--	Operating
		c. River level recedes to 20 feet and falling	Deactivate pumping station	Close sump gates Open gravity conduit gate	Stop by schedule (plate B-2)
1		Phase 1 remains in effect until flooding no longer threatens the area and river level recedes to 18.5 feet	All personnel remain on alert status	Normal	Idle

NOTES: (1) See Page B-11 for reference to river levels and operational phase

(2) Sandbag on river side of Concord Street gate

SAXONVILLE PUMPING STATION

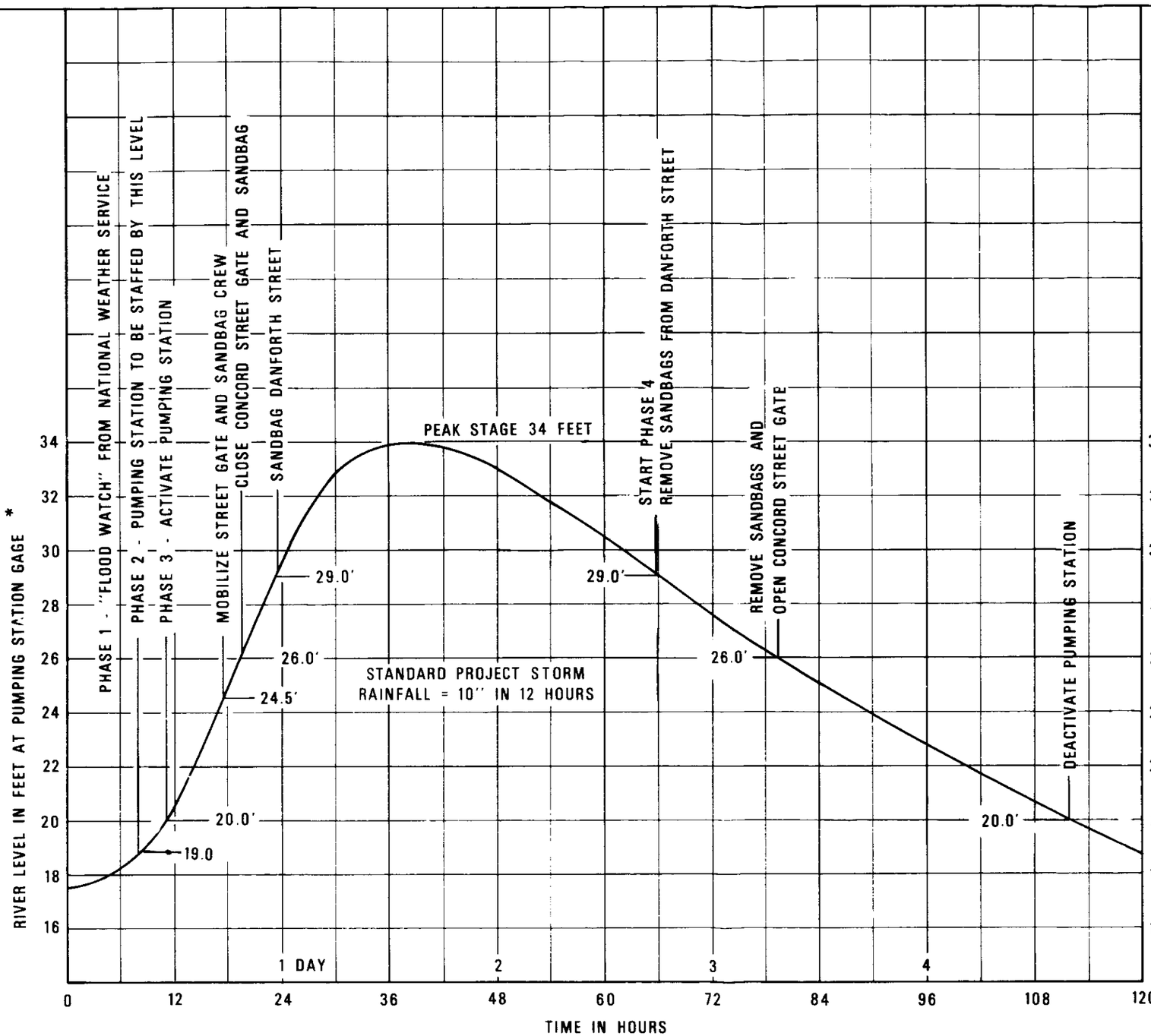
OPERATING SCHEDULE

	FLOOD OPERATIONS		
Normal Conditions	**Activate Station**	**Pump Operations**	**Deactivate Station**
During nonflood times the station will be in the following status: 1. 48" gravity conduit gate open. 2. Both sump gates closed. 3. Automatic sump pump on.	When the water rises to 20 feet on the river level gage the operator will: 1. Shut off automatic sump pump (and furnace). 2. Open 36" x 42" sump gates and immediately close the 48" gravity conduit gate. 3. Start pumps, operating by schedule.	Operate pump(s) based on the following water levels in the sump, and alternate No. 1 & No. 2 pumps: Pumps No. 1 / No. 2 (sump level in feet) start 20 / 20.5 stop 17* / 18*	When the river stage recedes to 20 feet, the operator will: 1. Close sump gates. 2. Open the gravity conduit gate. 3. Pump down the sump 4. Turn on automatic sump pump (and furnace). 5. Complete station log.

*NOTE: a) The water level indicator is designed to automatically sound an alarm when the water in the sump drops to 18 feet and automatically shut off the pumps when the level drops to 17 feet.

b) The steel rod float stop is 1 foot above the floor of the sump; therefore the gage dial should indicate a 16 foot reading when the float is resting on the rod.

c) If the inflow into the pump station is such that a pump operating cycle is less than 20 minutes between start of a diesel engine, then a bypass valve (Section F, Para. 29c(2)) on the discharge line should be opened to allow water to be recycled into the pumping station sump to maintain diesel engine operation.



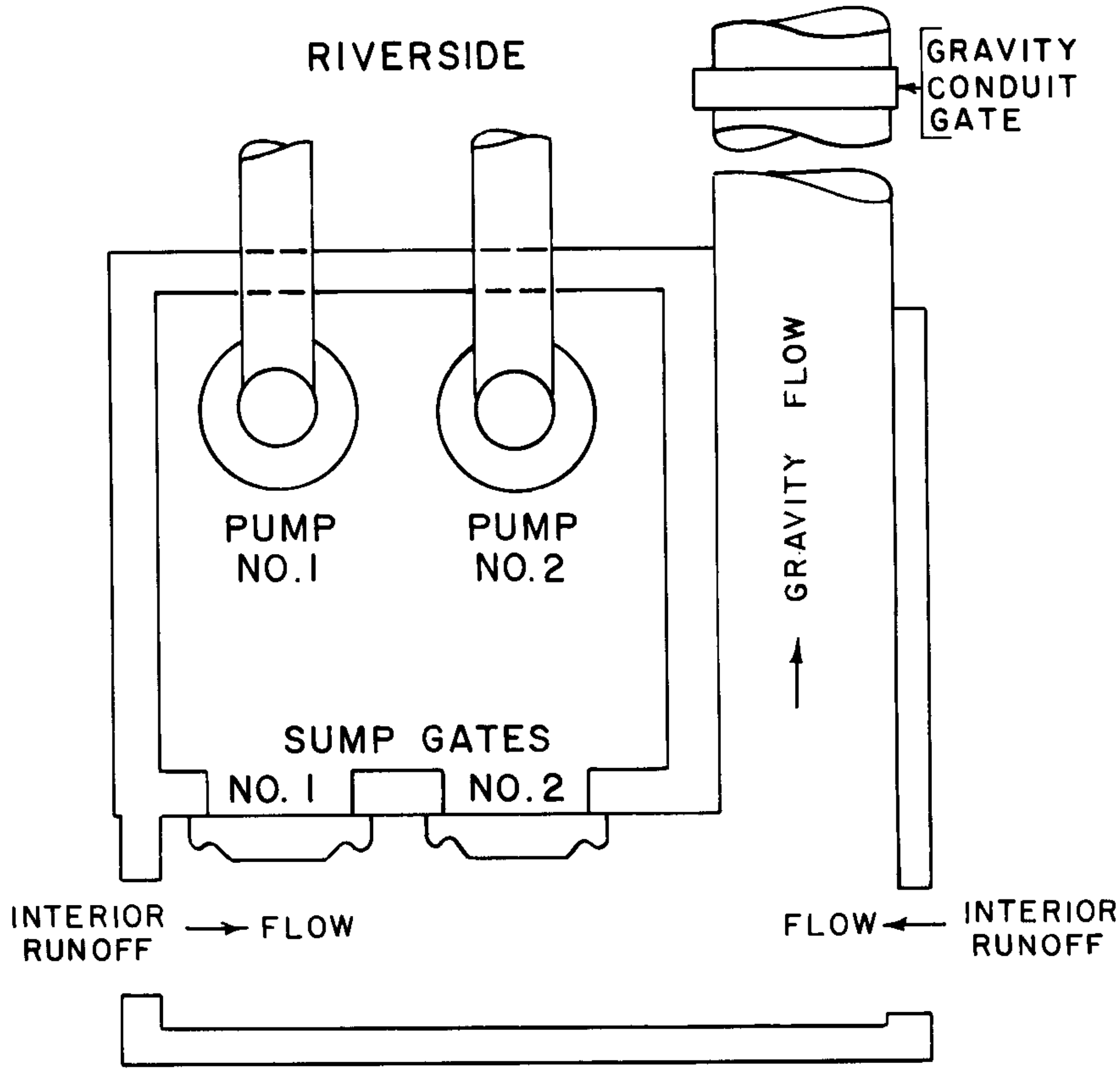
* ALL REFERENCES ASSOCIATED WITH RIVER LEVELS AND OPERATIONAL PHASES ARE BASED UPON READINGS AT THE CIRCULAR RIVER LEVEL GAGE IN THE PUMPING STATION.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION PROJECT

SAMPLE OPERATION
STANDARD PROJECT FLOOD

SUDBURY RIVER MASSACHUSETTS

SAXONVILLE PUMPING STATION AND OPERATION LOG



TIME	RIVER EL.	SUMP EL.	SUMP GATE NO. 1	SUMP GATE NO. 2	GRAV. COND. GATE	PUMP NO. 1	PUMP NO. 2	REMARKS (INCLUDE LOG OF STREET CLOSURES)

NOTE: DURING AN OPERATION, HOURLY RIVER LEVELS SHOULD BE RECORDED

APPENDIX C

REPORT FORMS

DESIGNATION OF SUPERINTENDENT

Name of Project: _____

Location: _____

MAINTAINING MUNICIPAL AGENCY:

Agency: _____

Address: _____ Tel. No. _____

"SUPERINTENDENT" - As required by Section 208.10 (a) (2), Chap. II, Title 33 USC

Name & Title: _____

Employed By: _____

Business Address: _____

Business Tel. No: _____

Nights, Sundays, Address: _____

Nights, Sundays, Tel. No: _____

Remarks:

Signed: _____

Title: _____

Date: _____

NOTE: To be submitted and updated as necessary by the responsible agency which will maintain and operate the works in accordance with regulations prescribed by the Secretay of the Army as required by law (Title 33, Chap. 208, Sec. II, USC).

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.)

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

DATE	INSPECTED BY: TYPED NAME & TITLE	SIGNATURE

CHECK LIST INSPECTION REPORT
SAXONVILLE LOCAL PROTECTION

Use with NED Form 513 - Inspection Report

1. Pumping Station

a. Structures

(1) Walls _____
(2) Roof _____
(3) Louvers _____
(4) Doors _____
(5) Painting _____
(6) Miscellaneous _____

b. Pumps, Motors, Engines

(1) When Trial Operated _____
(2) Oil Changes _____
(3) Lubrication _____
(4) Electric Motor Insulation Tests (Meggar tests) _____
(5) Metal Intakes, Etc. _____
(6) Diesel Fuel _____

c. Gates & Knife Valves

(1) When Trial Operated _____
(2) General Condition _____
(3) Leaks _____
(4) Lubrication _____
(5) Electrical Systems _____
(6) Manual Closure _____
(7) Painting _____

d. Instrumentation (Calibration) _____

e. Miscellaneous

(1) Sump Pump _____
(2) Heating System _____
(3) Suction Chamber _____
(4) Outdoor Control Stations _____
(5) Fans _____
(6) Emergency Generator _____
(7) Misc. Equipment _____
(8) Ponding Area _____

2. Drainage Structures

a. Gates and Valves

(1) When Trial Operated _____
(2) General Condition _____
(3) Leaks _____
(4) Lubrication _____
(5) Painting _____

b. Structure

(1) Date inspected by Superintendent _____
(2) General Condition _____
(3) Trash Racks _____
(4) Miscellaneous _____

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 borrowing animal holes in dike _____
g. Trespassing
(1) Are there any paths on dike _____
(2) Has right-of-way been used for dumping of stroage materials _____
h. Condition of rock slope protection _____
i. Condition of toe drains _____
j. Describe deficiencies, including location, and corrective measures planned _____

_____
_____
_____
_____.

4. Stop Logs

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

5. Channel

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

_____
_____.

6. Concrete Structures (Floodwalls, Street-gate, 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. Describe deficiencies, including location, and corrective measures planned _____

_____
_____.

7. Miscellaneous

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

8. 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. _____

_____

_____.

9. Remarks and Additional Comments

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

APPENDIX D

ASSURANCES OF LOCAL COOPERATION

TOWN OF FRAMINGHAM
AND
COMMONWEALTH OF MASSACHUSETTS

AGREEMENT BETWEEN

THE UNITED STATES OF AMERICA

AND

THE COMMONWEALTH OF MASSACHUSETTS

FOR LOCAL COOPERATION AT

THE SAXONVILLE LOCAL PROTECTION PROJECT

SUDBURY RIVER, FRAMINGHAM, MASSACHUSETTS

THIS AGREEMENT entered into this 31st day of December, 1974 by and between the UNITED STATES OF AMERICA (hereinafter called the "Government"), represented by the Contracting Officer executing this agreement, and the COMMONWEALTH OF MASSACHUSETTS (hereinafter called the "Commonwealth"), acting by and through the DEPARTMENT OF PUBLIC WORKS, with the consent of the Governor, WITNESSETH THAT:

WHEREAS, construction of the Saxonville Local Protection Project on the Sudbury River, Framingham, Massachusetts (hereinafter called the "Project"), was authorized by the Flood Control Act of 1966 approved 7 November 1966, Public Law 89-789, 89th Congress, 2d Session; and

WHEREAS, the Commonwealth hereby represents that it has the authority and capability to furnish the non-Federal cooperation required by the Federal legislation authorizing the Project and by other applicable law; and further, the Commonwealth represents that it fully understands and meets the requirements of Section 221, Rivers and Harbors of 1970, Public Law 91-611, approved 31 December 1970,

1. The Commonwealth agrees that, if the Government shall commence construction of the Saxonville Local Protection Project, Sudbury River, Framingham, Massachusetts, substantially in accordance with Federal legislation authorizing such Project, Public Law 89-789, Title II, Section 203, the Commonwealth shall, in consideration of the Government commencing construction of such Project, fulfill the requirements of non-Federal cooperation in such legislation, to wit:

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction and operation of the Project, including lands for spoil disposal areas, pumping station, and drainage systems;

b. Hold and save the United States free from damages due to the construction works, except damages which are attributable to the fault or negligence of the United States or its contractors;

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

d. Provide without cost to the United States all alterations and replacements of existing utilities including bridges, highways, sewers, and railroad modifications and relocations other than bridges and bridge approaches, which may be required for the construction of the Project;

e. Prescribe and enforce regulations to prevent encroachment on both the improved and unimproved channel through Saxonville, and

f. Prohibit encroachment on ponding areas and, if the capacity of these areas is impaired, promptly provide substitute ponding capacity or equivalent pumping capacity without cost to the United States.

DD-2

2. The Commonwealth further agrees to comply with requirements of non-Federal cooperation specified in Sections 210 and 305 of Public Law 91-646, 91st Congress, S. 1, approved 2 January 1971, known as the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," to wit:

a. Fair and reasonable relocation payments and assistance shall be provided to or for displaced persons, as are required to be provided by a Federal agency under Sections 202, 203 and 204 of Public Law 91-646;

b. Relocation assistance programs offering the services described in Section 205 of Public Law 91-646 shall be provided to such displaced persons;

c. Within a reasonable period of time prior to displacement, decent, safe, and sanitary replacement dwellings will be available to displaced persons in accordance with Section 205 (c) (3) of Public Law 91-646;

d. In acquiring real property the Commonwealth will be guided, to the greatest extent possible under its laws, by the land acquisition policies in Section 301 and the provisions of Section 302 of Public Law 91-646; and

e. Property owners will be paid or reimbursed for necessary expenses as specified in Sections 303 and 304 of Public Law 91-646.

3. The Commonwealth hereby gives the Government a right to enter upon, at reasonable times and in a reasonable manner, lands which the Commonwealth owns or controls, for access to the Project for the purpose of inspection, and for the purpose of completing, operating, repairing, and maintaining the Project if such inspection shows that the Commonwealth for any reason is failing to complete, repair, and maintain the Project in accordance with the assurances hereunder and has persisted in such failure after a reasonable notice in writing by the Government delivered to Commonwealth officials. No completion, operation, repair and maintenance by the Government in such

event shall operate to relieve the Commonwe[illegible] obligations as set forth in paragraph 1 of this Agreement, [illegible] to prevent the Government from pursuing any other remedy at law or equity.

4. This Agreement is subject to the approval of the Secretary of the Army.

IN WITNESS WHEREOF, the parties hereto have executed the contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

By _____
JOHN H. MASON
Colonel, Corps of Engineers
Division Engineer
Contracting Officer

DATE: 31 December 1974

APPROVED:

WOODROW BERGE
Director of Real Estate
FOR THE Secretary of the Army

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

By _____
_____
_____
_____

APPROVED:

_____
Governor

I have reviewed the foregoing Agreement and have considered the effect of Section 221 of the Flood Control Act of 1970, Public Law 91-611, and I am satisfied that the Commonwealth can fully comply with the provisions of said Agreement.

_____
Attorney General

DD-4

CERTIFICATION

I, John F. X. Davoren, certify that I am Secretary of the Commonwealth, that Bruce Campbell, Commissioner, Malcolm B. Graf, Associate Commissioner, Thomas G. Barlow, Assoc. Commissioner, Peter E. Donadio, Assoc. Commissioner, and _____, who signed this Agreement on behalf of the Commonwealth, were then members of the Public Works Commission; that said Agreement was duly signed for and on behalf of the Commonwealth, and that said Agreement is within the scope of the Commission's powers.

I further certify that Francis W. Sargent was Governor of this Commonwealth on the date of approval of this Agreement.

John F. X. Davoren
Secretary of the Commonwealth

AGREEMENT BETWEEN

THE COMMONWEALTH OF MASSACHUSETTS

AND THE TOWN OF FRAMINGHAM

FOR LOCAL COOPERATION AT

THE SAXONVILLE LOCAL PROTECTION PROJECT

SUDBURY RIVER, FRAMINGHAM, MASSACHUSETTS

THIS AGREEMENT entered into this 25 th day of June, 1975, by and between the COMMONWEALTH OF MASSACHUSETTS, (hereinafter called the "Commonwealth"), acting by and through the DEPARTMENT OF PUBLIC WORKS and the Town of Framingham (hereinafter called the "Town") acting by and through the Framingham Board of Selectmen,

WITNESSETH THAT:

WHEREAS, construction of the Saxonville Local Protection Project on the Sudbury River, Framingham, Massachusetts (hereinafter called the "Project"), was authorized by the Flood Control Act of 1966 approved 7 November 1966, Public Law 89-789, 89th Congress, 2d Session; and

WHEREAS, the Town hereby represents that it has the authority and capability to furnish the non-federal cooperation required by the Federal legislation authorizing the Project and by other applicable laws and further, the Town represents that it fully understands and meets the requirements of Section 221, Rivers and Harbors of 1970, Public Law 91-611, approved 31 December 1970.

NOW, THEREFORE, the parties agree as follows:

1. The Town agrees that, if the United States of America (hereinafter called the "Government") shall commence construction of the Saxonville Local Protection Project, Sudbury River, Framingham, Massachusetts, substantially in accordance with Federal legislation authorizing such Project, Public Law 89-789, Title II, Section 203, the Town shall, in consideration of the Government commencing construction of such Project, fulfill the

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requirements of non-Federal cooperation specified in such legislation, to wit:

a. Provide without cost to the Commonwealth, all lands, easements, and rights-of-way necessary for the construction and operation of the Project, including lands for spoil disposal areas, pumping station, and drainage systems;

b. Hold and save the Commonwealth free from damages due to the construction works, except damages which are attributable to the fault or negligence of the Commonwealth or its contractors;

c. Maintain and operate all the works after completion without cost to the Commonwealth in accordance with regulations prescribed by the Secretary of the Army;

d. Provide without cost to the Commonwealth all alterations and replacements of existing utilities, including bridges, highways, sewers, and railroad modifications and relocations other than bridges and bridge approaches, which may be required for the construction of the Project;

e. Prescribe and enforce regulations to prevent encroachment on both the improved and unimproved channel through Saxonville; and

f. Prohibit encroachment on ponding areas and, if the capacity of these areas is impaired, promptly provide substitute ponding capacity or equivalent pumping capacity without cost to the Commonwealth.

2. The town further agrees to comply with requirements of non-Federal cooperation specified in Sections 210 and 305 of Public Law 91-646, 91st Congress, H. R. 3, approved 2 January 1971, known as the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," to wit:

a. Fair and reasonable relocation payments and assistance shall be provided to or for displaced persons, as are required to be provided by a Federal agency, under Sections 202, 203 and 204 of Public Law 91-646;

b. Relocation assistance programs offering the services described in Section 205 of Public Law 91-646 shall be provided to such displaced persons;

c. Within a reasonable period of time prior to displacement, decent, safe, and sanitary replacement dwellings will be available to displaced persons in accordance with Section 205 (c) (3) of Public Law 91-646;

d. In acquiring real property the Town will be guided, to the greatest extent possible under its laws, by the land acquisition policies in Section 301 and the provisions of Section 302 of Public Law 91-646; and

e. Property owners will be paid or reimbursed for necessary expenses as specified in Sections 303 and 304 of Public Law 91-646.

3. The Town hereby gives the Commonwealth a right to enter upon, at reasonable times and in a reasonable manner, lands which the Town owns or controls, for access to the Project for the purpose of inspection, and for the purpose of completing, operating, repairing, and maintaining the Project, if such inspection shows that the Town for any reason is failing to complete, operate, and maintain the Project in accordance with the assurances hereunder and has persisted in such failure after a reasonable notice in writing by the Commonwealth delivered to Town officials. No completion, operation, repair, and maintenance by the Commonwealth in such event shall operate to relieve the Town of responsibility to meet its obligations as set forth in paragraph 1 of this agreement, or to preclude the Commonwealth from pursuing any other remedy at law or equity.

4. This Agreement is subject to the approval of the Attorney General.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

TOWN OF FRAMINGHAM

Chairman, Board of Selectmen

Member, Board of Selectmen

Member, Board of Selectmen

Member, Board of Selectmen

Member, Board of Selectmen

Accepted:

Commissioner, Department of Public Works

Malcolm E. Graf

Associate Commissioner

Associate Commissioner

Associate Commissioner

Associate Commissioner

Approved as to Form:

Assistant Attorney General

KNOW ALL MEN BY THESE PRESENTS

That the TOWN OF FRAMINGHAM, acting by and through its Chairman of the Board of Selectmen, hereby grants to the UNITED STATES OF AMERICA, its agents, employees and contractors permission to enter all lands needed for construction and maintenance of the Saxonville Local Protection Project authorized by the Flood Control Act of 1966 approved 7 November 1966, Public Law 89-789, 89th Congress, 2d Session.

IN WITNESS WHEREOF, on this 10th day of January, 1977, the said TOWN OF FRAMINGHAM has caused this instrument to be executed and delivered and its seal to be hereunto affixed by its Chairman of the Board of Selectmen, hereunto duly authorized and empowered.

TOWN OF FRAMINGHAM

By PETER W. ABLONDI
Chairman, Board of Selectmen

(Town Seal)

Commonwealth of Massachusetts,)
County of Middlesex) ss: Framingham

In Framingham on the 10th day of January, 1977 before me personally appeared Peter W. Ablondi, Chairman of the Board of Selectmen, Town of Framingham, Middlesex County, Commonwealth of Massachusetts, to me known and known by me as the party executing the foregoing instrument by him executed to be his free act and deed as Chairman of the Board of Selectmen and the free act and deed of the Town of Framingham.

Notary Public

My commission expires April 28, 1988.

(Seal)

ATTORNEY'S CERTIFICATE

I hereby certify that the Town of Framingham has valid and assignable real estate rights and title in and to all the premises needed for construction and maintenance of the Saxonville Local Protection Project as authorized by the Flood Control Act of 1966 approved 7 November 1966, Public Law 89-789, 89th Congress, 2d Session.

AARON K. BIKOFSKY
Town Counsel

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APPENDIX E

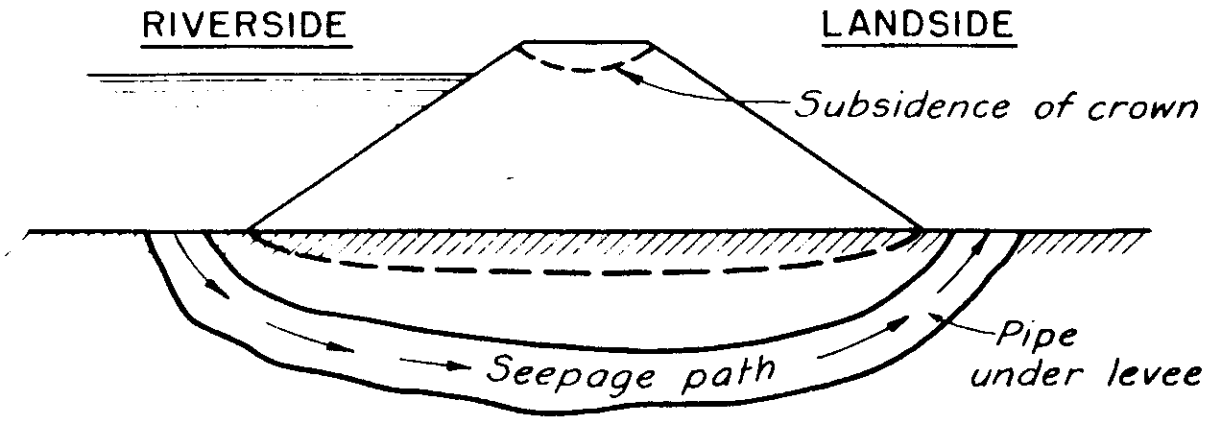
FLOOD EMERGENCY MEASURES

APPENDIX E

FLOOD EMERENCY MEAUSRES

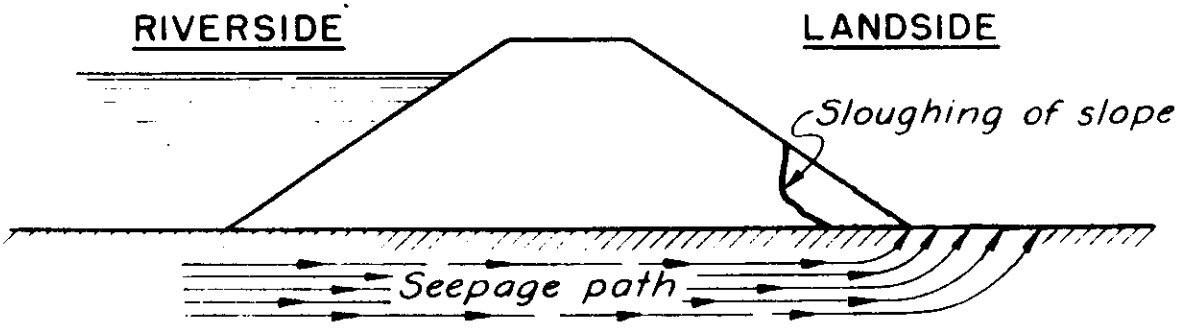
Plate No.	Title
I	Effect of Sand Boils
II	Sand Boil
III	Sacking Sloughs
IV	Sack Dike or Topping
V	Model Sack Dike or Topping
VI	Lumber and Sack Topping
VII	Flashboards

EFFECTS OF SAND BOILS ON LEVEE



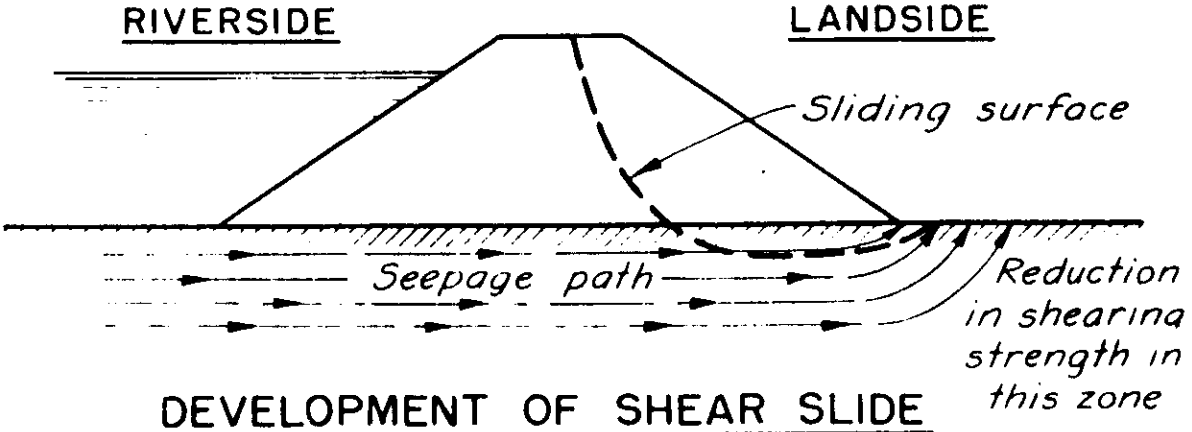
DEVELOPMENT OF PIPE UNDER LEVEE

Fig. 1



SLOUGHING OF LANDSLIDE SLOPE DUE TO RAVELLING AND UNDERCUTTING OF TOE

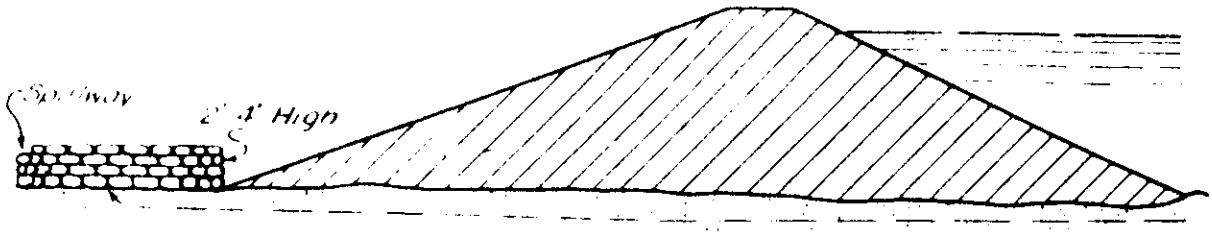
Fig. 2



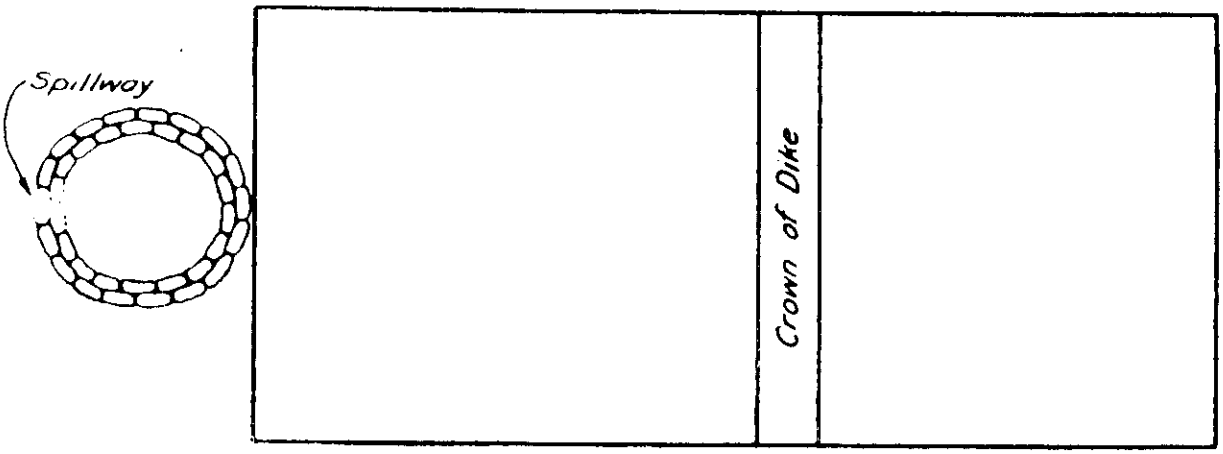
DEVELOPMENT OF SHEAR SLIDE

Fig. 3

PLATE NO. I



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



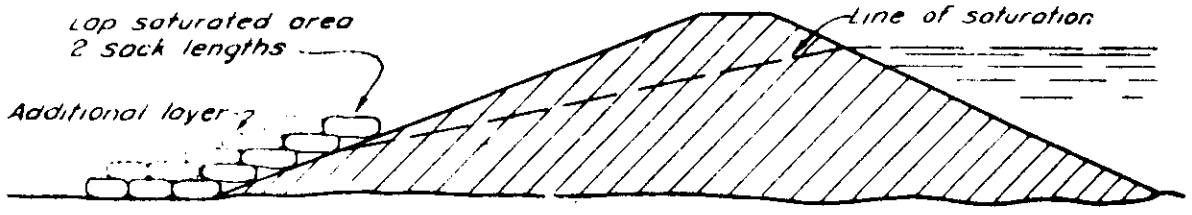
PLAN

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

SAND BOIL
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

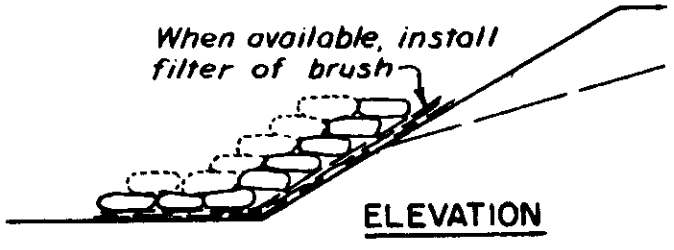
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. II

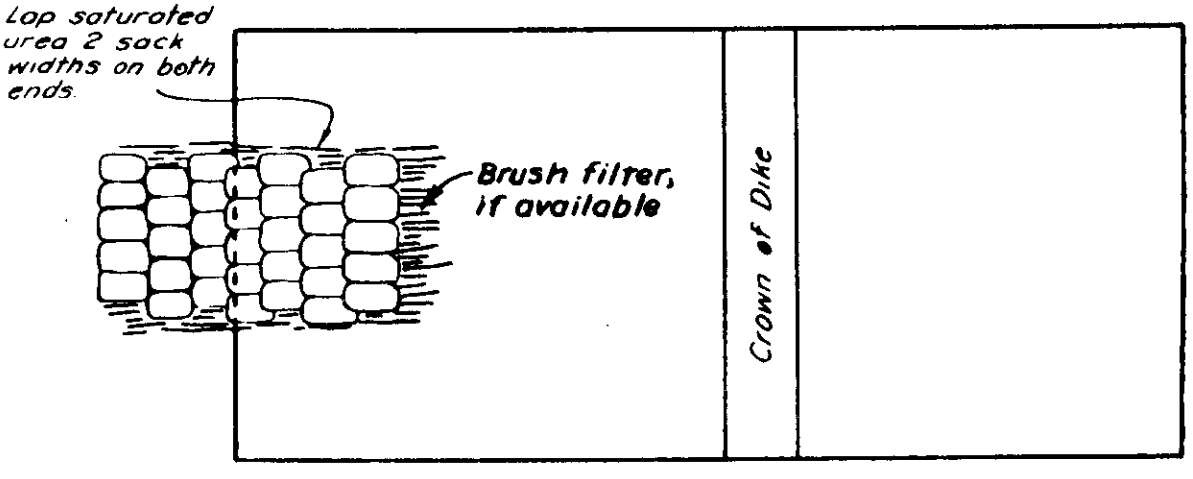


ELEVATION

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



ELEVATION



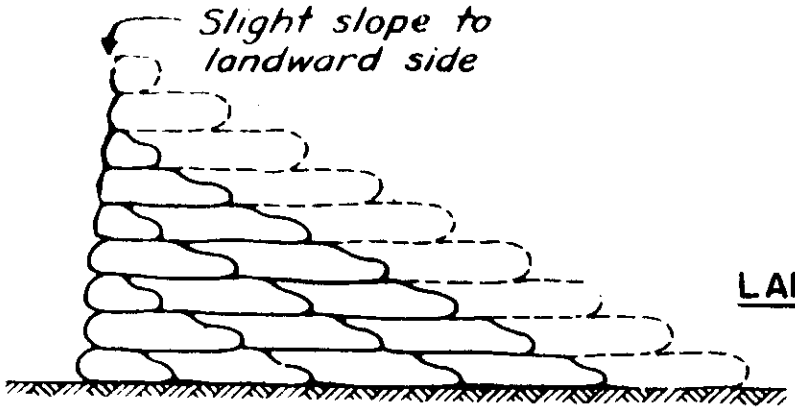
PLAN

Sacks should be laid shingle fashion and not moulded into place

SACKING SLOUGHS
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

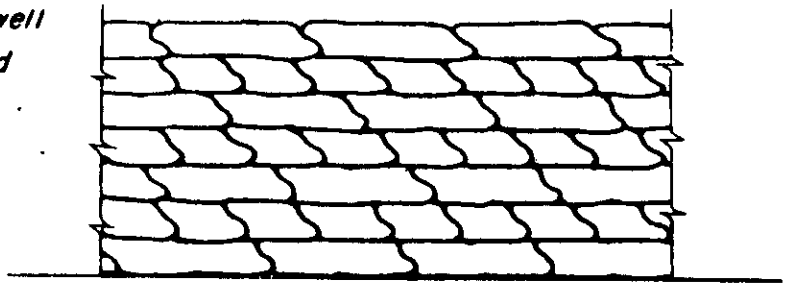
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. III



SECTION

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



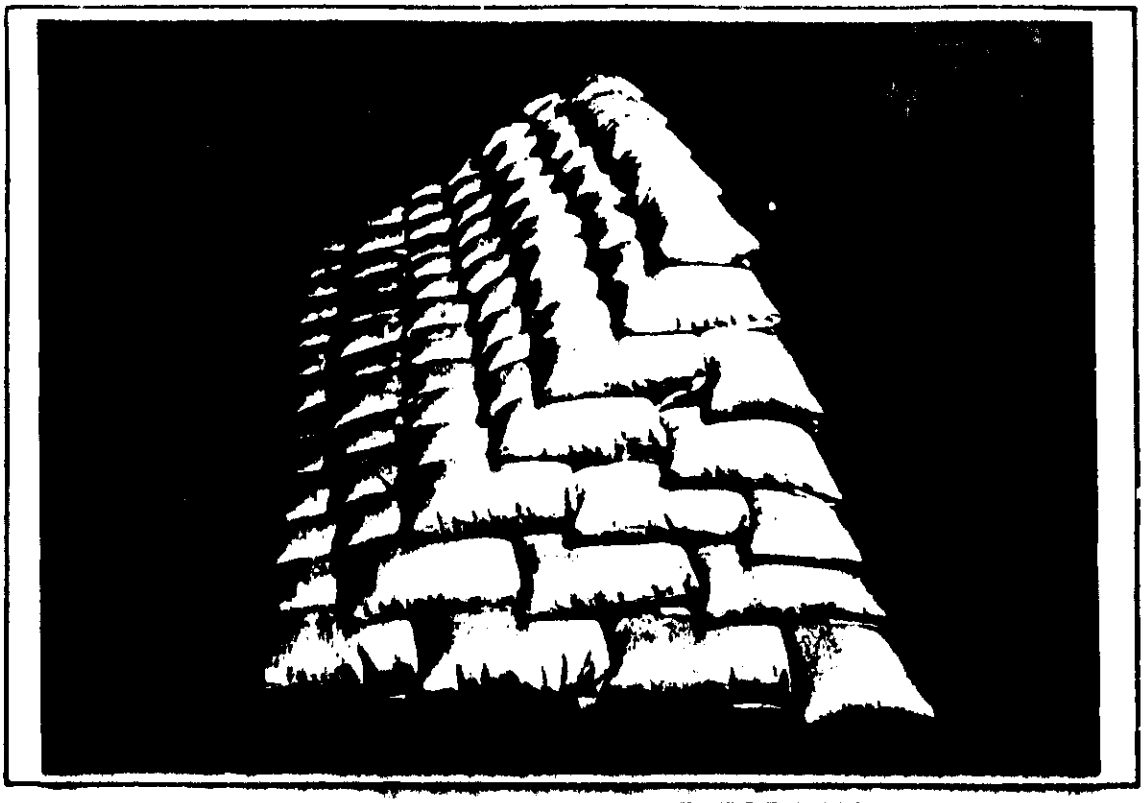
RIVERSIDE ELEVATION

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

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

SACK DIKE OR TOPPING
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

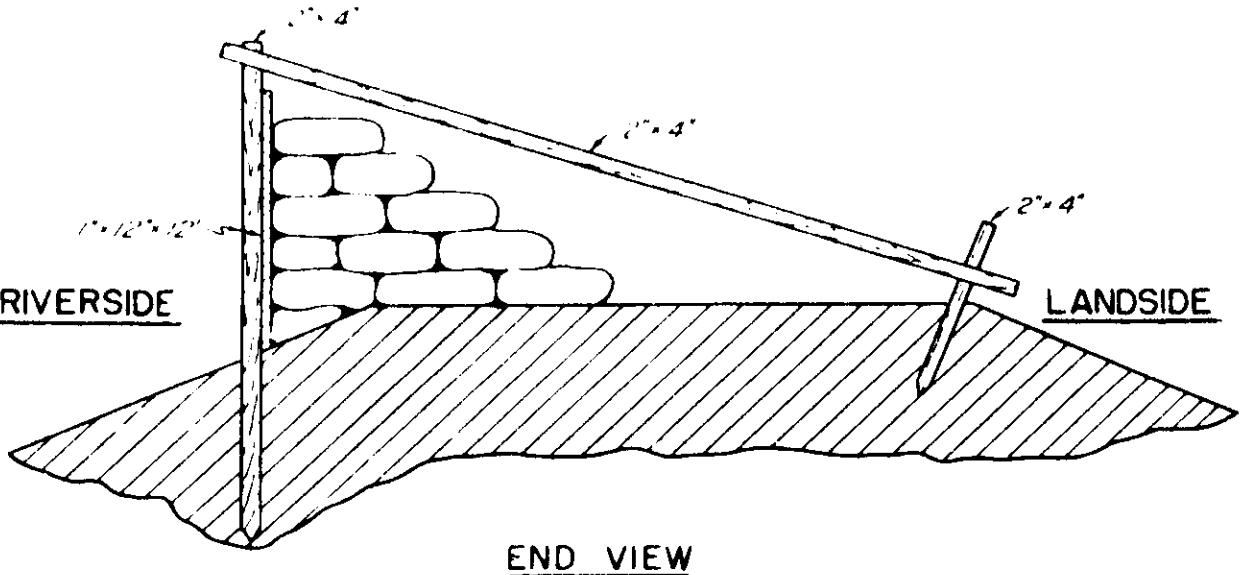
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.



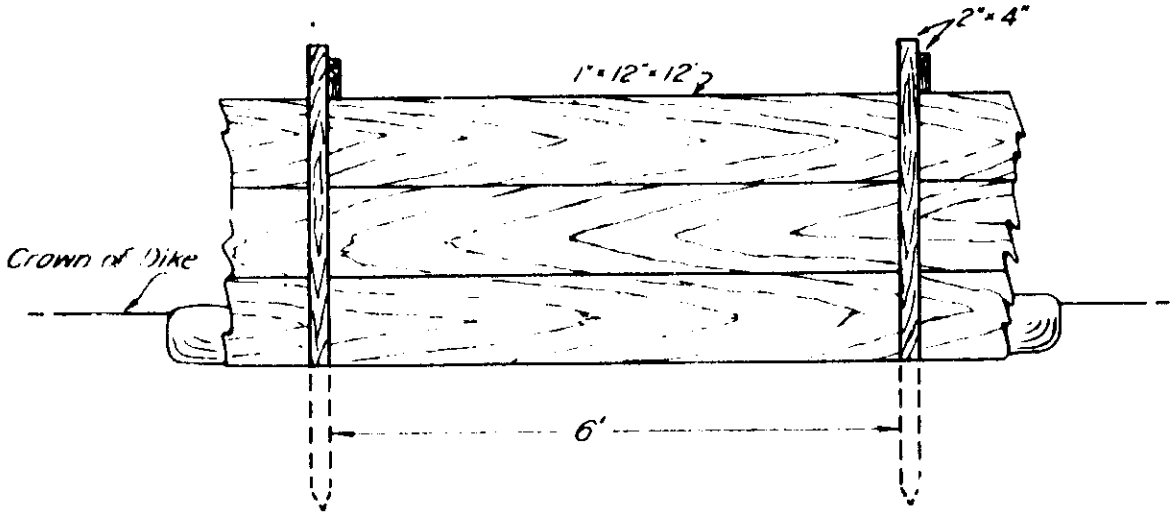
MODEL SACK DIKE OR TOPPING
Typical Section

MODEL SACK DIKE OR TOPPING
Riverside View

PLATE NO. V



END VIEW



FRONT ELEVATION

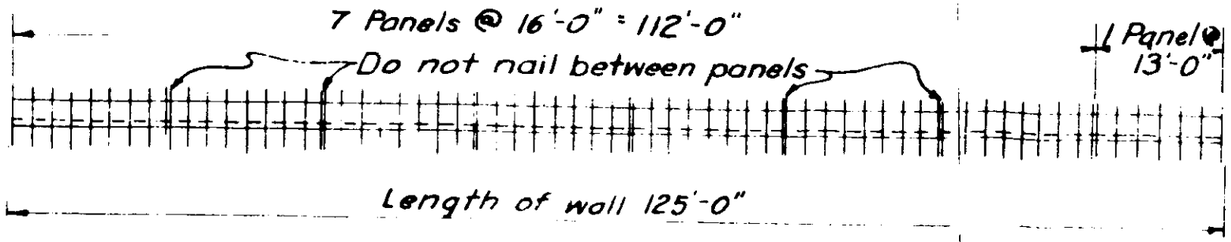
BILL OF MATERIAL TO CONSTRUCT 100 FEET

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

LUMBER AND SACK TOPPING
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

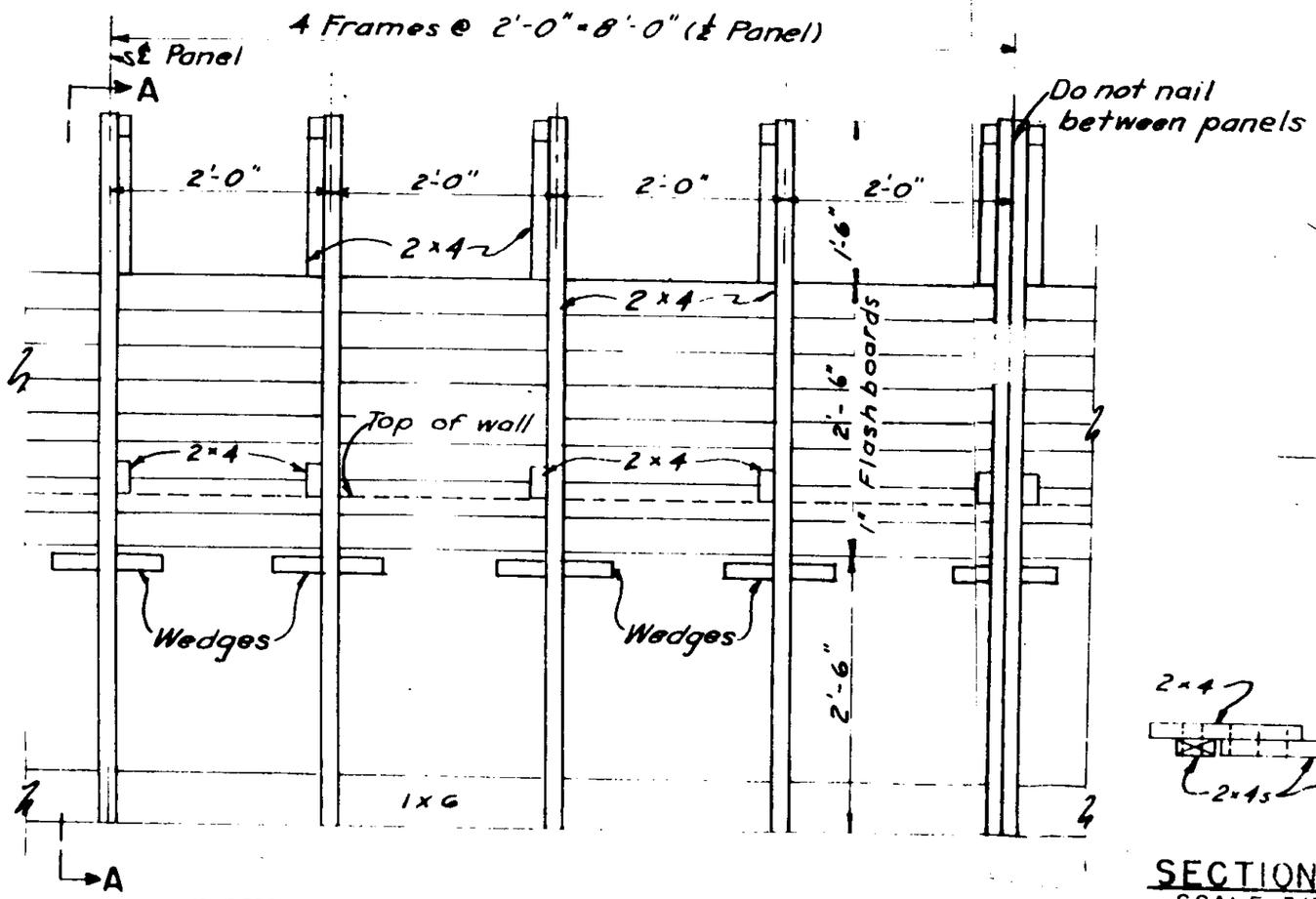
DEPARTMENT OF THE ARMY
N. W. ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. VI

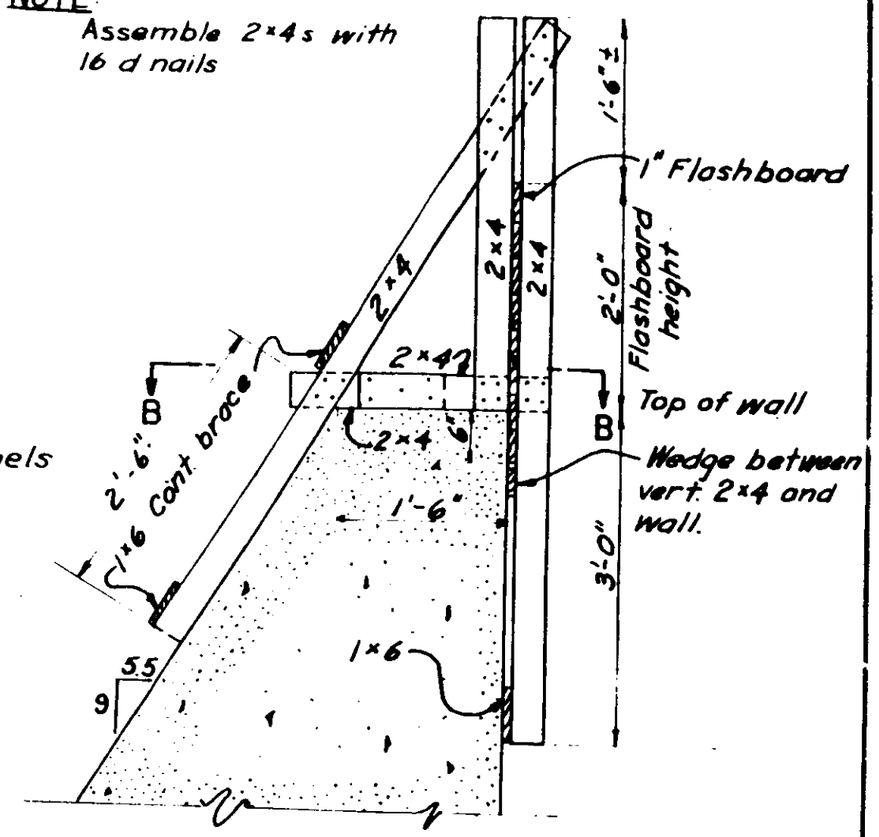


NOTE:
Assemble 2×4s with 16 d nails

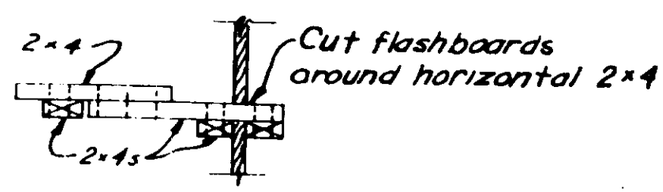
ELEVATION OF FLASHBOARDS
SCALE: 1/16" = 1'-0"



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



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



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

FLOOD EMERGENCY MEASURES
FLASHBOARDS

CORPS OF ENGINEERS U. S. ARMY

INDEX TO DRAWINGS

DWG. NO.	SH. NO.	TITLE
SUD-1	1	INDEX TO DRAWINGS
SUD-1	2	GENERAL PLAN AND LOCATION MAP
SUD-1	3	ALINEMENT PLAN
SUD-1	4	WALLS AND DIKES - PLAN AND PROFILE NO. 1
SUD-1	5	WALLS AND DIKES - PLAN AND PROFILE NO. 2
SUD-1	6	WALLS AND DIKES - PLAN AND PROFILE NO. 3
SUD-1	7	PLAN, ELEVATION AND SECTIONS - STA. 0+00 TO STA. 7+50
SUD-1	8	DIVERSION OF RIVER AND DANFORTH STREET WALL-PLANS AND SECTIONS
SUD-1	9	DIKE-TYPICAL EMBANKMENT SECTIONS NO. 1
SUD-1	10	DIKE-TYPICAL EMBANKMENT SECTIONS NO. 2
SUD-1	11	DIKE-TYPICAL EMBANKMENT SECTIONS NO. 3
SUD-1	12	SAXONVILLE POND-WALLS AND INTAKE STRUCTURE PLANS, PROFILE AND SECTIONS
SUD-1	13	SAXONVILLE POND-INTAKE STRUCTURE-REINFORCEMENT DETAILS
SUD-1	14	CONCRETE FLOODWALLS - REINFORCEMENT DETAILS
SUD-1	15	SPECIAL FLOODWALL MONOLITHS - REINFORCEMENT DETAILS NO. 1
SUD-1	16	SPECIAL FLOODWALL MONOLITHS - REINFORCEMENT DETAILS NO. 2
SUD-1	17	FLOODWALLS AND WATERSTOPS - STRUCTURAL MISCELLANEOUS DETAILS
SUD-1	18	I WALLS - STRUCTURAL-PLANS, ELEVATIONS AND DETAILS
SUD-1	19	ACCESS BRIDGE AND GRAVITY CONDUIT-REINFORCEMENT DETAILS
SUD-1	20	GRAVITY CONDUIT, GATE STRUCTURE AND OUTLET STUCTURE-REINFORCEMENT DETAILS
SUD-1	21	UTILITY DETAILS NO. 1
SUD-1	22	UTILITY DETAILS NO. 2
SUD-1	23	UTILITY DETAILS NO 3
SUD-1	24	CONCORD STREET GATE-PLAN AND SECTIONS
SUD-1	25	CONCORD STREET GATE-EXCAVATION PLAN
SUD-1	26	CONCORD STREET GATE-ARCHITECTURAL-PLAN, ELEVATIONS AND DETAILS
SUD-1	26A	ELEVATION AND DETAILS
SUD-1	27	CONCORD STREET GATE-REINFORCEMENT DETAILS
SUD-1	28	CONCORD STREET GATE-STRUCTURAL DETAILS NO. 1
SUD-1	29	CONCORD STREET GATE-STRUCTURAL DETAILS NO. 2
SUD-1	30	CONCORD STREET GATE-STRUCTURAL DETAILS NO. 3
SUD-1	31	CONCORD STREET GATE-STRUCTURAL DETAILS NO. 4
SUD-1	32	PUMPING STATION - PLAN AND SECTIONS
SUD-1	33	PUMPING STATION - SECTIONS AND DETAILS
SUD-1	34	PUMPING STATION - ARCHITECTURAL - PLANS, ELEVATIONS AND SECTION
SUD-1	35	PUMPING STATION-ARCHITECTURAL-SECTION AND DETAILS
SUD-1	36	PUMPING STATION-REINFORCEMENT DETAILS NO. 1
SUD-1	37	PUMPING STATION-REINFORCEMENT DETAILS NO. 2
SUD-1	38	PUMPING STATION-REINFORCEMENT DETAILS NO. 3
SUD-1	39	PUMPING STATION-STRUCTURAL-MASONRY WALL DETAILS
SUD-1	40	PUMPING STATION-MECHANICAL-PLANS AND SECTIONS
SUD-1	41	PUMPING STATION-DISCHARGE PIPING PLAN, ELEVATION AND DETAILS
SUD-1	42	PUMPING STATION-MECHANICAL-MISCELLANEOUS DETAILS
SUD-1	43	PUMPING STATION-ELECTRICAL-PLANS AND SCHEDULE
SUD-1	44	PLANTING PLANS
SUD-1	45	HYDROGRAPHS NO. 1
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SUD-1	47	HYDROGRAPHS NO. 3
SUD-1	48	PLAN OF FOUNDATION EXPLORATIONS
SUD-1	49	RECORD OF EXPLORATIONS
SUD-2	1	PLAQUE
N.E.D. STANDARD DRAWING		
STD-4	1	1 AND 2 NUMBER TILE AND STAFF GAGES

DRAWINGS INCLUDED WITH SPECIFICATIONS

DWG. NO.	SH. NO.	TITLE
STD-36	—	SAFETY SIGN
STD 22A	—	CONSTRUCTION PROJECT SIGN
40-06-04	3	INTERIOR ELECTRICAL
40-06-04	10	INTERIOR ELECTRICAL
40-06-04	30A	INTERIOR ELECTRICAL
40-16-09	—	FENCE DETAILS
NED 1009A	—	TREES AND SHRUBS
STD-42	—	SANITARY SEWER MANHOLES
STD-50	—	CAST IRON FRAME, GRATE AND COVER
STD-60	—	TYPICAL STORM DRAIN MANHOLE
40-02-02	—	WATERSTOPS-TYPES A&B
40-02-03	—	WATERSTOPS-TYPES U&Y
△ SK-306	—	MATERIALS LABORATORY
△ 40-06-01	33	MANHOLE HARDWARE
△ 40-06-07	1	DOUBLE ELECTRIC MANHOLE

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY
△	9-27-77	[illegible]	[illegible]
△	9-28-77	[illegible]	[illegible]
△	11-30-77	[illegible]	[illegible]

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

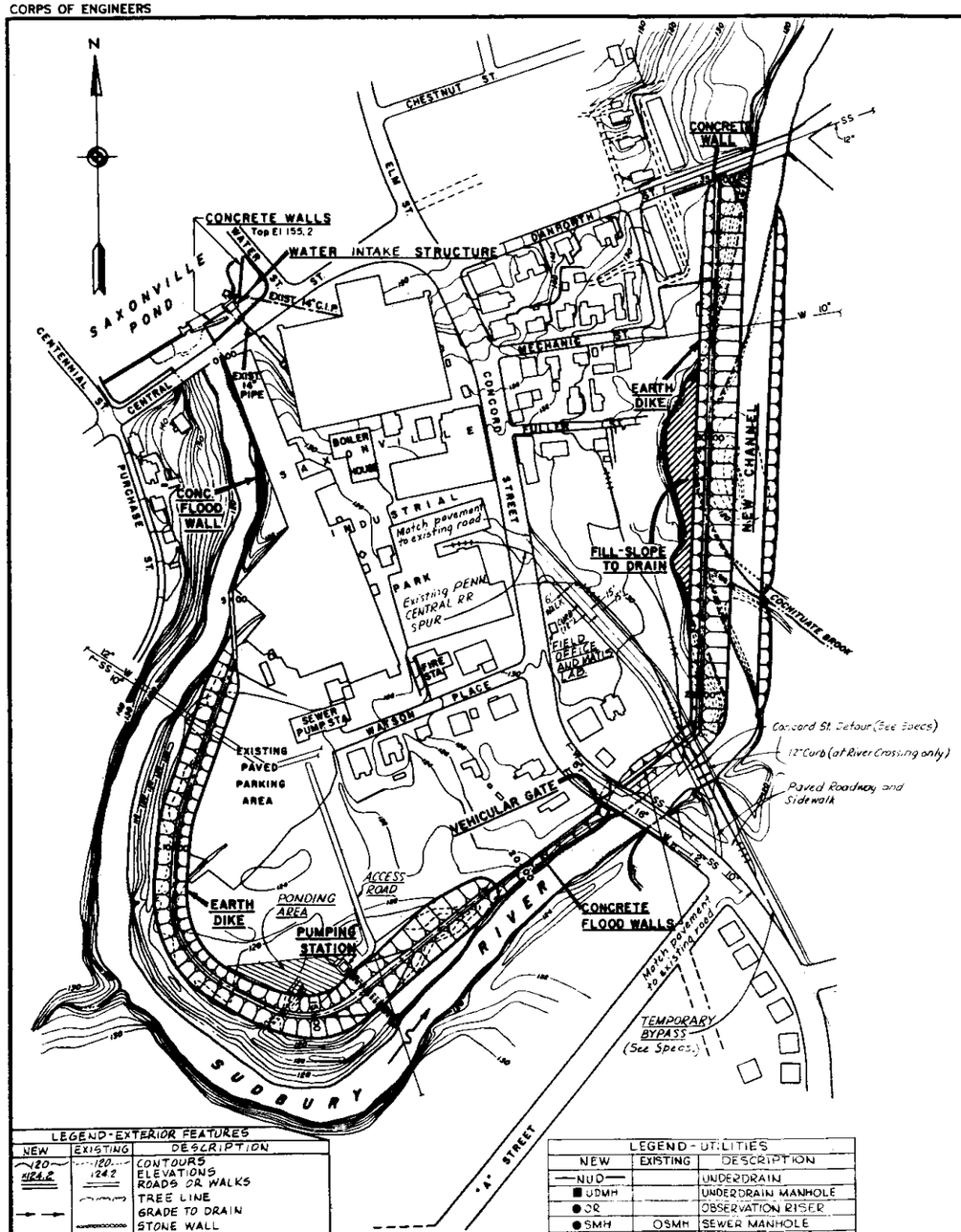
DES. BY W. K. | DR. BY M W B | CK. BY [illegible]

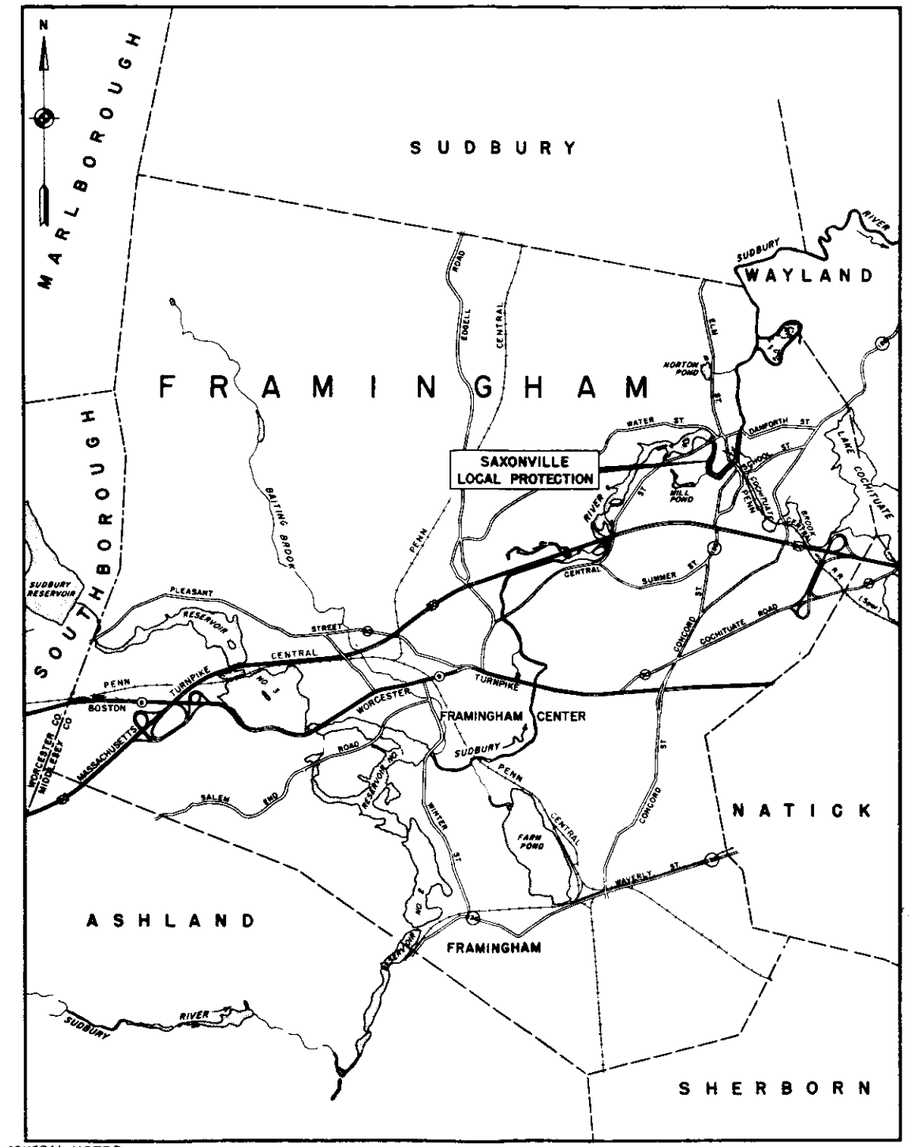
SUBMITTED: CHIEF, DRAFTING SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
RECOMMENDED: PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
INDEX TO DRAWINGS
SUDBURY RIVER MASSACHUSETTS

APPROVED: CHIEF, ENGINEERING DIVISION
DATE NOV 1976

SCALE | SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 1





LEGEND - EXTERIOR FEATURES		
NEW	EXISTING	DESCRIPTION
120	120	CONTOURS
124.2	124.2	ELEVATIONS
		ROADS OR WALKS
		TREE LINE
		GRADE TO DRAIN
		STONE WALL
		BUILDINGS
		LIMIT OF CONTRACTORS WORK AREA
		EARTH CUT AND ROCK CUT
		EARTH CUT WITH STONE PROTECTION
		EARTH FILL
		EARTH FILL WITH ROCK SLOPE PROTECTION
		EARTH SURFACE (SECTION)
		ASSUMED ROCK SURFACE OR ROCK CUT (SECTION)

GENERAL PLAN

SCALE: 1" = 100'

LEGEND - UTILITIES		
NEW	EXISTING	DESCRIPTION
—NUD—		UNDERDRAIN
■ UDMH		UNDERDRAIN MANHOLE
● OR		OBSERVATION RISER
● SMH	OSMH	SEWER MANHOLE
⊕		NEW FRAMES & COVERS ON EXISTING SMHS
	—FM—	SEWER FORCE MAIN
	—GV—	GATE VALVE
—NSD—	—SD—	STORM DRAIN
■ DMH	☐ DMH	STORMDRAIN MANHOLE
—NW—	—W—	WATER LINE
	—SS—	SANITARY LINE (SEWER)
—NG—	—G—	GAS LINE
	—⊗—	GAS SHUT OFF

GENERAL NOTES:

1. Elevations refer to Mean Sea Level Datum.
2. Plane coordinates refer to Massachusetts State Plane Coordinates.
3. Figures in hexagons indicate item numbers under which payment will be made
4. Bid item references are shown where practicable on the drawings for convenience only. Under no circumstances should these be used without reference to 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.
5. Unless otherwise indicated on the plans and typical sections, all backfilled areas contiguous to the landside of floodwalls and dikes shall be graded to drain.

LOCATION MAP

SCALE IN FEET 1000' 0 1000' 3000' 5000'

As Built Drawing

Contract No. DACW33-77-C-0034

GRAPHIC SCALES

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

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

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

DES. BY J.B.M. DR. BY S.D.L. CK. BY R.E.J.

SUBMITTED: CHIEF, LAYOUT SECTION

RECOMMENDED: CHIEF, DESIGN BRANCH

RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
GENERAL PLAN AND LOCATION MAP

SUDBURY RIVER MASSACHUSETTS

APPROVED: CHIEF, ENGINEERING DIVISION

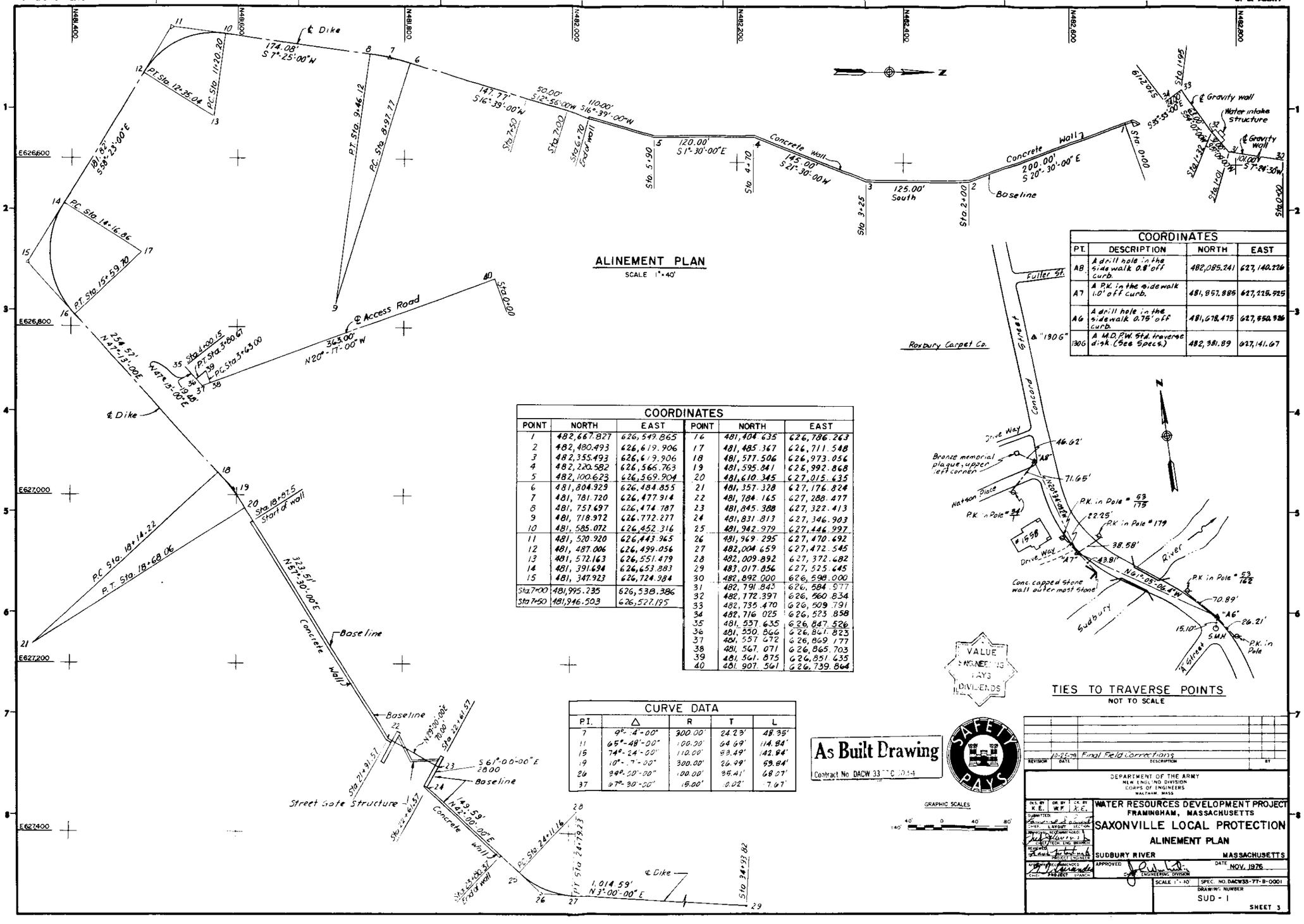
DATE NOV. 1976

SCALE AS SHOWN SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD - 1

SHEET 2

CORPS OF ENGINEERS — U. S. ARMY



ALINEMENT PLAN

SCALE 1" = 40'

COORDINATES					
POINT	NORTH	EAST	POINT	NORTH	EAST
1	482,667.827	626,549.865	16	481,404.635	626,786.263
2	482,480.493	626,619.906	17	481,485.367	626,711.548
3	482,355.493	626,619.906	18	481,577.506	626,973.056
4	482,220.582	626,566.763	19	481,595.841	626,992.868
5	482,100.623	626,569.904	20	481,610.345	627,015.635
6	481,804.929	626,484.855	21	481,357.328	627,176.824
7	481,781.720	626,477.914	22	481,784.165	627,288.477
8	481,757.697	626,474.787	23	481,845.388	627,322.413
9	481,718.972	626,772.277	24	481,831.813	627,346.903
10	481,585.072	626,452.316	25	481,942.979	627,446.997
11	481,520.920	626,443.965	26	481,969.295	627,470.692
12	481,487.006	626,499.056	27	482,004.659	627,472.545
13	481,572.163	626,551.479	28	482,009.892	627,372.682
14	481,391.694	626,653.883	29	483,017.856	627,525.645
15	481,347.923	626,724.984	30	482,892.000	626,598.000
Sta 7+00	481,995.235	626,538.386	31	482,791.843	626,584.977
Sta 7+50	481,946.503	626,527.195	32	482,772.397	626,560.834
			33	482,735.470	626,509.791
			34	482,716.025	626,523.858
			35	481,537.635	626,847.526
			36	481,550.866	626,861.823
			37	481,557.672	626,869.177
			38	481,567.071	626,865.703
			39	481,561.875	626,851.635
			40	481,907.561	626,739.864

CURVE DATA				
P.I.	Δ	R	T	L
7	9°-14'-00"	300.00'	24.23'	48.35'
11	65°-48'-00"	100.00'	64.69'	114.84'
15	74°-24'-00"	110.00'	83.49'	142.84'
19	10°-17'-00"	300.00'	26.49'	53.84'
26	34°-50'-00"	100.00'	31.41'	60.07'
37	67°-30'-00"	15.00'	10.02'	17.67'

COORDINATES			
PT.	DESCRIPTION	NORTH	EAST
AB	A drill hole in the sidewalk 0.8' off curb.	482,085.241	627,140.226
A7	A P.K. in the sidewalk 1.0' off curb.	481,857.885	627,225.525
A6	A drill hole in the sidewalk 0.75' off curb.	481,678.475	627,350.326
130G	A M.D.P.W. Std. traverse disk. (See Spec.)	482,381.89	627,141.67

TIES TO TRAVERSE POINTS

NOT TO SCALE

VALUE ENGINEERING PAYS DIVIDENDS

SAFETY PAYS

As Built Drawing

Contract No DACW 33-77-C-0034

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final Field Corrections	

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

DES. BY K.E. | DR. BY W.F. | CK. BY K.E.

SUBMITTED: CHIEF, LAYOUT SECTION

RECOMMENDED: CHIEF, TECH. ENG. BRANCH

RECOMMENDED: CHIEF, PROJECT BRANCH

APPROVED: CHIEF, ENGINEERING DIVISION

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

ALINEMENT PLAN

SUDBURY RIVER — MASSACHUSETTS

DATE NOV. 1976

SCALE 1" = 40' | SPEC. NO. DACW33-77-B-0001

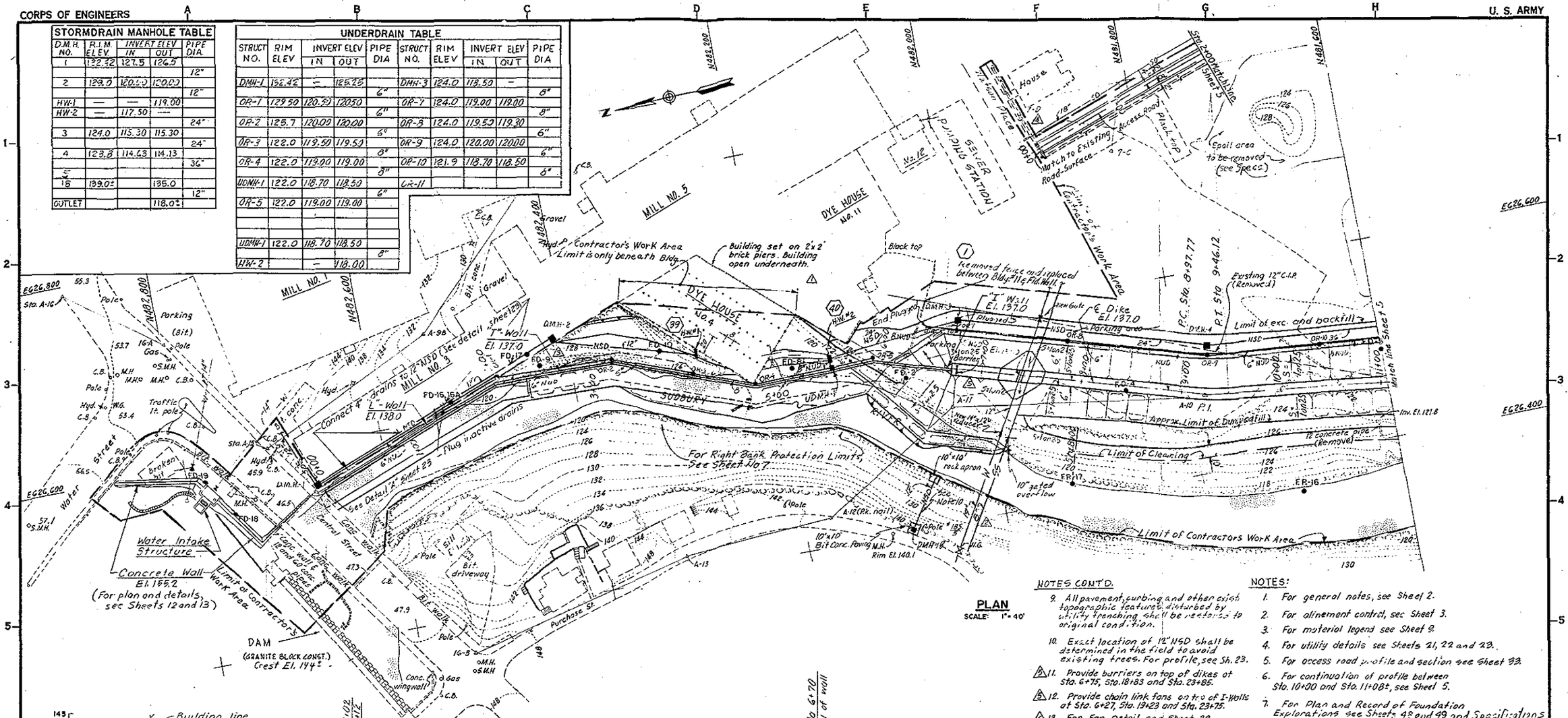
DRAWING NUMBER SUD - 1

SHEET 3

CORPS OF ENGINEERS — U. S. ARMY

STORMDRAIN MANHOLE TABLE				
D.M.H. NO.	R.I.M. ELEV	INVERT ELEV IN	INVERT ELEV OUT	PIPE DIA.
1	122.42	127.5	126.5	
				12"
2	129.0	120.00	120.00	
				12"
HW-1	—	—	119.00	
HW-2	—	117.50	—	
				24"
3	124.0	115.30	115.30	
				24"
4	123.8	114.43	114.13	
				36"
5				
18	139.0±		135.0	
				12"
OUTLET			118.0±	

UNDERDRAIN TABLE									
STRUCT NO.	RIM ELEV	INVERT ELEV IN	INVERT ELEV OUT	PIPE DIA	STRUCT NO.	RIM ELEV	INVERT ELEV IN	INVERT ELEV OUT	PIPE DIA
DMH-1	132.42	—	125.28		DMH-3	124.0	118.50	—	
				6"					8"
OR-1	129.50	120.50	120.50		OR-7	124.0	119.00	119.00	
				6"					8"
OR-2	125.7	120.00	120.00		OR-8	124.0	119.50	119.30	
				6"					6"
OR-3	122.0	119.50	119.50		OR-9	124.0	120.00	120.00	
				8"					6"
OR-4	122.0	119.00	119.00		OR-10	121.9	118.70	118.50	
				8"					8"
UDMH-1	122.0	118.70	118.50		OR-11				
				6"					
OR-5	122.0	119.00	119.00						
UDMH-1	122.0	118.70	118.50						
				8"					
HW-2		—	118.00						



PLAN

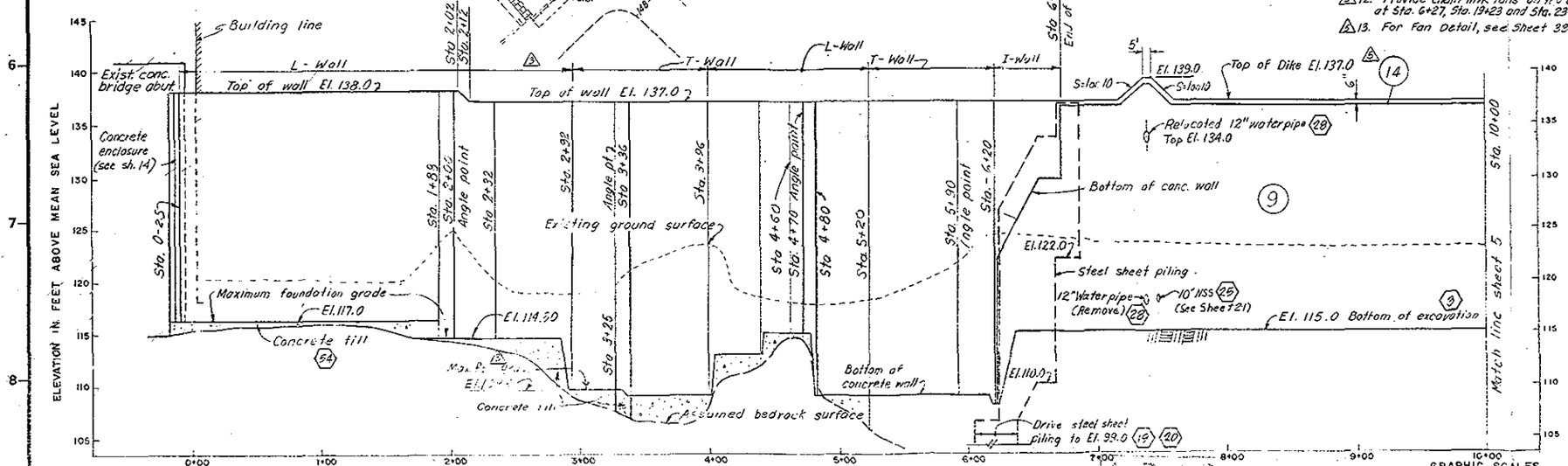
SCALE: 1" = 40'

NOTES CONT'D.

9. All pavement, curbing and other existing topographic features disturbed by utility trenching shall be restored to original condition.
10. Exact location of 12" NSD shall be determined in the field to avoid existing trees. For profile, see Sh. 23.
11. Provide barriers on top of dikes at Sta. 6+75, Sta. 18+83 and Sta. 23+85.
12. Provide chain link fans on top of I-walls at Sta. 6+27, Sta. 19+23 and Sta. 23+75.
13. For Fan Detail, see Sheet 32.

NOTES:

1. For general notes, see Sheet 2.
2. For alinement control, see Sheet 3.
3. For material legend see Sheet 9.
4. For utility details see Sheets 21, 22 and 23.
5. For access road profile and section see Sheet 32.
6. For continuation of profile between Sta. 10+00 and Sta. 11+08±, see Sheet 5.
7. For Plan and Record of Foundation Explorations see Sheets 48 and 49 and Specifications
8. All existing drains discharging into the river whether shown or not shown on plans shall be removed from under the protection.



PROFILE ALONG ℄ WALL AND DIKE

SCALE: HORIZ. 1" = 40'
VERT. 1" = 5'

GRAPHIC SCALES

1" = 40'-0"

1" = 5'-0"

As Built Drawing

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final Field Corrections	
5	10-23-78	Notes added. Barrier added. Road gravel added.	
4	10-26-77	Limit of work area revised.	
3	9-28-77	Concrete walls revised	
2	1-20-77	Revised pipe size (Am. #2)	
1	1-20-77	Added note (Am. #1)	

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

DES. BY K. E. | DR. BY W. F. | CK. BY JAA KE

SUBMITTED: CHIEF, LAYOUT SECTION

APPROVAL RECOMMENDED: CHIEF, FDN. ENG. BRANCH

REVIEWED: PROJECT ENGINEER

APPROVED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
WALLS AND DIKES
PLAN AND PROFILE NO. 1

SUDBURY RIVER — MASSACHUSETTS

APPROVED: CHIEF, ENGINEERING DIVISION

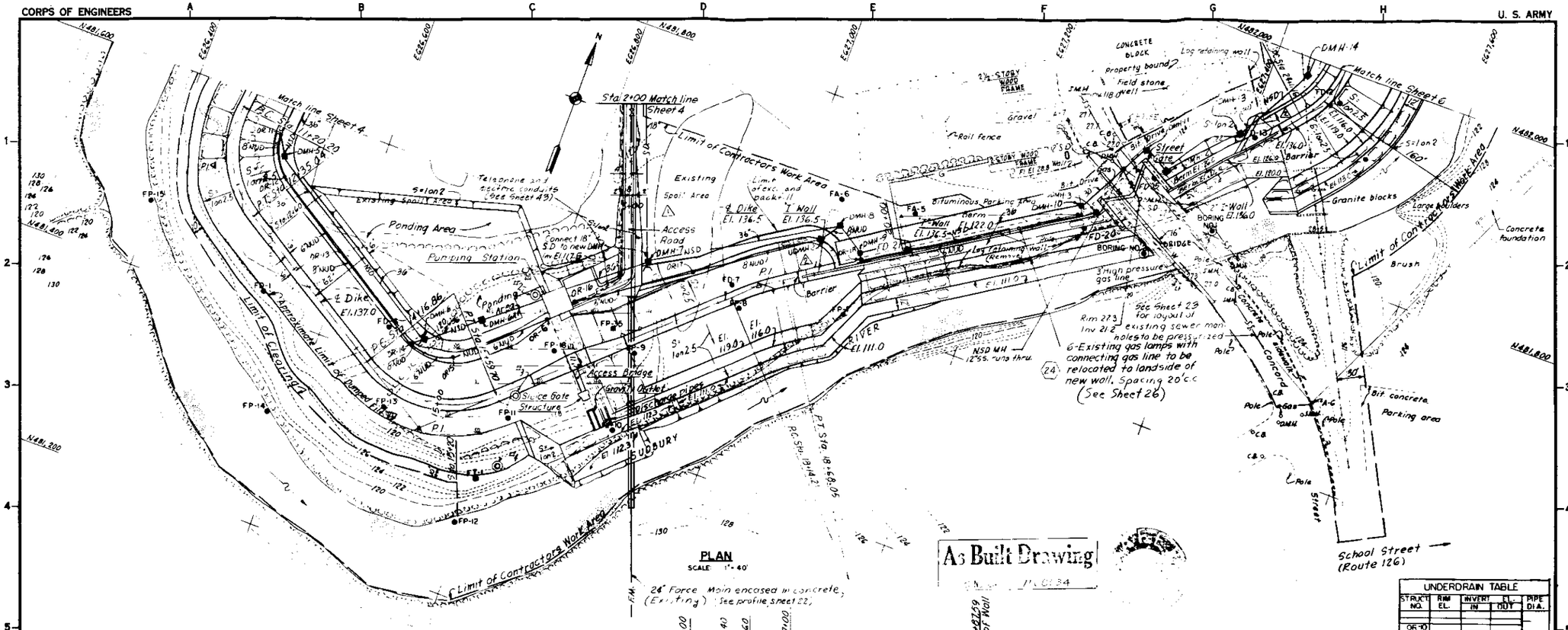
DATE NOV. 1976

SCALE: AS SHOWN | SPEC. NO. DACW33-77-B-0001

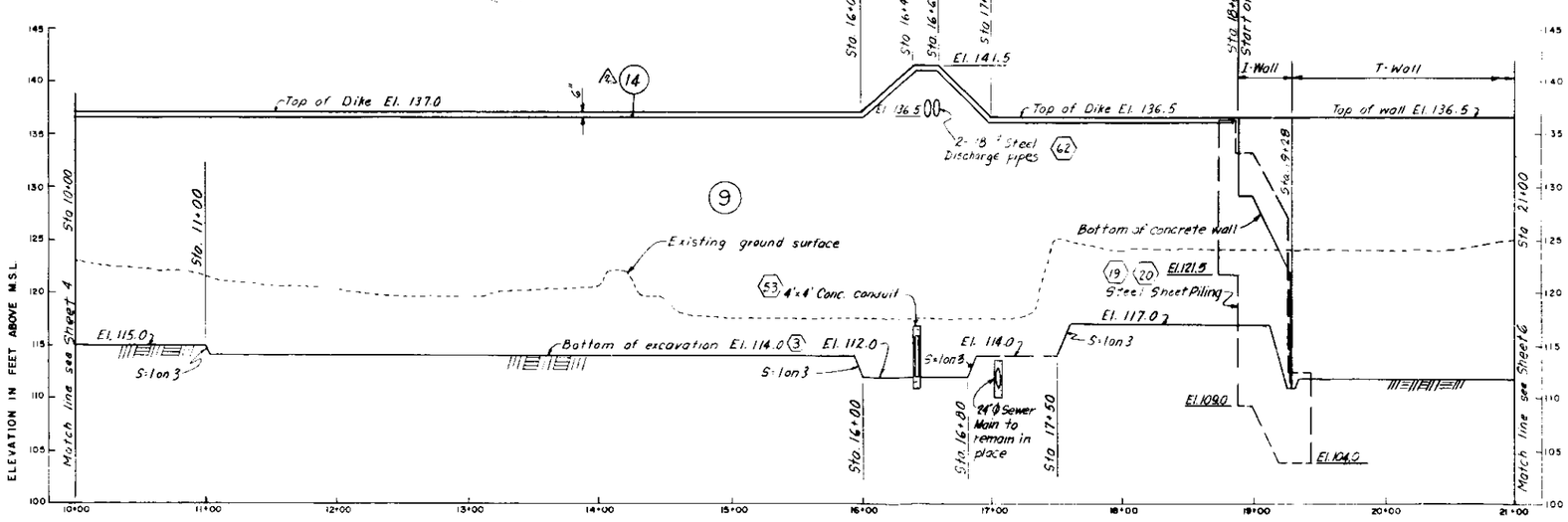
DRAWING NUMBER SUD-1

SHEET 4

CORPS OF ENGINEERS — U. S. ARMY



PLAN
SCALE 1" = 40'



PROFILE ALONG ℄ WALL AND DIKE
SCALE HORIZ. 1" = 40' VERT 1" = 5'

NOTES
1. For notes applying to this Sh. see Sh. 3
2. For materials legend see Sh. 9
3. For continuation of profile between Sta 21+00 and Sta. 24+95± see Sh. 6

GRAPHIC SCALE
1" = 40'-0'
1" = 5'-0'

STORMDRAIN MANHOLE TABLE

D.M.H. NO.	RIM EL.	INVERT EL. IN	INVERT EL. OUT	PIPE DIA.
5	123.6	113.69	113.69	36"
6	121.0	113.24	113.24	36"
G.A.	118.0	113.10	113.10	36"
P.S.		113.00	—	
P.S.	—	114.90	—	36"
7	122.35	114.60	114.60	36"
8	123.0	115.20	115.2	36"
9	124.0	115.40	115.40	36"
10	125.7	116.5	116.0	30"
11	125.7	116.8	116.8	30"
12	125.0	116.92	116.92	30"
13	124.0	117.18	117.18	30"
14	126.8	117.61	117.61	30"
15				

UNDERDRAIN TABLE

STRUCT. NO.	RIM EL.	INVERT EL. IN	INVERT EL. OUT	PIPE DIA.
OR-10				8"
OR-11	123.5	116.50	116.50	
OR-5		116.0		6"
OR-12	123.5	116.70	116.70	6"
OR-13	121.0	116.50	116.30	8"
OR-14	121.0	116.00	116.00	
DMH-6		115.5		6"
OR-15	118.0	116.2	116.2	6"
OR-6			116.5	
OR-16	125.2	—	117.5	6"
OR-17	124.0	117.70	117.50	8"
UDMH-2	124.0	117.00	117.00	6"
OR-18	124.0	118.20	118.00	6"
UDMH-3	126.0	—	119.50	
UDMH-2	124.0	117.00	117.00	8"
DMH-8			116.8	

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final Field Corrections	
2	10-23-78	Barriers added. Road gravel added.	AF DA FM
1	10-26-77	Telephone & Electric conduits revised.	RS RC AF

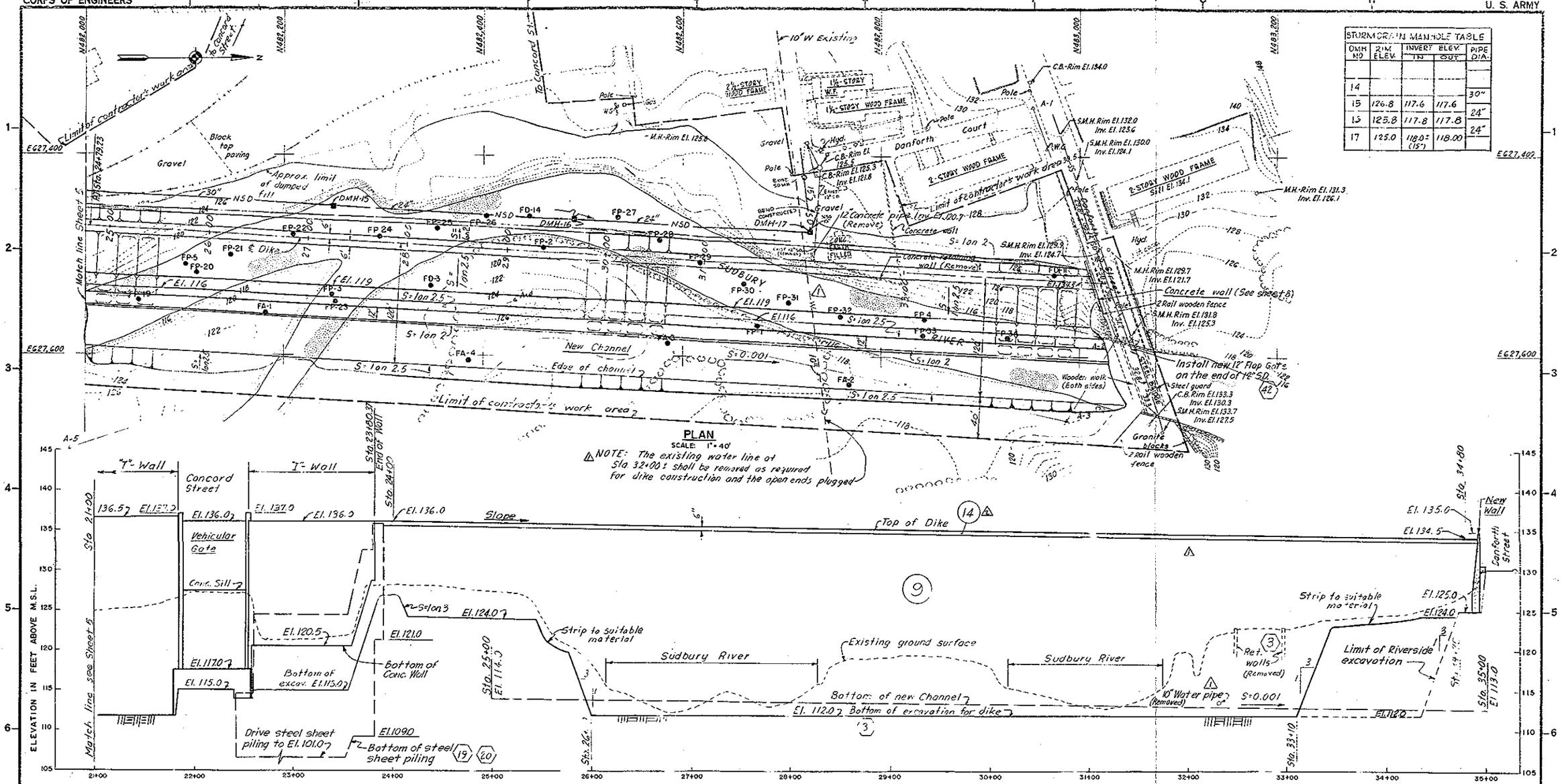
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY K.E. | DR. BY W.F. | CK. BY A.F.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: PROJECT ENGINEER
APPROVAL: CHIEF PROJECT BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
WALLS AND DIKES
PLAN AND PROFILE NO 2
SUDBURY RIVER — MASSACHUSETTS
DATE NOV. 1976

SCALE: AS SHOWN | SPEC NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 5

CORPS OF ENGINEERS — U. S. ARMY



PROFILE ALONG ℄ WALL AND DIKE

SCALE: HORIZ. 1" = 40' VERT. 1" = 5'

STORM DRAIN MANHOLE TABLE				
DMH NO	RIM ELEV.	INVERT ELEV. IN	INVERT ELEV. OUT	PIPE DIA.
14				
15	126.8	117.6	117.6	30"
16	125.8	117.8	117.8	24"
17	125.0	118.0± (15")	118.00	24"

Notes:
1. For notes applying to this sheet, see Sheet 4.
2. For Materials Legend, see Sheet 8.

As Built Drawing
Contract No. DACW33-77-C-0031

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final Field Corrections	
2	10-23-78	Road gravel added.	
1	1-20-77	[illegible]	RIA

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

DES. BY K.E. | DR. BY S.D. | CK. BY

SUBMITTED: CHIEF LAYOUT SECTION

APPROVAL RECOMMENDED: CHIEF TECH. ENG. BRANCH

REVIEWED: PROJECT ENGINEER

APPROVED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
WALLS AND DIKES
PLAN AND PROFILE NO. 3
SUDBURY RIVER — MASSACHUSETTS

APPROVED: CHIEF, ENGINEERING DIVISION — DATE NOV 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD - 1
SHEET 6

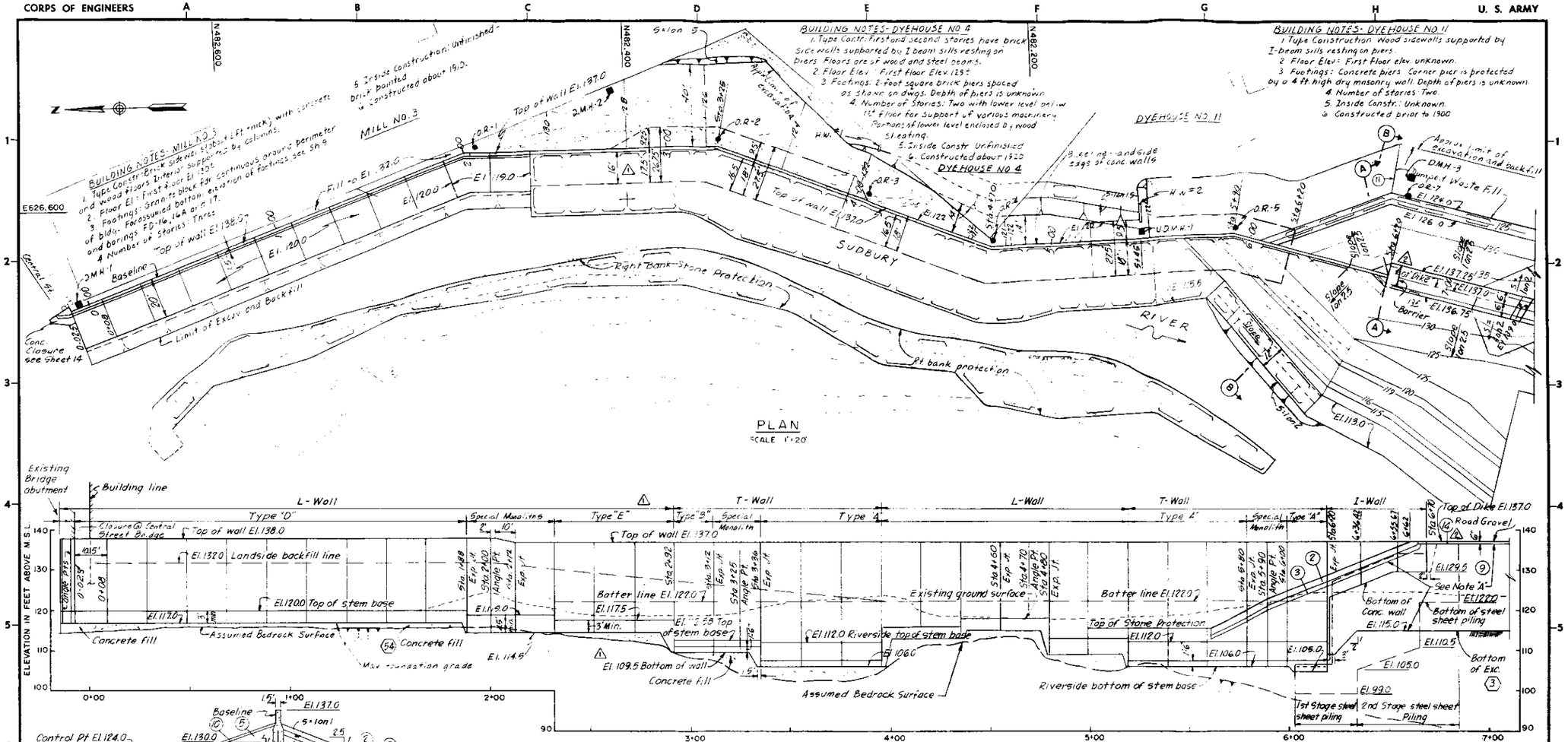
GRAPHIC SCALE
1" = 40'-0" 40' 0 40' 80'
1" = 5'-0" 5' 0 5' 10'

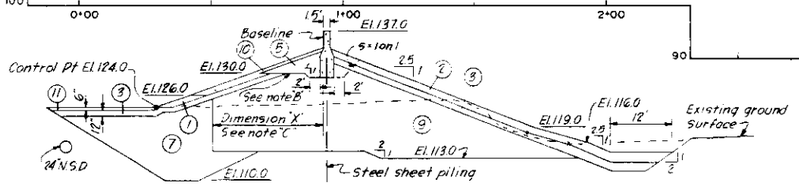
CORPS OF ENGINEERS — U. S. ARMY

BUILDING NOTES: MILL NO. 3
1. Type Constr: Brick sidewalls stabilized (8 ft. thick) with concrete and wood floors. Interior supported by columns.
2. Floor El: First floor El. 130.
3. Footings: Granite block for continuous around perimeter of bldg. Foreassumed bottom elevation of footings see Sh 9 and borings FD-16, 16A and 17.
4. Number of Stories: Three
5. Inside Construction: Unfinished brick painted
6. Constructed about 1910.

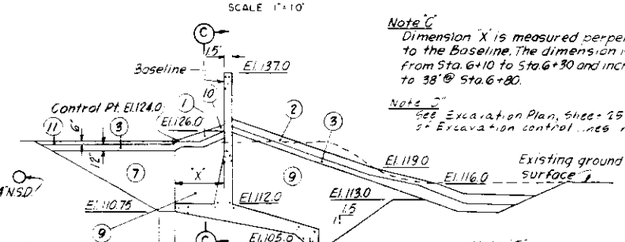
BUILDING NOTES: DYEHOUSE NO 4
1. Type Constr: First and second stories have brick sidewalls supported by I beam sills resting on piers. Floors are of wood and steel beams.
2. Floor Elev: First floor Elev 129?
3. Footings: 2-foot square brick piers spaced as shown on dwgs. Depth of piers is unknown.
4. Number of Stories: Two with lower level below 1st floor for support of various machinery. Portions of lower level enclosed by wood siding.
5. Inside Constr: Unfinished
6. Constructed about 1920

BUILDING NOTES: DYEHOUSE NO 11
1. Type Construction: Wood sidewalls supported by I-beam sills resting on piers.
2. Floor Elev: First floor elev. unknown.
3. Footings: Concrete piers. Corner pier is protected by a 4 ft. high dry masonry wall. Depth of piers is unknown.
4. Number of stories: Two.
5. Inside Constr.: Unknown.
6. Constructed prior to 1900





SECTION B-B
SCALE 1"=10'



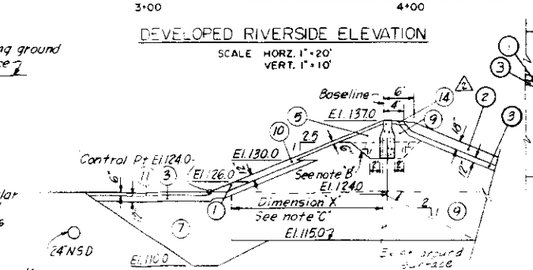
STA. 6+20 (BACK)
SCALE 1"=10'

Note C
Dimension "X" is measured perpendicular to the Baseline. The dimension is 9.5' from Sta. 6+10 to Sta. 6+30 and increases to 38' @ Sta. 6+80.

Note D
See Excavation Plan, Sheet 25 for location of Excavation control lines in this area.

Note F
Place 2' compacted sand fill (7) between processed gravel fill (41) and impervious fill (9) (Sta 6+08 to Sta 6+10.)

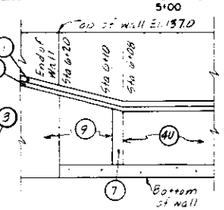
Note E
Uncompacted processed gravel fill (41) ends @ Sta 6+08.
Compacted impervious fill (9) begins @ Sta 6+10. See Section C-C.



SECTION A-A
SCALE 1"=10'

Note A
Limit of embankment to be constructed prior to driving 2nd Stage steel sheet piling.

Note B
Construct embankment to limits shown (Note B) prior to driving 2nd Stage steel sheet piling. Excavate fill as indicated to bottom of I-Wall. After I-Wall has been constructed, backfill with compacted impervious fill (9) on the ends and riverside of the wall and with compacted Gravel fill (5) on the landside of the wall.



SECTION C-C
SCALE: 1"=10'

NOTES:
1. For General Notes see Sheet 2.
2. For Notes applying to this Sheet see Sheet 8
3. For Materials legend see Sheet 9
4. All vertical joints are contraction joints (Contr. Jt.) unless otherwise noted as expansion joints (Exp. Jt.).
5. All monoliths are 20 ft. long unless otherwise noted.
6. All concrete for L-wall will be paid for under Item No. 50.
7. All concrete for I-wall will be paid for under Item No. 51.
8. All concrete for T-walls will be paid for under Item No. 52.

VALUE ENGINEERING PAYS DIVIDENDS

SAFETY PAYS

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

REVISION	DATE	DESCRIPTION	BY
3	10-25-79	Final Field Corrections	
2	10-23-78	Barrier added. Road gravel added.	
1	9-28-77	Concrete walls revised	

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

DES. BY JL | DR. BY JAP | CK. BY KE

SUBMITTED: Leonard J. Gonsalves, CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: Joel H. Glazier, CHIEF, TECH. ENG. BRANCH
APPROVAL RECOMMENDED: Paul Kokkinos, PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

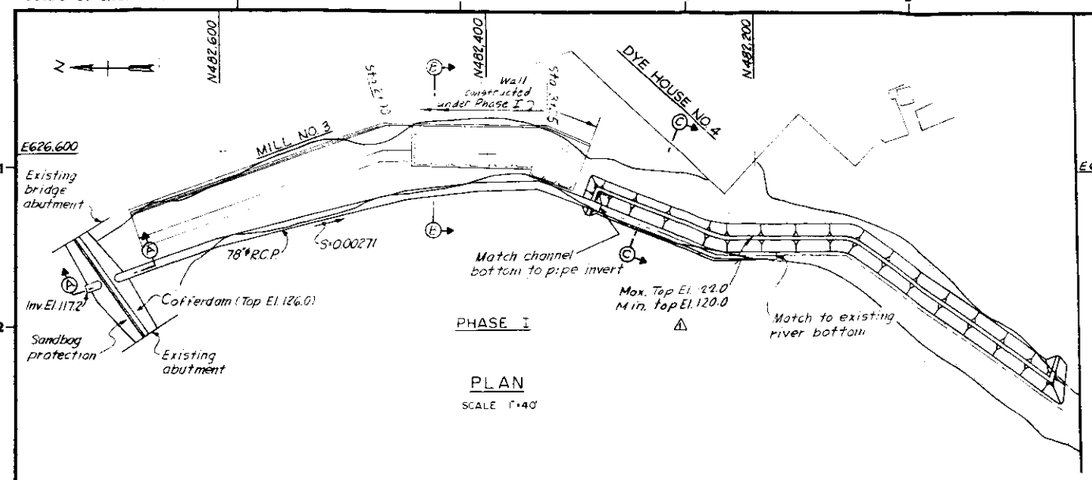
PLAN, ELEVATION AND SECTIONS
STA. 0+00 TO STA. 7+50

SUDBURY RIVER — MASSACHUSETTS

APPROVED: Wm. J. Leahy, CHIEF, ENGINEERING DIVISION
DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 7

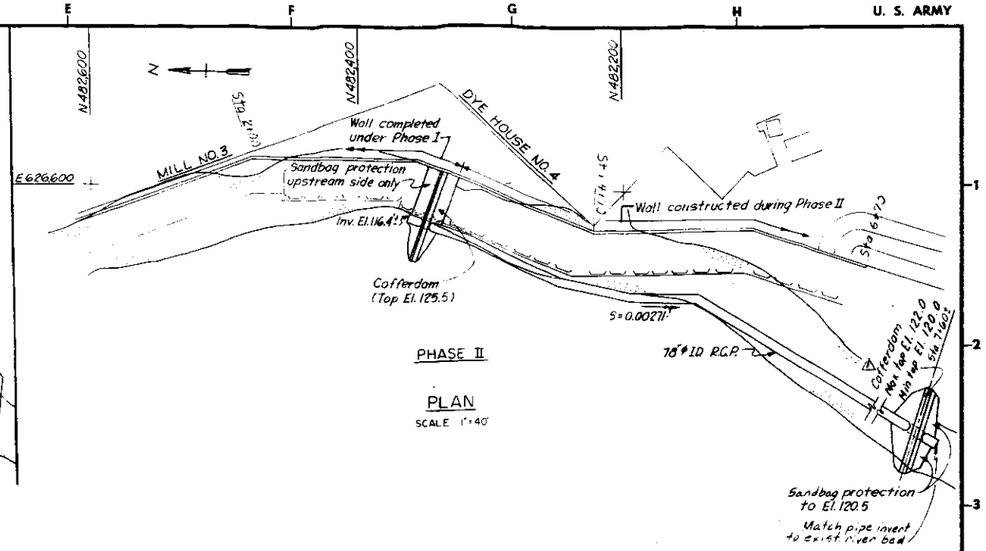
CORPS OF ENGINEERS — U. S. ARMY



PHASE I

PLAN

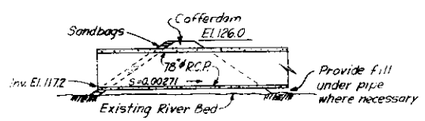
SCALE 1" = 40'



PHASE II

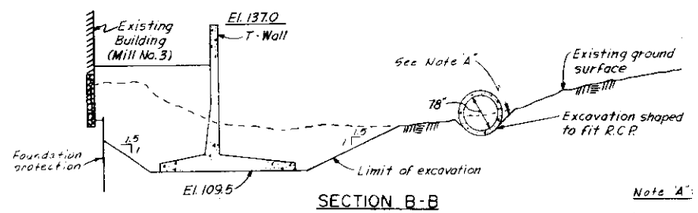
PLAN

SCALE 1" = 40'



SECTION A-A

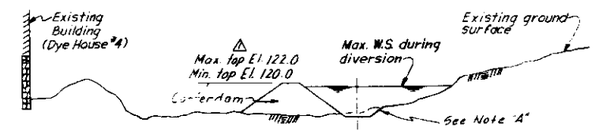
SCALE 1" = 10'



SECTION B-B

SCALE 1" = 10'

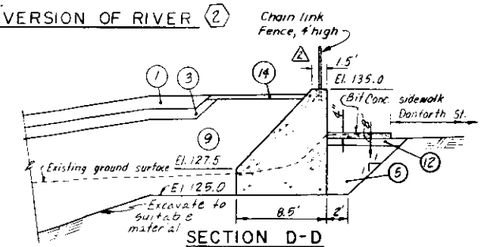
DIVERSION OF RIVER (2)



Note "A": Place 18" stone protection and 12" gravel bedding on excavated slopes after diversion is no longer required.

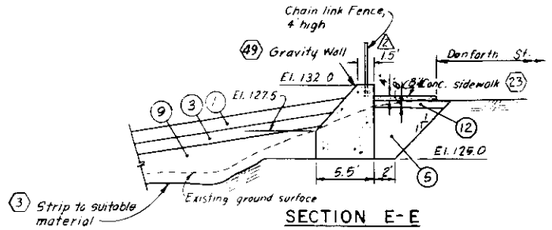
SECTION C-C

SCALE 1" = 10'



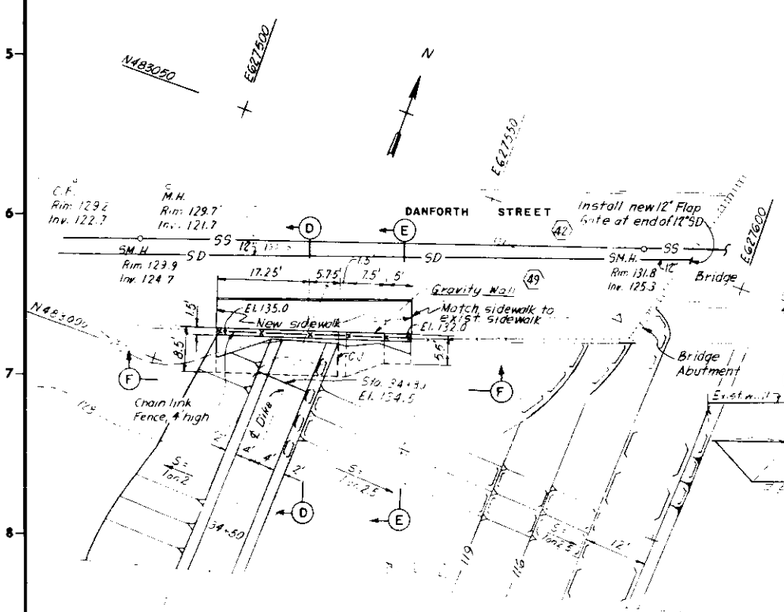
SECTION D-D

SCALE 1" = 5'-0"



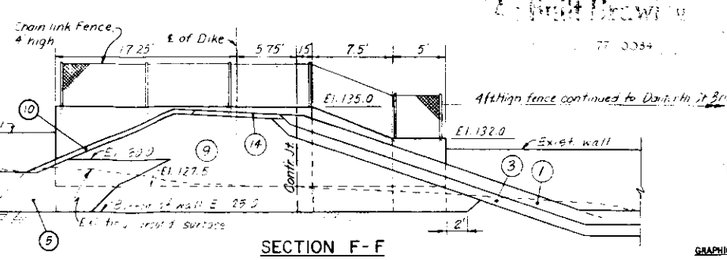
SECTION E-E

SCALE 1" = 5'-0"



PLAN △

SCALE 1" = 10'-0"



SECTION F-F

SCALE 1" = 5'-0"

DANFORTH STREET WALL △

GRAPHIC SCALES

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

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

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

NOTES

1. For notes applying to this sheet see Sheet 4.
2. For Material Legend see sheet 9.
3. Danforth St Conc. Wall will be paid for under Item No. 49.

REVISION	DATE	DESCRIPTION	BY
	11-77	Final field corrections	
△	10-23-78	Plan and Sections revised	
△	1-20-79	Added Elevations (Amt #1)	

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

DES. BY J.H.L. — DR. BY J.A.P. — CK. BY E.E.C.

SUBMITTED: CHIEF, LAYOUT SECTION

APPROVAL RECOMMENDED: CHIEF, BLDG. ENG. BRANCH

PROJECT ENGINEER

APPROVAL RECOMMENDED: CHIEF PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
DIVERSION OF RIVER AND DANFORTH STREET WALL
PLANS AND SECTIONS

SUDBURY RIVER — MASSACHUSETTS

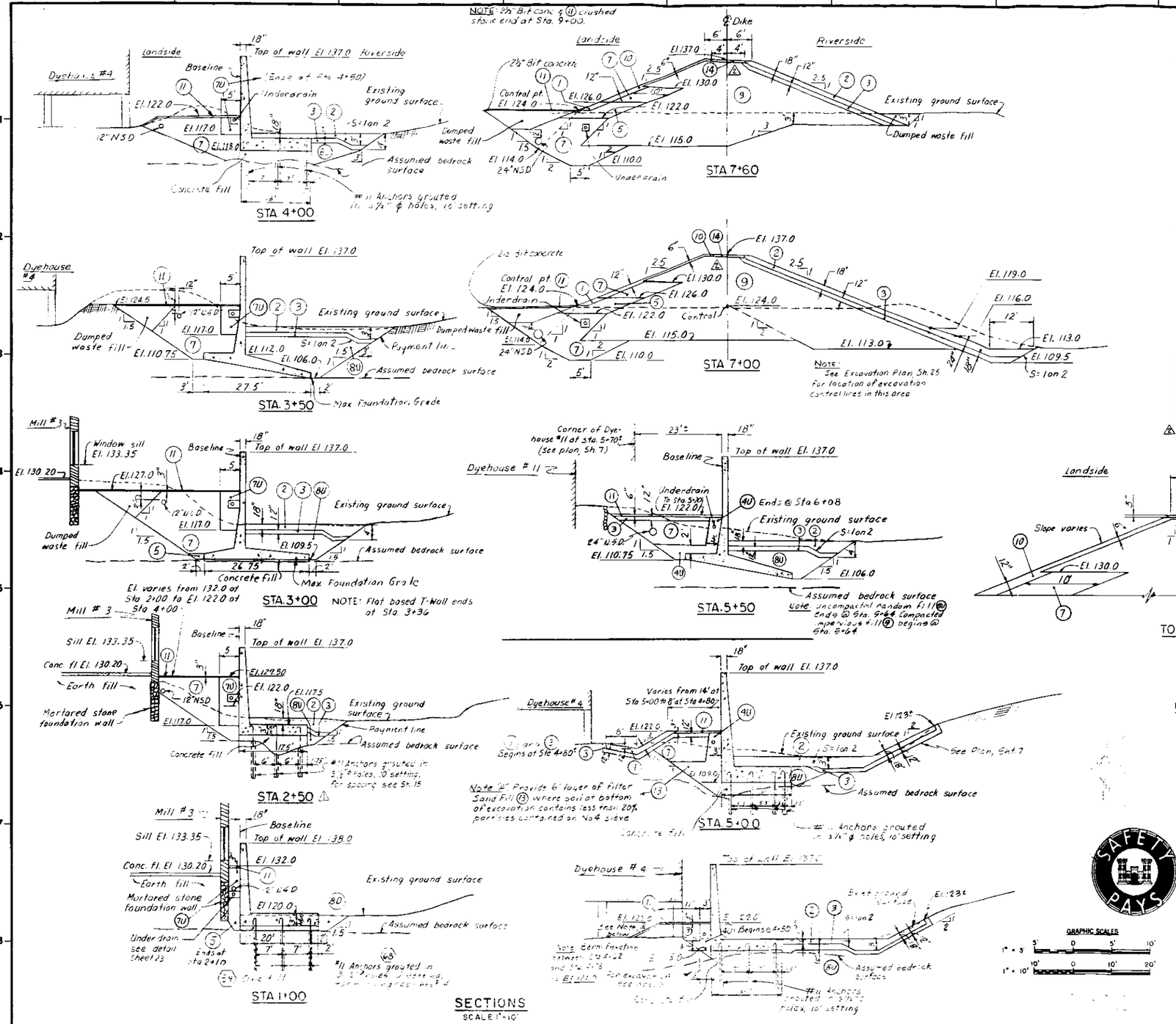
APPROVED: CHIEF, ENGINEERING DIVISION — DATE NOV. 1976

SCALE: AS SHOWN — SPEC. NO. DACW33-77-B-0001

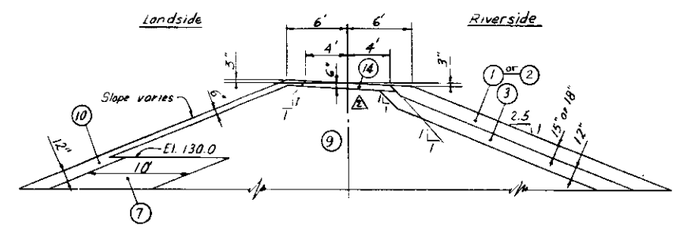
DRAWING NUMBER: SUD-1

SHEET 8

CORPS OF ENGINEERS U. S. ARMY



MATERIAL LEGEND		
DESIGNATION	TYPE OF MATERIAL	PAYMENT ITEM NO.
1	Class I Stone Protection	13
2	Class II Stone Protection	14
3	Gravel Bedding	15
4U	Uncompacted Processed Gravel Fill	7
5	Compacted Gravel Fill	8
5D	Dumped Gravel Fill	8
6	Compacted Processed Sand Fill	9
7	Compacted Sand Fill	9
7U	Uncompacted Sand Fill	9
8	Compacted Random Fill	10
8U	Uncompacted Random Fill	10
8D	Dumped Random Fill	10
9	Compacted Impervious Fill	11
10	Topsoil	70
11	Crushed Stone Fill	7
12	Gravel Base Course	6
14	Road Gravel	81



TOP OF DIKE SECTION
SCALE 1"=5'

NOTE: For notes applying to this sheet, see sheet 4.

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	
2	10-23-78	Sections and material legend revised	
1	9-28-77	Sections revised	

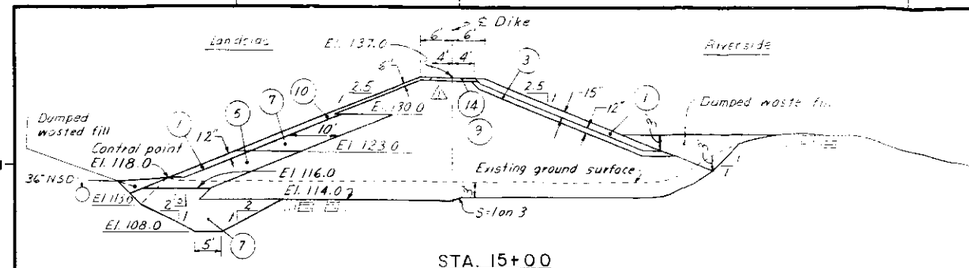
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
DIKE
TYPICAL EMBANKMENT SECTIONS NO. 1
SUDBURY RIVER MASSACHUSETTS

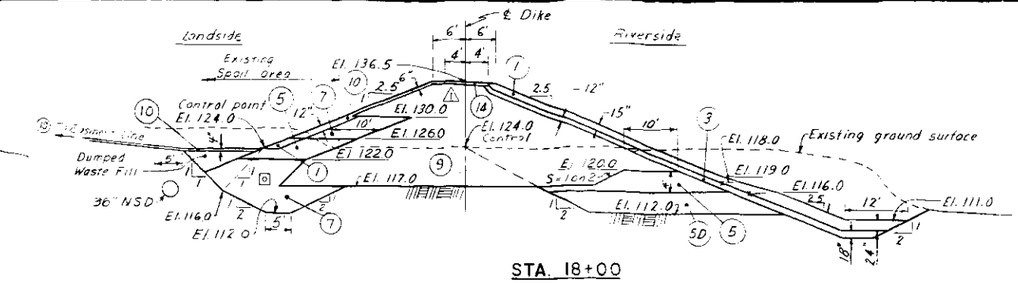
DES. BY J.L. DR. BY S.D. CK. BY K.E.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION
DATE NOV. 1976
SCALE AS SHOWN SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 9

CORPS OF ENGINEERS A B C D E F G H U. S. ARMY

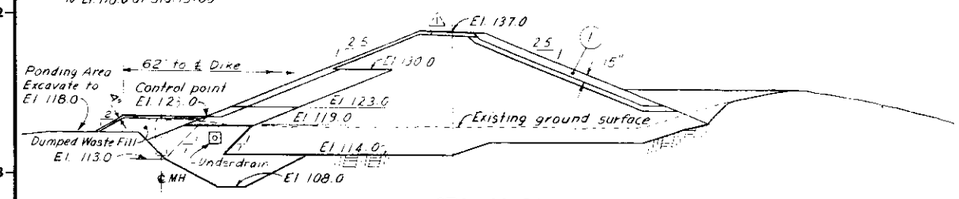


STA. 15+00

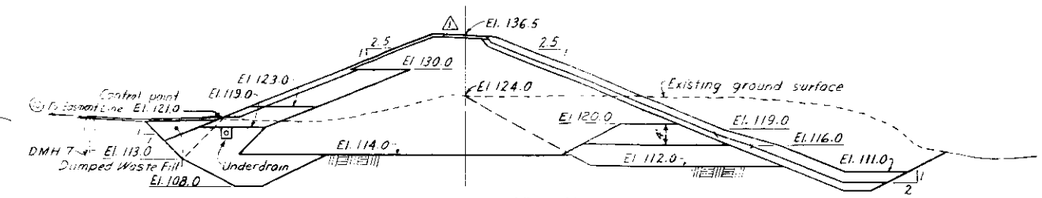
NOTE: Control point varies from El. 123.0 at Sta. 14+50 to El. 118.0 at Sta. 15+00



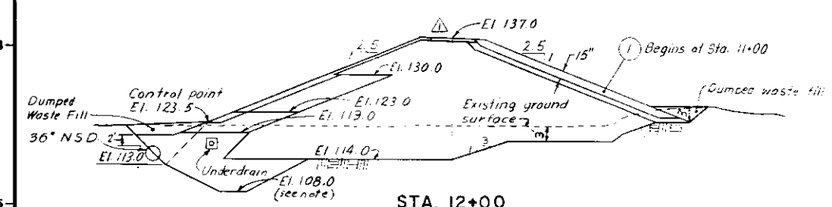
STA. 18+00



STA. 14+50

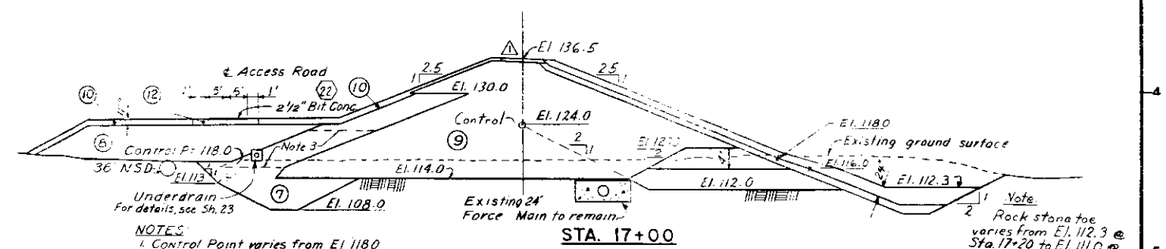


STA. 17+50



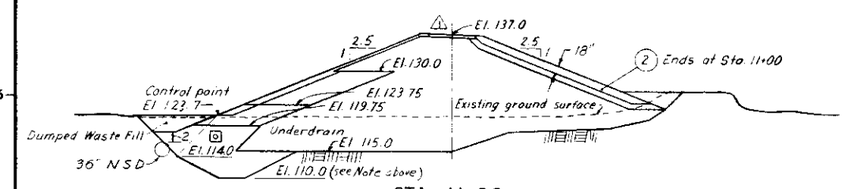
STA. 12+00

Note: Elev. varies from El. 110.5 @ Sta. 11+00 to El. 108.0 @ Sta. 11+06



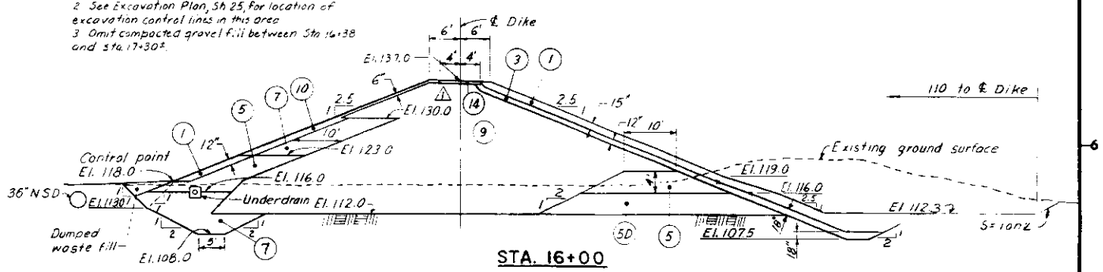
STA. 17+00

NOTES:
1. Control Point varies from El. 118.0 at Sta. 17+00 to El. 124.0 at Sta. 18+00.
2. See Excavation Plan, Sh. 25, for location of excavation control lines in this area.
3. Omit compacted gravel fill between Sta. 16+38 and Sta. 17+30±.

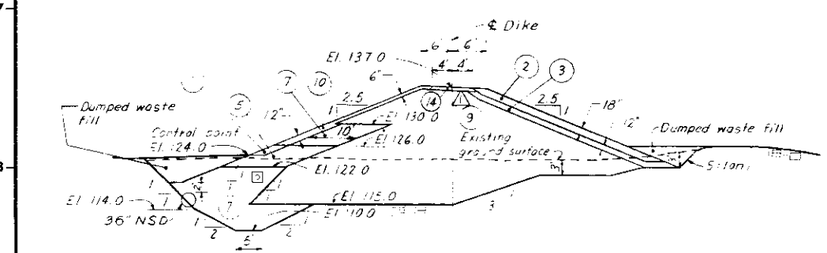


STA. 11+00

NOTE: Control point varies from El. 124.0 at Sta. 9+50 to El. 123.0 at Sta. 14+50



STA. 16+00



STA. 9+50

NOTES:
1. For notes applying to this sheet see sheet 4.
2. For Materials Legend see Sheet 9.

SECTIONS
SCALE 1" = 10'

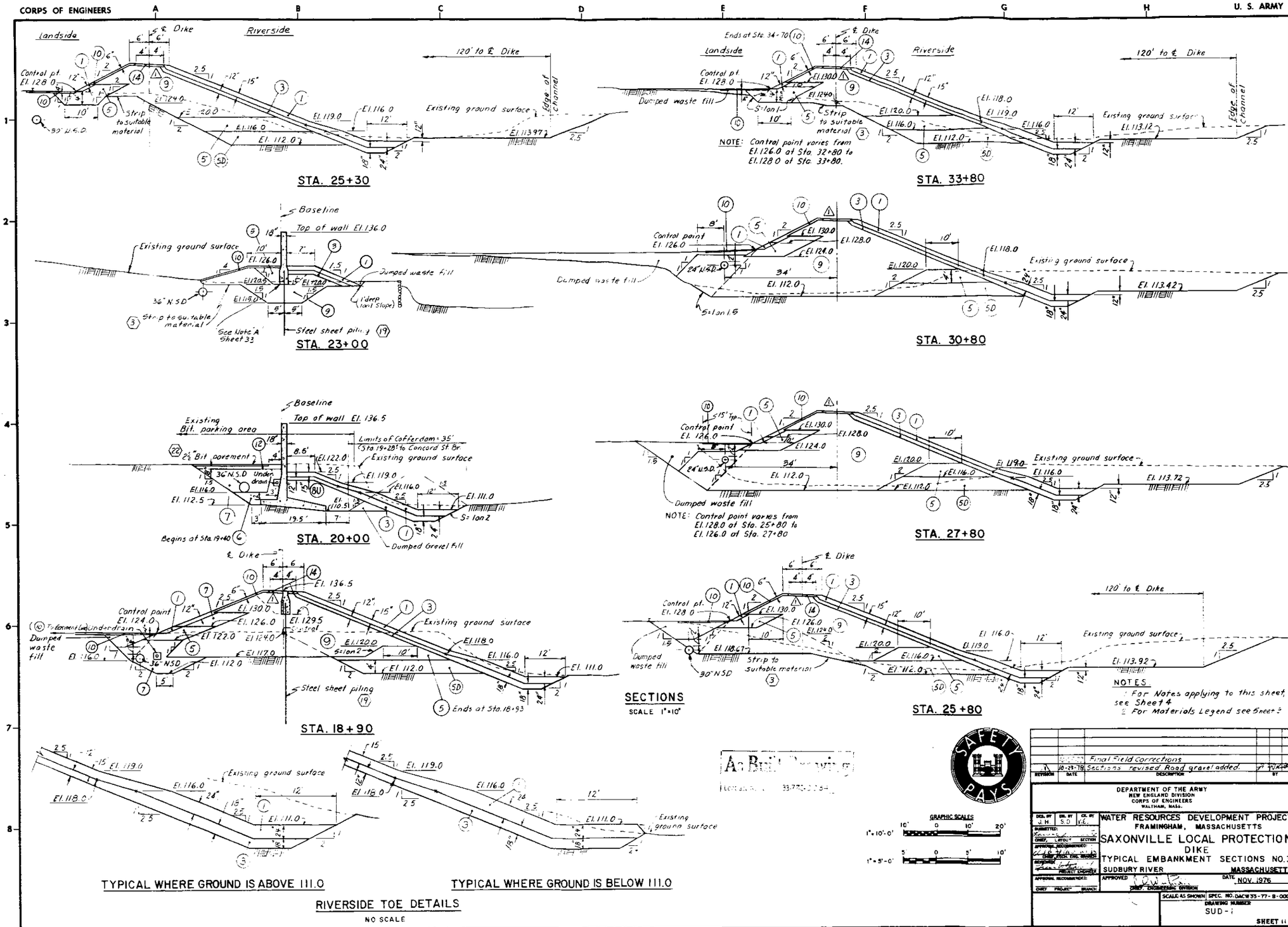
GRAPHIC SCALES
1" = 10'-0" 10' 0 10' 20'

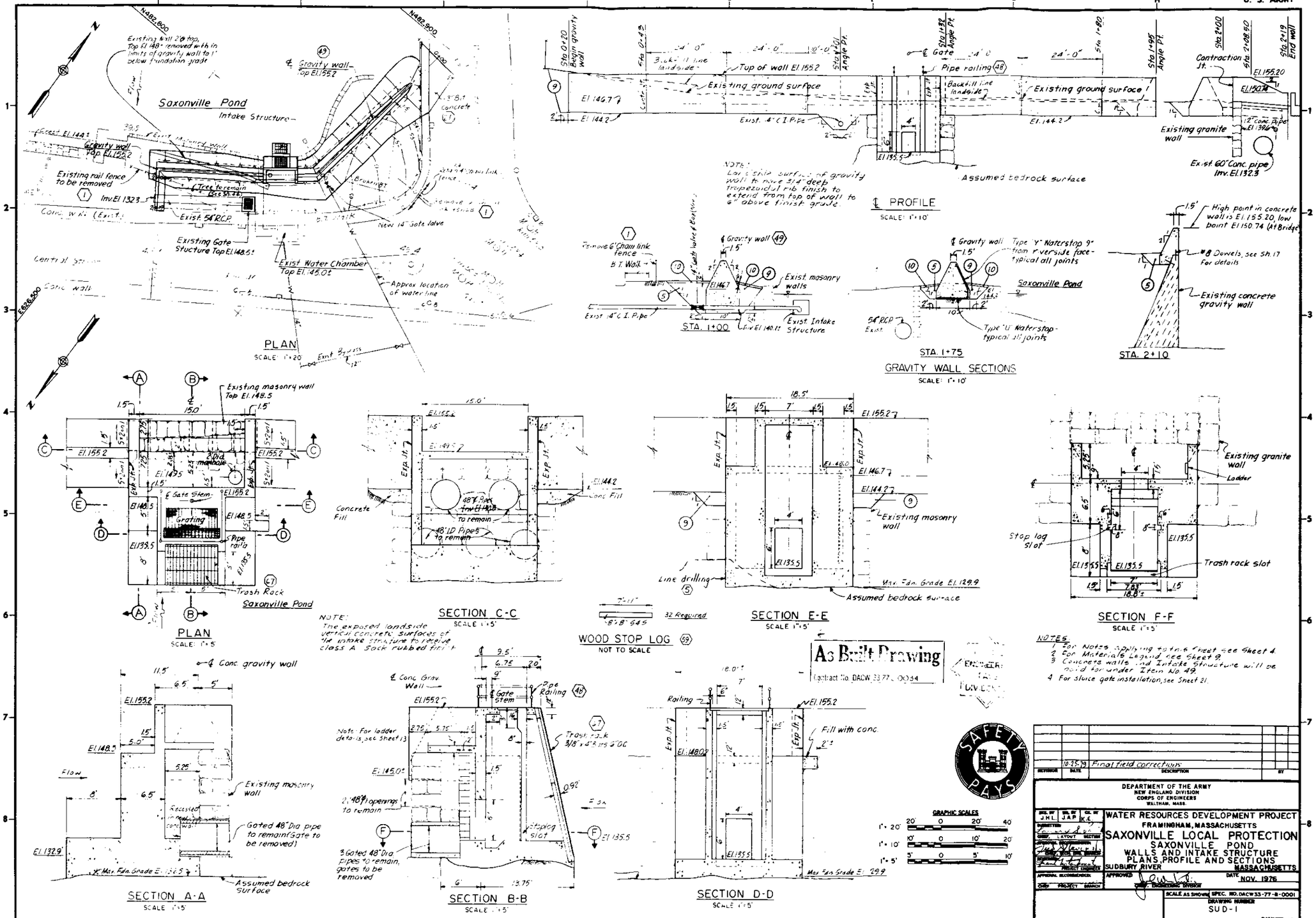
REVISION	DATE	DESCRIPTION	BY
	12-23-77	Final Plan - [illegible]	
1	10-23-70	Sections revised. Road gravel added	[illegible]

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

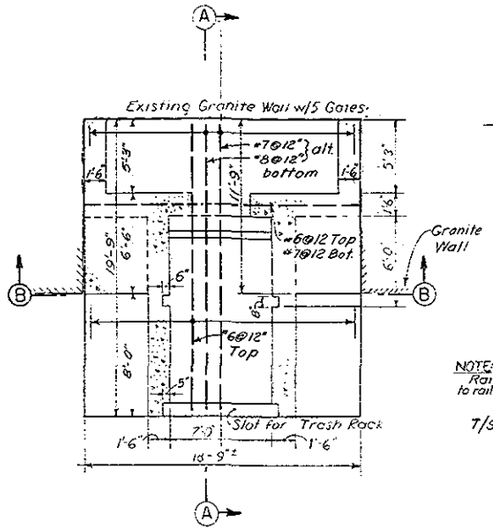
DES. BY J.H. DR. BY S.D. CK. BY K.E.
SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH
REVIEWED: PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION DIKE
TYPICAL EMBANKMENT SECTIONS NO. 2
SUDBURY RIVER MASSACHUSETTS
APPROVED: CHIEF, ENGINEERING DIVISION
DATE NOV. 1976
SCALE 1" = 10'
SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 10

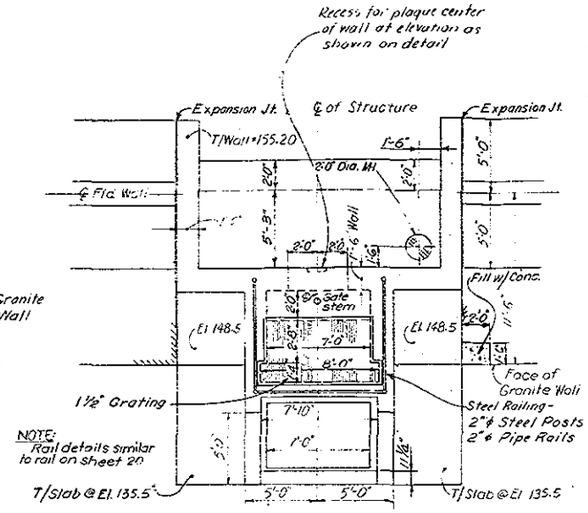

CORPS OF ENGINEERS
U. S. ARMY
Landside
Riverside
Control pt. El. 128.0
Strip to suitable material
Existing ground surface
Edge of channel
120' to ℄ Dike
STA. 25+30
Ends at Sta. 34+70
Dumped waste fill
NOTE: Control point varies from El. 126.0 at Sta. 32+80 to El. 128.0 at Sta. 33+80.
STA. 33+80
Baseline
Top of wall El. 136.0
Existing ground surface
Dumped waste fill
Steel sheet piling
See Note A Sheet 33
STA. 23+00
Control point El. 126.0
Existing ground surface
STA. 30+80
Existing Bit. parking area
Top of wall El. 136.5
Limits of Cofferdam = 35' (Sta. 19+28' to Concord St. Br.)
Existing ground surface
Begins at Sta. 19+40
Dumped Gravel Fill
STA. 20+00
Control point El. 126.0
Dumped waste fill
NOTE: Control point varies from El. 128.0 at Sta. 25+80 to El. 126.0 at Sta. 27+80
STA. 27+80
Control point El. 124.0
Dumped waste fill
Existing ground surface
Steel sheet piling
Ends at Sta. 18+93
STA. 18+90
Control pt. El. 128.0
Dumped waste fill
Strip to suitable material
STA. 25+80
SECTIONS
SCALE 1"=10'
NOTES
1. For Notes applying to this sheet, see Sheet 4
2. For Materials Legend see Sheet 3
TYPICAL WHERE GROUND IS ABOVE 111.0
TYPICAL WHERE GROUND IS BELOW 111.0
RIVERSIDE TOE DETAILS
NO SCALE
GRAPHIC SCALES
1"=10'-0'
1"=5'-0'
SAFETY PAYS
Final Field Corrections
10-23-78 Sections revised Road gravel added.
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
DIKE
TYPICAL EMBANKMENT SECTIONS NO. 3
SUDBURY RIVER
MASSACHUSETTS
NOV. 1976
SCALE AS SHOWN
SPEC. NO. DACW 33-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 11


CORPS OF ENGINEERS
U. S. ARMY
Saxonville Pond
Intake Structure
PLAN
SCALE: 1"=20'
Existing Gate Stucture Top El.148.5±
Exist Water Chamber Top El.145.0±
Approx location of water line
Existing rail fence to be removed
Exist. 54" RCP
New 14" Gate Valve
Existing masonry wall Top El.148.5
Trash Rack
Saxonville Pond
SECTION A-A
SCALE: 1"=5'
SECTION B-B
SCALE: 1"=5'
SECTION C-C
SCALE: 1"=5'
Concrete Fill
Conc Fill
WOOD STOP LOG
NOT TO SCALE
32 Required
SECTION D-D
SCALE: 1"=5'
Fill with conc.
Max Fdn Grade El. 129.9
SECTION E-E
SCALE: 1"=5'
Existing masonry wall
Line drilling
Assumed bedrock surface
Max. Fdn. Grade El. 129.9
SECTION F-F
SCALE: 1"=5'
Existing granite wall
Ladder
Stop log slot
Trash rack slot
Contraction Jt.
Existing granite wall
Exist. 60" Conc. pipe Inv. El. 132.3
Pipe railing
Existing ground surface
Top of wall El. 155.2
Assumed bedrock surface
PROFILE
SCALE: 1"=10'
STA. 1+00
STA. 1+75
STA. 2+10
GRAVITY WALL SECTIONS
SCALE: 1"=10'
Exist. masonry walls
Exist. Intake Structure
Type "Y" Waterstop 9" from riverside face - typical all joints
Type "U" Waterstop - typical all joints
High point in concrete wall is El. 155.20, low point El. 150.74 (At Bridge)
#8 Dowels, see Sh. 17 for details
Existing concrete gravity wall
NOTE: The exposed landside vertical concrete surfaces of the intake structure to receive class A Sack rubbed finish
NOTES
1 For Notes applying to this Sheet see Sheet 4.
2 For Materials Legend see Sheet 9.
3 Concrete walls and Intake Structure will be paid for under Item No. 49.
4 For sluice gate installation, see Sheet 21.
As Built Drawing
Contract No. DACW 33-77-B-0034
GRAPHIC SCALES
SAFETY PAYS
10-25-79 Final field corrections
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
SAXONVILLE POND
WALLS AND INTAKE STRUCTURE
PLANS, PROFILE AND SECTIONS
SUDBURY RIVER
MASSACHUSETTS
NOV. 1976
SCALE AS SHOWN
SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 12

CORPS OF ENGINEERS — U. S. ARMY



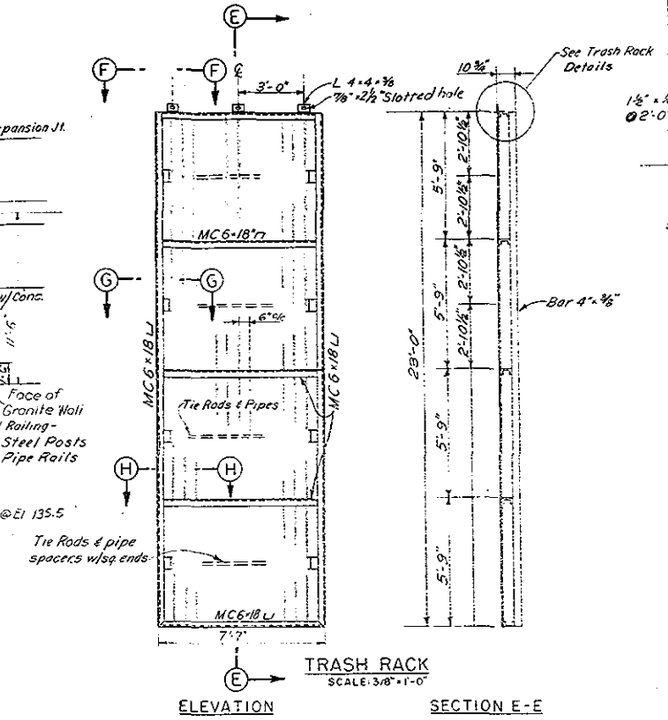
FOUNDATION PLAN
SCALE 1/4"=1'-0"



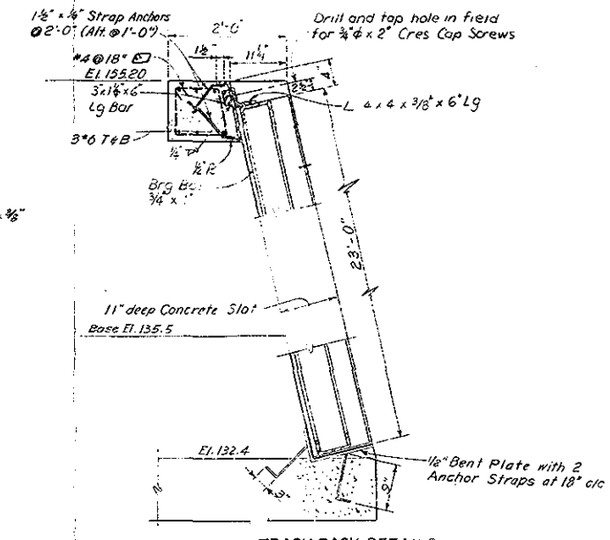
NOTE: Rail details similar to rail on sheet 20

PLAN AT EL. 155.2
SCALE: 1/4" = 1'-0"

GRATING NOTES:
1. Band all edges of grating.
2. Mfgr. to provide fastenings for grating.
3. Angle frames to be mitered and welded at corners.
4. All steel construction to be A 36 galvanized.

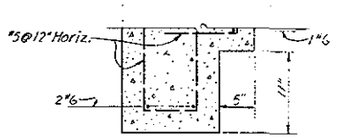


TRASH RACK
SCALE: 3/8"=1'-0"

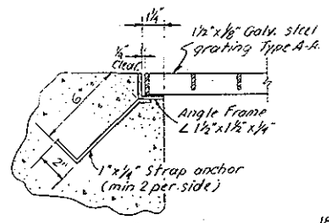


TRASH RACK DETAILS
SCALE: 1"=1'-0"

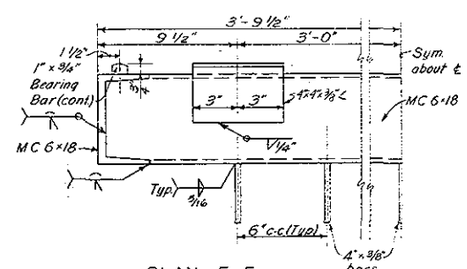
TRASH RACK NOTES:
1. All structural steel – A 36 Galv.



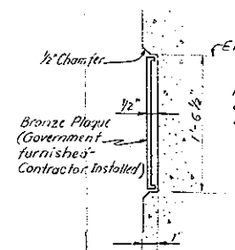
SECTION C-C
SCALE: 1½" = 1'-0"



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



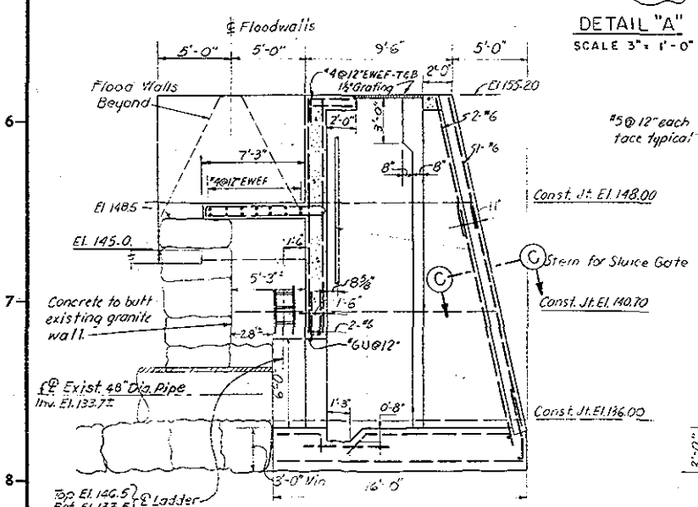
PLAN F-F
SCALE: 3" = 1'-0"



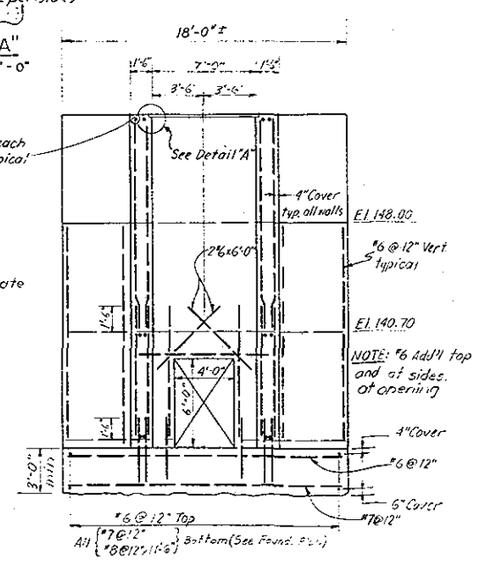
Provide 1" deep recess 1'-6½" high and 1'-3½" wide for plaque. For location see Plan at El. 155.2.

PLAQUE DETAIL
NO SCALE

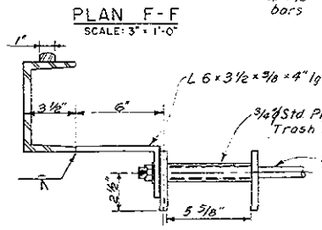
NOTE:
1. For transition opening thru walls @ ½" pipes see sheet 12.
2. Provide 2-#5 (add'l horiz.) over each transition opening.



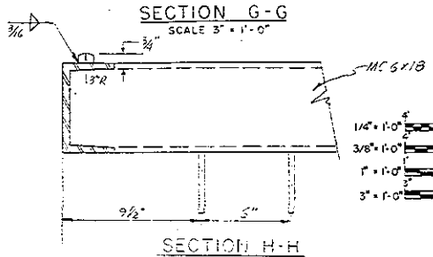
SECTION A-A
SCALE 1/4"=1'-0"



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



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



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

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

As Built Drawing
33-77-C-0034

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	

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

DES. BY W.H.R. | DR. BY A.Z. | CK. BY SC

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
SAXONVILLE POND - INTAKE STRUCTURE
REINFORCEMENT DETAILS

SUDBURY RIVER — MASSACHUSETTS

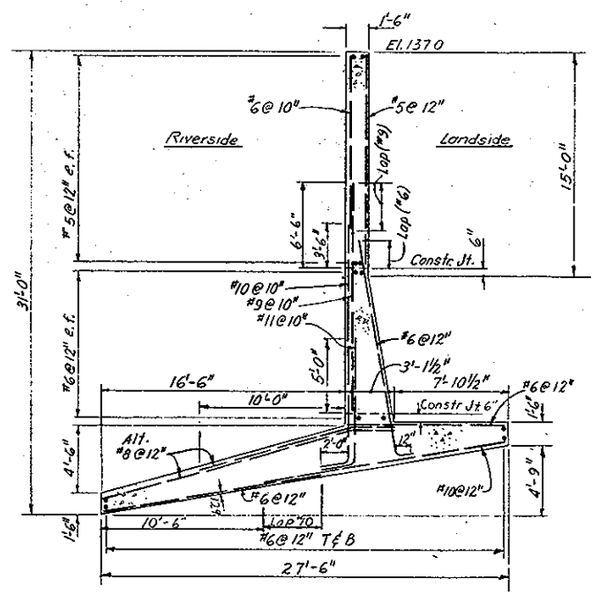
APPROVED — DATE NOV. 1975
CHIEF, ENGINEERING DIVISION

SCALE AS SHOWN SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 13

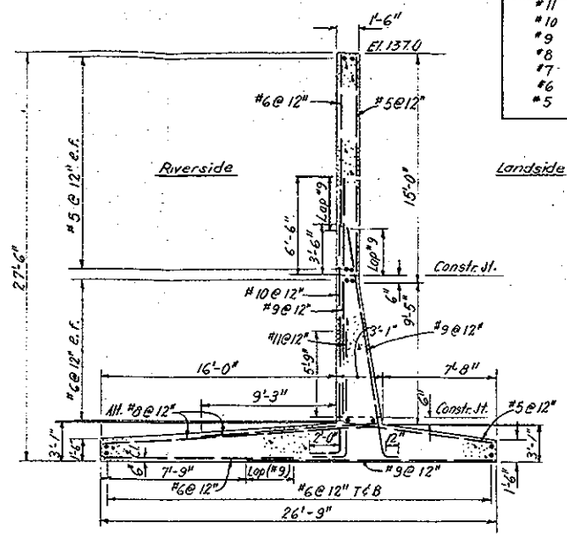
CORPS OF ENGINEERS — U. S. ARMY

TENSION LAP SPLICES (INCHES)		
BAR	OTHER BARS	TOP BARS*
#11	60	85
#10	48	69
#9	39	55
#8	30	43
#7	24	33
#6	18	24
#5	18	18

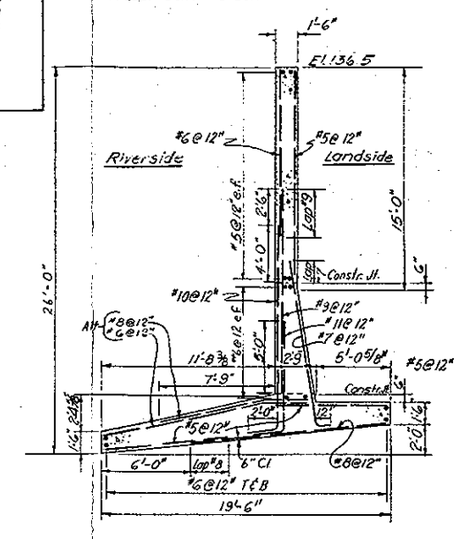
* Top bars are horizontal bars so placed that more than 12" of concrete is cast in the member below the bar.



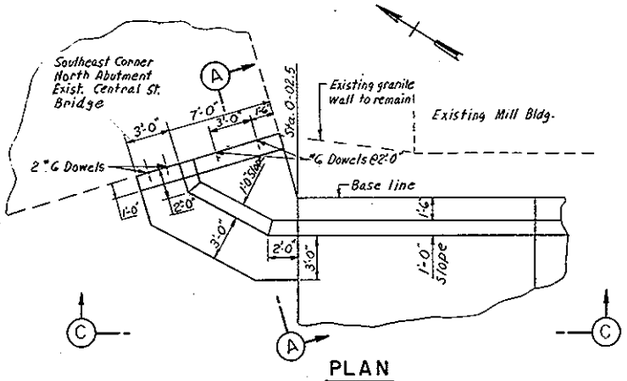
TYPE "A" WALL



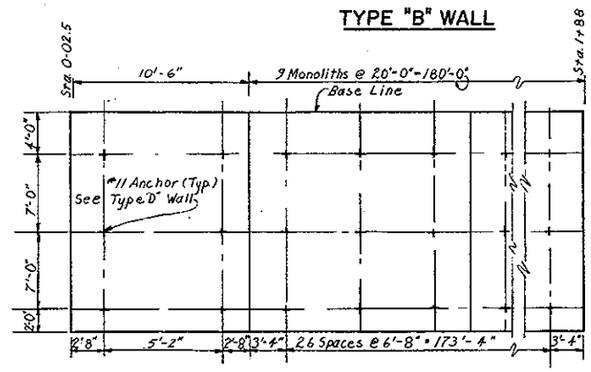
TYPE "B" WALL



TYPE "C" WALL



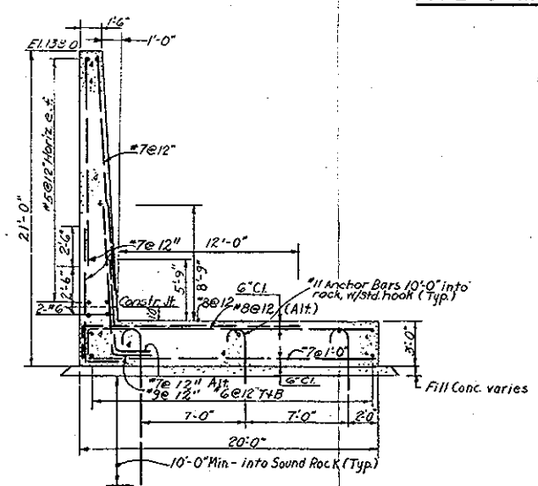
PLAN
SCALE: 1/4"=1'-0"



ANCHOR LOCATION PLAN

TYPE "D" WALL

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

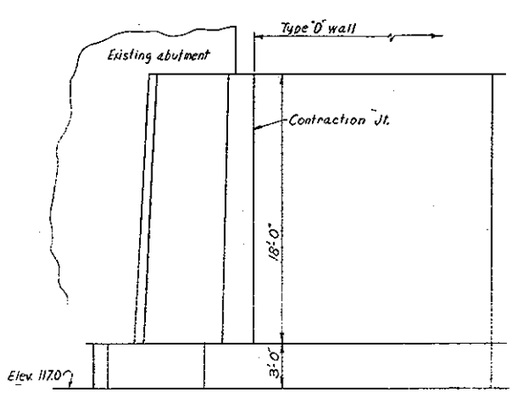


TYPE "D" WALL

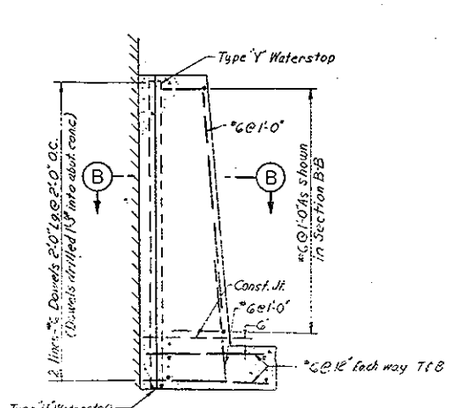
NOTES:

1. Minimum cover to steel reinf. shall be 4" unless noted otherwise.
2. Minimum bar lap for splices shall be as indicated in the table except as shown otherwise.
3. Longitudinal steel must not run through vertical contraction or expansion joints. Reinf. to stop 3" back from joint.
4. All walls have been designed for a 250#/s.f. surcharge load landside.
5. All concrete in the floodwalls will be paid for under Item No. 50, 51 & 52. All reinf. steel will be paid for under Item No. 57. Anchor bars will be paid for under Item No. 68.
6. For miscellaneous details see sheet no. 17.

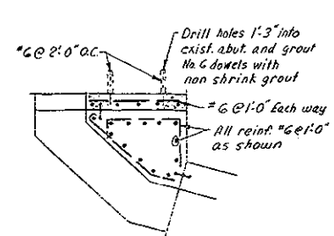
As Built Drawing
Contract No. DACW 33-77-C-0034



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



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



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

GRAPHIC SCALES
1/4" = 1'-0" 4' 0 4' 8'
3/16" = 1'-0" 8' 0 8'

REVISION	DATE	DESCRIPTION	BY
	10-25-77	Final field corrections	

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

DES. BY R.H. | DR. BY A.Z. | CK. BY S.C.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
CONCRETE FLOODWALLS
REINFORCEMENT DETAILS

SUDBURY RIVER — MASSACHUSETTS

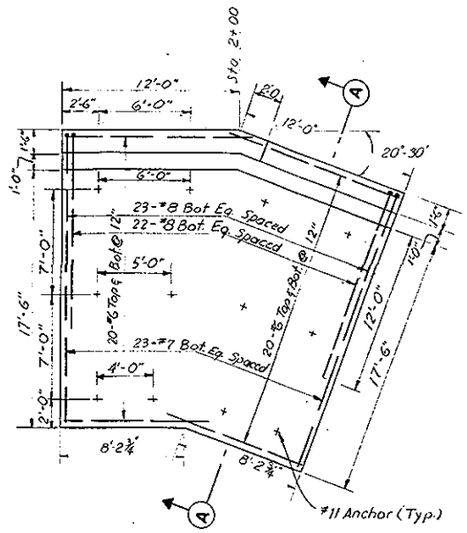
DATE NOV. 1976

SCALE AS SHOWN SPEC. NO. DACW33-77-B-0001

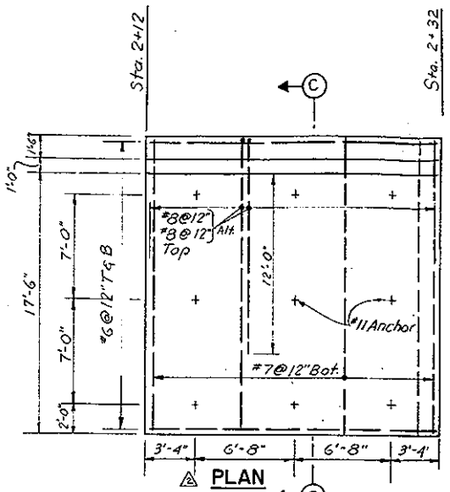
DRAWING NUMBER SUS-1

SHEET 16

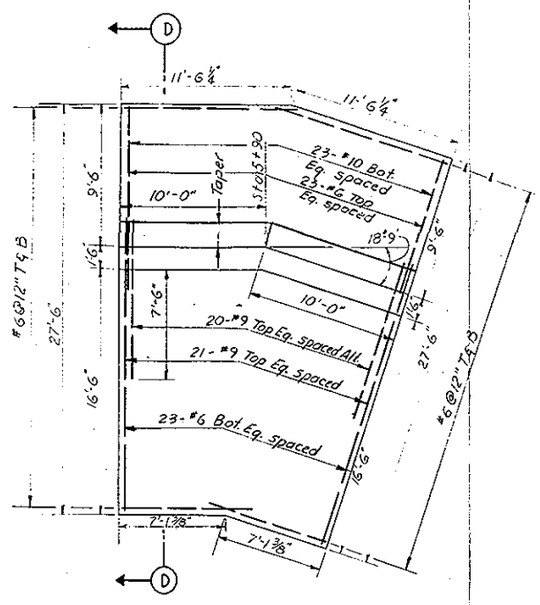
CORPS OF ENGINEERS — U. S. ARMY



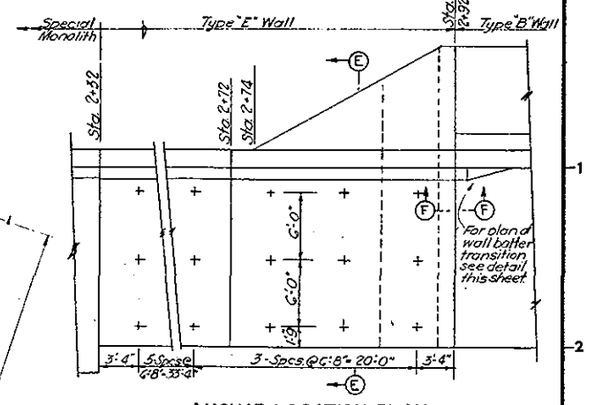
PLAN
STA. 2+00
SCALE: 1/4"=1'-0"



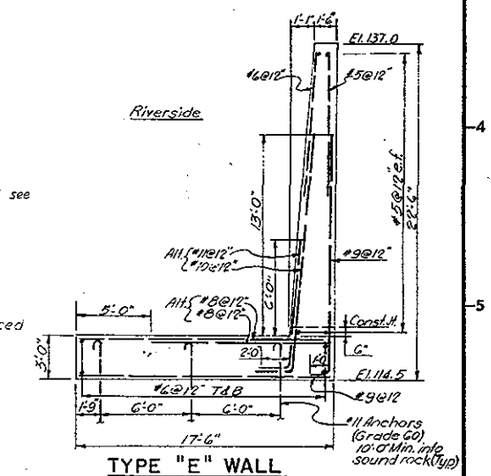
PLAN
STA. 2+12
SCALE: 1/4"=1'-0"



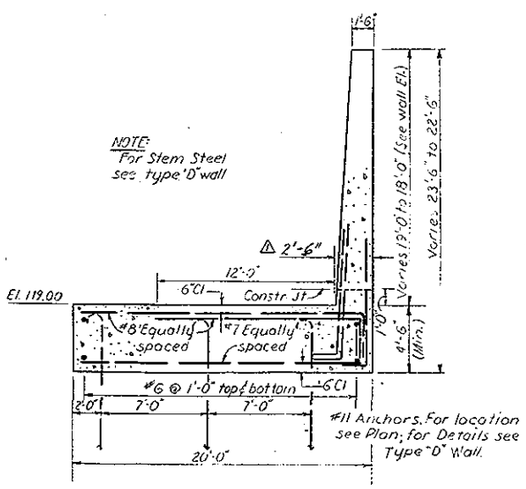
PLAN
STA. 5+90
SCALE: 1/4"=1'-0"



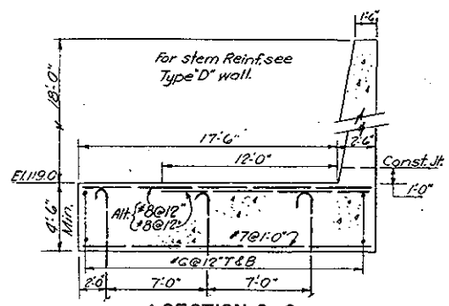
ANCHOR LOCATION PLAN
TYPE "E" WALL
SCALE 3/16"=1'-0"



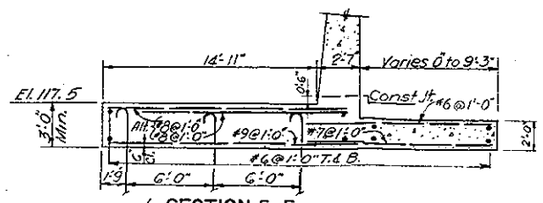
TYPE "E" WALL
TYPICAL SECTION
SCALE 1/4"=1'-0"



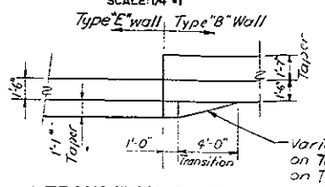
SECTION A-A
SCALE: 1/4"=1'



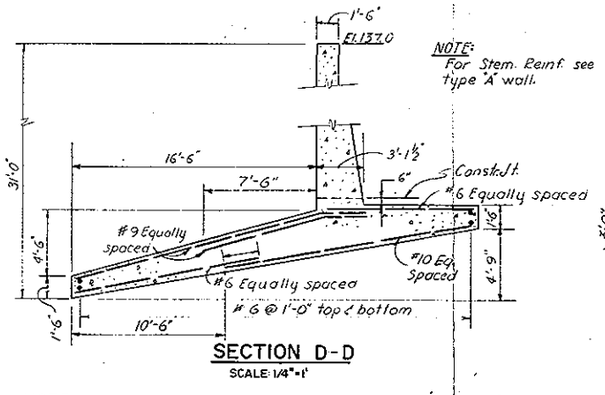
SECTION C-C
SCALE 1/4"=1'-0"



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

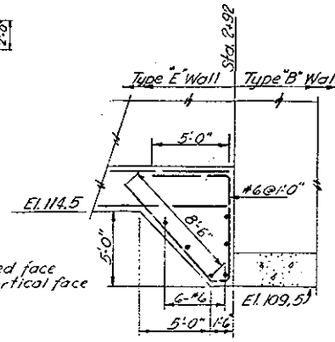


TRANSITION DETAIL
SCALE: 1/4"=1'



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

NOTE:
Cover for Bot. of footing - 6".
All other surfaces shall have 4" of cover unless otherwise noted.



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

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

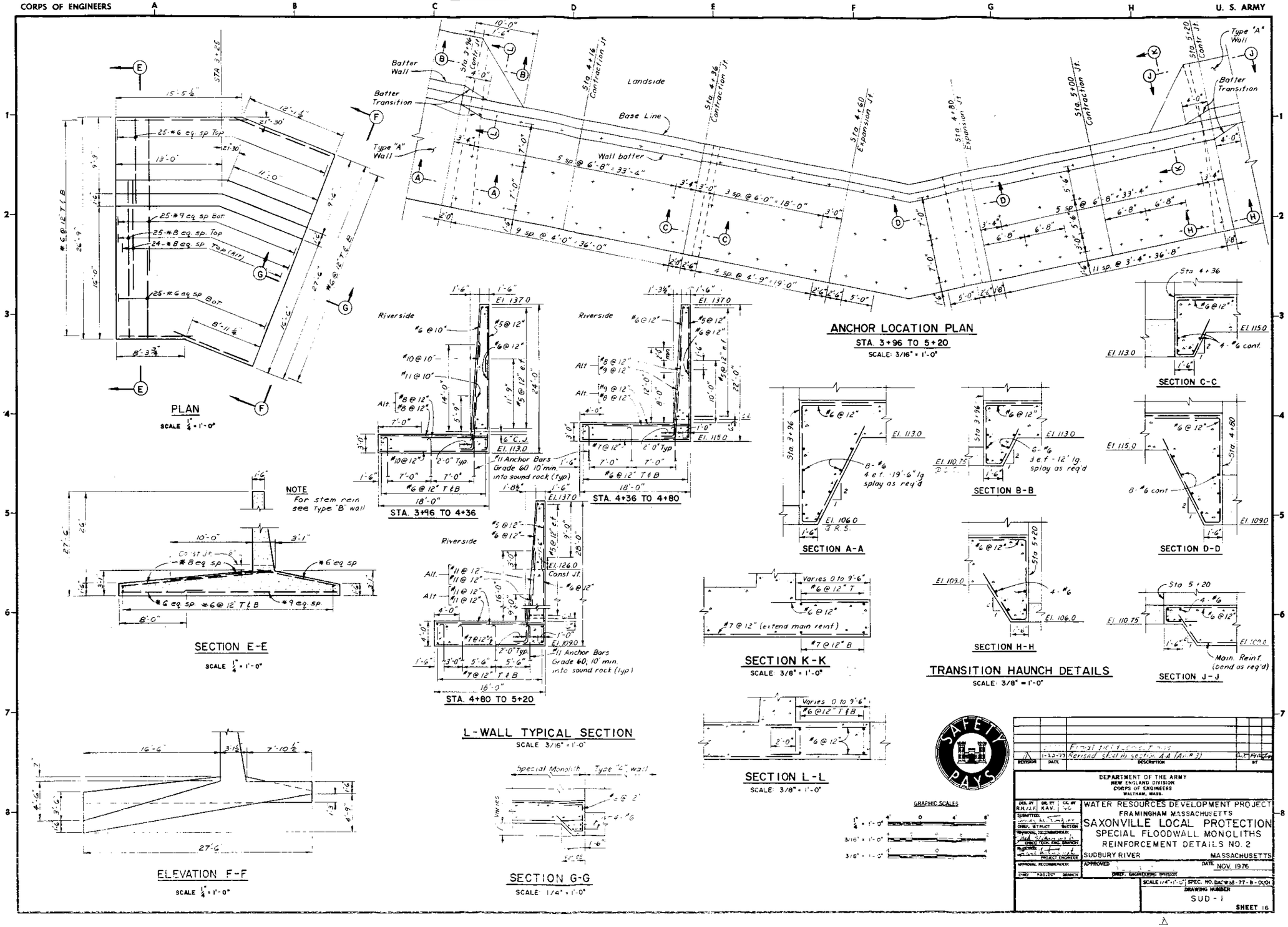
REVISION	DATE	DESCRIPTION	BY
2	9-28-77	Plan and sections added; plan, section and detail revised; section deleted.	
1	1-20-77	Revised dimension (Am. #1)	

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

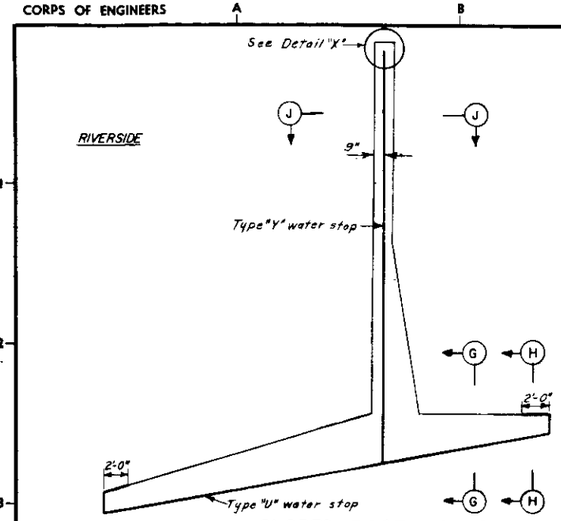
DES. BY R.H. DR. BY A.Z. CK. BY
SUBMITTED: Carole M. Tinlan
CHIEF, STRUCT. SECTION
APPROVAL RECOMMENDED: Lick J. Gaskins
CHIEF, TECH. ENG. BRANCH
RECOMMENDED: Paul Antonucci
PROJECT ENGINEER
APPROVAL RECOMMENDED:
CHIEF PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
SPECIAL FLOODWALL MONOLITHS
REINFORCEMENT DETAILS NO. I
SUDBURY RIVER — MASSACHUSETTS
APPROVED: CHIEF, ENGINEERING DIVISION
DATE NOV. 1976
SCALE 1/4"=1'-0"
SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 15

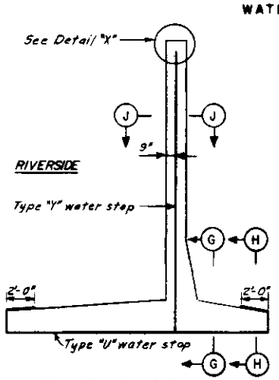
DACW 33-77-C-0034


CORPS OF ENGINEERS
U. S. ARMY
PLAN
SCALE 1/4" = 1'-0"
ANCHOR LOCATION PLAN
STA. 3+96 TO 5+20
SCALE: 3/16" = 1'-0"
Landside
Base Line
Wall batter
Batter Wall
Batter Transition
Type "A" Wall
Sta. 3+96 Contr. Jt.
Sta. 4+16 Contraction Jt.
Sta. 4+36 Contraction Jt.
Sta. 4+60 Expansion Jt.
Sta. 4+80 Expansion Jt.
Sta. 5+00 Contraction Jt.
Sta. 5+20 Contr. Jt.
Sta. 3+25
25-#6 eq. sp. Top
25-#9 eq. sp. Bot.
25-#8 eq. sp. Top
24-#8 eq. sp. Top (Alt.)
25-#6 eq. sp. Bot.
#6 @ 12" T & B
NOTE
For stem rein see type "B" wall
SECTION E-E
SCALE 1/4" = 1'-0"
Riverside
STA. 3+96 TO 4+36
STA. 4+36 TO 4+80
STA. 4+80 TO 5+20
#11 Anchor Bars Grade 60 10' min. into sound rock (typ)
#11 Anchor Bars Grade 60, 10' min. into sound rock (typ)
L-WALL TYPICAL SECTION
SCALE 3/16" = 1'-0"
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION H-H
SECTION J-J
SECTION K-K
SCALE: 3/8" = 1'-0"
SECTION L-L
SCALE: 3/8" = 1'-0"
TRANSITION HAUNCH DETAILS
SCALE: 3/8" = 1'-0"
ELEVATION F-F
SCALE 1/4" = 1'-0"
SECTION G-G
SCALE 1/4" = 1'-0"
Special Monolith
Type "A" wall
GRAPHIC SCALES
SAFETY PAYS
Final field corrections
Revised steel in section A-A (Ar. #3)
REVISION
DATE
DESCRIPTION
BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
SPECIAL FLOODWALL MONOLITHS
REINFORCEMENT DETAILS NO. 2
SUDBURY RIVER
MASSACHUSETTS
APPROVED
DATE NOV. 1976
SCALE 1/4" = 1'-0"
SPEC. NO. DACW38-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 16

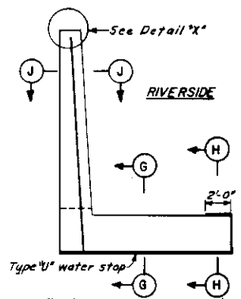
CORPS OF ENGINEERS — U. S. ARMY



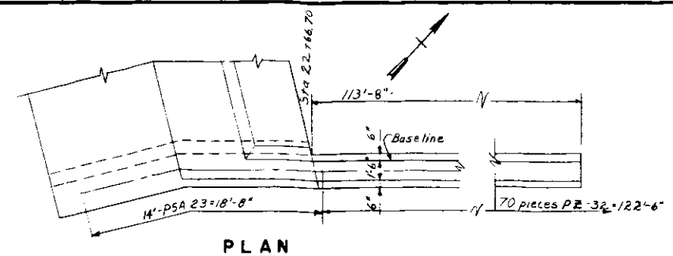
SLOPED BASE WALLS
WATER STOP DETAILS



FLAT BASE WALLS
WATER STOP DETAILS

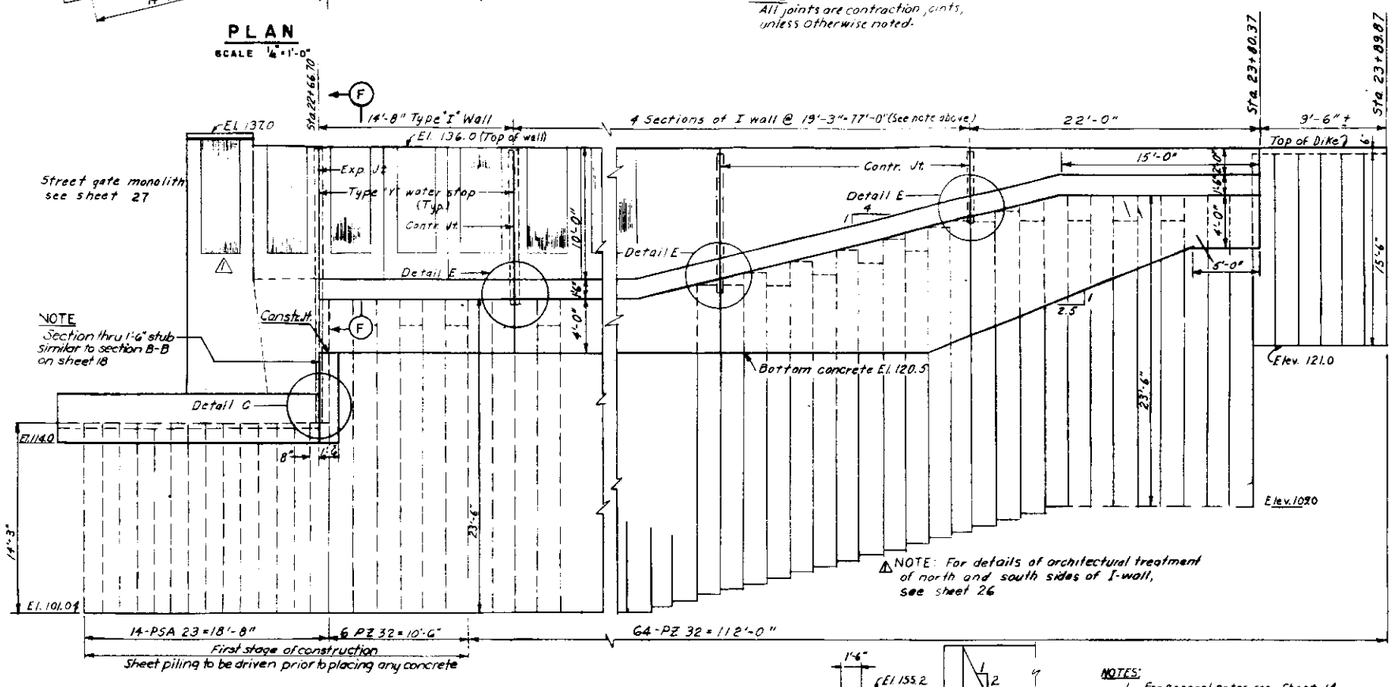


"L" SHAPED WALLS
WATER STOP DETAILS



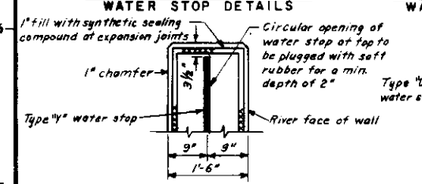
PLAN
SCALE 1/4"=1'-0"

NOTE:
All joints are contraction joints, unless otherwise noted.

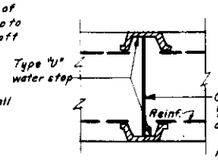


ELEVATION
SCALE 1/4"=1'-0"

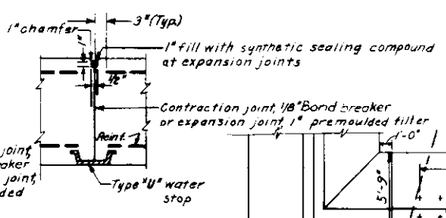
NOTES:
1. For general notes see Sheet 14
2. For Sections F-F, Details "C" and "E" see sheet no. 18.
3. Concrete in I-Walls will be paid for under Item No. 51.
4. Steel Sheet Piling will be paid for under Item Nos. 19 & 20.



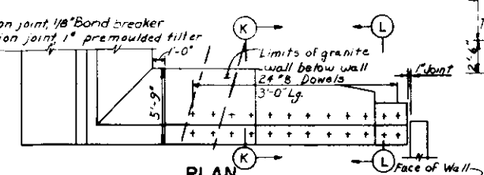
DETAIL "X"



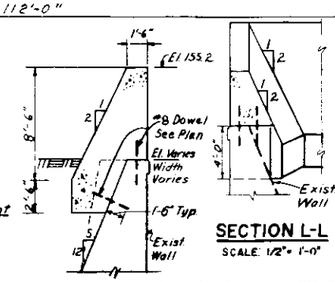
SECTION H-H



SECTION G-G

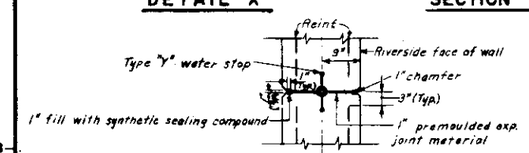


PLAN

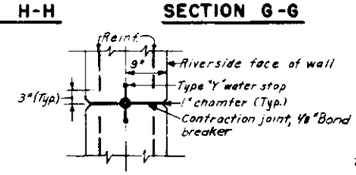


SECTION K-K
SCALE: 1/4"=1'-0"

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

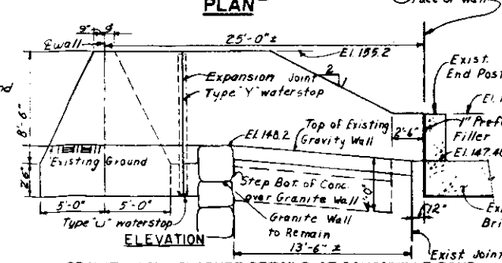


TYPICAL STEM EXPANSION JOINT



TYPICAL STEM CONTRACTION JOINT

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



ELEVATION

GRAVITY WALL CLOSURE DETAILS AT SAXONVILLE POND
SCALE: 1/4"=1'-0"

NOTE:
Drill 2" ø holes in existing wall and masonry 1'-6" deep and install dowels as shown with non-shrink grout.

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

VALUE ENGINEERING PAYS DIVIDENDS

As Built Drawing
Contract No. DACW 33-77-C-0034

SAFETY PAYS

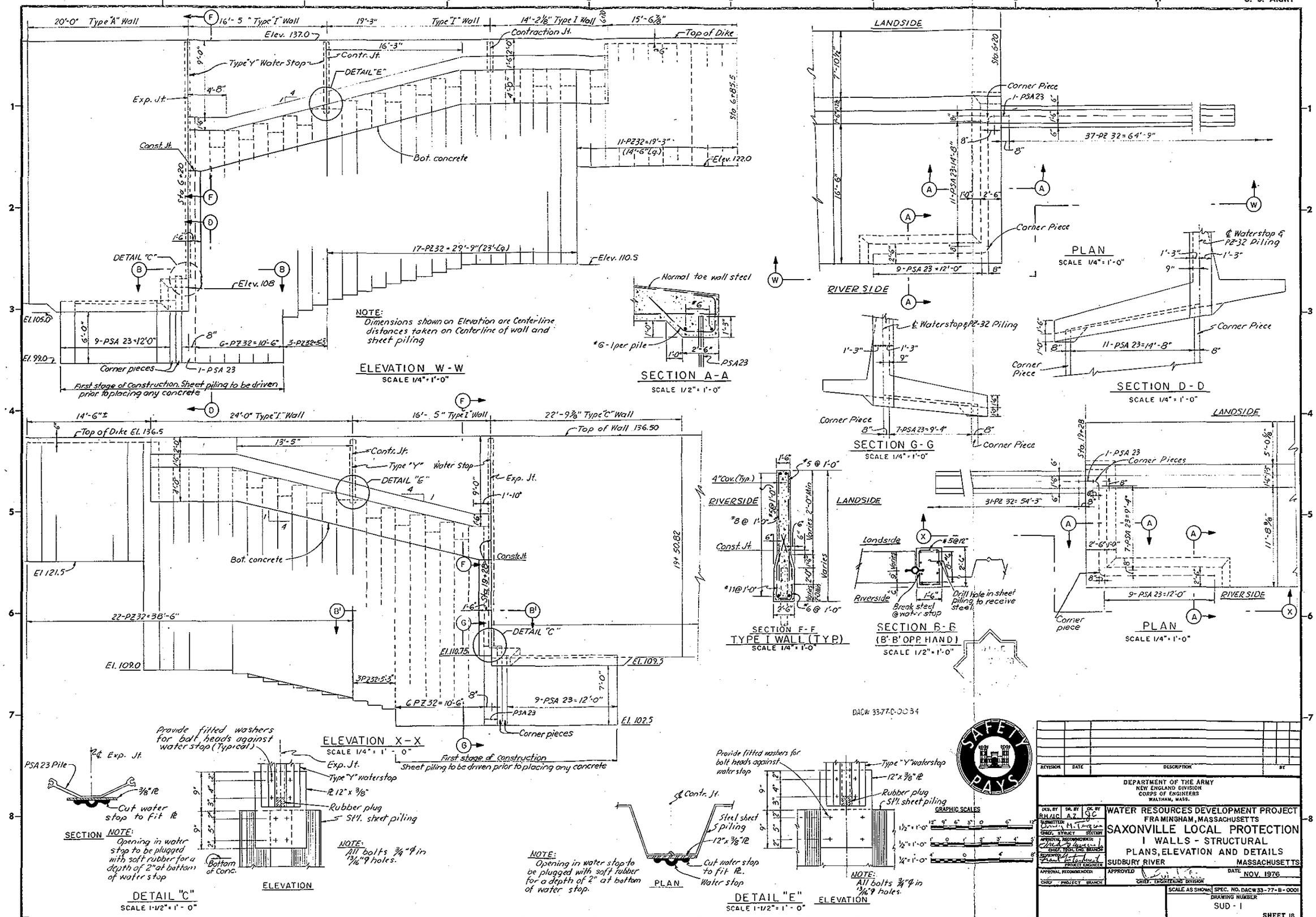
DATE	DESCRIPTION	BY
10-25-79	Final field corrections	
1-30-77	Added note and arch. panels (Am #2)	

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

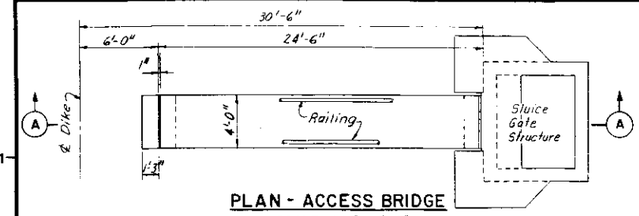
DESIGNED R.L.H. DRAWN E.J.K. CHECKED J.C.
SUBMITTED
CHIEF, DESIGN BRANCH
CHIEF, ENGINEERING DIVISION
APPROVED
CHIEF, DESIGN DIVISION

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
FLOODWALLS AND WATERSTOPS
STRUCTURAL
MISCELLANEOUS DETAILS
SUDBURY RIVER — MASSACHUSETTS

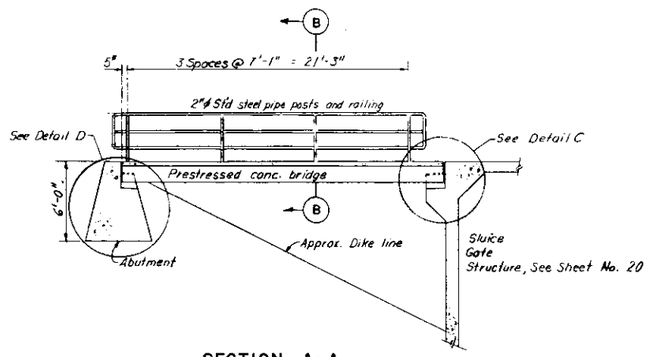
DATE NOV. 1976
SCALE AS SHOWN
SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 17


CORPS OF ENGINEERS
U. S. ARMY
ELEVATION W-W
SCALE 1/4" = 1'-0"
NOTE:
Dimensions shown on Elevation are Centerline distances taken on Centerline of wall and sheet piling
SECTION A-A
SCALE 1/2" = 1'-0"
PLAN
SCALE 1/4" = 1'-0"
SECTION D-D
SCALE 1/4" = 1'-0"
SECTION G-G
SCALE 1/4" = 1'-0"
ELEVATION X-X
SCALE 1/4" = 1'-0"
SECTION F-F
TYPE I WALL (TYP.)
SCALE 1/4" = 1'-0"
SECTION B-B
(B'-B' OPP. HAND)
SCALE 1/2" = 1'-0"
PLAN
SCALE 1/4" = 1'-0"
DETAIL "C"
SCALE 1-1/2" = 1'-0"
DETAIL "E"
SCALE 1-1/2" = 1'-0"
DACW 33-77-C-0034
SAFETY PAYS
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
I WALLS - STRUCTURAL
PLANS, ELEVATION AND DETAILS
SUDBURY RIVER
MASSACHUSETTS
NOV. 1976
SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER
SUD - 1
SHEET 18

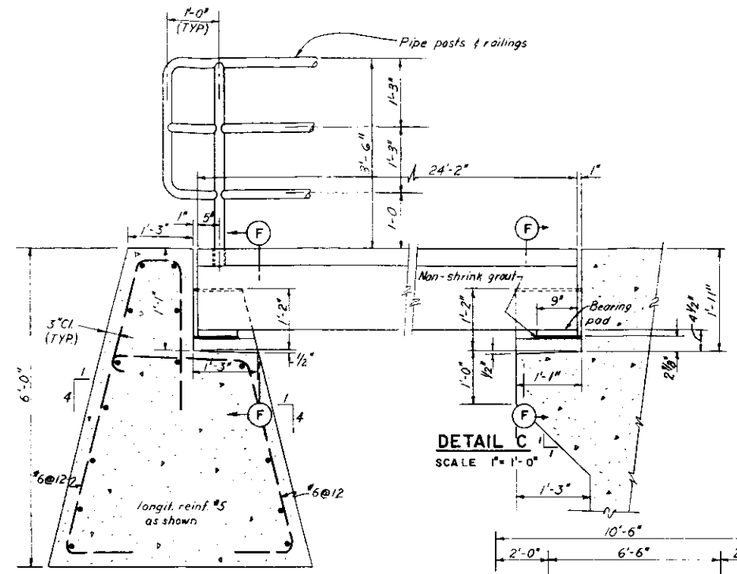
CORPS OF ENGINEERS — U. S. ARMY



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

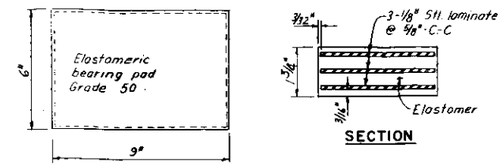


SECTION A-A
SCALE 1/4" = 1'-0"



DETAIL D
SCALE 1" = 1'-0"

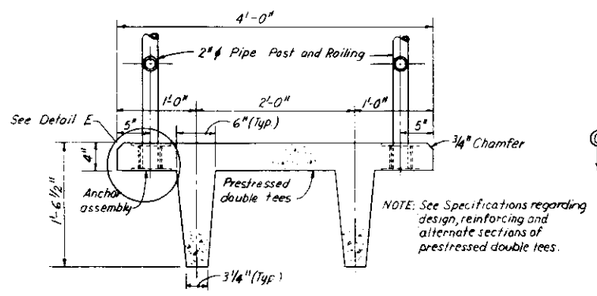
DETAIL C
SCALE 1" = 1'-0"



PLAN

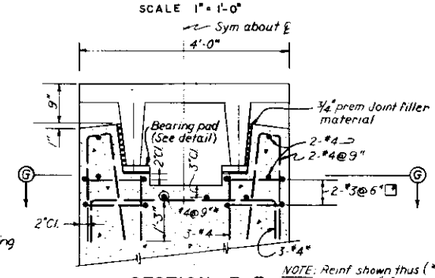
SECTION

BEARING PAD DETAILS
NOT TO SCALE



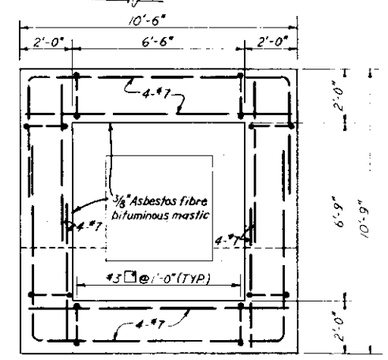
NOTE: See Specifications regarding design, reinforcing and alternate sections of prestressed double tees.

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

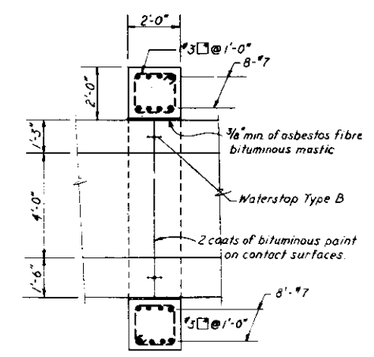


SECTION F-F
SCALE 1" = 1'-0"

NOTE: Reinf shown thus (*) is for Detail D only. Remainder of reinf. applies to both Details.



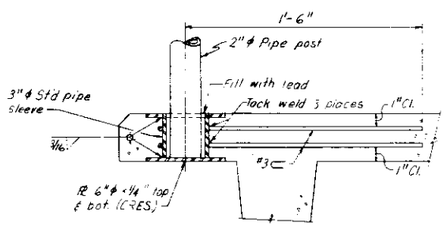
ELEVATION OF COLLAR
SCALE 1/2" = 1'-0"



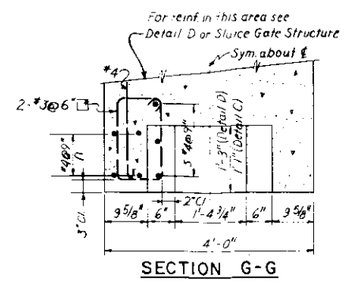
SECTION AT COLLAR
SCALE 1/2" = 1'-0"

As Built Drawing
Contract No. DACW33-77-C-0034

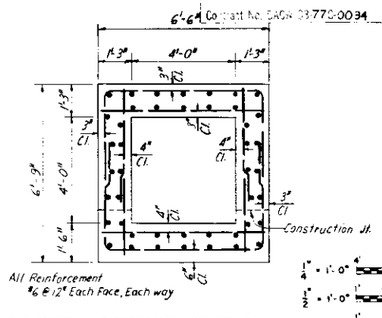
NOTES:-
1. Access bridge will be paid for under Item No. 47.
2. Concrete in conduit and collars will be paid for under Item No. 53.
3. Abutment concrete will be paid for under Item No. 49.



DETAIL E
SCALE 3" = 1'-0"



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



GRAVITY CONDUIT SECTION
SCALE 1/2" = 1'-0"

GRAPHIC SCALES

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY

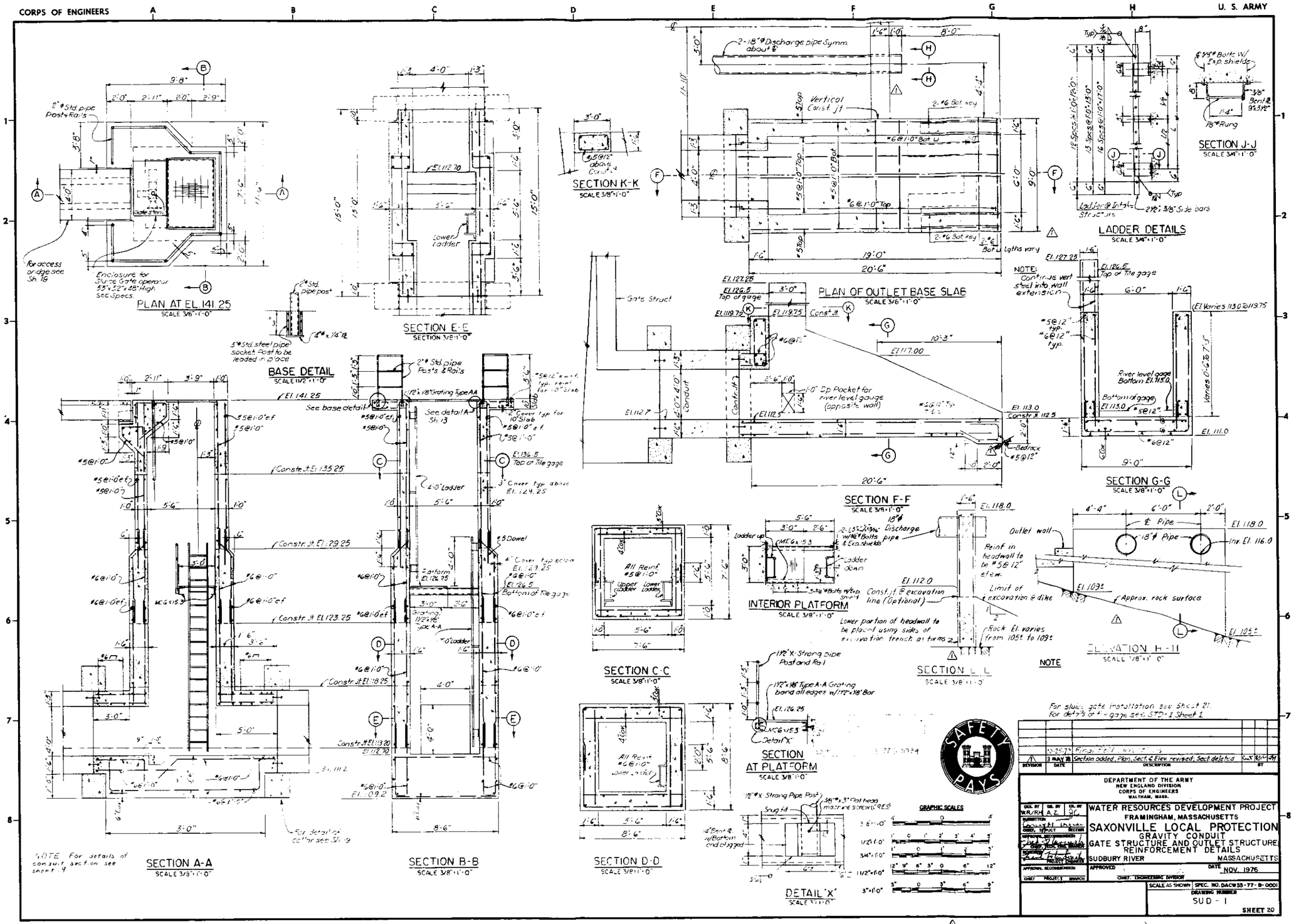
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

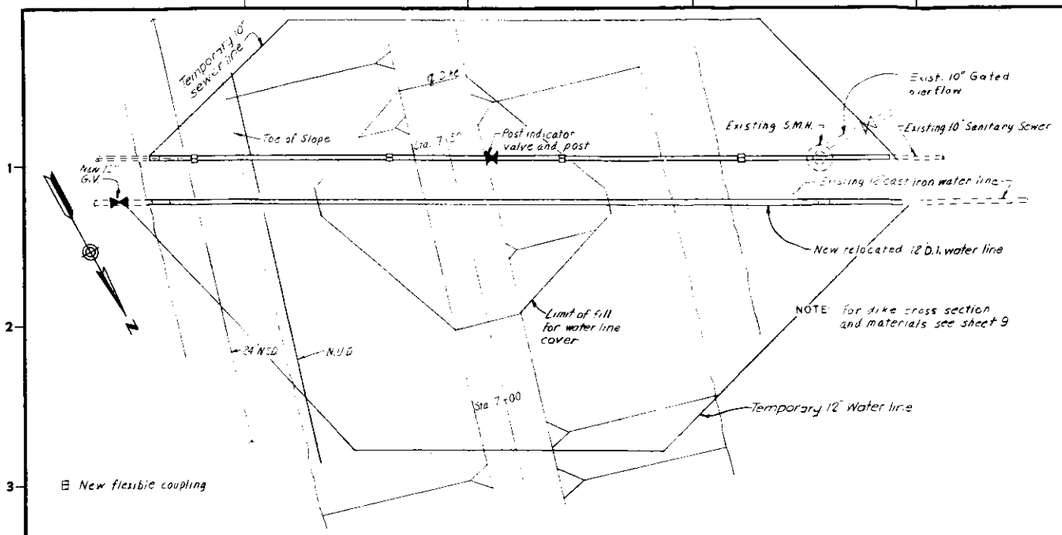
DES. BY R.L.H. | DR. BY W.F. | CK. BY QC

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
ACCESS BRIDGE AND GRAVITY CONDUIT
REINFORCEMENT DETAILS
SUDBURY RIVER — MASSACHUSETTS

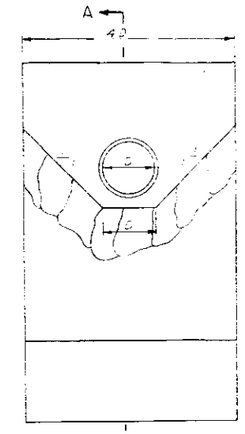
SUBMITTED: CHIEF, STRUCT. DESIGN SECTION
CHIEF, DESIGN BRANCH
PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION
DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 19

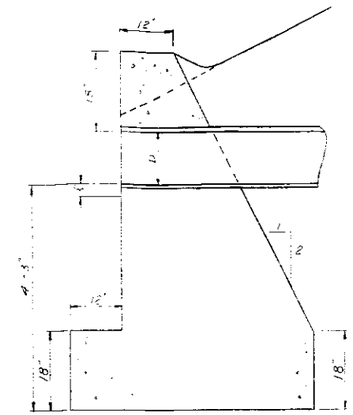

CORPS OF ENGINEERS
U. S. ARMY
PLAN AT EL. 141.25
SCALE 3/8"=1'-0"
SECTION E-E
SECTION 3/8"=1'-0"
BASE DETAIL
SCALE 1 1/2"=1'-0"
SECTION K-K
SCALE 3/8"=1'-0"
PLAN OF OUTLET BASE SLAB
SCALE 3/8"=1'-0"
LADDER DETAILS
SCALE 3/4"=1'-0"
SECTION J-J
SCALE 3/4"=1'-0"
SECTION F-F
SCALE 3/8"=1'-0"
SECTION G-G
SCALE 3/8"=1'-0"
SECTION A-A
SCALE 3/8"=1'-0"
SECTION B-B
SCALE 3/8"=1'-0"
SECTION C-C
SCALE 3/8"=1'-0"
SECTION D-D
SCALE 3/8"=1'-0"
INTERIOR PLATFORM
SCALE 3/8"=1'-0"
SECTION L-L
SCALE 3/8"=1'-0"
ELEVATION H-H
SCALE 3/8"=1'-0"
SECTION AT PLATFORM
SCALE 3/8"=1'-0"
DETAIL 'X'
SCALE 3/4"=1'-0"
NOTE
NOTE: For details of conduit section see sheet 19
For sluice gate installation see Sheet 21.
For details of the gage see STD-1 Sheet 1
GRAPHIC SCALES
SAFETY PAYS
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
GRAVITY CONDUIT
GATE STRUCTURE AND OUTLET STRUCTURE
REINFORCEMENT DETAILS
SUDBURY RIVER
MASSACHUSETTS
NOV. 1976
SCALE AS SHOWN
SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 20



PLAN



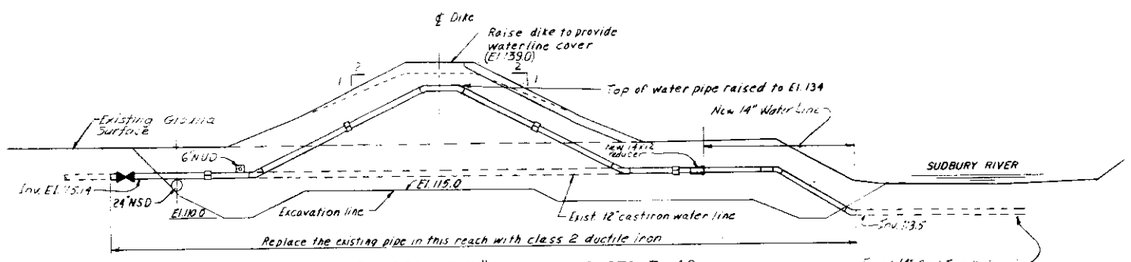
ELEVATION



SECTION A-A

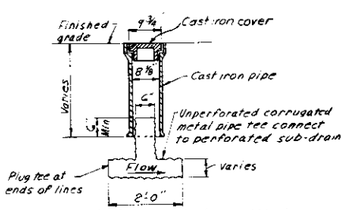
HEADWALL DETAIL

NTS



PROFILE OF RELOCATED 12" WATER LINE - STA. 7+40

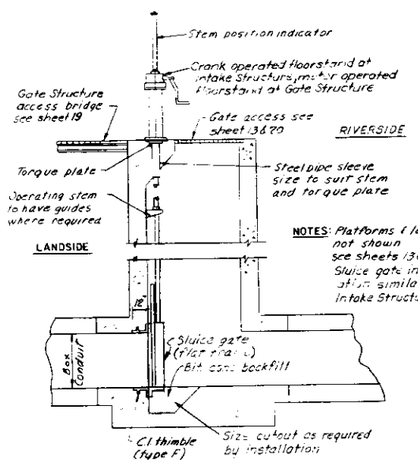
SCALE 1" = 10'



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

OBSERVATION RISER

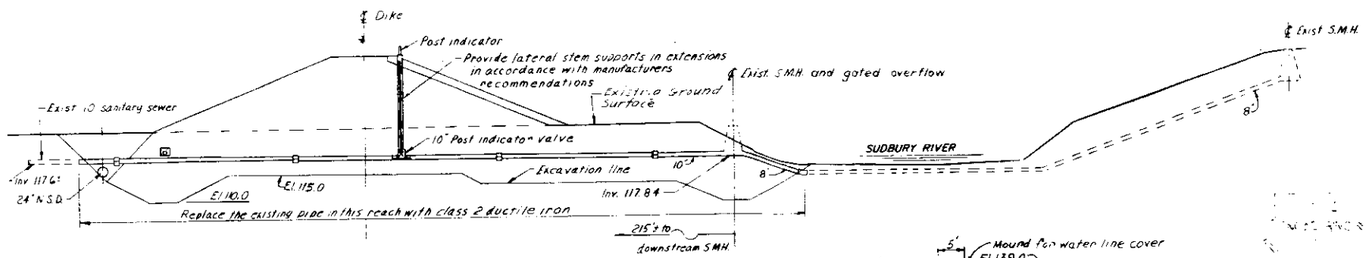
NTS



NOTES: Platforms & ladders not shown see sheets 13 & 20. Sluice gate installation similar at intake Structure.

SLUICE GATE INSTALLATION IN DIKE

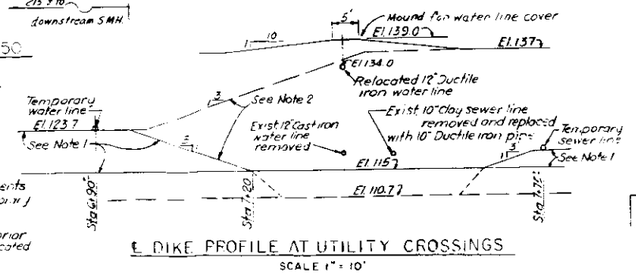
NO SCALE



PROFILE OF MODIFIED 10" SANITARY SEWER STA 7+50

UTILITY DIKE CROSSINGS AT STA 7+40 & 7+50

SCALE 1" = 10'



NOTES:

1. Limits of earth embankments prior to constructing temporary water and sewer lines.
2. Limits of embankment prior to constructing new relocated water line

℄ DIKE PROFILE AT UTILITY CROSSINGS

SCALE 1" = 10'

GRAPHIC SCALES

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

33-770-10034

REVISION	DATE	DESCRIPTION	BY
	10-25-78	Final field corrections	

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

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

UTILITY DETAILS NO. 1

SUDBURY RIVER MASSACHUSETTS

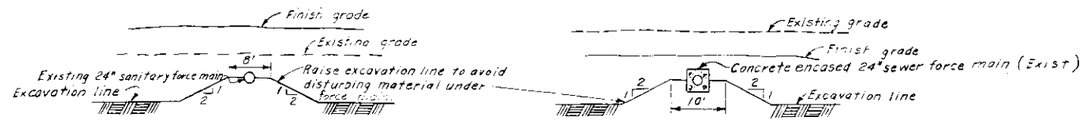
DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

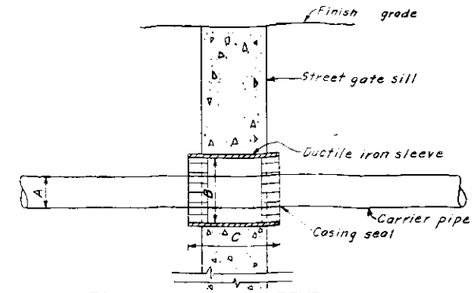
SHEET 21

CORPS OF ENGINEERS U. S. ARMY

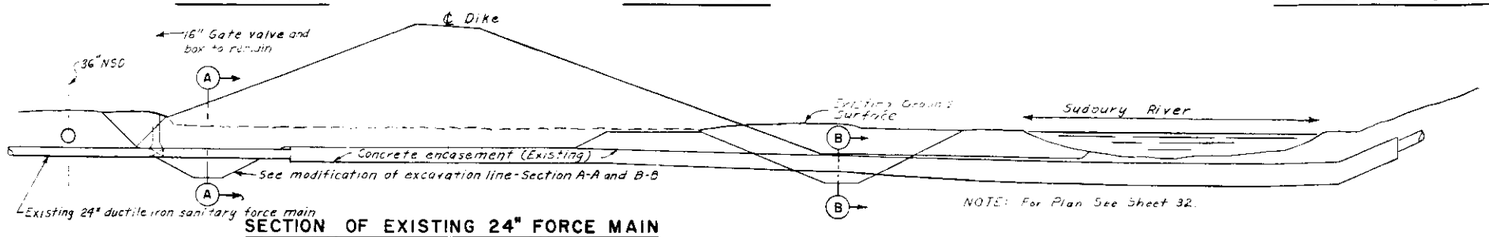


SECTION A-A

SECTION B-B



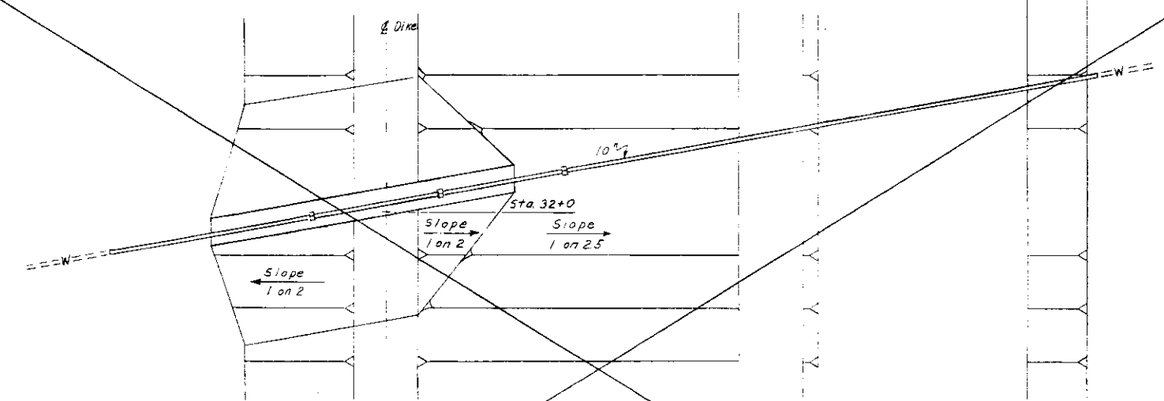
STREET GATE SLEEVE DETAIL



SECTION OF EXISTING 24" FORCE MAIN

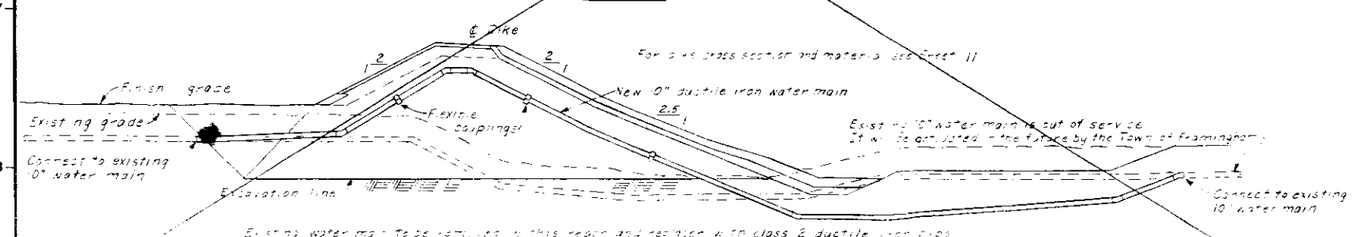
VICINITY OF STA. 17+0

SLEEVE DATA - CONCORD ST. GATE				
UTILITY	CARRIER PIPE DIA. I.D. A	SLEEVE DIA. I.D. B	SLEEVE LENGTH C	CARRIER PIPE INV.
WATER	6"	10"	7'	121.5±
"	16"	22"	10'	121.0+
SANITARY SEWER	12"	16"	8'	120.91
GAS	3"	6"	7'	123.8±



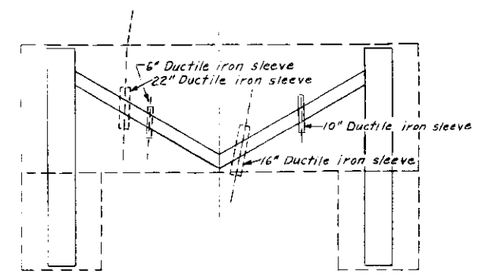
PLAN

OMIT

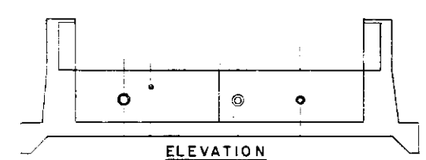


PROFILE-RELOCATED 10" WATER LINE (STA. 32+0±)

SCALE 1"=10'



PLAN



ELEVATION

DETAILS OF UTILITY CROSSINGS AT CONCORD ST. GATE

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
	3-25-79	Final [illegible]	
1	1-20-77	Deleted Plan and [illegible] (Am#1)	

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

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

UTILITY DETAILS NO. 2

SUDBURY RIVER MASSACHUSETTS

DATE NOV. 1976

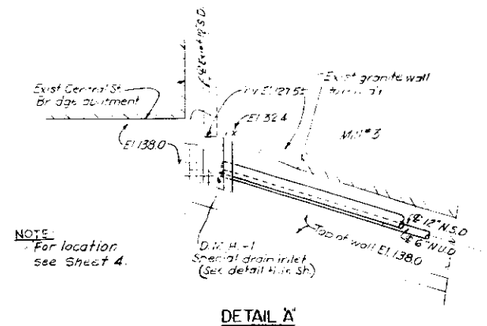
SCALE 1"=10'

SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

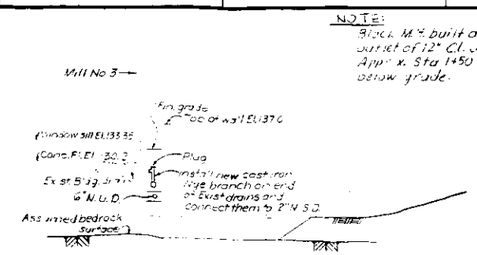
SHEET 22

CORPS OF ENGINEERS — U. S. ARMY



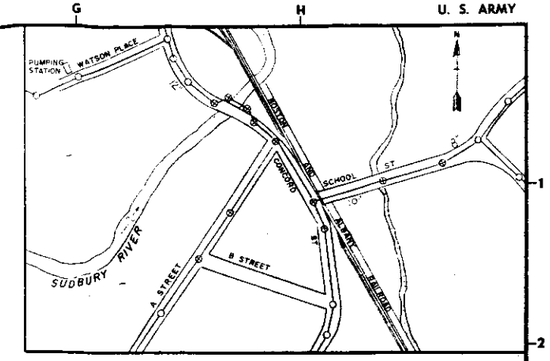
NOTE
For location see Sheet 4.

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



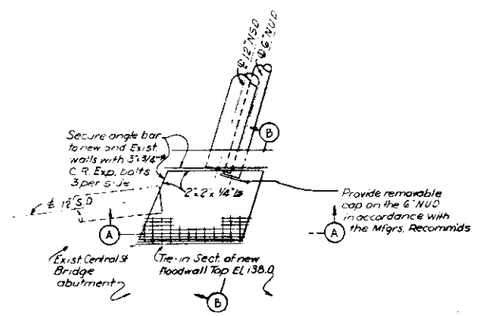
NOTE:
Block M.H. built at outset of 12" C.I. drain, Approx. Sta 1+50 cover below grade.

TYPICAL BUILDING DRAIN CONNECTION
NOT TO SCALE

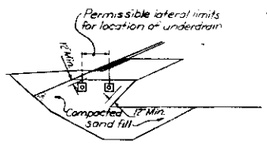


NOTE
Remove Exist frame & cover on manholes indicated with ⊗. Replace with Le Baron foundry type LA8208 or approved equal. Restore pavement around manholes to match Exist.

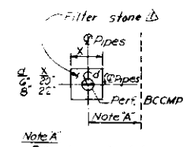
EXISTING SEWER MANHOLE MODIFICATION LAYOUT
SCALE 1" = 200'



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

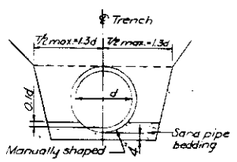


UNDERDRAIN LOCATION DETAIL IN DIKE SAND FILL SECTION
NOT TO SCALE

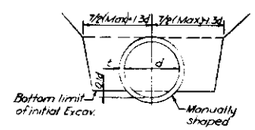


Note "A"
Filter stone extended to side of floodwall where indicated on dwgs.

TYPICAL UNDERDRAIN DETAIL IN SAND AND GRAVEL FILL SECTION
NOT TO SCALE

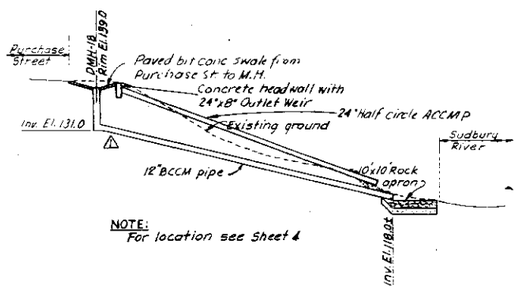


EXCAVATION LIMITS AND TYPICAL SAND BEDDING DETAIL FOR NSD
NOT TO SCALE



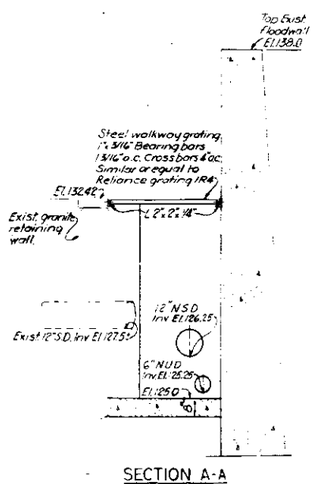
EXCAVATION LIMITS OF UNSHEETED TRENCHES FOR R.C. AND V.C. PIPES
NOT TO SCALE

LEGEND
d = Nominal diameter of pipe
t = Thickness of barrel
W = 12" for d = 30" or less
W = 18" for d = 36"
T = Width of trench at top of pipe

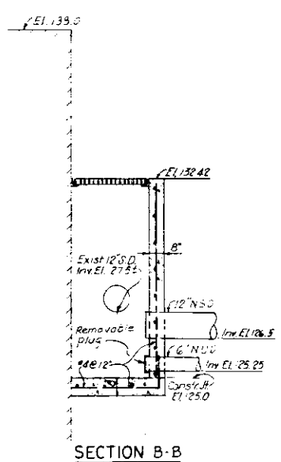


NOTE:
For location see Sheet 4

PROFILE
PURCHASE STREET STORM DRAIN
SCALE 1" = 10'

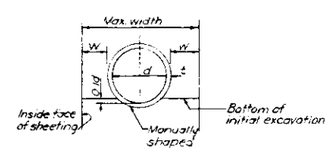


SECTION A-A
SCALE 1/2"=1'-0"



SECTION B-B

D.M.H. No. 1
(SPECIAL DRAIN INLET)



EXCAVATION LIMITS OF SHEETED TRENCHES FOR R.C. AND V.C. PIPES
NOT TO SCALE

GRAPHIC SCALES
1/4" = 1'-0"
1/2" = 1'-0"
1" = 200'
1" = 10'

DACW 33-77-C-0034

REVISION	DATE	DESCRIPTION	BY
1	10-25-77	Final field corrections	
2	1-20-77	Added [illegible] and revised storm drain (Am #1)	[illegible]

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

DES. BY W.J.F. | DR. BY R.Z. | CK. BY [illegible]

SUPERVISION: [illegible]
CHIEF, UTILITIES SECTION
[illegible]
CHIEF, DESIGN BRANCH
[illegible]
APPROVAL RECOMMENDATION
CHIEF PROJECT BRANCH

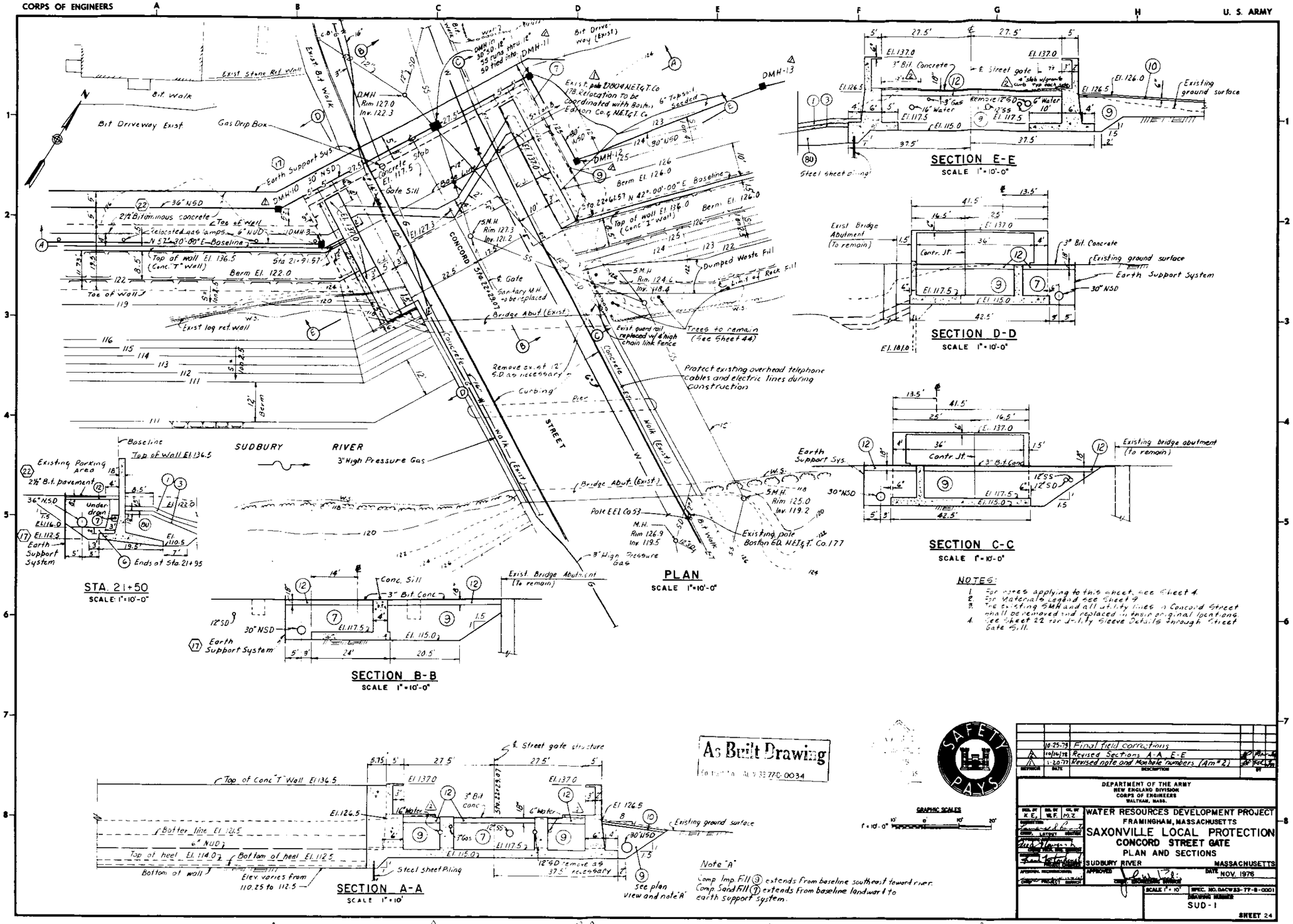
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
UTILITY DETAILS NO. 3

SUDBURY RIVER — MASSACHUSETTS

APPROVED: [illegible]
CHIEF, ENGINEERING DIVISION
DATE: NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW 33-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 23

CORPS OF ENGINEERS — U. S. ARMY



NOTES:

1. For notes applying to this sheet, see Sheet 4.
2. For Materials Legend see Sheet 9.
3. The existing SMH and all utility lines in Concord Street shall be removed and replaced in their original location.
4. See Sheet 22 for utility sleeve details through Street Gate Sill.

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	
2	10/16/78	Revised Sections A-A, E-E	
1	1-20-77	Revised note and Manhole numbers (Am #2)	

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

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
CONCORD STREET GATE
PLAN AND SECTIONS

SUDBURY RIVER — MASSACHUSETTS

DATE NOV. 1976

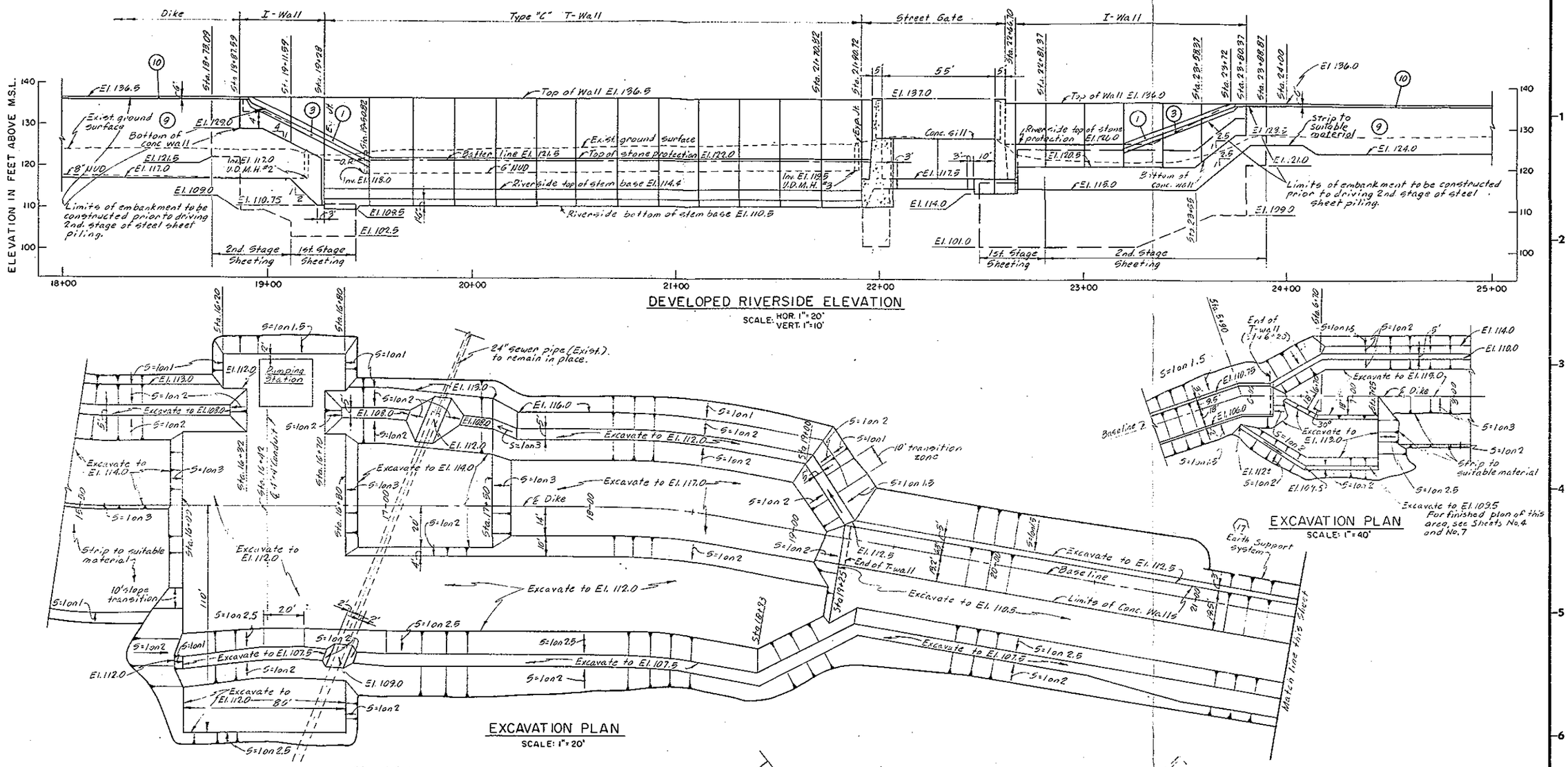
SCALE 1" = 10'

SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

SHEET 24

CORPS OF ENGINEERS — U. S. ARMY



DEVELOPED RIVERSIDE ELEVATION

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

EXCAVATION PLAN

SCALE: 1" = 40'

EXCAVATION PLAN

SCALE: 1" = 20'

EXCAVATION PLAN

SCALE: 1" = 20'

As Built Drawing

Contract No. DACW33-77-C-0034

GRAPHIC SCALES

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

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

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

NOTES:

For notes applying to this Sh. see Sh. 4 & Sh. 7.

For materials legend see Sh. 9.

REVISION	DATE	DESCRIPTION	BY
	7-22-79	Final field corrections	

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

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

SUBMITTED: CHIEF, LAYOUT SECTION

APPROVED RECOMMENDED: CHIEF, TECH. DOC. BRANCH

SUBMITTED: PROJECT ENGINEER

APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

CONCORD STREET GATE
EXCAVATION PLAN

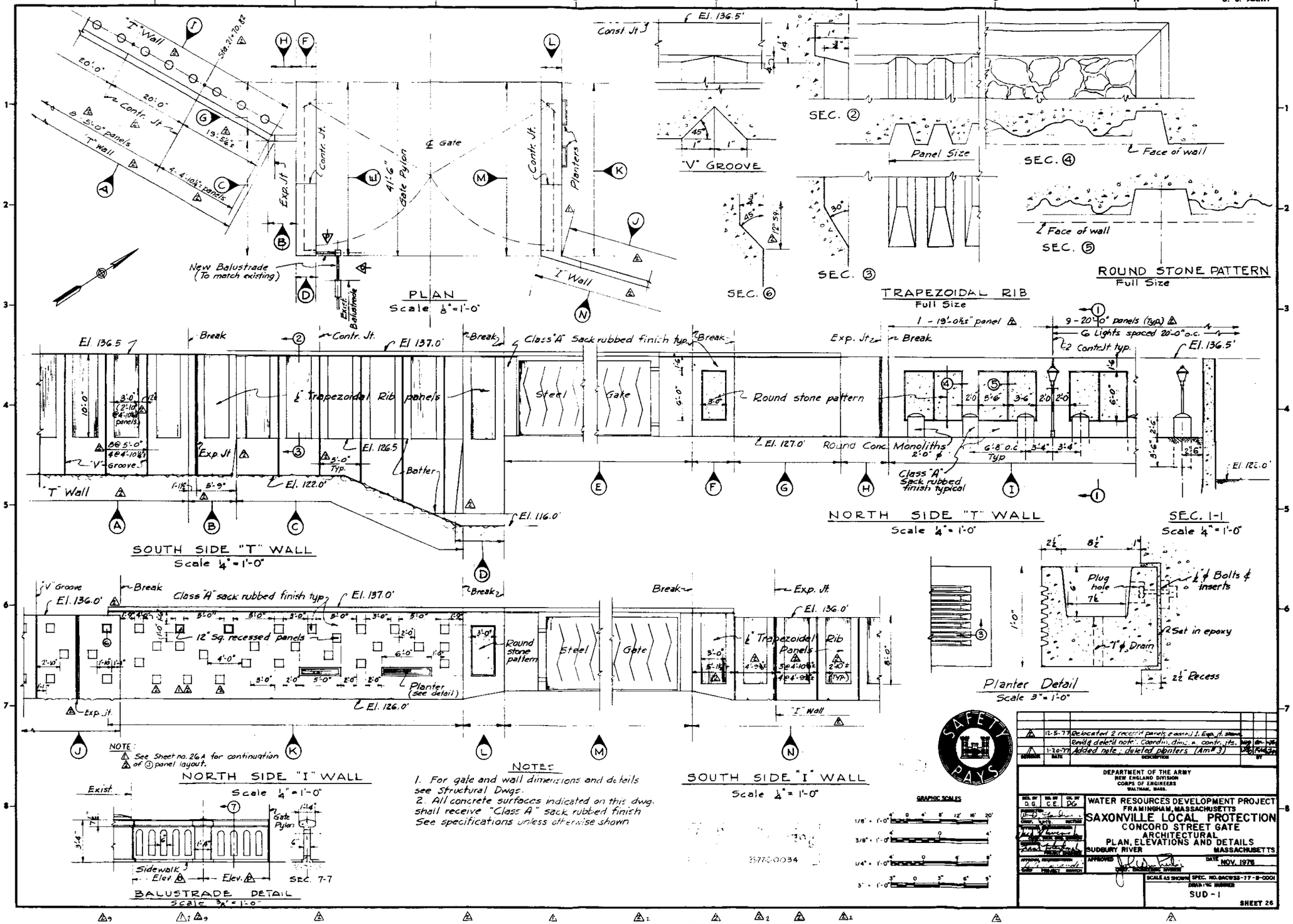
SUDBURY, RIVER — MASSACHUSETTS

APPROVED: CHIEF, ENGINEERING DIVISION — DATE NOV 1976

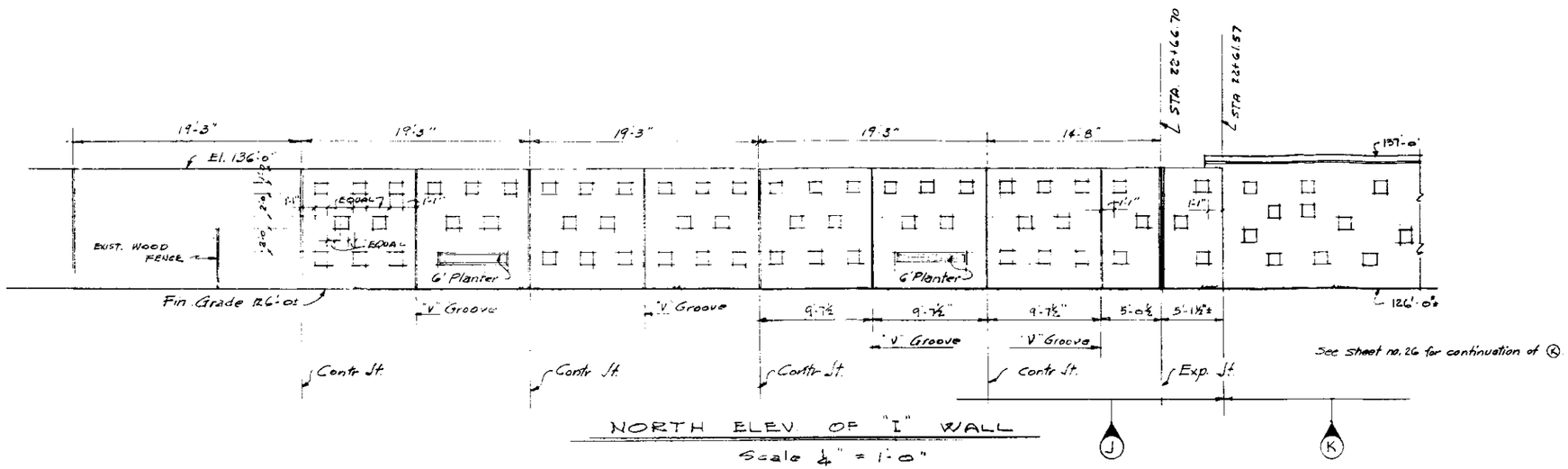
SCALE: AS SHOWN — SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

SHEET 25

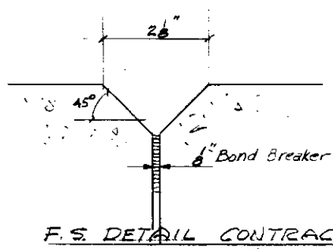

CORPS OF ENGINEERS
U. S. ARMY
PLAN
Scale 1/8" = 1'-0"
"T" Wall
Contr. Jt.
Exp. Jt.
Gate Pylon
Planters
New Balustrade (To match existing)
Exist. Balustrade
"I" Wall
"V" GROOVE
SEC. ②
SEC. ③
SEC. ④
SEC. ⑤
SEC. ⑥
Panel Size
Face of wall
TRAPEZOIDAL RIB
Full Size
ROUND STONE PATTERN
Full Size
SOUTH SIDE "T" WALL
Scale 1/4" = 1'-0"
Class "A" Sack rubbed finish typ.
Trapezoidal Rib panels
Steel Gate
Round stone pattern
Round Conc. Monoliths
Class "A" Sack rubbed finish typical
NORTH SIDE "T" WALL
Scale 1/4" = 1'-0"
SEC. 1-1
Scale 1/4" = 1'-0"
Plug hole
Bolts & inserts
Set in epoxy
Drain
Recess
Planter Detail
Scale 3" = 1'-0"
Class "A" sack rubbed finish typ.
12" Sq. recessed panels
Planter (see detail)
NORTH SIDE "I" WALL
Scale 1/4" = 1'-0"
SOUTH SIDE "I" WALL
Scale 1/4" = 1'-0"
NOTE:
See Sheet no. 26A for continuation of ③ panel layout.
NOTES
1. For gate and wall dimensions and details see Structural Dwgs.
2. All concrete surfaces indicated on this dwg. shall receive "Class A" sack rubbed finish See specifications unless otherwise shown
BALUSTRADE DETAIL
Scale 3/8" = 1'-0"
SEC. 7-7
GRAPHIC SCALES
12-5-77 Relocated 2 recess'd panels & added 1. Exp. jt. shown
Rev'd & dele'd note: Coordin. dims. & contr. jts.
1-20-77 Added note; deleted planters (Am#3)
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
CONCORD STREET GATE
ARCHITECTURAL
PLAN, ELEVATIONS AND DETAILS
SUDBURY RIVER
MASSACHUSETTS
NOV. 1976
SUD-1
SHEET 26

CORPS OF ENGINEERS — U. S. ARMY

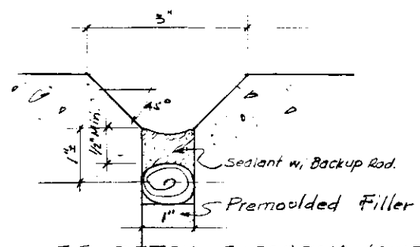


NORTH ELEV. OF "I" WALL

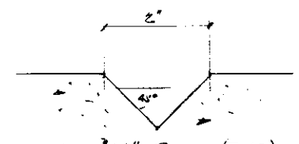
Scale ¼" = 1'-0"



F.S. DETAIL CONTRACTION JOINT (TYP.)



F.S. DETAIL EXPANSION JOINT (TYP)



F.S. DETAIL "V" Groove (TYP)

As Built Drawing

Contract No. DACW 33-77-C-0034

GRAPHIC SCALES

1/4" = 1'-0"

REVISION	DATE	DESCRIPTION	BY

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

DES. BY D.G. — DR. BY C.E. — CK. BY

SUBMITTED — CHIEF, ARCH. SECTION

APPROVAL RECOMMENDED — CHIEF, ARCH. DES. BRANCH

RESPECTFULLY SUBMITTED — PROJECT ENGINEER

APPROVAL RECOMMENDED — CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

CONCORD STREET GATE
ARCHITECTURAL
ELEVATION AND DETAILS

SUDBURY RIVER — MASSACHUSETTS

APPROVED — CHIEF, ENGINEERING DIVISION

DATE NOV. 1977

SCALE AS SHOWN — SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD - I

SHEET 26A

CORPS OF ENGINEERS

U. S. ARMY

PLAN
BASE SLAB REINFORCEMENT
SCALE 3/16" = 1'-0"

NOTE: Sta. 21+91.57 theoretical point for alinement only.

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

NOTE: For details of architectural treatment of north and south sides of I-wall and T-wall adjacent to street gate, see sheet 26.

ELEVATION B-B
ELEVATION C-C (OPP. HAND)
SCALE 1/4" = 1'-0"

SECTION D-D
SECTION E-E (OPP. HAND)
SCALE 1/4" = 1'-0"

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

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

SECTION H-H (H'-H' Opp. Hand)
SCALE 3/8" = 1'-0"

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

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
2	1-16-78	Sect. A-A, D-D, F-F & Plan-Gate Sill Revised	
1	11-20-77	Added note (Am. #2)	

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

DES. BY W.R./R.H. | DR. BY W.F. | CK. BY J.C.

SUBMITTED: CHIEF, STRUCT. SECTION

APPROVAL RECOMMENDED: CHIEF, FOUND. & STRUCT. BRANCH

REVIEWED: PROJECT ENGINEER

APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
CONCORD STREET GATE
REINFORCEMENT DETAILS

SUDBURY RIVER — MASSACHUSETTS

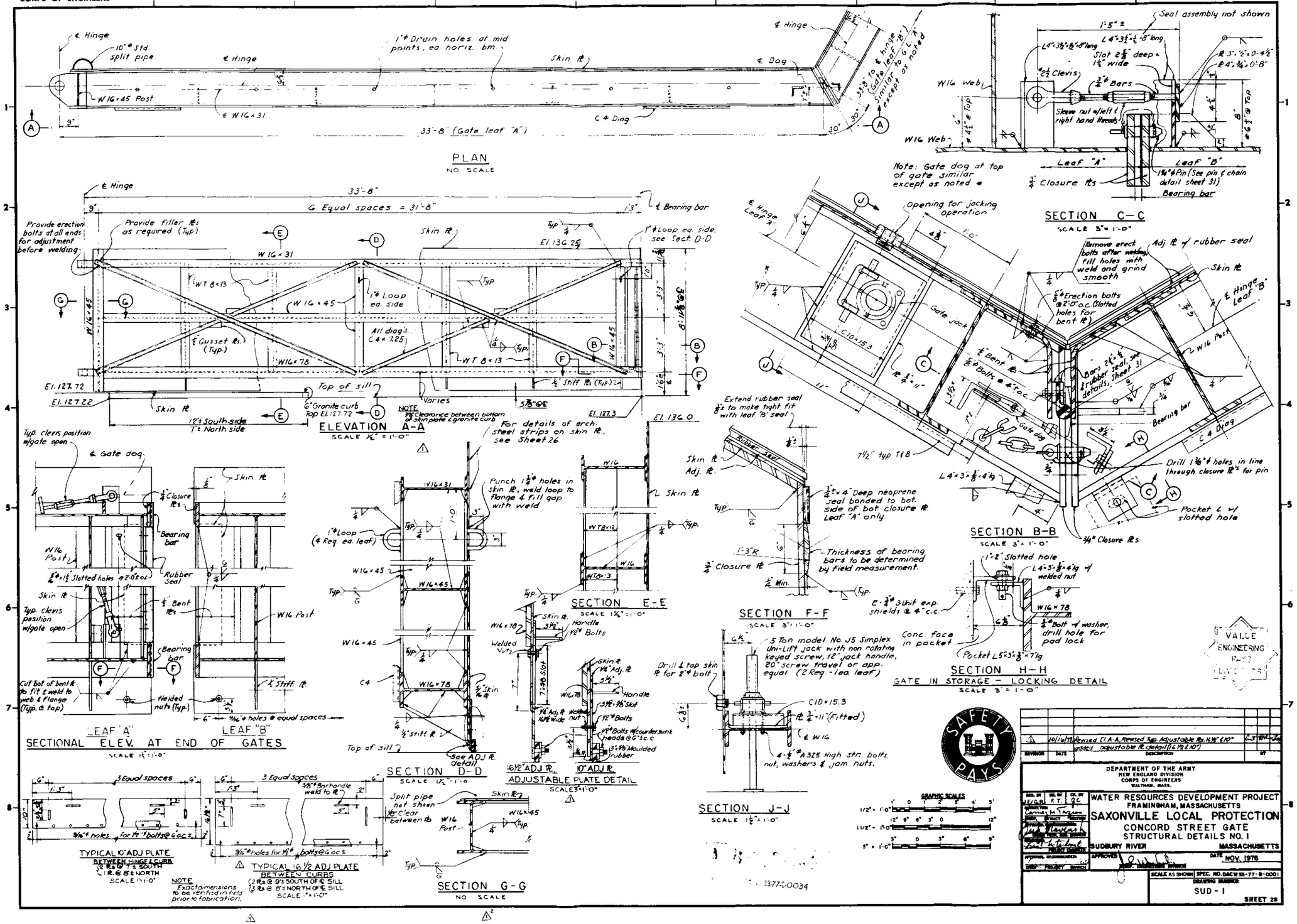
APPROVED: CHIEF, ENGINEERING DIVISION — DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

SHEET 27

CORPS OF ENGINEERS — U. S. ARMY



1	10/16/78	Revised El A-A, Revised Typ. Adjustable ℞'s 16 1/16" & 10", added adjustable ℞ detail (16 1/2" & 10")	D.S.
REVISION	DATE	DESCRIPTION	BY

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

DES. BY J.F.G.B. — DRN. BY F.T. — CK. BY J.C.

SUBMITTED: Lawrence M. Tarzia, CHIEF, STRUCT. PROJECTS BRANCH

APPROVED: Robert L. Tarbox, CHIEF, PROJECT BRANCH

APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

CONCORD STREET GATE
STRUCTURAL DETAILS NO. 1

SUDBURY RIVER — MASSACHUSETTS

APPROVED: DATE NOV. 1976
CHIEF, ENGINEERING DIVISION

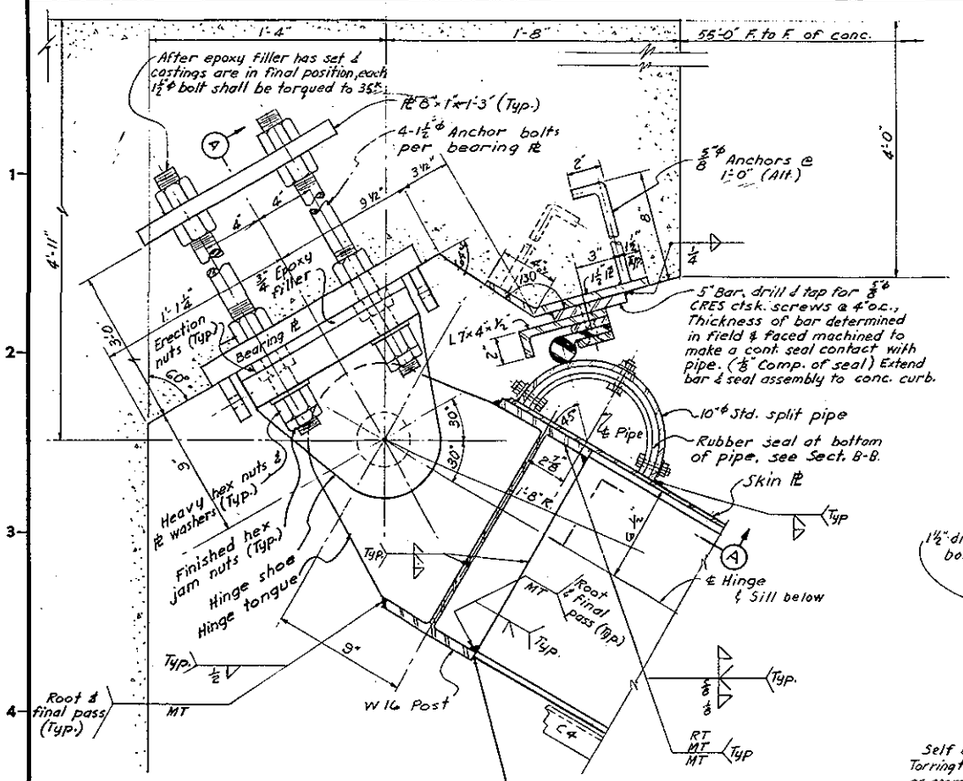
SCALE AS SHOWN — SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD - 1

SHEET 28

VALUE ENGINEERING PAYS

SAFETY PAYS

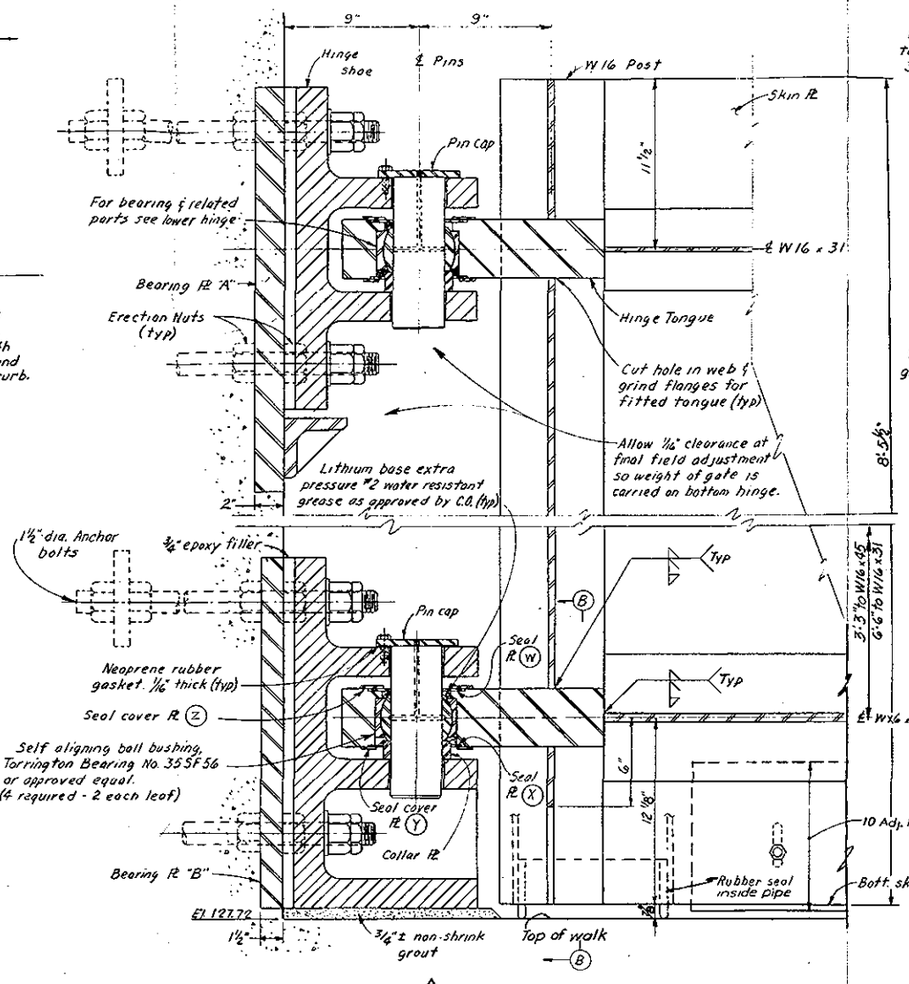


NOTES

1. Welding of hinge tongues and of other parts of the gates shall have min. preheat & interpass temperatures according to the specifications and AWS D1.1-75
2. After hinge tongues have been welded to post the post welds shall be stress relieved before proceeding with skin PL. & beam to post connections.

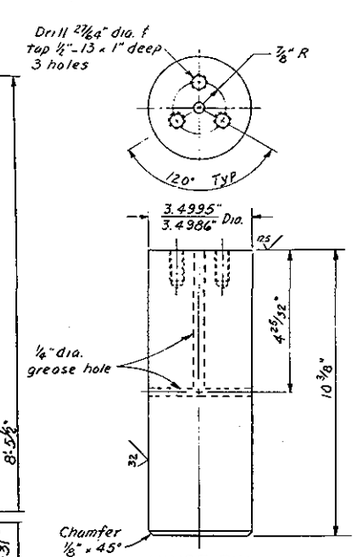
SECTIONAL PLAN AT HINGES

SCALE 3" = 1'-0"



SECTION A-A

SCALE 3" = 1'-0"



HINGE PIN

MAT'L STAINLESS STEEL

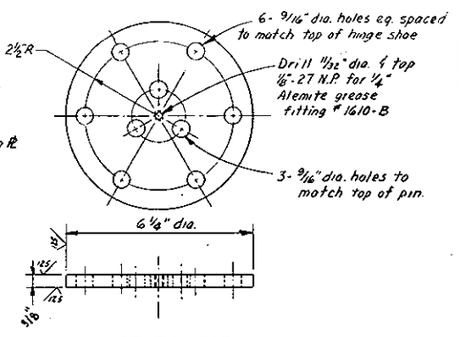
ASTM A276-75 TYPE 410

(CONDITION "T")

4 REQ

(ALL LOTS TO BE TESTED & RESULTS SUBMITTED FOR APPROVAL)

HALF SCALE

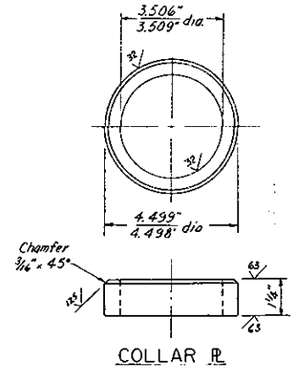


HINGE PIN CAP

MAT'L STAINLESS STEEL-410

4 REQ

HALF SCALE

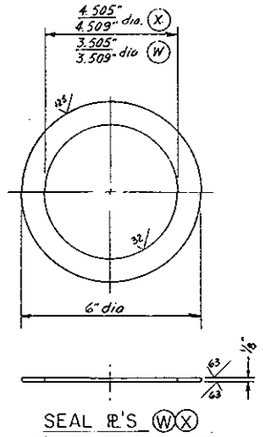


COLLAR PL

MAT'L STAINLESS STEEL-410

4 REQ

HALF SCALE

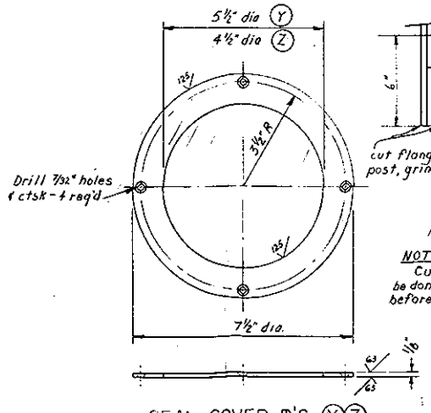


SEAL PL'S (W)(X)

MAT'L BRASS QQB-637

4 OF EACH RLQ

HALF SCALE

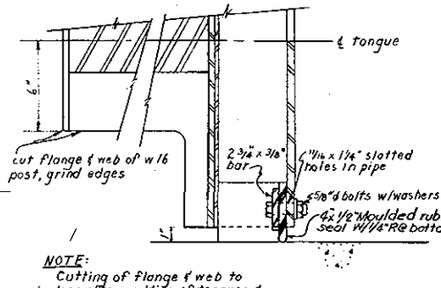


SEAL COVER PL'S (Y)(Z)

MAT'L STAINLESS STEEL-410

4 OF EACH REQ

HALF SCALE



NOTE:
Cutting of flange & web to be done after welding of tongues & before stress relieving.

SECTION B-B

SCALE 3" = 1'-0"

GRAPHIC SCALES

6" = 1'-0" 2" 0 2" 4"

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

VALUE ENGINEERING PAYS DIVIDENDS

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY
1	10/16/78	Revised Sect A-A, B-B, & Sectional plan @ hinges	

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

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

SUBMITTED: STRUCT. SECTION

APPROVED: CHIEF, PROJECT ENGINEER

APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
CONCORD STREET GATE
STRUCTURAL DETAILS NO. 2

SUDBURY RIVER MASSACHUSETTS

APPROVED: CHIEF, ENGINEERING DIVISION

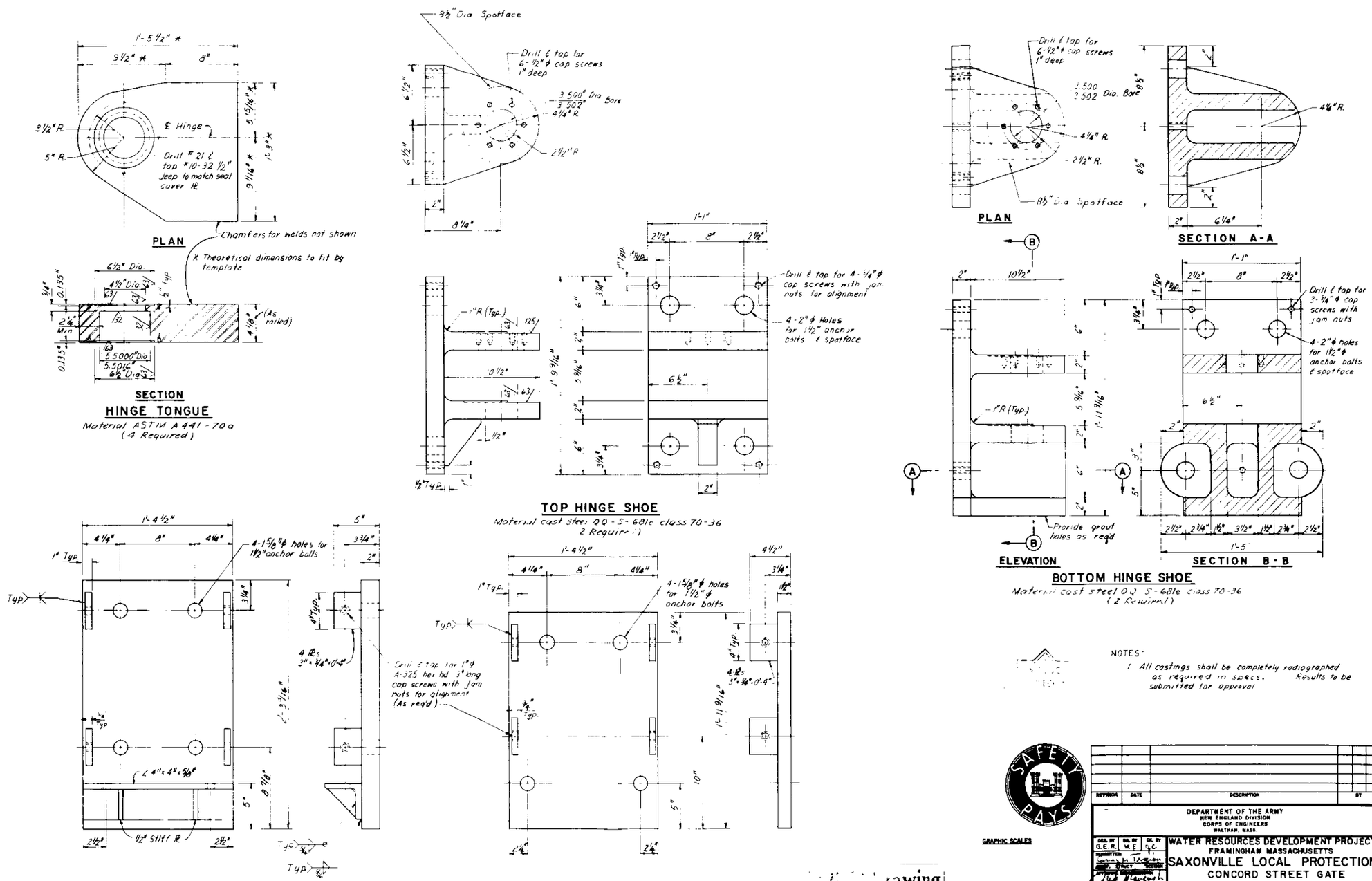
DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

SHEET 29

DACW 33-77-C-0034



NOTES:

1. All castings shall be completely radiographed as required in specs. Results to be submitted for approval

GRAPHIC SCALES

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY

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

DES. BY G.E.R. | DR. BY W.E. | CK. BY G.C.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
CONCORD STREET GATE
STRUCTURAL DETAILS NO. 3
SUDBURY, RIVER MASSACHUSETTS

APPROVED
CHIEF, ENGINEERING DIVISION

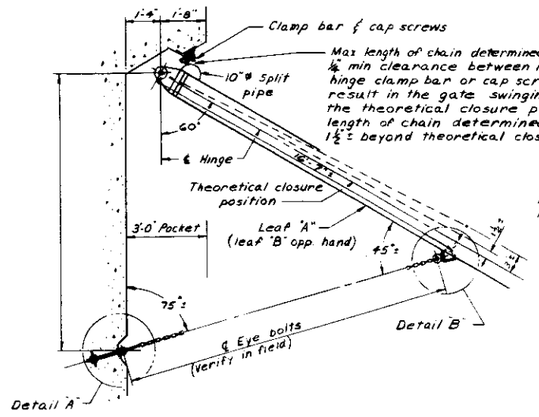
DATE NOV 1976

SCALE

SPEC. NO. DACW33-77-B-0001

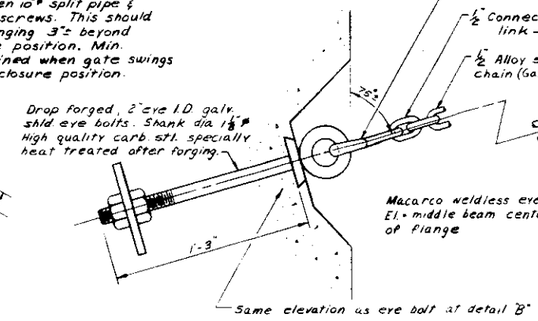
DRAWING NUMBER SUD-1

SHEET 30



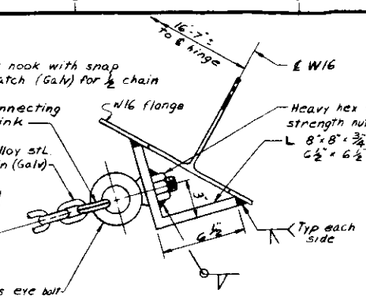
PLAN

NO SCALE



DETAIL "A"

SCALE 3" = 1'-0"

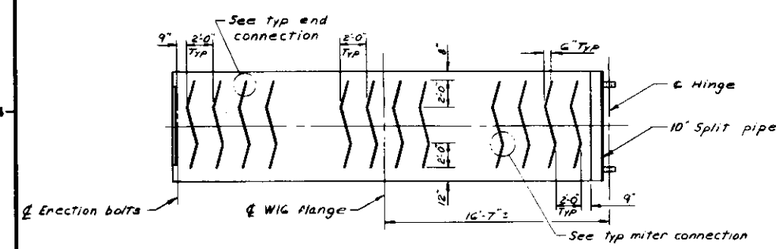


DETAIL "B"

SCALE 3" = 1'-0"

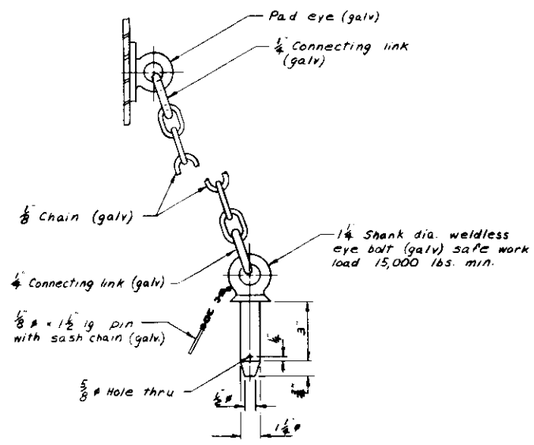
STOP CHAIN FOR STREET GATE

(Provide 2 complete chain sets for 2 gate leaves)



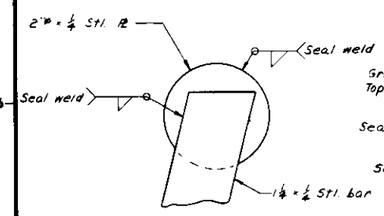
GATE LEAF ELEVATION

LEAF A AS SHOWN
LEAF B OPPOSITE HAND
SCALE 1/4" = 1'-0"



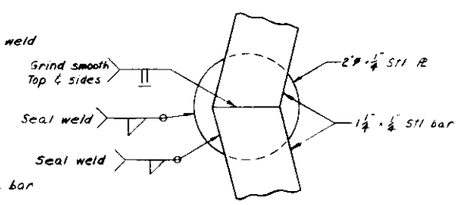
PIN & CHAIN DETAIL

NO SCALE



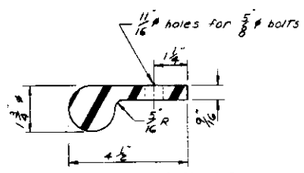
TYPICAL END CONNECTION

SCALE 12" = 1'-0"



TYPICAL MITER CONNECTION

SCALE 12" = 1' 0"



TYPICAL SEAL DETAILS

SCALE 6" = 1'-0"

STREET GATE NOTES

1. All structural steel shall conform to ASTM A36 except as otherwise noted.
2. Anchor bolts shall conform to ASTM A325-Type 3.
3. Each gate jack shall have a 5 ton working capicity.
4. Groove welds shall have complete penetration welds unless otherwise shown.
5. R.T.U.T. & M.T. indicates joints and parts in which weld soundness shall be established by non-destructive testings. Symbols are in accordance with American Welding Society A2.2
6. Provide one set of wrenches for each gate leaf to operate bolts & jacks for gate operation and storage. Store wrenches at designated locations.
7. All bolts, nuts and washers shall be Stainless Steel-Type 316 (min. yield = 30,000 p.s.i.) except as otherwise noted.
8. Chain shall be 5/8" Marcarco alloy steel chain or approved equal, No. 3587Y16 with 5.625 ton working load. Links shall be 1/2" heavy duty alloy steel connecting links, No. 3578T16 with 5.625 ton working load. Eye bolt shall be Marcarco weldless, threaded shoulder pattern, shank 1 1/8" dia. x 2 3/8" lg. safe working load of 5 tons or approved equal. The safty hook shall be alloy steel for 1/2" chain & 1 1/8" eye I.D., No. 8934Y16 with 5.625 ton working load. These items shall be galvinized and are listed in the Mc Master-Carr Supply Co. catalog #76
9. All items shown on Sheets 28 to 31 inclusive plus frames, covers, eye bolts and plates attached to concrete, shown on Sheet 27 shall be included for payment under item No 65.

As Built Drawing

GRAPHIC SCALES

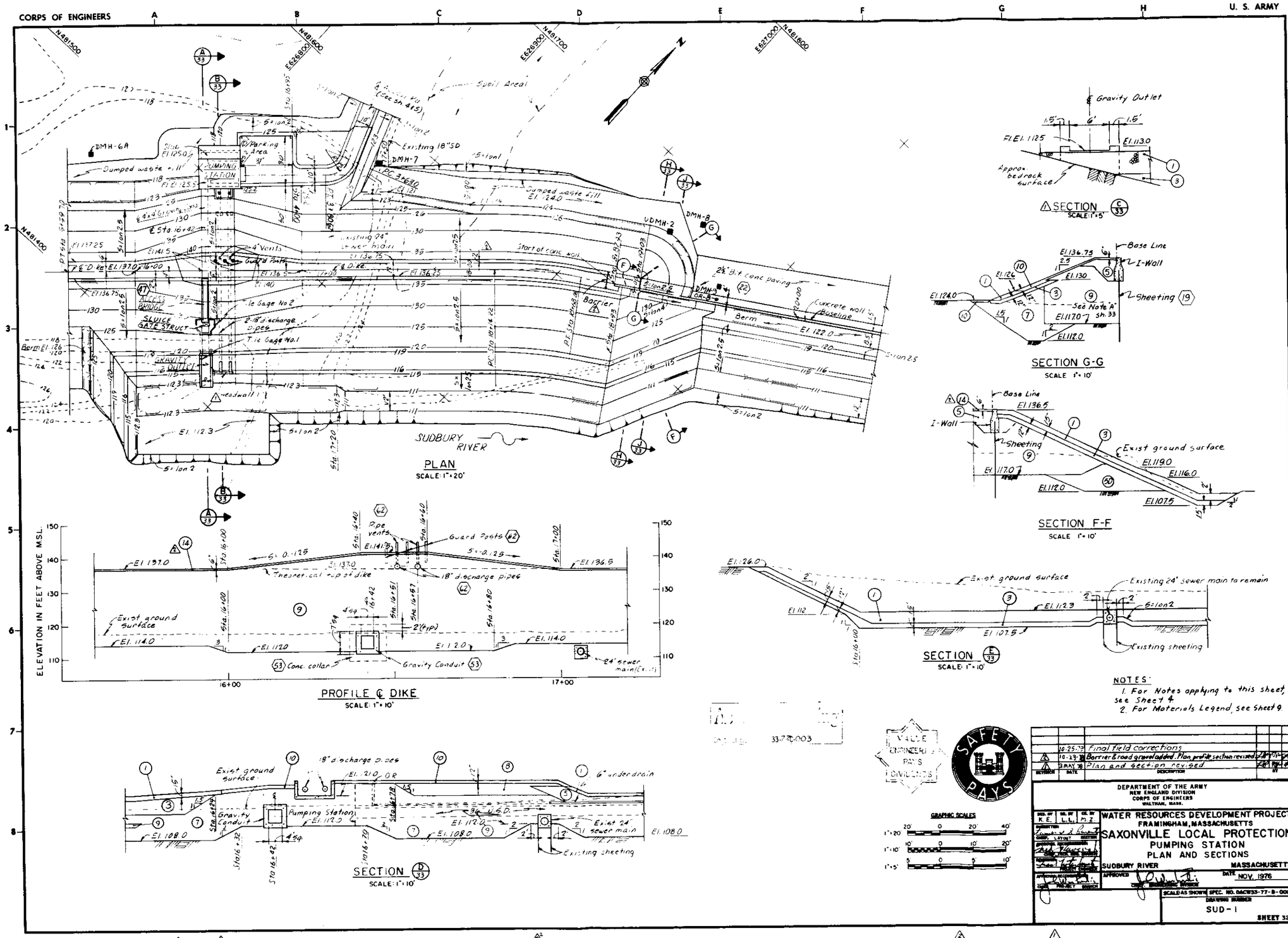
1/4" = 1'-0"
3" = 1'-0"
6" = 1'-0"
12" = 1'-0"

REVISION	DATE	DESCRIPTION	BY

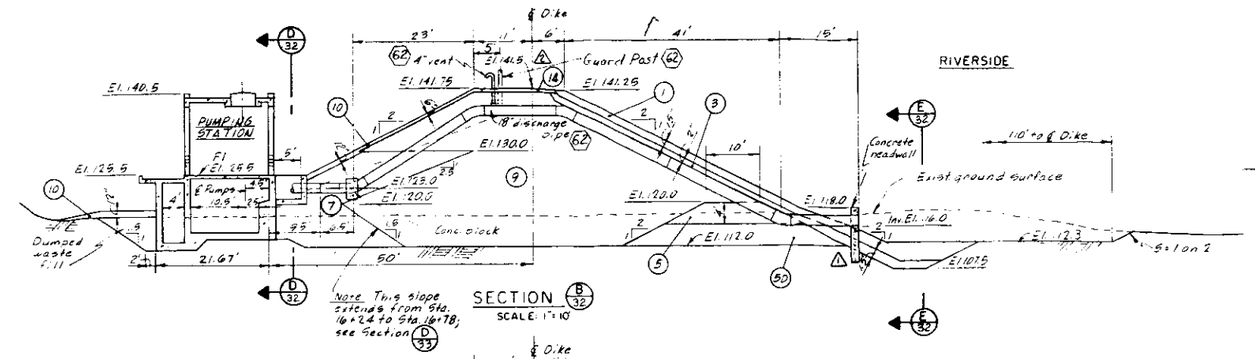
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
CONCORD STREET GATE
STRUCTURAL DETAILS NO. 4
SUDBURY RIVER
MASSACHUSETTS

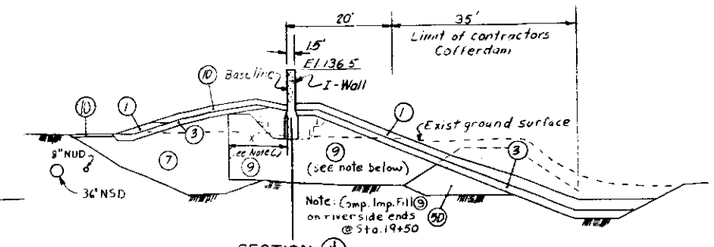
DATE NOV. 1976
SCALE AS SHOWN
SPEC. NO. DACW33-77-B-0801
DRAWING NUMBER SUD - 1
SHEET 31


CORPS OF ENGINEERS
U. S. ARMY
PLAN
SCALE: 1" = 20'
SUDBURY RIVER
PROFILE ℄ DIKE
SCALE: 1" = 10'
ELEVATION IN FEET ABOVE MSL.
SECTION C/33
SCALE: 1" = 5'
SECTION G-G
SCALE 1" = 10'
SECTION F-F
SCALE 1" = 10'
SECTION E/33
SCALE: 1" = 10'
SECTION D/33
SCALE: 1" = 10'
NOTES:
1. For Notes applying to this sheet, see Sheet 4.
2. For Materials Legend, see Sheet 9.
GRAPHIC SCALES
VALUE ENGINEERING PAYS DIVIDENDS
SAFETY PAYS
10-25-79 Final field corrections
10-23-78 Barrier & road gravel added. Plan, profile section revised
3 MAY 78 Plan and section revised
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
PLAN AND SECTIONS
SUDBURY RIVER
MASSACHUSETTS
DATE NOV. 1976
SCALE AS SHOWN
SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 32

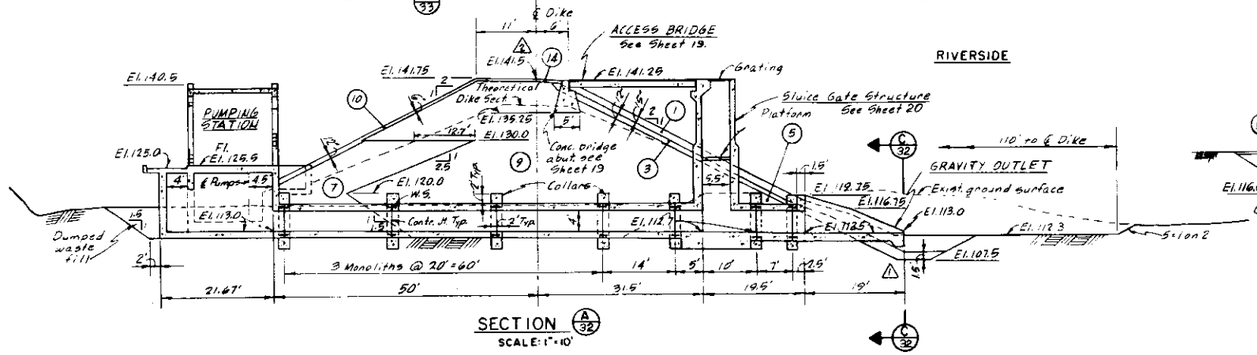
CORPS OF ENGINEERS U. S. ARMY



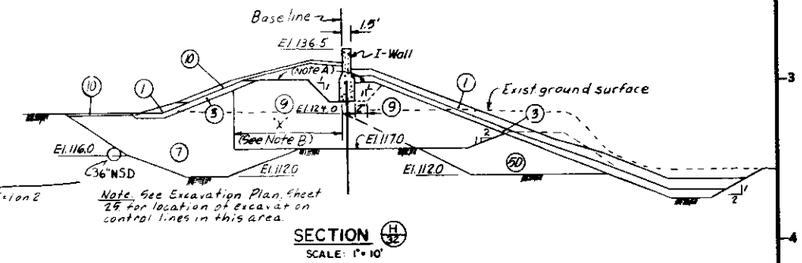
SECTION B/32
SCALE: 1"=10'



SECTION J/32
SCALE: 1"=10'



SECTION A/32
SCALE: 1"=10'



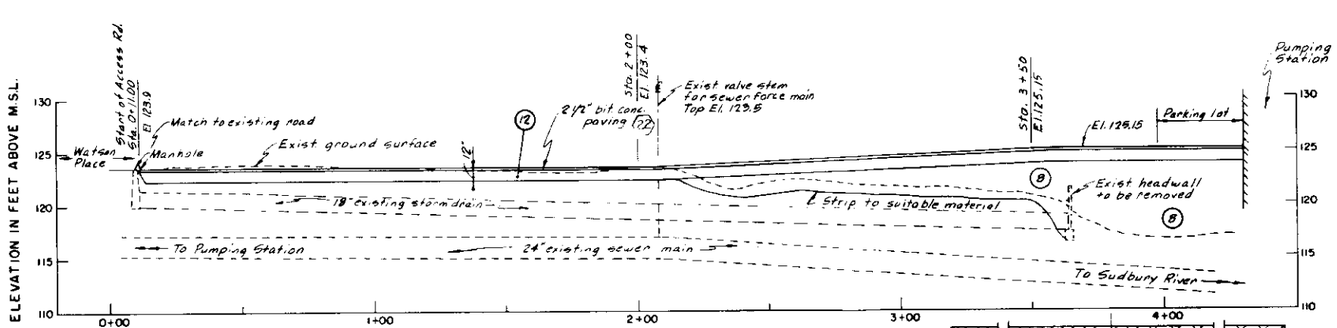
SECTION H/32
SCALE: 1"=10'

NOTE "A"

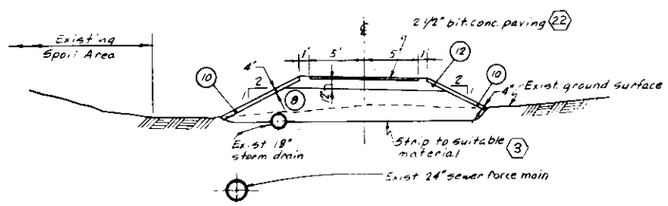
Construct embankment to limits shown (Note A) prior to driving 2nd. stage steel sheet piling. Excavate fill as indicated to bottom of I-wall. After I-wall has been constructed, back fill with compacted impervious fill 9 on the ends and Riverside of the wall and with compacted gravel fill 5 on the landside of the wall.

NOTE "B"

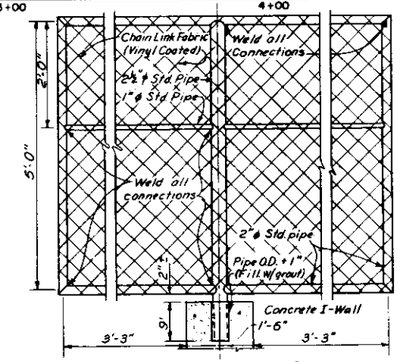
Dimension "X" is measured perpendicular to the baseline. The dimension is 6' from Sta. 19+40 to Sta. 19+25 and increases to 35' at Sta. 18+93.



PROFILE ℄ ACCESS ROAD
SCALE: HOR. 1"=20' VERT. 1"=5'



TYPICAL ACCESS ROAD SECTION
SCALE: 1"=5'



FAN DETAIL 2
NOT TO SCALE

NOTES:

1. For Notes applying to this Sheet, see Sheet 4.
2. For Materials Legend, see Sheet 9.

VALUE ENGINEERING PAYS DIVIDENDS

SAFETY PAYS

As Built Drawing
Contract No. DACW 33-77-C-0034

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	
2	10-23-78	Sections revised. Fan detail added.	
1	3 MAY 78	Sections revised.	

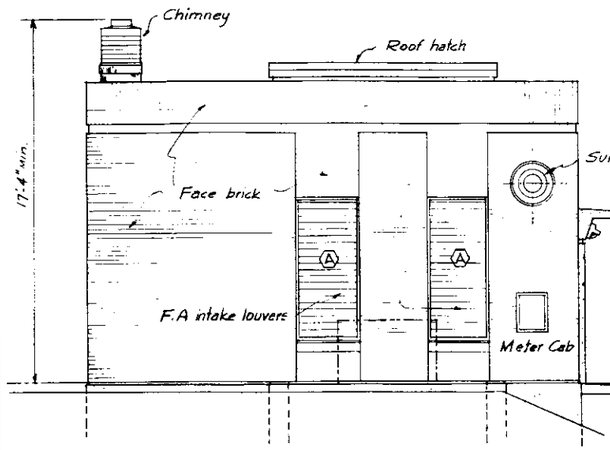
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
SECTIONS AND DETAILS
SUDBURY RIVER MASSACHUSETTS

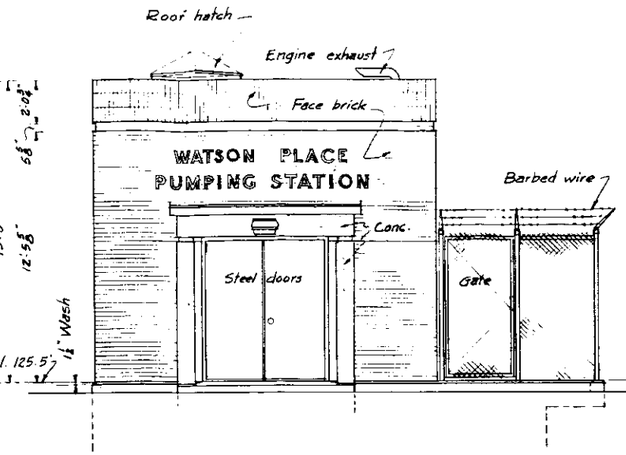
DATE NOV. 1976

SCALE AS SHOWN SPEC. NO. DACW 33-77-B-0006
DRAWING NUMBER SUD-1
SHEET 33

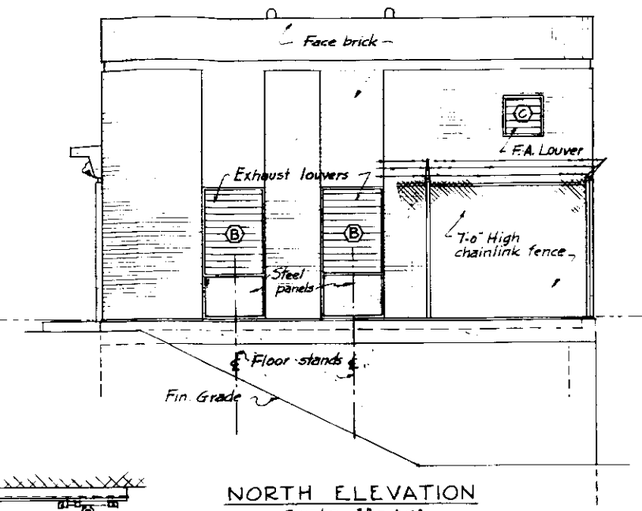
CORPS OF ENGINEERS U. S. ARMY



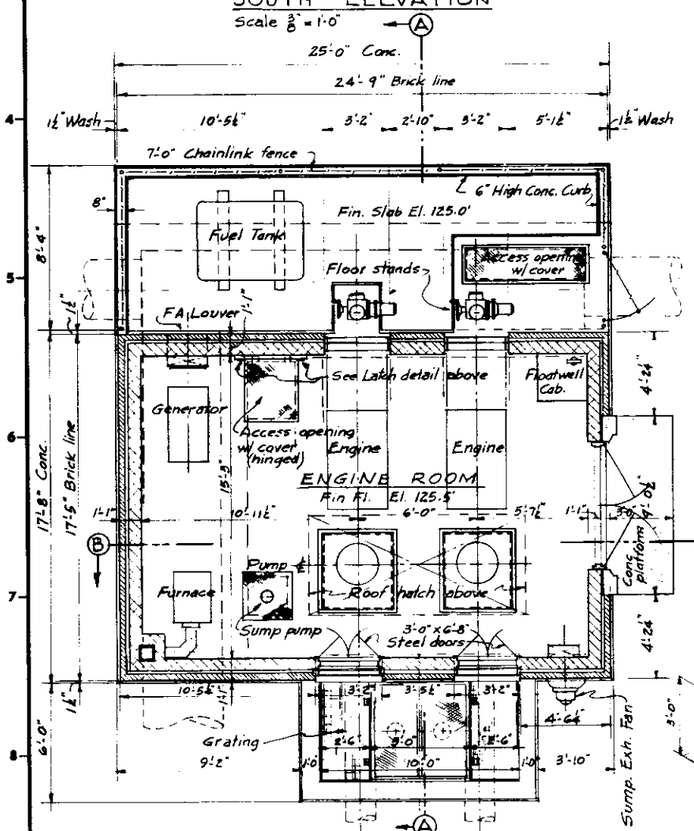
SOUTH ELEVATION
Scale 3/8" = 1'-0"



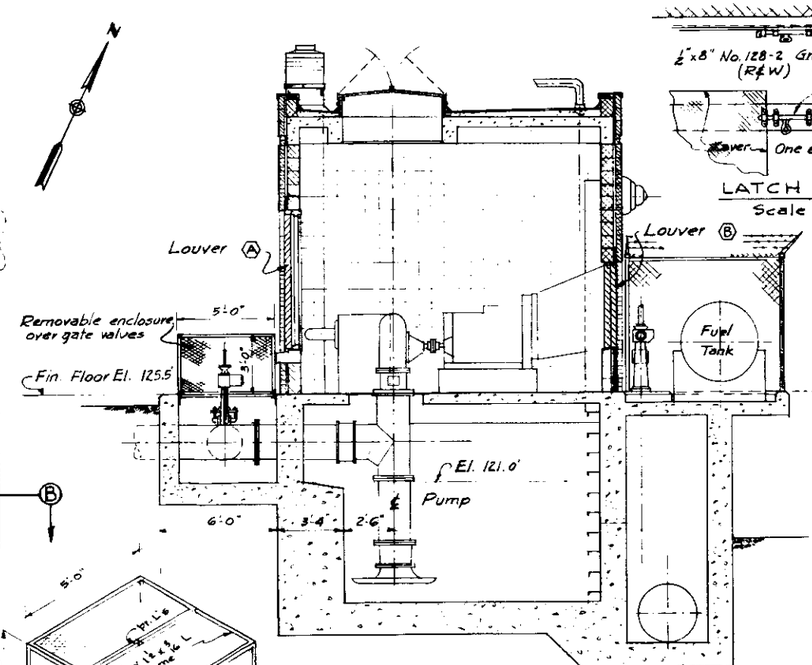
EAST ELEVATION
Scale 3/8" = 1'-0"



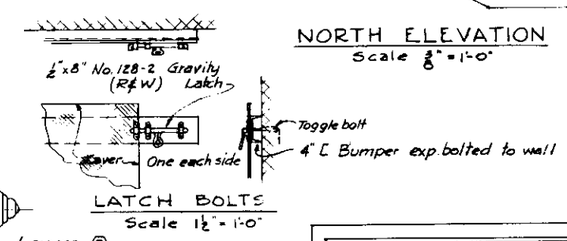
NORTH ELEVATION
Scale 3/8" = 1'-0"



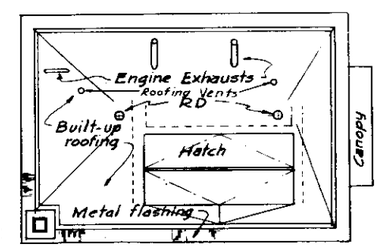
ENGINE ROOM PLAN
Scale 3/8" = 1'-0"



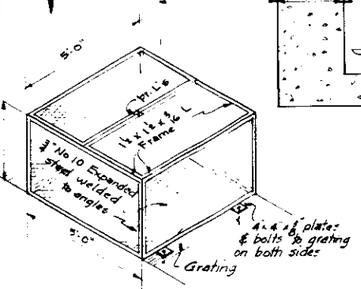
SECTION A-A
Scale 3/8" = 1'-0"



LATCH BOLTS
Scale 1½" = 1'-0"



ROOF PLAN
Scale ¼" = 1'-0"



GATE VALVE ENCLOSURE

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

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	

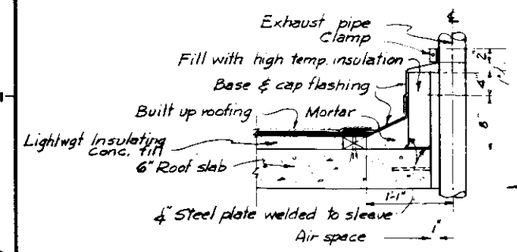
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
ARCHITECTURAL
PLANS, ELEVATIONS AND SECTION
SUDBURY RIVER MASSACHUSETTS

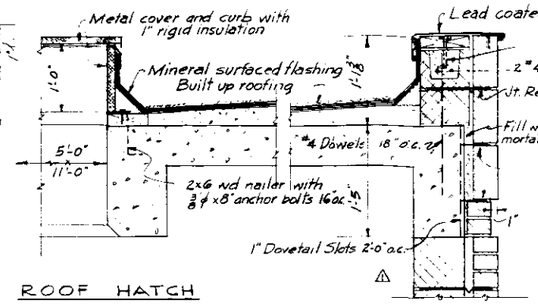
DATE NOV. 1976
SCALE AS SHOWN
SPEC. NO. DACW33-77-B-0001
SUD-1
SHEET 34

DACW 33-77-C-0034

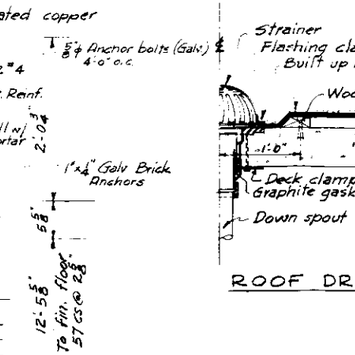
CORPS OF ENGINEERS — U. S. ARMY



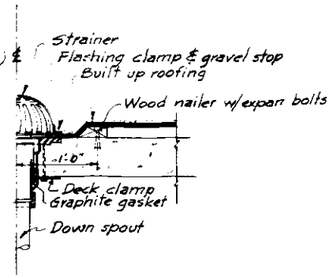
ENGINE EXHAUST



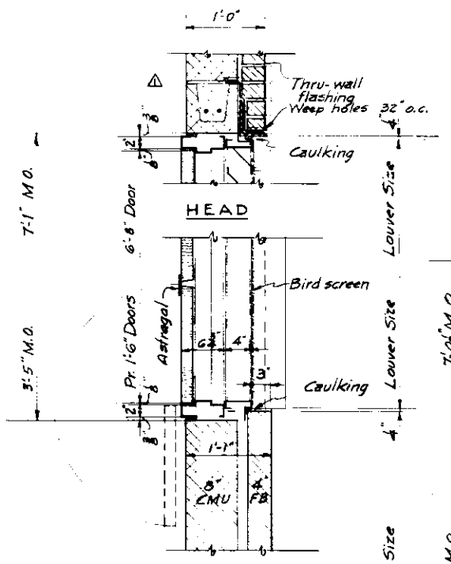
ROOF HATCH



PARAPET

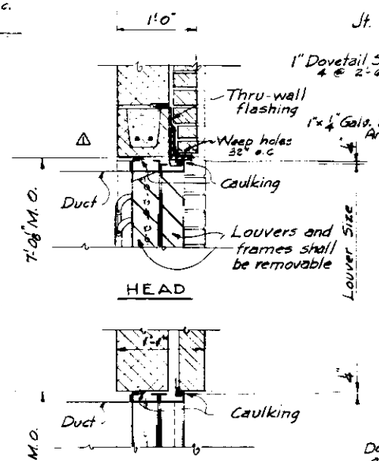


ROOF DRAIN



HEAD

JAMB



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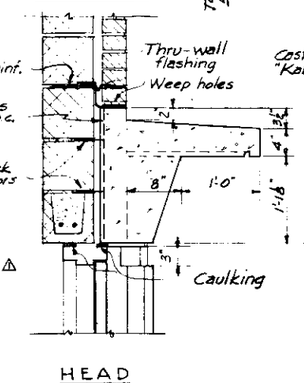

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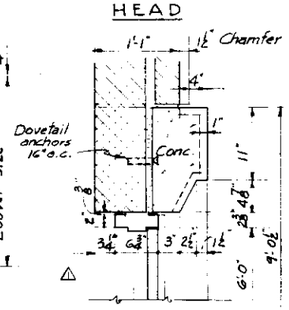

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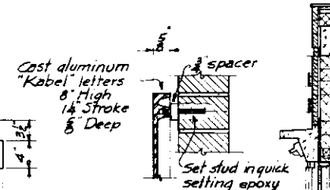
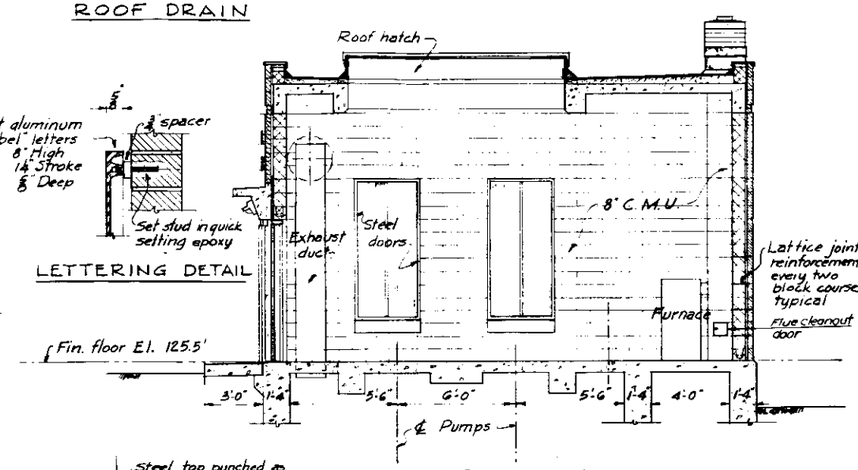


LETTERING DETAIL

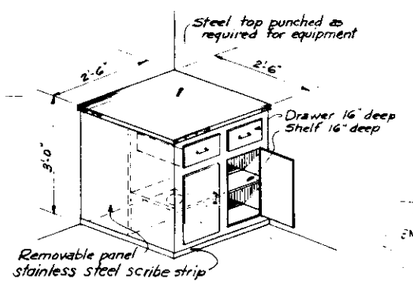


SECTION B-B

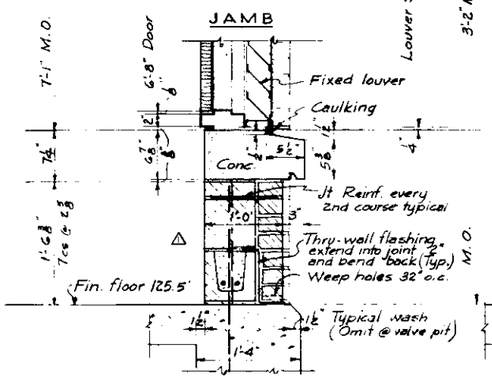
Scale 3/8" = 1'-0"

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 brick are based on standard 2 1/4" x 3 3/4" x 8" with 3/8" joints
3. Brick shall be Richtex Corp. Columbia S.C. Shade 760 or approved equal. Color or color range indicated are for identification purposes only and are not intended to limit the selection of similar color from other manufacturers

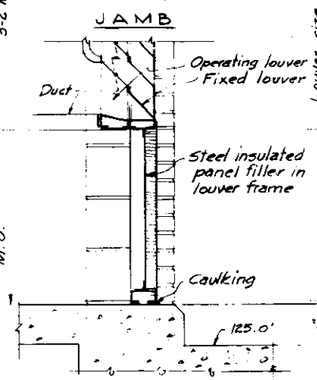


FLOATWELL CABINET



SILL

LOUVER Ⓐ

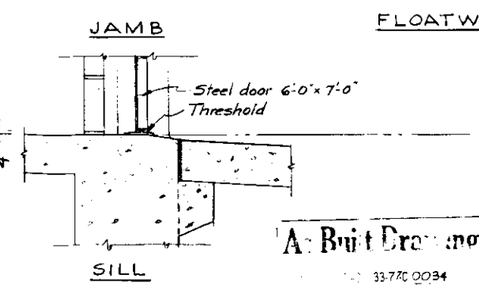


SILL

LOUVER Ⓑ

LOUVER DETAILS

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



SILL

ENTRANCE

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

GRAPHIC SCALES

11/2" = 1'-0" 12" 9" 6" 3" 0 6" 12"

3/8" = 1'-0" 6" 0 6"

"As Built Drawing"

33-77C 0034

REVISION	DATE	DESCRIPTION	BY
1	12-29-76	PARAPET DETAIL REV. MASONRY ANCHORS & REINF DET. ADDED THRU-WALL FLASHING REV.	CPR

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

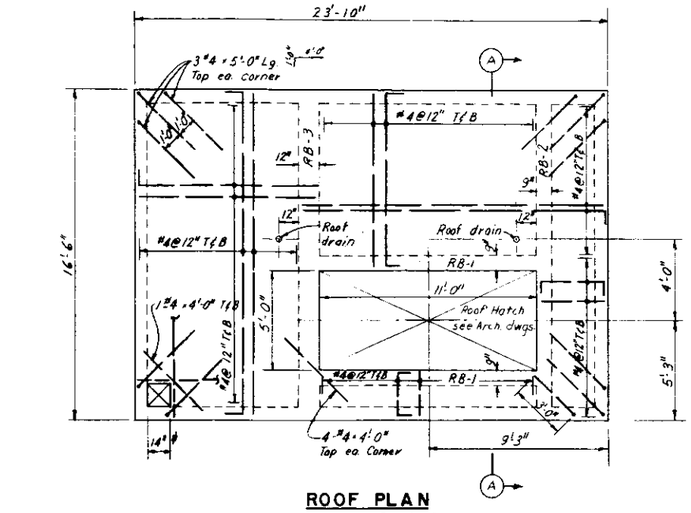
DES. BY W.D.G. | DR. BY C.E. | CK. BY JOC

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
ARCHITECTURAL
SECTION AND DETAILS
SUDBURY RIVER MASSACHUSETTS

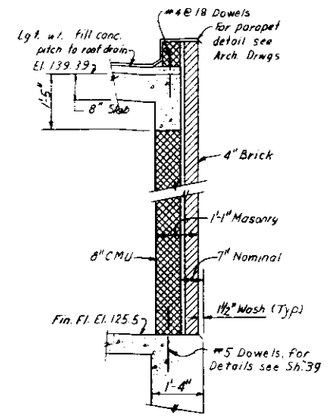
APPROVED
DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 35

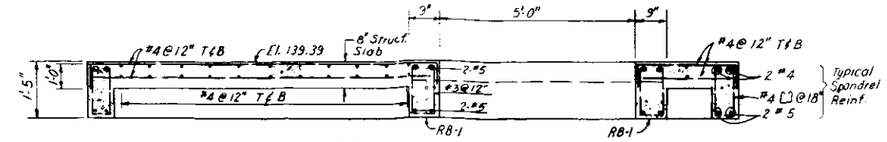
CORPS OF ENGINEERS — U. S. ARMY



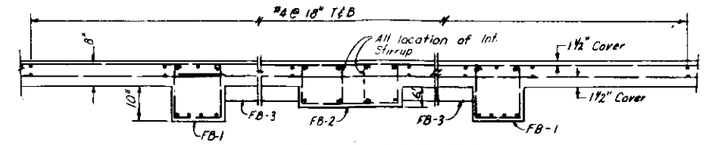
ROOF PLAN
SCALE 3/8" = 1'-0"



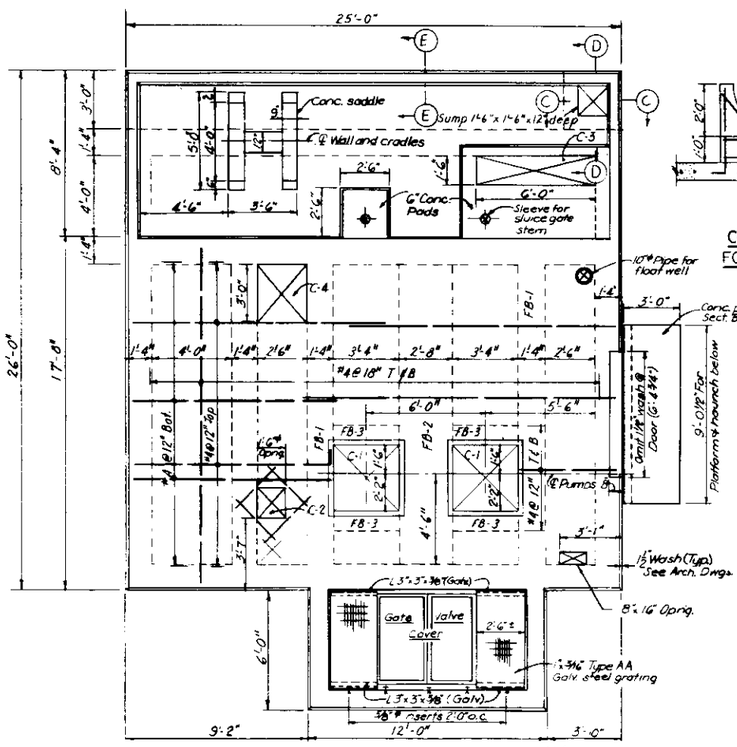
TYPICAL WALL SECTION
SCALE 3/4" = 1'-0"



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

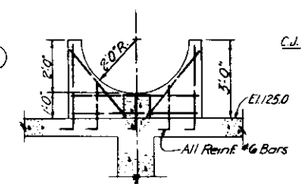


OPERATING FLOOR AND FLOOR BEAMS
SCALE 3/4" = 1'-0"

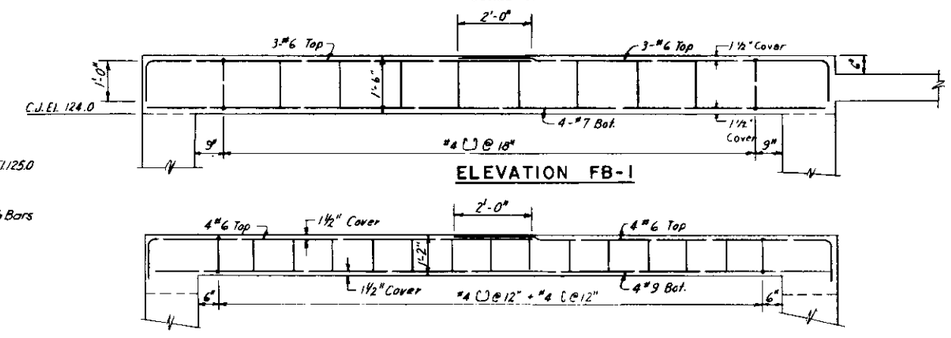


OPERATING FLOOR PLAN
SCALE 3/8" = 1'-0"

Note:
1. For details of grating and cover ℞ see Sh. 39
2. For operating rm. walls see Sh. 39
3. For fdn. wall reinf. see sheet 36.

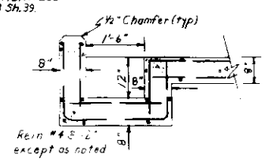


CONC. SADDLES FOR FUEL TANK
SCALE 1"=1'-0"

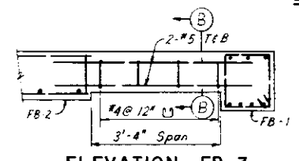


ELEVATION FB-1

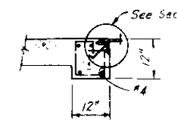
ELEVATION FB-2



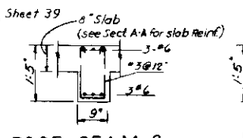
SECTION C-C
SCALE: 3/4" = 1'-0"



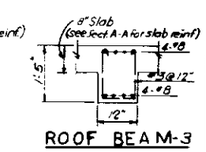
ELEVATION FB-3
SCALE: 3/4" = 1'-0"



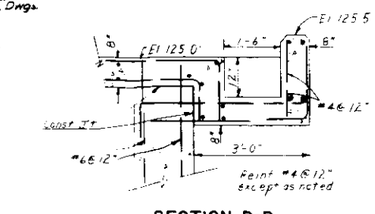
SECTION B-B
SCALE: 3/4" = 1'-0"



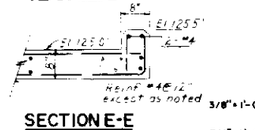
ROOF BEAM-2
SCALE 3/4" = 1'-0"



ROOF BEAM-3
SCALE 3/4" = 1'-0"



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



SECTION E-E
CURB DETAIL
SCALE: 3/4" = 1'-0"

NOTE
2" cover typical for 8" slab and 8" curb on Sect. C-C, D-D, and E-E

As Built Drawing
Contract No. DACW33-77-C-0034

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

NOTE: For Roof Beam 1 Reinf. details see Section A-A

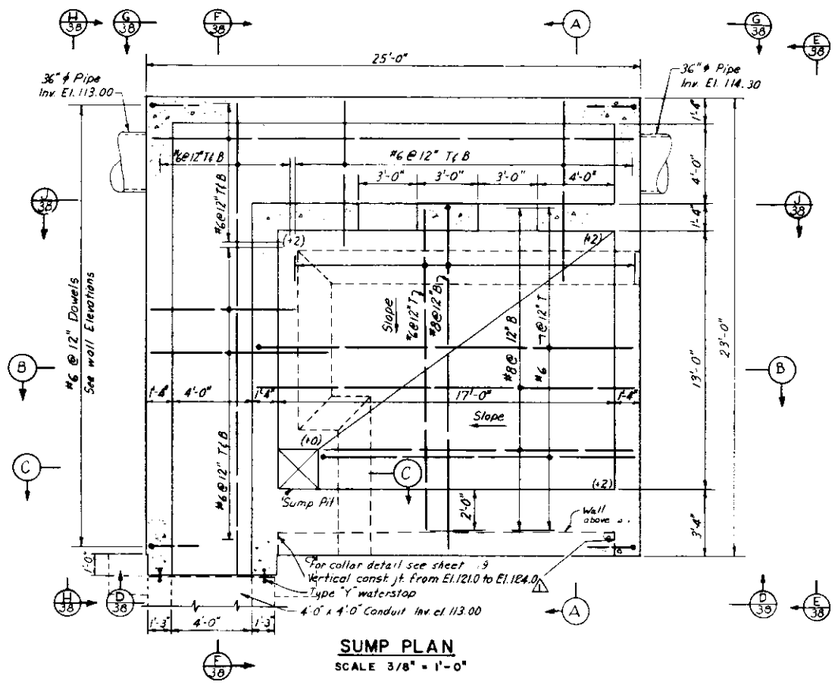
REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	

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

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
REINFORCEMENT DETAILS NO. 1
SUDBURY, RIVER MASSACHUSETTS
APPROVED DATE NOV. 1978

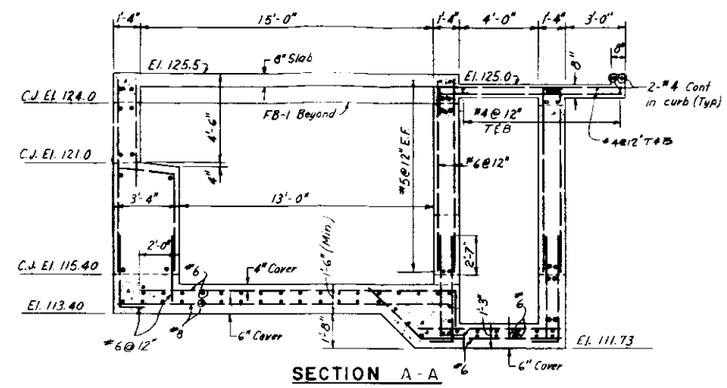
SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 36

CORPS OF ENGINEERS U. S. ARMY

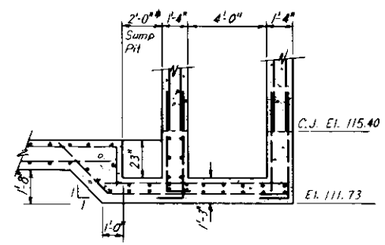


SUMP PLAN
SCALE 3/8" = 1'-0"

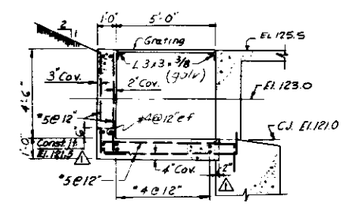
NOTE:
EL. 114.90 CALLED (+0 INCHES)



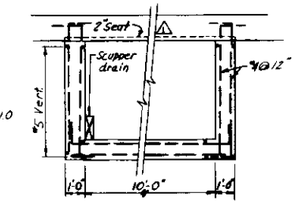
SECTION A-A
SCALE 3/8" = 1'-0"



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

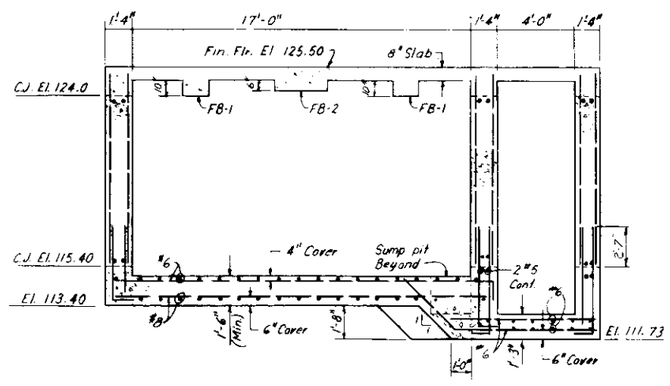


SECTION AT VALVE PIT
SCALE 3/8" = 1'-0"



PLAN AT VALVE PIT
SCALE 3/8" = 1'-0"

Note:
1. All vertical reinforcement in foundation walls to be #6@12" except as noted.
2. All horizontal reinforcement in foundation walls to be #5@12" except as noted.



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

As Built Drawing
Contract No. DACW 33-77-C-0034

SAFETY PAYS

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

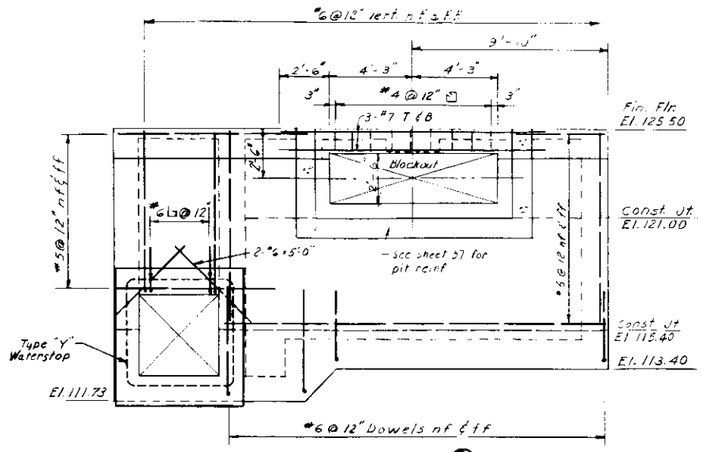
REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	
1	13 JUN 77	Const jts. and 2" seat added.	

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

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
REINFORCEMENT DETAILS NO. 2
SUDBURY, RIVER MASSACHUSETTS

DATE NOV. 1978
SCALE 3/8"=1'-0" SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD - 1
SHEET 37

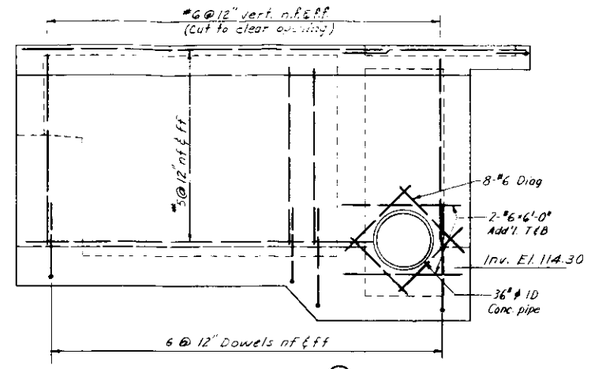
CORPS OF ENGINEERS — U. S. ARMY



ELEVATION (D/37)

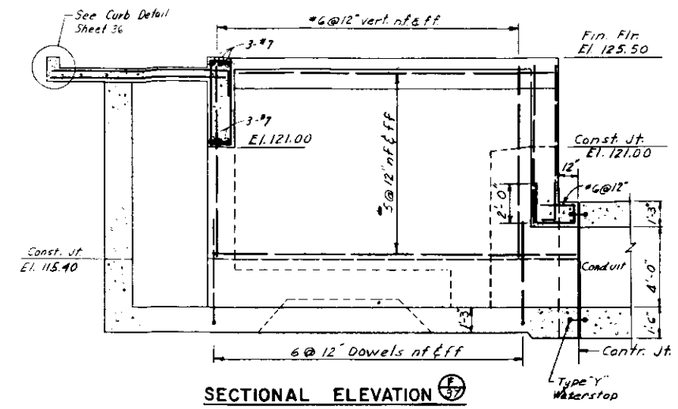
SCALE 3/8" = 1'-0"

NOTE: Reinforcing to run thru blockout steel to be cut as required to install mechanical equipment



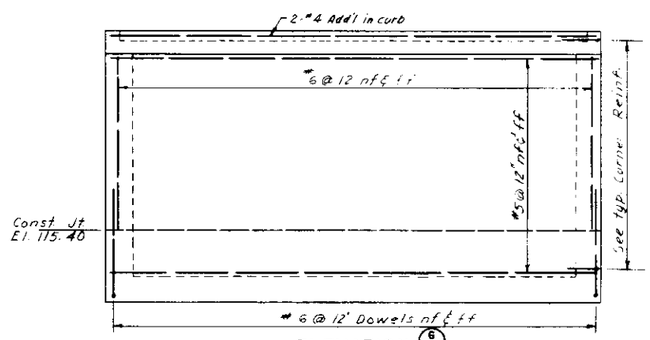
ELEVATION (F/37)

SCALE 3/8" = 1'-0"



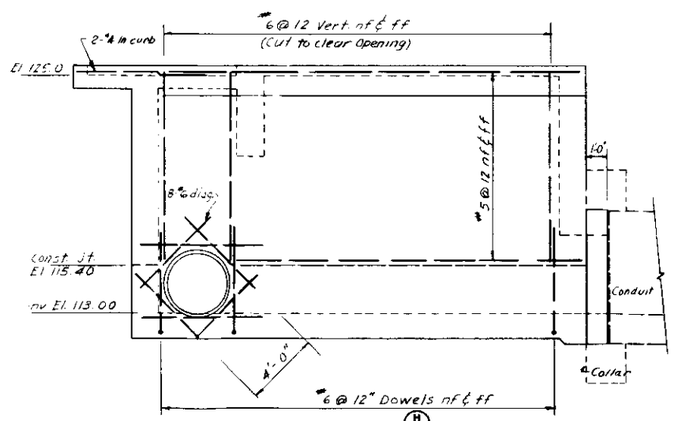
SECTIONAL ELEVATION (F/37)

SCALE 3/8" = 1'-0"



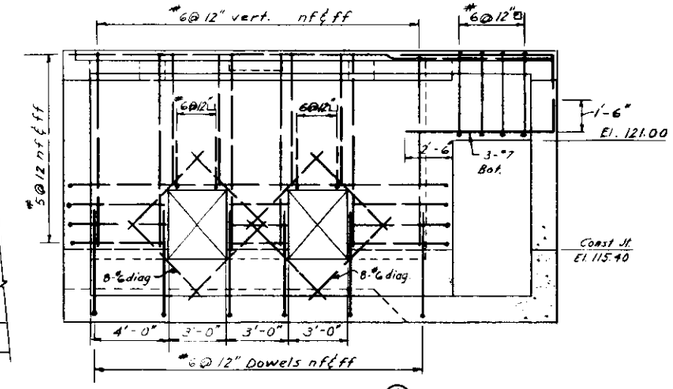
ELEVATION (G/37)

SCALE 3/8" = 1' 0"



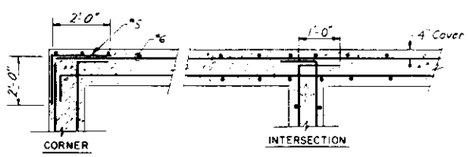
ELEVATION (H/37)

SCALE 3/8" = 1'-0"



SECTIONAL ELEVATION (J/37)

SCALE 3/8" = 1'-0"



TYPICAL WALL REINFORCING DETAILS

SCALE 1/2" = 1'-0"

As Built Drawing

33-770-0034

SAFETY PAYS

GRAPHIC SCALES

3/8" = 1'-0"

1/2" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
	6-25-79	Final field corrections	

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

DES. BY W.H.R. — DR. BY W.E. — CK. BY S.C.

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
PUMPING STATION
REINFORCEMENT DETAILS NO. 3

SUDBURY RIVER — MASSACHUSETTS

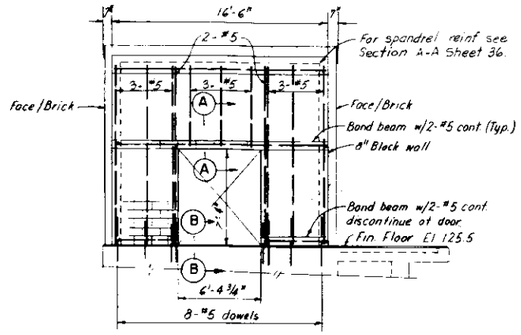
APPROVED — DATE NOV. 1976

SCALE AS SHOWN — SPEC. NO. DACW33-77-B-0001

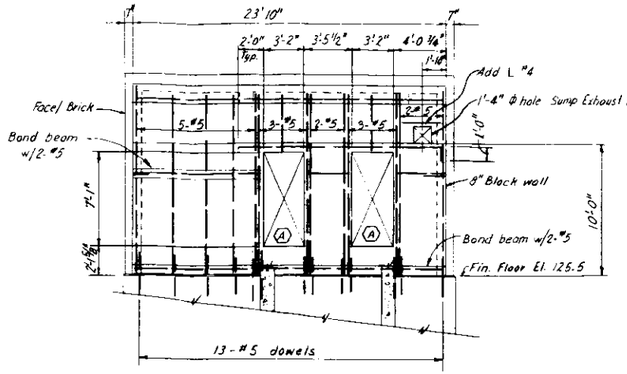
DRAWING NUMBER SUD-1

SHEET 38

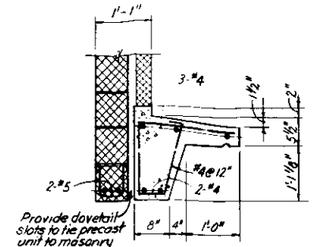
CORPS OF ENGINEERS U. S. ARMY



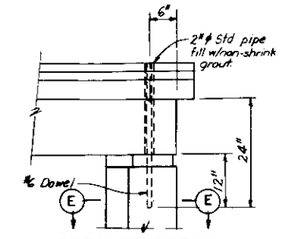
EAST WALL ELEVATION
SCALE 1/4" = 1'-0"



SOUTH WALL ELEVATION
SCALE 1/4" = 1'-0"



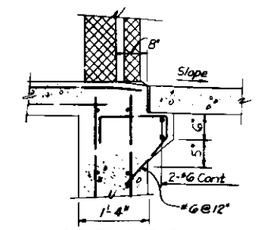
SECTION A-A
SCALE 1" = 1'-0"



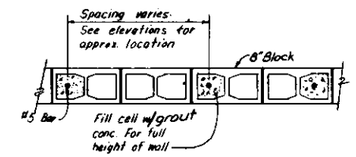
PRECAST DETAIL

NOTE. For dimensions see Arch dwg.

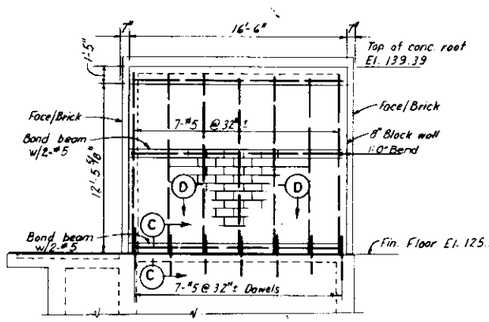
SECTION E-E
SCALE 1" = 1'-0"



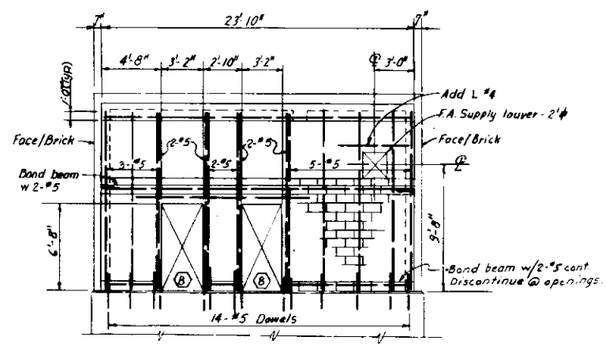
SECTION B-B
SCALE 1" = 1'-0"



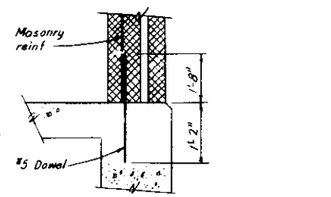
SECTION D-D
SCALE 1" = 1'-0"



WEST WALL ELEVATION
SCALE 1/4" = 1'-0"

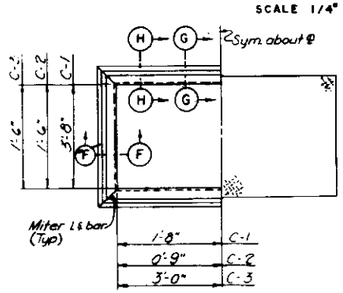


NORTH WALL ELEVATION
SCALE 1/4" = 1'-0"

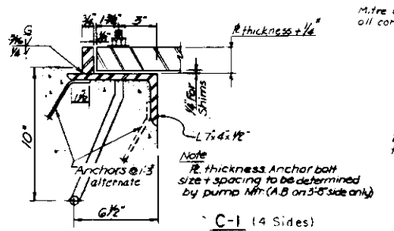


SECTION C-C
SCALE 1" = 1'-0"

As Built Drawing
Contract No. DACW 33-77-C-0034

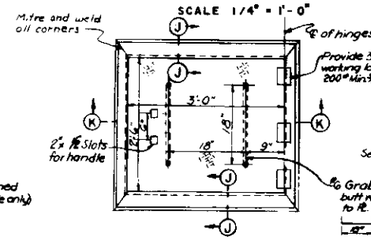


FRAME PLATE

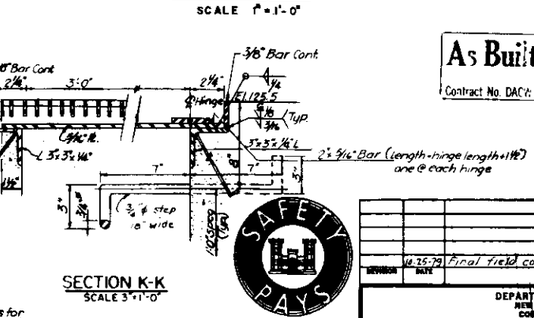


C-1 (4 Sides)

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

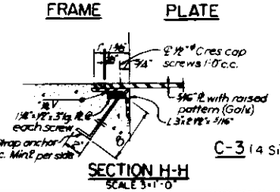


PLAN COVER C-4
SCALE 1" = 1'-0"



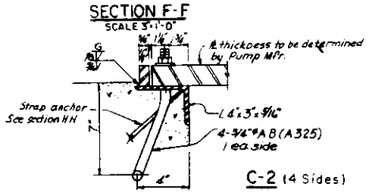
SECTION K-K
SCALE 3" = 1'-0"

Notes
See Arch Dwgs for latches to secure ℄ in open position.



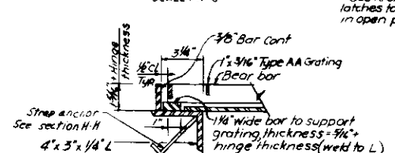
C-3 (4 Sides)

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



C-2 (4 Sides)

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



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

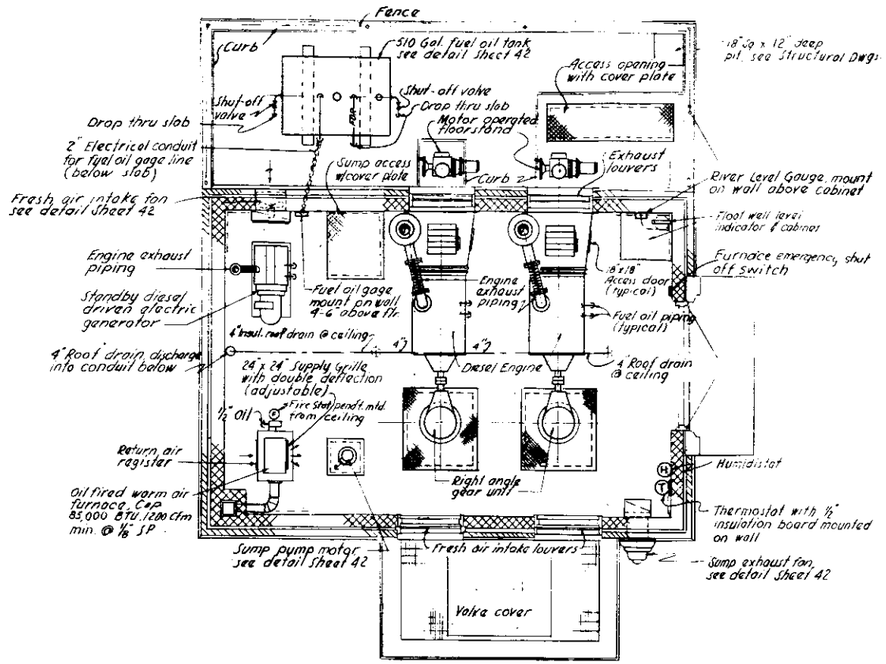
GRAPHIC SCALES
1/4" = 1'-0" 0 4' 8' 12'
1" = 1'-0" 0 1' 2' 3'
3" = 1'-0" 0 3' 6' 9'

REVISION	DATE	DESCRIPTION	BY
	6-25-79	Final field corrections	

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

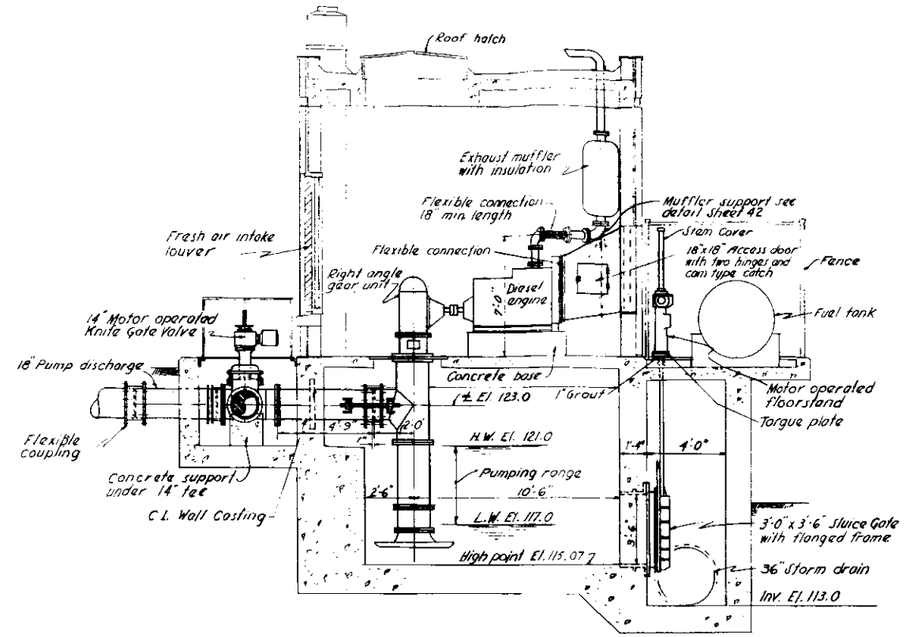
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
STRUCTURAL-MASONRY WALL DETAILS
SUDBURY RIVER MASSACHUSETTS
APPROVED DATE NOV. 1976

SCALE AS SHOWN SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 39



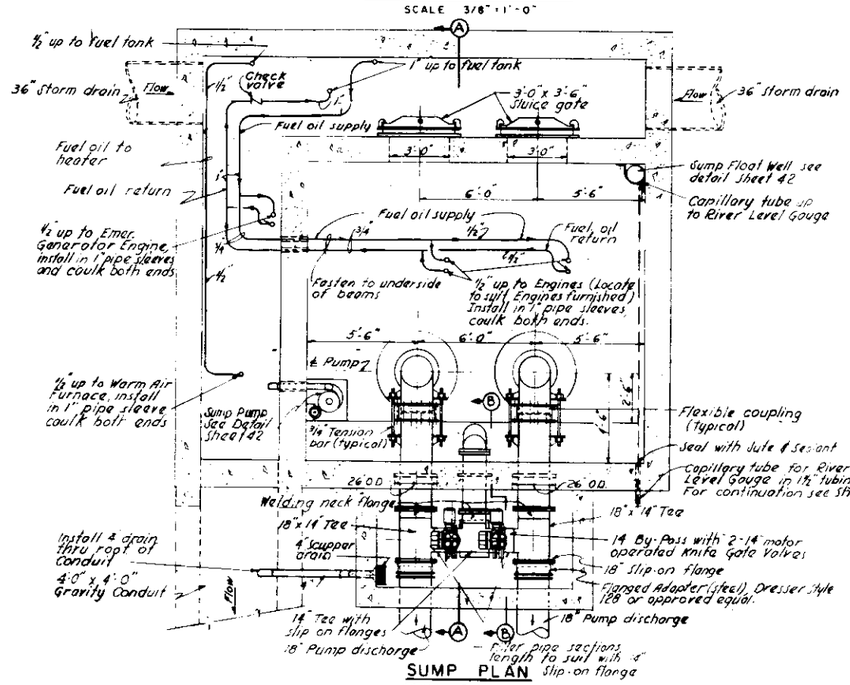
ENGINE ROOM PLAN

SCALE 3/8" = 1'-0"



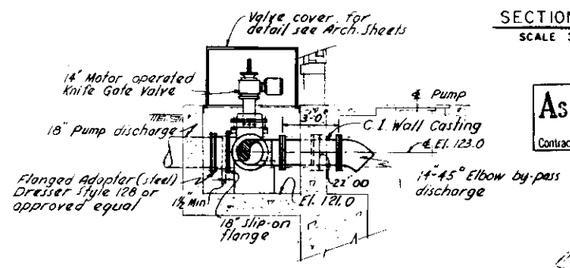
SECTION A-A

SCALE 3/8" = 1'-0"



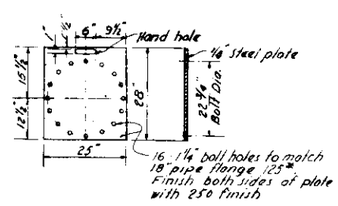
SUMP PLAN

SCALE 3/8" = 1'-0"



SECTION B-B

SCALE 3/8" = 1'-0"



DETAIL – BLIND PLATE

FOR TESTING PUMPS

(1 REQUIRED)

SCALE 3/4" = 1'-0"

As Built Drawing

Contract No. DACW33-77-C-0034

VALUE ENGINEERING PAYS

SAFETY PAYS

GRAPHIC SCALES

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

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

REVISION	DATE	DESCRIPTION	BY
	11-25-79	Final field corrections	

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

DES. BY J.S. DR. BY J.V. CK. BY

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
PUMPING STATION
MECHANICAL
PLANS AND SECTIONS

SUDBURY RIVER MASSACHUSETTS

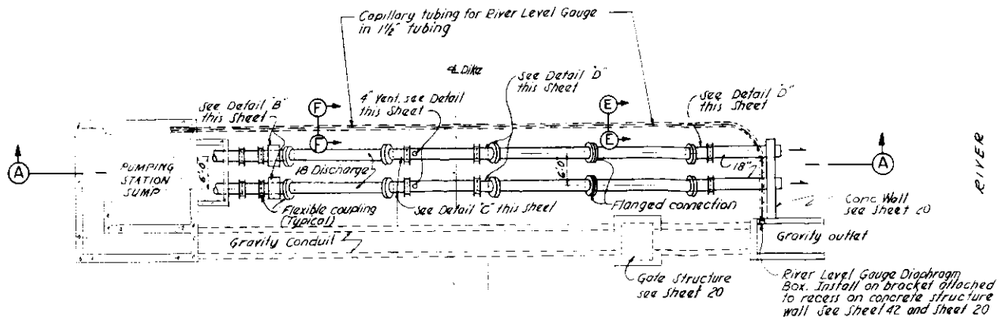
APPROVED: DATE: NOV. 1976

SCALE AS SHOWN SPEC. NO. DACW33-77-B-0001

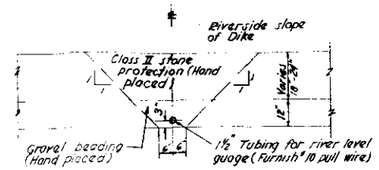
DRAWING NUMBER SUD-1

SHEET 40

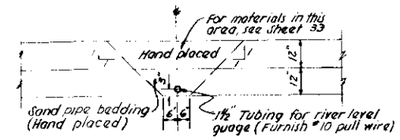
CORPS OF ENGINEERS U. S. ARMY



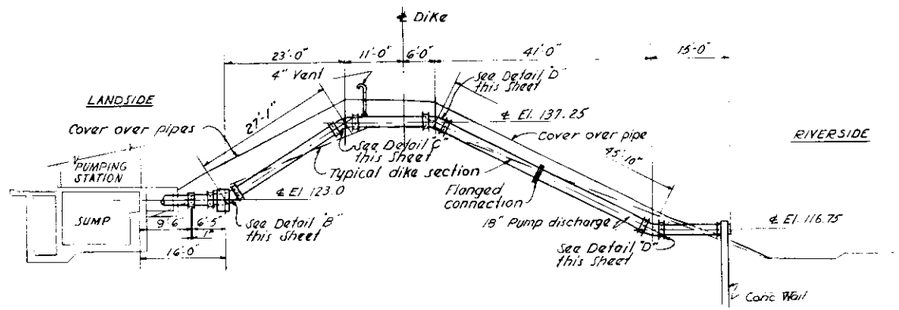
PLAN
SCALE 1" = 10'



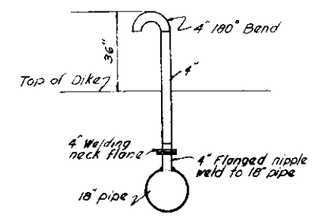
SECTION E-E
NOT TO SCALE



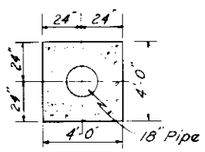
SECTION F-F
NOT TO SCALE

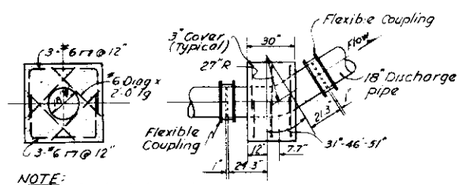


ELEVATION A-A
SCALE 1" = 10'



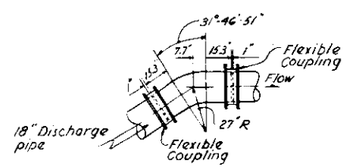
DETAIL VENT CONNECTION
SCALE 1/2" = 1'-0"



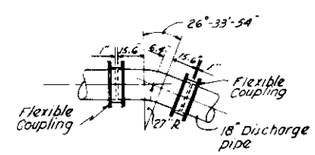


NOTE:
Reinf. steel shown is typical for both concrete blocks

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



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



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

As Built Drawing
Contract No. DACW 33-77-C-0034

SAFETY PAYS

GRAPHIC SCALES
3/8" = 1'-0"
1/2" = 1'-0"
1" = 10'

REVISION	DATE	DESCRIPTION	BY
	11-25-79	Final field corrections	

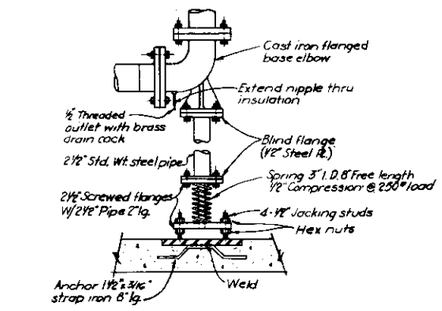
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY J.S. DR. BY J.V. CK. BY

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
DISCHARGE PIPING
PLAN, ELEVATION AND DETAILS
SUDBURY RIVER MASSACHUSETTS

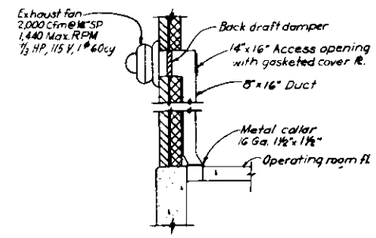
APPROVED
DATE NOV 1976
SCALE AS SHOWN
SPEC. NO. DACW33-77-B-0004
DRAWING NUMBER
SUD-1
SHEET 41

CORPS OF ENGINEERS U. S. ARMY



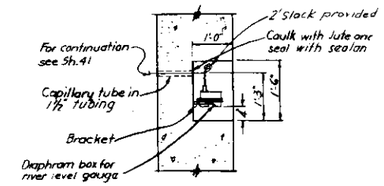
DETAIL MUFFLER SUPPORT

NOT TO SCALE



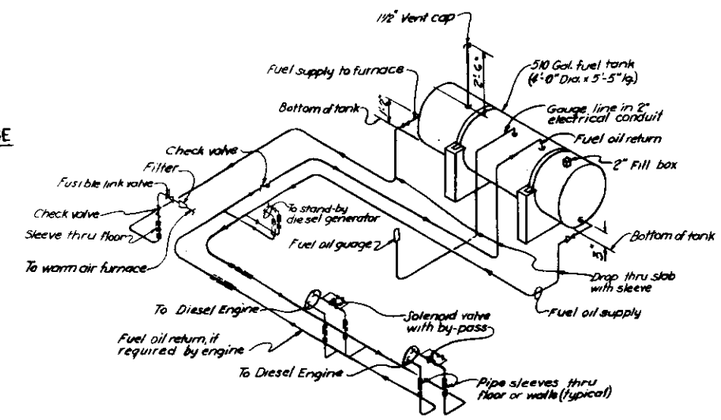
DETAIL EXHAUST FAN

SCALE 3/8" = 1'-0"



DETAIL-RIVER LEVEL GAUGE

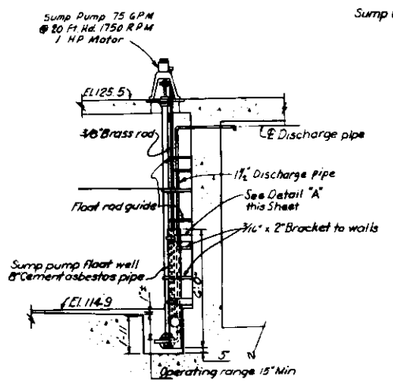
SCALE: 3/4" = 1'-0"



DETAIL-FUEL OIL PIPING

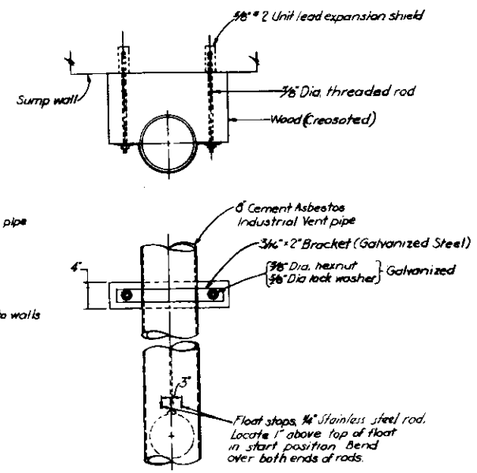
NOT TO SCALE

NOTE
Solenoid valve with bypass to be installed between fuel filter system and injector manifold on the diesel engines



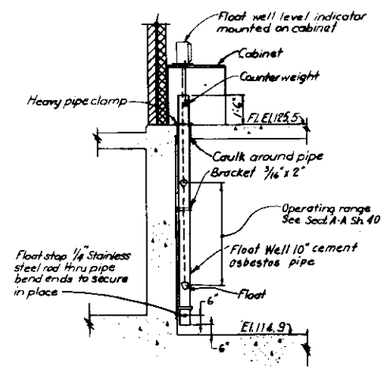
DETAIL-SUMP PUMP

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



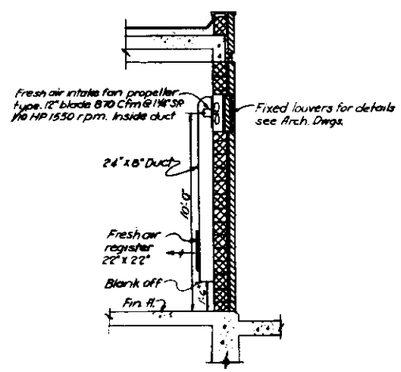
DETAIL "A"

NOT TO SCALE



DETAIL-SUMP FLOAT WELL

SCALE 3/8" = 1'-0"



DETAIL FRESH AIR FAN

SCALE 3/8" = 1'-0"

As Built Drawing

Contract No. DACW 33-77-C-0034

GRAPHIC SCALES

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

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

DIVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	

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

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION
PUMPING STATION
MECHANICAL
MISCELLANEOUS DETAILS

SUDBURY RIVER MASSACHUSETTS

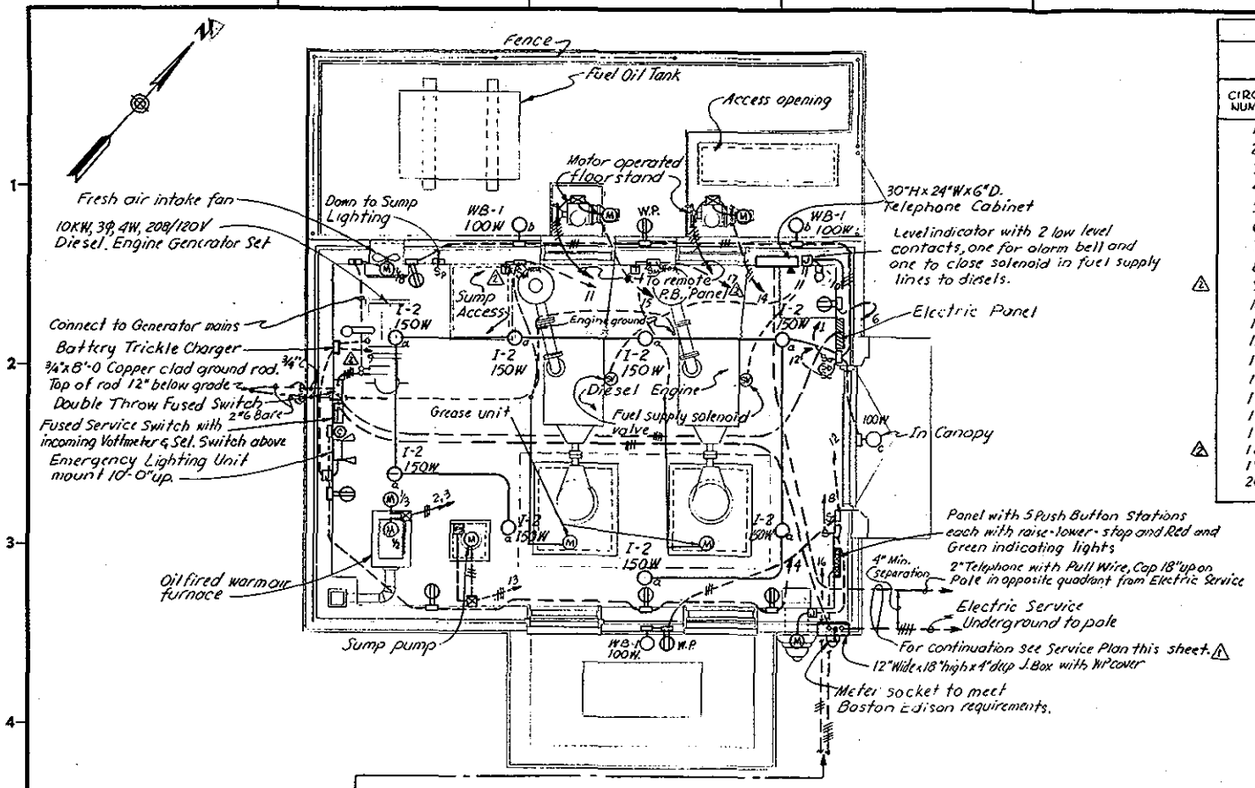
APPROVED DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

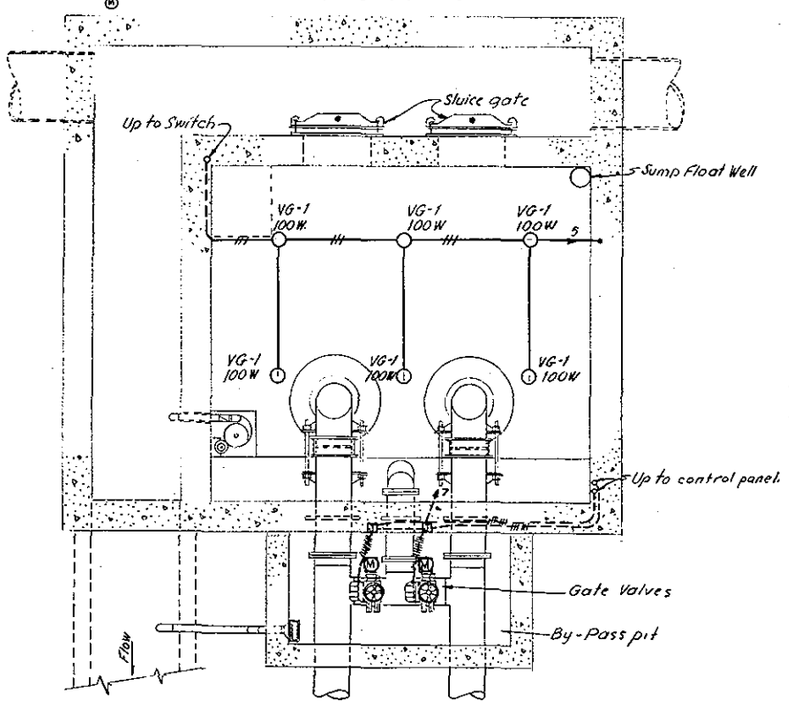
SHEET 42

CORPS OF ENGINEERS — U. S. ARMY



ENGINE ROOM PLAN
SCALE 3/8" = 1'-0"

Sluice Gate, see Sheet 32 for location

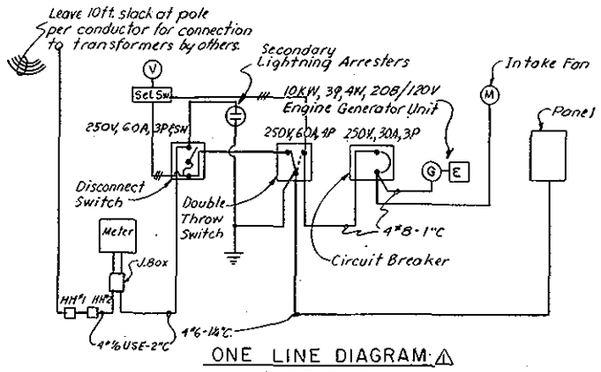


SUMP PLAN
SCALE 3/8" = 1'-0"

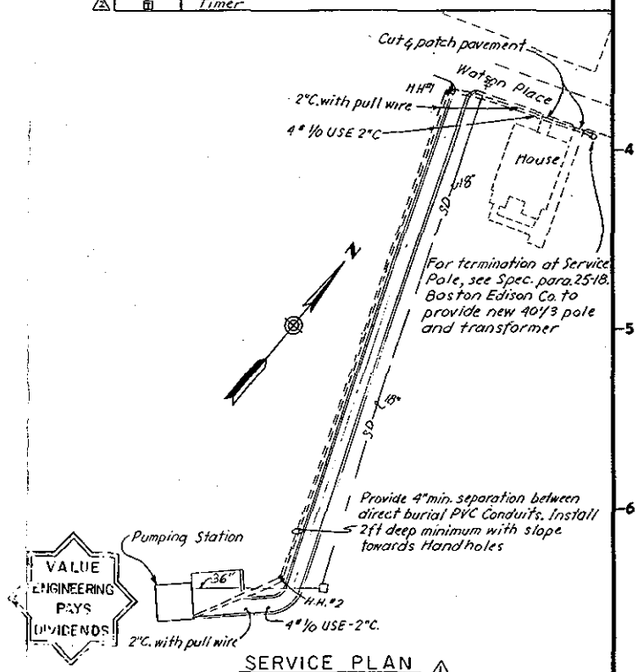
PANEL				
120/208V 3φ 4 WIRE 50AMP MAIN BREAKER				
CIRCUIT NUMBER	BREAKER SIZE AMPS	NUMBER OF POLES	SERVES	CONNECTED LOAD KVA
1	20	1	Lighting	1.2
2	20	1	Fan	1/3
3	20	1	Furnace	1/3
4	20	1	Receptacles	1.0
5	20	1	Sump lighting	.6
6	20	1	Float Well recept. & sol. valves	.2
7	20	3	Motorized Valves	2@ 1/3
8	20	1	Sump exhaust fan	1/3
9	20	1	Battery charger & emerg. lig.	.1
10	20	1	Level Indicator Alarm	.1
11	20	1	Grease Unit	1/3
12	20	1	Exterior lighting & Recept.	.6
13	15	3	Sump pump	1
14	15	3	Floor stand No. 1	1
15	15	3	Floor stand No. 2	1
16	20	3	Sluice gate	2
17	20	1	Grease Unit	1/3
18	20	1	Spare	—
19	20	1	Spare	—
20	20	1	Spare	—

FIXTURE SCHEDULE				
TYPE	LAMP WATTS	DWG. NO.	SH.	REMARKS
VG-1	100W	40-06-04	10	
I-2	150W	40-06-04	3	
WB-1	100W	40-06-04	30A	
C	100W	—	—	ITT ART METAL CAT. NO. V85C or equal

LEGEND	
SYMBOL	DESCRIPTION
	Ceiling outlet
	Wall outlet
	Junction box
	Duplex convenience outlet - WP indicates weatherproof
	Motor - HP as indicated
	Emergency lighting unit
	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
C	Clock Outlet
V	Voltmeter
Sel Sw.	Selector Switch
SV	Solenoid Valve
	Alarm Bell
	Timer



ONE LINE DIAGRAM
NOT TO SCALE



SERVICE PLAN
SCALE 1" = 40'

VALUE ENGINEERING PAYS DIVIDENDS

As Built Drawing
Contract No. Dacw 33-77-C-0034

SAFETY PAYS

GRAPHIC SCALES
3/8" = 1'-0" 4' 2' 0 4'
1" = 40' 40' 0 40' 80'

REVISION	DATE	DESCRIPTION	BY
	11-25-79	Final field corrections	
2	11-22-77	Panel revised, Cir. 17 added, Circuit 9 identified	TJS RJA FM
1	10-26-77	Service revised, Plan added	TJS RJA FM

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

DES. BY L.F. DR. BY J.D. CK. BY TJS

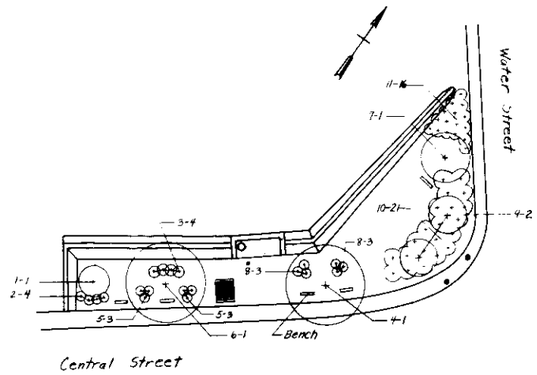
SUBMITTED: CHIEF, MECH-ELECT SECTION
APPROVAL RECOMMENDED: CHIEF, MECH. ENG. BRANCH
RECOMMENDED: PROJECT ENGINEER
APPROVAL RECOMMENDED: CHIEF, PROJECT BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PUMPING STATION
ELECTRICAL
PLANS AND SCHEDULE
SUDBURY RIVER MASSACHUSETTS

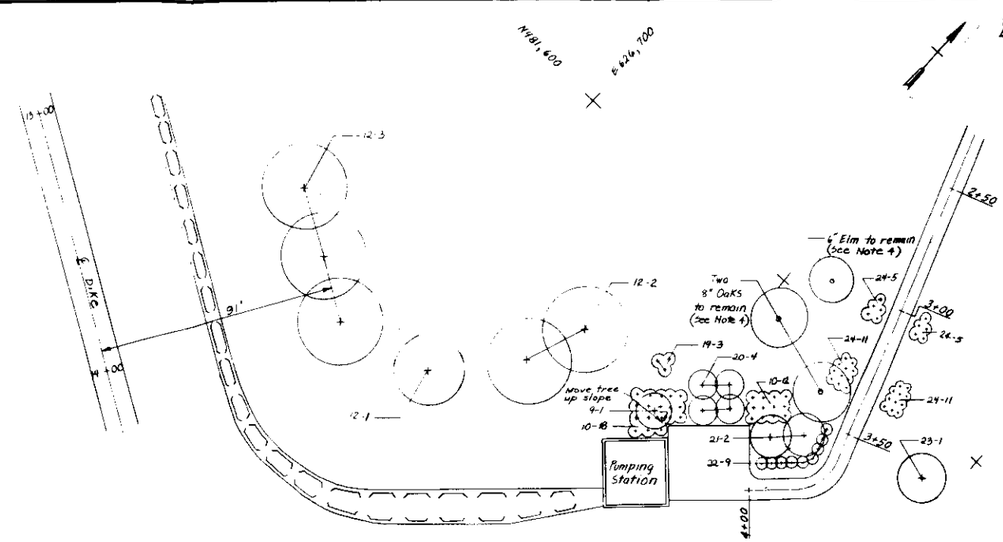
APPROVED: CHIEF, ENGINEERING DIVISION
DATE NOV. 1976

SCALE AS SHOWN | SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER SUD-1
SHEET 43

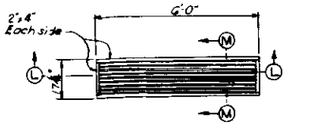
CORPS OF ENGINEERS — U. S. ARMY

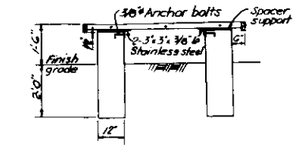


PLAN A
ENLARGED VIEW
SCALE 1" = 20'

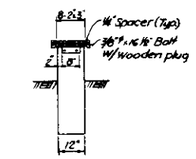


PLAN B
ENLARGED VIEW
SCALE 1" = 20'



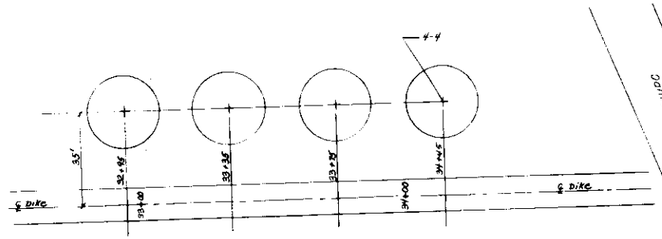


SECTION L-L

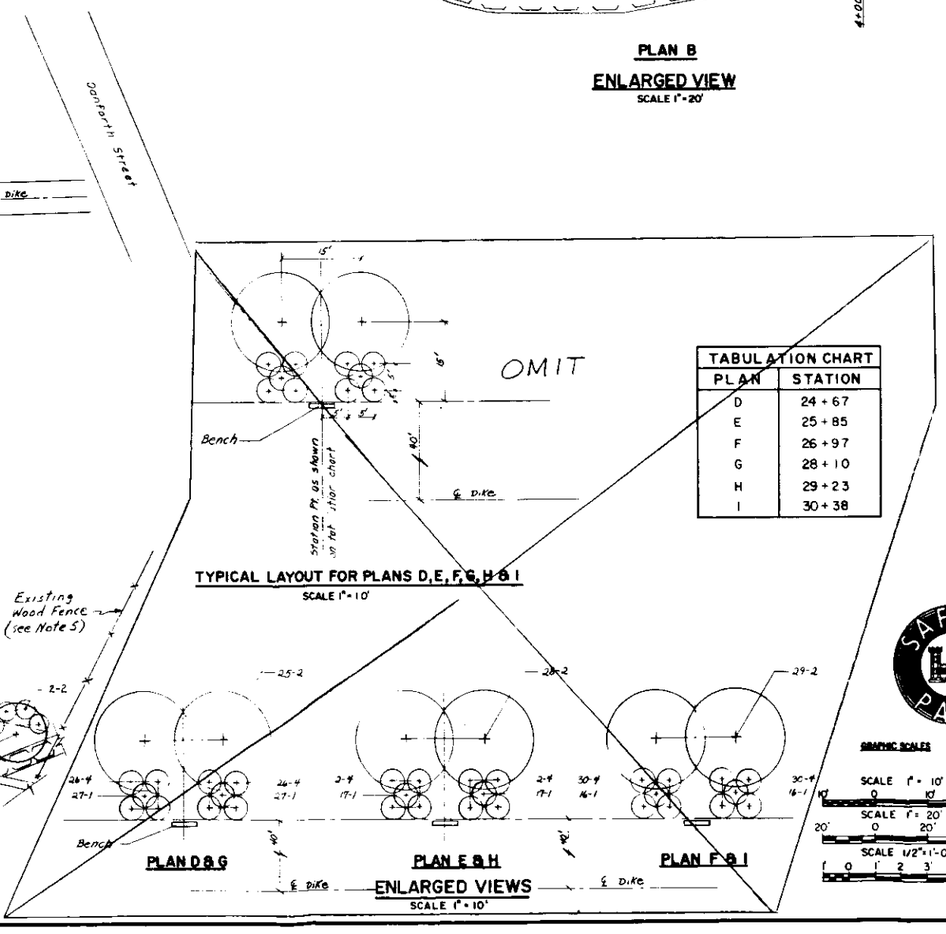


SECTION M-M

BENCH (75)
SCALE 1/2" = 1'-0"

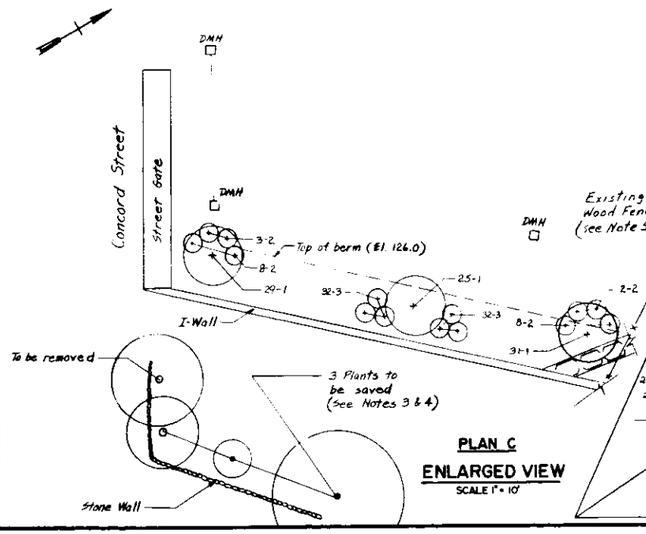


PLAN J
ENLARGED VIEW
SCALE 1" = 20'



TYPICAL LAYOUT FOR PLANS D, E, F, G, H & I
SCALE 1" = 10'

TABULATION CHART	
PLAN	STATION
D	24 + 67
E	25 + 85
F	26 + 97
G	28 + 10
H	29 + 23
I	30 + 38



PLAN C
ENLARGED VIEW
SCALE 1" = 10'

PLAN D & G — **PLAN E & H** — **PLAN F & I**
ENLARGED VIEWS
SCALE 1" = 10'

LEGEND:

- Existing Vegetation
- Proposed Vegetation
- Planting Cluster
- 8-4 Plant Number Quantity
- Bench

NOTES:

1. See specifications for plant list and planting details.
2. The contractor shall relocate any proposed tree or shrub as directed on the ground by the Contracting Officer.
3. No excavation shall be allowed within 10' of plant material that is to remain.
4. Before construction, plants shall be barricaded with 2x4's to protect them from injury.
5. Existing wood fence shall be removed as required and replaced w/ a 6' high chain link fence.

As Built Drawing
Contract No. DACW 33-77-C-0034

VALUE ENGINEERING PAYS DIVIDENDS

SAFETY PAYS

GRAPHIC SCALES
SCALE 1" = 10'
SCALE 1" = 20'
SCALE 1/2" = 1'-0"

REVISION	DATE	DESCRIPTION	BY
	10-25-79	Final field corrections	

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

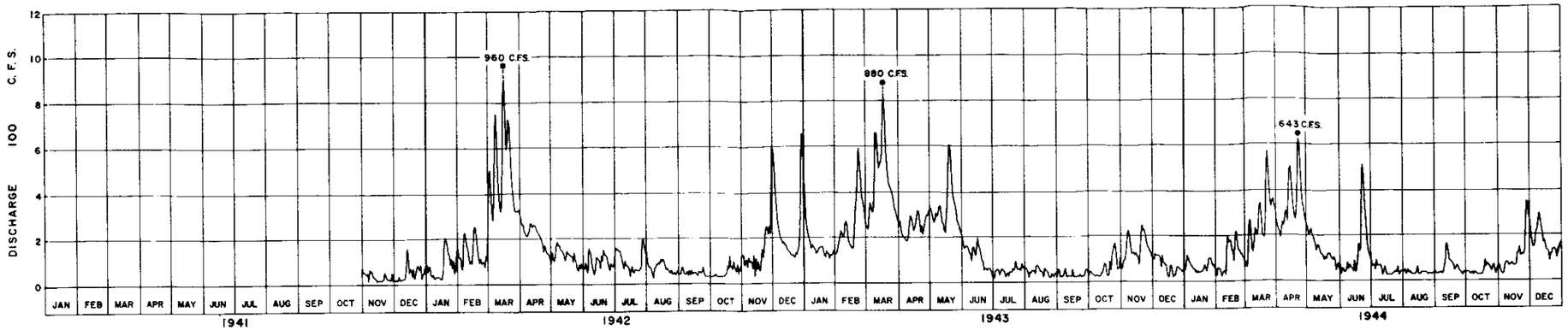
DES. BY D.H. — DR. BY W.K. — CK. BY D.N.

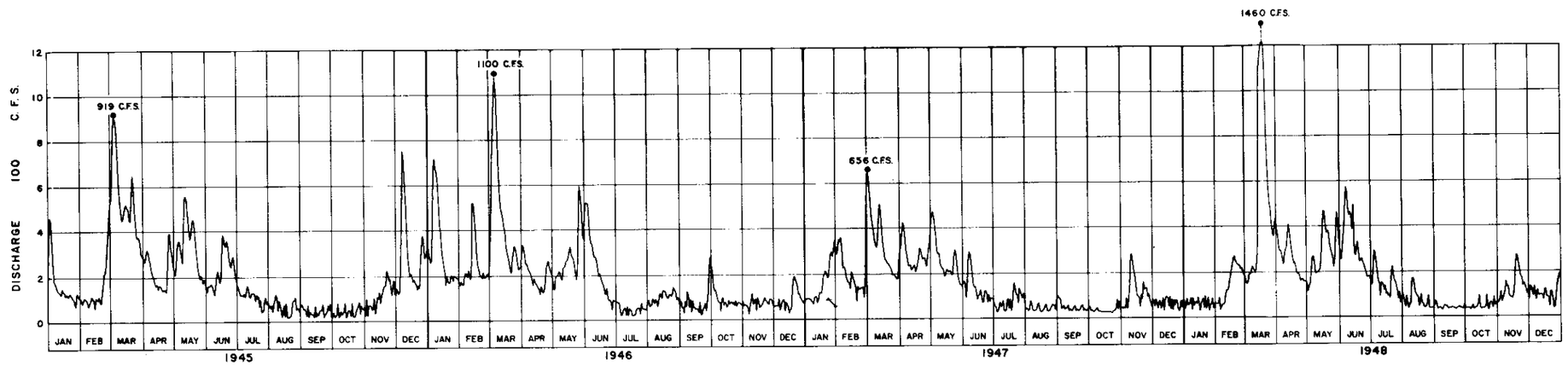
LANDSCAPE ARCHITECT

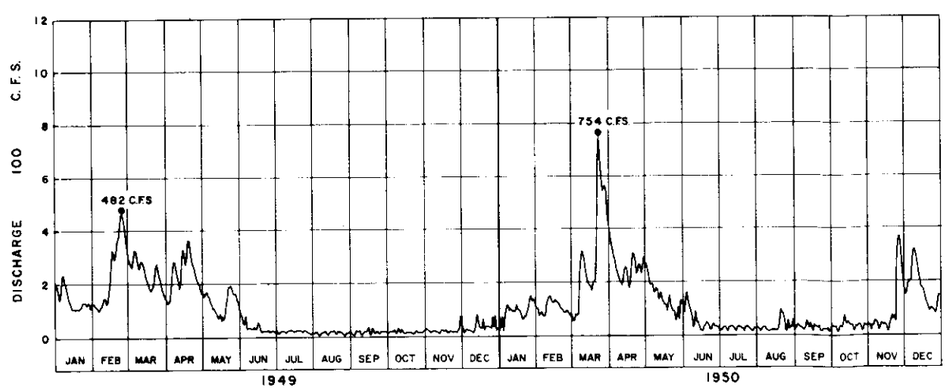
WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PLANTING PLANS
SUDBURY RIVER — MASSACHUSETTS

APPROVED — DATE NOV. 1976

SCALE AS SHOWN — SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER
SUD - 1
SHEET 44







NOTES

1. THESE HYDROGRAPHS REPRESENT THE DAILY AVERAGE STREAMFLOW OF THE ASSABET RIVER AT MAYNARD, MASS. THE DRAINAGE AREA OF THE ASSABET RIVER AT MAYNARD IS 116 SQUARE MILES. THE DRAINAGE AREA OF THE SUDBURY RIVER AT SAXONVILLE DAM IS 86 SQUARE MILES.
2. SOME INSTANTANEOUS PEAK DISCHARGES ARE SHOWN BY THE SYMBOL-●
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 THERE-FROM MADE BY ANY BIDDER OR CONTRACTOR.

VALUE ENGINEERING PAYS DIVIDENDS

SAFETY PAYS

GRAPHIC SCALES

As Built Drawing
No. 33-77-C-0034

REVISION	DATE	DESCRIPTION	BY

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

DES. BY J.L. DR. BY J.W. CHK. BY S.P.

MERRIMACK RIVER FLOOD CONTROL
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

HYDROGRAPHS NO. 1

SUDBURY RIVER MASSACHUSETTS

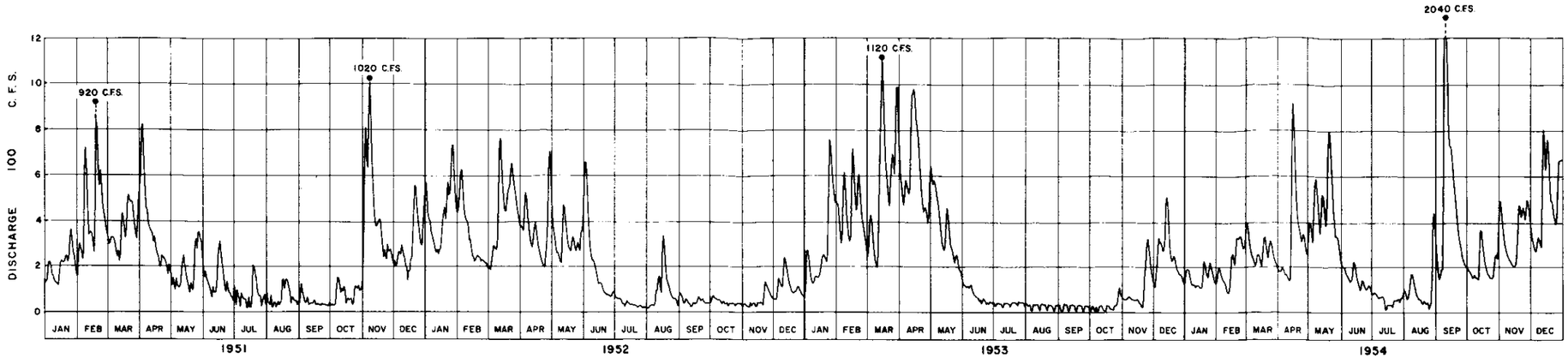
APPROVED DATE NOV. 1976

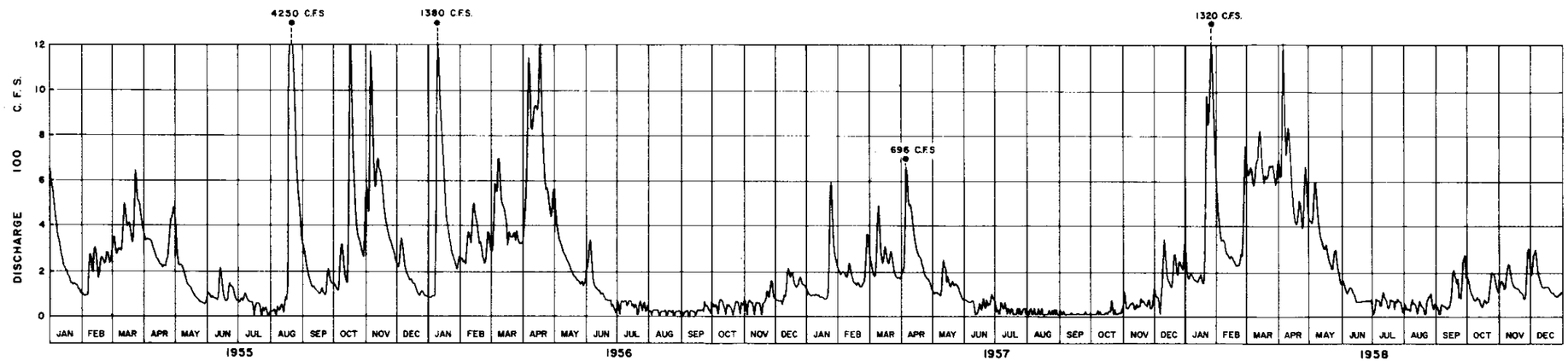
SCALE SPEC. NO. DACW33-77-B-0001

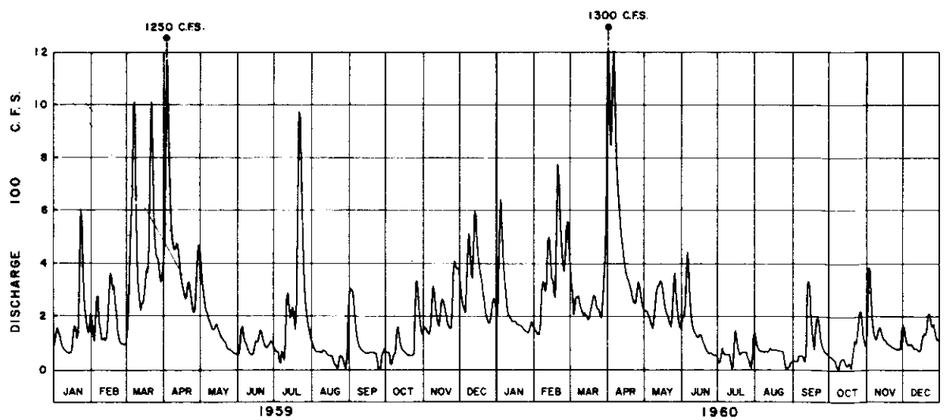
DRAWING NUMBER SUD-1

SHEET 45

CORPS OF ENGINEERS U. S. ARMY







NOTE

SEE HYDROGRAPHS NO. 1 FOR NOTES

GRAPHIC SCALES

As Built Drawing

Contract No. DACW 33-77-C-0034

REVISION	DATE	DESCRIPTION	BY

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

MERRIMACK RIVER FLOOD CONTROL
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

HYDROGRAPHS NO. 2

SUDBURY RIVER MASSACHUSETTS

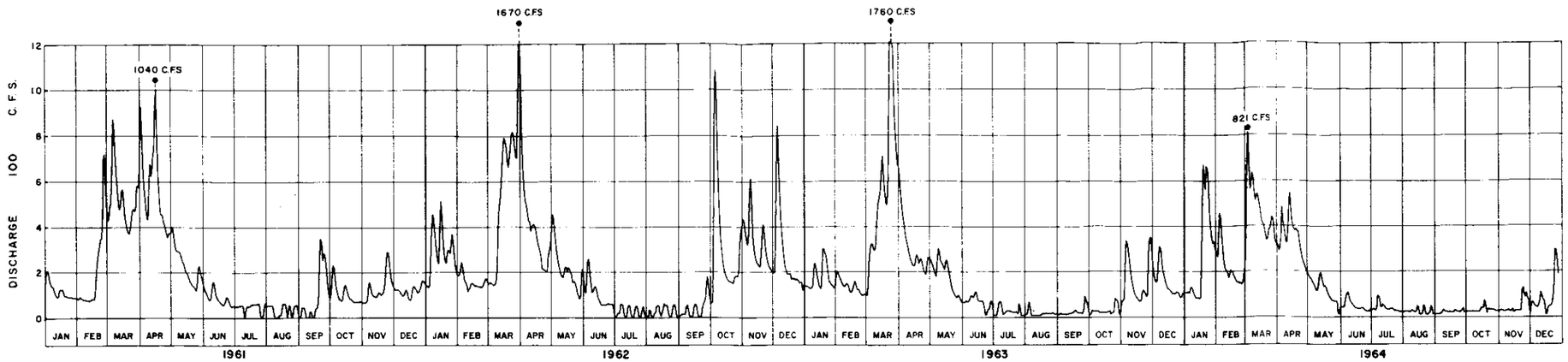
APPROVED DATE: NOV. 1976

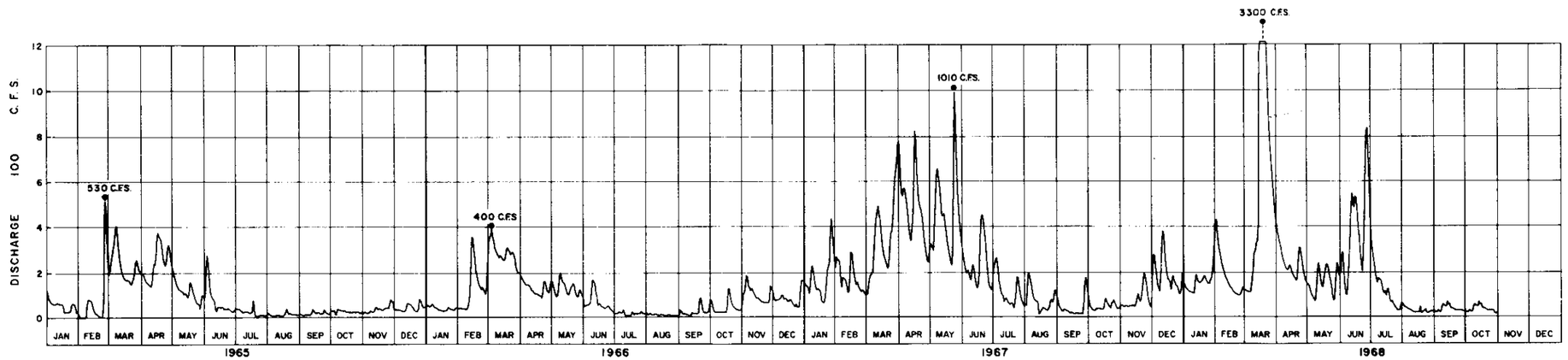
SCALE SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

SHEET 46

CORPS OF ENGINEERS U. S. ARMY





NOTE

SEE HYDROGRAPHS NO. 1 FOR NOTES

GRAPHIC SCALES

As Built Drawing

Contract No. 33-77-C-0034

REVISION	DATE	DESCRIPTION	BY

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

MERRIMACK RIVER FLOOD CONTROL
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

HYDROGRAPHS NO. 3

SUDBURY RIVER MASSACHUSETTS

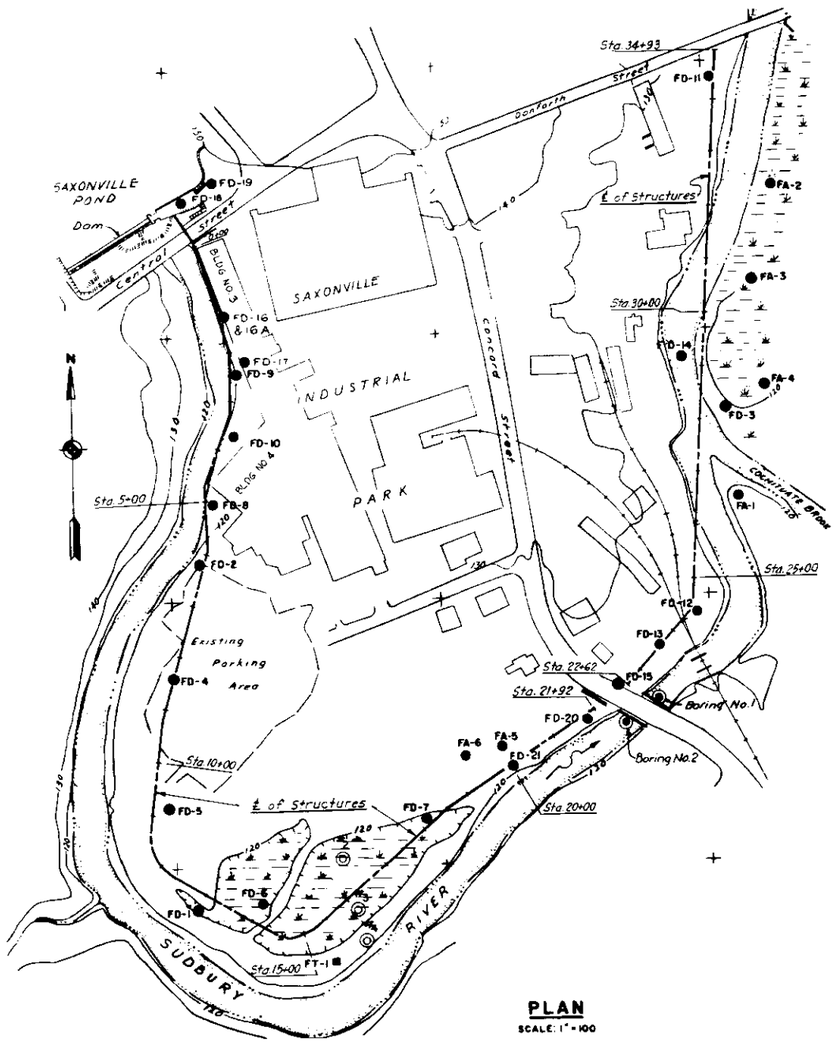
APPROVED DATE NOV. 1978

SCALE

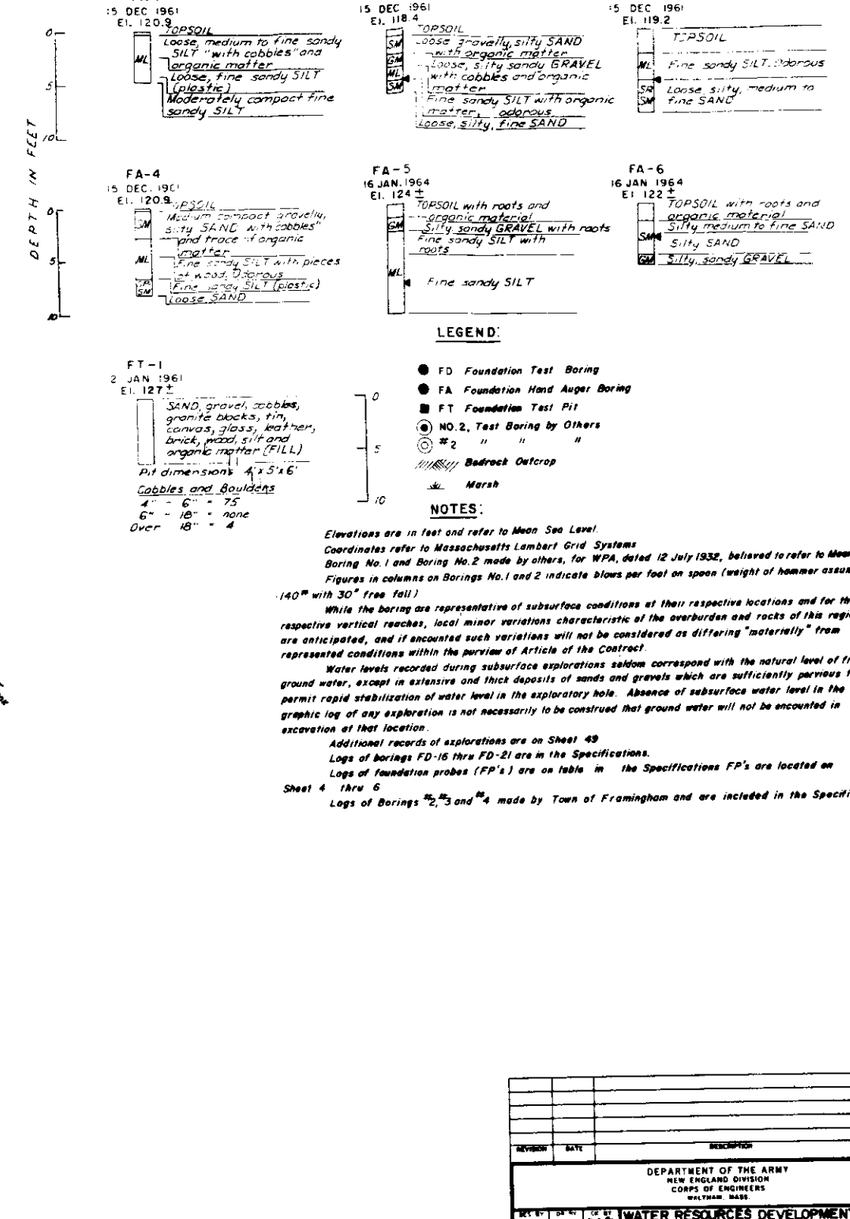
SPEC. NO. DACW33-77-B-0001

DRAWING NUMBER SUD-1

SHEET 47



PLAN
SCALE: 1" = 100



NOTES:

Elevations are in feet and refer to Mean Sea Level.

Coordinates refer to Massachusetts Lambert Grid Systems.

Boring No. 1 and Boring No. 2 made by others, for WPA, dated 12 July 1932, believed to refer to Mean Sea Level.

Figures in columns on Borings No. 1 and 2 indicate blows per foot on spoon (weight of hammer assumed to be 140# with 30" free fall.)

While the boring are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local minor variations characteristic of the overburden and rocks of this region are anticipated, and if encounted such variations will not be considered as differing "materially" from represented conditions within the purview of Article of the Contract.

Water levels recorded during subsurface explorations seldom correspond with the natural level of free ground water, except in extensive and thick deposits of sands and gravels which are sufficiently pervious to permit rapid stabilization of water level in the exploratory hole. Absence of subsurface water level in the graphic log of any exploration is not necessarily to be construed that ground water will not be encounted in excavation at that location.

Additional records of explorations are on Sheet 49

Logs of borings FD-16 thru FD-21 are in the Specifications.

Logs of foundation probes (FP's) are on table in the Specifications FP's are located on Sheet 4 thru 6

Logs of Borings #2, #3 and #4 made by Town of Framingham and are included in the Specifications

GRAPHIC SCALE
100' 0 100' 200'
1" = 100'

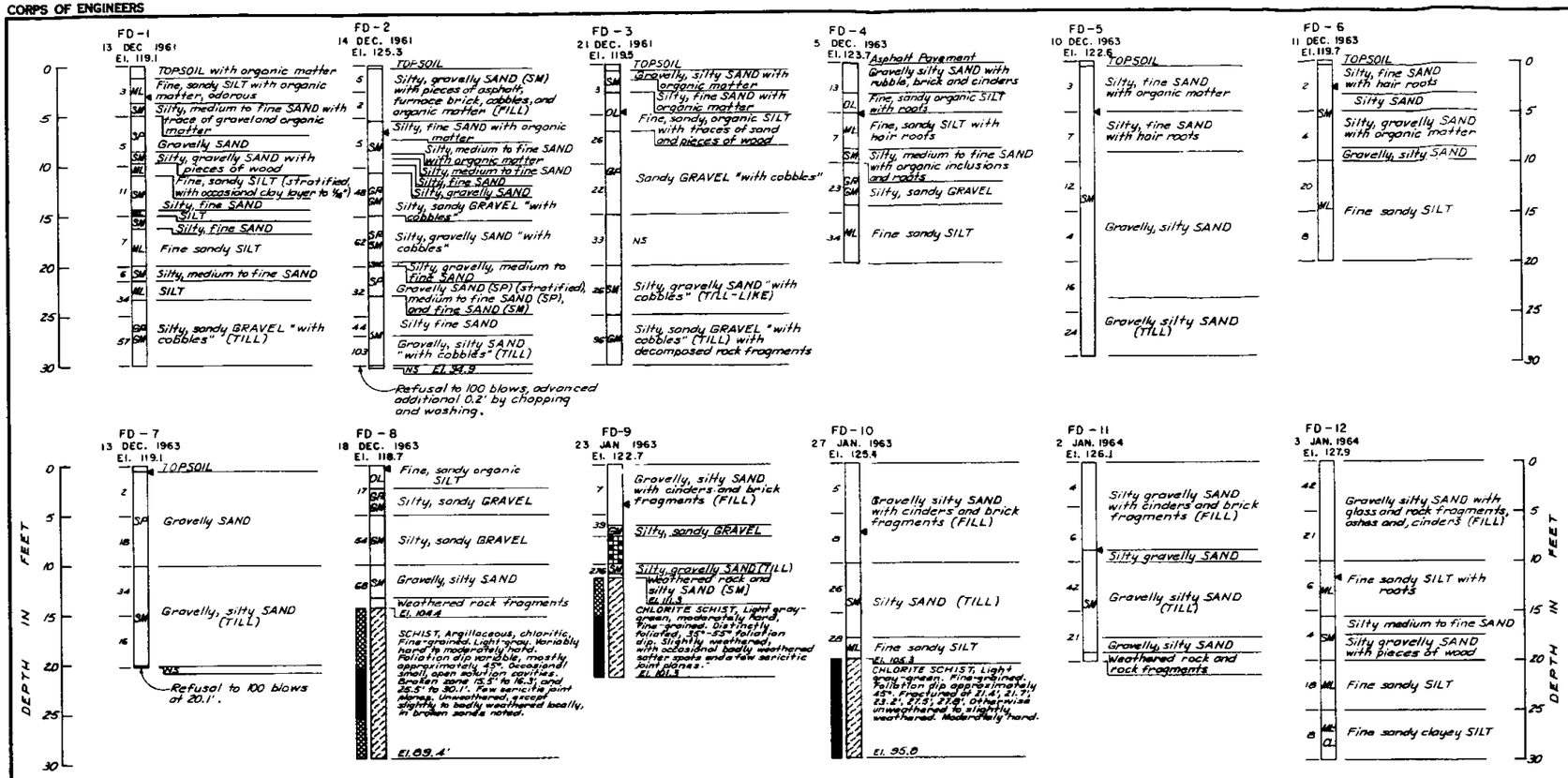
As Built Drawing
Date 77 0034

REVISION	DATE	DESCRIPTION	BY

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

DES. BY E.B. | DR. BY J.M. | CK. BY QC%
SUBMITTED
CHIEF F.S.B. DESIGN
CHIEF TECH. ENG. BRANCH
PROJECT ENGINEER
SPECIAL REQUIREMENTS
CHIEF DRAFTING BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PLAN OF FOUNDATION EXPLORATIONS
SUDBURY RIVER MASSACHUSETTS
APPROVED
DATE NOV. 1976
CHIEF DRAFTING BRANCH
SCALE AS SHOWN SPEC. NO. DACW33-77-B-0001
DRAWING NUMBER
SUD-1
SHEET 48



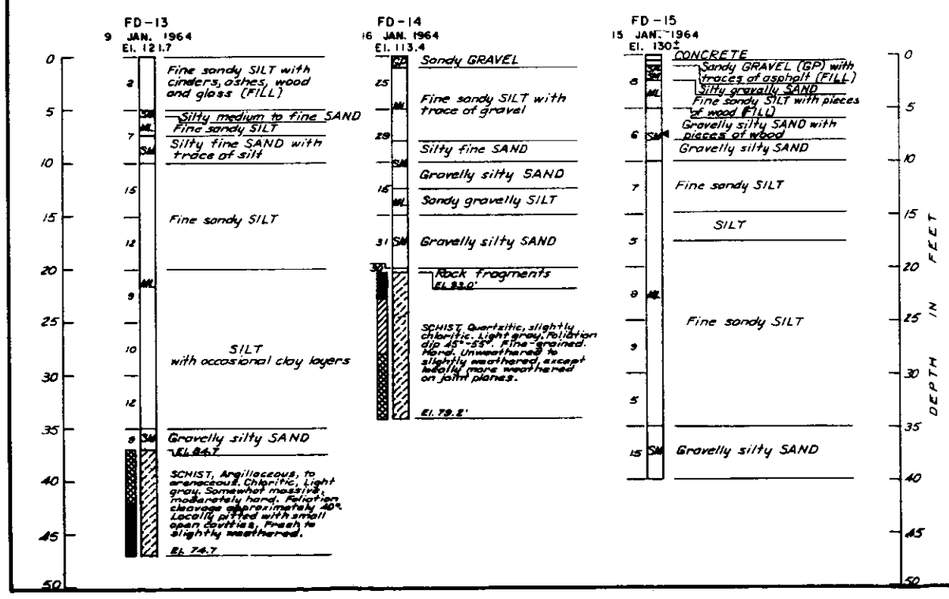
LEGEND FOR GRAPHIC LOGS

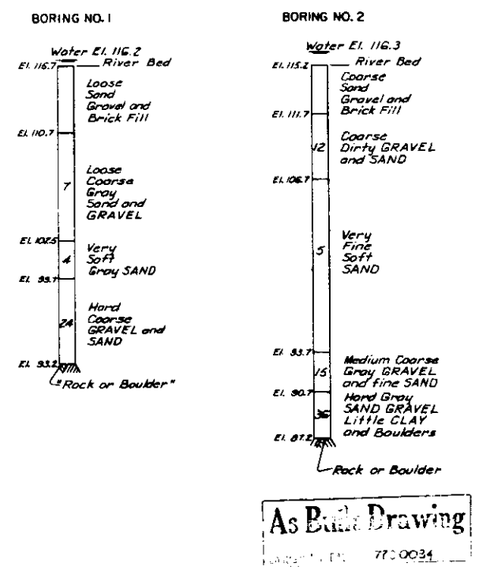
- ● FD — Foundation Test Boring
- ● FA — Foundation Hand Auger Boring
- ■ FT — Foundation Test Pit
- 21 DEC. 1961 — Date exploration completed
- El. 120.2 — Elevation of ground surface during time of exploration.
- Group letter symbol according to Unified Soil Classification System
- SP — NR — No Recovery or unsatisfactory soil samples recovered
- 72 — Blows per foot of penetration considered most representative for each sample drive using a 350 pound hammer with a free fall of about 18" on a 1 3/8" I.D. or 2" O.D., 2" I.D. or 2 1/2" O.D. size sample spoon equipped with a beveled and sharpened drive shoe.
- Subsurface water level in boring at time of exploration.
- El. 114.3 — Elevation of rock surface.
- Rock symbol

Core recovery (Usually 2 1/8" diameter)

- 0 - 25 %
- 25 - 50 %
- 50 - 75 %
- 75 - 90 %
- 90 - 100 %

El. 98.3 Elevation bottom of exploration





NOTES:

See notes on Sheet 48

As Built Drawing

77-0034

DIVISION	DATE	DESCRIPTION	BY

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

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS

SAXONVILLE LOCAL PROTECTION

RECORD OF EXPLORATIONS

SUDBURY RIVER — MASSACHUSETTS

DATE NOV. 1976

SPEC. NO. DACW33-77-B-0001

SUD - 1

SHEET 42

CORPS OF ENGINEERS — U. S. ARMY

SAXONVILLE
LOCAL PROTECTION
SUDBURY RIVER FLOOD CONTROL

1977-1979

CONSTRUCTED BY
U.S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

IN COOPERATION WITH
THE TOWN OF FRAMINGHAM

COLONEL MAX B. SCHEIDER
DIVISION ENGINEER

JOE B. FRYAR
CHIEF ENGINEER

FRANK NOTARDONATO
PROJECT ENGINEER

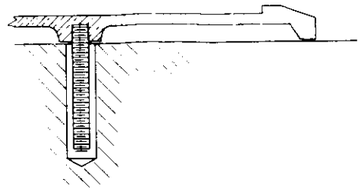
FREDERICK W. MOEHLE
CONSTRUCTION ENGINEER

JOHN R. BROWN
RESIDENT ENGINEER

1' 6"

1' 3"

"A"



SECTION "A"-"A"

PLAQUE SPECIFICATIONS

METAL	CAST BRONZE
LETTER STYLE	FLAT FACE ROMAN CLASSIC SIMILAR LETTERING STANDARD WITH THE FOUNDRY MAY BE USED SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER SPACING MAY BE VARIED TO ACCOMMODATE THE LETTERING USED
BORDER STYLE	SINGLE LINE BEVEL EDGE
BACKGROUND	LEATHERETTE TEXTURE DARK BRONZE COLOR
TYPE OF MOUNTING	CONCEALED STUDS
EMBLEM	CAST BRONZE

As Built Drawing
27 JUL 2004

SAFETY PAYS

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY

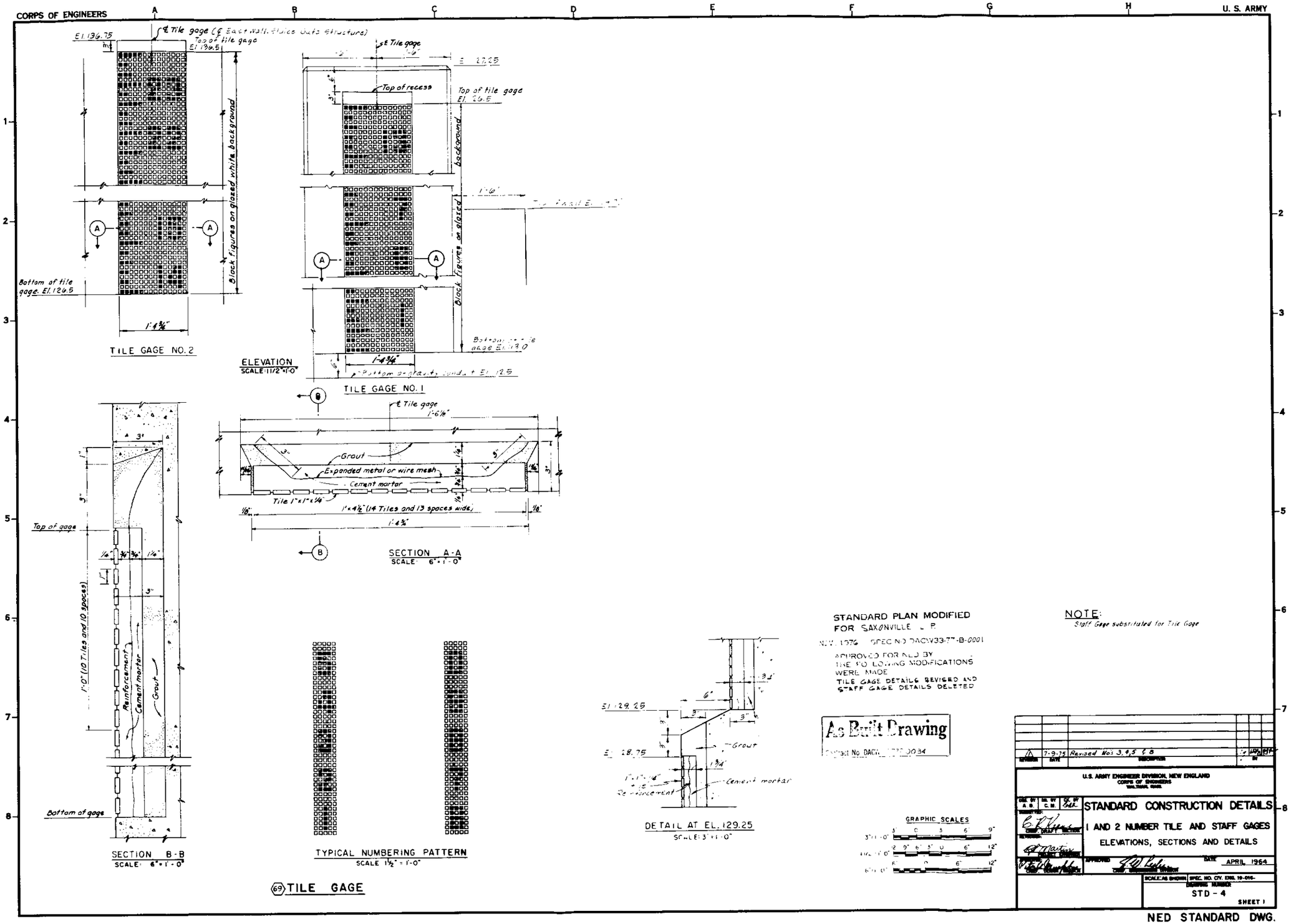
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY | DR. BY | CK. BY

SUBMITTED:
CHIEF, SECTION
APPROVAL RECOMMENDED:
CHIEF, TECH. ENG. BRANCH
REVIEWED:
CHIEF, ENGINEERING DIVISION
APPROVAL RECOMMENDED:
CHIEF, BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
FRAMINGHAM, MASSACHUSETTS
SAXONVILLE LOCAL PROTECTION
PLAQUE
SUDBURY RIVER — MASSACHUSETTS
APPROVED — DATE
CHIEF ENGINEERING DIVISION

SCALE | SPEC. NO | DRAWING NUMBER
SUD- 2
SHEET 1


CORPS OF ENGINEERS
U. S. ARMY
TILE GAGE NO. 2
ELEVATION
SCALE: 1 1/2" = 1'-0"
TILE GAGE NO. 1
SECTION A-A
SCALE: 6" = 1'-0"
SECTION B-B
SCALE: 6" = 1'-0"
TYPICAL NUMBERING PATTERN
SCALE 1 1/2" = 1'-0"
DETAIL AT EL. 129.25
SCALE: 3" = 1'-0"
GRAPHIC SCALES
STANDARD PLAN MODIFIED
FOR SAXONVILLE, L. P.
NOV. 1976 SPEC NO DACW33-77-B-0001
APPROVED FOR NED BY
THE FOLLOWING MODIFICATIONS
WERE MADE
TILE GAGE DETAILS REVISED AND
STAFF GAGE DETAILS DELETED
As Built Drawing
NOTE:
Staff Gage substituted for Tile Gage
7-9-75 Revised Nos 3, 4, 5 & 8
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
STANDARD CONSTRUCTION DETAILS
1 AND 2 NUMBER TILE AND STAFF GAGES
ELEVATIONS, SECTIONS AND DETAILS
APRIL, 1964
STD - 4
SHEET 1
NED STANDARD DWG.

(69) TILE GAGE