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Chicopee and Chicopee Falls Local Protection Projects - Hydrologic Review of Interior Drainage

Chief, Operations Division

Chief, Engineering Division

28 February 1983
Mr. Manley/ac/540

1. Transmitted herewith is the study report: "Hydrologic Review and Analysis of Interior Drainage Facilities", Chicopee and Chicopee Falls Local Protection Projects, Chicopee, Massachusetts. The study was requested and funded by your Operations Division.

2. The findings and recommendations presented are those of the Hydrologic Engineering Section, Water Control Branch. Related studies and reviews by other offices, i.e., Mechanical and Reservoir Control, may supplement, modify or correct the findings of this study. However, this report should serve as an informational base upon which to build a consensus of opinion. The implementation of any of the recommendations involving modifications to the projects, should be coordinated with Engineering Division.

Incls
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CHICOPEE AND CHICOPEE FALLS LOCAL PROTECTION PROJECTS CHICOPEE, MASSACHUSETTS

HYDROLOGIC REVIEW AND ANALYSIS OF INTERIOR DRAINAGE FACILITIES

BY
HYDROLOGIC ENGINEERING SECTION
WATER CONTROL BRANCH
ENGINEERING DIVISION

NEW ENGLAND DIVISION
CORPS OF ENGINEERS

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HYDROLOGIC REVIEW AND ANALYSIS OF INTERIOR DRAINAGE FACILITIES CHICOPEE, MASSACHUSETTS

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HYDROLOGIC REVIEW AND ANALYSIS
OF INTERIOR DRAINAGE FACILITIES

I PURPOSE

This report presents a hydrologic review, updata and analysis of interior drainage facilities at the Chicopee and Chicopee Falls Local Protection Projects in Chicopee, Massachusetts. The purpose of the review was to provide a hydrologic assessment, of present interior drainage conditions relative to interior pumping station needs, to aid the planning and prioritizing of plant replacements and improvements. Included are sections on general description, hydrologic factors considered, pertinent data, and hydrologic assessments.

II SUMMARY

The two relatively new pumping stations at the Chicopee Falls Local Protection project, completed in 1964, are both in good operating condition with highly adequate capacity for present interior watershed conditions.

The six stations at the older Chicopee Local Protection Project (1939-40 vintage) are in need of systematic rehabilitation including a planned program for pump engine replacement (Reference: 25 May 1982 Inpsection Report). The Chicopee stations were originally designed with some allowances for expected future watershed conditions and storm drain improvements. Though there have been changes, many of the projections have not materialized. The purpose of this review, therefore, was to update and assess current pumping station needs and priorities based on present, or projected near future, conditions. The resulting hydrologic assessments and recommendations were made in the interest of minimizing the economic burden of plant replacement and rehabilitation costs on the limited resources of the city of Chicopee, while at the same time maintaining sound project engineering and functional design. Following is a summary of findings:

A. At Paderewski, Jones Ferry and Call Street stations, each equipped with multiple propeller pumps plus a single variable speed volute pump, the capacity provided by two propeller pumps plus the volute is considered quite adequate for present watershed and storm drain conditions. Rehabilitating

the stations to these capacities would be considered a creditable short term goal. Paderewski should be assigned first priority for it presently has only one out of two propeller pumps reportedly operable plus a sump gate that is only manually operable. The Jones Ferry and Call Street stations presently each have two out of three propeller pumps reported operable.

B. At the Dwight station there is a high priority need for the repair or replacement of the twin 9' x 9' gravity discharge gates, both presently inoperable in a closed or nearly closed position. These gates were originally sized for the maximum discharge capacity of tailrace number 3, a capacity that has been greatly reduced by filling. Replacing these gates with two smaller 3-foot wide by 4-foot high gates, or the equivalent, should be considered. Also, closing and sealing gates at the no longer used tailrace channels 1 and 2 would eliminate a 15 cfs pumping capacity allowance for leakage and discounting the 15 cfs originally allowed for industrial process water would reduce originally designed pumping capacity requirements by 30 cfs to about 80 cfs which might be provided by two rather than three pumps.

C. The Bertha station has no pumping or gravity discharge capacity to spare. Increased watershed area, drainage imporvements, and some loss of ponding capacity makes it necessary that this station be maintained at not less than its full design capacity, and that the gravity discharge as well as pumping facilities be properly maintained and clear of any restrictive buildup of sediment or debris at all times.

D. The Plainfield station was designed for future storm drain improvements that apparently have not taken place. Therefore, the station has more than adequate capacity for present conditions. It is recommended that the station be maintained but that engine replacement be given less priority than at the other five stations. When engines are replaced, possible savings by replacing with less capacity may want to be considered. It is Corps policy, however, that flood control pumping stations be equipped with not less than two pumps to provide operational flexibility and reduce the risk from a single pump failure.

III DESCRIPTION

A. Chicopee Local Protection

The city of Chicopee, Massachusetts is located on the Connecticut River (river mile 81) at the confluence of the tributary Chicopee River.

The Chicopee Local Protection project consists of a system of dikes and walls extending 28,300 feet along the left (east) bank of the Connecticut River and the right and left (north and south) banks of the Chicopee River, within the backwater reach of the Connecticut River. The upstream end of the Springfield, Massachusetts dike, including one pumping station, is also located within the city of Chicopee and, though this segment is hydrologically separate, it is also considered a part of the Chicopee Local Protection project. (A general plan and interior watershed map of the project is shown on plate 1).

The project was built as a result of the disastrous Connecticut River flood of March 1936. It was built in sections and construction commenced in October 1936 and was completed in 1941.

The project includes six interior pumping stations for discharging interior drainage during high river stage. As most of Chicopee is serviced by a combined sanitary and storm sewer system, most of the pumping stations are designed to discharge both sanitary and stormflows during high river stage.

Within the past few years a sewage treatment system has been built in Chicopee in which "dry weather" flows from the combined sewer system are intercepted, near points of discharge to the river, and conveyed to a central point for treatment and discharge to the river. It was determined, as part of this review, that the diversion capacity of this treatment system is equivalent to a watershed runoff rate of only about 0.14 inches per day (3-4 cfs/square mile) therefore, the extent to which this new sanitary system might supplement existing storm drainage discharge-capacity during intense rainfall would be minor.

The dikes of the Chicopee project provide about 3 feet, and the walls 1 foot, of freeboard above the record March 1936 flood level or about 8 and 6 feet above the recurring March 1936 flood as modified by the existing system of upstream flood control reservoirs built since 1936.

B. Chicopee Falls Local Protection

The Chicopee Falls project provides flood protection for a highly industrial area of Chicopee along the right (north) bank of the Chicopee River about two miles upstream from the mouth of the river. The project consists of about 4,800 feet of dikes and walls, two pressure drains for discharging high level interior drainage, and two pumping stations for

discharging low level runoff from about 40 acres of interior area plus industrial process water. The Chicopee Falls project was built following the Chicopee River flood of August 1955. Construction was started in October 1963 and completed in July 1965. The project was designed to protect against the Standard Project Flood as modified by the upstream Barre Falls and Conant Brook flood control reservoirs plus some local channel improvements. Walls and dikes were designed to provide a minimum of 3 feet of freeboard above the design flood level. A general plan and interior watershed map of the Chicopee Falls project is shown on plates 1 and 21.

IV REVIEW CONSIDERATIONS

A. General

Determining interior drainage pumping capacity requirements is not a definitive hydrologic process. The assessment of the relative adequacy of a station cannot be entirely analytical, but must be a combination of both quantitative and subjective analysis. Pumping stations are very costly facilities, not only initially, but continually for operation and maintenance. Therefore, the sizing of a station, an indicator of cost, must be weighed against the interior flood risk based on both frequency and magnitude of potential flood damages. For example, street drains serving small drainage areas, where flood potential is minor and of a nuisance category, are usually sized using a relative low (frequeny) storm runoff criteria i.e., 2 year to 5 year storm frequency runoff. However, for systems with greater flood damage potential, possibly involving loss of life or extensive property damage, a more severe criteria is generally employed i.e., 50 to 100 year storm frequency runoff criteria or even up to the Standard Project storm runoff, a criteria used by the Corps in the design of high dikes and walls where design flood exceedance could be catastrophic. Some hydrologic factors to be considered in assessing pumping station requirements are:

1. Frequency and duration of high river stages requiring pumping.

2. Likely coincidence of interior rainfall-runoff and high river stage.

3. Interior watershed size and runoff potential.

4. The interior flood damage potential in both human life and property.

A guide chart developed for the Chicopee review, in which design runoff criteria is related to flood damage potential, frequency of high river stage and rainfall-river stage coincidence, is shown on plate 2.

B. Frequency of High River Stage.

The frequency and duration that a receiving river is at, or above, the stage for gravity storm drainage is obviously an indicator of the frequency (probability) of required pumping. The greater the frequency and duration of high stage the greater the chance of intense interior rainfall occurring during high river stage. This factor is a measure of risk based on probability of occurrence alone and is an important consideration in combination with other factors such as the magnitude of damage that could occur if intense rainfall-runoff, though maybe improbable, did occur during a period of high river stage.

Stage frequency curves for the Connecticut and Chicopee Rivers are shown on plate 3. Activation of the six pumping stations at the Chicopee Local Protection project are a function of Connecticut River stages and the two stations at the Chicopee Falls project area a function of Chicopee River stages. The approximate upper limit river stage and frequency for pump activation at each of the stations is indicated on the curves. The stage frequency curves were developed using previously developed stage-discharge rating curves and peak discharge-frequencies, as modified by upstream flood control reservoirs. Discharge frequency and stage discharge ratings are also shown on plate 3. The analysis indicated that the frequency of required pump activation at the different stations ranged from about an annual event at some stations to as rare as a 50 year event (2% annual chance) at one station.

The duration or percent of time either river is above pump activation level is relatively small, generally less than 1 to 3 percent of the total time. The rivers are relatively quick to rise and high flows may occur from a day or two up to a week or more, particularly on the Connecticut River.

C. Coincidence of Interior Rainfall and High River Stage

In addition to the frequency and duration of high river stage, a second consideration is the probable coincidence of intense local rainfall-runoff during high river stage. With protection projects on small flashy rivers it is quite probable that interior rainfall will occur during high river stage, both resulting from the same storm system. However, on larger rivers with increasing times of concentration, interior rainfall during high river stage would be less probable and more likely the result of a secondary storm system rather than that associated with the initial runoff event. Considering the likely coincidence of the two events is again a relative measure of risk based on "probabilities" rather than "possibilities" of occurrence.

As part of the hydrologic review of the Chicopee and Chicopee Falls drainage facilities, rainfall amounts at a long term station in the region were determined for periods when the Connecticut River was approaching or exceeding minimum stages for pump activation. Though the Connecticut and Chicopee Rivers are high a small percentage of the time, the analysis indicated a relatively high coincidence of interior rainfall during high river stages. This was most notable during the greater flood events, particularly the major floods of August 1955 and September 1938. The analysis was made for a 23-year period and the highest experienced 1 and 3 hour rainfall amounts during high river stage were listed in order of magnitude and assigned "Weibull" annual frequency plotting positions. The developed rainfall frequencies are shown on plate 4 and are compared with all season rainfall frequencies from US Weather Bureau T.P. #40. This comparison indicated that the 40 percent chance (2 year) all season rainfall had about a 2 to 4 percent annual chance of occurrence during high river stage and the 10 percent (10 year) all season rainfall about a 1 to 2 percent chance of occurrence during high river stage.

It is noted that in August 1955, 5 to 10 percent chance all season 3-hour rainfall was experienced during high river stage. It was reported that pumping stations operated satisfactorily during this flood event and though widespread interior flooding did occur, it was reported due to insufficient storm drain capacity rather than inadequate pumping capacity.

D. Interior Watersheds - Size and Runoff Potential

The primary factor in determining interior runoff potential is the size and character (topography and development) of the interior watersheds. In addition, as previously discussed, the peak rate of runoff to a pumping station from a relatively flat urbanized area can be highly affected and limited by the design capacity of storm drainage systems in the area. Information on the effective size of interior watersheds in Chicopee, and their hydrologic character, is presented in subsequent sections of this report. An interior watershed map is shown on plate 1. The pumping stations were originally designed using runoff rates based on 10-year frequency rainfall and reduced using a "Relative Protection Factor" adjustment. In the current hydrologic review runoff rate and frequency estimates were based on an analysis of peak discharge frequencies from small gaged streams in the general region with some allowance made for effects of urbanization. The adopted upper and lower limit curves of runoff rate versus frequency are shown on plate 4. The lower curve is considered typical of an average undeveloped watershed in the area and the upper curve represents peak runoff frequencies for a steeper more flashy watershed. The curves indicate peak

discharge frequencies for a one square mile watershed. Peak discharges generally vary with watershed size by a ratio of drainage area to the 0.7 exponential power. This relationship has been found generally applicable based on past regional flood frequency studies. The peak discharge frequency from a given size watershed is thus equal to the peak flow for a one square mile drainage area, of similar hydrologic characrer, times the given drainage area in square miles to the 0.7 exponential power.

Runoff volume frequencies for durations up to 4 days were similarly developed from high flow duration studies of long term streamflow records in the general region. The approximate runoff volume-frequency relations are illustrated on plate 4.

V ANALYSIS OF INTERIOR PUMPING STATIONS

A. Chicopee Local Protection Project

1. Plainfield Pumping Station

a. General. The Springfield Flood Protection Project along the east bank of the Connecticut River extends northward a short distance into the city of Chicopee. The protective works within Chicopee intercepts runoff from about 300 acres within the political limits of Chicopee. The interior drainage from 270 acres of the area is served by a 72-inch pressure storm drain discharging to the Connecticut River just downstream of the Plainfield pumping station. Drainage from the remaining 30 acres of area is normally discharged by gravity but the Plainfield pumping station was built to discharge runoff from the remaining low area during high river stages. The 30 acres served by the station is a very flat industrially developed area with very limited storm drainage facilities. The Plainfield station was built wth provisions for the future connection of twin 36-inch diameter storm drains. There is no indication that the storm drains have been installed or are planned in the near future. Presently the only drainage believed entering the station is that from 8-inch and 12-inch toe drains located along the land side of the line of protection. Estimated capacity of the toe drains is in the order of 8 cfs.

b. Hydrologic Assessment. The interior flood potential in the Plainfield area is rated "low to medium". A major storm runoff of 3 to 4 inches, with discharge preempted, would result in flooding in the 2 to 3 foot maximum depth category. The frequency of high river stage requiring pumping, at about 50-year frequency is rated "low". Under present levels of development in the area, and storm drain inlet capacity, pumping capacity greater than 8 cfs (2-year) is considered unwarranted. Though the present station was designed for the future connection of 36-inch storm drains, these

TABLE 1

CHICOPEE LOCAL PROTECTION
PLAINFIELD PUMPING STATION
PERTINENT DATA

(1) DRAINAGE AREA

(a) Size: 30 acres

(b) Character: Very flat, highly industrially developed

(c) Est. 2 Year Q: 8 cfs 10 Year: 20 100 Year: 40

(2) PUMPS

(a) Number and Size: 2 - 16-inch volute

(b) Capacity: 22 cfs design, 30 cfs installed (1" R.O./hr.)

(c) Est. Freq.: 10 year +

(d) Present conditions: operational

(3) ELEVATIONS

(a) Top of Protec: 68.9 feet NGVD

(b) Design Flood: 68.4+ 100 Year: 63 10 Year: 57

(c) Normal River: 40.7

(d) Drain Invert: 44.3

(e) Ground El: 62.0

(f) Pump Activation Max: 60

drains have not been installed. Present inflow is believed limited to the capacity of 8-inch and 12-inch diamteter toe drains with an estimated combined capacity not in excess of 8 cfs. It is concluded that if the Plainfield station were being built today for present hydrologic conditions, a design capacity greater than 8 cfs would probably not be hydrologically or economically justified. It is recommended that the station be maintained but that engine replacement be given less priority than at the other five Chicopee stations. When engines are replaced, possible savings by replacing with less capacity may want to be considered. Unless inlet capacity is increased, twin pumps with a total combined capacity of 10 to 12 cfs would seem appropriate. It is Corps policy that flood control pumping stations be equipped with not less than 2 pumps to provide operational flexibility and reduce the risk from a single pump failure.

2. Dwight Pumping Station

a. General. Protection along the left (south) bank of the Chicopee River in Chicopee consists of about 1,200 feet of dikes and walls extending from the Davitt Memorial bridge to the Boston & Maine railroad embankment near the mouth of the Chicopee River. A general outline of the protection is shown on plate 1. The interior area consists of about 25 acres of completely industrialized area along the narrow protected flood plain. The interior area lies generally between a high level water power canal to the south and the line of protection to the north. There are four tailrace outlets from the canal through the line of protection. Three of the tailraces are gated and tailrace 4 can remain operational during design flood conditions. Dwight pumping station is located at tailrace 3. The pumping station was designed to discharge interior drainage comprised of:

(1) Gate leakage at tailrace 1, 2, and 3 (35 cfs)

(2) Seepage through water supply canal embankment, (20 cfs)

(3) Seepage through dike and under floodwall, (4 cfs)

(4) Leakage from tailrace 4 pressure conduit (10 cfs)

(5) Industrial water (15 cfs)

(6) Interior storm runoff (25 cfs).

Pertinent data on the Dwight pumping station is listed in table 2.

Tailrace canal 3, which originally provided an interior ponding area, has been replaced by a pipe conduit and almost completely filled for use as a parking lot. The industry located east of Davitt Memorial Bridge is no longer in business and the buildings are presently vacant. It is presently planned that the buildings will be converted to housing. With tailrace canals 1 and 2 no longer in use, their gates are closed.

The Dwight station has twin 9' x 9' gravity sluice gates which are both presently inoperable. One is in the closed position and the other almost closed. Two of the three pumps are presently operational.

b. Hydrologic Assessment. The interior flood potential at the Dwight station, from interior storm runoff, is considered "low to medium". A 4-inch rainfall runoff without discharge would result in ponding in the 2 to 3 foot range occurring generally in parking lots and industrial building basements. The frequency of high river stage requiring pumping is "medium". the maximum pump activation stage of 58 feet NGVD has about a 10 percent (10-year) annual chance of occurrence. Based on potential damages and stage frequency for pump activation, the pumping capacity of 25 cfs allotted to interior storm runoff, estimated to be at least a 20 percent (5-year) all season frequency runoff, is considered both adequate and appropriate.

If tailraces 1 and 2 are not to be used it is recommended that the gates be both closed and sealed to prevent leakage. This would theoretically reduce design pumping capacity requirements by 15 cfs - that capacity allotted to leakage at tailrace gates 1 and 2. Without the 15 cfs leakage and the 15 cfs allotted to industrial water supply, originally designed pumping capacity requirements would be reduced from 110 to 80 cfs and might be provided by two rather than three pumps.

Complete rehabilitation of the Dwight station gravity sluice gates is of highest priority. The present twin 9' x 9' gates were originally designed to pass maximum tailrace channel 3 flow capacity of about 350 cfs with minimum head loss. Since tailrace channel 3 has been mostly filled and replaced by a storm drain of unknown size it is concluded that required sluicing capacity has been greatly reduced. Assuming the drain replacing canal 3 probably isn't more than 48 inches in diameter, it is concluded that a gravity sluicing capacity of about 200 cfs would be adequate. This would provide 100 year frequency storm runoff gravity capacity of 100 cfs (4" R.O./hr) plus another 100 cfs for leakage and seepage. Assuming the design head on the gate openings could be as high as elevation 58, the required gate opening would be in the order of 20 to 25 square feet, provided the

TABLE 2

CHICOPEE LOCAL PROTECTION
DWIGHT PUMPING STATION
PERTINENT DATA

(1) DRAINAGE AREA

(a) Size: 25 acres

(b) Character: Flat, completely developed industrially

(c) Est. 2 Year Q: 15 cfs 10 Year: 40 cfs 100 Year: 100 cfs

(2) PUMPS

(a) Number and Size: 3 - 30" propeller

(b) Capacity: 110 cfs design, 150 cfs installed, (25 cfs storm runoff - 1" R.O./hr.)

(c) Est. Freq: 5 yr. ±

(d) Present Conditions: Only 2 of 3 pumps operational. Gravity gates inoperable.

(3) ELEVATIONS

(a) Top of Protec: 71.2

(b) Design Flood: 70± 100 Year: 64 10 Year: 58

(c) Normal River: 41

(d) Drain Invert: 41.2

(e) Ground El: 60

(f) Pump Activation Max: 58

top of the gate openings are below elevation 54 feet NGVD. It is therefore recommended that consideration be given to replacing the present twin 9' x 9' gates with twin 3-foot wide by 4-foot high gates, or the equivalent. It is important that the new gates both be kept normally open allowing free discharge to the river and, that the inlet and passage ways be kept free of any sediment or debris buildup.

3. Bertha Avenue Pumping Station

a. General. The Bertha Avenue station receives drainage from a bluff area east of the Connecticut River flood plain. Drainage from the bluff passes west beneath the new highway route 391 and then south through a low flat area along the B&M railroad. It is noted that storm drainage from route 391 itself does not reach the Bertha station. The highway has its own extensive drainage system discharging directly to the Chicopee and Connecticut Rivers. The Bertha station was originally designed for a drainage area of 335 acres, however, the present review revealed the drainage area extending further north along the B&M railroad and the present drainage is believed more nearly 400 acres. The station was originally designed with about 15 acre-feet of ponding capacity adjacent to the station. Much of this storage has been lost with the construction of highway 391. The remaining storage is that within a highway interchange loop just upstream from the station. The storm drain capacity between the upstream interchange storage and the pumping station is that of twin 36-inch diameter culverts. Pertinent data on the Bertha Avenue station is listed in table 3. The limits of its watershed are shown on plate 1.

b. Hydrologic Assessment. The flood damage potential in the Bertha Avenue interior area is considered "low to medium". Flooding in the event of excess runoff would be in the 2 to 4 foot category generally concentrated in the low area along the west side of the B&M railroad. Flooding would occur quite extensively throughout the industrial developments present in the area and it is expected, with the construction of route 391, that there will be expanded development in the future in this area. The frequency of high river stage requiring pump activation is "medium". The estimated annual frequency of a river stage to elevation 55 is about 20 percent (5 year).

The total installed pumping capacity of the two pumps at the station is about 70 cfs. With the increased drainage area, storm drain improvements that have been made, and the loss of pondage, this total capacity is likely not more than a two year to five year all season runoff rate and could be even less with continued storm drain improvements. The capacity of

TABLE 3

CHICOPEE LOCAL PROTECTION
BERTHA AVENUE PUMPING STATION
PERTINENT DATA

(1) DRAINAGE AREA

(a) Size: 400 acres (originally 335)

(b) Character: Flat lowlands and bluffs, only partially developed

(c) Est. 2 Year Q: 50 cfs 10 Year: 110 100 Year: 240

(2) PUMPS

(a) Number and Size: 2 - 24 inch volate

(b) Capacity: 70 cfs installed (0.17" R.O./Hr.)

(c) Est. Freq: 2 yr +

(d) Present Conditions: Operational

(3) ELEVATIONS

(a) Top of Protec: 72.7' NGVD

(b) Design Flood: 69.7' 100 Year: 64' 10 Year: 58'

(c) Normal River: 41'

(d) Drain Invert: 42.5'

(e) Ground El: 56'

(f) Pump Activation Max: 55'

the twin 36-inch culverts leading to the station are probably somewhat in excess of 100 cfs.

It is concluded that the Bertha station, with a total installed two pump capacity of 70 cfs, does not have excessive capacity for present or expected future drainage conditions in the watershed. The station should be properly maintained with both pumps operational and any replacements should be of no less capacity. It is also hydrologically important that the remaining ponding capacity in the highway interchange immediately upstream be retained. The gravity discharge capacity at the station is also limited. It is therefore important that the inlet and twin 36-inch gravity discharge lines be kept free of sediment or debris buildup.

4. Paderewski Pumping Station

a. General. The Paderewski pumping station was built to provide interior drainage, under high river stage, for about 350 acres of very flat residential area generally lying between the Massachusetts Turnpike north to Chicopee Street. The original station design indicated a drainage area of 260 acres, however, this review indicated more nearly 350 acres. The approximate delineation of the watershed and pumping station location is shown on plate 1. The area has a combined sanitary-storm sewer system culminating in a 60-inch diameter drain at the pumping station. A recently constructed sanitary interceptor sewer system diverts normal sanitary flows near the entrance to the station, but the diversion capacity from the Paderewski watershed is only 1 to 2 cfs. Therefore, it provides little relief to the storm drainage requirements from the area. The Paderewski station was equipped with 2 - 30-inch propeller pumps and 1 - 16-inch variable speed electrically driven volute pump with provisions for the addition of another 30-inch propeller pump when expected development in the area warranted. Pertinent data on the station is listed in table 4. The Paderewski station is presently in a state of disrepair. Only one of the two large pumps plus the volute pump is presently operable and the one operable large pump couldn't be started during the last periodic inspection (dead batteries). Also, the sump gate to the large pumps can only be operated manually. Pertinent data on the station is listed in table 4.

b. Hydrologic Assessment: The interior flood damage potential in the event of a major storm runoff without discharge is considered "medium". Because of the flat topography, a rainfall excess in the order of 4 inches would result in 1 to 2 feet of ponding in streets and low areas. However, because the drainage system is combined storm-sanitary, there would be backup of the sanitary system throughout the residential area, posing a considerable health, in addition to flood, problem. The frequency of

TABLE 4

CHICOPEE LOCAL PROTECTION
PADEREWSKI PUMPING STATION
PERTINENT DATA

(1) DRAINAGE

(a) Size: 350 acres (originally 260)

(b) Character: Very flat residential area with combined sanitary-storm sewer system.

(c) Est. 2 Year Q: 30-40* cfs 10 Year : 60-80 100 Year: 120-160

(2) PUMPS

(a) Number and Size: 2 - 30" propeller, 1 - 16" volute

(b) Capacity: Approx. 100 cfs installed (0.28" R.O./Hr.)
(2-45 cfs + 1-10 cfs)

(c) Est. Freq: 10 Yr. +

(d) Present Conditions: 1 large pump inoperable, sump gate only manually operable.

(3) ELEVATIONS

(a) Top of Protec: 72.5

(b) Design Flood: 69.5 100 Year: 64.5 10 Year: 58

(c) Normal River: 41

(d) Drain Invert: 43

(e) Ground El: 58+

(f) Pump Activation Max: 52

*Range in capacity dependent on extent of storm drainage system. Lower value probably more representative of present level of development.

high river stage requiring pumping at Paderewski is high. The maximum design stage for pump activation is 52 feet NGVD, which occurs on an average of at least once per year. It is concluded that the Paderewski pumping station is in need of nearly complete rehabilitation, and the estimated 10-year frequency all season runoff rate in the order of 70 cfs is considered reasonable design pumping capacity. It is recommended that the station, as now, have one smaller variable speed pump plus a minimum of two larger pumps, with physical space for the possible future addition of a third large pump if needed. It is recommended that the existing number and sizing of pumps be retained, or at least the two larger pumps not be replaced with pumps less than 40 cfs each.

The 60-inch diameter inlet drain to the station has an estimated capacity in the order of 100 to 120 cfs, however, it is believed that a flow rate of 70 cfs is probably more representative of the overall storm drainage system capacity.

5. Jones Ferry Pumping Station

a. General. The Jones Ferry pumping station located near the end of McKinstry Street was built to discharge the flows of a 72-inch diameter combined sewer outletting to the Connecticut River at that location. In the original design, it was assumed the 72-inch diameter drain served an interior watershed area of about 840 acres. The original area was made up of the very flat Connecticut flood plain area generally west of the B&M railroad and a high bluff area lying east of the B&M railroad and draining into the low area via McKinstry Street. In the current review it was determined that a 48-inch diameter pressure conduit intercepts much of the drainage from the area east of the railroad and discharges to the Connecticut River just south of the Jones Ferry pumping station. This pressure conduit reduces the contributing watershed to the pumping station from the original 840 acres to more nearly 630 acres. The only drainage from east of the railroad to the pumping station is believed to be that of one 30-inch drain with an estimated limiting capacity of about 20 cfs. The present drainage area is very flat mostly residential with some industrial and commercial development. The area is almost completely storm sewered. Principal sewers feeding the trunkline sewer are two 36, one 48 and one 42 inch diameter drains. The conveyance capacity of the existing drain to the pumping station is estimated to be in the order of 200 cfs.

A diverter has been installed on the trunkline sewer near the station for the diversion of "dry weather" flows to a treatment plant. However, diversion capacity from the watershed is limited to about 5 cfs and has little effect on the peak rate of storm runoff to the Jones Ferry station.

The Jones Ferry station was originally equipped with 3 - 42-inch propeller pumps and 1 - 16-inch variable speed volute pump with provisions for the future addition of a fourth 42-inch pump. Pertinent data on the Jones Ferry station is listed in table 5.

b. Hydrologic Assessment. The flood damage potential in the Jones Ferry area, in the event of an intense rainfall without discharge, is considered "medium". Flooding from a 3 to 4 inch excess rainfall would be in the 1 to 2 foot depth category in streets and low areas, but becuase it is a combined system, in a heavily residential and industrial area, there could be extensive sanitary sewer backup, posing a significant health as well as flood threat.

The frequency of high river stage requiring pumping is considered high. A river stage of 52 feet NGVD occurs on the average of at least once per year. The 10 year frequency all season storm runoff is considered a reasonable storm magnitude for pumping station design at Jones Ferry. The estimated 10 year frequency peak runoff from the present reduced drainage area is in the order of 160 cfs and allowing for 20 cfs from east of the railroad results in a total flow of 180 cfs. It is therefore concluded that the present pumping station with only two of the large pumps and the one small pump operational is still reasonably adequate in capacity. When the present pumps are replaced it is recommended that one small variable speed pump and not less than two large pumps be installed with physical provisions retained for the possible future addition of a third large pump if needed.

6. Call Street Pumping Station

a. General. The Call Street pumping station, the most northerly station in Chicopee, serves to discharge the flows of a 60-inch combined sanitary storm sewer to the Connecticut River during periods of high river stage. The station was originally designed to serve an eventual maximum watershed area of 740 acres. The current review indicates that the present, and probable future, total drainage area is considerably less. About one-half the original drainage area was the flat flood plain area west of the B&M railroad and the other half the steeper bluff area east of the B&M railroad, this area generally divided by Gratton Street. However the current review indicates that surface runoff from the bluff area south of Gratton Street drains west beneath highway 391 and then south along the B&M track eventually reaching the Bertha Avenue pumping station outlet. Also, the surface runoff in the draw north of Gratton Street enters a 48-inch diameter culvert inlet at the B&M railroad, and indications are,

TABLE 5

CHICOPEE LOCAL PROTECTION
JONES FERRY PUMPING STATION
PERTINENT DATA

(1) DRAINAGE AREA

(a) Size: 630 acres (originally 840)

(b) Character: Flat, storm sewered, residentially and industrially developed.

(c) Est. 2 Year Q: 60 10 Year: 160 100 Year: 260

(2) PUMPS

(a) Number and Size: 3 - 42 inch propeller, 1 - 16 inch volute

(b) Capacity: 220 cfs design, (0.34 inch R.O./Hr.)

(c) Est. Freq: 20 Yr. ± (Present D.A.)

(d) Present Conditions: 1 large pump inoperable, total present capacity 180 cfs (.28 inch R.O./Hr.)

(3) ELEVATIONS

(a) Top of Protec: 73.4

(b) Design Flood: 70.4 100 Year: 65 10 Year: 59

(c) Normal River: 41

(d) Drain Invert: 46

(e) Ground El: 57

(f) Pump Activation Max: 52

based on discussions with city personnel and a study of drainage maps of the area on 2 February 1983, that this 48-inch drain flows almost due west outletting to the Connecticut River upstream of the Call Street station. It is noted that this was not confirmed by physically tracing the drain to the Connecticut, but, assuming it to be the case, the present Call Street station drainage area is more nearly 230 acres, mostly of very flat residentially and commercially developed flood plain area west of the railroad plus a strip along Gratton Street east of the railroad, as delienated on plate 1.

It would be expected that during intense rainfalls some flows would bypass the inlet to the 48-inch drain north of Gratton Street and enter the flat flood plain but these flows would likely pond irregardless of pumping capacity due to limited conveyance capacity to the station. An important consideration in the hydrologic evaluation of Call Street is that the present storm drain capacity to the station is estimated to be in the order of 110 cfs, and there are no plans by the city for enlarging this capacity in the near future.

Pertinent hydrologic data on the Call Street station is listed in table 6.

b. Hydrologic Assessment. The flood damage potential in the Call Street interior area is considered "medium" In the event of 3 to 4 inches of excess runoff without discharge would be in the 1 to 3 foot depth category in streets and low areas, but because it has a combined storm sanitary drain system there could be extensive sanitary backup posing a health as well as flood threat.

The frequency of high river stage requiring pumping at Call Street is considered "high". A Connecticut stage of 55 feet NGVD, the maximum pump activation level, has an estimated annual frequency of occurrence in the order of 20 percent (5 yr.).

The estimated 10 year all season runoff rate of 100 cfs (.43 inch R.O./Hr.) comparable to the present inlet drain capacity, is considered a reasonable design capacity at Call Street under present conditions. Added pumping capacity, unless for reserve backup, would be difficult to justify unless it is determined that the effective drainage area is larger and improvements were made in existing storm drain capacity.

Though the combined capacity of one large pump (75 cfs) and the small pump (15 cfs) approach present estimated drain capacity at Call Street, it

TABLE 6

CHICOPEE LOCAL PROTECTION
CALL STREET PUMPING STATION
PERTINENT DATA

(1) DRAINAGE AREA

(a) Size: 230 acres (originally 740)

(b) Character: Flat, storm drained, residentially and commercially developed

(c) Est. 2 Year Q: 45 10 Year: 100 100 Year: 200

(2) PUMPS

(a) Number and Size: 3 - 36 inch propeller, 1 - 16 inch volute

(b) Capacity: 240 cfs installed (1.0 inch R.O./Hr.)

(c) Est. Freq: 100 yr.

(d) Present Conditions: 1 large pump inoperable, present capacity 165 cfs (0.7 inch R.O./Hr.) Est. present inlet cap. 100-140 cfs (0.4 inch R.O./Hr.)

(3) ELEVATIONS

(a) Top of Protec: 74.7

(b) Design Flood: 71.7 100 Year: 66 10 Year: 60

(c) Normal River: 41

(d) Drain Invert: 47

(e) Ground El: 72

(f) Pump Activation Max: 55

is Corps policy that at least two large pumps be maintained operational at a station to provide flexibility of operation and provide a factor of safety against single pump failure. In rehabilitating the station, the feasibility and possible savings, of providing two large pumps with a lesser individual capacity of about 60 cfs may want to be considered.

B. Chicopee Falls Local Protection

1. Main Street Pumping Station

a. General. Interior drainage from approximately 150 acres of high level area at the Chciopee Falls project is intercepted and discharged to the river by pressure conduits. Drainage from the remaining 38 acres of low level area, during high river stage, is provided by two pumping stations. The Main Street pumping station is located adjacent to the line of protection (floodwall) approximately 2,000 feet downstream from Deady Memorial Bridge and discharges drainage from about 20.5 acres of the industrial low level area at the former Savage Arms and Chicopee Manufacturing Corporations. Drainage to the station is by 30-inch and 18-inch diameter storm drains with a total combined capacity of 30 to 40 cfs. The location of the pumping station and its contributing low level watershed is shown on plates 1 and 21. Pertinent data on the station is listed in table 7.

b. Hydrologic Assessment. The flood potential in the Main Street area in the event of intense excess rainfall is considered "low to medium", provided the upper level pressure drains function as designed. Ponding would be in the 2 to 3 foot depth category tending to concentrate in the low area along the line of protection. The frequency of high river stages requiring pump activation is considered "low". A river stage of 86 feet NGVD, considered the maximum level for pump activation, is in the range of a 10-year frequency event. The Main Street station, built in 1964, is in good operating condition and it is concluded that its design storm runoff capacity of 30 cfs (in excess of an estimated 10-year frequency all season runoff) is highly adequate. Pumping capacity at the Main Street station was quite liberal in design, having experienced the major storm rainfall of August 1955 a short time before. If the station were being built today, under present economic conditions and present levels of industrial activity in the area, a 30 cfs design storm runoff capacity would probably be difficult to justify. The estimated 50 percent chance (2 year) all season storm runoff from the area would be in the order of 10 cfs.

TABLE 7

CHICOPEE FALLS LOCAL PROTECTION PROJECT
MAIN STREET PUMPING STATION
PERTINENT DATA

(1) DRAINAGE AREA

(a) Size; 20.5 Acres

(b) Character: Moderately flat, complete industrial development

(c) Est. 2 Year Q: 10 10 Year : 20 100 Year: 35

(2) PUMPS

(a) Number and Size: 2 - 16 inch propeller

(b) Capacity: 30 cfs runoff + 10 cfs other = 40 cfs total (1.5 inch R.O./Hr.)

(c) Est. Freq: 10 year +

(d) Present Conditions: Fully operational

(3) ELEVATIONS

(a) Top of Protec: 104.8

(b) Design Flood: 98+ 100 Year: 93 10 Year: 86

(c) Normal River: 74

(d) Drain Invert: 74

(e) Ground El: 88+

(f) Pump Activation Max: 83-86

2. Oak Street Station

a. General. The Oak Street station, with a drainge of 17.8 acres, serves the most downstream portion of the interior low level drainage area. The area is the large industrial complex of the former US Rubber Company. Unfortunately, for the city of Chicopee, the industry at the site has closed down and the extensive building complex is presently in a rapid state of deterioration. The location of the Oak Street station, and its drainage area, is shown on plate 1. Pertinent data on the station is listed in table 8. The station is fed by 36-inch and 30-inch diameter drains with an estimated combined capacity in the order of 50-60 cfs. The Oak Street station has a design capacity of 46 cfs, 20 cfs allotted to process water and 26 cfs to interior storm runoff.

b. Hydrologic Assessment. The flood potential at the Oak Street area is considered "low to medium". One to two feet of ponding in the area would expose considerable industrial equipment on low level floors, however, damages would be lessened with the equipment presently not in use. The frequency of river stage requiring pump activation is considered "low". A river stage of 83, maximum pump activation level, has about a 10 percent (10-year) annual chance of occurrence. The station, built in 1964, is in good operating condition. Pumping capacity at Oak Street station was quite liberal in design as a result of the intense rainfall experienced in 1955, a short time before. Design capacity also included 20 cfs for industrial process water which presently is not needed with industry closed down. The capacity of the station is, therefore, considered highly adequate under present conditions in the area.. Two out of the three installed pumps would serve the area quite adequately under present conditions.

TABLE 8

CHICOPEE FALLS LOCAL PROTECTION PROJECT
OAK STREET PUMPING STATION
PERTINENT DATA

(1) DRAINAGE AREA

(a) Size: 17.8 acres

(b) Character: Moderately flat, complete industrial development.

(c) Est. 2 Year Q: 10 10 Year: 20 100 Year: 35

(2) PUMPS

(a) Number and Size: 3 - 16 inch propeller

(b) Capacity: 26 cfs runoff - 20 cfs other = 46 cfs total (1.5 inch R.O./Hr.)

(c) Est. Freq: 10 year

(d) Present Conditions: Fully operational

(3) ELEVATIONS

(a) Top of Protec: 100

(b) Design Flood: 96 100 Year: 90 10 Year: 83

(c) Normal River: 78+

(d) Drain Invert: 76

(e) Ground El: 85+

(f) Pump Activation Max: 80-83

CORPS OF ENGINEERS U. S. ARMY

DRAINAGE AREAS

CHICOPEE L.P.P.

①	30 ACRES
②	25 "
③	400 "
④	350 "
⑤	630 "
⑥	230 "

CHICOPEE FALLS L.P.P.

⑦	20.5 ACRES
⑧	17.8 "

PUMPING STATIONS

CHICOPEE L.P.P.

1	PLAINFIELD
2	DWIGHT
3	BERTHA
4	PADEREWSKI
5	JONES FERRY
6	CALL STREET

CHICOPEE FALLS L.P.P.

7	MAIN ST.
8	OAK ST.

SCALE IN FEET

0 1000' 2000' 3000'

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

CHICOPEE & CHICOPEE FALLS LOCAL PROTECTION

CHICOPEE, MASSACHUSETTS

HYDROLOGIC REVIEW OF INTERIOR DRAINAGE

INTERIOR DRAINAGE AREA MAP

FEBRUARY 1983

PLATE 1

INTERIOR FLOOD POTENTIAL

HIGH: GENERALLY EXCEEDING 5'. EXTENSIVE PROPERTY LOSS. THREAT TO HUMAN LIFE.

MED: GENERALLY 3-5' EXTENSIVE PROPERTY LOSS LITTLE THREAT TO LIFE.

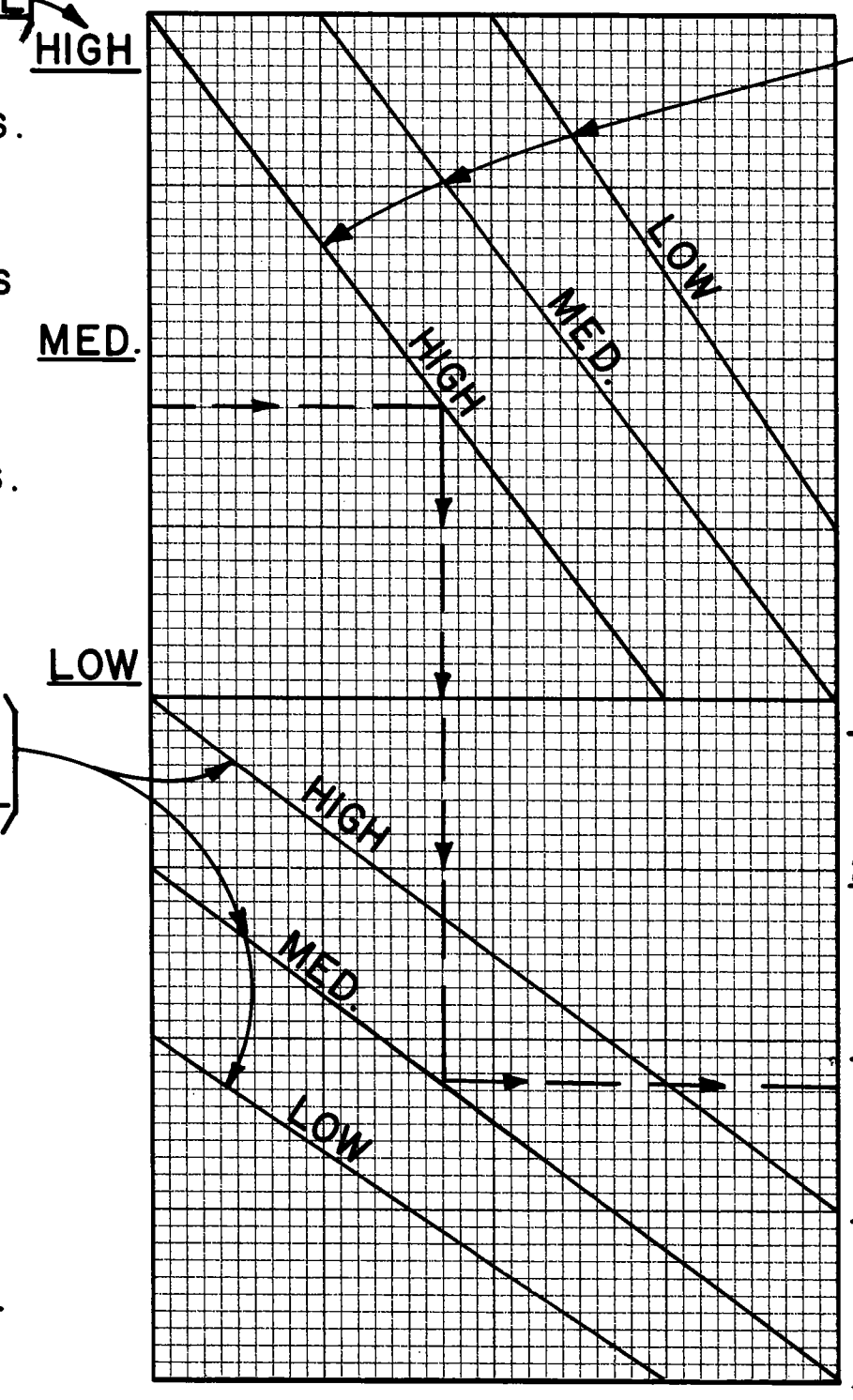
LOW: GENERALLY 1-3' IN STREETS AND LOW AREAS MODERATE PROPERTY LOSS.

INTERIOR RUNOFF-AND RIVER STAGE COINCIDENCE

HIGH: INTERIOR RUNOFF AND RIVER GENERALLY PEAK WITHIN 1 TO 4 HOURS OF EACH OTHER.

MED: RUNOFF AND RIVER GENERALLY PEAK WITHIN 4 TO 12 HOURS OF EACH OTHER.

LOW: RIVER RISE GENERALLY MORE THAN 12 HOURS AFTER INTENSE RAINFALL.



FREQUENCY OF RIVER STAGE REQUIRING PUMPING

HIGH: GENERALLY MORE THEN 5 YR. FREQUENCY.

MED: 5 YR. TO 20 YR. FREQUENCY.

LOW: LESS THAN 20 YR. FREQUENCY.

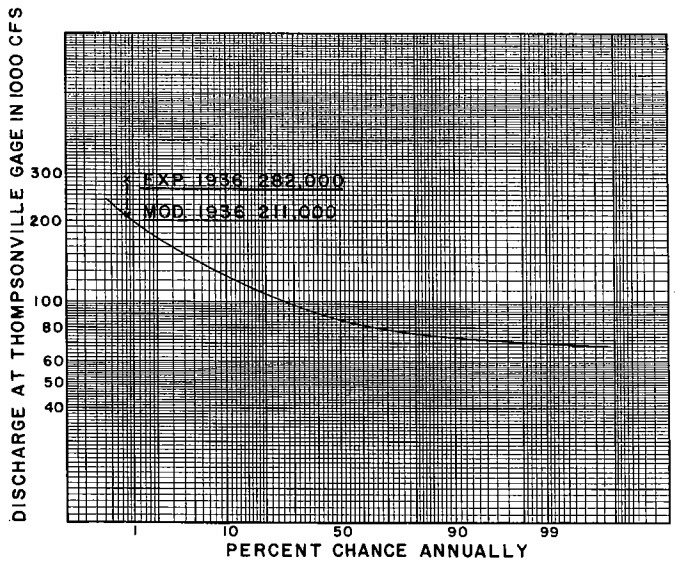
RELATIVE RUNOFF FREQUENCY FOR INTERIOR DRAINAGE DESIGN

CHICOPEE AND CHICOPEE FALLS
LOCAL PROTECTION PROJECTS

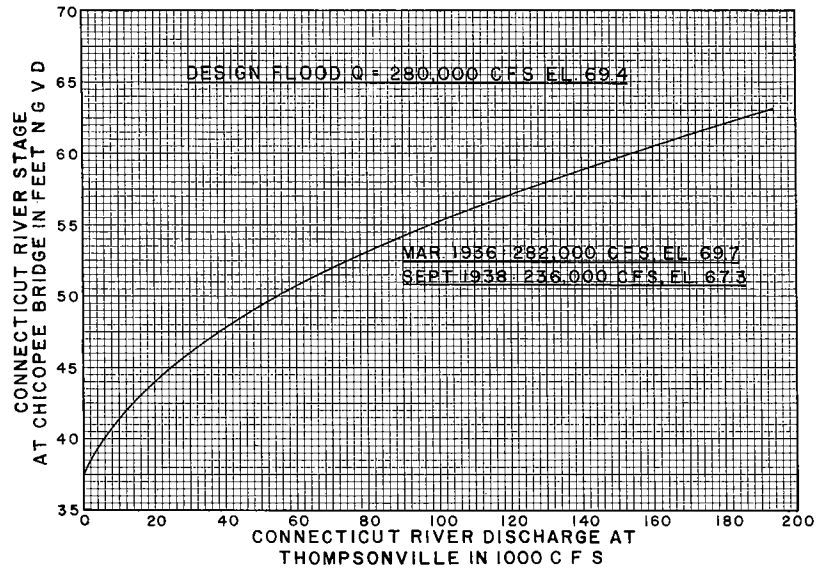
GUIDE CHART FOR HYDROLOGIC REVIEW OF INTERIOR PUMPING CAPACITIES

FEB. 1983

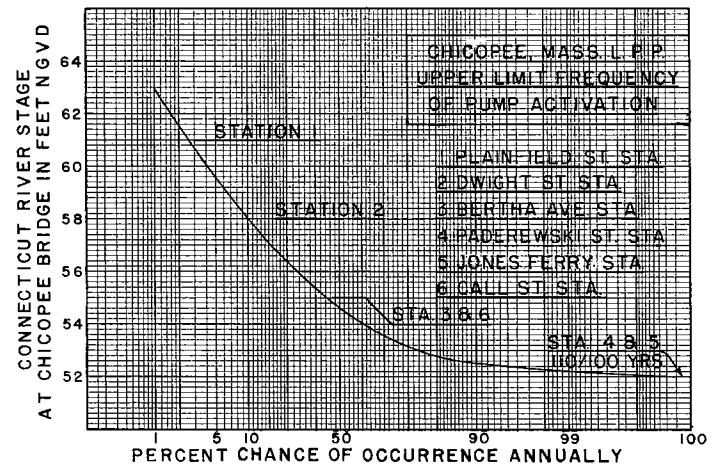
PLATE 2



CONNECTICUT RIVER PEAK DISCHARGE FREQUENCIES
AT THOMPSONVILLE AS MODIFIED BY RESERVOIRS

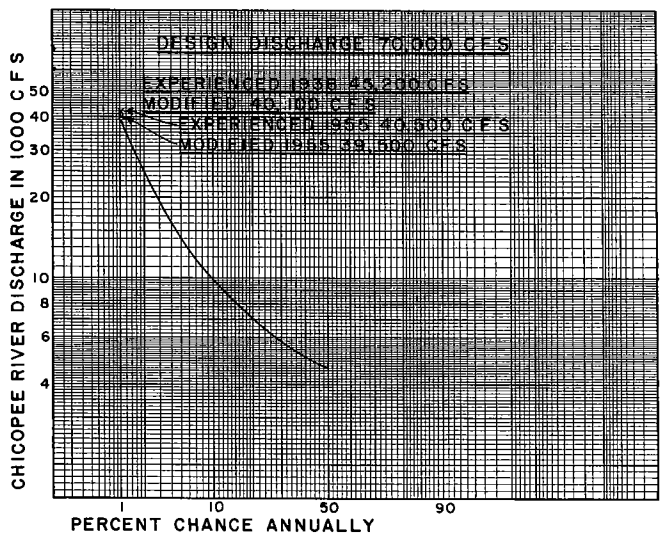


CONNECTICUT RIVER STAGE DISCHARGE RATING

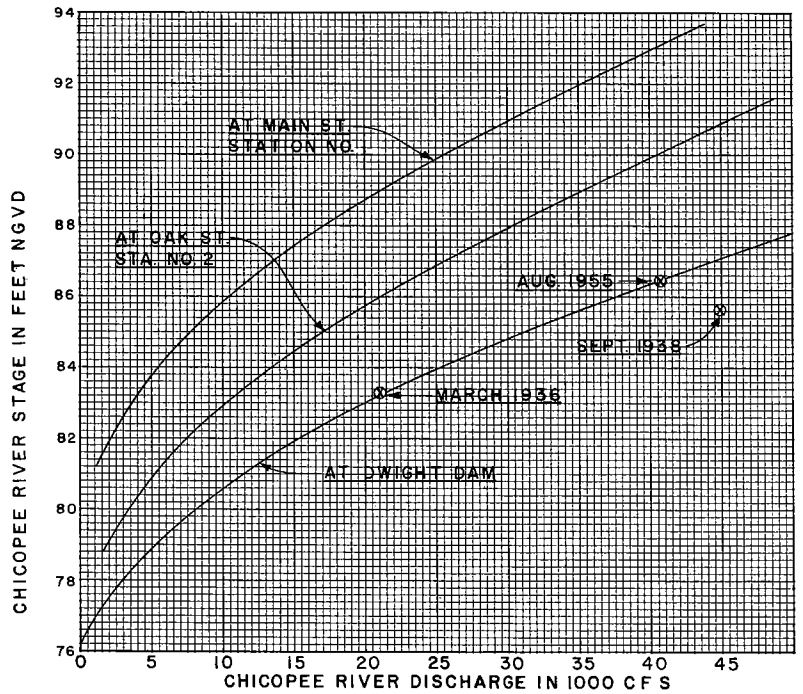


CONNECTICUT RIVER MODIFIED STAGE FREQUENCY
AT CHICOPEE BRIDGE

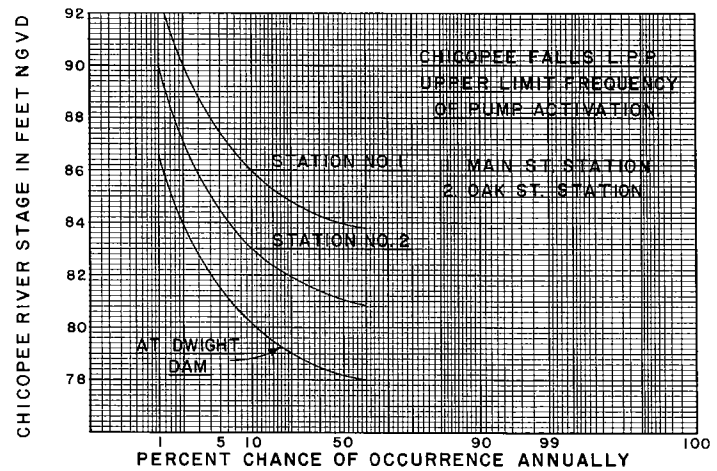
CHICOPEE LOCAL PROTECTION



CHICOPEE RIVER PEAK DISCHARGE FREQUENCIES
AS MODIFIED BY RESERVOIRS



CHICOPEE RIVER STAGE DISCHARGE RATINGS



CHICOPEE RIVER MODIFIED STAGE FREQUENCIES

CHICOPEE FALLS LOCAL PROTECTION

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, DESIGN BRANCH
REVIEWED:
PROJECT MANAGER
APPROVAL RECOMMENDED:
CHIEF, PROJECT MNGT. BRANCH

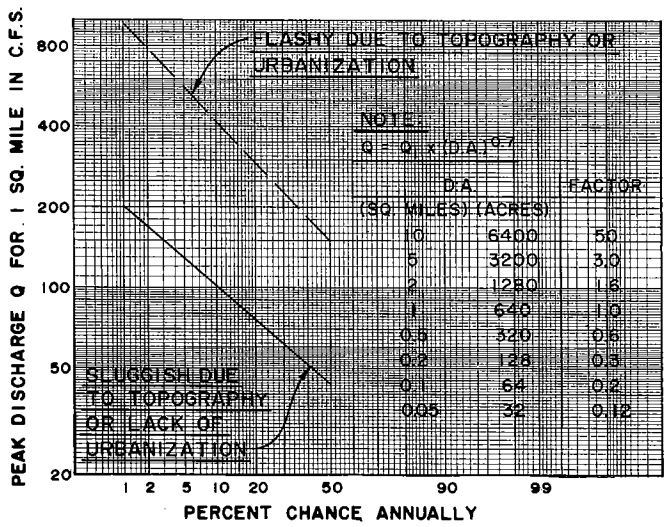
CHICOPEE & CHICOPEE FALLS
LOCAL PROTECTION
HYDROLOGIC REVIEW OF INTERIOR DRAINAGE

RIVER DISCHARGE AND STAGE FREQUENCIES

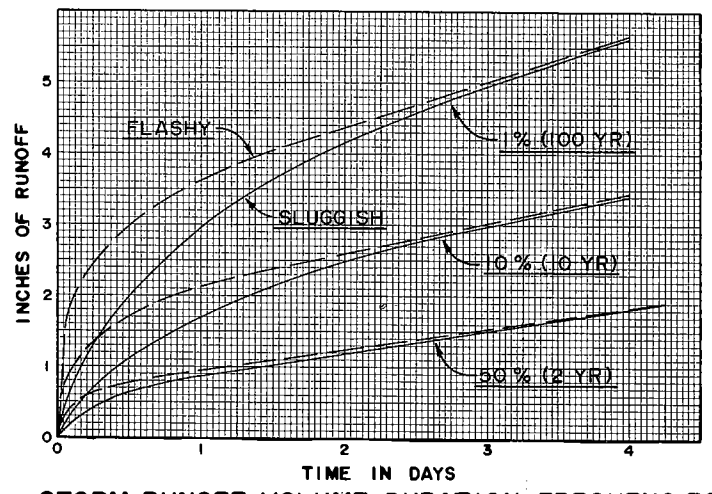
APPROVED
CHIEF, ENGINEERING DIVISION
DATE

SCALE | SPEC. NO.
DRAWING NUMBER
SHEET

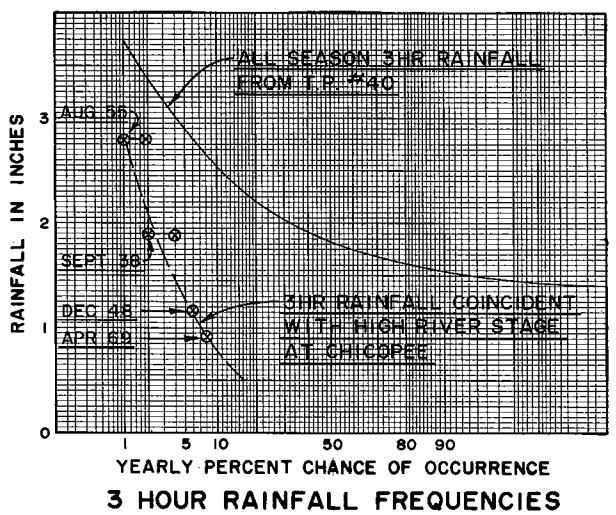
PLATE 3



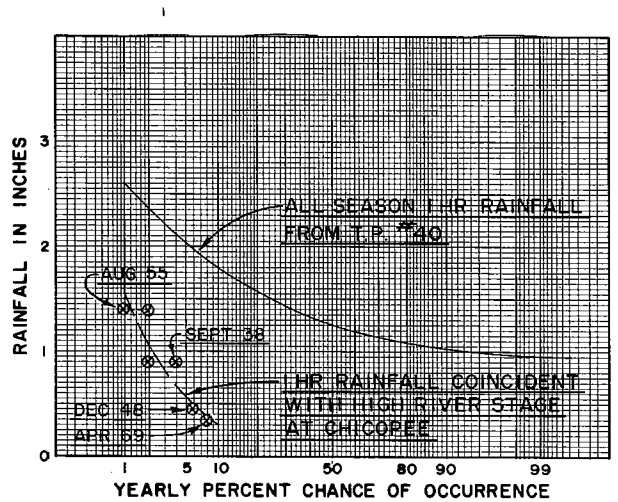
COMPARATIVE PEAK DISCHARGE FREQUENCIES IN CENTRAL MASS. AND CONN.



STORM RUNOFF VOLUME DURATION FREQUENCIES IN CENTRAL MASSACHUSETTS



3 HOUR RAINFALL FREQUENCIES AND COINCIDENCE WITH HIGH CONNECTICUT RIVER STAGE



1 HOUR RAINFALL FREQUENCIES AND COINCIDENCE WITH HIGH CONNECTICUT RIVER STAGE

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, DESIGN BRANCH
REVIEWED:
PROJECT MANAGER
APPROVAL RECOMMENDED:
CHIEF, PROJECT MNGT. BRANCH

CHICOPEE & CHICOPEE FALLS
LOCAL PROTECTION
HYDROLOGIC REVIEW OF INTERIOR DRAINAGE
RAINFALL - RUNOFF
RATE AND VOLUME FREQUENCIES

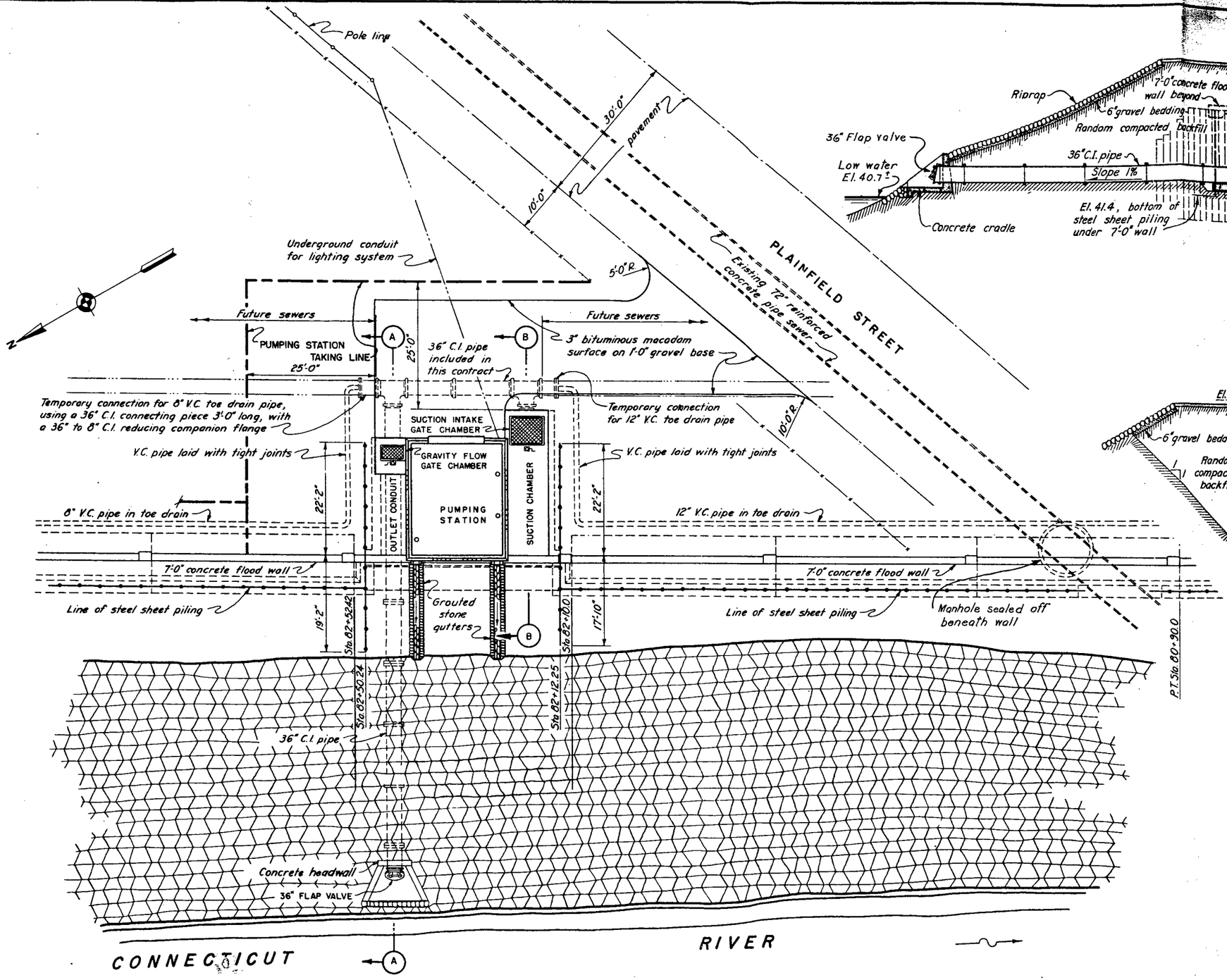
APPROVED DATE
CHIEF, ENGINEERING DIVISION

SCALE SPEC. NO.
DRAWING NUMBER
SHEET

PLATE 4

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

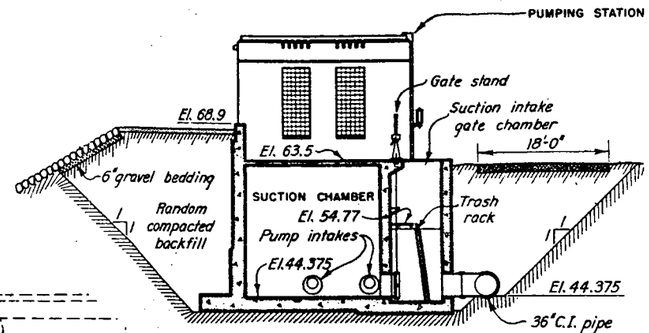


PLAN

SCALE 1" = 10'-0"

SECTION A

SCALE 1" = 10'-0"



SECTION B

SCALE 1" = 10'-0"

CONNECTICUT RIVER FLOOD CONTROL

SPRINGFIELD DIKE

PLAINFIELD PUMPING STATION

GENERAL PLAN

CHICOPEE, MASS.

CONNECTICUT RIVER MASSACHUSETTS

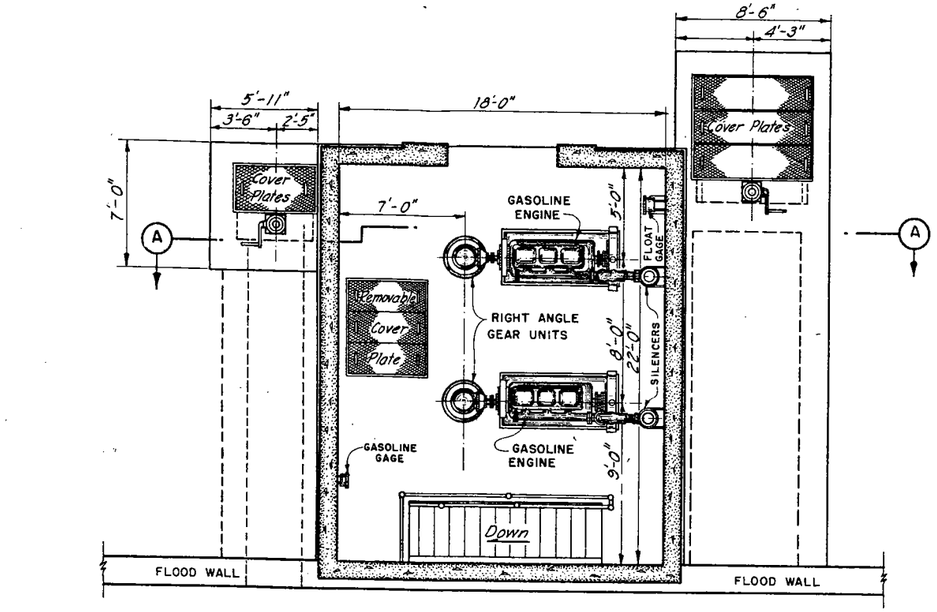
SCALE: 1 IN. = 10 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

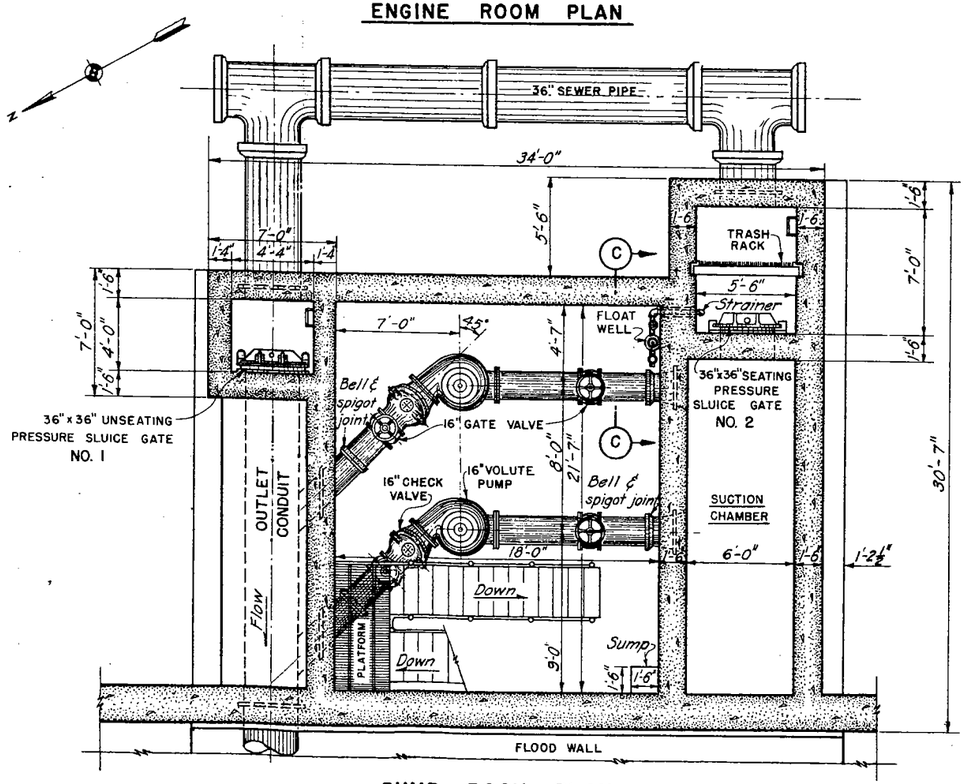
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

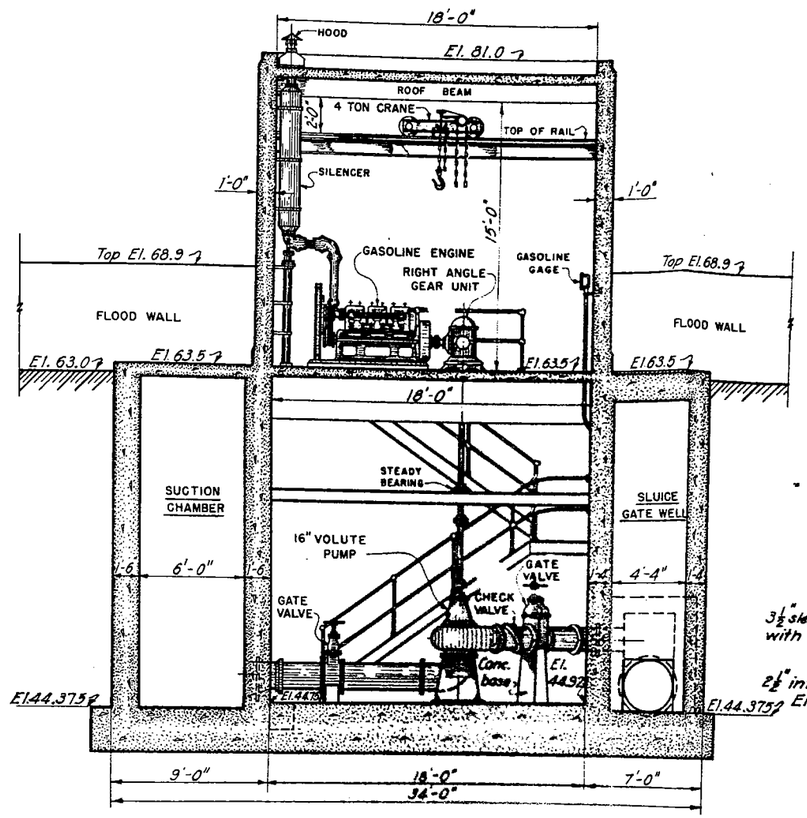
PLATE 5



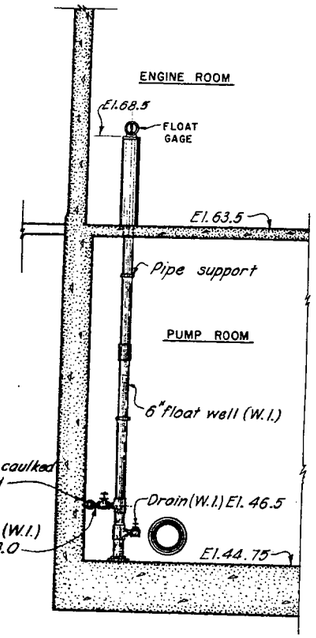
ENGINE ROOM PLAN



PUMP ROOM PLAN



SECTION A



SECTION C

NOTES

Elevations refer to mean sea level datum. For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

SPRINGFIELD DIKE

PLAINFIELD PUMPING STATION

MECHANICAL EQUIPMENT

CHICOPEE, MASS.

CONNECTICUT RIVER MASSACHUSETTS

SCALE: 1/4 IN = 1 FT.

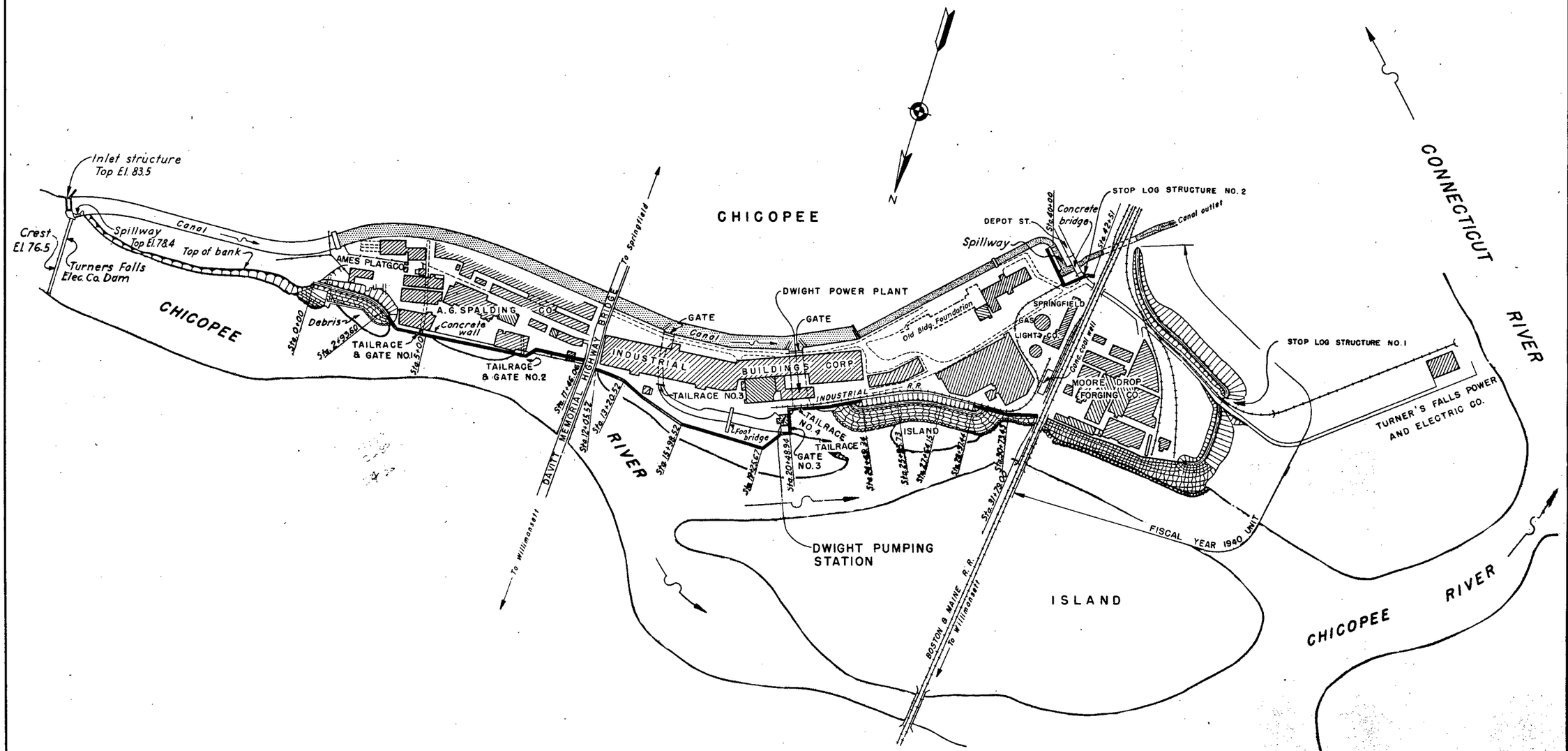
0 5' 10'

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE 6



CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

GENERAL PLAN

CONNECTICUT RIVER — CHICOPEE, MASS.

SCALE: 1 IN = 200 FT

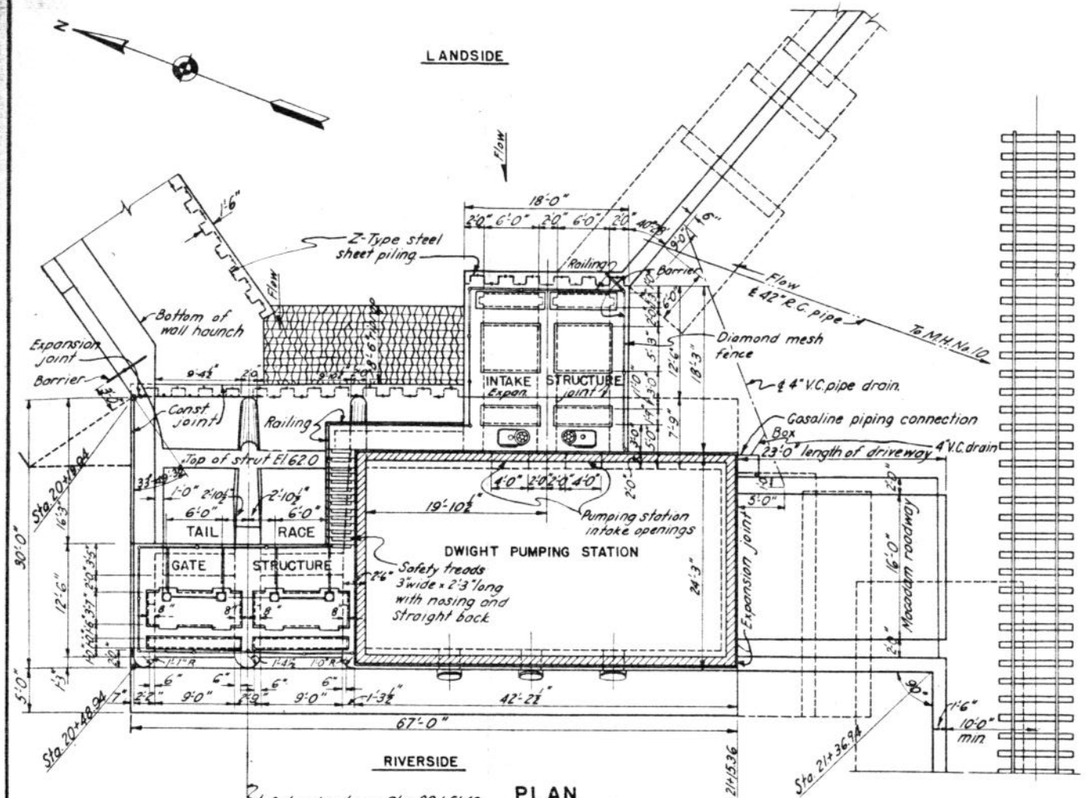
200' 0 200' 400'

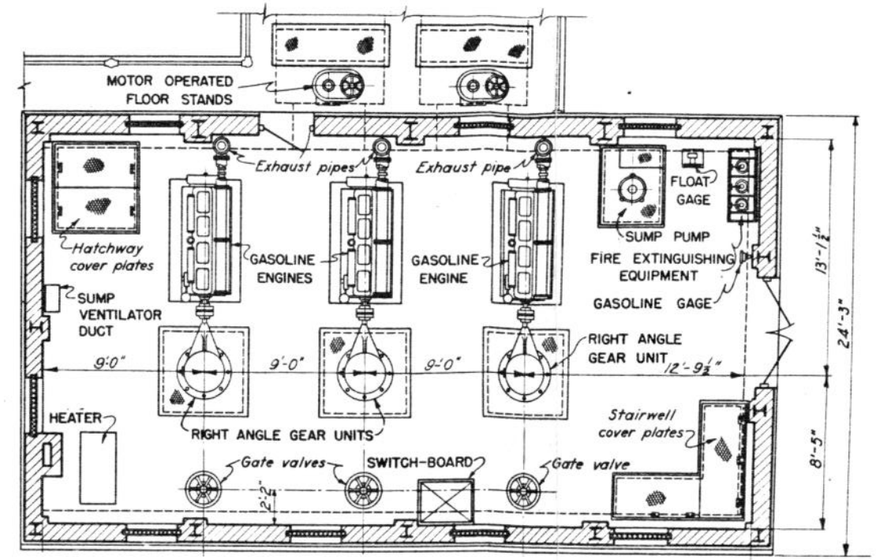
U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

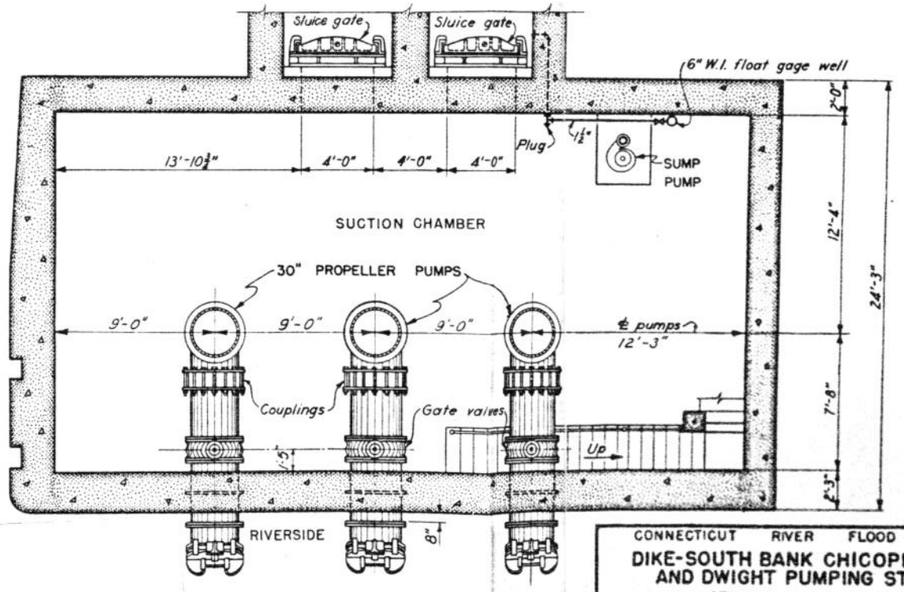
CHICOPEE, MASS

PLATE 7





ENGINE ROOM PLAN



PUMP ROOM PLAN

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

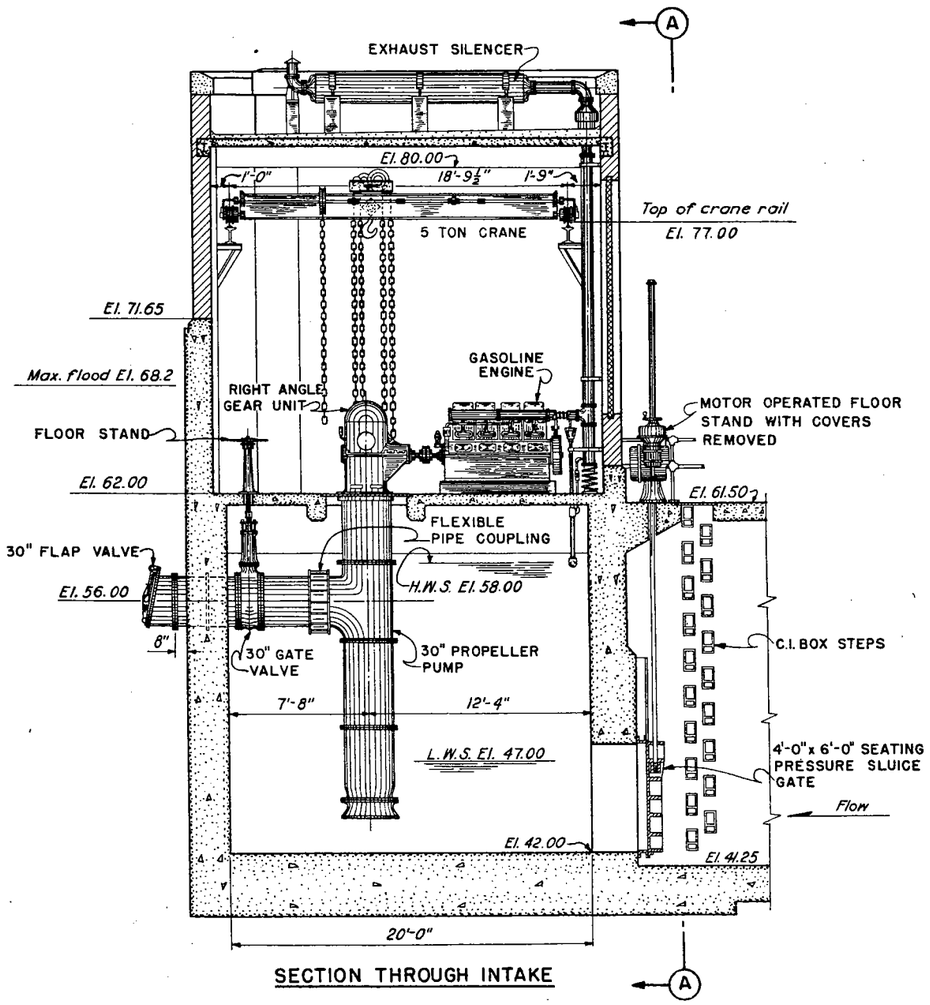
GENERAL ARRANGEMENT
PUMPING STATION

CONNECTICUT RIVER — CHICOPEE, MASS.

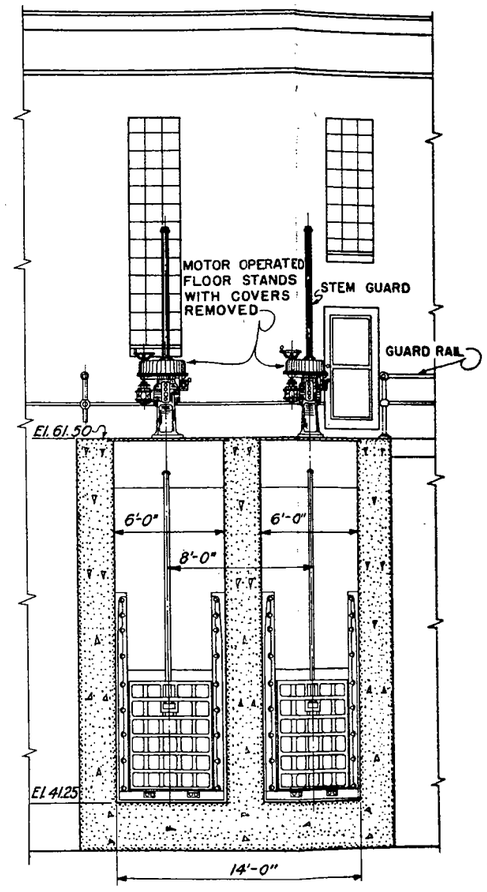
SCALE 1/8 IN = 1 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

OPERATION AND MAINTENANCE MANUAL
CHICOPEE, MASS.



SECTION THROUGH INTAKE



SECTION A

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

SECTIONS SHOWING GENERAL ARRANGEMENT OF EQUIPMENT

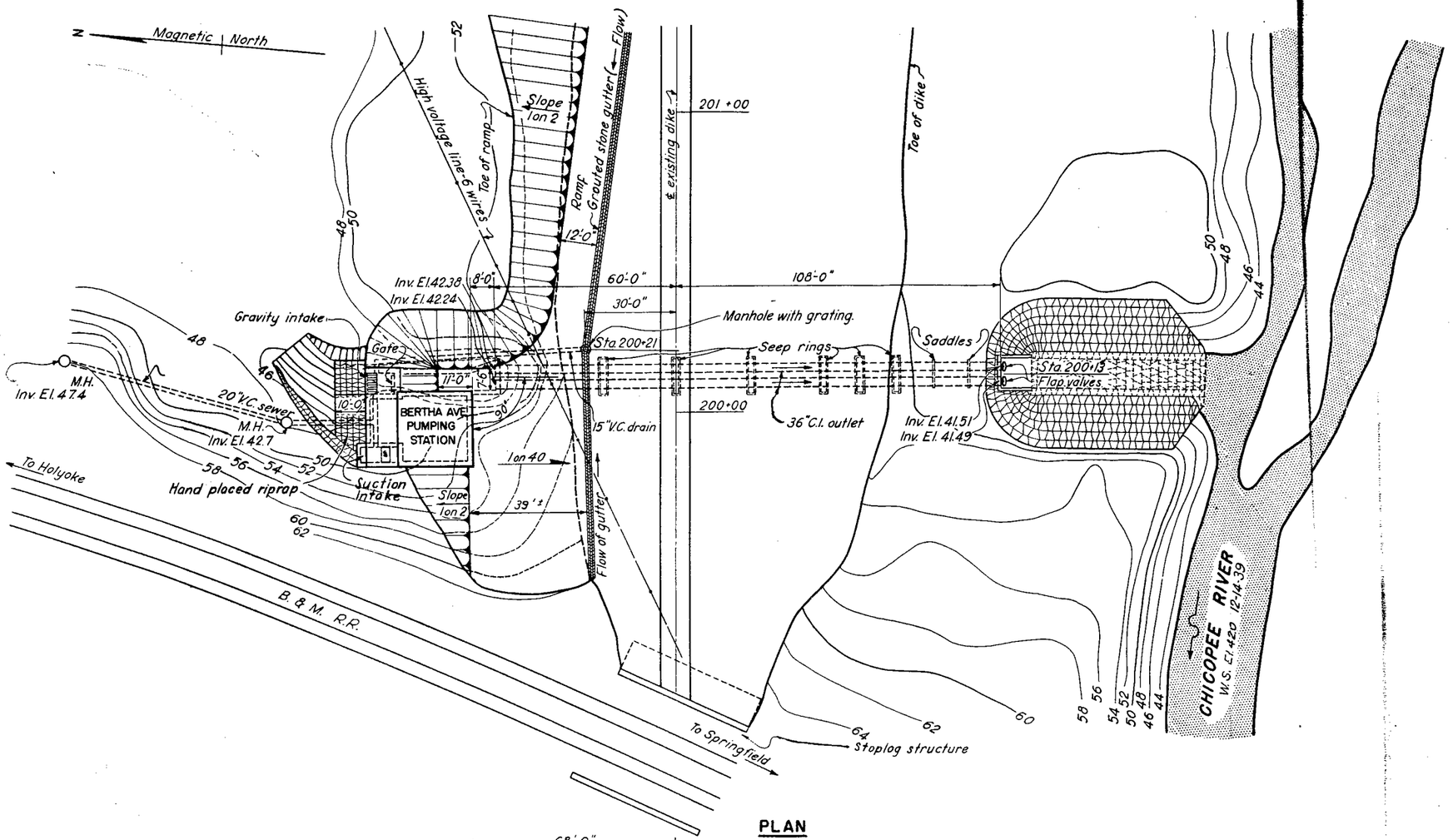
CONNECTICUT RIVER CHICOPEE, MASS.

SCALE: 1/4 IN. = 1 FT.

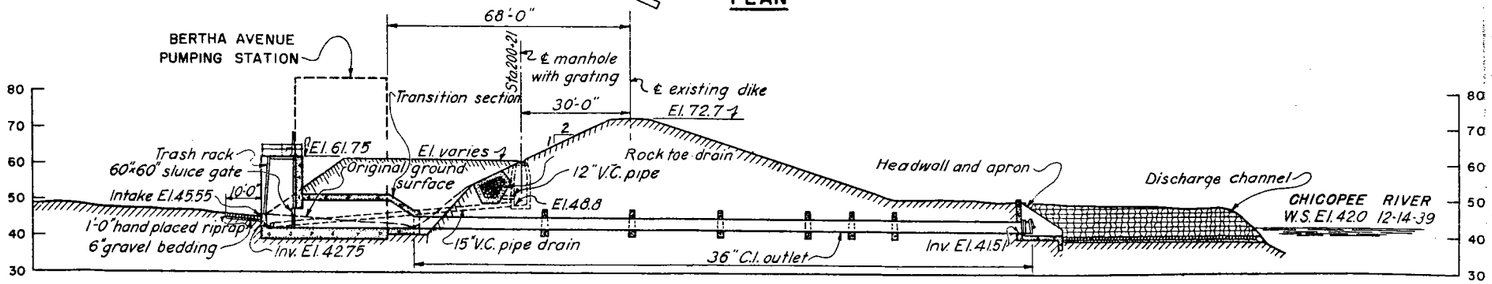
U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS



PLAN



PROFILE ALONG ℄ CONDUIT

NOTE

Elevations refer to Mean Sea Level Datum.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

BERTHA AVENUE PUMPING STATION

CHICOPEE, MASS.

GENERAL PLAN

CONNECTICUT RIVER — MASSACHUSETTS

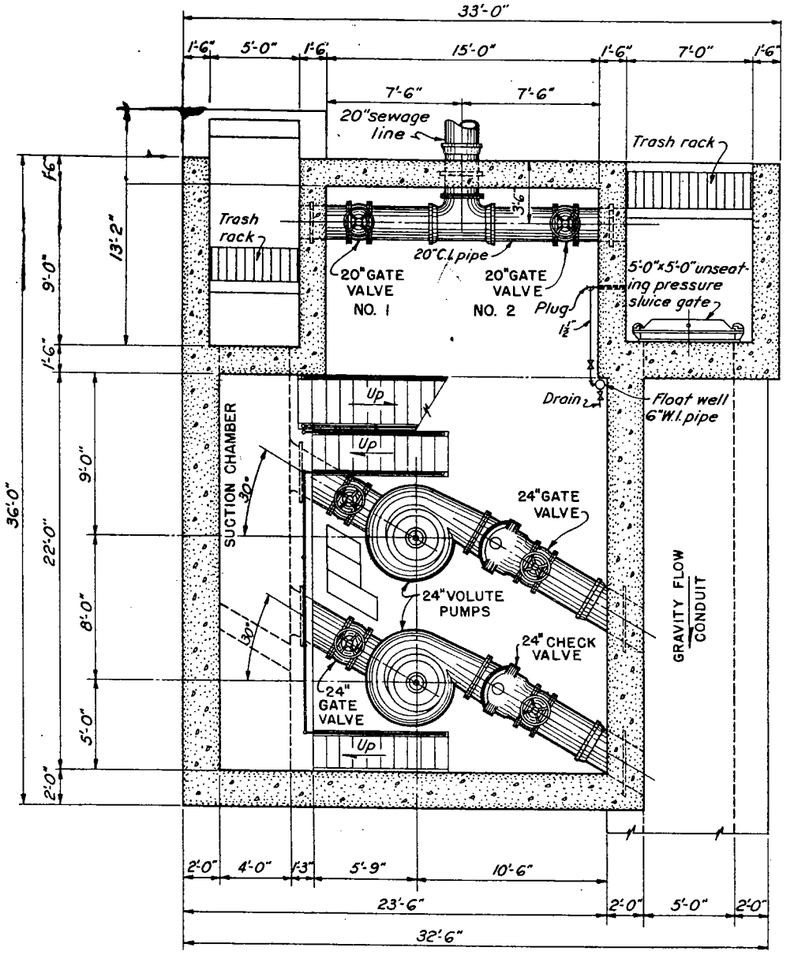
SCALE: 1 IN. = 20 FT.

20' 0' 20' 40'

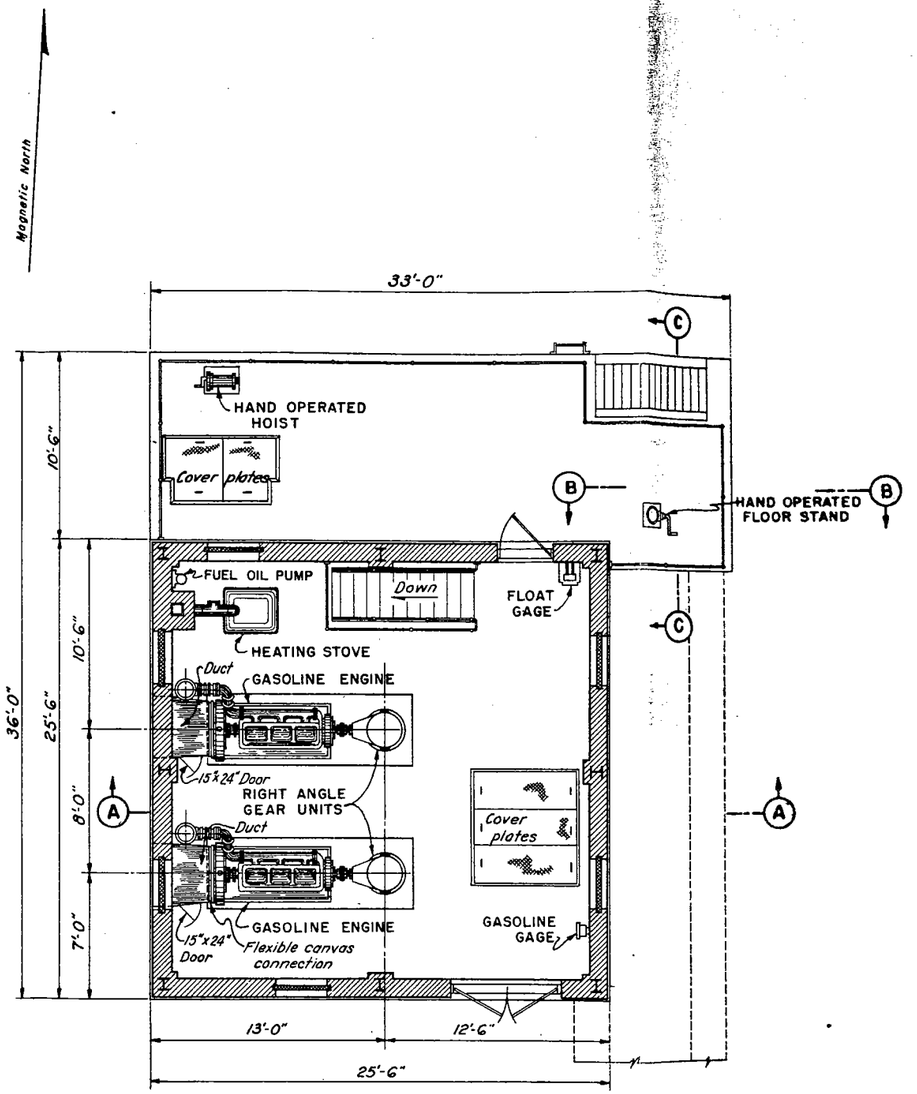
U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS



PUMP ROOM PLAN



ENGINE ROOM PLAN

CONNECTICUT RIVER FLOOD CONTROL

BERTHA AVENUE PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1/4 IN. = 1 FT.

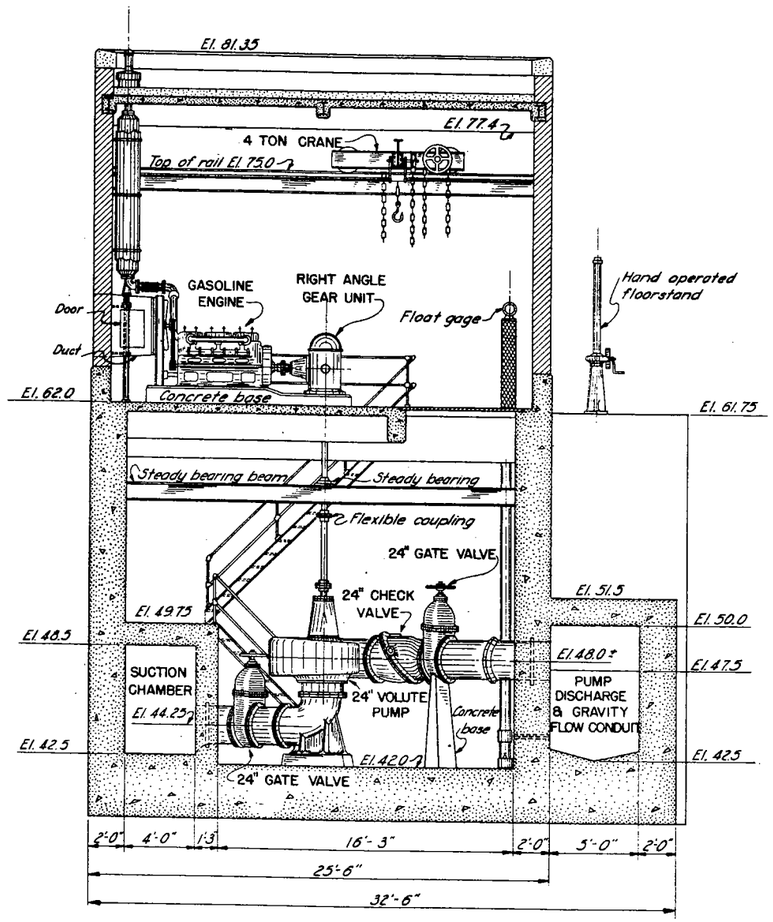
5' 0 5' 10'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

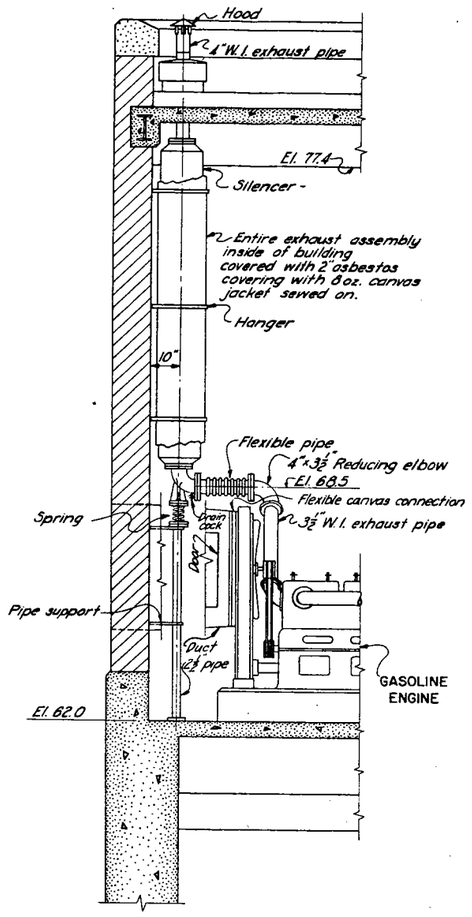
CHICOPEE, MASS

PLATE II



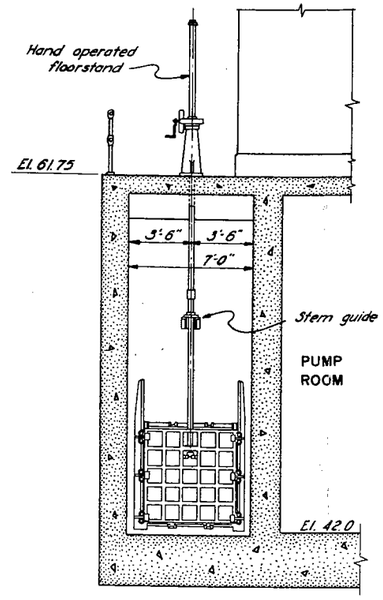
SECTION A

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



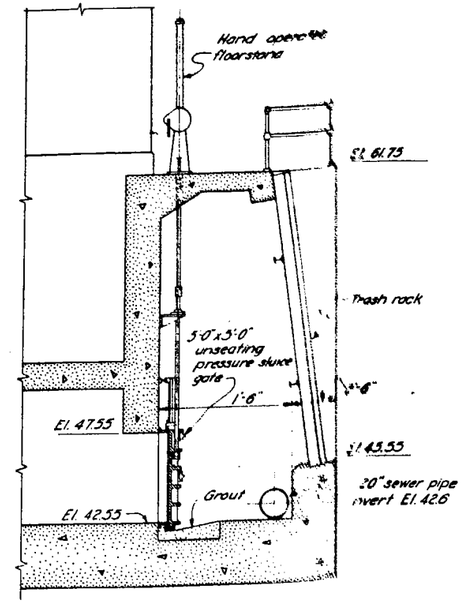
DETAIL OF GASOLINE ENGINE EXHAUST

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



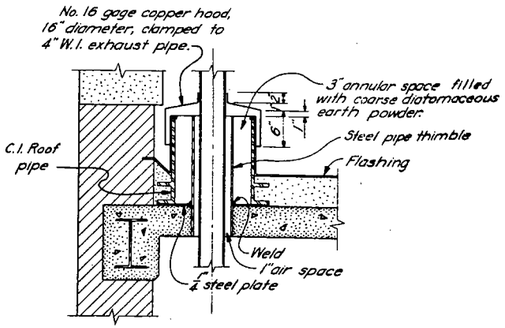
SECTION B

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



SECTION C

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



DETAIL OF ENGINE EXHAUST AT ROOF

SCALE: 1" = 1'-0"

NOTE

Elevations refer to Mean Sea Level datum. For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

BERTHA AVENUE PUMPING STATION

CHICOPEE, MASS

MISCELLANEOUS DETAILS

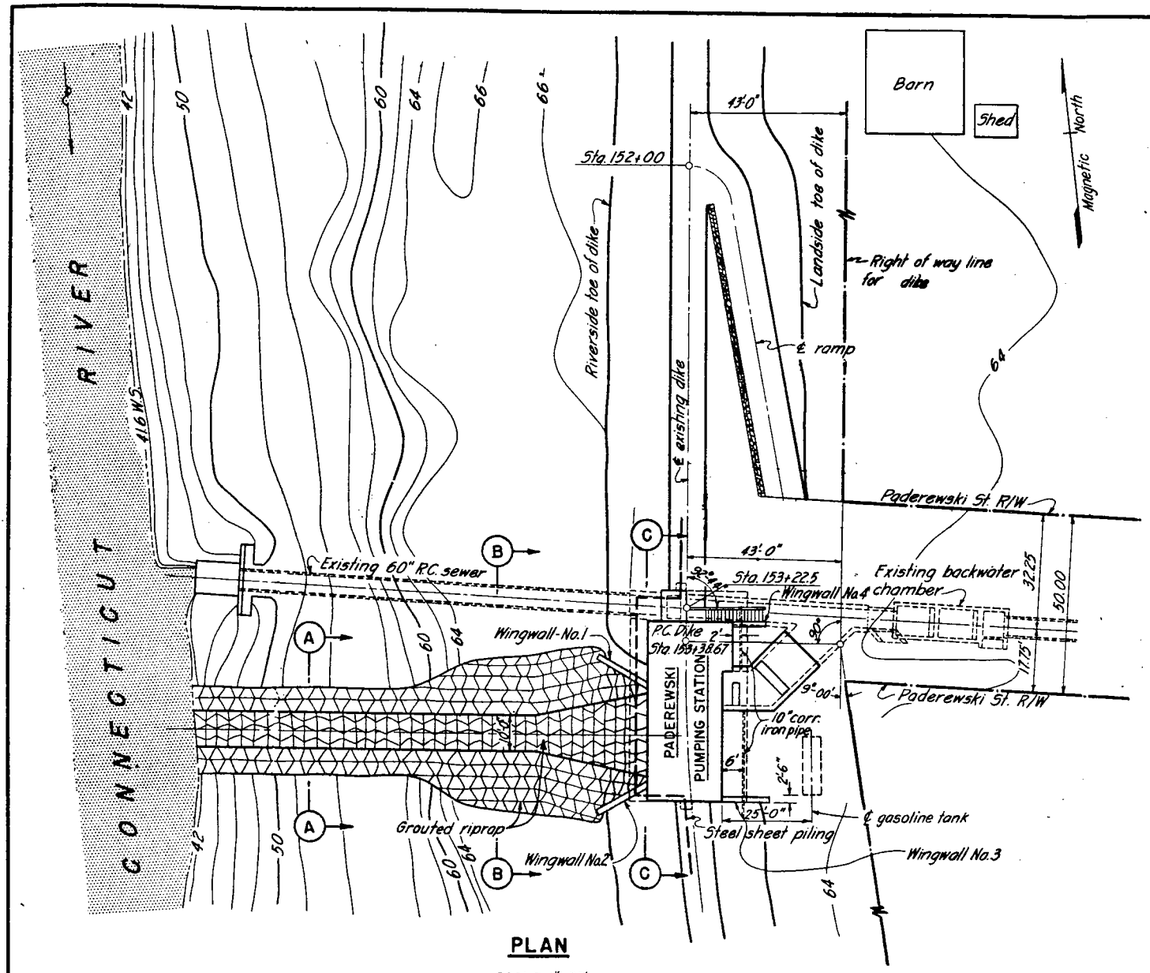
CONNECTICUT RIVER MASSACHUSETTS

SCALE: 1/4 IN = 1'

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.

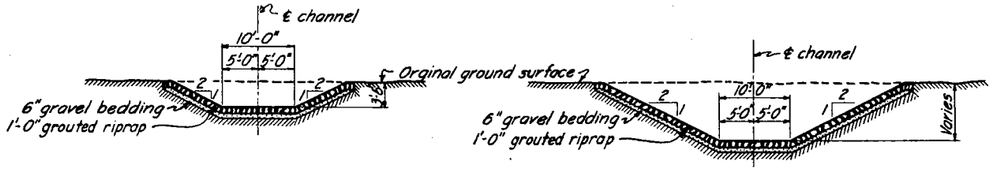
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS



PLAN

SCALE: 1" = 20'

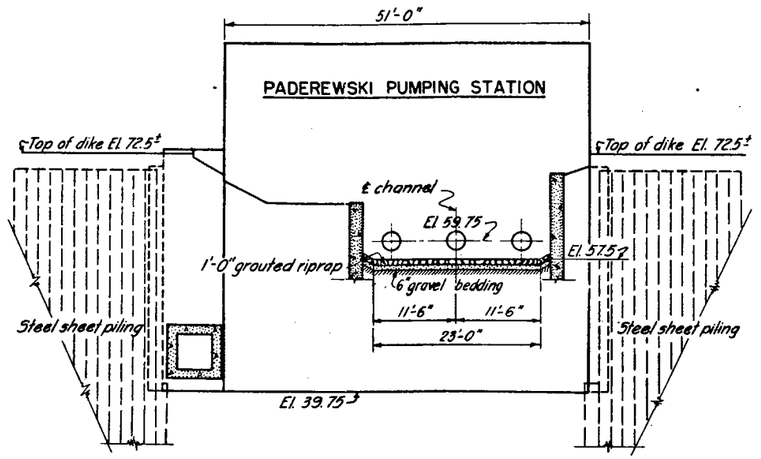


SECTION A

SCALE: 1" = 10'

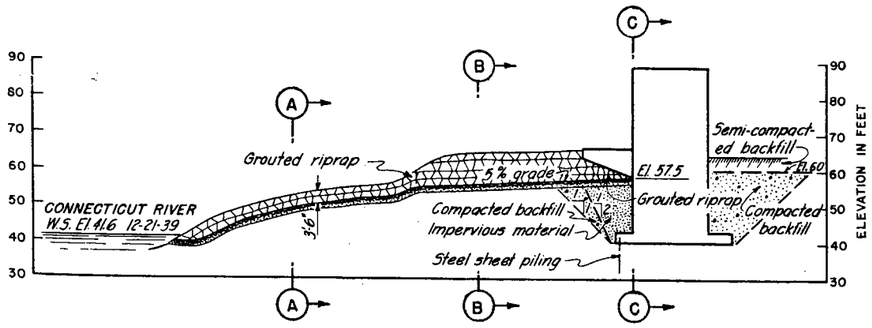
SECTION B

SCALE: 1" = 10'



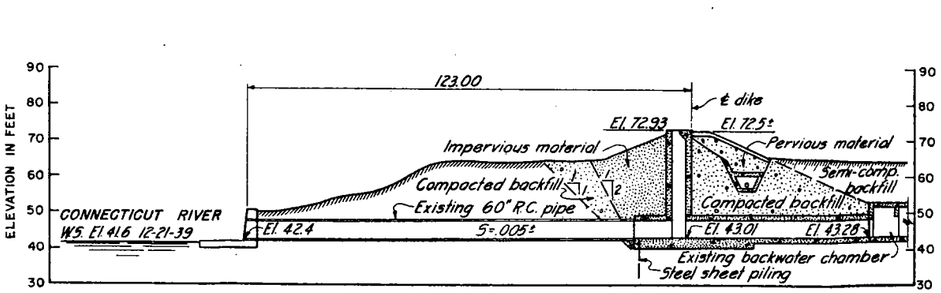
SECTION C

SCALE: 1" = 10'



PROFILE ALONG ℄ CHANNEL

SCALE: 1" = 20'



PROFILE ALONG ℄ EXISTING PIPE

SCALE: 1" = 20'

NOTE

Elevations refer to Mean Sea Level Datum. For further details see contract drawings furnished city

CONNECTICUT RIVER FLOOD CONTROL

PADEREWSKI PUMPING STATION

CHICOPEE, MASS.

GENERAL PLAN

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1 IN. = 20 FT.

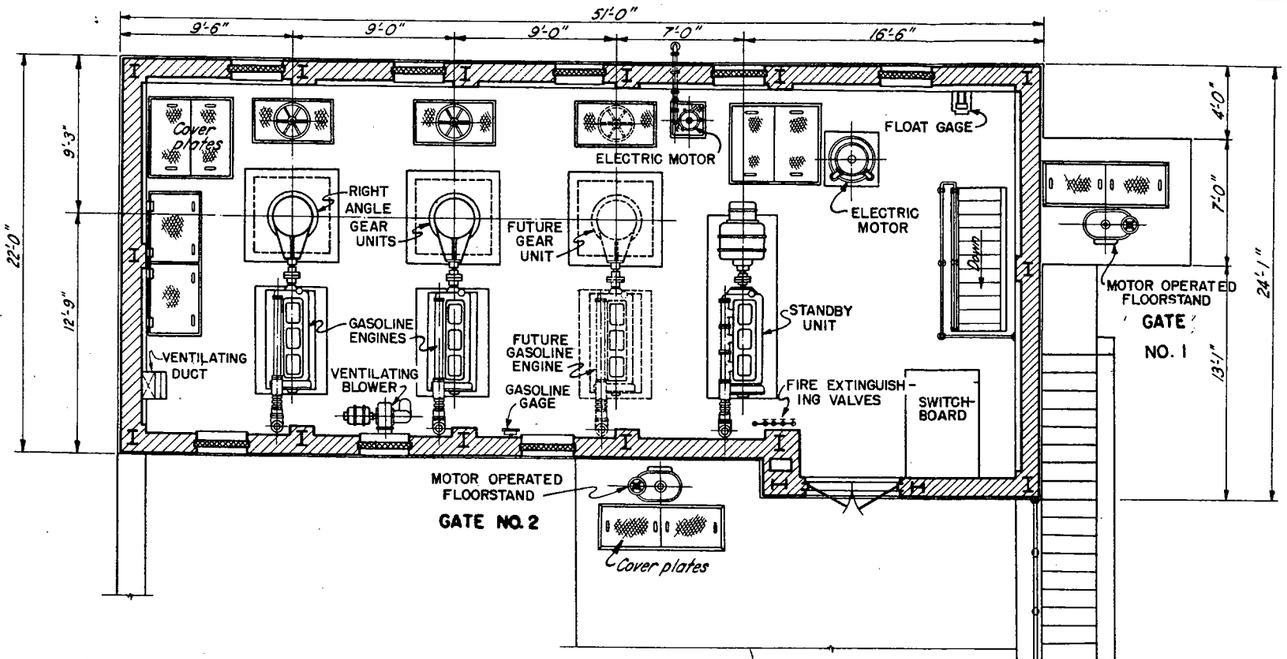
20' 0 20' 40'

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

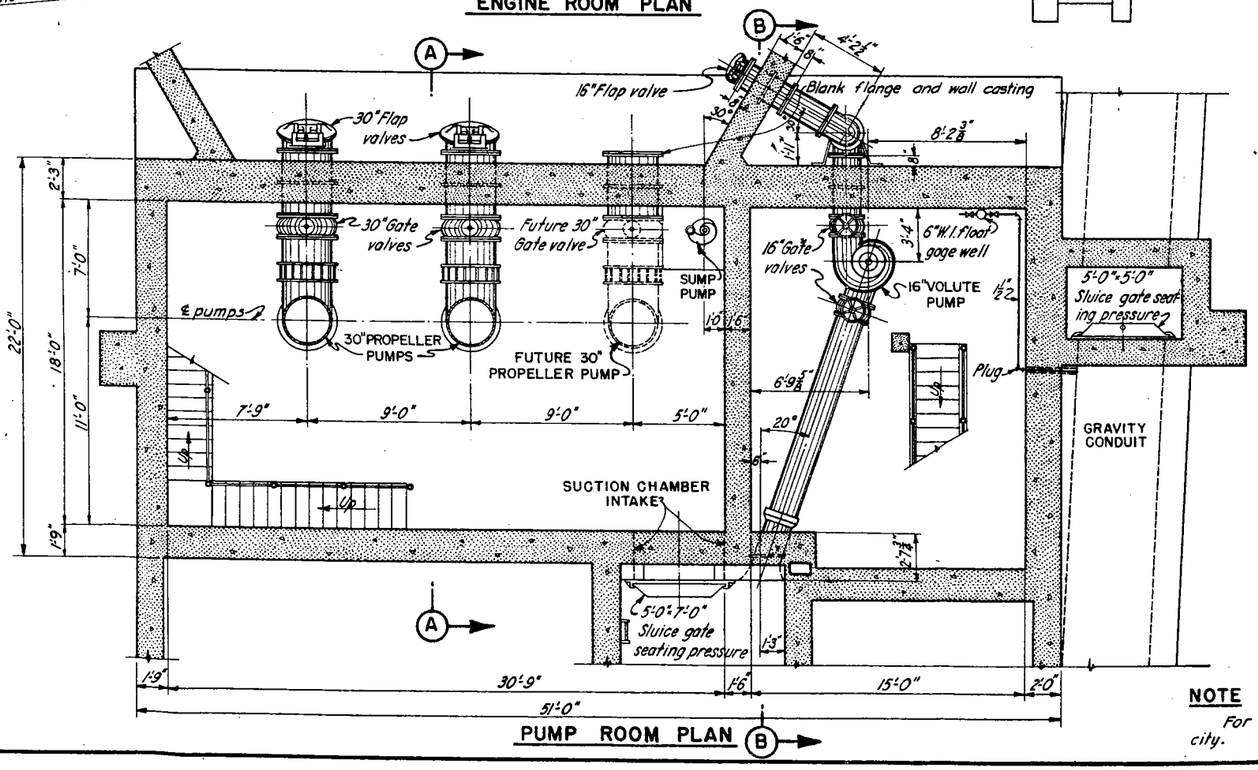
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

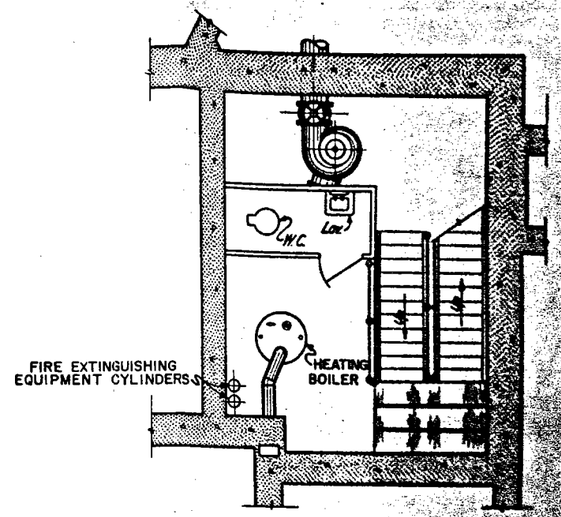
PLATE 13



ENGINE ROOM PLAN



PUMP ROOM PLAN



BOILER ROOM PLAN

NOTE

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

PADEREWSKI PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 1

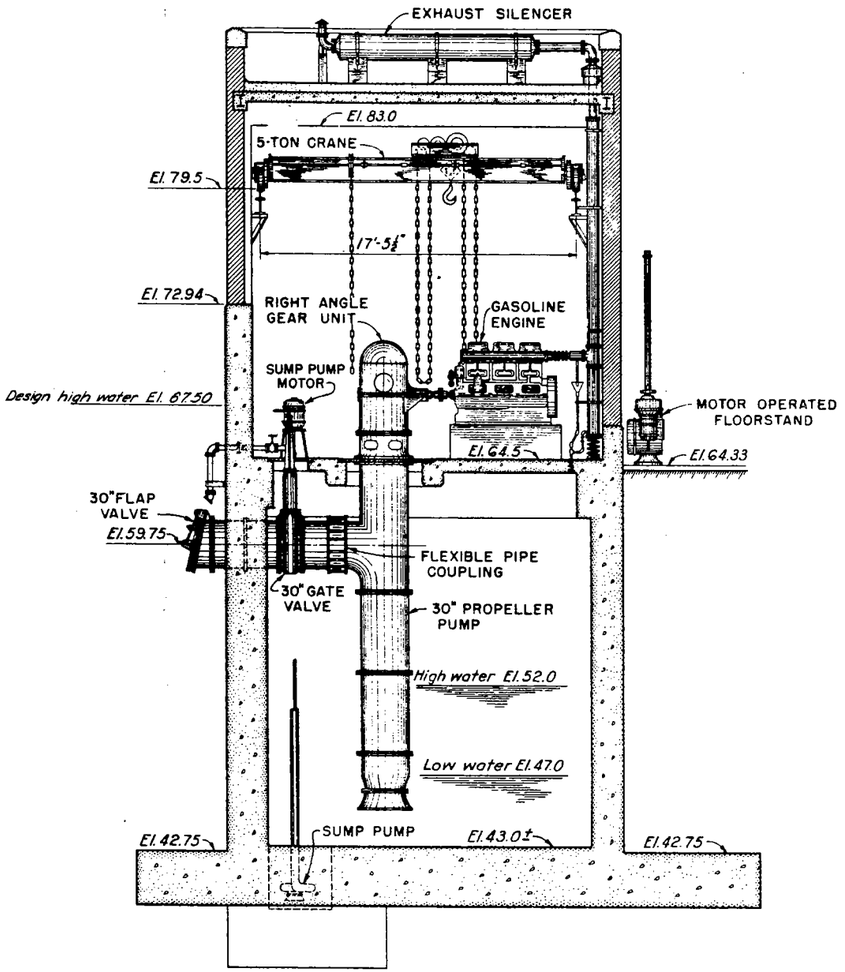
CONNECTICUT RIVER MASSACHUSETTS

SCALE AS INDICATED

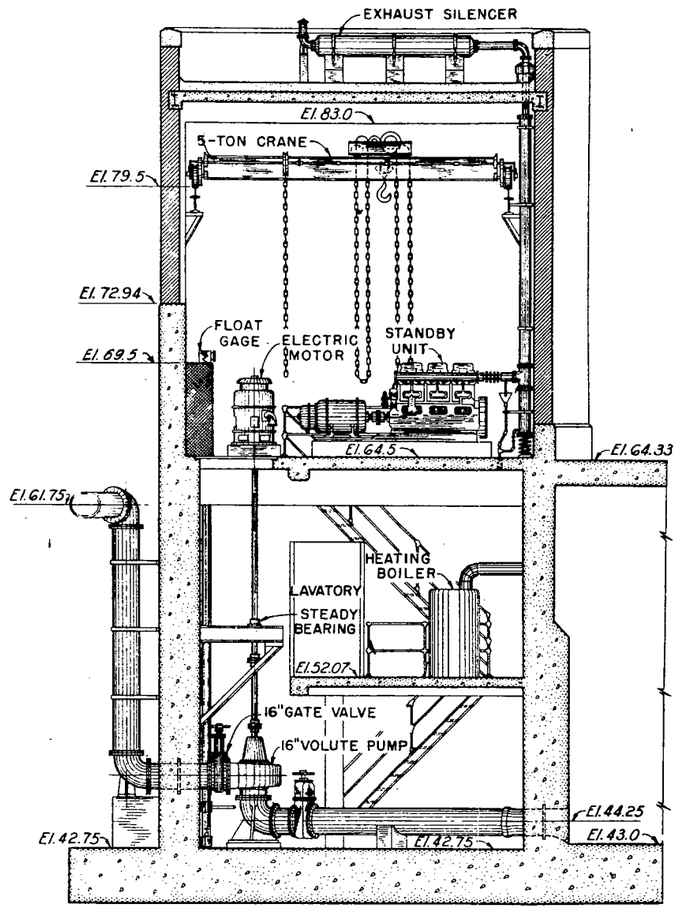
U.S. ENGINEER OFFICE, PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS



SECTION A



SECTION B

CONNECTICUT RIVER FLOOD CONTROL

PADEREWSKI PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 2

CONNECTICUT RIVER MASSACHUSETTS

SCALE: 1/4 IN. = 1 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

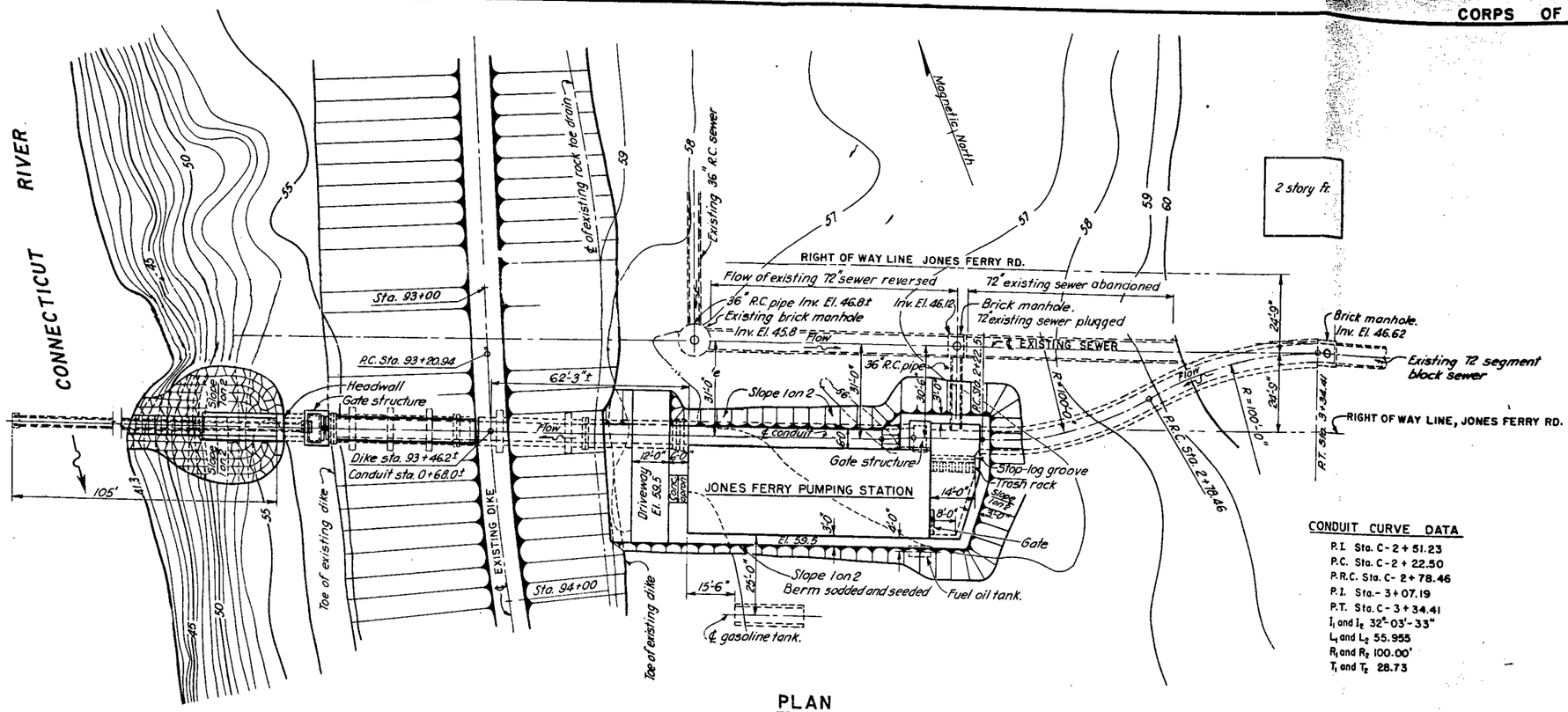
OPERATION AND MAINTENANCE MANUAL

CHICOPEE MASS

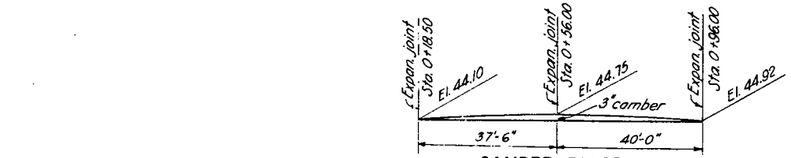
PLATE 15

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

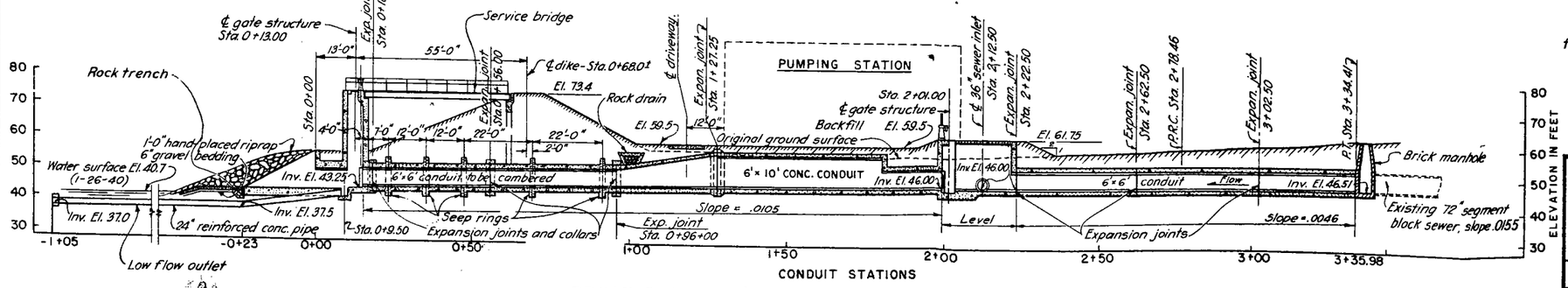


PLAN



CAMBER DIAGRAM

NOT TO SCALE



PROFILE ALONG ℄ CONDUIT

NOTE

Elevations refer to Mean Sea Level Datum For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

JONES FERRY PUMPING STATION

CHICOPEE, MASS.

GENERAL PLAN

CONNECTICUT RIVER MASSACHUSETTS

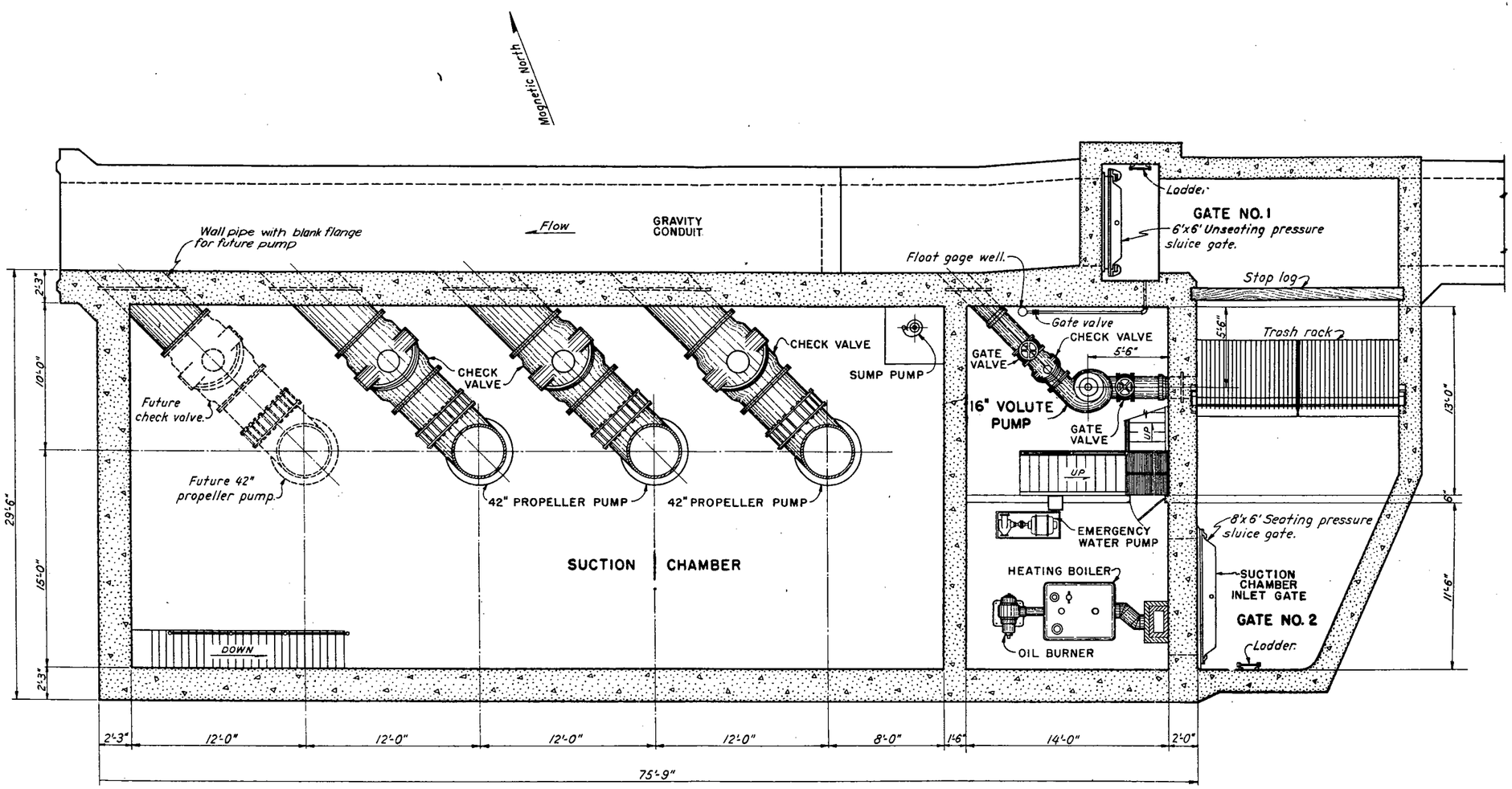
SCALE: 1 IN. = 20 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE 16



PUMP ROOM PLAN

NOTES

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

JONES FERRY PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 2

CONNECTICUT RIVER MASSACHUSETTS

SCALE 1/4 IN. = 1 FT.

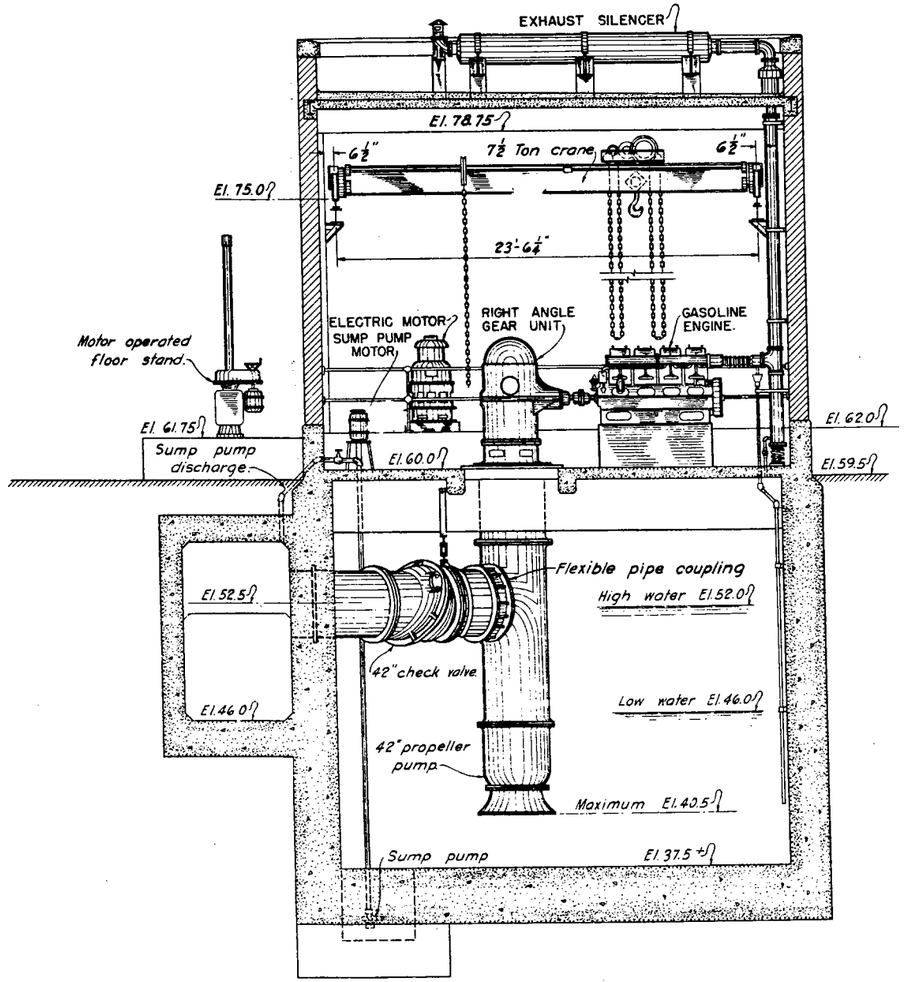
0 5' 10'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

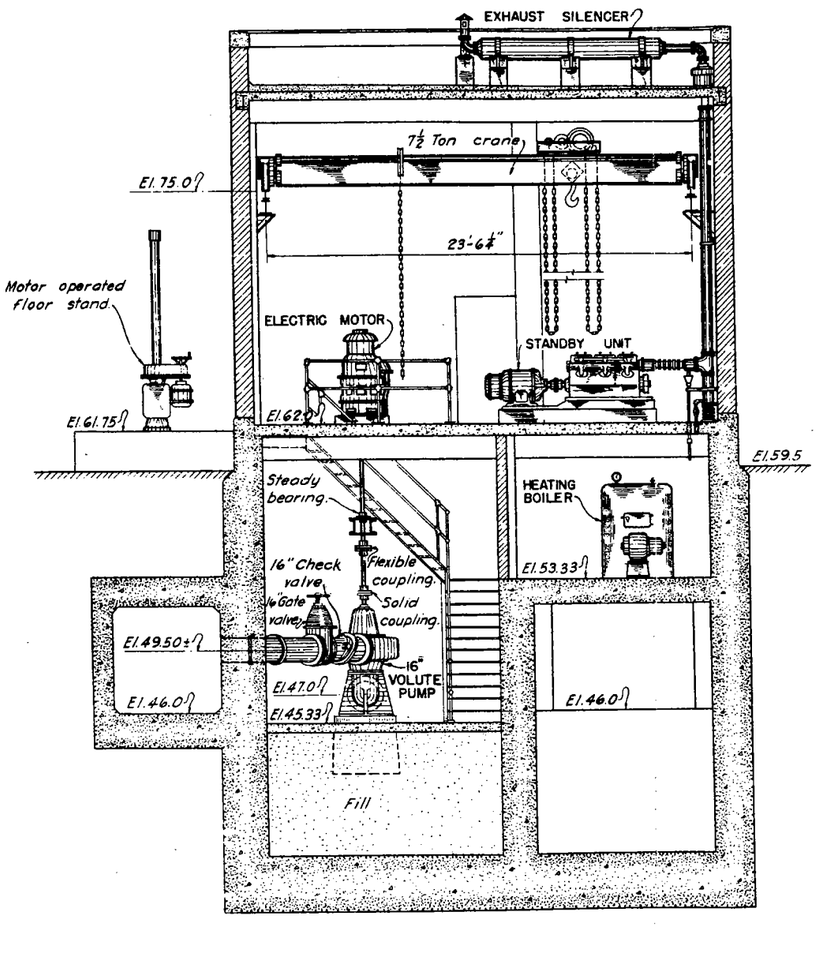
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

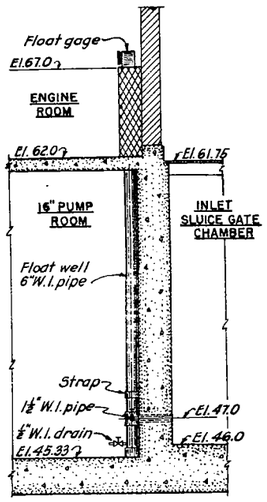
PLATE 17



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



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



SECTION C

CONNECTICUT RIVER FLOOD CONTROL

JONES FERRY PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 3

CONNECTICUT RIVER — MASSACHUSETTS

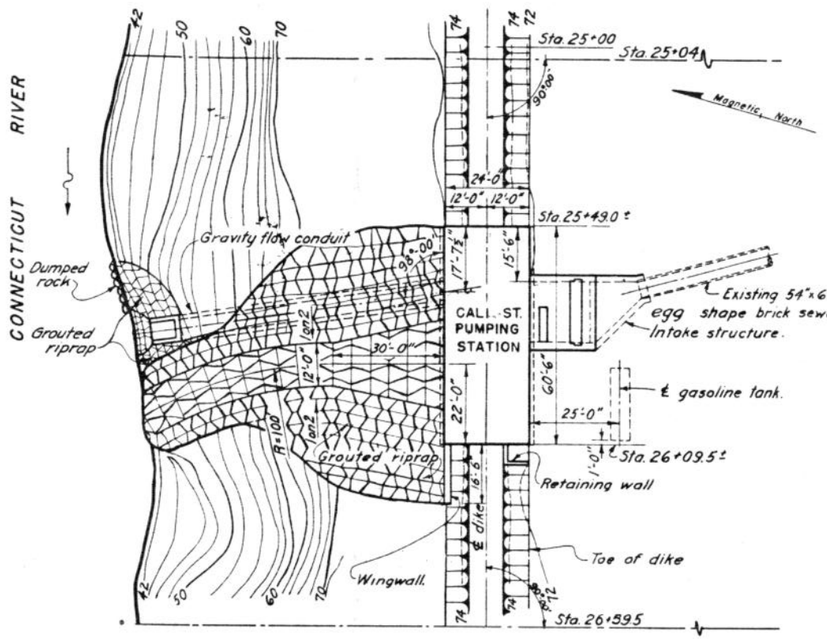
SCALE: 1/4 IN. = 1 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

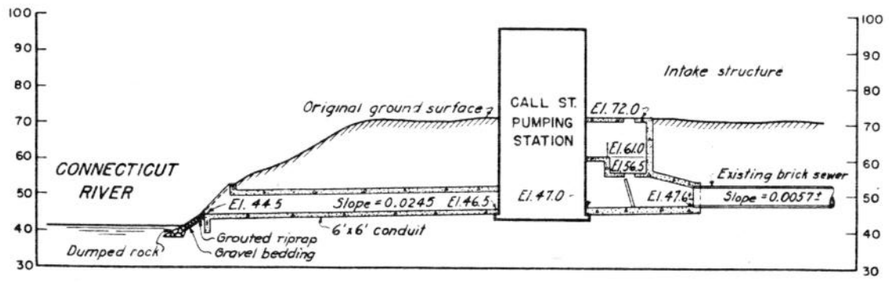
CHICOPEE, MASS

PLATE 18

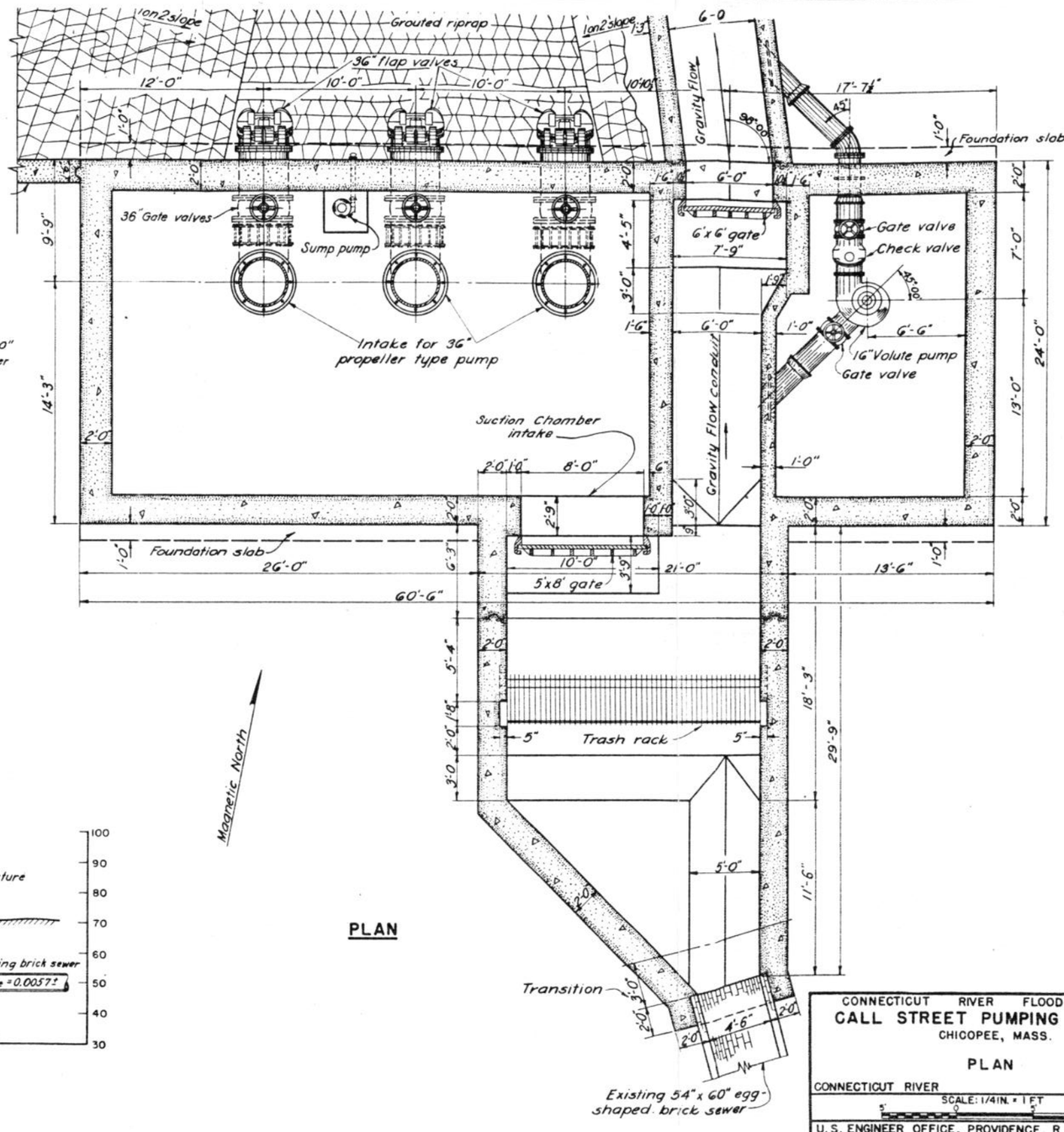


GENERAL PLAN

SCALE. 1" = 20'-0"



PROFILE ALONG ℄ OF CONDUIT



PLAN

CONNECTICUT RIVER FLOOD CONTROL

CALL STREET PUMPING STATION

CHICOPEE, MASS.

PLAN

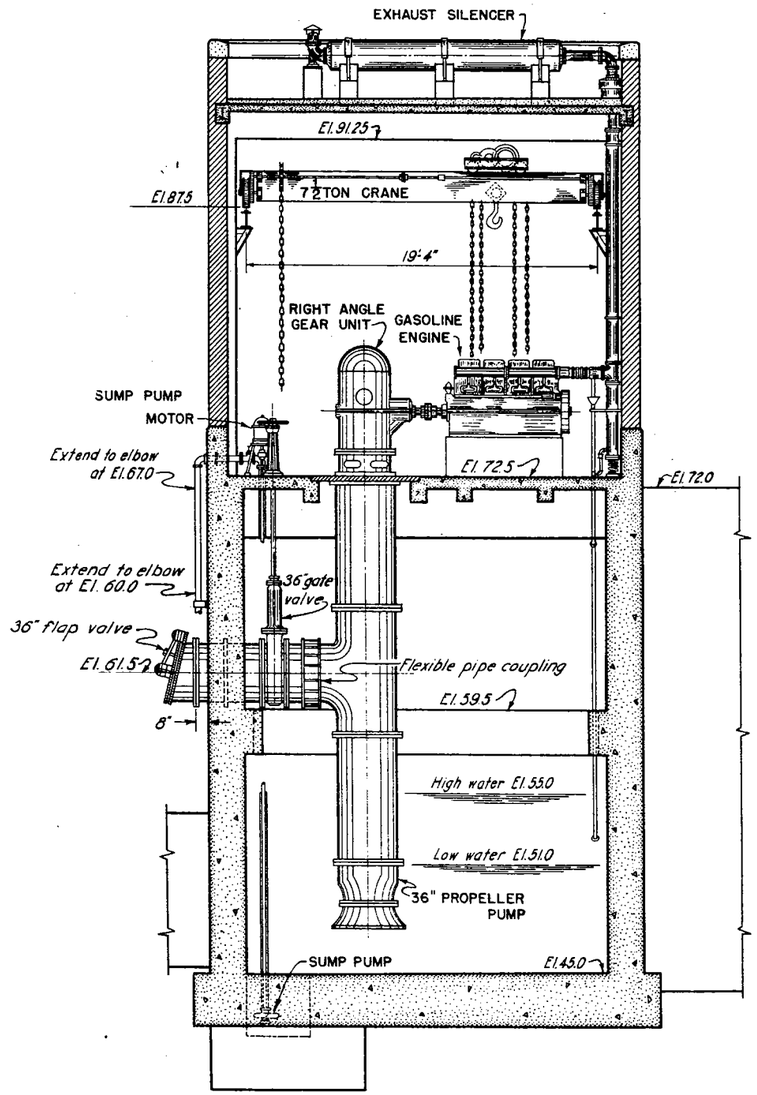
CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1/4 IN. = 1 FT

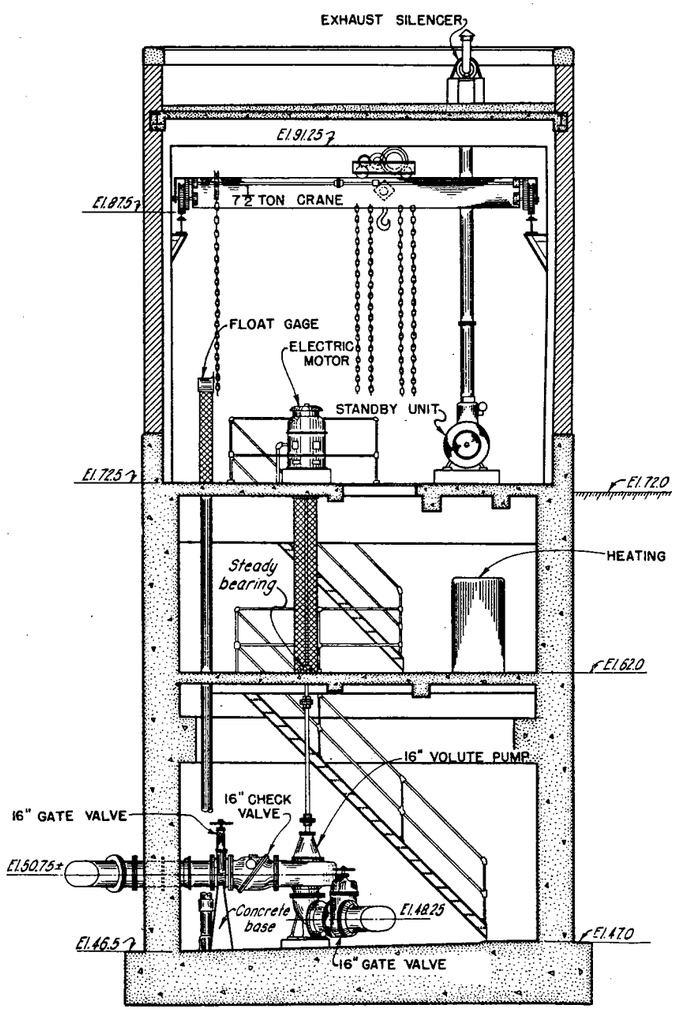
U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.



SECTION A



SECTION B

CONNECTICUT RIVER FLOOD CONTROL

CALL STREET PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 2

CONNECTICUT RIVER MASSACHUSETTS

SCALE: 1/4 IN. = 1 FT.

0 5' 5' 10'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE 20

odifications
placement of

ater Supply -

tations -
lans, Sections

locations

CORPS OF ENGINEERS — U.S. ARMY

PROFILE OF FLOOD WALLS AND DIKES
SCALE: HOR. 1" = 200'
VERT. 1" = 10'

GENERAL PLAN
SCALE 1" = 100'

NOTE:
(2) INDICATES BUILDING NUMBER

NOTE:
⚠ See Sheet 3 for location of borrow and spoil areas

Record Drawing
Contract No. DA-19-016-CIV ENG. 64-19

		Final Field Corrections	
⚠	C-64-3	Spec. No. revised.	2/ JUL 64
⚠	5-14-63	Borrow and spoil area location, wall toe rev.	2/ JUL 63
REVISED	DATE	DESCRIPTION	BY

GREELEY ENGINEERING AFFILIATES, INC. BOSTON, MASS. — ARCHITECT - ENGINEER

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

CHICOPEE RIVER FLOOD CONTROL
CHICOPEE FALLS
GENERAL PLAN
CHICOPEE RIVER — MASSACHUSETTS

APPROVED — DATE: APRIL, 1963

SCALE AS SHOWN — SPEC. NO. CIV. ENG.-19-016-64-19 — DRAWING NUMBER CT-5885 — SHEET 2

GRAPHIC SCALES
1" = 10'
1" = 100'
1" = 200'

PLATE 21

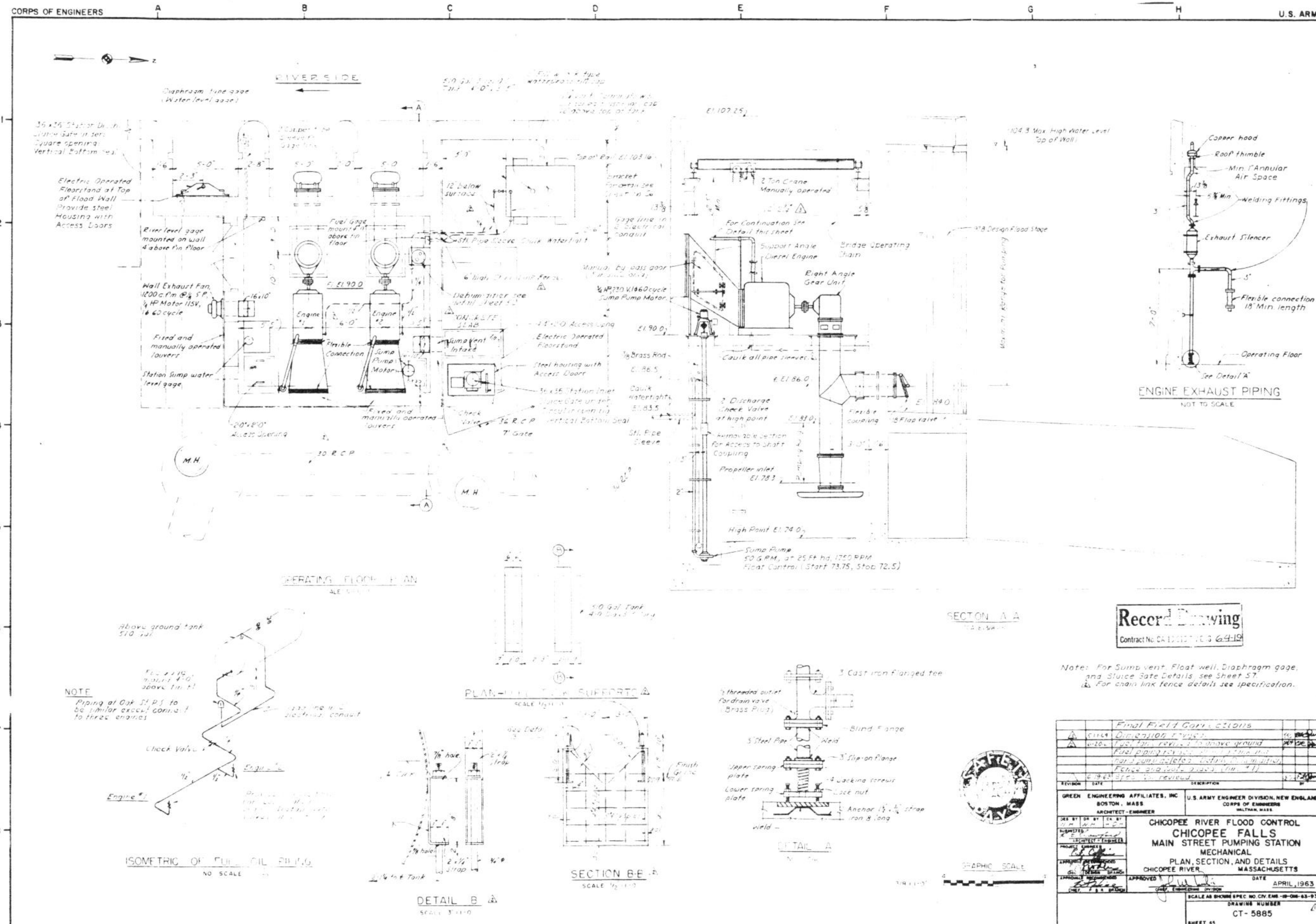

CORPS OF ENGINEERS
U.S. ARMY
RIVER SIDE
Diaphragm type gage (Water level gage)
Electric Operated Floorstand at Top of Flood Wall Provide steel Housing with Access Doors
River level gage mounted on wall 4' above fin floor
Wall Exhaust Fan, 1200 c.f.m. @ 1/8" S.P., 1/4 HP Motor 115V, 1φ 60 cycle
Fixed and manually operated louvers
Station Sump water level gage
Engine #1
Engine #2
Flexible Connection
Sump Pump Motor
Fuel Gage mounted 4' above fin floor
Dehumidifier see Detail Sheet 52
Sump Vent Intake
Electric Operated Floorstand
Steel housing with Access Doors
36"x36" Station Inlet Sluice Gate under Floor (Open top) Vertical Bottom Seal
Check Valve
36" R.C.P.
7' Gate
Fixed and manually operated louvers
20'x8'0" Access Opening
30" R.C.P.
M.H.
M.H.
OPERATING FLOOR PLAN
El. 107.25
2 Ton Crane Manually operated
For Continuation See Detail this sheet
Support Angle Diesel Engine
Bridge Operating Chain
Right Angle Gear Unit
1/4 HP 230 V. 1φ 60 cycle Sump Pump Motor
El. 90.0
Brass Rod
Caulk all pipe sleeves
El. 86.0
El. 86.5
Caulk watertight
El. 83.5
Stl. Pipe Sleeve
Discharge Check Valve at high point
Removable Section for Access to Shaft Coupling
Flexible coupling
Flap Valve
El. 84.0
Propeller inlet El. 78.3
High Point El. 74.0
Sump Pump 50 G.P.M. at 25 Ft hd, 1750 RPM Float Control (Start 73.75, Stop 72.5)
104.5 Max. High Water Level Top of Wall
98 Design Flood Stage
SECTION A-A
Copper hood
Roof thimble
Min. 1" Annular Air Space
Welding Fittings
Exhaust Silencer
Flexible connection 18" Min. length
Operating Floor
See Detail "A"
ENGINE EXHAUST PIPING
NOT TO SCALE
Record Drawing
Above ground tank 510 Gal.
NOTE
Piping at Oak St. P.S. to be similar except connect to three engines
Check Valve
Engine #1
ISOMETRIC OF FUEL OIL PIPING
NO SCALE
50 Gal. Tank
PLAN
SUPPORTS
DETAIL B
SECTION B-B
Finish Grade
3" Cast iron flanged tee
Weld
Blind flange
3" Steel Pipe
3" Slip-on flange
Upper spring plate
Lower spring plate
Jacking screws
Jack nut
Anchor
DETAIL A
GRAPHIC SCALE
Note: For Sump vent, Float well, Diaphragm gage, and Sluice Gate Details, see Sheet 57.
For chain link fence details see specification.
Final Field Corrections
Dimension revised
Fuel tank revised to above ground
Spec. No. revised
REVISION
DATE
DESCRIPTION
GREEN ENGINEERING AFFILIATES, INC
BOSTON, MASS
ARCHITECT - ENGINEER
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
CHICOPEE RIVER FLOOD CONTROL
CHICOPEE FALLS
MAIN STREET PUMPING STATION
MECHANICAL
PLAN, SECTION, AND DETAILS
CHICOPEE RIVER
MASSACHUSETTS
APPROVED
DATE
APRIL, 1963
DRAWING NUMBER
CT-5885
SHEET 45

PLATE 22

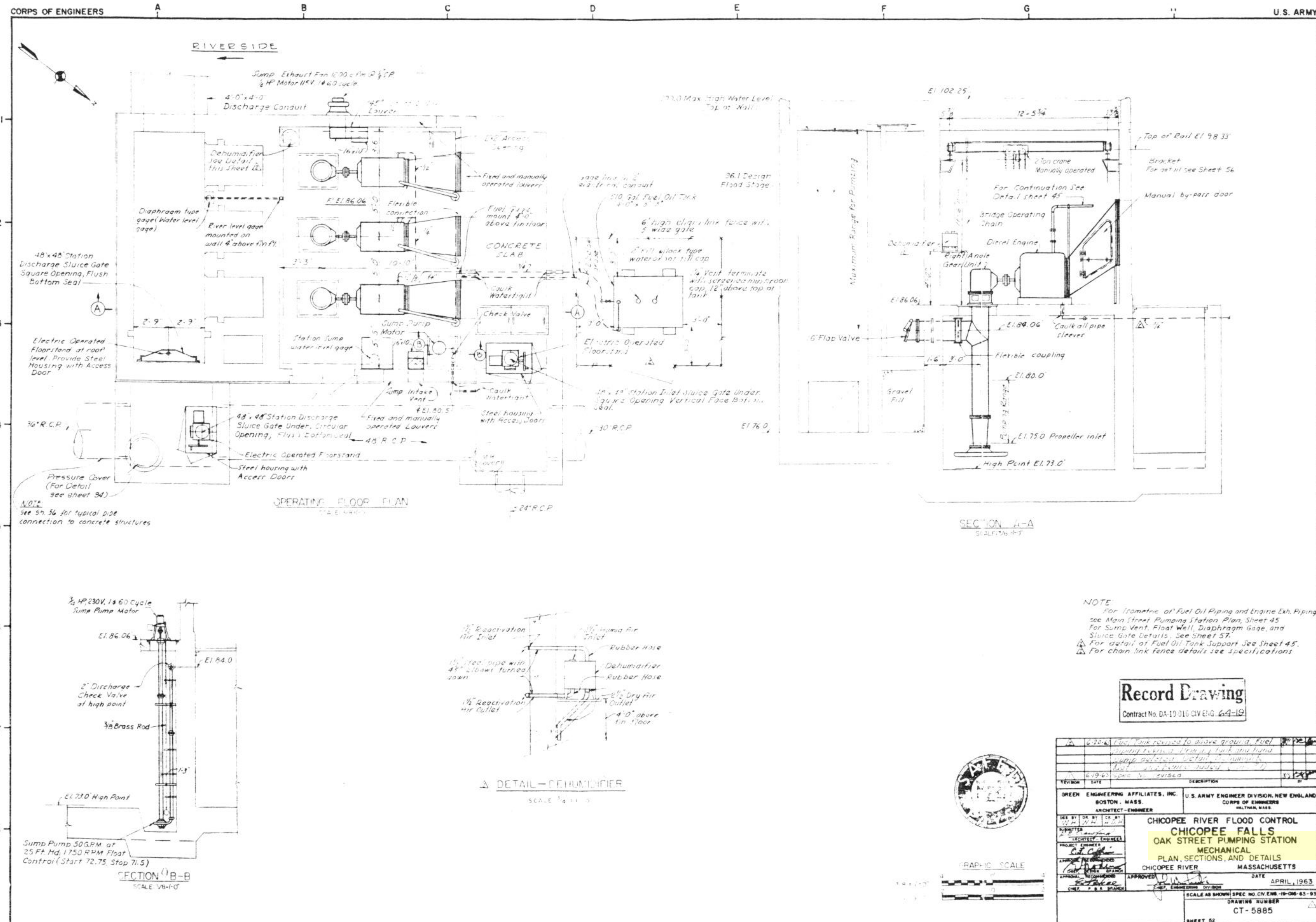

CORPS OF ENGINEERS
U.S. ARMY
RIVERSIDE
OPERATING FLOOR PLAN
SECTION A-A
SECTION B-B
DETAIL—DEHUMIDIFIER
NOTE
For Isometric of Fuel Oil Piping and Engine Exh. Piping see Main Street Pumping Station Plan, Sheet 45
For Sump Vent, Float Well, Diaphragm Gage, and Sluice Gate Details, See Sheet 57.
For detail of Fuel Oil Tank Support See Sheet 45.
For chain link fence details see specifications
Record Drawing
Contract No. DA-19-016 CIV ENG 64-19
GREEN ENGINEERING AFFILIATES, INC.
BOSTON, MASS.
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
CHICOPEE RIVER FLOOD CONTROL
CHICOPEE FALLS
OAK STREET PUMPING STATION
MECHANICAL
PLAN, SECTIONS, AND DETAILS
CHICOPEE RIVER
MASSACHUSETTS
DATE APRIL, 1963
SCALE AS SHOWN
SPEC NO. CIV. ENG.-19-016-63-93
DRAWING NUMBER
CT-5885
SHEET 52

PLATE 23