MIRA
Dissolution Authority

Date Submitted: March 10, 2025

# The South Meadows Redevelopment Considerations Study









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# APPENDIX E1

OPERATION, INSPECTION, AND MAINTENANCE PLAN

# FLOODWALL PENETRATION OPERATION, INSPECTION, AND MAINTENANCE PLAN

**Materials Innovation and Recycling Authority**
**Resource Recovery Facility**
**Hartford, CT**
**23 January 2025**




**PREPARED FOR**
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23 January 2025

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Project 240840 – Floodwall Penetration Operation, Inspection, and Maintenance Plan (OIMP), Former MIRA Facility, 100 Reserve Road and 300 Maxim Road, Hartford, CT

Dear Mr. Shepard:

At your request, Simpson Gumpertz & Heger Associates, Inc. (SGH) prepared the attached OIMP to provide guidance for the operation, inspection, and maintenance of utility penetrations through the Hartford Flood Control System floodwall that passes through the Materials Innovation and Recycling Authority Resource Recovery Facility. The companion to the OIMP is the Floodwall Penetration Emergency Preparedness Plan, which is submitted under separate cover.

Please contact Justin A. Dominguez at 617-909-6844 or jadominguez@sgh.com if you have any questions.

Sincerely yours,

23 January 2025

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## ABBREVIATIONS

| | |
|---|---|
| CCTV | Closed-Circuit Television |
| CT DEEP | Connecticut Department of Energy & Environmental Protection |
| DAS | Department of Administrative Services |
| DPW | Department of Public Works |
| dia. | Diameter |
| El. | Elevation |
| EPP | Emergency Preparedness Plan |
| ft | Feet |
| GHFC | Greater Hartford Flood Commission |
| HFCS | Hartford Flood Control System |
| in. | Inch, inches |
| MDA | MIRA Dissolution Authority |
| MIRA | Materials Innovation and Recycling Authority |
| M.S.L. | Mean Sea Level |
| NGVD 29 | National Geodetic Vertical Datum of 1929 |
| No. | Number |
| NWS | National Weather Service |
| OIM | Operation, Inspection, and Maintenance |
| O&M | Operation and Maintenance |
| PBF | Power Block Facility |
| USACE | U.S. Army Corps of Engineers |
| WPF | Waste Processing Facility |

# 1. INTRODUCTION

## 1.1 Background

The Materials Innovation and Recycling Authority (MIRA) Resource Recovery Facility (the Facility) is a shuttered trash-to-energy power plant in the South Meadows Section of Hartford, Connecticut (Fig 1). The Facility, constructed in the 1920s, was originally coal-fired, then transitioned to a combination of oil and coal. In the 1980s, a waste processing facility (WPF) was constructed at the site, and the power plant was converted for trash-to-energy use. The power plant portion of the site is referred to as the power block facility (PBF) to differentiate it from the WPF. The Facility stopped receiving, processing, and combusting waste in July 2022. Over the life of the Facility, there were six generating units, two of which (Units 5 and 6) were in use when operations ceased.

The Facility is located along the west bank of the Connecticut River. In response to the devastating floods in 1936 and 1938, the U.S. Army Corps of Engineers (USACE) constructed a flood control system to reduce flooding risks. The Hartford Flood Control System (HFCS) consists of earthen dikes, concrete floodwalls, closure structures, and structures to facilitate drainage inside the protected area. The HFCS passes through the Facility, with most of the area adjacent to the PBF consisting of concrete floodwall. Several penetrations through the floodwall allow for passage of pipes between the landside and the riverside.

After construction, the USACE handed over management of the flood control infrastructure to the City of Hartford as the Local Sponsor. The Greater Hartford Flood Commission (GHFC), a consortium of the communities protected by the HFCS, is presently the Local Sponsor.

In June 2024, the successor to MIRA, the MIRA Dissolution Authority (MDA), retained the services of Weston & Sampson Engineers, Inc. and its team, including Simpson Gumpertz & Heger Associates, Inc. to prepare a Redevelopment Considerations Study for the Facility. One of the Study's tasks was the review and documentation of penetrations through the HFCS floodwall, including the preparation of this Floodwall Penetration Operation, Inspection, and Maintenance Plan.

## 1.2 Purpose of Plan

The purpose of this plan is to provide guidance for the operation, inspection, and maintenance (OIM) of the penetrations at the Facility, which are important to the overall performance of the flood protection system. The companion to this OIM plan is the latest version of the Floodwall Penetration Emergency Preparedness Plan (EPP), which outlines the roles and responsibilities of those in charge of monitoring for and responding to emergency conditions involving penetrations through the floodwalls at the Facility.

Operations of other components of the HFCS, including the sections of floodwall and earthen dike within the Facility, are documented in the Operation & Maintenance Manual (O&M) for the Hartford Local Protection Project, Connecticut and Park Rivers (the HCFS O&M Manual).

## 1.3 Roles and Responsibilities

### 1.3.1 MIRA Dissolution Authority / Department of Administrative Services

The MDA was created by an act of the State of Connecticut Legislature – Public Act 23-170, effective 1 July 2023. As a result of this legislation, the MDA replaced MIRA and assumed MIRA's statutory duties and responsibilities.

The MDA is responsible for the operations, inspection, and maintenance of the penetrations through the HFCS within the Facility.

It is important to note that Public Act 23-170 also establishes the State of Connecticut Department of Administrative Services (DAS) as the successor agency to MDA, effective 1 July 2025. Therefore, DAS will assume responsibility for the operations, inspection, and maintenance of the penetrations through the HFCS within the Facility on 1 July 2025.

### 1.3.2 Greater Hartford Flood Commission

The GHFC is the regulatory authority with stewardship over public works constructed in the Greater Hartford area for the purpose of flood control on the Connecticut and Park Rivers, and on the tributaries of the Park River. The GHFC consists of seven members appointed by the

Mayor of the City of Hartford, four being from the City of Hartford and one each from the towns of Bloomfield, Newington, and West Hartford.

The general duties and authorities of the GHFC and its designees include:

- Act for the elimination, prevention, and control of flooding and flood damage in the areas falling under its jurisdiction.
- Construct, supervise, operate, maintain, and dispose of flood control works such as dikes, floodwalls, pumping stations, reservoirs, sewer systems, conduits, bridges, highways, etc.
- Issue regulations for the purpose of flood control.
- Provide assurances to the Secretary of the Army regarding federally constructed flood control works.

### 1.3.3 City of Hartford Department of Public Works (DPW)

Maintenance of the HFCS is conducted by a permanent staff under the direction and supervision of the Department of Public Works for the City of Hartford. Hartford DPW's areas of responsibility include:

- Complete operation of the project during flood periods.
- Determining phases of preparedness, mobilization, and operations based on: National Weather Service (NWS) river and weather forecasts, and river stages on the Park River at Pope Park pumping station and on the Connecticut River at Hartford (Bulkeley Bridge).
- Training personnel in specific duties and holding periodic practice sessions to ensure efficient and effective maintenance and operation.
- Maintaining adequate contact with the NWS to obtain weather and flood forecasts.
- Maintenance of all project features.

DPW's support during flooding operations will associated with the HFCS and its stability. DPW will not enter facility buildings as part of flood monitoring or corrective actions.

### 1.3.4 National Weather Service

The NWS has no direct role in the operations of the project; however, it has the responsibility of issuing weather and flood forecasts to the general public. The NWS maintains the Northeast

River Forecast Center at Bloomfield, Connecticut, which is the official agency for issuing flood watches, warnings, and forecasts in the Connecticut River basin. River forecasts for the Connecticut River (U.S. Geologic Survey Gage # 01190070 at the Bulkeley Bridge) can be viewed online, at https://water.noaa.gov/gauges/HFDC3. Weather forecasts and reports for the area are issued by the NWS office at Bradley Field in Windsor Locks.

### 1.3.5 U.S. Army Corps of Engineers

The USACE Reservoir Control Center continually monitors rainfall and runoff conditions in much of New England. This climatologic and hydrologic information is available upon request online at http://www.reservoircontrol.com.

The USACE New England Division Levee Safety Program has regulatory oversight of the HFCS, which it refers to in its reporting as the Connecticut River Right Bank – Hartford, CT Flood Risk Management System.

### 1.3.6 Connecticut Department of Energy & Environmental Protection (CT DEEP)

CT DEEP administers the state's Dam Safety Regulatory Program, whose mission is to ensure the safety of dams to protect life, property, and the environment by ensuring that all dams are designed, constructed, operated, and maintained safely and effectively.

CT DEEP Dam Safety has regulatory oversight of the HFCS, as it is classified as a Class C, High Hazard Dam.

## 1.4 Elevation Datum

The elevations in this manual are referenced to the National Geodetic Vertical Datum of 1929 (NGVD or NGVD 29), also referred to as Mean Sea Level (M.S.L.) in USACE record drawings for the HFCS. The Bulkeley Bridge gage zero is set to NGVD, so all gage readings indicate the water elevation in feet NGVD.

## 1.5 Description of Flood Control System within MIRA Facility Limits

The section of the HFCS within the Facility consists of portions of earthen dike and floodwall. The earthen dikes generally consist of freely draining river sand with a clay blanket and stone riprap face on the riverside slope, a steel sheet pile seepage cutoff wall at the riverside toe, and a gravel toe drain at the landside toe. The landside slope is three units horizontal to one unit vertical (3H:1V). The riverside slope varies from 2.5H:1V to 3H:1V.

The floodwalls consist of reinforced concrete T-wall with a steel sheet pile seepage cutoff wall embedded in the riverside toe and a gravel toe drain at the landside heel. South of the former coal tower, 2 ft wide concrete buttresses are provided on approximately 11 to 15 ft centers. The ground to the riverside of the floodwall is generally flat between Screenhouses No. 1 and No. 3 with a steel sheet pile bulkhead and the walls of the screenhouses providing grade separation from the river. To the north and south of the screenhouses, the riprap-face ground slopes down toward the river at slopes ranging from 2H:1V to 1H:1V. A toe drain, consisting of an approximately 2.5 to 5 ft wide by 3 ft tall zone of crushed stone wrapped in tar paper, is located on the landside of the floodwall. Seepage is collected in a 15 to 18 in. vitrified clay pipe running through the center of the drainage zone. The collection pipe is sloped toward the south, eventually discharging at the South Meadows Pumping Station storage pond. Manholes leading to collection pipes are located periodically along the toe drain.

The floodwall originally had three openings. Two of them, a bulkhead door and a 6 ft wide stop-log closure, were permanently plugged with reinforced concrete in 2015. The remaining opening (referred to as Closure Structure No. 4 in the GHFC O&M Manual) is closed during high water with aluminum panels stored in a rack attached to an adjacent section of floodwall. Locked chain link fences prevent unauthorized access along fence lines to the north of Screenhouse No. 1, to the south of the floodwall, and through Closure Structure No. 4.

## 2. DESCRIPTION OF PENETRATIONS

### 2.1 General

Descriptions for the penetrations within the Facility are provided below. Over time, some penetrations through the floodwall have been properly abandoned, either by removing them or filling them with concrete as they cross through or under the floodwall. To reduce confusion, these abandoned penetrations are not listed in this manual, but are provided for reference in Appendix A. The remaining, non-abandoned penetrations are shown in Figs. 2 and 3 and summarized in Table 1. Most of these penetrations are inactive. Inactive means that the penetration is no longer used but has not been removed or properly abandoned. Inactive status does not mean that a penetration does not pose a potential risk to the flood control system. Therefore, these penetrations must still be inspected and maintained, as outlined in Sections 4 and 5.

### 2.2 HD-36 (Roof Drain Outfall)

HD-36 is a 12 in. cast-iron roof drainpipe passing below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, north of Screenhouse No. 1. This pipe also receives stormwater runoff from the paved parking lot area located between the floodwall and the Facility's administrative building. The pipe invert elevation at the floodwall centerline is at El. 21.92 ft. The pipe passes through a valve chamber adjacent to the floodwall on the landside. The pipe has a gate valve in the valve chamber immediately to the landside of the floodwall and a flap valve at the outfall end of the pipe on the riverside. This line is active.

### 2.3 HD-37 (Inactive Compressed Air and Water)

HD-37 consists of three pipes (1 in. dia. compressed air, 1.5 in. dia. city water, and 6 in. dia. service water) passing through the floodwall base and leading to the abandoned Chlorine House. The pipe inverts at the floodwall centerline are at El. 25.0 ft. The pipe material is unknown. These lines are inactive.

## 2.4 HD-38 (Inactive Unit 6 Non-Contact Cooling Water Intake)

HD-38 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe formerly served as the cooling water intake for the Unit 6 steam condenser. The pipe invert at the floodwall centerline is at approximately El. 9.5 ft. Two pumps in Screenhouse No. 1 draw water from the river and discharge into two pipes that merge on the riverside of the floodwall. The line continues as the single, 48 in. pipe into the PBF. Gate valves are provided in Screenhouse No. 1 on the discharge side of the pumps. These gate valves are intended to be permanently closed. This line is inactive.

## 2.5 HD-43 (Inactive Service Water Intake)

HD-43 is a 24 in. metal pipe inside a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. The 48 in. pipe formerly served as the cooling water intake for the Unit 4 steam condenser. The 24 in. inner pipe, which was installed later, served as a service water intake. It is not known if the inner pipe was grouted inside the 48 in. diameter pipe or simply placed inside. The 48 in. pipe invert at the floodwall centerline is at approximately El. 17.77 ft. Two pumps in Screenhouse No. 3 draw water from the river and discharge into two pipes that merge inside the screenhouse. The line continues as the single, 24 in. pipe into the PBF. Gate valves are provided in Screenhouse No. 3 on the discharge side of the pumps. These gate valves are intended to be permanently closed. This line is inactive.

## 2.6 HD-44 (Inactive Unit 5 Non-Contact Cooling Water Intake)

HD-44 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, at Closure Structure No. 4. This pipe formerly served as the cooling water intake for the Unit 5 steam condenser. The pipe invert at the floodwall centerline is at El. 16.3 ft. Two pumps in Screenhouse No. 3 draw water from the river and discharge into two pipes that merge on the riverside of the floodwall. The line continues as the single, 48 in. pipe into the PBF. Gate valves are provided in Screenhouse No. 3 on the discharge side of the pumps. This line is inactive.

### 2.7 HD-45 (Inactive Water Discharge)

HD-45 is a 14 in. cast-iron water discharge pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of Screenhouse No. 3. This pipe is adjacent and parallel to HD-46. The pipe invert at the floodwall centerline is at El. 22.25 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. It is unclear whether there are any valves on this line or where they might be located. This line is inactive.

### 2.8 HD-46 (Inactive Service Water Discharge)

HD-46 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of Screenhouse No. 3. This pipe formerly served as the service water discharge and is adjacent and parallel to HD-45. The pipe invert at the floodwall centerline is at El. 18.0 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. It is unclear whether there are any valves on this line or where they might be located. This line is inactive.

### 2.9 HD-47 (Inactive Unit 5 Non-Contact Cooling Water Discharge)

HD-47 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of Closure Structure No. 4. This pipe formerly served as the cooling water discharge for the Unit 5 steam condenser. The pipe invert at the floodwall centerline is at El. 17.13 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. A gate valve is provided on the discharge side of the Unit 5 steam condenser, in the Turbine Hall. This line is inactive.

### 2.10 HD-47a (Inactive Unit 6 Non-Contact Cooling Water Discharge)

HD-47a is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, north of the former coal tower foundation. This pipe formerly served as the cooling water discharge for the Unit 6 steam condenser. The pipe invert at the floodwall centerline is at El. 17.13 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. A gate valve is provided on the discharge side of the Unit 6 steam condenser, in the Turbine Hall. This line is inactive.

### 2.11 HD-48 (Inactive Former Ash Pit Outfall)

HD-48 is a 12 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of the former coal tower foundation. The pipe invert at the floodwall centerline is at approximately El. 9.5 ft. The pipe has a gate valve in the valve chamber immediately to the landside of the floodwall and a flap valve at the outfall end of the pipe on the riverside. Formerly an ash pit outfall, the pipe was later cut and capped landward of the valve chamber. This line is inactive.

### 2.12 HD-49 (Inactive Oil Line in Former Ash Pit Outfall)

HD-49 is an 8 in. steel pipe that was placed inside of a 10 in. cast-iron pipe that passes through the below grade portion of the floodwall stem, near the coal unloading facility. The outer pipe invert at the floodwall centerline is at El. 16.86 ft. The original 10 in. pipe was an outfall for a former ash pit. The pipe discharged at a headwall on the riverbank on the riverside of the floodwall. On the landside of the floodwall, the pipe passed through a valve chamber and towards the ash pit. The 8 in. oil line runs from the south dock to the headwall, where it enters the original pipe. The newer oil line runs into the valve chamber, where the original pipe was cut. The pipe then bends 90 degrees and rises vertically in the valve chamber to approximately 5 ft below the top of the chamber. The pipe then bends 90 degrees and runs horizontally through the landside wall of the valve chamber, into a second valve chamber that shares a wall with the first, and then towards the Facility. The pipe has been cut inside the second valve chamber, with blind flanges attached to both cut ends. This line is inactive.

### 2.13 HD-50a (Inactive Liquid Fuel Line)

HD-50a is an 8 in. steel pipe, formerly carrying liquid fuel. The pipe runs from the south dock and then turns south (downriver) and then runs just below the ground surface in a 2 ft by 2 ft concrete encasement up on the dike riverside slope (the flood protection system transitions from floodwall to earth embankment just south of the south dock). The pipe then runs up over the dike crest, and down the landside dike slope. The top of the encasement is flush with the surrounding ground surface. The pipe invert at the dike centerline is approximately El. 42.5 ft. The pipe terminates at the south dock with a gate valve and blind flange. This line is inactive.

## 3. OPERATIONS

### 3.1 General

Many of the penetrations are inactive. Valves on these pipes should always be left closed, except during inspections and maintenance. Specific guidance for each penetration is discussed below. Requirements for operations before, during, and after a flood event are outlined in the Floodwall Penetration EPP, which will be activated if floodwaters are predicted to reach El. 11.0 ft.

### 3.2 HD-36 (Roof Drain Outfall)

On the landside of the floodwall, there is a valve chamber containing a gate valve. The stem of the gate valve rises to approximately 18 in. below the valve chamber cover. The stem can be turned with a square head valve key. On the riverside of the floodwall, there is a flap valve at the end of the pipe.

The landside gate valve shall be closed when the Connecticut River at Bulkeley Bridge gage is predicted to reach a stage of 21.5 ft, as outlined in the Floodwall Penetration EPP.

### 3.3 HD-37 (Inactive Compressed Air and Water)

There are no known operable parts for this penetration.

### 3.4 HD-38 (Inactive Unit 6 Non-Contact Cooling Water Intake)

On the riverside, there are two gate valves in Screenhouse No. 1, one on each of the intake pumps. The valves are in the closed position and should always be left closed, except during inspections and maintenance.

### 3.5 HD-43 (Inactive Service Water Intake)

On the riverside, there are two gate valves in Screenhouse No. 3, one on each of the intake pumps. The valves are in the closed position and should always be left closed, except during inspections and maintenance.

### 3.6 HD-44 (Inactive Unit 5 Non-Contact Cooling Water Intake)

On the riverside, there are two gate valves in Screenhouse No. 3, one on each of the intake pumps. The valves are in the closed position and should always be left closed, except during inspections and maintenance.

### 3.7 HD-45 (Inactive Water Discharge)

There are no known operable parts for this penetration.

### 3.8 HD-46 (Inactive Service Water Discharge)

There are no known operable parts for this penetration.

### 3.9 HD-47 (Inactive Unit 5 Non-Contact Cooling Water Discharge)

On the landside, there is a gate valve on the discharge side of the Unit 5 steam condenser, in the Turbine Hall. This valve should always be left closed, except during inspections and maintenance.

### 3.10 HD-47a (Inactive Unit 6 Non-Contact Cooling Water Discharge)

On the landside, there is a gate valve on the discharge side of the Unit 6 steam condenser, in the Turbine Hall. This valve should always be left closed, except during inspections and maintenance.

### 3.11 HD-48 (Inactive Former Ash Pit Outfall)

On the landside of the floodwall, there is a valve chamber containing a gate valve. The handwheel for the valve is at the bottom of the valve chamber. On the riverside of the floodwall, there is a flap valve at the end of the pipe.

The gate valve should always be left closed, except during inspections and maintenance. The valve chamber is a confined space.

### 3.12 HD-49 (Inactive Oil Line in Former Ash Pit Outfall)

The pipe has a gate valve on the riverside and is covered with a steel blind flange on both the riverside and landside. The valve is in the closed position and should always be left closed, except during inspections and maintenance. The blind flanges should always remain in place, except during closed-circuit television (CCTV) inspections (see Section 4.3).

### 3.13 HD-50a (Inactive Liquid Fuel Line)

The pipe has a gate valve on the riverside and is covered with a steel blind flange on the riverside. The valve is in the closed position and should always be left closed, except during inspections and maintenance. The blind flange should always remain in place, except during CCTV inspections (see Section 4.3).

## 4. INSPECTION

### 4.1 General

Routine inspections shall be performed twice per year, preferably at the same time as one of the quarterly maintenance intervals to reduce the number of entries into the valve chambers. The inspection checklist is provided in Appendix B.

Requirements for inspections before, during, and after a flood event are outlined in the Floodwall Penetration EPP, which will be activated if floodwaters are predicted to reach El. 11.0 ft, with an initial pre-flood inspection triggered when floodwaters reach El. 12.0 ft. The inspection checklist shall be completed in a similar manner as the routine inspection. The riverside of the floodwall may not be accessible during flooding.

### 4.2 Routine Inspections

The penetrations shall be checked for the deficiencies listed below. If any deficiencies are observed, they shall be noted on the checklist along with the penetration ID number. Deficiencies must be addressed as soon as practical.

<u>Ground Surface Near Penetrations</u>

- Settlement, depressions, or sinkholes.
- Soft soil.
- Erosion.
- Wet spots or flowing water.
- Sand boils or sand piles.

<u>Exposed Sections of Pipe</u>

- Cracking.
- Holes.
- Deterioration or excessive corrosion.

Flap Gates

- Damage or distress to the flap gate.
- Debris preventing the flap gate from closing.
- Flap gate not swinging freely.
- Debris or sediment around the flap gate.
- Damage or distress to the headwall.
- Movement of the headwall.

Gate Valves

- Leakage or damage.
- Locks and chains on handwheels missing.
- Gate open (for permanently closed gates).
- Gate does not move freely.

Valve Chambers

- Missing or damaged chamber cover.
- Spalling or deterioration of concrete.
- Cracks or holes in concrete.
- Leakage of water or soil through concrete.
- Excessive corrosion or deterioration of steps.

### 4.3 CCTV Inspections

All penetrations shall be inspected every five years using a CCTV camera, except the HD-37 1.5 in. water and 1 in. compressed air pipes, which are too small to inspect. The inspection shall be performed in accordance with requirements outlined in USACE EM 1110-2-2902, Conduits, Pipes, and Culverts Associated with Dams and Levee Systems dated 31 December 2020. No direct onshore access to most of these penetrations currently exists (HD-37, HD-38, HD-43, HD-44, HD-45, HD-46, HD-47, HD-47a). MDA's successor, DAS, will need to construct access points to facilitate inspections.

The pipe shall be checked for the deficiencies listed below. If any deficiencies are observed, they shall be noted on the CCTV inspection report. Deficiencies must be addressed as soon as practical.

- Blockages in the pipe due to debris or sedimentation. Note if jetting was required to advance the camera.
- Water ponding, which could be a sign of pipe settlement.
- Cracking, corrosion, or deterioration.
- Separation of joints.
- Intrusion from roots at joints.
- Voids near any joint separation.
- Leakage into or out of the conduit.

### 4.4 Inspection Limits

USACE EM 1110-2-2902 provides guidance for inspection limits. The limits provided herein meet or exceed the USACE limits and are simplified for implementation in the field. Visual inspections should be conducted from the riverside end of the pipe (either the outfall, termination at a pipe blind, or at the intake pump within the screenhouse), to the face of the PBF or 75 ft landward of the floodwall stem, whichever is shorter. The non-contact cooling water and service water intake and discharge pipes are visible within the PBF. These pipes should be visually inspected where visible within the PBF to their termination points. CCTV inspections should extend from the riverside end of the pipe to at least 75 ft landward of the floodwall stem.

## 5. MAINTENANCE

### 5.1 General

Maintenance shall be performed quarterly.

### 5.2 Valve Chambers

Maintenance of valve chambers, regardless of whether the valve chamber contains an operable gate, consists of:

- Dewatering of the valve chamber and cleaning accumulated sediment and/or debris.
- Cleaning the chamber cover frame and verifying that the cover seats properly in the frame.

### 5.3 Gate Valves

Maintenance of gate valves consists of:

- Replacing worn seals.
- Lubricating the stem gear and all other moving parts.
- Removing excess grease.
- Trial-operating the gate through its full range of motion and verifying an adequate seal when closed.

### 5.4 Flap Gates

Maintenance of flap gates consists of:

- Cleaning accumulated sediment and/or debris from the gate seating surface, headwall, and surrounding area.
- Verifying that the flap moves freely and seats flush on the outfall pipe.
- Verifying that the seating surfaces are free of nicks, dents, or any other damage that would compromise the seal.
- Lubricating the hinge.

## 6. DRAWINGS, RECORD-KEEPING, AND REPORTING

Relevant record drawings for each penetration are provided in Appendix C.

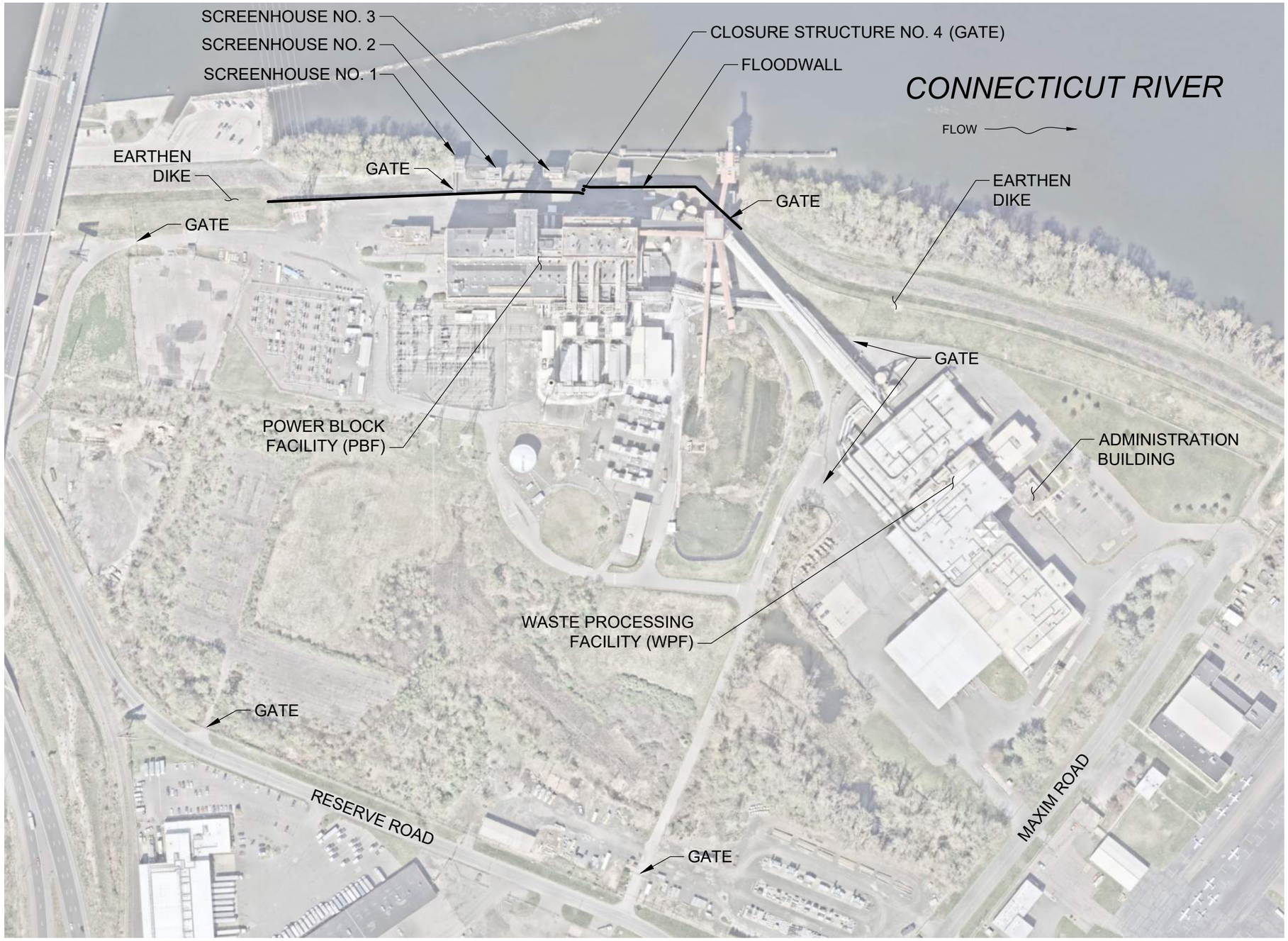
Inspection reports, maintenance/repair logs, and photos shall be kept in a centralized system.

Inspection reports and maintenance/repair logs shall be transmitted to GHFC twice per year, so that they may be included in the City's February and August reports to CT DEEP Dam Safety and USACE Levee Safety Program. CCTV inspection reports shall be transmitted to GHFC upon completion.

I:\BOS\Projects\2024\240840.00-MIRA\WP\002JADominguez-R-240840.00.kri.docx

**Table 1. Floodwall Penetration Inventory**
**MIRA Dissolution Authority**

| ID No. | Station | Description | Diameter/Size and Material of Penetration | Invert Elevation at Floodwall Centerline (ft NGVD 29) | Status | Backflow Prevention Measures |
|---|---|---|---|---|---|---|
| HD-36 | 84+21M | Roof drain outfall | 12 in. dia. pipe - Cast Iron | 21.92 | Active | Flap valve at riverside outfall, gate valve in valve chamber immediately landside |
| HD-37 | 85+28M | Compressed air and water | 1.5 in. dia. city water<br>1 in. dia. compressed air<br>6 in. dia. service water | 25.0 | Inactive | Unknown |
| HD-38 | 84+55M | Non-contact cooling water intake (Unit 6) | 48 in. dia. pipe - Steel | ~9.5 | Inactive | Two gate valves in Screenhouse No. 1 on riverside, one on each intake pump |
| HD-43 | 86+77.5M | Service water intake | 24 in. dia. pipe placed inside<br>48 in. dia. pipe - Steel | 17.77 | Inactive | Two gate valves in Screenhouse No. 3 on riverside, one on each intake pump |
| HD-44 | 87+65M | Non-contact cooling water intake (Unit 5) | 48 in. dia. pipe - Steel | 16.3 | Inactive | Two gate valves in Screenhouse No. 3 on riverside, one on each intake pump |
| HD-45 | 87+40.6M | Water discharge (Source unknown) | 14 in. dia. pipe - Cast Iron | 22.25 | Inactive | Unknown |
| HD-46 | 87+35.85M | Service water discharge | 48 in. dia. pipe - Steel | 18.0 | Inactive | Unknown |
| HD-47 | 87+85M | Non-contact cooling water discharge (Unit 5) | 48 in. dia. pipe - Steel | ~9.5 | Inactive | Gate valve in turbine hall on landside |
| HD-47a | 88+34M | Non-contact cooling water discharge (Unit 6) | 48 in. dia. pipe - Steel | 17.13 | Inactive | Gate valve in turbine hall on landside |
| HD-48 | 89+36.5M | Storm drain (former ash pit outfall) | 12 in. dia. pipe - Cast Iron | 7.72 | Inactive | Flap valve at riverside outfall, gate valve in valve chamber immediately landside |
| HD-49 | 90+75M | Oil pipe in former ash pit outfall | 8 in. dia. oil line (Steel) placed inside<br>10 in. dia. drain line (Cast Iron) | 16.86 | Inactive | Blind flange and gate valve at south dock on riverside, blind flange in valve chamber immediately landside |
| HD-50a | 92+31.7M | Liquid fuel line | 8 in. steel pipe encased in concrete | ~43.5 | Inactive | Blind flange and gate valve at south dock on riverside |



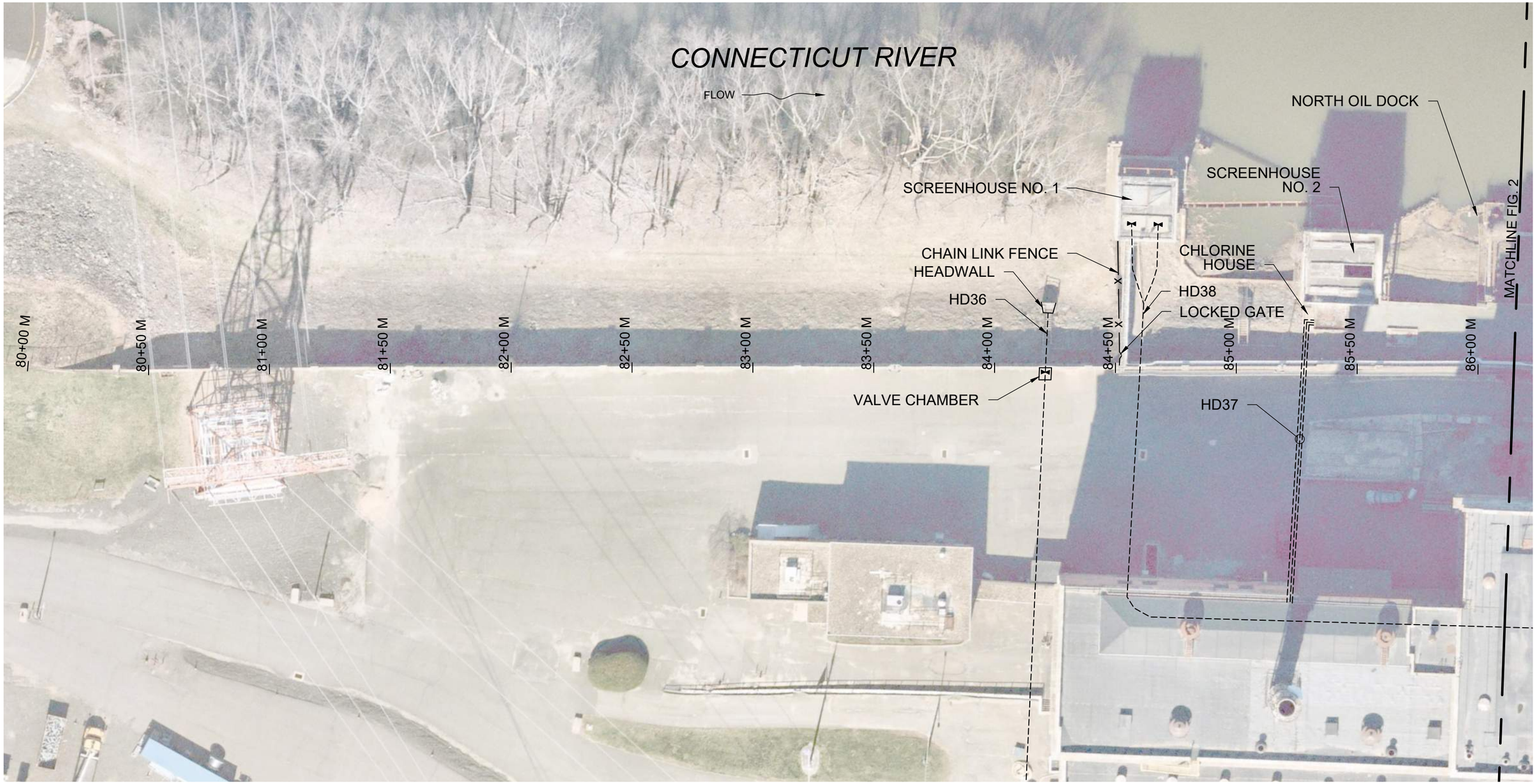

NOTES:
1. AERIAL PHOTO © 2023 NEARMAP. REPRODUCED WITH PERMISSION.

0 125' 250' 500' 750' 1000'

1" = 250'-0"

SIMPSON GUMPERTZ & HEGER
480 Totten Pond Road
Waltham, MA 02451
781.907.9000
sgh.com

| | | | |
|---|---|---|---|
| Project: MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION OPERATION, MAINTENANCE, AND INSPECTION MANUAL | | | Drawing No.: FIG. 1 |
| Title: SITE PLAN | | | Scale: 1" = 250'-0" |
| Drawn: RKP | Checked: JAD | Approved: BPS | Project No.: 240840 / Date: 9/13/2024 |




NOTES:
1. AERIAL PHOTO © 2023 NEARMAP. REPRODUCED WITH PERMISSION.
2. LOCATIONS AND FLOOD CONTROL SYSTEM STATIONING HAVE NOT BEEN VERIFIED WITH SITE SURVEY AND THEREFORE, SHOULD BE CONSIDERED APPROXIMATE.

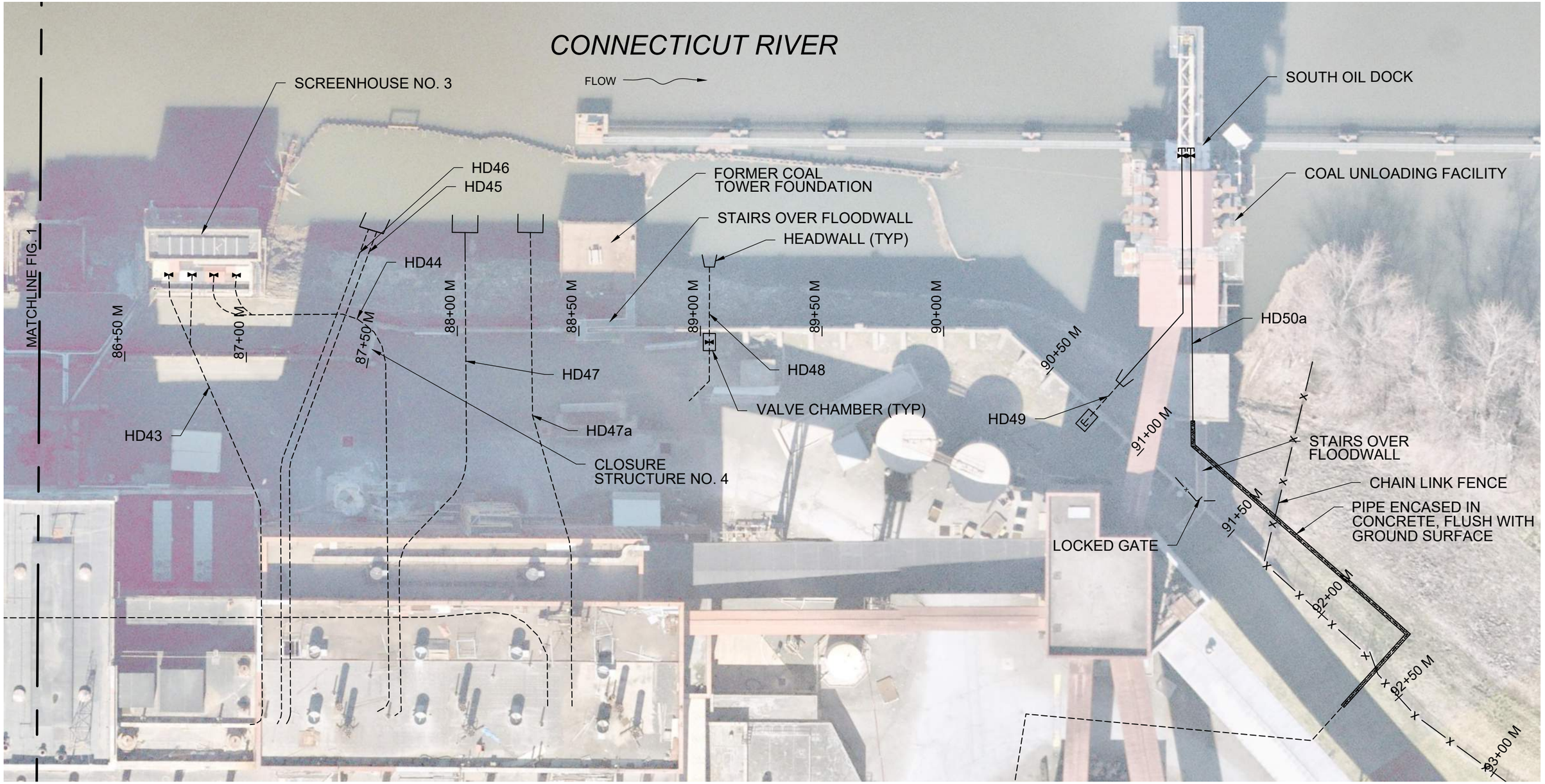
LEGEND:
- BELOW GROUND PIPE
- ABOVE GROUND PIPE
- GATE VALVE
- BLIND FLANGE

0 20' 40' 80' 120' 160'

1" = 40'-0"

SIMPSON GUMPERTZ & HEGER
480 Totten Pond Road
Waltham, MA 02451
781.907.9000
sgh.com

| | | | | |
|---|---|---|---|---|
| Project: MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION OPERATION, MAINTENANCE, AND INSPECTION MANUAL | | | | Drawing No.: FIG. 2 |
| Title: PENETRATION LOCATIONS | | | | Scale: 1" = 40'-0" |
| Drawn: RKP | Checked: JAD | Approved: BPS | Project No.: 240840 | Date: 10/2/2024 |




NOTES:
1. AERIAL PHOTO © 2023 NEARMAP. REPRODUCED WITH PERMISSION.
2. LOCATIONS AND FLOOD CONTROL SYSTEM STATIONING HAVE NOT BEEN VERIFIED WITH SITE SURVEY AND THEREFORE, SHOULD BE CONSIDERED APPROXIMATE

LEGEND:
- BELOW GROUND PIPE
- ABOVE GROUND PIPE
- GATE VALVE
- BLIND FLANGE

0 20' 40' 80' 120' 160'

1" = 40'-0"

SIMPSON GUMPERTZ & HEGER
480 Totten Pond Road
Waltham, MA 02451
781.907.9000
sgh.com

| | | | | |
|---|---|---|---|---|
| Project: MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION OPERATION, MAINTENANCE, AND INSPECTION MANUAL | | | | Drawing No.: FIG. 3 |
| Title: PENETRATION LOCATIONS | | | | Scale: 1" = 40'-0" |
| Drawn: RKP | Checked: JAD | Approved: BPS | Project No.: 240840 | Date: 10/2/2024 |

# APPENDIX A

**Appendix A. Floodwall Penetration Inventory (Including Abandoned Penetrations)**
**MIRA Dissolution Authority**

| ID No. | Station | Description | Diameter/Size and Material of Penetration | Invert Elevation at Floodwall Centerline (ft NGVD 29) | Status | Backflow Prevention Measures |
|---|---|---|---|---|---|---|
| HD-36 | 84+21M | Roof drain outfall | 12 in. dia. pipe - Cast Iron | 21.92 | Active | Flap valve at riverside outfall, gate valve in valve chamber immediately landside |
| HD-37 | 85+28M | Compressed air and water | 1.5 in. dia. city water<br>1 in. dia. compressed air<br>6 in. dia. service water | 25.0 | Inactive | Unknown |
| HD-38 | 84+55M | Non-contact cooling water intake (Unit 6) | 48 in. dia. pipe - Steel | ~9.5 | Inactive | Two gate valves in Screenhouse No. 1 on riverside, one on each intake pump |
| - | 85+40.9 | Non-contact cooling water (Former Units 1 and 2) | Two stacked 9.5 ft tall by 7 ft wide concrete tunnels | 11 (Intake)<br>-1 (Discharge) | Abandoned | Abandoned by bulkheading on landside and riverside and filling with concrete. The discharge tunnel, which runs parallel to the floodwall on the riverside. The outfall was bulkheaded and the tunnel between the concrete plug and outfall was backfilled with sand. |
| HD-42 | 85+60 | Oil and steam | 8 in. dia. pipe - Steel<br>4 in. dia. pipe - Steel | ~26 | Abandoned | Abandoned by cutting and filling with grout in 2015 as part of a closure structure improvement project. |
| HD-43 | 86+77.5M | Service water intake | 24 in. dia. pipe placed inside<br>48 in. dia. pipe - Steel | 17.77 | Inactive | Two gate valves in Screenhouse No. 3 on riverside, one on each intake pump |
| HD-44 | 87+65M | Non-contact cooling water intake (Unit 5) | 48 in. dia. pipe - Steel | 16.3 | Inactive | Two gate valves in Screenhouse No. 3 on riverside, one on each intake pump |
| HD-45 | 87+40.6M | Water discharge (Source unknown) | 14 in. dia. pipe - Cast Iron | 22.25 | Inactive | Unknown |
| HD-46 | 87+35.85M | Service water discharge | 48 in. dia. pipe - Steel | 18.0 | Inactive | Unknown |
| HD-47 | 87+85M | Non-contact cooling water discharge (Unit 5) | 48 in. dia. pipe - Steel | ~9.5 | Inactive | Gate valve in turbine hall on landside |
| HD-47a | 88+34M | Non-contact cooling water discharge (Unit 6) | 48 in. dia. pipe - Steel | 17.13 | Inactive | Gate valve in turbine hall on landside |
| HD-48 | 89+36.5M | Storm drain (former ash pit outfall) | 12 in. dia. pipe - Cast Iron | 7.72 | Inactive | Flap valve at riverside outfall, gate valve in valve chamber immediately landside |
| HD-49 | 90+75M | Oil pipe in former ash pit outfall | 8 in. dia. oil line (Steel) placed inside<br>10 in. dia. drain line (Cast Iron) | 16.86 | Inactive | Blind flange and gate valve at south dock on riverside, blind flange in valve chamber immediately landside |
| HD-50a | 92+31.7M | Liquid fuel line | 8 in. steel pipe encased in concrete | ~43.5 | Inactive | Blind flange and gate valve at south dock on riverside |

# APPENDIX B

**MIRA Dissolution Authority**

**Floodwall Penetration Inspection Checklist**

Date of Inspection: _____

Inspection Type (Routine or Pre-/During-/Post-Flooding): _____

Inspector: _____

If any of the deficencies below are observed, they shall be marked "Y" below and photographed. Provide detailed notes of the observed conditions.
Any observed deficiencies shall be addressed as soon as practical.

| Item to Check | Penetrations | | | | | | | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HD-36 (Roof Drain Outfall) | HD-37 (Inactive Compressed Air and Water) | HD-38 (Inactive Unit 6 Non-Contact Cooling Water Intake) | HD-43 (Inactive Service Water Intake) | HD-44 (Inactive Unit 5 Non-Contact Cooling Water Intake) | HD-45 (Inactive Water Discharge) | HD-46 (Inactive Service Water Discharge) | HD-47 (Inactive Unit 5 Non-Contact Cooling Water Discharge) | HD-47a (Inactive Unit 6 Non-Contact Cooling Water Discharge) | HD-48 (Inactive Former Ash Pit Outfall) | HD-49 (Inactive Oil Line in Former Ash Pit Outfall) | HD-50a (Inactive Liquid Fuel Line) | |
| **Ground Surface Near Penetrations** | | | | | | | | | | | | | |
| Settlement, depressions, or sinkholes | | | | | | | | | | | | | |
| Soft soil | | | | | | | | | | | | | |
| Erosion | | | | | | | | | | | | | |
| Wet spots or flowing water | | | | | | | | | | | | | |
| Sand boils or sand piles | | | | | | | | | | | | | |
| **Exposed Sections of Pipe** | | | | | | | | | | | | | |
| Cracking | | | | | | | | | | | | | |
| Holes | | | | | | | | | | | | | |
| Deterioration or excessive corrosion | | | | | | | | | | | | | |
| **Flap Gates** | | | | | | | | | | | | | |
| Debris preventing the flap gate from closing | | | | | | | | | | | | | |
| Flap gate not swinging freely | | | | | | | | | | | | | |
| Debris or sediment around the flap gate | | | | | | | | | | | | | |
| Damage or distress to the headwall | | | | | | | | | | | | | |
| Movement of the headwall | | | | | | | | | | | | | |

**MIRA Dissolution Authority**

**Floodwall Penetration Inspection Checklist**

Date of Inspection: _____

Inspection Type (Routine or Pre-/During-/Post-Flooding): _____

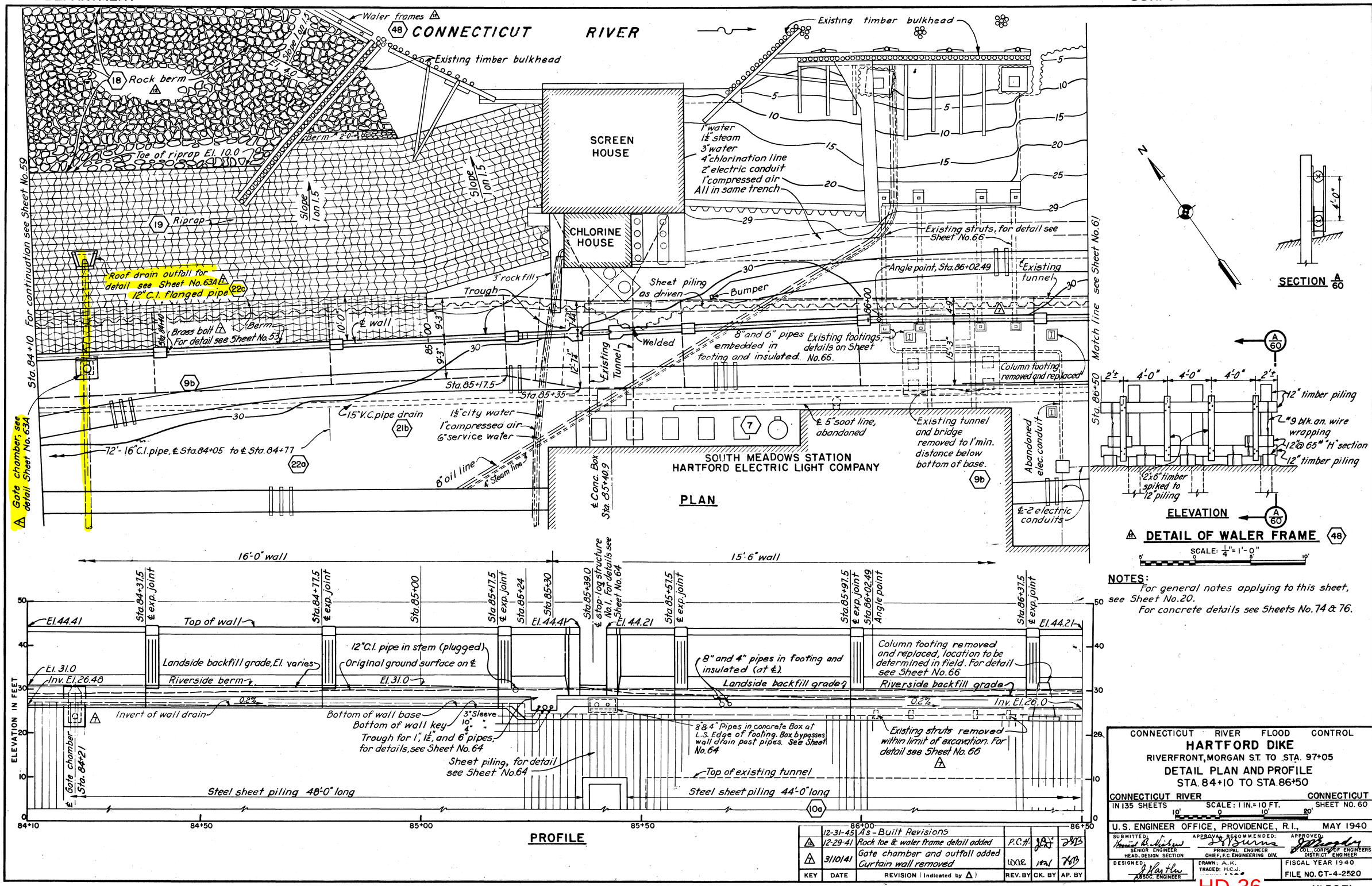
Inspector: _____

If any of the deficencies below are observed, they shall be marked "Y" below and photographed. Provide detailed notes of the observed conditions.
Any observed deficiencies shall be addressed as soon as practical.

| Item to Check | Penetrations | | | | | | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HD-36 (Roof Drain Outfall) | HD-37 (Inactive Compressed Air and Water) | HD-38 (Inactive Unit 6 Non-Contact Cooling Water Intake) | HD-43 (Inactive Service Water Intake) | HD-44 (Inactive Unit 5 Non-Contact Cooling Water Intake) | HD-45 (Inactive Water Discharge) | HD-46 (Inactive Service Water Discharge) | HD-47 (Inactive Unit 5 Non-Contact Cooling Water Discharge) | HD-47a (Inactive Unit 6 Non-Contact Cooling Water Discharge) | HD-48 (Inactive Former Ash Pit Outfall) | HD-49 (Inactive Oil Line in Former Ash Pit Outfall) | HD-50a (Inactive Liquid Fuel Line) | |
| **Gate valves** | | | | | | | | | | | | | |
| Leakage or damage | | | | | | | | | | | | | |
| Locks and chains on handwheels missing | | | | | | | | | | | | | |
| Gate open (for permanently closed gates) | | | | | | | | | | | | | |
| Gate does not move freely | | | | | | | | | | | | | |
| **Valve chambers** | | | | | | | | | | | | | |
| Missing or damaged chamber cover | | | | | | | | | | | | | |
| Spalling or deterioration of concrete | | | | | | | | | | | | | |
| Cracks or holes in concrete | | | | | | | | | | | | | |
| Leakage of water or soil through concrete | | | | | | | | | | | | | |
| Excessive corrosion or deterioration of steps | | | | | | | | | | | | | |

Additional Notes:

# APPENDIX C




NOTES:
For general notes applying to this sheet, see Sheet No.20.
For concrete details see Sheets No.74 & 76.

| KEY | DATE | REVISION (Indicated by Δ) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As-Built Revisions | | | |
| Δ | 12-29-41 | Rock toe & waler frame detail added | P.C.H. | JCC | JWB |
| Δ | 3/10/41 | Gate chamber and outfall added Curtain wall removed | WAE | WAL | JWB |

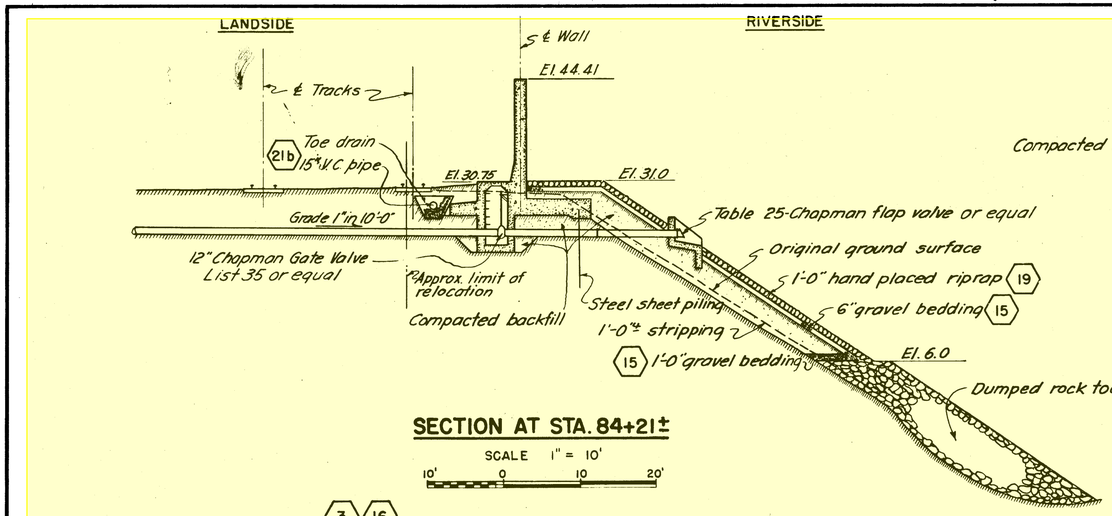
CONNECTICUT RIVER FLOOD CONTROL
HARTFORD DIKE
RIVERFRONT, MORGAN ST. TO STA. 97+05
DETAIL PLAN AND PROFILE
STA. 84+10 TO STA. 86+50

CONNECTICUT RIVER — CONNECTICUT
IN 135 SHEETS — SCALE: 1 IN. = 10 FT. — SHEET NO. 60

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

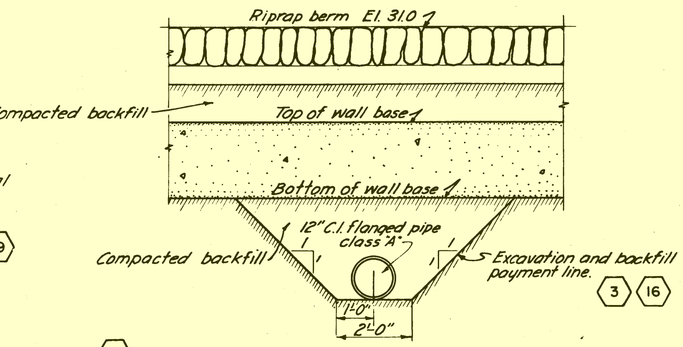
SUBMITTED: Lionel R. Wilson, SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: J.S. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: Stoddard, COL. CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: J. Wathen, ASSOC. ENGINEER
DRAWN: A.K.
TRACED: H.C.J.
FISCAL YEAR 1940
FILE NO. CT-4-2520

HD-36



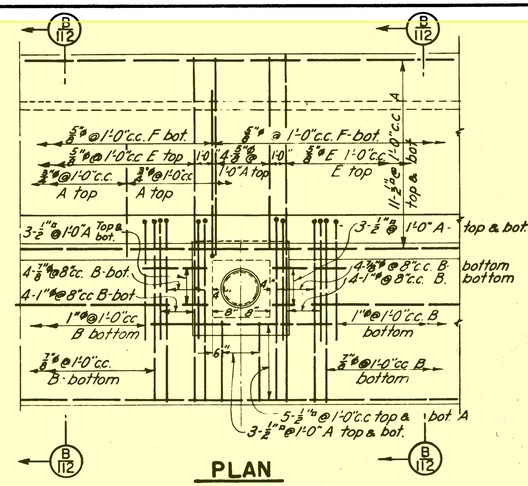

## SECTION AT STA. 84+21±

SCALE 1" = 10'




## SECTION B/63A

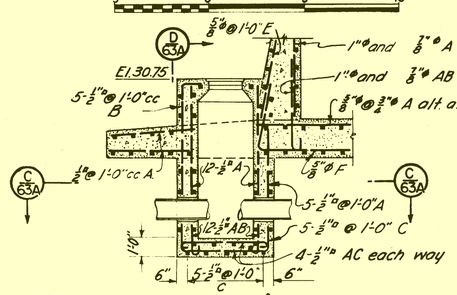
SCALE 1/2" = 1'-0"



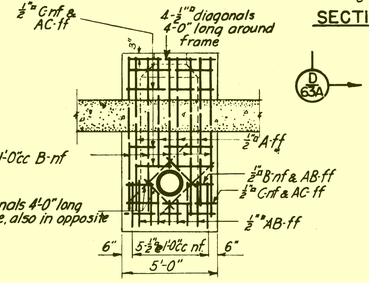

## PLAN

WALL BASE STEEL

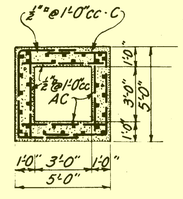
SCALE 1/4 = 1'-0"




## SECTION A/63A



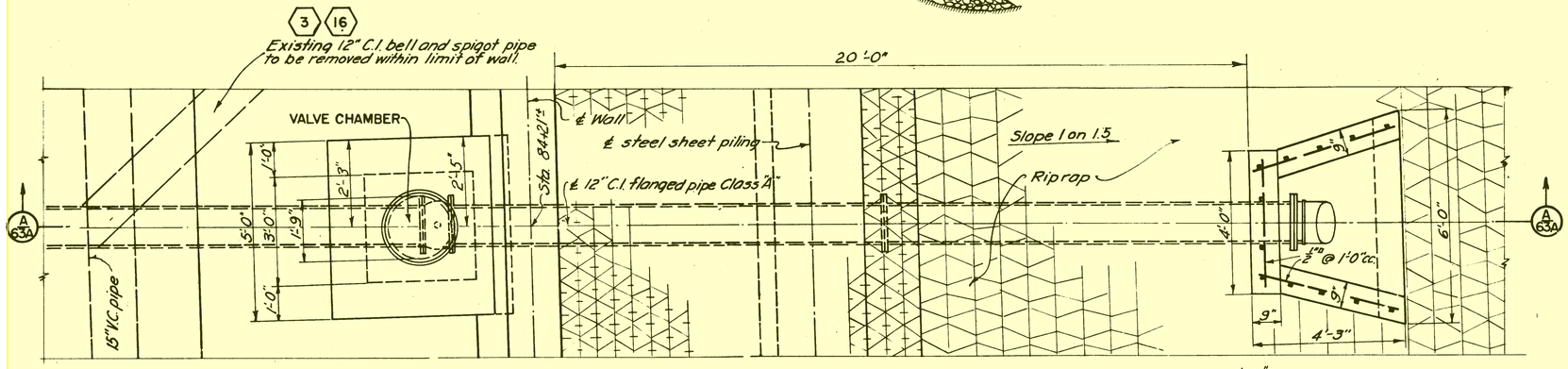

## SECTION D/63A




## SECTION C/63A

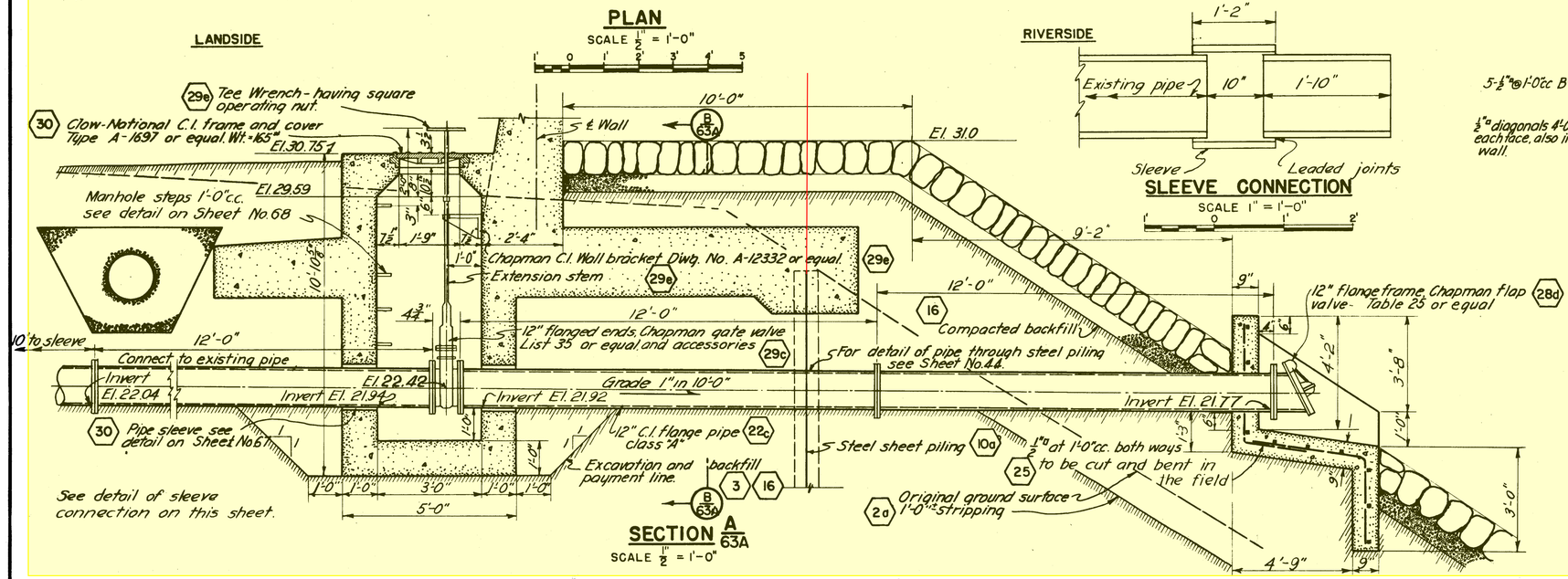
## VALVE CHAMBER REINFORCING DETAILS

SCALE 1/4 = 1'-0"




## PLAN

SCALE 1/2" = 1'-0"




## SECTION A/63A

SCALE 1/2" = 1'-0"




## SLEEVE CONNECTION

SCALE 1" = 1'-0"

THIS SHEET ADDED TO SET AS OF CHANGE ORDER NO. 5

| KEY | DATE | REVISION (INDICATED BY △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12/31/45 | As built revisions | | | |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT. MORGAN ST. TO STA. 96+73

## DETAIL OF ROOF DRAIN OUTFALL AT STA. 84+21± SOUTH MEADOWS STATION

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1/2 IN. = 1 FT. — SHEET NO. 63A

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., FEB. 1941

| SUBMITTED: | APPROVAL RECOMMENDED: | APPROVED: |
|---|---|---|
| SENIOR ENGINEER, HEAD, DESIGN SECTION | PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV. | W. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER |

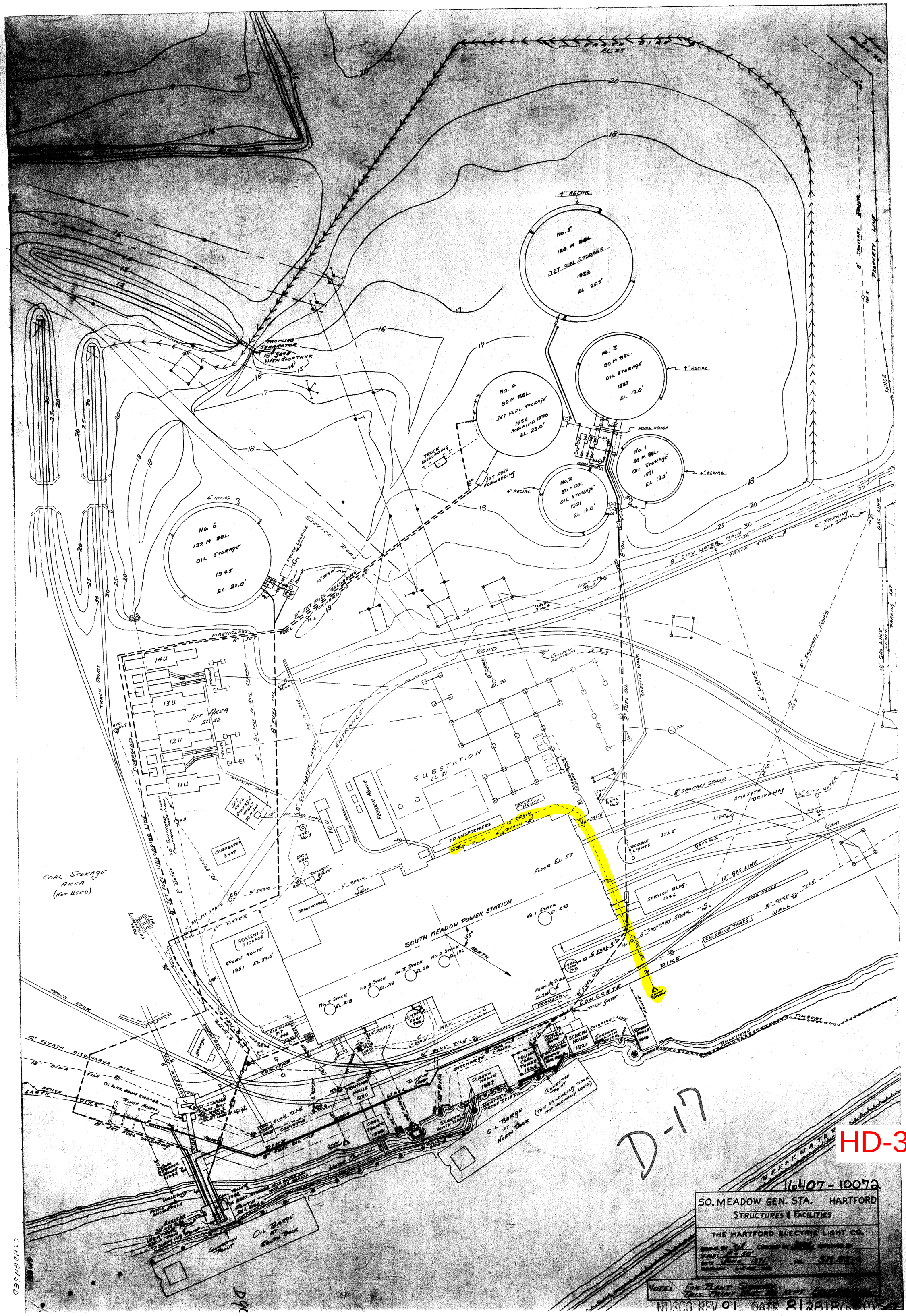
| DESIGNED: | DRAWN: D.W.C. | FISCAL YEAR 1941 |
|---|---|---|
| ASSOC. ENGINEER | TRACED: M.H.L. | FILE NO. CT-4-2849 |
| | CHECKED: | |

Ht. 5 & 7b

63A

HD-36

PRINTED ON "ARGYRIGHT" TRACING CLOTH KEUFFEL & ESSER CO., N. Y.


4" RECIRC.
No. 5
120 M BBL.
JET FUEL STORAGE
1958
EL. 25.5'
No. 3
80 M BBL.
OIL STORAGE
1933
EL. 17.0'
4" RECIRC.
No. 4
80 M BBL.
JET FUEL STORAGE
1934
MODIFIED 1970
EL. 23.0'
PUMP HOUSE
No. 1
50 M BBL.
OIL STORAGE
1931
EL. 19.0'
4" RECIRC.
No. 2
50 M BBL.
OIL STORAGE
1931
EL. 19.0'
4" RECIRC.
No. 6
132 M BBL.
OIL STORAGE
1945
EL. 22.0'
PROPOSED SEPARATOR
18" GATE WITH SLOP TANK
TRUCK UNLOADING
JET FUEL FORWARDING
TRUCK LOADING
PUMP HOUSE
SERVICE ROAD
8" JET FUEL UNLOADING FORWARDING LINE
FIBERGLASS 6" JET FUEL
8" FUEL OIL
8" CITY WATER MAIN
8" OIL
TRACK SPUR
10" PARKING LOT DRAIN
12" GAS LINE
FENCE
PARKING LOT
8" SANITARY SEWER
6" WATER
AMESITE WALK
ROAD
ENTRANCE
SUBSTATION
EL. 31
FEEDER HOUSE
RELAY HOUSE
TRANSFORMERS
AMESITE
AMESITE DRIVEWAY
ISLE
DOUBLE LIGHTS
LIGHT
VENT
FLOOR EL. 37
SERVICE BLDG. 1946
CHLORINE TANKS
DIKE
WALL
TIMBERS
JET AREA
EL. 32
14 U
13 U
12 U
11 U
JET FUEL STORAGE TANKS 30 M CAP.
CARPENTER SHOP
DRY WELL
DELUGE HOUSE
TRANSFORMER
COAL STORAGE AREA (NOT USED)
SORBENT-C STORAGE
STORE HOUSE 1951 EL. 35.0'
SOUTH MEADOW POWER STATION
No. 1 Stack EL. 238
No. 2 Stack EL. 196
No. 3 Stack EL. 219
No. 4 Stack EL. 218
No. 5 Stack EL. 218
55°
NORTH
ASH SLUICING PIT 1942
GARAGE
SCALE HOUSE
COAL CRUSHER HOUSE 1942
COAL TRANSFER HOUSE 1938
COAL TOWER 1938
SCREEN HOUSE 1937
SCREEN HOUSE 1921
FOUND COAL TOWER 1934
SCREEN HOUSE 1949
CONCRETE
DIKE GATE
CHLORINE LINE
TRANSFORMER
TRACK SPUR
12" FLYASH DISCHARGE PIPE
78" DIKE FILE
OIL SLICK BOOM STORAGE
"RIVER ROOM"
BOAT STORAGE
CONVEYOR
COAL TRUCK UNLOADING
COAL BARGE UNLOADING
OIL BARGE AT SOUTH DOCK
OIL BARGE AT NORTH DOCK
CONNECTION POINT
(THIS UNLOADING DOCK NOT NORMALLY USED)
BREAKWATER
TIMBERS
D-17
HD-36
16407 - 10072
SO. MEADOW GEN. STA. HARTFORD
STRUCTURES & FACILITIES
THE HARTFORD ELECTRIC LIGHT CO.
MISCO REV 01 DATE 8/28/81

SM 83

HD-36

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE SERVICE

FEEDER HOUSE

Wet Area

Wet Area

Wet Area

Power Line

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

RESERVE ROAD

N 34°-13'-40" W
591.36'
P.T. - P.C.

359.26'
210.72'

#26 C.M.S. (FD)

#38 M.S. BROKEN

#39 M.S. BROKEN

#52 #54 #11 D.H. #12 #20 #21 #10 #2 PK-SPK #3

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY

PROJECT SOUTH MEADOW GENERATING STATION

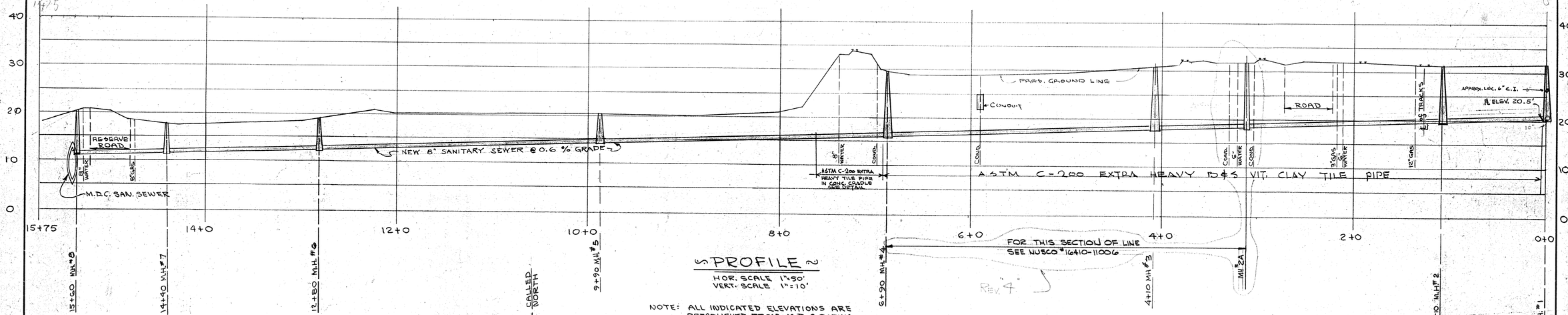
| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 89-1.54 DWG NO. 50532 VS. H-17-1

SHEET 2 OF 4

FOLD

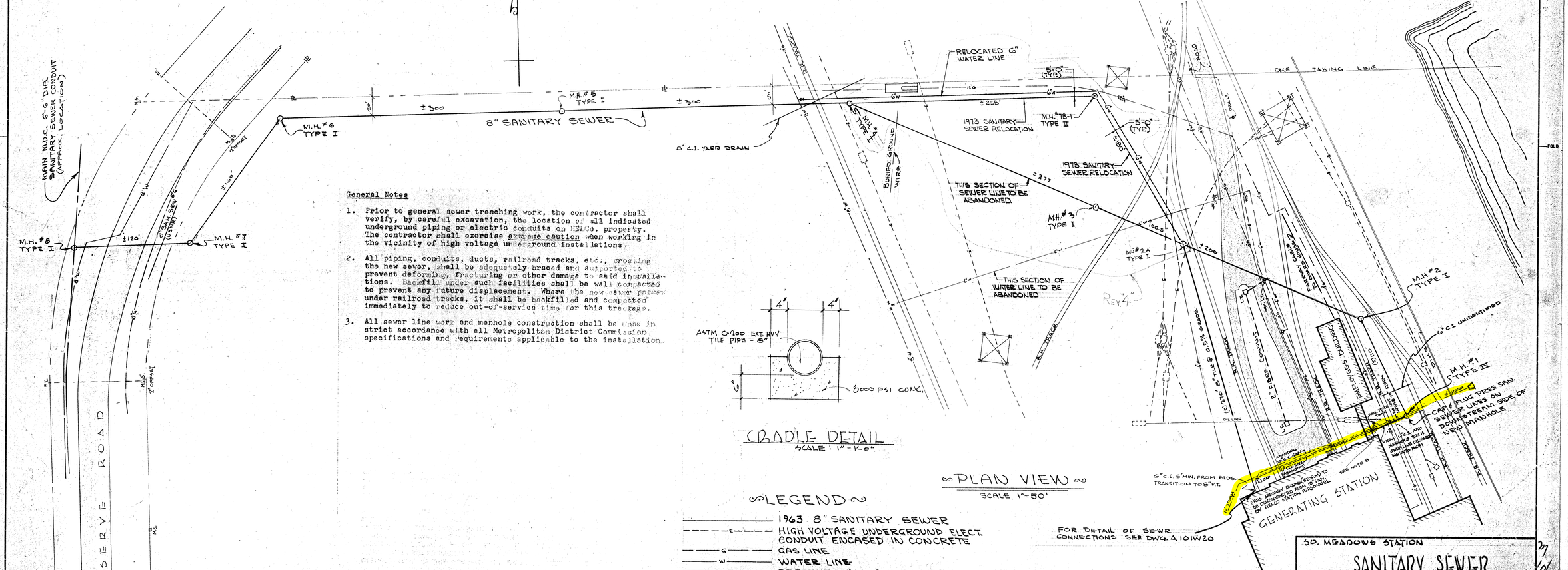
1975




## PROFILE

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

NOTE: ALL INDICATED ELEVATIONS ARE ESTABLISHED FROM M.D.C. DATUM




## PLAN VIEW

SCALE 1"=50'

## CRADLE DETAIL

SCALE: 1"=1'-0"




## LEGEND

- 1963 8" SANITARY SEWER
- E — HIGH VOLTAGE UNDERGROUND ELECT. CONDUIT ENCASED IN CONCRETE
- G — GAS LINE
- W — WATER LINE
- PRESENT SANITARY SEWER
- OIL FEED LINE
- PROPERTY OR TAKING LINES
- PRESENT STORM SEWER
- R.R. TRACK — RAILROAD TRACK

### General Notes

1. Prior to general sewer trenching work, the contractor shall verify, by careful excavation, the location of all indicated underground piping or electric conduits on HELCo. property. The contractor shall exercise extreme caution when working in the vicinity of high voltage underground installations.
2. All piping, conduits, ducts, railroad tracks, etc., crossing the new sewer, shall be adequately braced and supported to prevent deforming, fracturing or other damage to said installations. Backfill under such facilities shall be well compacted to prevent any future displacement. Where the new sewer passes under railroad tracks, it shall be backfilled and compacted immediately to reduce out-of-service time for this trackage.
3. All sewer line work and manhole construction shall be done in strict accordance with all Metropolitan District Commission specifications and requirements applicable to the installation.

| NO. | DATE | DESCRIPTION | BY | APP. BY |
|---|---|---|---|---|
| 4 | 3-28-78 | RELOCATED SEWER & WATER LINE | MF | |
| 3 | 11-7-66 | FIELD REVISIONS | [illegible] | [illegible] |
| 2 | 11-7-63 | ADD MH #2A, 370' TILE & MISC. | DKS | — |
| 1 | 10-17-63 | ADD NOTE, 3 MANHOLES & MISC. | DKS | — |

REVISIONS

50. MEADOWS STATION

# SANITARY SEWER

THE HARTFORD ELECTRIC LIGHT CO.
GENERAL ENGINEERING DEPARTMENT

DRAWN BY WSC. CHECKED BY [illegible] APPROVED BY [illegible]
SCALE AS SHOWN
DATE 7-12-63
NO. D247E18

11-107-10018

10/68

HD-36

Waler frames (48)

CONNECTICUT RIVER

Existing timber bulkhead

Slope 1on1.5

(18) Rock berm

Berm 2'-0"

Toe of riprap El. 10.0

Slope 1on1.5

(19) Riprap

SCREEN HOUSE

CHLORINE HOUSE

Existing timber bulkhead

1" water
1½" steam
3" water
4" chlorination line
2" electric conduit
1" compressed air
All in same trench

Existing struts, for detail see Sheet No.66

Angle point, Sta.86+02.49

Existing tunnel

Roof drain outfall for detail see Sheet No.63A (22c)
12" C.I. Flanged pipe

3" rock fill

Trough

Sheet piling as driven

Bumper

Brass bolt
For detail see Sheet No.53

Berm

℄ wall

Sta.84+10 For continuation see Sheet No.59

Sta.86+00

Match line see Sheet No.61

8" and 6" pipes embedded in footing and insulated.

Existing footings, details on Sheet No.66.

Welded

Existing Tunnel

Column footing removed and replaced

(9b)

Sta.85+17.5

Sta.85+35

15" V.C. pipe drain (21b)

1½" city water
1" compressed air
6" service water

72'-16" C.I. pipe, ℄ Sta.84+05 to ℄ Sta.84+77 (22a)

8" oil line

Steam line

℄ 5' soot line, abandoned

Existing tunnel and bridge removed to l'min. distance below bottom of base. (9b)

SOUTH MEADOWS STATION
HARTFORD ELECTRIC LIGHT COMPANY

Abandoned elec. conduit

℄ 2 electric conduits

℄ Conc. Box Sta.83+40.9

Gate chamber, see detail Sheet No.63A

PLAN

N

SECTION A/60

Sta.86+50

2'± 4'-0" 4'-0" 4'-0" 2'±

12" timber piling

#9 blk. an. wire wrapping

12"@65# "H" section

12" timber piling

2x6" timber spiked to 12" piling

ELEVATION (A/60)

## DETAIL OF WALER FRAME (48)

SCALE: ¼" = 1'-0"

16'-0" wall

15'-6" wall

Sta.84+37.5 ℄ exp. joint

Sta.84+17.5 ℄ exp. joint

Sta.85+00

Sta.85+17.5 ℄ exp. joint

Sta.85+24

Sta.85+30

Sta.85+39.0 ℄ stop-log structure No.1. For details see Sheet No.64

Sta.85+57.5 ℄ exp. joint

Sta.85+97.5 ℄ exp. joint

Sta.86+02.49 Angle point

Sta.86+37.5 ℄ exp. joint

El. 44.41

Top of wall

El. 44.41

El. 44.21

El. 44.21

12" C.I. pipe in stem (plugged)

Original ground surface on ℄

El. 31.0

Landside backfill grade, El. varies

Riverside berm

0.2%

Inv. El. 26.48

Invert of wall drain

Bottom of wall base

Bottom of wall key

3" Sleeve
10" "
4" "

Trough for 1", 1½", and 6" pipes; for details, see Sheet No.64

Sheet piling, for detail see Sheet No.64

8" and 4" pipes in footing and insulated (at ℄)

Landside backfill grade?

Riverside backfill grade

0.2%

Inv. El. 26.0

8" & 4" Pipes in concrete Box at L.S. Edge of footing. Box bypasses wall drain past pipes. See Sheet No.64

Existing struts removed within limit of excavation. For detail see Sheet No.66

Column footing removed and replaced, location to be determined in field. For detail see Sheet No.66

Top of existing tunnel

Steel sheet piling 48'-0" long

Steel sheet piling 44'-0" long (10a)

Gate chamber ℄ Sta.84+21

ELEVATION IN FEET

50 40 30 20 10 0

84+10 84+50 85+00 85+50 86+00 86+50

PROFILE

NOTES:

For general notes applying to this sheet, see Sheet No.20.

For concrete details see Sheets No.74 & 76.

| KEY | DATE | REVISION (Indicated by Δ) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As-Built Revisions | | | |
| Δ | 12-29-41 | Rock toe & waler frame detail added | P.C.H. | JCC | JWB |
| Δ | 3/10/41 | Gate chamber and outfall added<br>Curtain wall removed | WAE | WAL | JWB |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

DETAIL PLAN AND PROFILE

STA. 84+10 TO STA. 86+50

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE: 1 IN. = 10 FT. — SHEET NO. 60

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY 1940

SUBMITTED: Lionel R. Wilson, SENIOR ENGINEER, HEAD, DESIGN SECTION

APPROVAL RECOMMENDED: J. S. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: Stanley, D. COL. CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: J. Waylw, ASSOC. ENGINEER

DRAWN: A.K.
TRACED: H.C.J.
CHECK

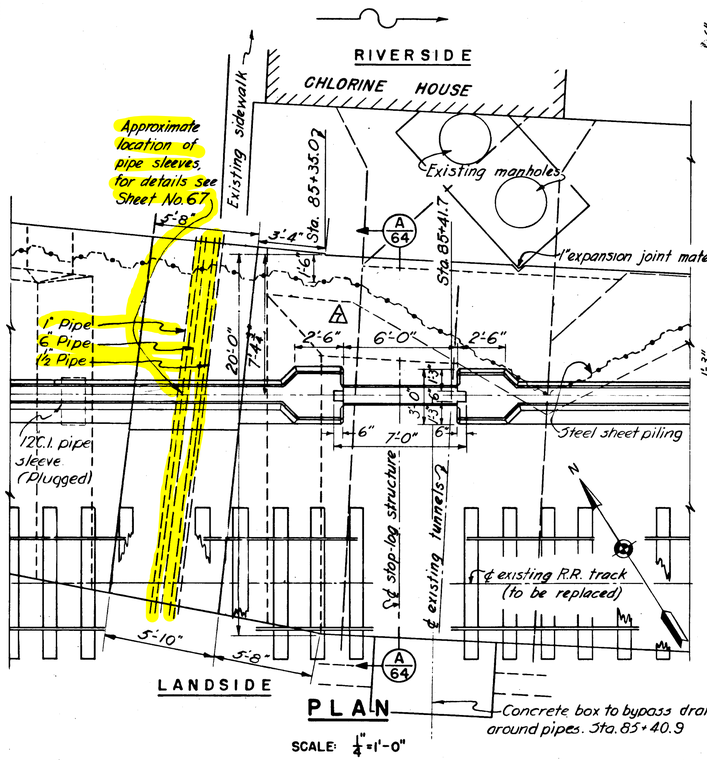
FISCAL YEAR 1940

FILE NO. CT-4-2520

HD-37

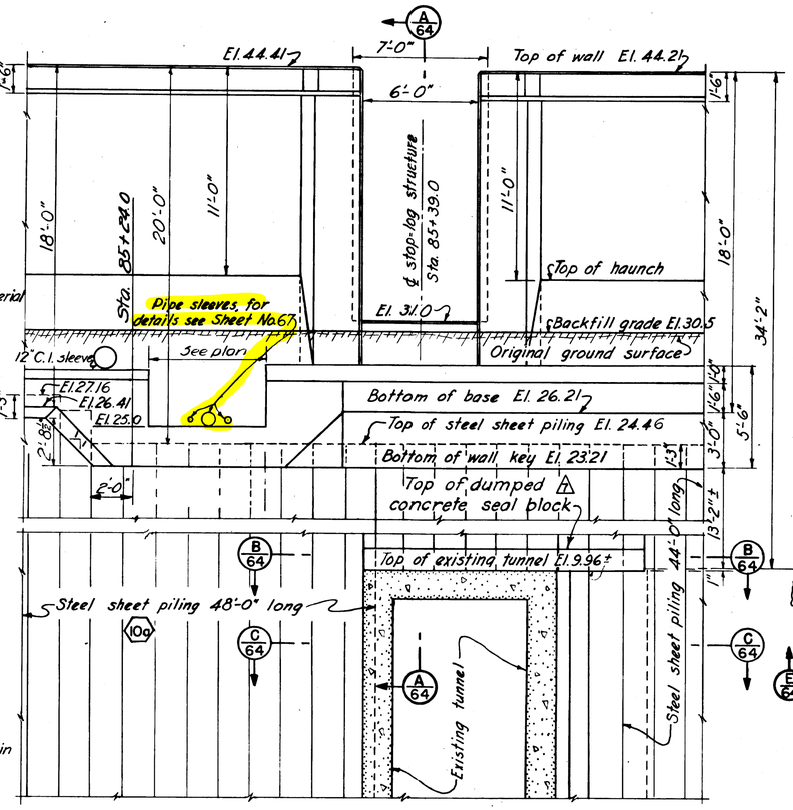
Ht. 5&7b

60



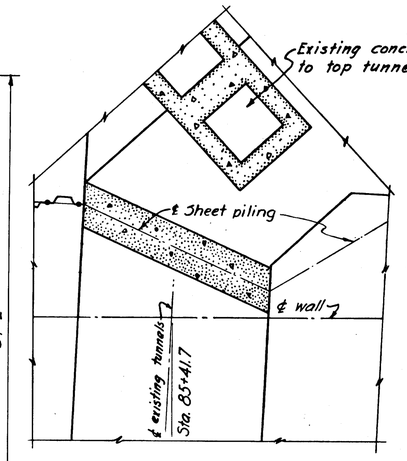

PLAN

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



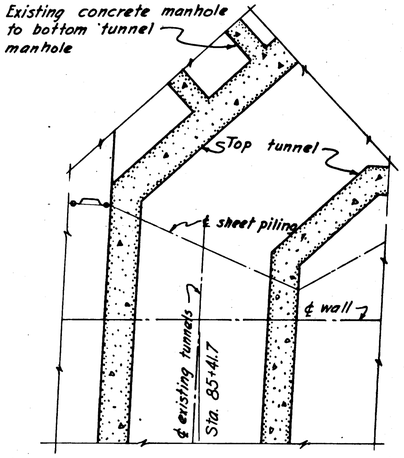

LANDSIDE ELEVATION

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



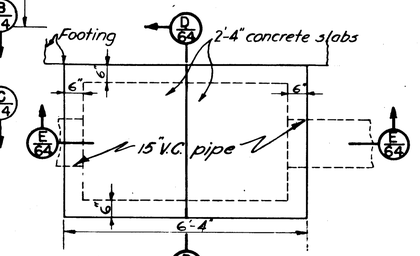

SECTION B/64

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

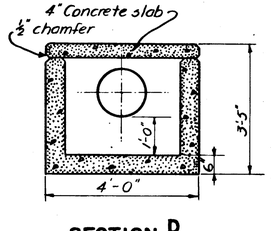



SECTION C/64

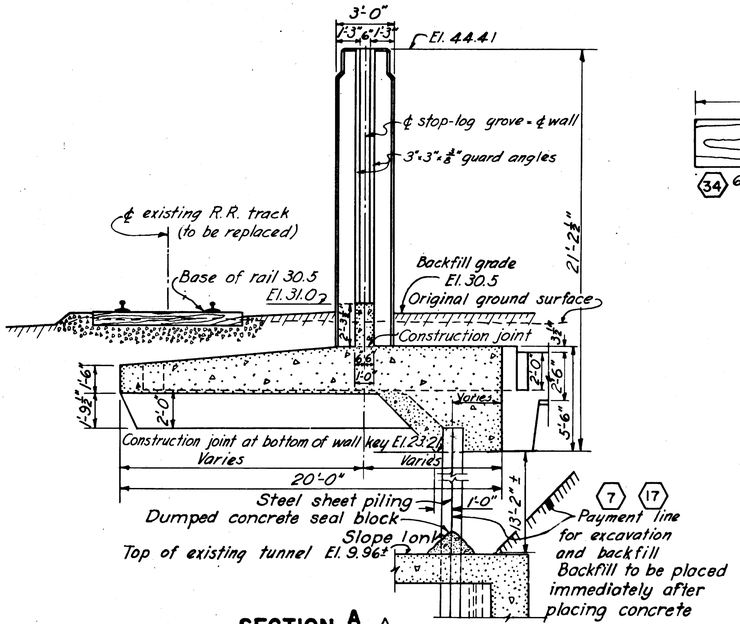
SCALE: 1/4" = 1'-0"




PLAN

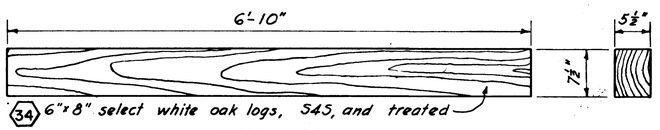



SECTION D/64




SECTION A/64 ⚠

SCALE: 1" = 1'-0"

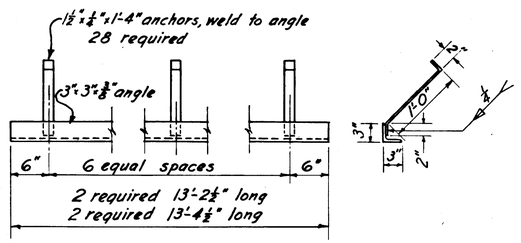



34 6"x8" select white oak logs, 545, and treated

DETAIL OF STOP-LOG

21 REQUIRED 34

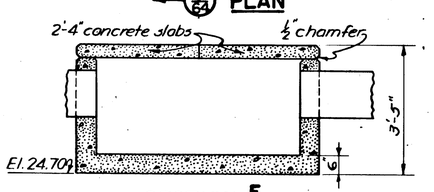
SCALE: 1" = 1'-0"




DETAIL OF STOP-LOG GROOVE ANGLE

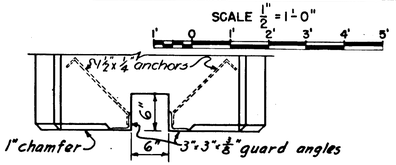
4 REQUIRED 30

SCALE: 1" = 1'-0"




SECTION E/64

DETAILS - SPECIAL M.H. AT STA. 85+40.9




DETAIL OF STOP-LOG GROOVE

SCALE: 1" = 1'-0"

NOTES:

For general notes applying to this sheet, see Sheet No. 20.

For steel reinforcement details, see Sheets No. 113 and 114.

For Plan and Profile see Sheet No. 60.

| KEY | DATE | REVISION (Indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| △ | 3-10-41 | Curtain wall removed. | WGE | RBL | JJS |

CONNECTICUT RIVER FLOOD CONTROL

HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 96+73

STOP-LOG STRUCTURE NO. 1

SOUTH MEADOW STATION

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE: 1/4 IN. = 1 FT. — SHEET NO. 64

U. S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Howard S. Nichols, SENIOR ENGINEER, HEAD, DESIGN SECTION

APPROVAL RECOMMENDED: R. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: J. J. Stadler, LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: J. Martin, ASSOC. ENGINEER

DRAWN: W. C. B.

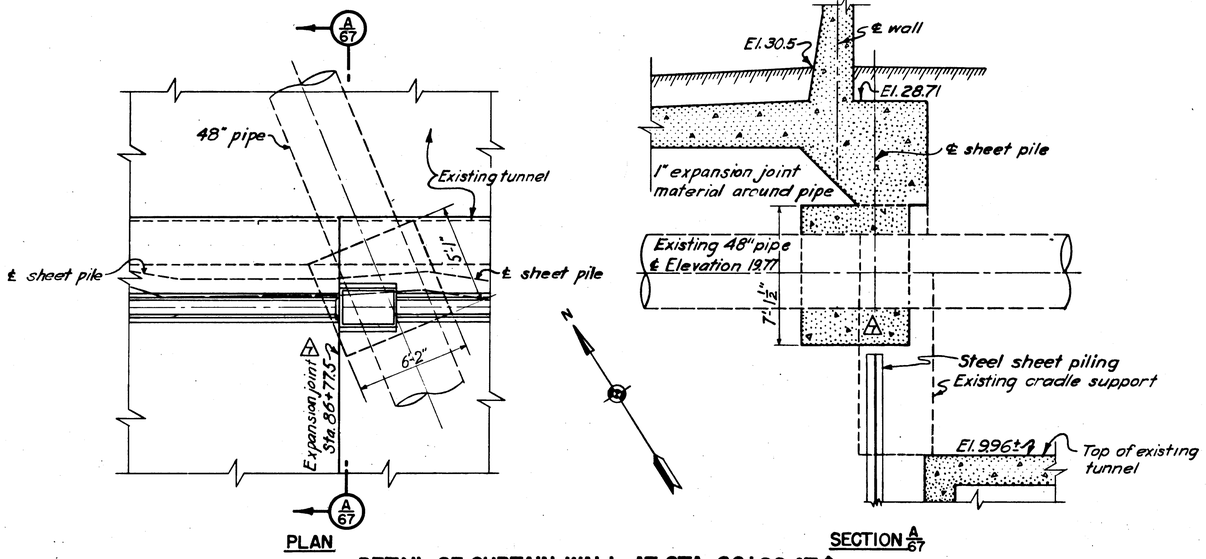
TRACED: B. S.

CHECKED: WGE

FISCAL YEAR 1940

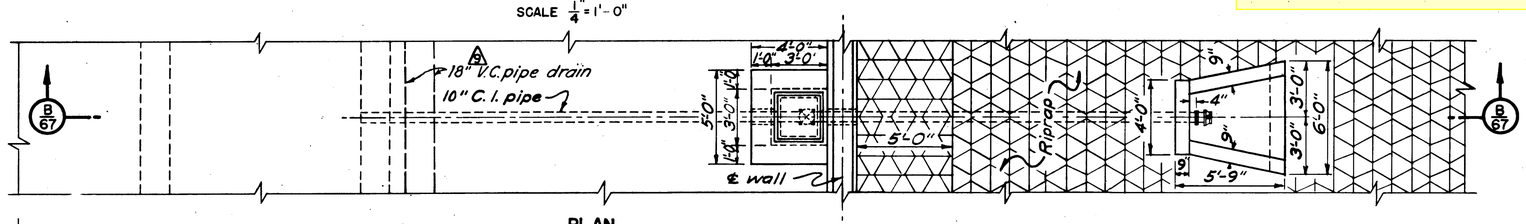
FILE NO. CT-4-2524

PRINTED ON "ARMYWRIGHT" TRACING CLOTH KEUFFEL & ESSER CO., N.Y.

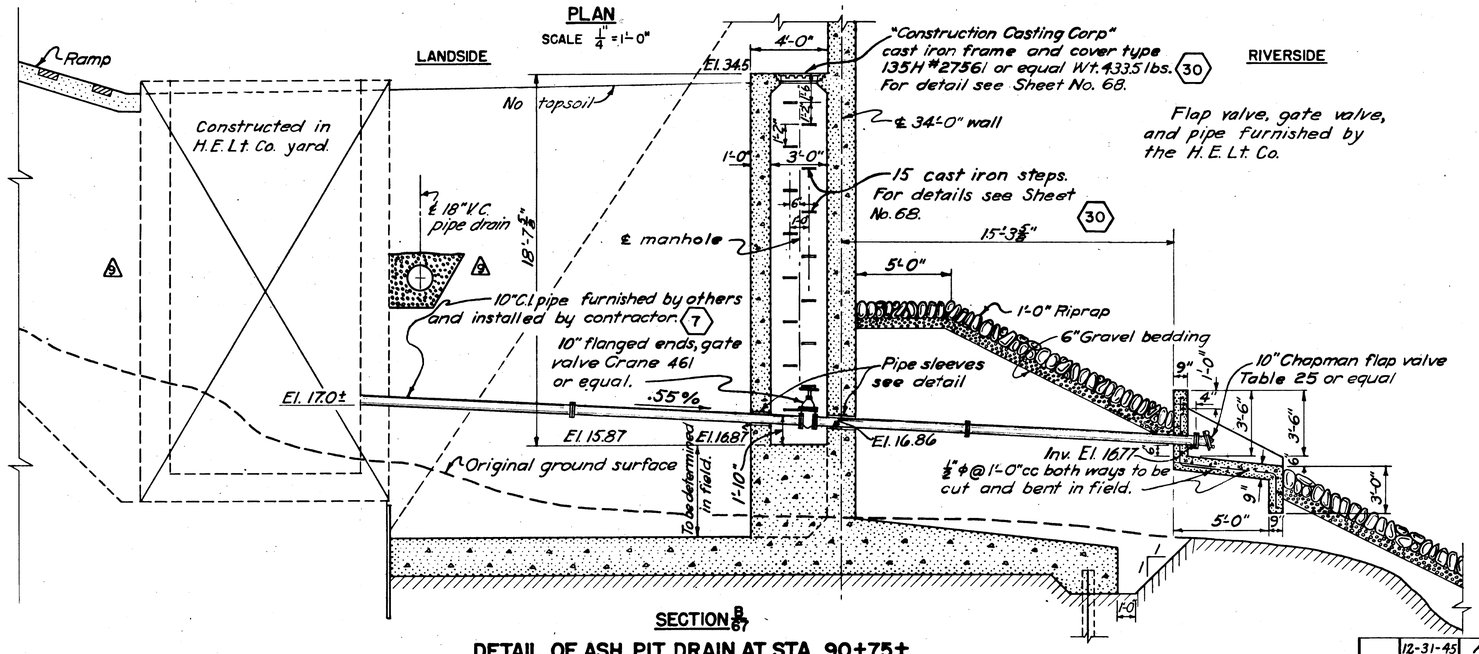



## DETAIL OF CURTAIN WALL AT STA. 86+80 AT ℄

SCALE 1/4" = 1'-0"

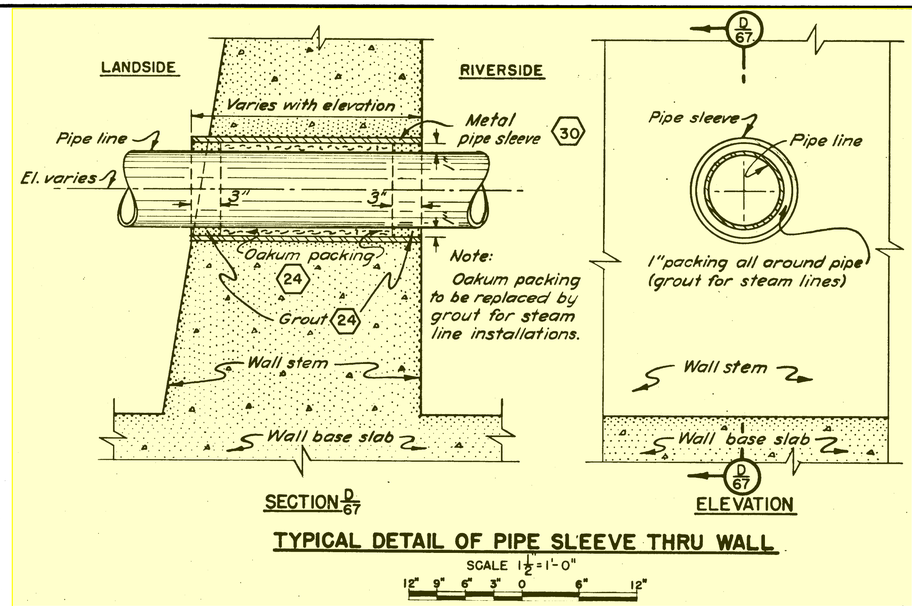



PLAN




## DETAIL OF ASH PIT DRAIN AT STA. 90+75±

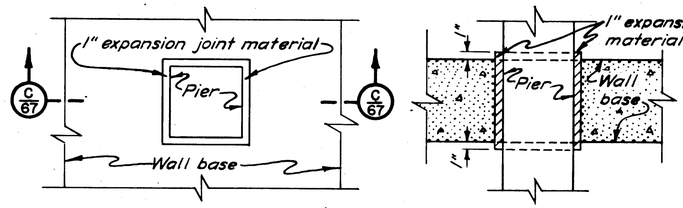
SCALE 1/4" = 1'-0"




## TYPICAL DETAIL OF PIPE SLEEVE THRU WALL

SCALE 1½" = 1'-0"

12" 9" 6" 3" 0 6" 12"




## TYPICAL DETAIL OF PIER THRU BASE SLAB

FOR LOCATION SEE SHEET NO. 62

NOT TO SCALE

### NOTES

For general notes applying to this sheet see Sheet No. 20.

For Plan and Profile see Sheet No. 62.

For steel reinforcing details see Sheets No. 120 & 126.

| KEY | DATE | REVISION (Indicated by Δ) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| 5 | 8-7-41 | 18" V.C. pipe drain relocated | RCH | | |
| 4 | 3/10/41 | Curtain wall removed. | WQE | | |

CONNECTICUT RIVER FLOOD CONTROL

HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 96+73

MISCELLANEOUS CONCRETE DETAILS NO. 2

SOUTH MEADOWS STATION

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1/4 IN = 1 FT. — SHEET NO. 67

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY 1940

SUBMITTED: Harold B. Nichols, SENIOR ENGINEER, HEAD, DESIGN SECTION

APPROVAL RECOMMENDED: [illegible], PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: [illegible], LT. COL. CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: [illegible], ASSOC. ENGINEER

DRAWN: W.C.B. & A.K.

TRACED: R.K.J.

CHECKED: W.Q.E.

FISCAL YEAR 1940

FILE NO. CT-4-2527

Ht. 587b

HD-37

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE

FEEDER

Wet Area

Wet Area

Wet Area

Power Line

Wet Area

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

N 34°-13'-40" W
591.36'
P.T. - P.C.

RESERVE ROAD

#38 M.S. BROKEN

#39 M.S. BROKEN

#26 C.M.S. (FD)

359.26'

210.72'

MATCH LINE SEE SHEET 3

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARK-OUTS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY

PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 89-1.54 DWG NO. 50532 VS. H-17-1

SHEET 2 OF 4

HD-38

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE SERVICE

HOUSE FEEDER

Wet Area

Wet Area

Wet Area

Power Line

Wet Area

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

N 34°-13'-40" W
591.36'
P.T. - P.C.

RESERVE ROAD

#38 M.S. BROKEN

#39 M.S. BROKEN

#26 C.M.S. (FD)

359.26'

210.72'

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 3

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MAPS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

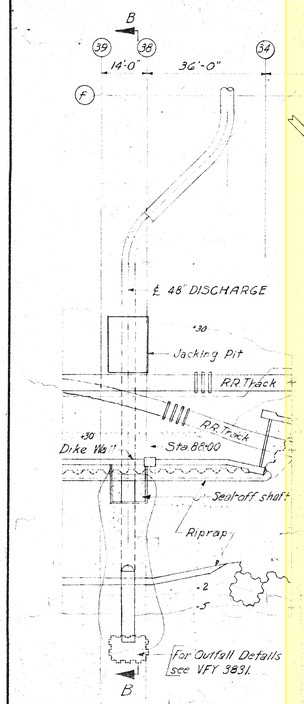
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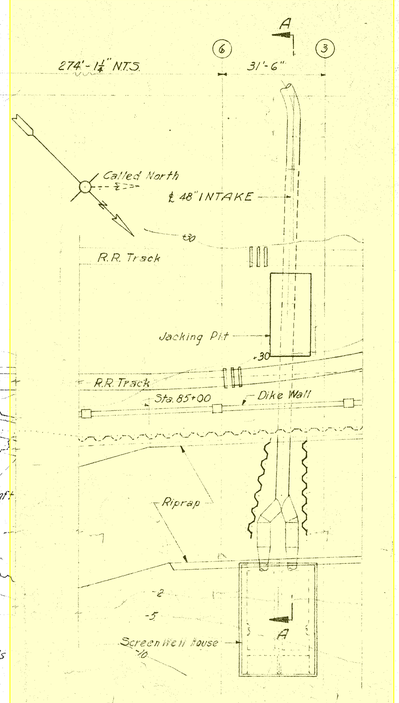
PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY EFF

PROJECT SOUTH MEADOW GENERATING STATION

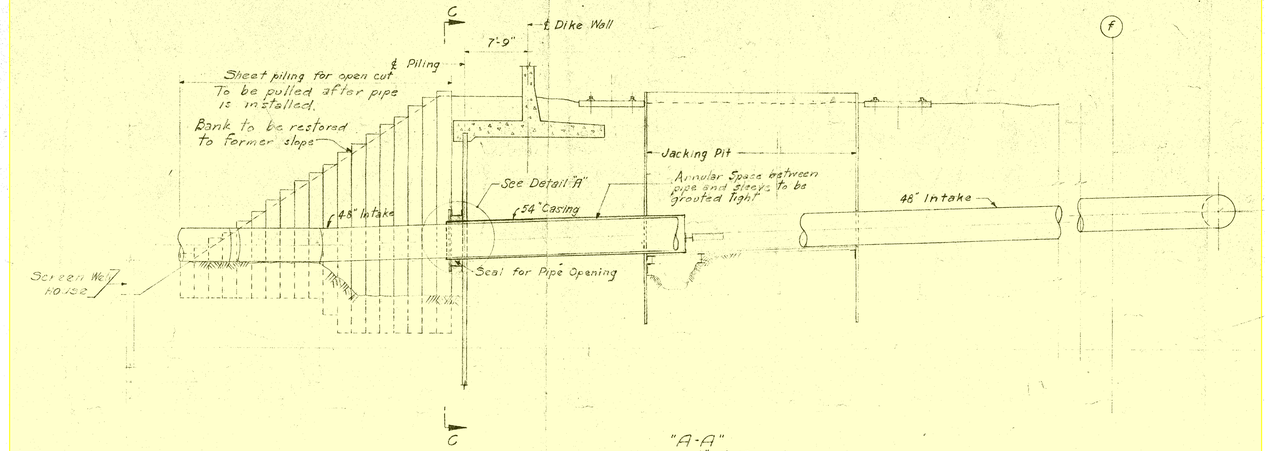
| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 69-1.54 DWG NO. 50532 V.S. N-17-1
SHEET 2 OF 4

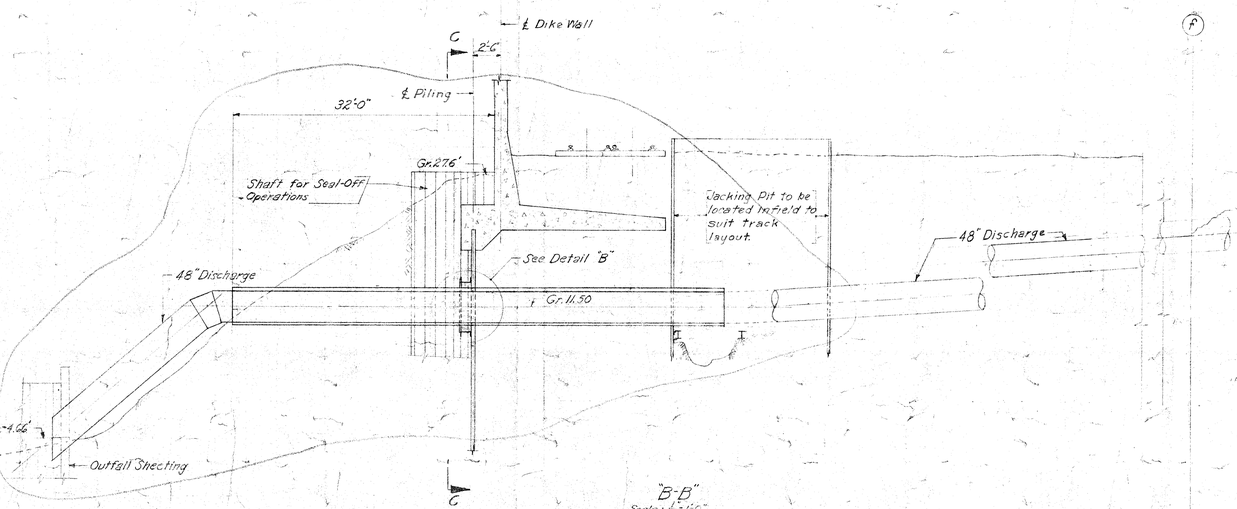


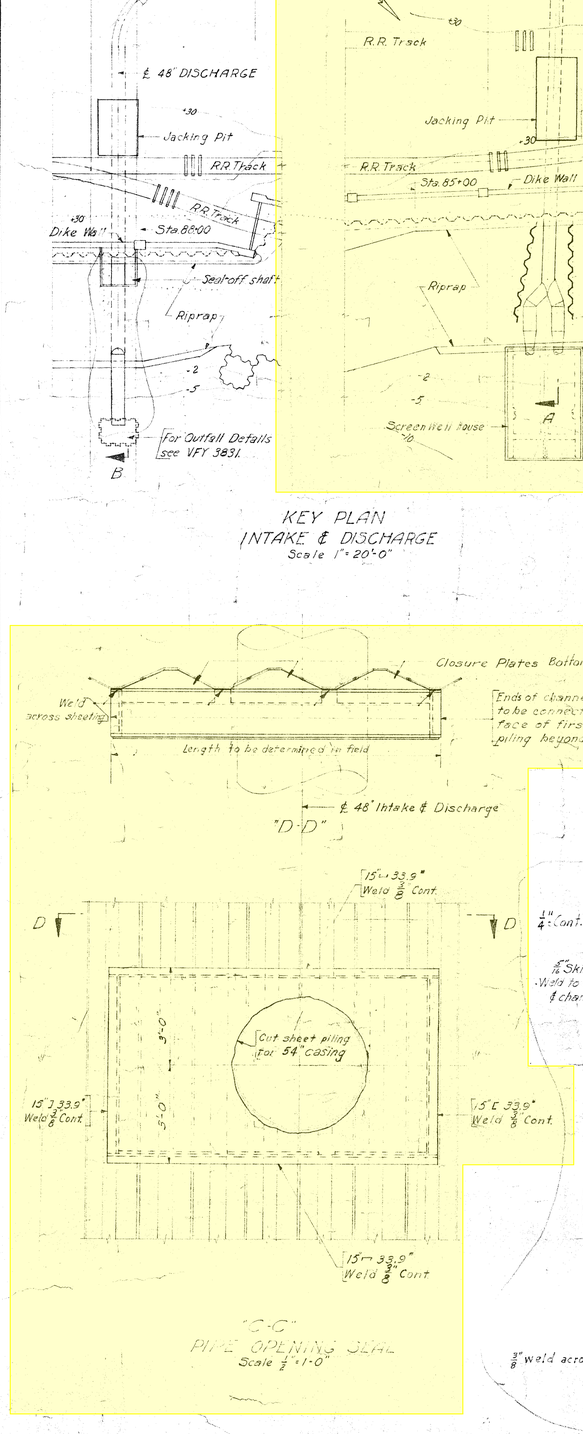

KEY PLAN
INTAKE & DISCHARGE
Scale 1"=20'-0"




"A-A"
Scale ⅜"=1'-0"



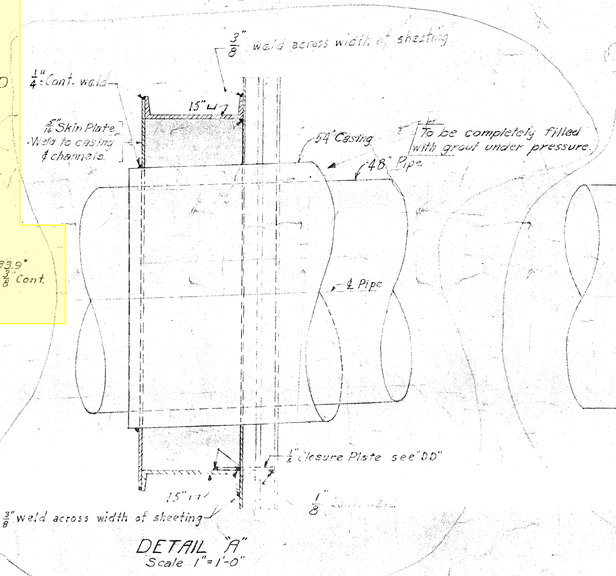

"B-B"
Scale: ⅛"=1'0"



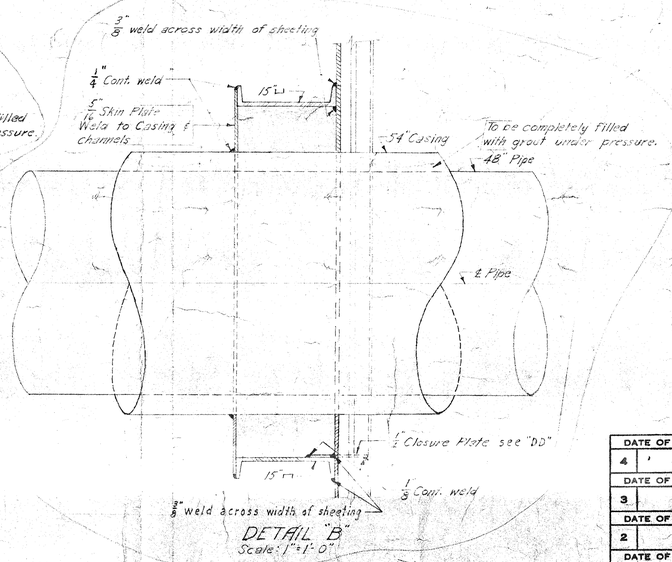

"D-D"




"C-C"
PIPE OPENING SEAL
Scale ½"=1'-0"




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




DETAIL "B"
Scale: 1"=1'-0"

Notes:
Scale as shown.
For Intake & Discharge Lines, See Dwgs. VFX3512 & VFX3511

APPROVED Ernest A. Dochstader
REGISTERED PROFESSIONAL ENG. No. 1287
STATE OF CONNECTICUT

| NO. | DESCRIPTION | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|---|
| 1 | DISCHARGE ENDSTRIP, ℄ CASING CHNGD. DETAIL 'A' ADDED | | | | |
| DATE OF SIGNATURES | | 6-17-49 | 6-17-49 | 6/17/49 | 6/21/49 |
| 2 | | | | | |
| DATE OF SIGNATURES | | | | | |
| 3 | | | | | |
| DATE OF SIGNATURES | | | | | |
| 4 | | | | | |
| DATE OF SIGNATURES | | | | | |

TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE.

# DETAILS THRU DIKE AT CIRCULATING WATER LINES

SUBSTRUCTURE

1949 EXT. - SOUTH MEADOW STATION

THE HARTFORD ELECTRIC LIGHT CO.

STONE & WEBSTER ENGINEERING CORPORATION

SCALE GIVEN
JULY 26, 1948
J. O. NO. 8018

| CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|
| 7-30-49 | 7-30-49 | 8-4-49 | 8-11-49 |
| JPG | Rud & | H&C | E&D |

VFX 4745

B.C. 11016

HD-38-11017

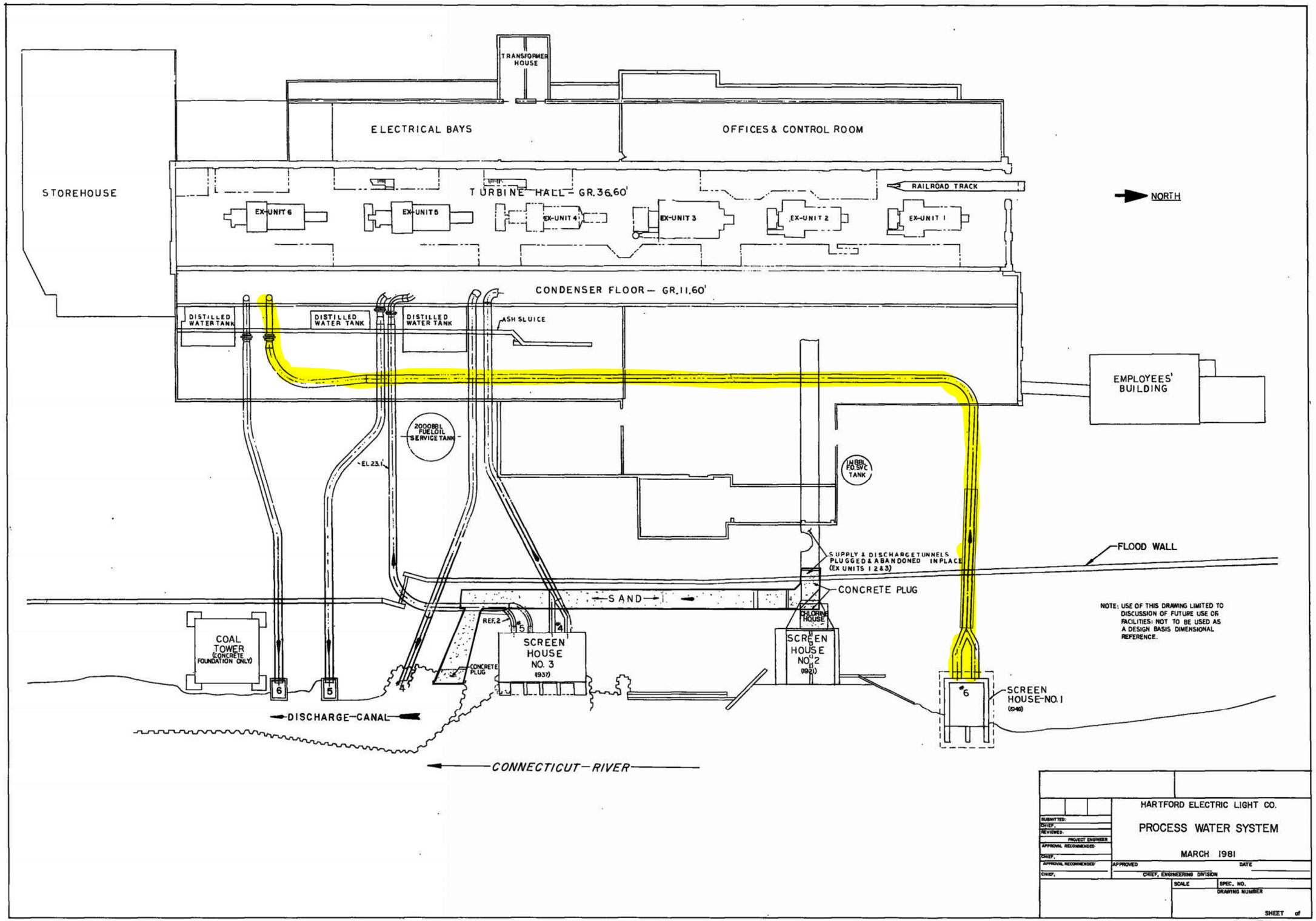
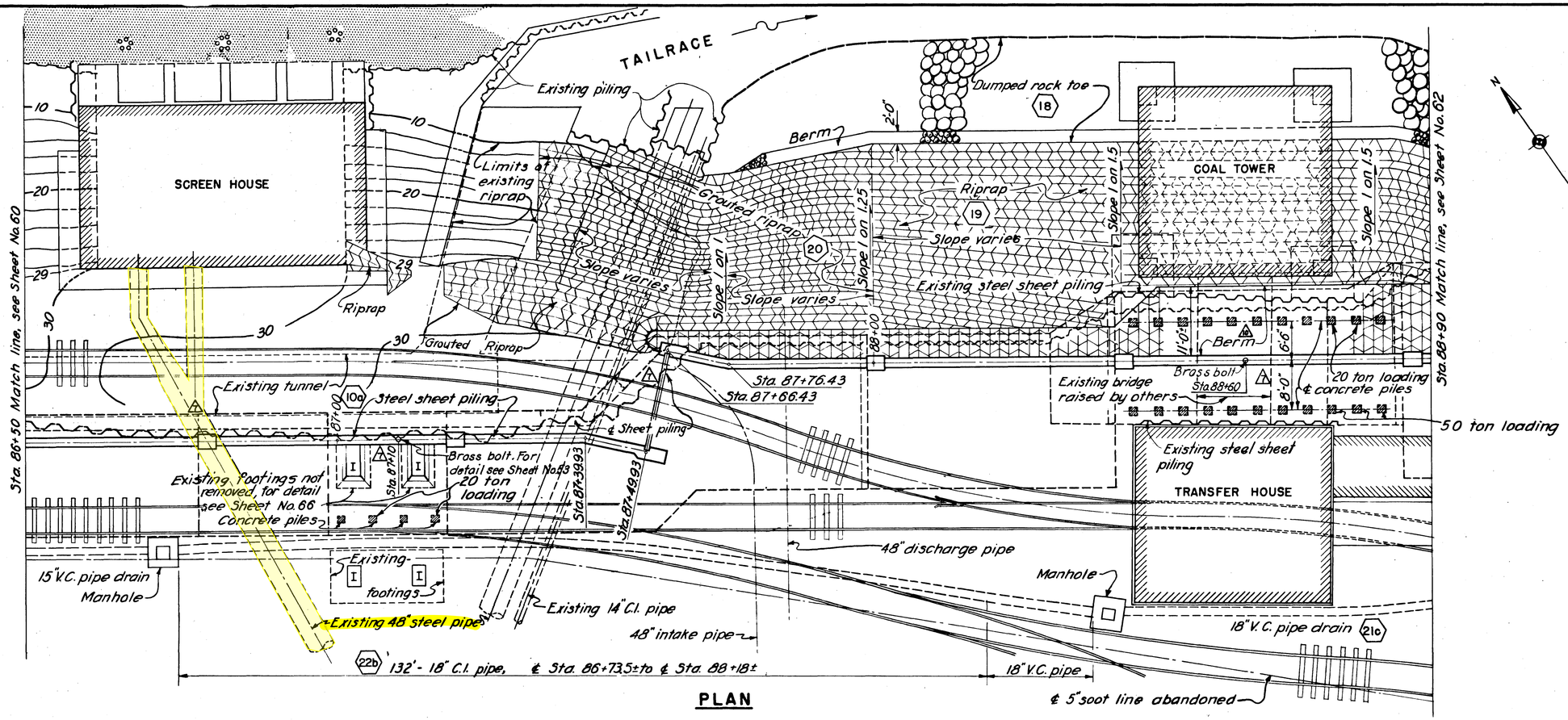
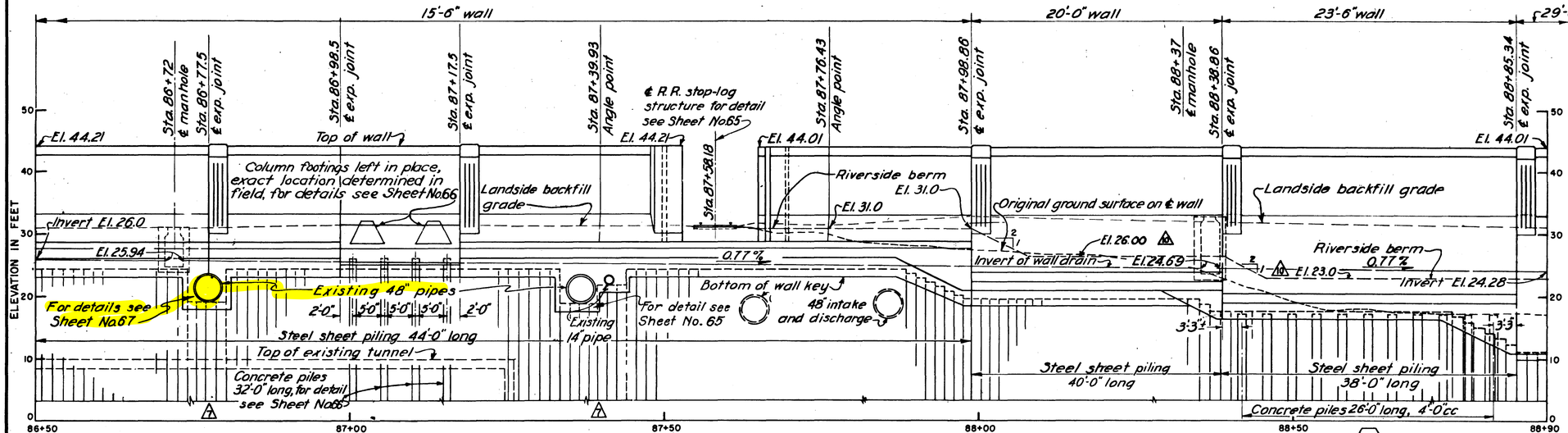



PLATE C-6

HD-38




PLAN




PROFILE

## NOTES

For general notes applying to this sheet, see Sheet No. 20.
For concrete details, see Sheets No. 74, 75, 76.

| KEY | DATE | REVISION (indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | P.C.H. | | |
| △ | 10/16/41 | Berm widened | P.C.H. | | |
| △ | 3/10/41 | Curtain wall removed. | W.A.E. | | |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

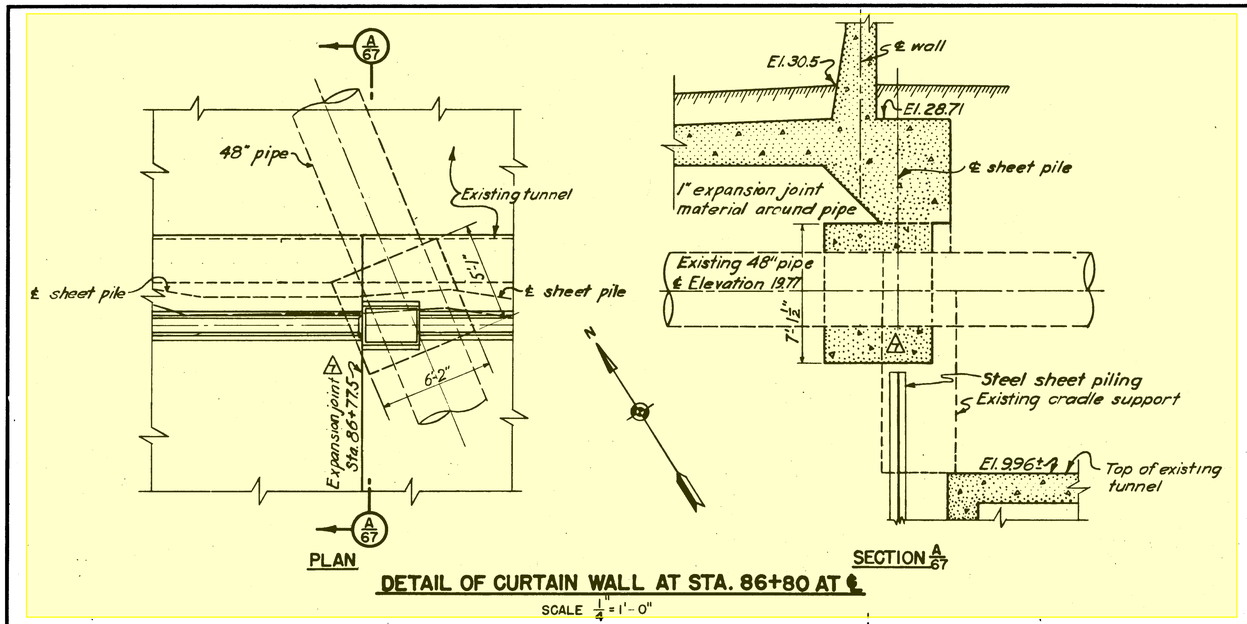
## DETAIL PLAN AND PROFILE STA. 86+50, TO STA. 88+90.

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1 IN. = 10 FT. (10 0 10 20) — SHEET NO. 61

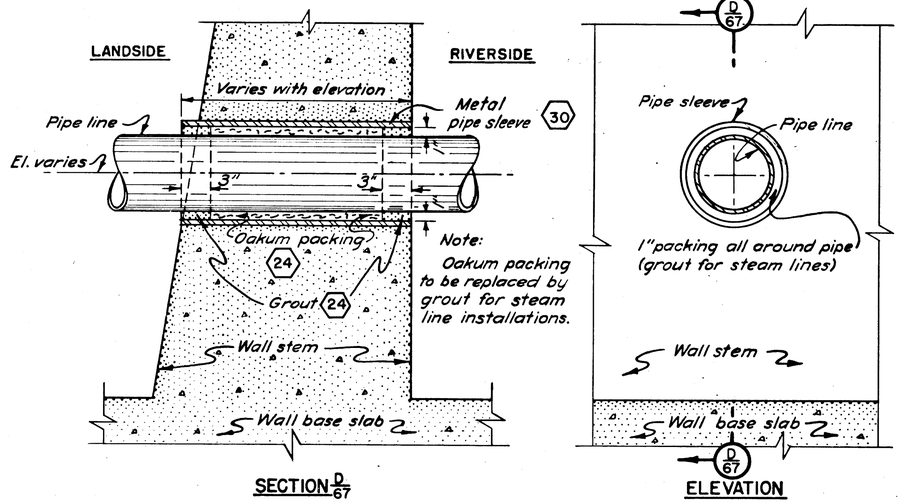
U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Howard B. Turbayne, SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: S. R. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: [illegible], LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: J. Hartley, ASSOC. ENGINEER
DRAWN: C.D.A. & A.K.
TRACED: D.L.B.
CHECKED: W.A.E.
FISCAL YEAR 1940
FILE NO. CT-4-2521



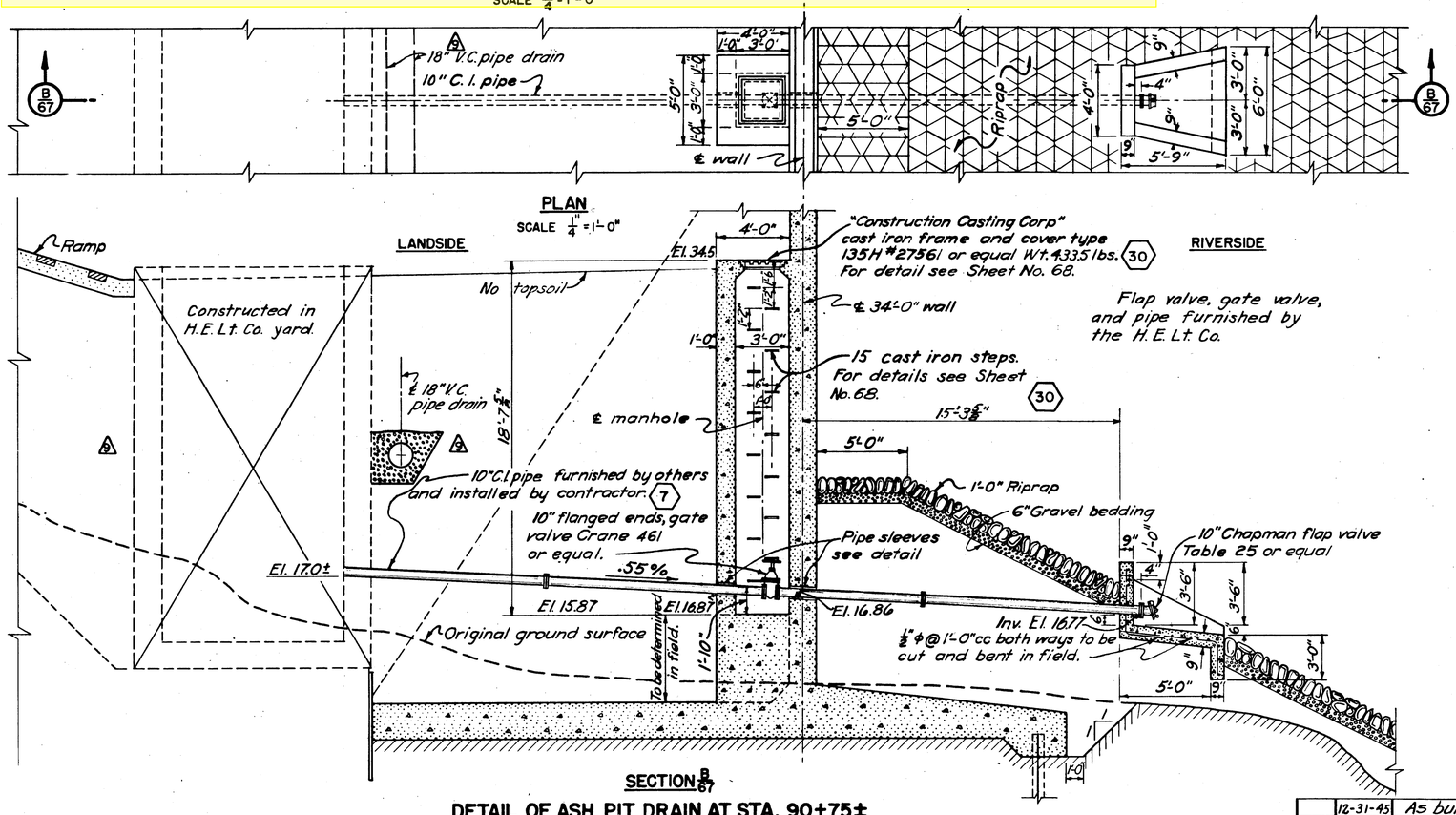

## DETAIL OF CURTAIN WALL AT STA. 86+80 AT ℄

SCALE 1/4" = 1'-0"



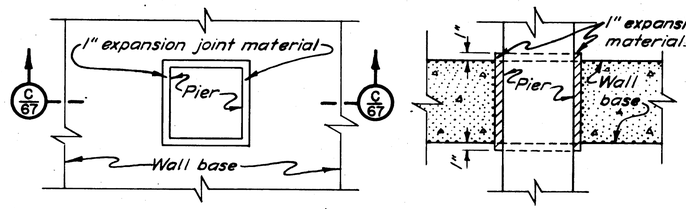

## TYPICAL DETAIL OF PIPE SLEEVE THRU WALL

SCALE 1½" = 1'-0"




## DETAIL OF ASH PIT DRAIN AT STA. 90+75±

SCALE 1/4" = 1'-0"




## TYPICAL DETAIL OF PIER THRU BASE SLAB

FOR LOCATION SEE SHEET NO. 62

NOT TO SCALE

### NOTES

For general notes applying to this sheet see Sheet No. 20.

For Plan and Profile see Sheet No. 62.

For steel reinforcing details see Sheets No. 120 & 126.

| KEY | DATE | REVISION (Indicated by Δ) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| 5 | 8-7-41 | 18" V.C. pipe drain relocated | | | |
| 4 | 3/10/41 | Curtain wall removed. | | | |

CONNECTICUT RIVER FLOOD CONTROL

HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 96+73

MISCELLANEOUS CONCRETE DETAILS NO. 2

SOUTH MEADOWS STATION

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1/4 IN = 1 FT. — SHEET NO. 67

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY 1940

SUBMITTED: Harold B. Nichols, SENIOR ENGINEER, HEAD, DESIGN SECTION

APPROVAL RECOMMENDED: [illegible], PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: [illegible], LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: [illegible], ASSOC. ENGINEER

DRAWN: W.C.B. & A.K.

TRACED: R.K.J.

CHECKED: W.C.B.

FISCAL YEAR 1940

FILE NO. CT-4-2527

Ht. 587b

HD-43

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

Wet Area

Wet Area

Power Line

Wet Area

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

RESERVE ROAD

N 34°-13'-40" W
591.36'
P.I. - P.C.

359.26'
210.72'

#26 C.M.S. (FD)

#38 M.S. BROKEN

#39 M.S. BROKEN

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

SHEET INDEX

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY EF

PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 89-1.54 DWG NO. 50532 VOL H-17-1
SHEET 2 OF 4

34 29 22 20 18 14

f

h

Top Gr. 30.0

6" Ash Removal Vk 310

Existing 6" Ash Removal Line

New 6" Ash Removal

Top Gr. 27.7

Top Gr. 27.8

Top Gr. 26.5

Top Gr. 27.0

Existing Conduit in Conc. Envelope (18"x 15")
Feed to Coal Unloading Tower

5' Duct Line 2'6" wide x 2'-0" deep

82'-8½"

76'-0"

Ignition Oil Tank
Top of Nozzles Gr. 31.60

18" 6'-9" 18'-4"

2'-9" Disch. from Coal Crusher Sump to River
Box [S] removed from 3 line framing used as dead-man for Sheet Piling

Filler

33 Pcs. Bethlehem Steel Sh. Piling 11'-9" long

1" Comp. Air

1" Brass Comp. Air (by H.E.L. Co.)

Chlorination Ho.

See Fld Sk.

Gr. 27.50

For continuation see Vk 310
Ash Removal Pump Suct. & Disch.

Duct Line
Top Gr. 28.3

Gr. Top 6" 26.05

Gr. Top 26.59

3'-5"

Edge of roof

1" Disc.

Steel Sheet Piling

Conc. Wall

3" Service Water
1" City Water Vk 1380
4" Chlor. Line Vk 1380
2" Conduit Vk 925
1½ Steam in 4" I. Conduit

Steel Sheet Piling

Existing 8" Ash Removal Line

Screen Well House

Top 6"ϕ Gr. 27.53
Top 12"ϕ Gr. 27.33
Top 1"ϕ Gr. 27.33

6" Service Water Vk 24 G 2
1½" City Water Vk 24 G 2
1" Comp. Air (by H.E.L. Co.)

For details of Sheet piling see Field Sketch
" " " " Concrete anchor " "

9 Pcs. Beth. Steel Sh. Piling 23' Long

11 Pcs. Beth. Steel Sh. Piling 30' Long

(Gr. 29.3)

33 Pcs. Bethlehem Sh. Piling
11'-9" Long

Gr. 29.3

18" B 36#

7 Pcs. Bethlehem Steel
Sheet Piling 30' Long

Conc. Strut 12"x24"

SECT. A-A Scale ¾"=1'-0"

SECT. B-B Scale ¾"=1'-0"

3" Ch. Line – Top Gr. 26.07
6" I. Conduit – Top Gr. 26.25
1" Comp. Air (by H.E.L. Co.) Top Gr. 26.28
3" Service Water – Top Gr. 26.35
1" City Water – Top Gr. 26.25
1½" Steam – Top Gr. 26.25

21" 3'-6" 5" 4'-6"

West Wall of New Sc. Well

SECT. C-C Scale ¾"=1'-0"

16404-25001

STUDY PLAN - YARD PIPING

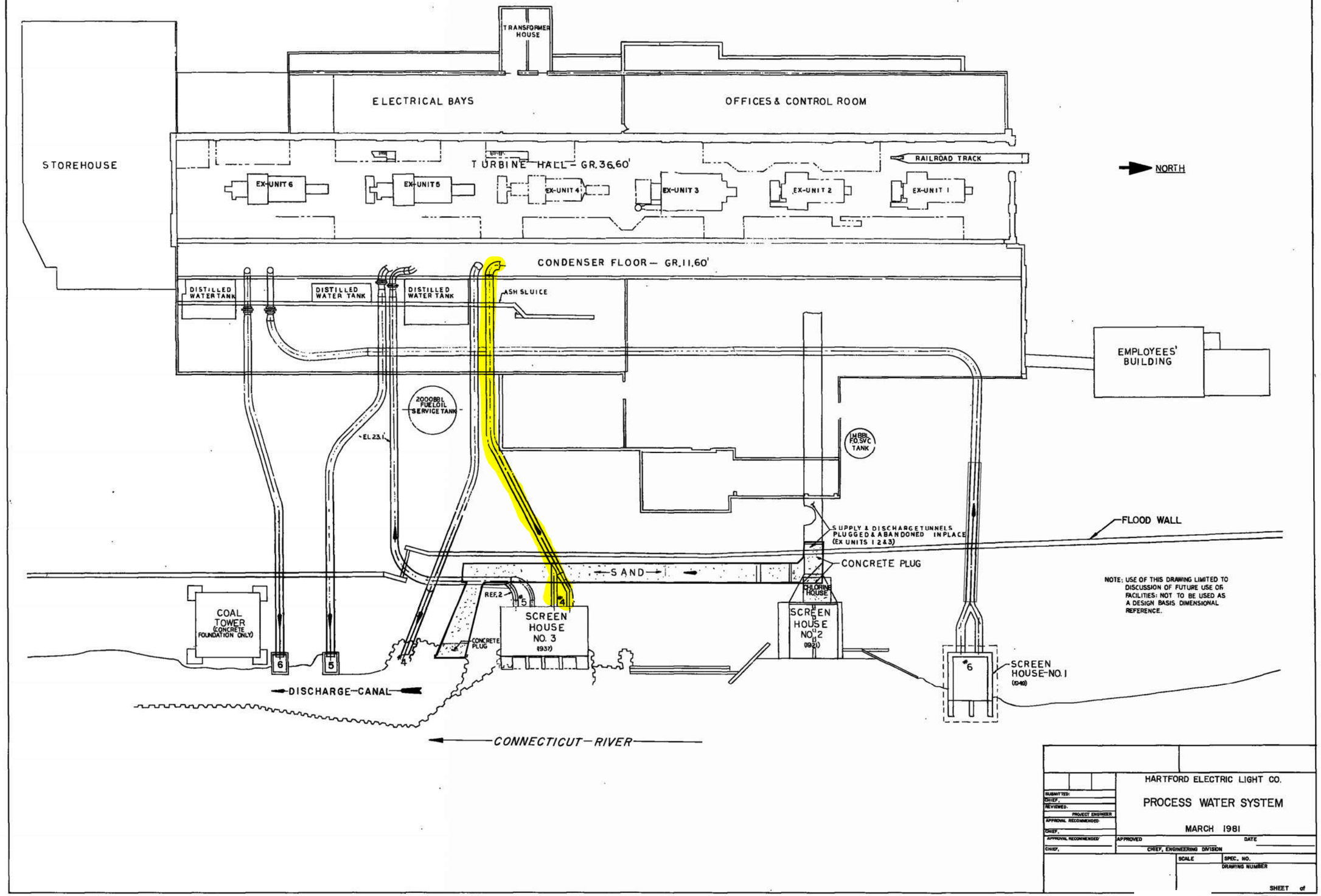
PIPING

1937 EXTENSION - SOUTH MEA. STATION
HARTFORD ELECTRIC LIGHT CO
STONE & WEBSTER ENG. CORP.

Scale 1"=10'-0"
J.O. 6352
Feb 17, 1938

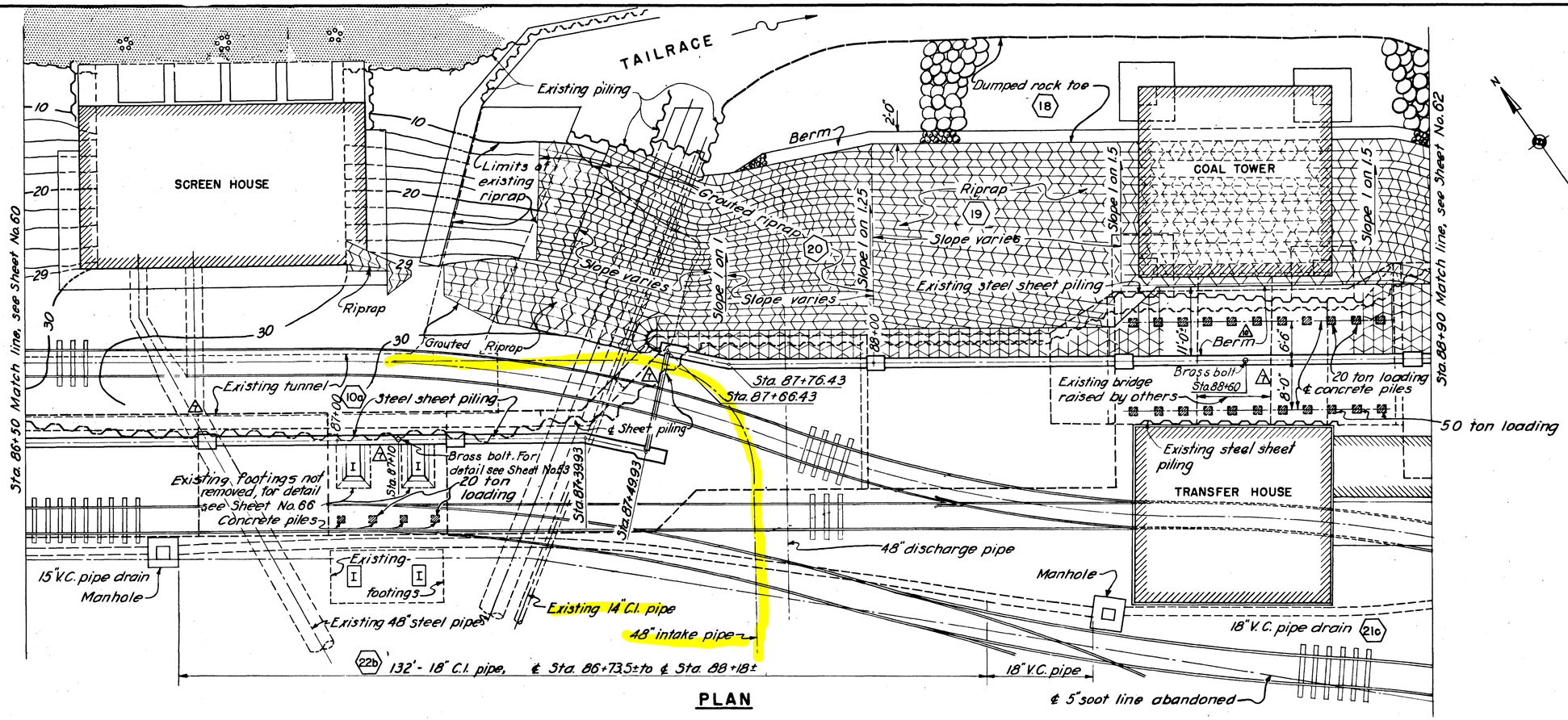
nusco rev 01 DATE 6-4-87

HD-43

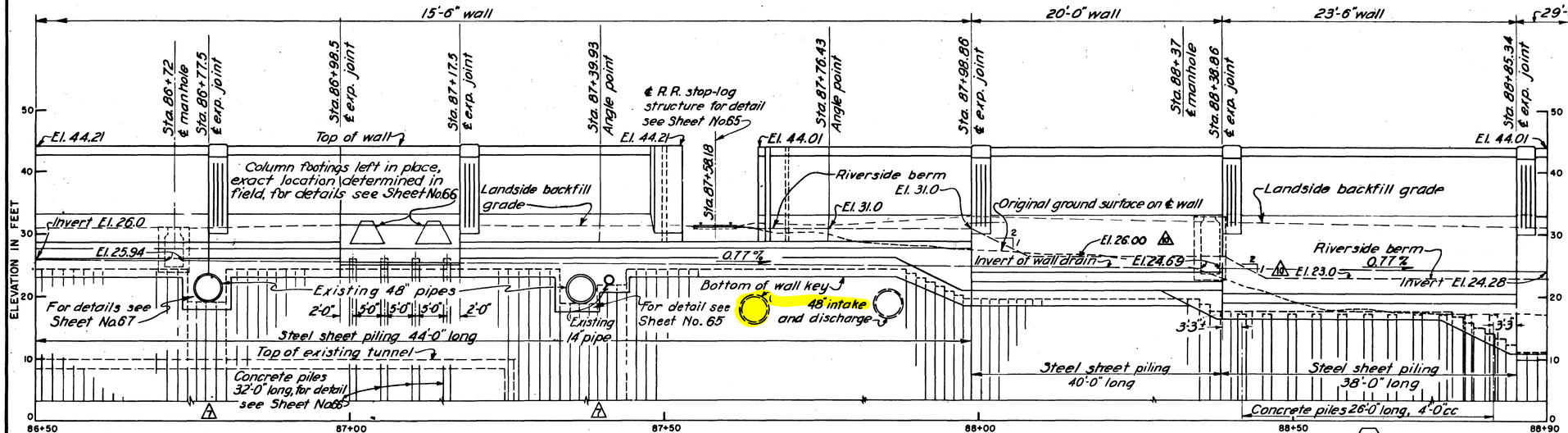



HD-43

PLATE C-6




PLAN




PROFILE

## NOTES

For general notes applying to this sheet, see Sheet No. 20.
For concrete details, see Sheets No. 74, 75, 76.

| KEY | DATE | REVISION (indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | P.C.H. | WAE | JWB |
| △ | 10/16/41 | Berm widened | WAE | JWB | JWB |
| △ | 3/10/41 | Curtain wall removed. | WAE | JWB | JWB |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

## DETAIL PLAN AND PROFILE STA. 86+50, TO STA. 88+90.

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1 IN. = 10 FT. (10 0 10 20) — SHEET NO. 61

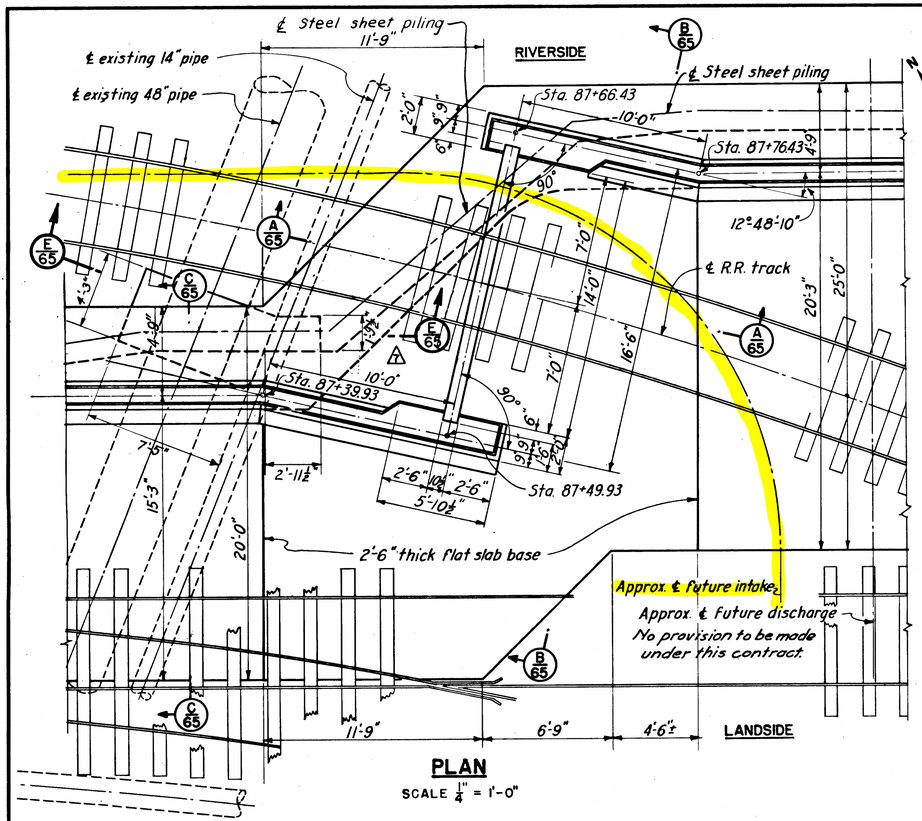
U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Howard B. Turbayne, SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: S. B. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: [illegible], LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: J. Hartley, ASSOC. ENGINEER
DRAWN: C.D.A. & A.K.
TRACED: D.L.B.
CHECKED: WAE
FISCAL YEAR 1940
FILE NO. CT-4-2521

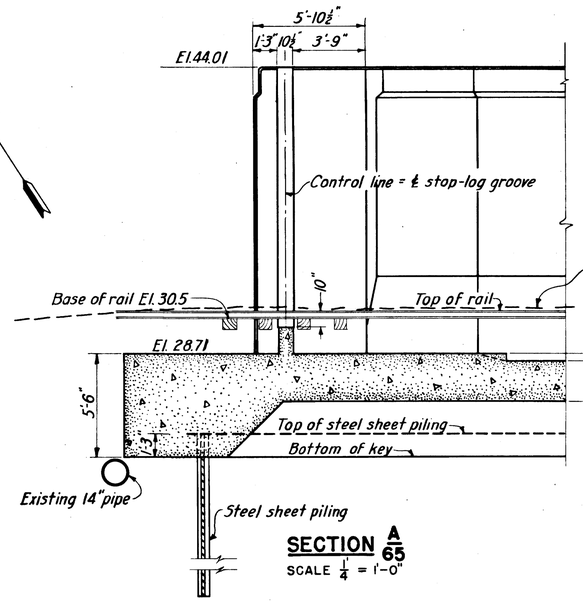
HD-44

Ht. 587b

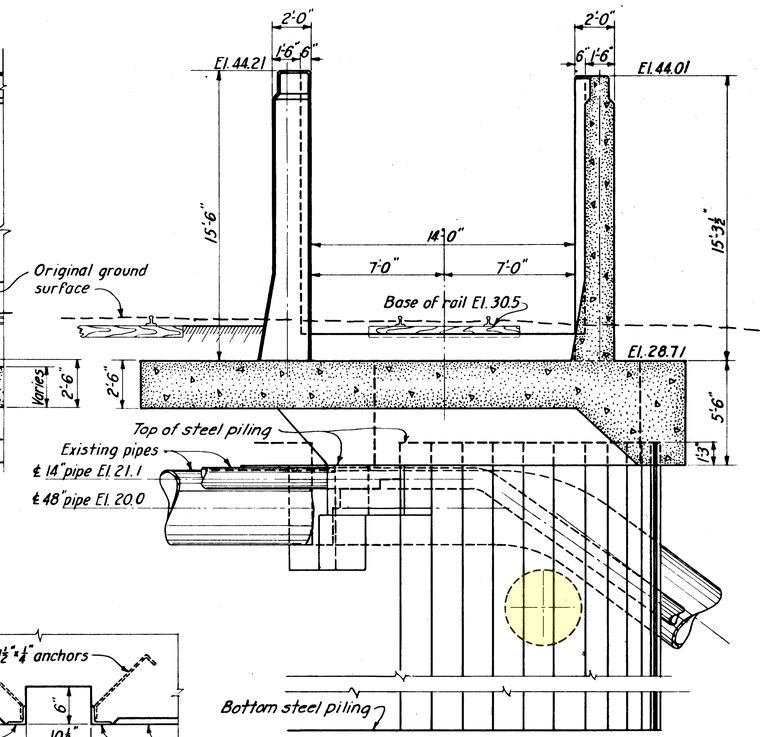
61



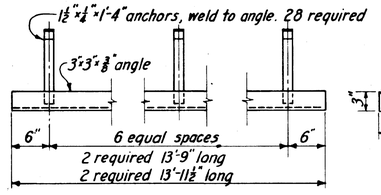

**PLAN**
SCALE 1" = 1'-0"



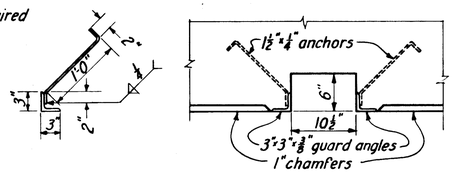

**SECTION A 65**
SCALE 1" = 1'-0"



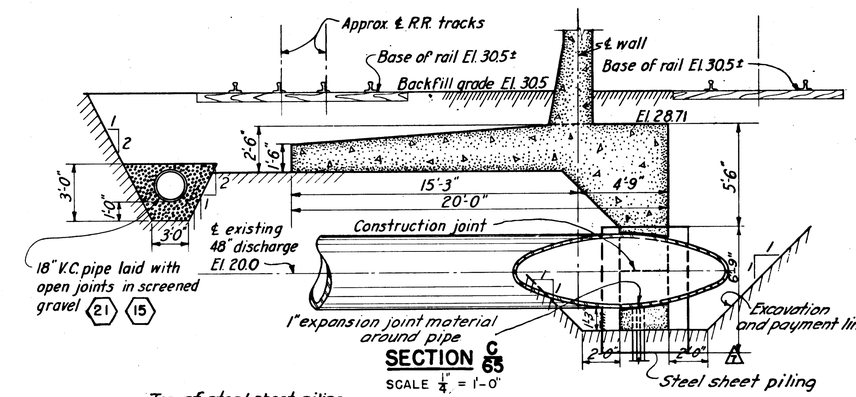

**⚠ SECTION B 65**
SCALE 1" = 1'-0"



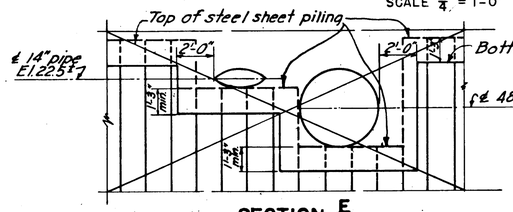

**DETAIL OF STOP-LOG GROOVE ANGLE**
4 REQUIRED (30)
SCALE 1" = 1'-0"



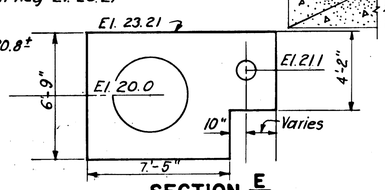

**DETAIL OF STOP-LOG GROOVE**
SCALE 1" = 1'-0"



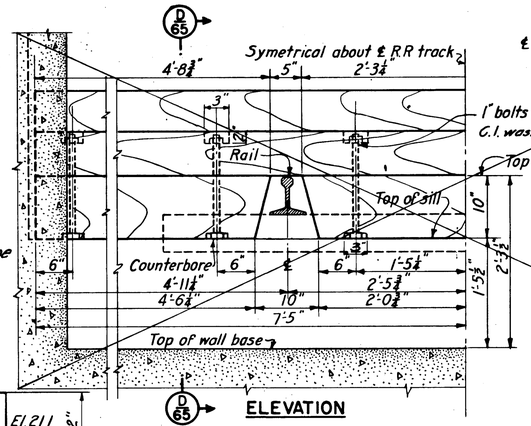

**SECTION C 65**
SCALE 1" = 1'-0"



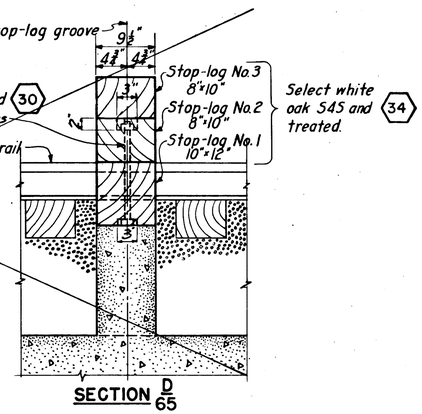

**⚠ SECTION E 65**
SCALE 1" = 1'-0"




**SECTION E 65**

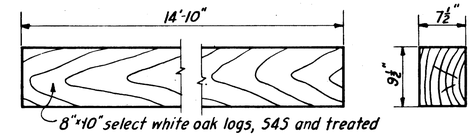



**ELEVATION**




**SECTION D 65**

**DETAIL OF STOP-LOG CLOSURE** 22 single logs placed at the request of the H. E. L. f. Co.
ONE REQUIRED
SCALE 1" = 1'-0"




**DETAIL OF STOP-LOGS 3 TO 21**
22 REQUIRED (34)
SCALE 1" = 1'-0"

## NOTES

*For general notes applying to this sheet see Sheet No. 20.*
*For steel reinforcing details see Sheets No. 118 and 119.*
*For plan and profile see Sheet No. 61.*

CONNECTICUT RIVER FLOOD CONTROL
**HARTFORD DIKE**
RIVERFRONT, MORGAN ST. TO STA. 96+73
**STOP-LOG STRUCTURE NO. 2**
SOUTH MEADOW STATION

CONNECTICUT RIVER — CONNECTICUT
IN 135 SHEETS — SCALE: 1/4 IN. = 1 FT. — SHEET NO. 65

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY 1940

SUBMITTED: Howard D. Nielsen, SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: J. H. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: [illegible], BY. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: [illegible], ASSOC. ENGINEER
DRAWN: W.C.B.
TRACED: N.B.
CHECKED: W.G.E.
FISCAL YEAR 1940
FILE NO. CT-4-2525

| KEY | DATE | REVISION (Indicated by ⚠) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| ⚠ | 3-10-41 | Section added. Sheet piling changed | W.G.E. | [illegible] | [illegible] |



PRINTED ON "ARKWRIGHT" TRACING CLOTH K & E CO., N. Y.

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE

FEEDER

Wet Area

Wet Area

Wet Area

Power Line

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

RESERVE ROAD

N 34°-13'-40" W
591.36'
P.I.-P.C.

#26 C.M.S. (FD)

#38 M.S. BROKEN

#39 M.S. BROKEN

359.26'

210.72'

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY EFF

PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 89-1.54 DWG NO. 50532 VS. H-17-1

SHEET 2 OF 4

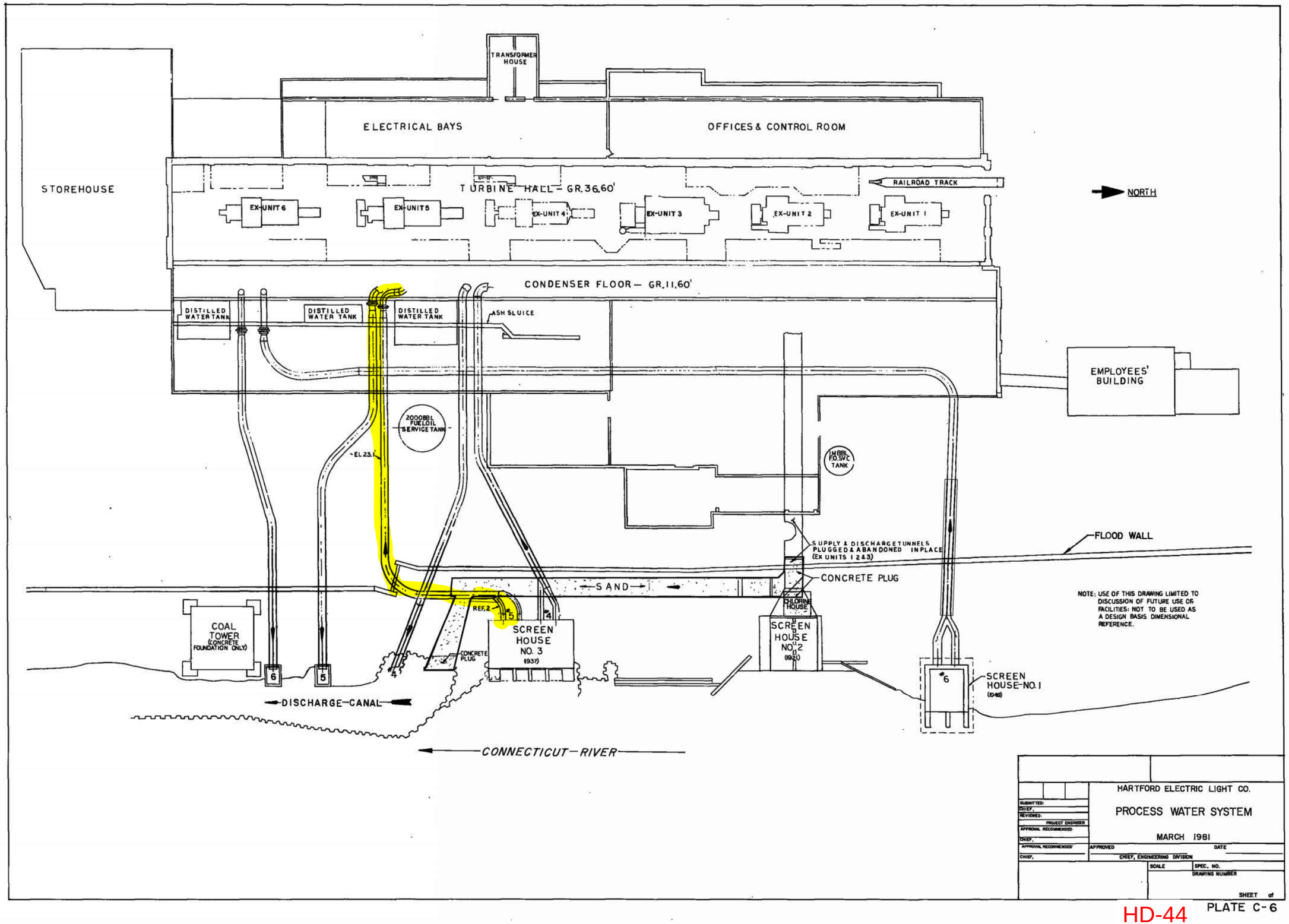
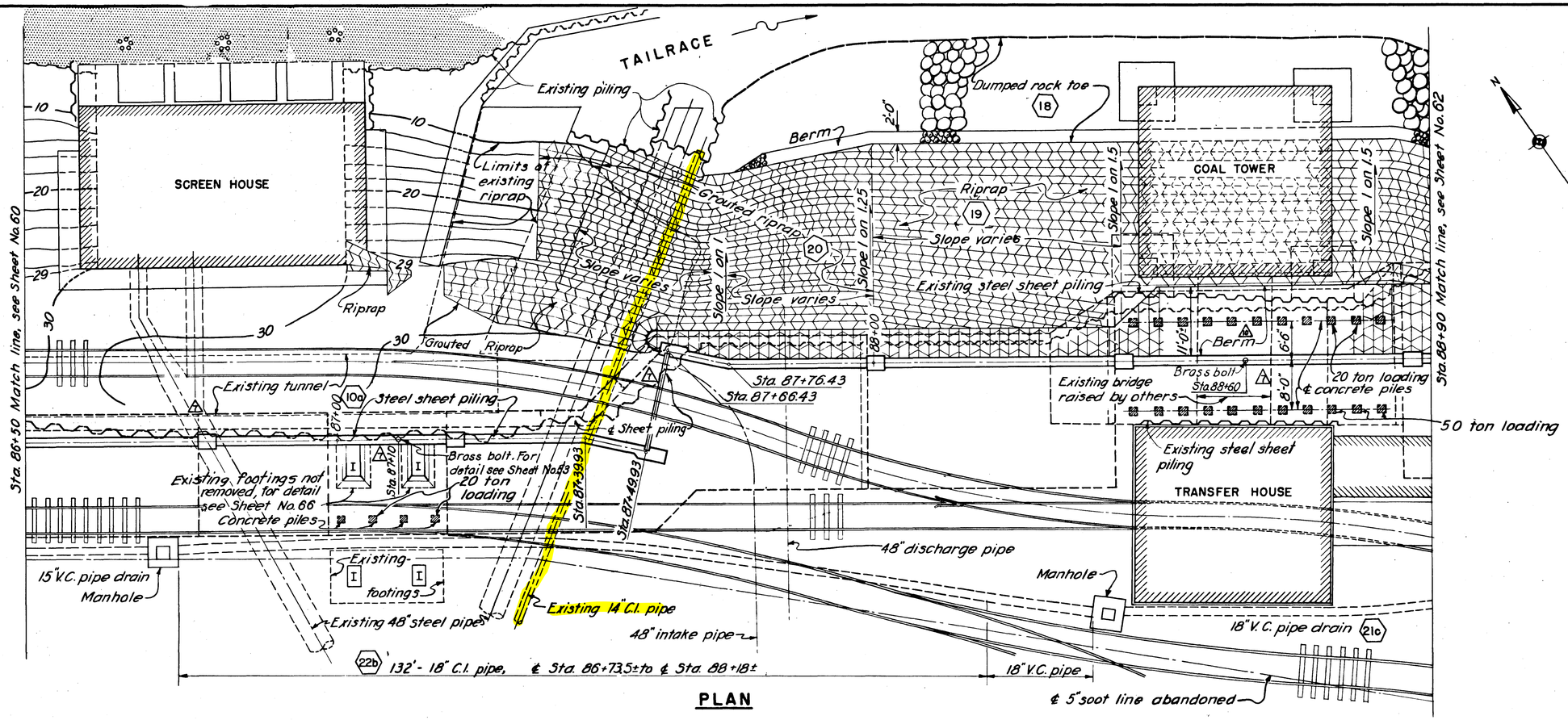
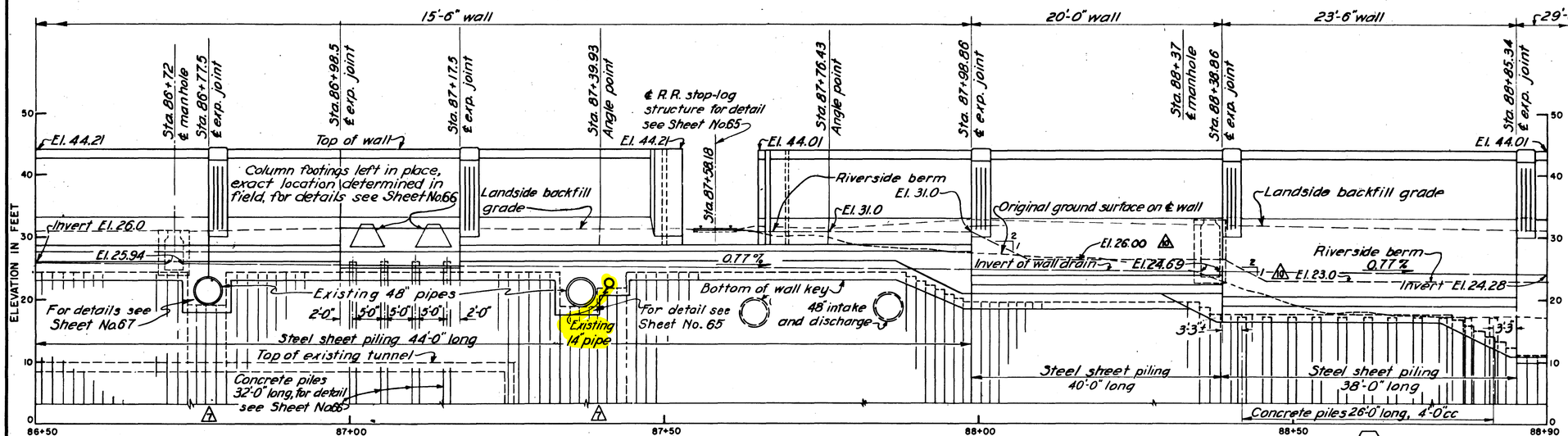



PLATE C-6

HD-44




PLAN




PROFILE

## NOTES

For general notes applying to this sheet, see Sheet No. 20.
For concrete details, see Sheets No. 74, 75, 76.

| KEY | DATE | REVISION (indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| 2 | 10/16/41 | Berm widened | P.C.H. | WAE | JWB |
| 1 | 3/10/41 | Curtain wall removed. | WAE | WAE | JWB |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

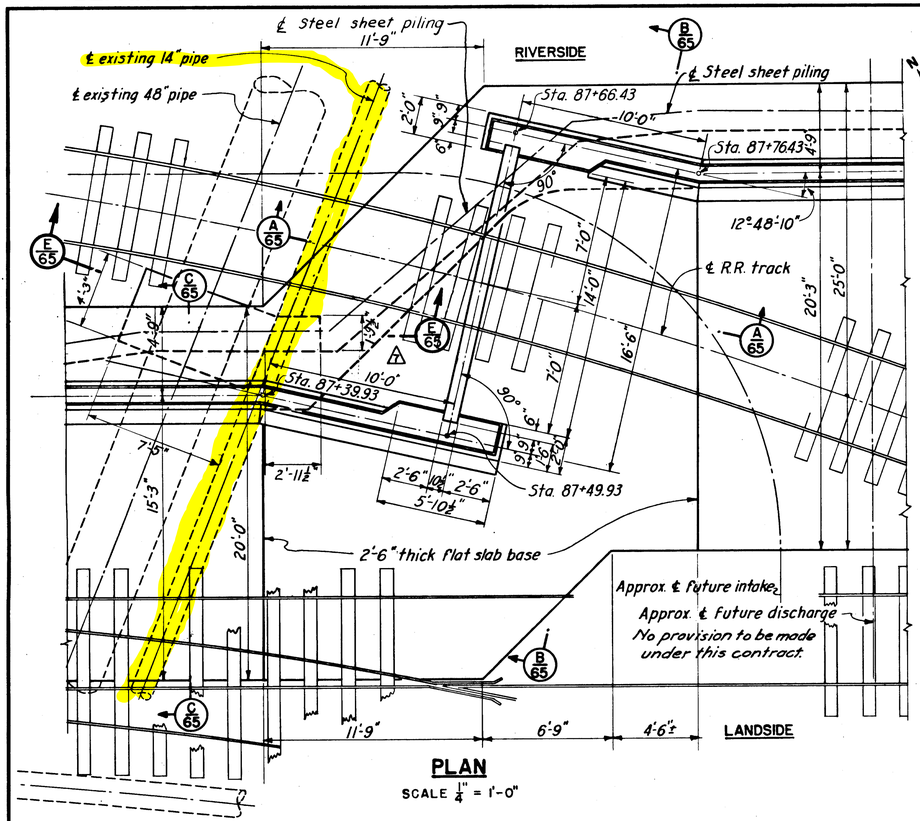
## DETAIL PLAN AND PROFILE STA. 86+50, TO STA. 88+90.

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1 IN. = 10 FT. (10 0 10 20) — SHEET NO. 61

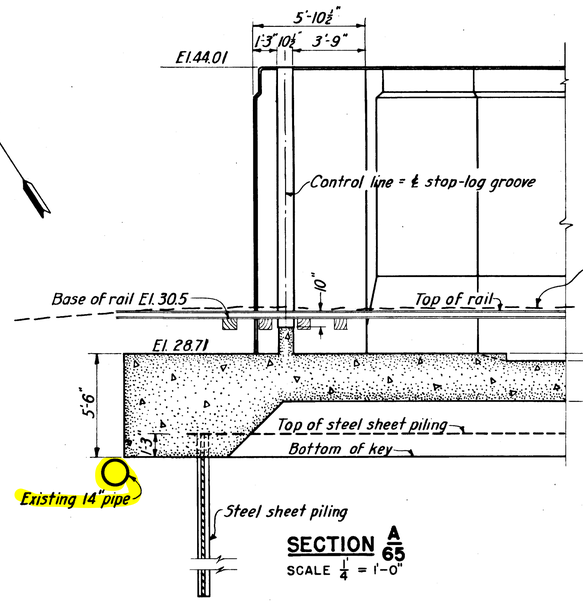
U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Howard B. Turbayne, SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: J. R. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: [illegible], LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: J. Hartley, ASSOC. ENGINEER
DRAWN: C.D.A. & A.K.
TRACED: D.L.B.
CHECKED: WAE
FISCAL YEAR 1940
FILE NO. CT-4-2521



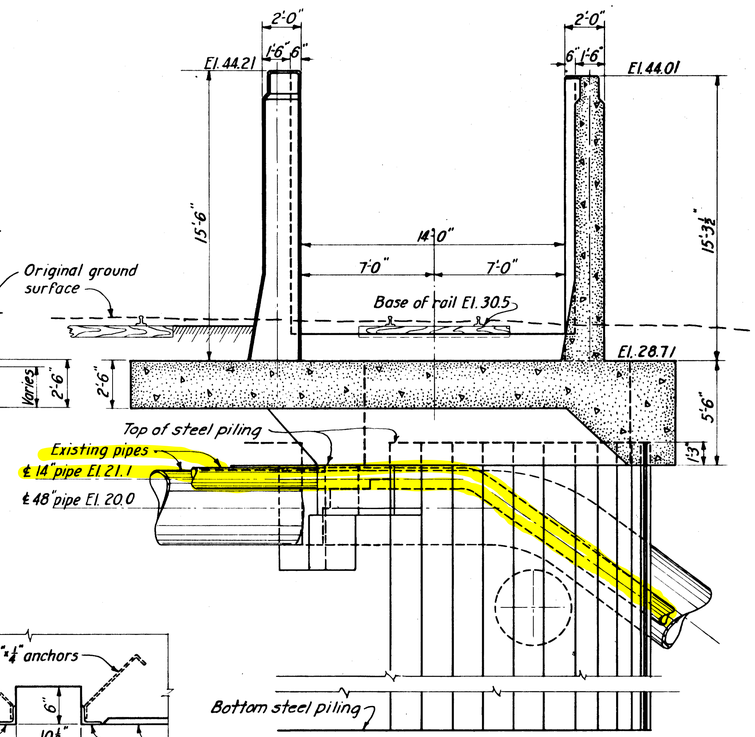

## PLAN

SCALE 1" = 1'-0"



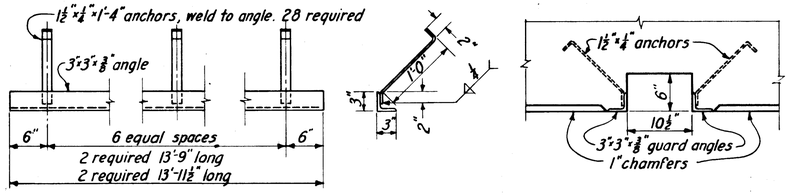

## SECTION A 65

SCALE 1" = 1'-0"




## ⚠ SECTION B 65

SCALE 1" = 1'-0"



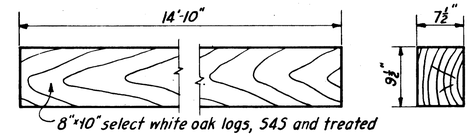

## DETAIL OF STOP-LOG GROOVE ANGLE

4 REQUIRED (30)

SCALE 1" = 1'-0"

## DETAIL OF STOP-LOG GROOVE

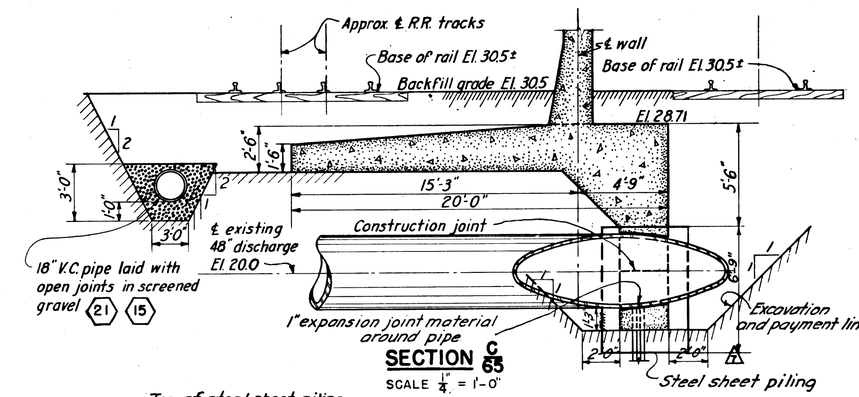
SCALE 1" = 1'-0"




## DETAIL OF STOP-LOGS 3 TO 21

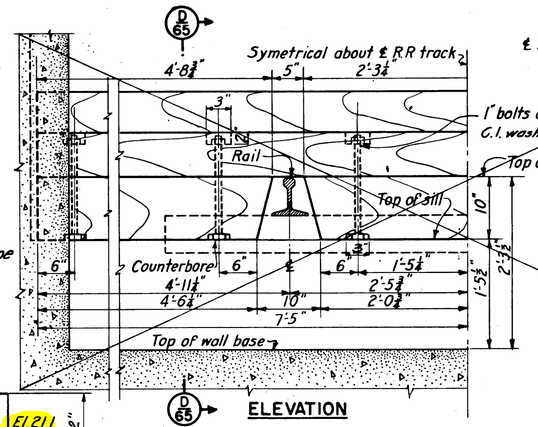
22 REQUIRED (34)

SCALE 1" = 1'-0"

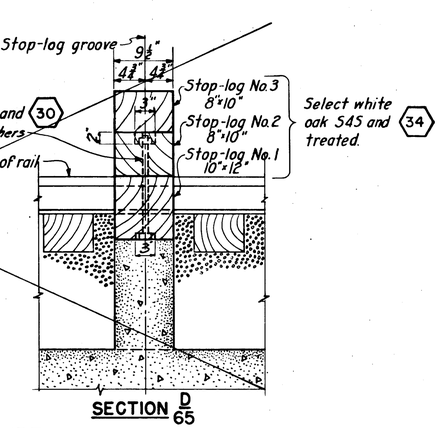



## SECTION C 65

SCALE 1" = 1'-0"




## ELEVATION



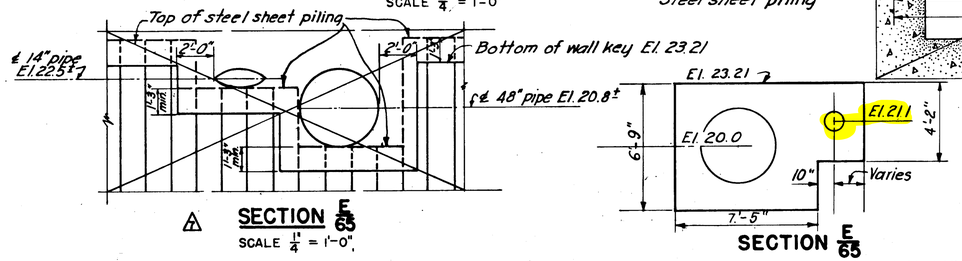

## SECTION D 65

## DETAIL OF STOP-LOG CLOSURE

22 single logs placed at the request of the H. E. L. f. Co.

ONE REQUIRED

SCALE 1" = 1'-0"




## ⚠ SECTION E 65

SCALE 1" = 1'-0"

## SECTION E 65

| KEY | DATE | REVISION (Indicated by ⚠) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| ⚠ | 3-10-41 | Section added. Sheet piling changed | WGE | RGL | JKH |

### NOTES

For general notes applying to this sheet see Sheet No. 20.
For steel reinforcing details see Sheets No. 118 and 119.
For plan and profile see Sheet No. 61.

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 96+73

## STOP-LOG STRUCTURE NO. 2

SOUTH MEADOW STATION

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE: 1/4 IN. = 1 FT. — SHEET NO. 65

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY 1940

SUBMITTED: Howard D. Nielsen, SENIOR ENGINEER, HEAD, DESIGN SECTION

APPROVAL RECOMMENDED: J. B. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: [illegible], BY, COL., CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: W. Hartley, ASSOC. ENGINEER

DRAWN: W.C.B.
TRACED: N.B.
CHECKED: WGE

FISCAL YEAR 1940

FILE NO. CT-4-2525

Ht. 587b (65)



PRINTED ON "ARKWRIGHT" TRACING CLOTH K & E CO., N. Y.

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE

FEEDER

Wet Area

Wet Area

Wet Area

Power Line

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

N 34°-13'-40" W
591.36'
P.I.-P.C.

RESERVE ROAD

#26 C.M.S. (FD)

#38 M.S. BROKEN

#39 M.S. BROKEN

359.26'

210.72'

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

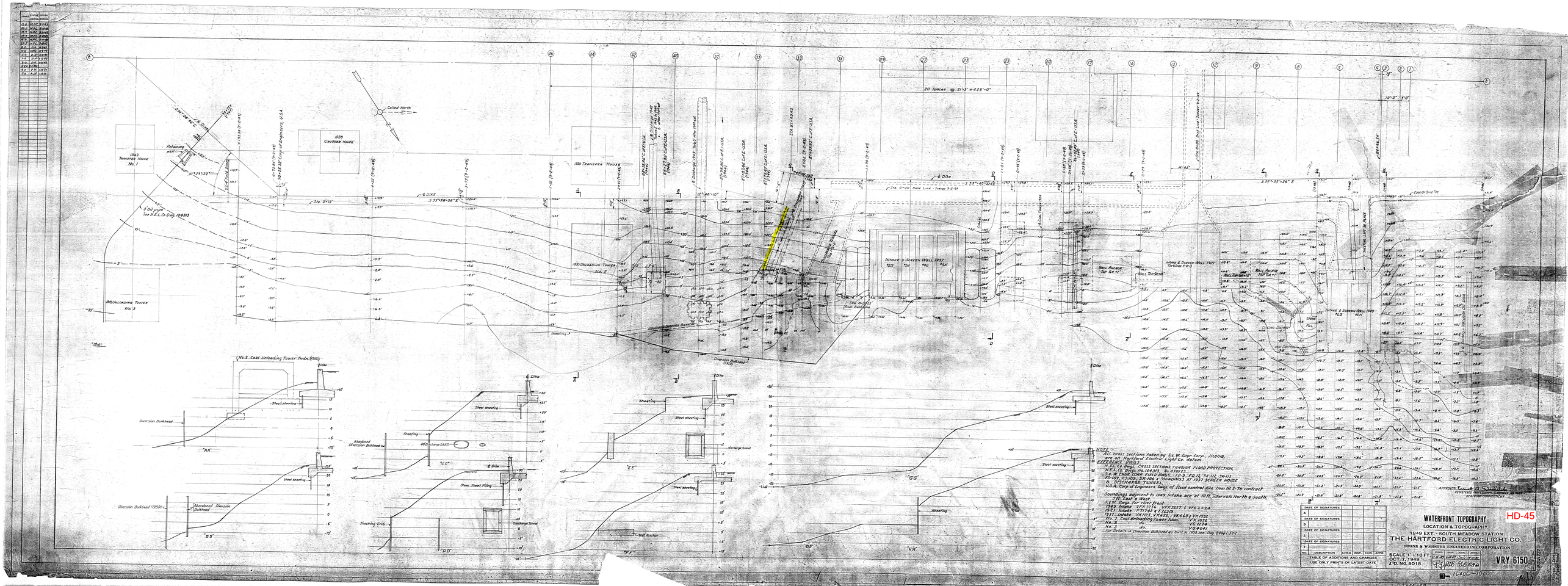
SCALE 1"=40' DATE JUNE 1989 NO. 50532

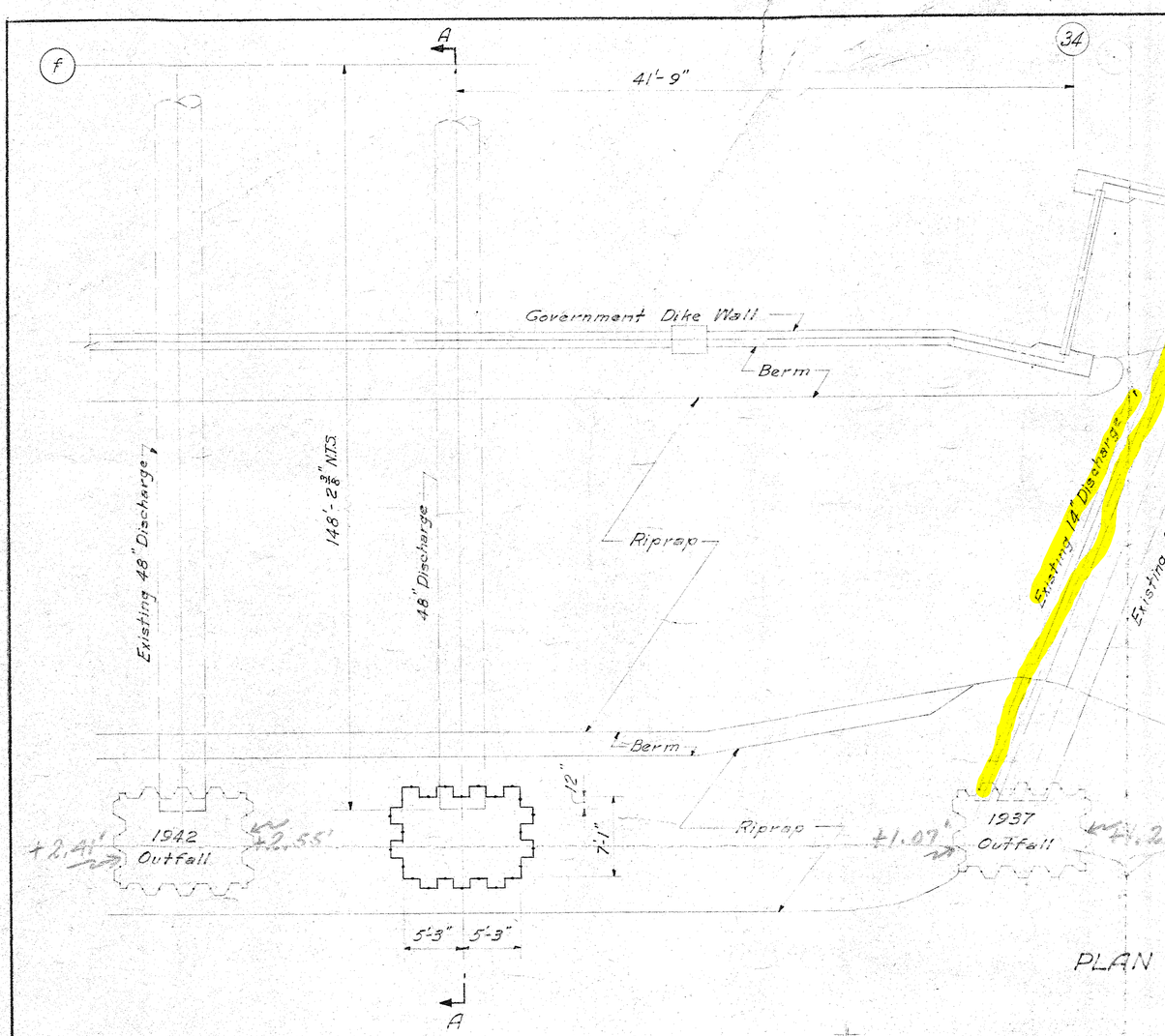
PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY EEF

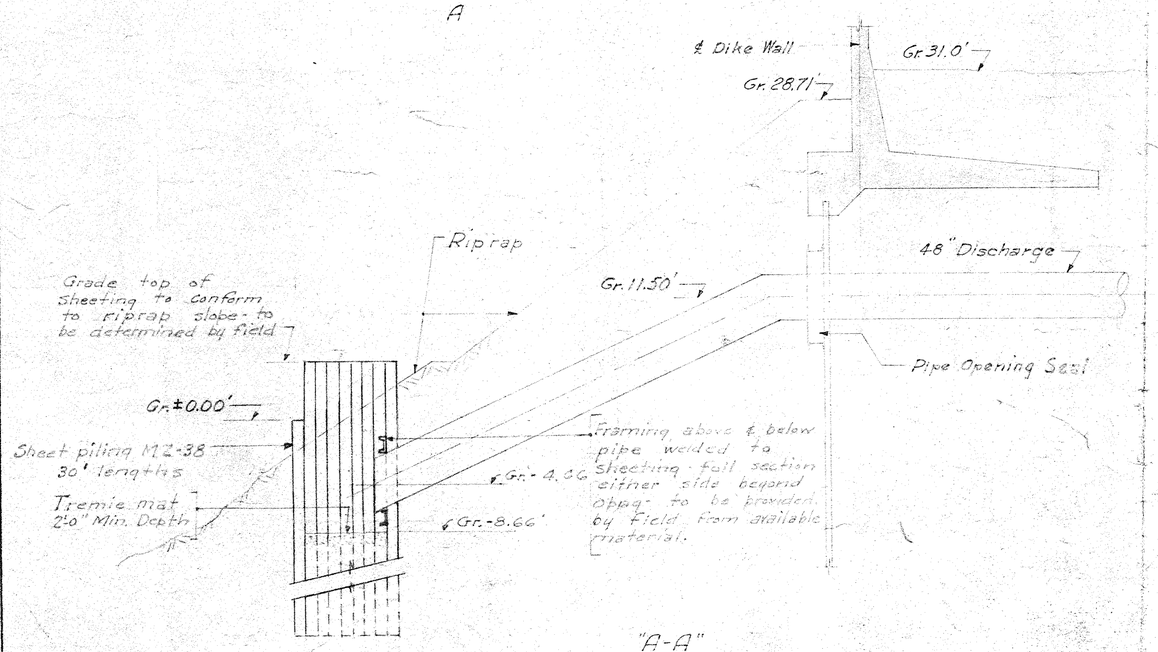
PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ. NO. 69-1.54 DWG NO. 50532 V.S. H-17-1
SHEET 2 OF 4


20 Spaces @ 21'-3" = 425'-0"
Called North
1948 Tennessee House No. 1
1930 Crushing House
1930 Tennessee House
1930 Unloading Tower No. 2
1948 Unloading Tower No. 3
Retaining wall
6 Dike
Diversion Bulkhead
Abandoned Diversion Bulkhead
Steel sheeting
Sheeting
Sheeting Cribs
Discharge Tunnel
Steel Sheet Piling
Concrete Slope Protection
Intake & Screen Well 1937
Intake & Screen Well 1949
Wall Anchor Top Gr. +7
Wall Top Grade
Existing Slope
Fill
Edge of Dike Fill
Existing Top of Bank
Existing Toe of Bank
Existing Ground
Existing Bottom of Bank




Notes:
Scale ⅛"=1'-0"
Grades referred to ~~U.S. Army Engineers Hartford Datum~~ "BM #1 71"
For Pipe Opening Seal in Government Dike see Dwg VFX 4745.
Steel sheet Piling "MZ 38"
For details of 1942 Discharge Well see Dwg. VP 2357.
to be used for Turbin

NOTE: Yellow notations made 11-24-48 per Steve Kusmik.

APPROVED Ernest A Dochstader
REGISTERED PROFESSIONAL ENGINEER NO. 1287
STATE OF CONNECTICUT

WORK this with VFY3831

16406-10015

To Be Used For RBINE No. 5

| NO. | DESCRIPTION | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|---|
| 4 | DATE OF SIGNATURES | | | | |
| 3 | DATE OF SIGNATURES | | | | |
| 2 | DATE OF SIGNATURES | | | | |
| 1 | DATE OF SIGNATURES | | | | |
| 1 | 01 | | 8/15 | 86 | MR |

TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE

# DETAILS - 48 INCH PIPE DICHARGE OUTFALL

SUBSTRUCTURE

1949 EXT. - SOUTH MEADOW STATION

THE HARTFORD ELECTRIC LIGHT CO.

STONE & WEBSTER ENGINEERING CORPORATION

SCALE GIVEN
SEPT. 27, 1948
J. O. NO. 8018

| | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|
| P.G.N. | 10-5-48 | 10-5-48 | 10-[illegible] | 11-16-48 |
| R.W.B. | | | [illegible] | [illegible] |

VHX 6126

R.C. 13336

HD-45

34 29 22 20 18 14

f

h

Top Gr. 30.0

6" Ash Removal Vk 310

Existing 6" Ash Removal Line

New 6" Ash Removal

Top Gr. 27.7

Top Gr. 27.8

Top Gr. 26.5

Top Gr. 27.0

Existing Conduit in Conc. Envelope (18"x 15")
Feed to Coal Unloading Tower

5' Duct Line 2'6" wide x 2'-0" deep

82'-8 3/4"

For continuation see VK 310
Ash Removal Pump Suct. & Disch.

Duct Line
Top Gr. 28.3

Gr. Top 6" 26.05

Gr. Top 26.59

Edge of roof

1" Disc.

Steel Sheet Piling

Conc. Wall

For details of Sheet piling see Field Sketch
" " " " Concrete anchor "

9 Pcs. Beth. Steel Sh. Piling 23' Long

11 Pcs. Beth. Steel Sh. Piling 30' Long

Ignition Oil Tank
Top of Nozzles Gr. 31.60

76'-0"

18'-7"

18" 6'-9"

18'-4"

2'-9" Disch. from Coal Crusher Sump to River
Box [S] removed from 3 line framing used
as dead-man for Sheet Piling

Filler

33 Pcs. Bethlehem Steel Sh. Piling 11'-9" long

1" Comp. Air

1" Brass Comp. Air (by H.E.L. Co.)

See Fld Sk.

Chlorination Ho.

Gr. 27.50

3" Service Water
1" City Water Vk 1380
4" Chlor. Line Vk 1380
2" Conduit VK 925
1½ Steam in 4" I. Conduit

Steel Sheet Piling

Screen Well House

Top 6"ϕ Gr. 27.53
Top 1½"ϕ Gr. 27.33
Top 1"ϕ Gr. 27.33

6" Service Water Vk 24 G 2
1½" City Water VK 24 G 2
1" Comp. Air (by H.E.L. Co.)

(Gr. 25.3)

33 Pcs. Bethlehem Sh. Piling
11'-9" Long

Gr. 29.3

18" B 36#

7 Pcs. Bethlehem Steel
Sheet Piling 30' Long

Conc. Strut 12"x24"

SECT. A-A Scale ¾"=1'-0"

SECT. B-B Scale ¾"=1'-0"

3" Chl. Line – Top Gr. 26.07
6" I. Conduit – Top Gr. 26.25
1" Comp. Air (by H.E.L. Co.) Top Gr. 26.28
3" Service Water – Top Gr. 26.35
1" City Water – Top Gr. 26.25
1½" Steam – Top Gr. 26.25

3'-3" 6'-5" 4'-6"

West Wall of New Sc. Well

SECT. C-C Scale ¾"=1-0

16404-25001

STUDY PLAN - YARD PIPING

PIPING

1937 EXTENSION - SOUTH MEA. STATION

HARTFORD ELECTRIC LIGHT CO

STONE & WEBSTER ENG. CORP.

Scale 1"=10'-0"

J.O. 6352

Feb 17, 1938

nusco rev 01 DATE 6-4-87

HD-45

Called North

TRANSFER HOUSE

UNLOADING TOWER No. 2

℄ 1942 DISCHARGE

℄ 1949 DISCHARGE

℄ 1937 DISCHARGE

DISCHARGE TUNNEL

INTAKE & SCREEN WELL - 1937

℄ DIKE

X

Unloading boom to be swung to 90° ∠ with line of pile clusters.

EXISTING DIVERSION BULKHEAD

Proposed Diversion Bulkhead

PLAN
Scale 1" = 10.0'

NOTE
For sections and details north of this location see S & W dwg R.C. 26590 Proposed Waterfront Alterations, dated May 16, 1950.

℄ Dike

Proposed Bulkhead 50' lengths of sheet piling.

Existing Bulkhead to be cut off at Gr. +2.0'

Water

M.L.W. Gr. +2.0'?

℄ Rock Paving Gr. -2.0'

℄ Gravel Fill Gr. -4.0'

SECT "X-X"
Scale: 1" = 10.0'

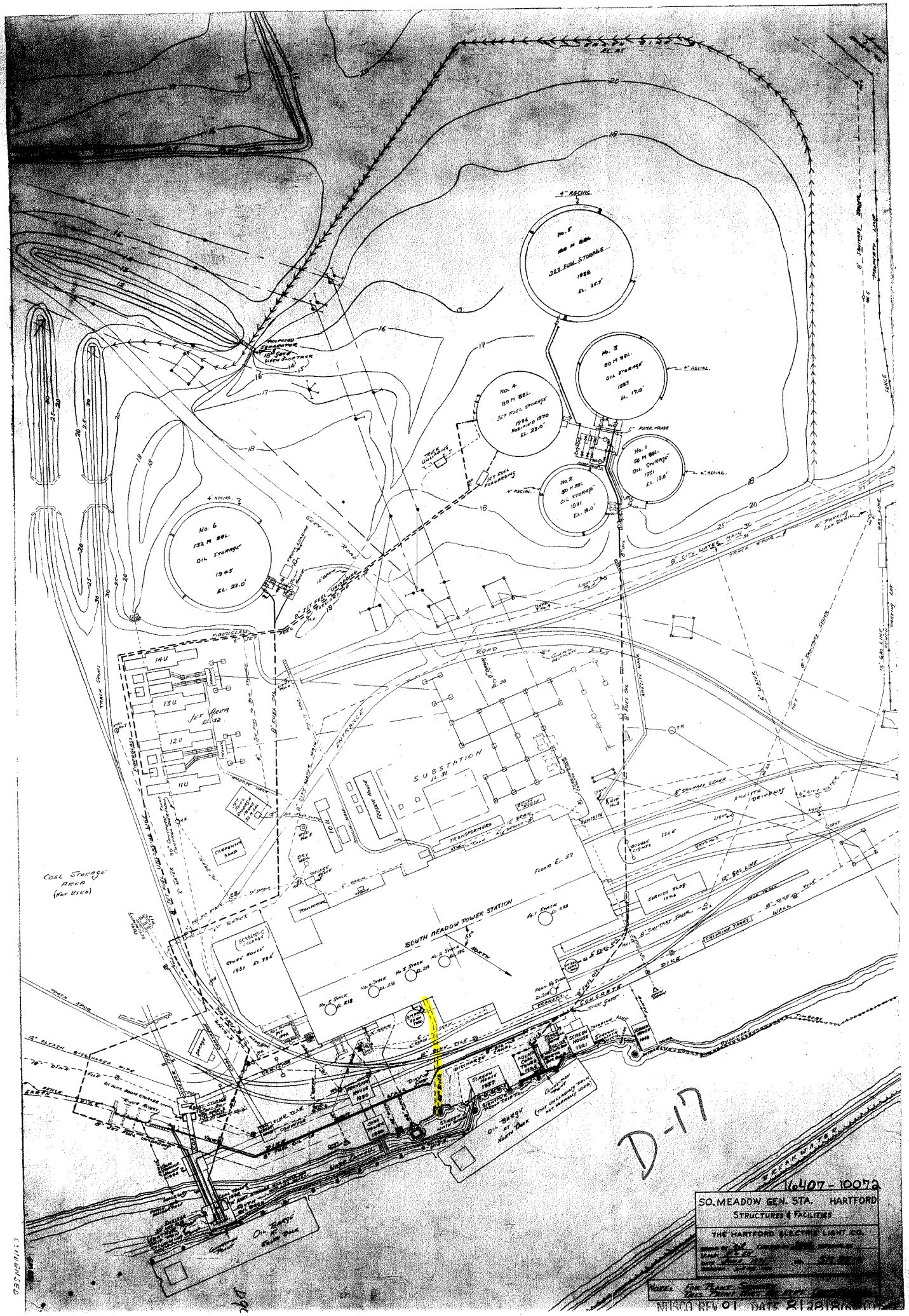
D-

PROPOSED WATERFRONT ALTERATIONS
SOUTH MEADOW STATION
THE HARTFORD ELECTRIC LIGHT CO.
STONE & WEBSTER ENG. CORP. - BOSTON, MASS.

Scale As Noted
Aug. 23, 1950, Rev Aug. 29, 1950
J.O. 8446-1

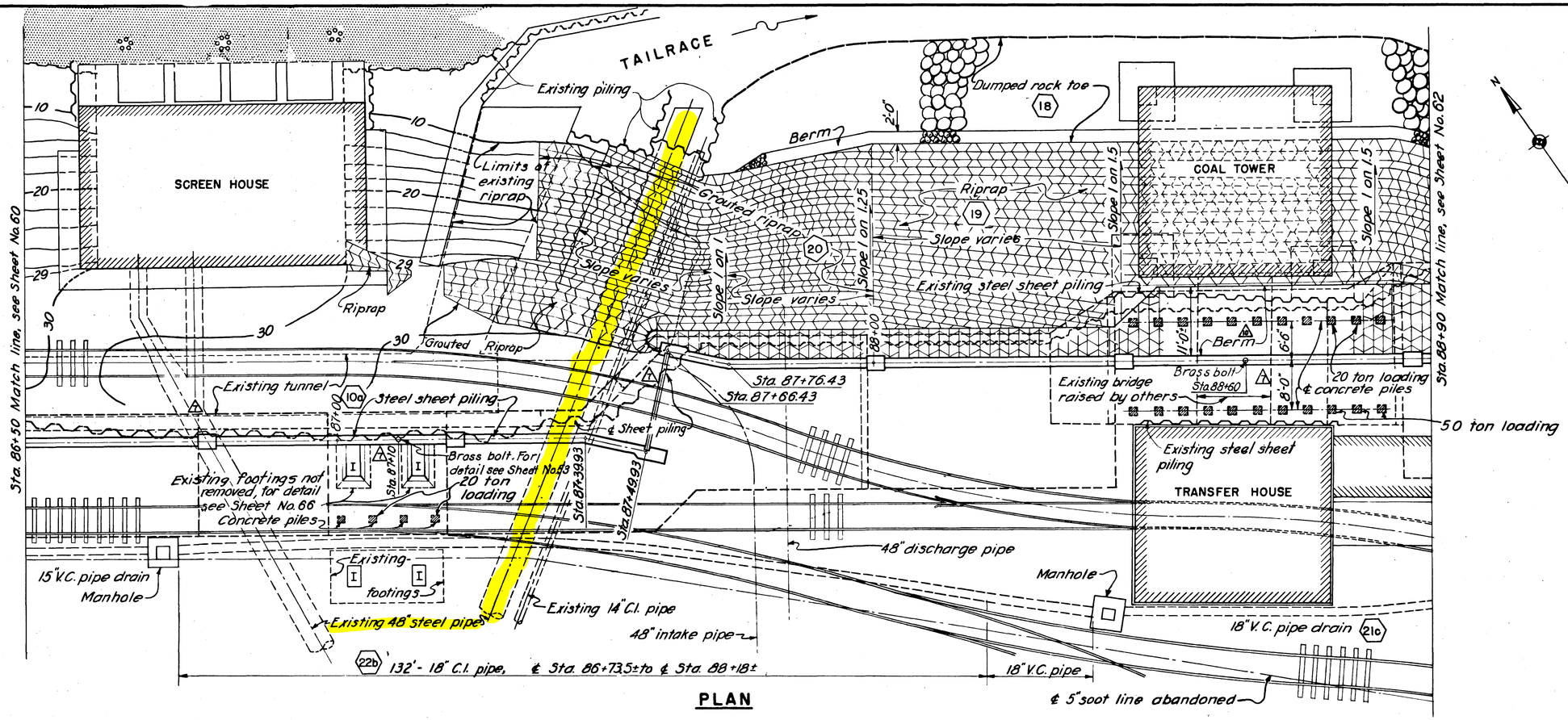
1-26590

HD-45

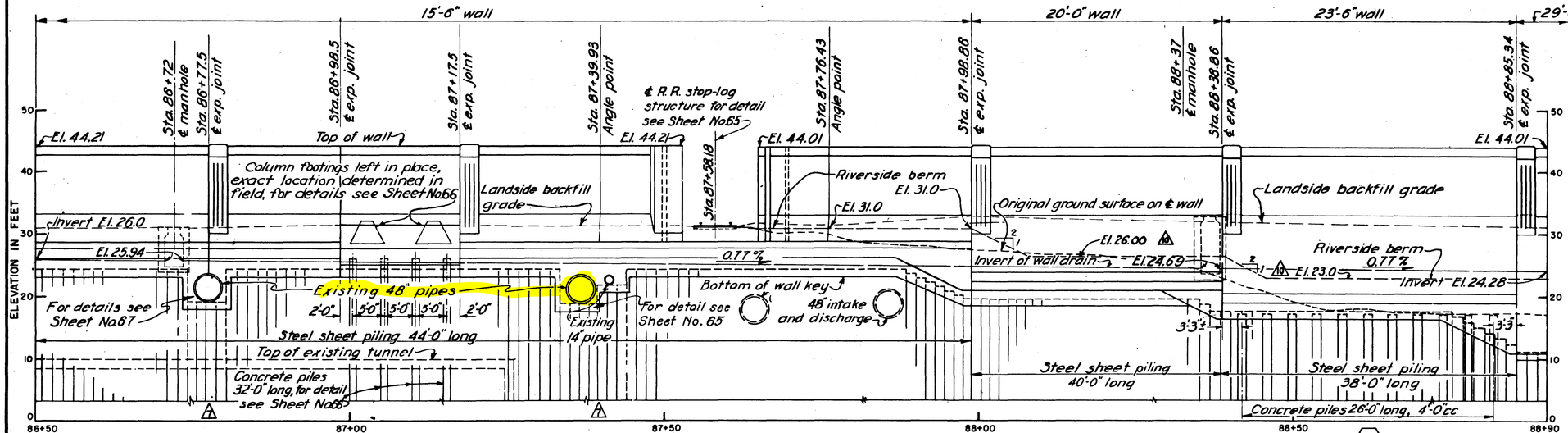

No. 5
150 M BBL.
JET FUEL STORAGE
1958
EL. 25.5'
No. 4
80 M BBL.
JET FUEL STORAGE
1956
HORTON 1970
EL. 23.0'
No. 3
80 M BBL.
OIL STORAGE
1955
EL. 19.0'
No. 1
50 M BBL.
OIL STORAGE
1951
EL. 19.6'
No. 2
50 M BBL.
OIL STORAGE
1951
EL. 19.0'
No. 6
132 M BBL.
OIL STORAGE
1945
EL. 22.0'
4" RECIRC.
PUMP HOUSE
TRUCK UNLOADING
JET FUEL FORWARDING
SERVICE ROAD
ROAD
SUBSTATION
EL. 31
TRANSFORMERS
FLOOR EL. 37
SOUTH MEADOW POWER STATION
No. 1 STACK EL. 238
No. 2 STACK EL. 196
No. 3 STACK EL. 218
No. 4 STACK EL. 218
No. 5 STACK EL. 218
No. 6 STACK EL. 218
CONTROL HOUSE
1951
EL. 33.5'
SCREEN HOUSE
1951
SCREEN HOUSE
1957
SCREEN HOUSE
1961
CIRCULATING PUMP HOUSE
1951
CIRCULATING PUMP HOUSE
1957
CIRCULATING PUMP HOUSE
1961
SERVICE BLDG.
1944
CHLORINE TANKS
DIKE
CONCRETE
OIL BARGE AT NORTH DOCK
OIL BARGE AT SOUTH DOCK
COAL STORAGE AREA
(Not Used)
JET AREA
EL. 32
CORPORATION SHOP
TRACK SPUR
ENTRANCE
8" CITY WATER MAIN
8" SANITARY SEWER
12" GAS LINE
15" GAS LINE
8" STORM SEWER
10" PARKING LOT DRAIN
ANSELMO DRIVEWAY
FENCE
PARKING AREA
D-17
16407-10072
SO. MEADOW GEN. STA. HARTFORD
STRUCTURES & FACILITIES
THE HARTFORD ELECTRIC LIGHT CO.
REVISED REV 01 DATE 8/28/81

HD-45

CM 83




PLAN




PROFILE

## NOTES

For general notes applying to this sheet, see Sheet No. 20.
For concrete details, see Sheets No. 74, 75, 76.

| KEY | DATE | REVISION (indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | P.C.H. | WAE | JWB |
| △2 | 10/16/41 | Berm widened | P.C.H. | WAE | JWB |
| △1 | 3/10/41 | Curtain wall removed. | WAE | WAE | JWB |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

## DETAIL PLAN AND PROFILE STA. 86+50, TO STA. 88+90.

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1 IN. = 10 FT. (10 0 10 20) — SHEET NO. 61

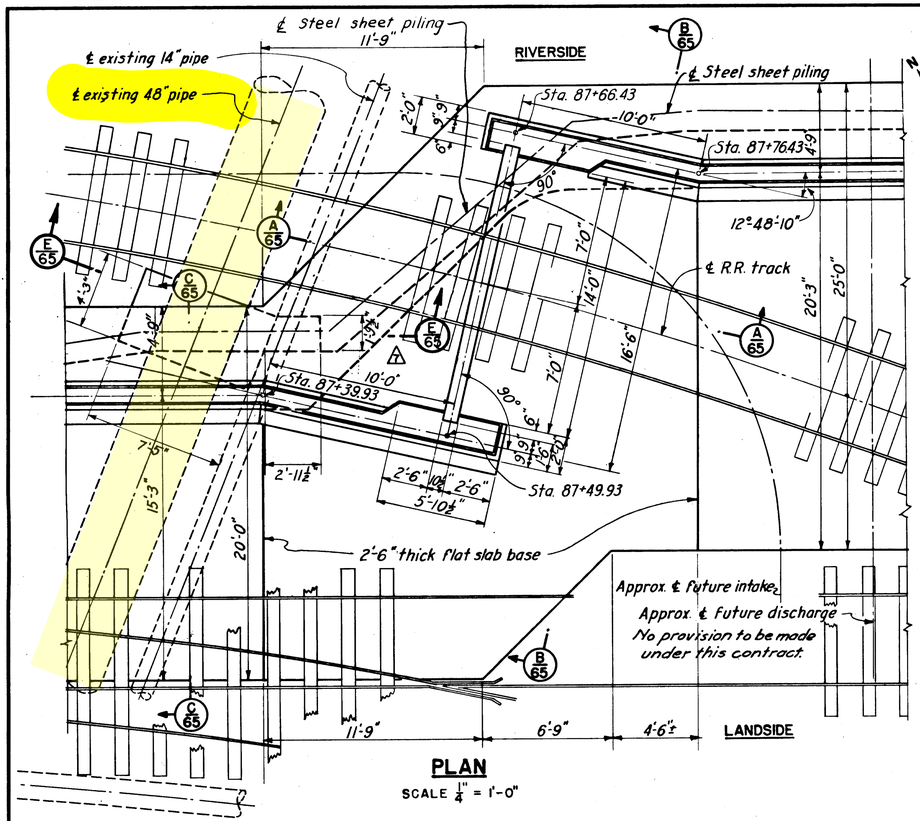
U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Howard B. Turbayne, SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: J. R. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: [illegible], LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: J. Hartley, ASSOC. ENGINEER
DRAWN: C.D.A. & A.K.
TRACED: D.L.B.
CHECKED: WAE
FISCAL YEAR 1940
FILE NO. CT-4-2521

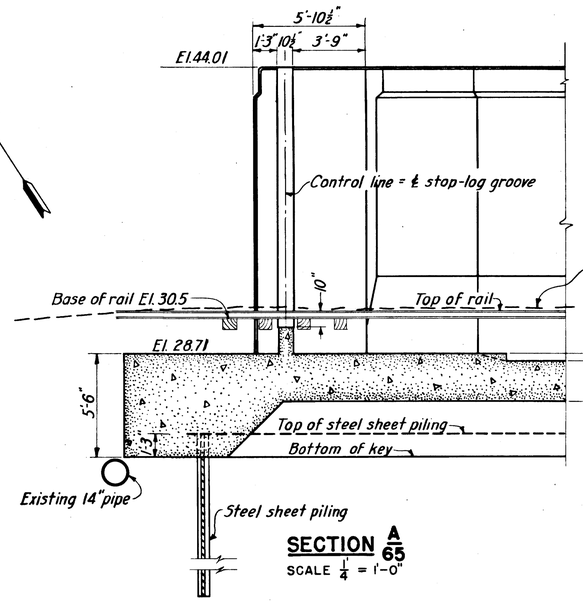
HD-46

Ht. 587b

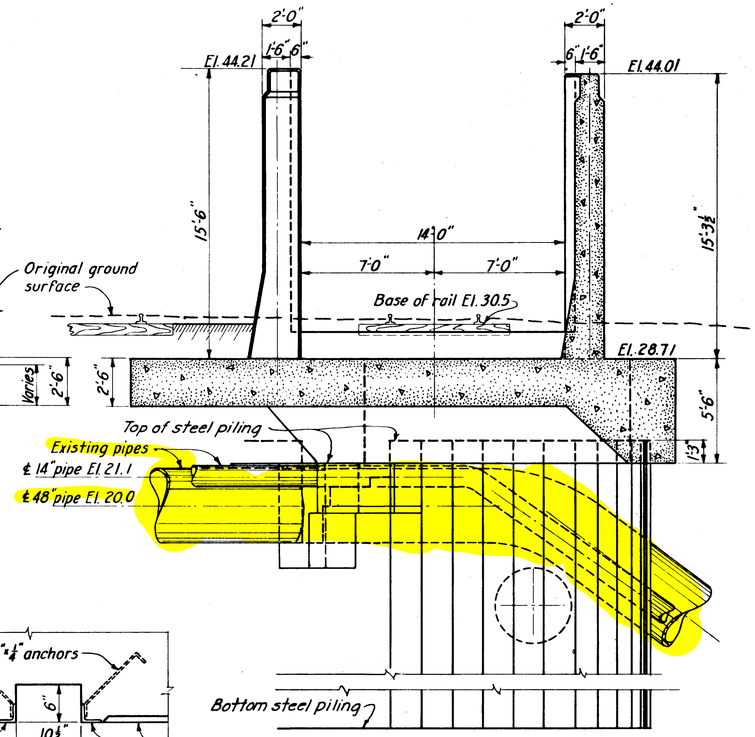
61



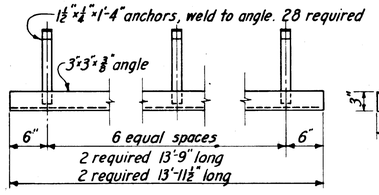

**PLAN**
SCALE 1/4" = 1'-0"



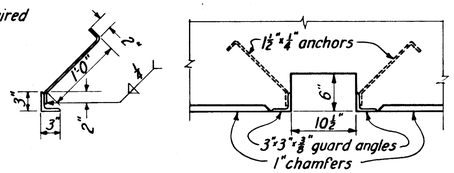

**SECTION A/65**
SCALE 1/4" = 1'-0"




**SECTION B/65**
SCALE 1/4" = 1'-0"



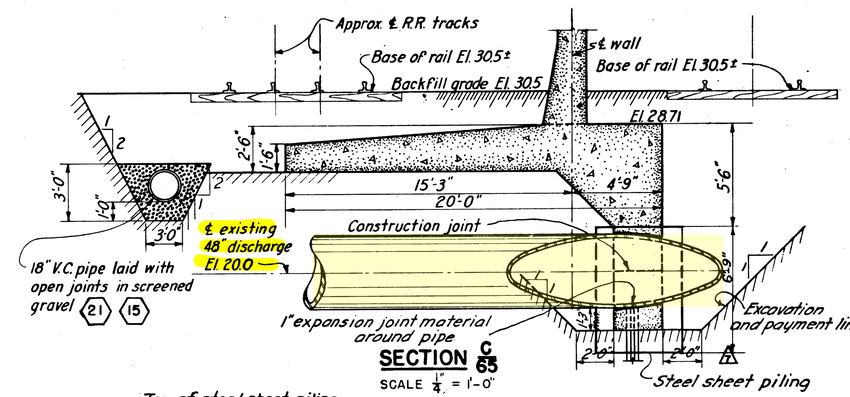

**DETAIL OF STOP-LOG GROOVE ANGLE**
4 REQUIRED (30)
SCALE 1" = 1'-0"



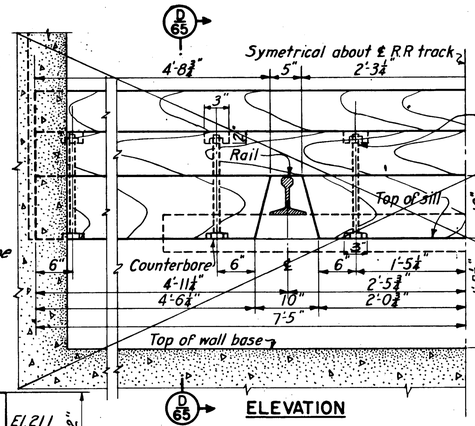

**DETAIL OF STOP-LOG GROOVE**
SCALE 1" = 1'-0"




**DETAIL OF STOP-LOGS 3 TO 21**
22 REQUIRED (34)
SCALE 1" = 1'-0"



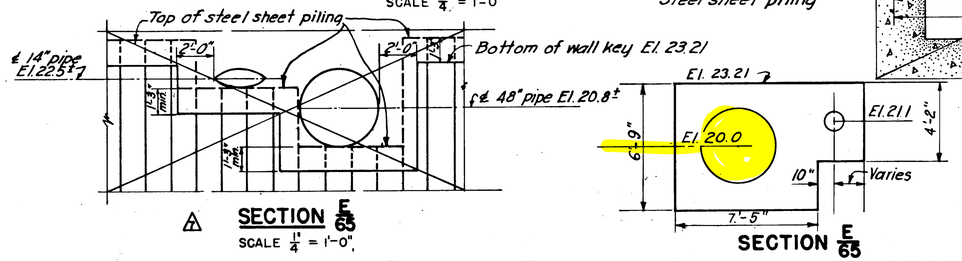

**SECTION C/65**
SCALE 1" = 1'-0"




**ELEVATION**

**SECTION D/65**

**DETAIL OF STOP-LOG CLOSURE** 22 single logs placed at the request of the H. E. L. f. Co.
ONE REQUIRED
SCALE 1" = 1'-0"




**SECTION E/65**
SCALE 1" = 1'-0"

**SECTION E/65**

## NOTES

For general notes applying to this sheet see Sheet No. 20.
For steel reinforcing details see Sheets No. 118 and 119.
For plan and profile see Sheet No. 61.

| KEY | DATE | REVISION (Indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| △ | 3-10-41 | Section added. Sheet piling changed | WGE | RGL | JKB |

CONNECTICUT RIVER FLOOD CONTROL
**HARTFORD DIKE**
RIVERFRONT, MORGAN ST. TO STA. 96+73
**STOP-LOG STRUCTURE NO. 2**
SOUTH MEADOW STATION

CONNECTICUT RIVER — CONNECTICUT
IN 135 SHEETS — SCALE: 1/4 IN. = 1 FT. — SHEET NO. 65

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY 1940

SUBMITTED: SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: BY COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: ASSOC. ENGINEER
DRAWN: W.C.B.
TRACED: N.B.
CHECKED: WGE
FISCAL YEAR 1940
FILE NO. CT-4-2525

Ht. 587b (65)

HD-46

PRINTED ON "ARKWRIGHT" TRACING CLOTH K & E CO., N. Y.

HD-46

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

#10 #11 D.H. #12 #20 #21 #52 #54

HOUSE SERVICE

HOUSE FEEDER

Wet Area

Wet Area

Wet Area

Power Line

Wet Area

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

N 34°-13'-40" W
591.36'
P.I. - P.C.

#38 M.S. BROKEN

#39 M.S. BROKEN

#26 C.M.S. (FD)

359.26'

210.72'

RESERVE ROAD

#3

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

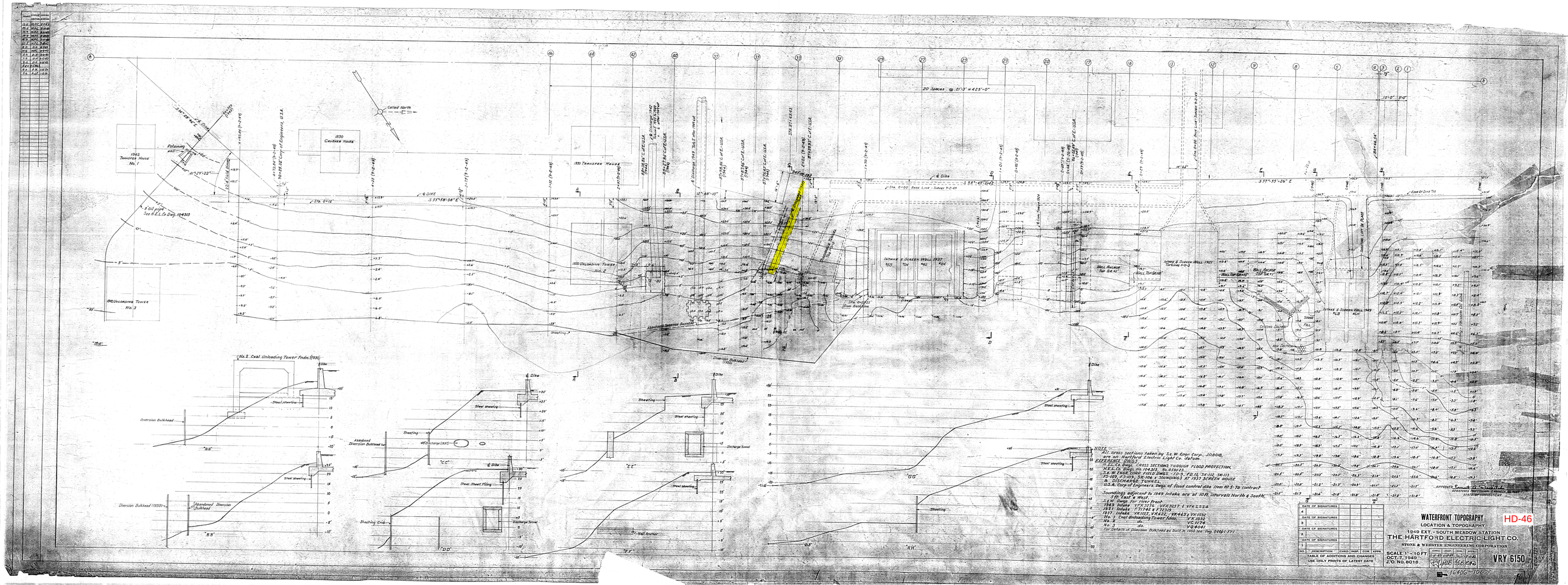
PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY

PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 69-1.54 DWG NO. 50532 VS. H-17-1

SHEET 2 OF 4


20 Spaces @ 21'-3" = 425'-0"
Called North
1948 Tenneyfer House No. 1
1930 Crushing House
1930 Tenneyfer House
1930 Unloading Tower No. 2
1941 Unloading Tower No. 3
Retaining wall
6 Dike
6 Oil pipe See H.E.L.Co Dwg. 104313
Intake & Screen Well 1937 Sta. 0+00 Base Line - Survey 9-2-49
Intake & Screen Well 1949 Sta. 0+00 Base Line - Survey 9-2-49
Wall Anchor Top Gr. +7
Wall Top Grade
Sta. 0+00 on Base Line
Diversion Bulkhead
Abandoned Diversion Bulkhead
Steel sheeting
Sheeting
Sheeting Cribs
Discharge Tunnel
Steel Sheet Piling
Tie Rod
Tie wall Anchor
Existing Slope Protection
Existing Stone Fill
Existing Concrete Wall
New Concrete Wall
Existing Timber Piles
Existing Timber Platform
Existing Timber Sheeting
Existing Timber Bracing
Existing Timber Wales
Existing Timber Fender Piles
Existing Timber Fender Wales
Existing Timber Fender Bracing
Existing Timber Fender Sheeting
Existing Timber Fender Anchor Piles
Existing Timber Fender Anchor Wales
Existing Timber Fender Anchor Bracing
Existing Timber Fender Anchor Sheeting
Existing Timber Fender Anchor Anchor Piles
Existing Timber Fender Anchor Anchor Wales
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Existing Timber Fender Anchor

f

A

41'-9"

34

Government Dike Wall

Berm

Existing 48" Discharge

148'-2⅜" NTS

48" Discharge

Riprap

Existing 14" Discharge

Existing 48" Discharge

Existing Discharge Tunnel

1937 Screen Well House

Called North

Berm

12"

7'-1"

Riprap

+2.41'

1942 Outfall

+2.55'

+1.07'

1937 Outfall

+4.22'

5'-3"

5'-3"

A

PLAN

℄ Dike Wall

Gr. 31.0'

Gr. 28.71'

Riprap

48" Discharge

Gr. 11.50'

Grade top of Sheeting to conform to riprap slope - to be determined by field

Pipe Opening Seal

Gr. ±0.00'

Sheet piling MZ-38 30' lengths

Framing above & below pipe welded to Sheeting full section either side beyond obpg. to be provided by field from available material.

Tremie mat 2'-0" Min. Depth

Gr. -4.66'

Gr. -8.66'

"A-A"

Notes:

Scale ⅛"=1'-0"

Grades referred to ~~U.S. Army Engineers~~ "Hartford Datum"

BM #1 71

For Pipe Opening Seal in Government Dike see Dwg. VFX 4745.

Steel sheet Piling "MZ 38"

For details of 1942 Discharge Well see Dwg. VP 2357.

to be used for Turbin

NOTE: Yellow notations made 11-24-48 per Steve Kusmik.

APPROVED Ernest A Dochstader

REGISTERED PROFESSIONAL ENGINEER NO. 1287

STATE OF CONNECTICUT

WORK this with VFY3831

16406-10015

| NO. | DESCRIPTION | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|---|
| 4 | DATE OF SIGNATURES | | | | |
| 3 | DATE OF SIGNATURES | | | | |
| 2 | DATE OF SIGNATURES | | | | |
| 1 | 01 | | 8/15 | 86 | MR |

TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE

To Be Used For TURBINE No. 5

# DETAILS - 48 INCH PIPE DICHARGE OUTFALL

## SUBSTRUCTURE

1949 EXT. - SOUTH MEADOW STATION

THE HARTFORD ELECTRIC LIGHT CO.

STONE & WEBSTER ENGINEERING CORPORATION

SCALE GIVEN
SEPT. 27, 1948
J. O. NO. 8018

| | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|
| P.G.N. | 10-5-48 | 10-5-48 | 10-? | 11-16-48 |
| R.W.B. | | | | |

VHX 6126

R.C. 13336

HD-46

Called North

TRANSFER HOUSE

UNLOADING TOWER NO. 2

℄ 1942 DISCHARGE

℄ 1949 DISCHARGE

℄ 1937 DISCHARGE

℄ DIKE

DISCHARGE TUNNEL

INTAKE & SCREEN WELL - 1937

Unloading boom to be swung to 90° ± with line of pile clusters.

EXISTING DIVERSION BULKHEAD

Proposed Diversion Bulkhead

PLAN
Scale 1" = 10.0'

NOTE
For sections and details north of this location see S & W dwg R.C. 26590 Proposed Waterfront Alterations, dated May 16, 1950.

℄ Dike

Proposed Bulkhead 50' lengths of sheet piling.

Existing Bulkhead to be cut off at Gr. -2.0'

Water

M.L.W. Gr. +2.0'?

℄ Rock Paving Gr. -2.0'

℄ Gravel Fill Gr. -4.0'

SECT "X-X"
Scale: 1" = 10.0'

# PROPOSED WATERFRONT ALTERATIONS
## SOUTH MEADOW STATION
## THE HARTFORD ELECTRIC LIGHT CO.
STONE & WEBSTER ENG. CORP. - BOSTON, MASS.

Scale As Noted
Aug. 23, 1950, Rev Aug. 29, 1950
J.O. 8446-1

D-

1-26590

HD-46

34 23 22 20 18 14

f

h

Top Gr. 30.0

6" Ash Removal Vk 310

Existing 6" Ash Removal Line

New 6" Ash Removal

Top Gr. 27.7

Top Gr. 27.8

Top Gr. 26.5

Top Gr. 27.0

Existing Conduit in Conc. Envelope (18"x 15")
Feed to Coal Unloading Tower

5' Duct Line 2'6" Wide x 2'-0" deep

82'-8½"

76'-0"

Ignition Oil Tank
Top of Nozzles Gr. 31.60

18" 6'-9" 18'-4"

2"ϕ Disch. from Coal Crusher Sump to River
Box [S] removed from 3 line framing used as dead-man for Sheet Piling

Filler

33 Pcs. Bethlehem Steel Sh. Piling 11'-9" long

1" Comp. Air

1" Brass Comp. Air (by H.E.L. Co.)

Chlorination Ho.

See Fld Sk.

Gr. 27.50

Top 6"ϕ Gr. 27.53
Top 1½"ϕ Gr. 27.33
Top 1"ϕ Gr. 27.33

6" Service Water Vk 24 GR
1½" City Water Vk 24 GR.
1" Comp. Air (by H.E.L. Co.)

For continuation see VK 310
Ash Removal Pump Suct. & Disch.

Duct Line
Top Gr. 28.3

Gr. Top 6" 26.05

Gr. Top 26.59

3'-5"

Edge of roof

1" Disc.

Steel Sheet Piling

Conc. Wall

Steel Sheet Piling

Existing 8" Ash Line
Abdn.

3" Service Water
1" City Water Vk 1380
4" Chlor. Line Vk 1380
2" Conduit Vk 925
1½ Steam in 4" I. Conduit

Screen Well House

For details of Sheet piling see Field Sketch
" " " " Concrete anchor " "

9 Pcs. Beth. Steel Sh. Piling 23' Long

11 Pcs. Beth. Steel Sh. Piling 30' Long

Gr. 25.3

33 Pcs. Bethlehem Sh. Piling
11'-9" Long

Gr. 25.3

18" B 36#

7 Pcs. Bethlehem Steel
Sheet Piling 30' Long

Conc. Strut 12"x24"

SECT. A-A Scale ¾"=1'-0"

SECT. B-B Scale ¾"=1'-0"

4" Chl. Line — Top Gr. 26.07
6" I. Conduit — Top Gr. 26.25
1" Comp. Air (by H.E.L. Co.) Top Gr. 26.28
3" Service Water — Top Gr. 26.35
1" City Water — Top Gr. 26.25
1½" Steam — Top Gr. 26.25

21" 3'-6" 5" 4'-6"

West Wall of New Sc. Well

SECT. C-C Scale ¾"=1-0

16404-25001

STUDY PLAN - YARD PIPING

PIPING

1937 EXTENSION - SOUTH MEA. STATION

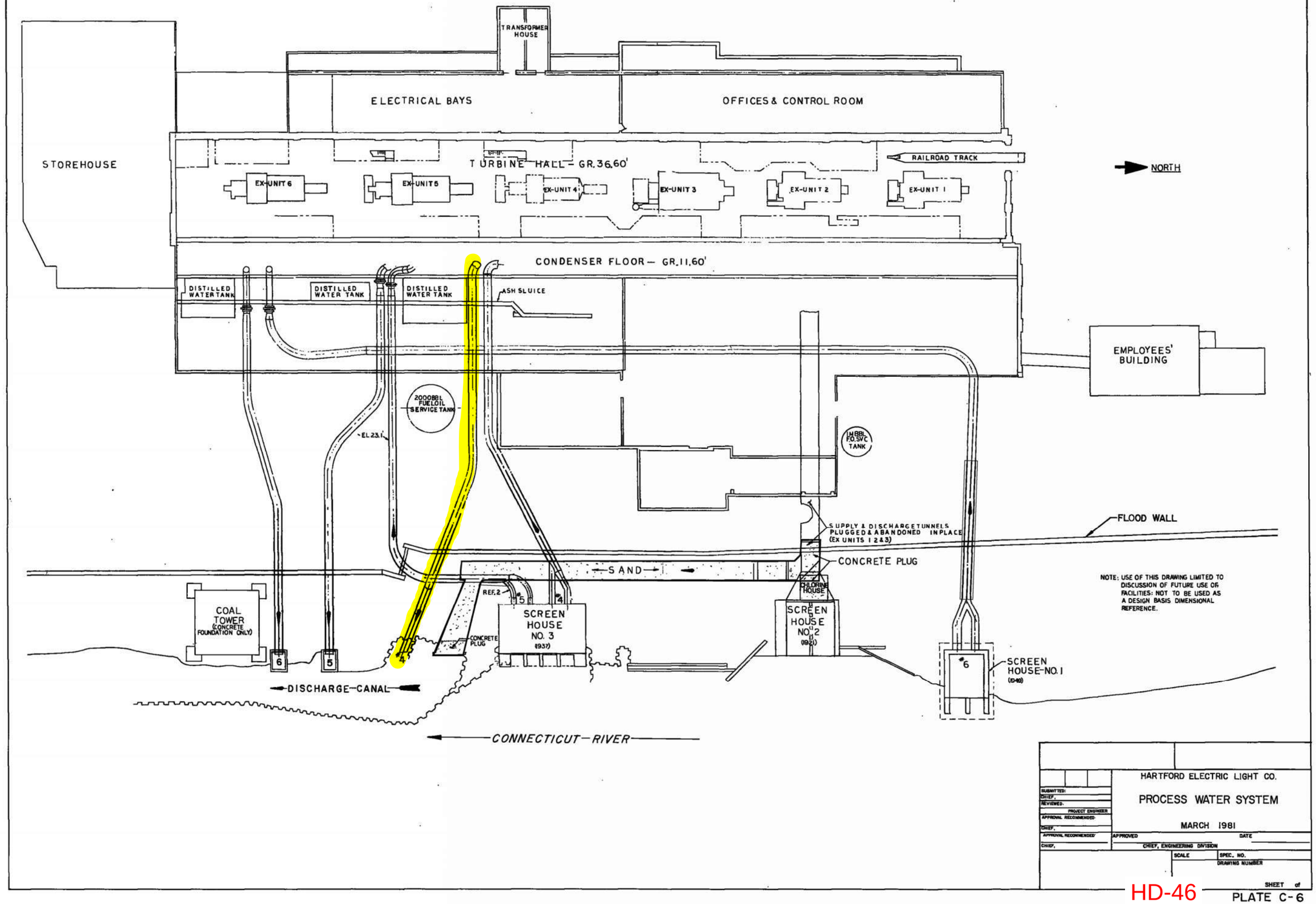
HARTFORD ELECTRIC LIGHT CO

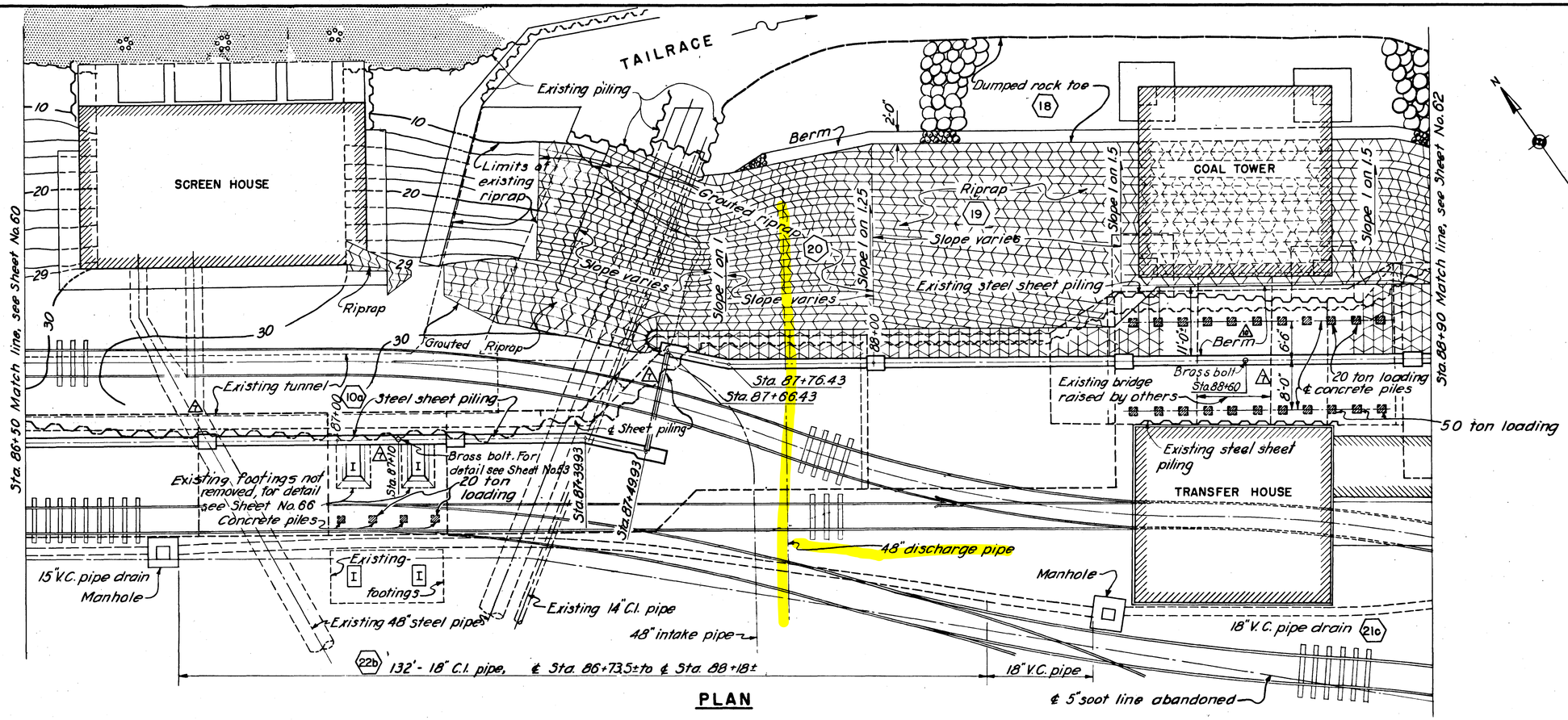
STONE & WEBSTER ENG. CORP.

Scale 1"=10'-0"
J.O. 6352
Feb 17, 1938

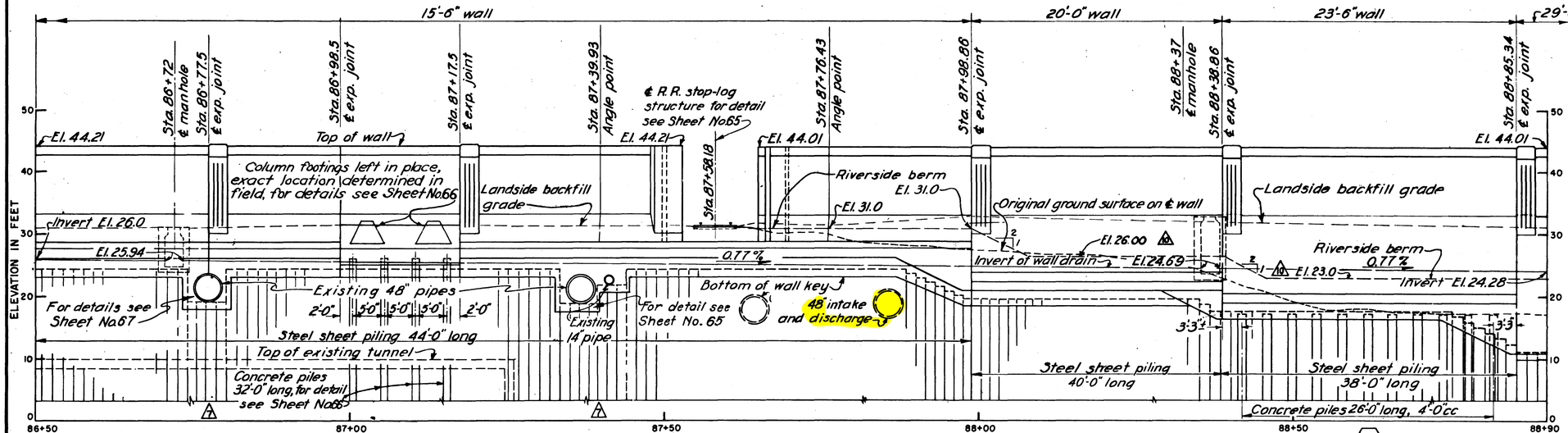
nusco rev 01 DATE 6-4-87

HD-46


TRANSFORMER HOUSE
ELECTRICAL BAYS
OFFICES & CONTROL ROOM
STOREHOUSE
TURBINE HALL – GR. 36.60'
RAILROAD TRACK
NORTH
EX-UNIT 6
EX-UNIT 5
EX-UNIT 4
EX-UNIT 3
EX-UNIT 2
EX-UNIT 1
CONDENSER FLOOR – GR. 11.60'
DISTILLED WATER TANK
DISTILLED WATER TANK
DISTILLED WATER TANK
ASH SLUICE
EMPLOYEES' BUILDING
2000 BBL FUEL OIL SERVICE TANK
EL 23.1'
1 BBL F.O. SVC TANK
SUPPLY & DISCHARGE TUNNELS PLUGGED & ABANDONED IN PLACE (EX UNITS 1 2 & 3)
FLOOD WALL
SAND
CONCRETE PLUG
CHLORINE HOUSE
REF. 2
COAL TOWER (CONCRETE FOUNDATION ONLY)
SCREEN HOUSE NO. 3 (1937)
CONCRETE PLUG
SCREEN HOUSE NO. 2 (1921)
SCREEN HOUSE-NO. 1 (1940)
DISCHARGE CANAL
CONNECTICUT RIVER
NOTE: USE OF THIS DRAWING LIMITED TO DISCUSSION OF FUTURE USE OF FACILITIES: NOT TO BE USED AS A DESIGN BASIS DIMENSIONAL REFERENCE.
HARTFORD ELECTRIC LIGHT CO.
PROCESS WATER SYSTEM
MARCH 1981
SUBMITTED:
CHIEF,
REVIEWED:
PROJECT ENGINEER
APPROVAL RECOMMENDED:
CHIEF,
APPROVAL RECOMMENDED:
CHIEF,
APPROVED
DATE
CHIEF, ENGINEERING DIVISION
SCALE
SPEC. NO.
DRAWING NUMBER
SHEET of
HD-46
PLATE C-6




PLAN




PROFILE

## NOTES

For general notes applying to this sheet, see Sheet No. 20.
For concrete details, see Sheets No. 74, 75, 76.

| KEY | DATE | REVISION (indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | P.C.H. | | |
| 2 | 10/16/41 | Berm widened | P.C.H. | | |
| 1 | 3/10/41 | Curtain wall removed. | W.A.E. | | |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

## DETAIL PLAN AND PROFILE STA. 86+50, TO STA. 88+90.

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1 IN. = 10 FT. (10 0 10 20) — SHEET NO. 61

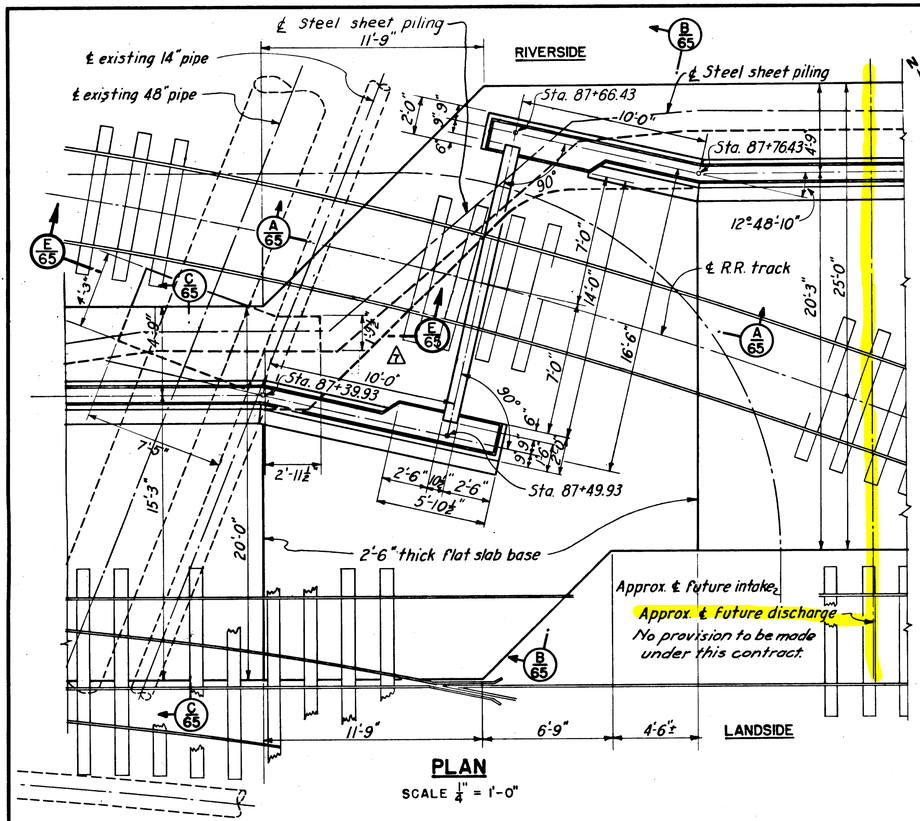
U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

| SUBMITTED: | APPROVAL RECOMMENDED: | APPROVED: |
|---|---|---|
| SENIOR ENGINEER, HEAD, DESIGN SECTION | PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV. | LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER |

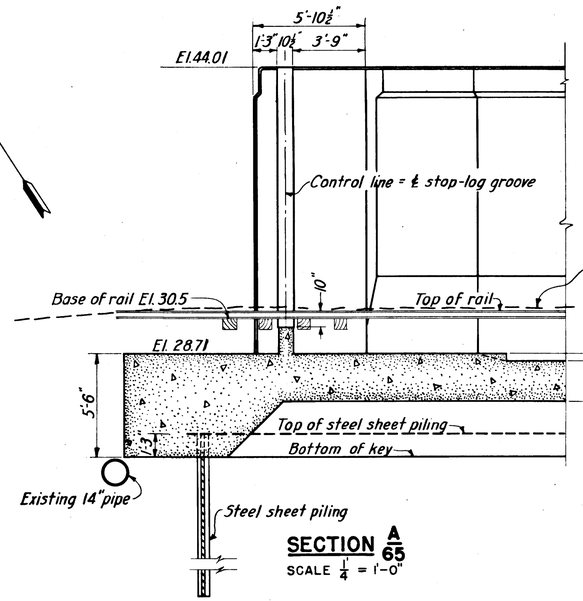
DESIGNED: ASSOC. ENGINEER — DRAWN: C.D.A. & A.K. — TRACED: D.L.B. — CHECKED: W.A.E.

FISCAL YEAR 1940
FILE NO. CT-4-2521

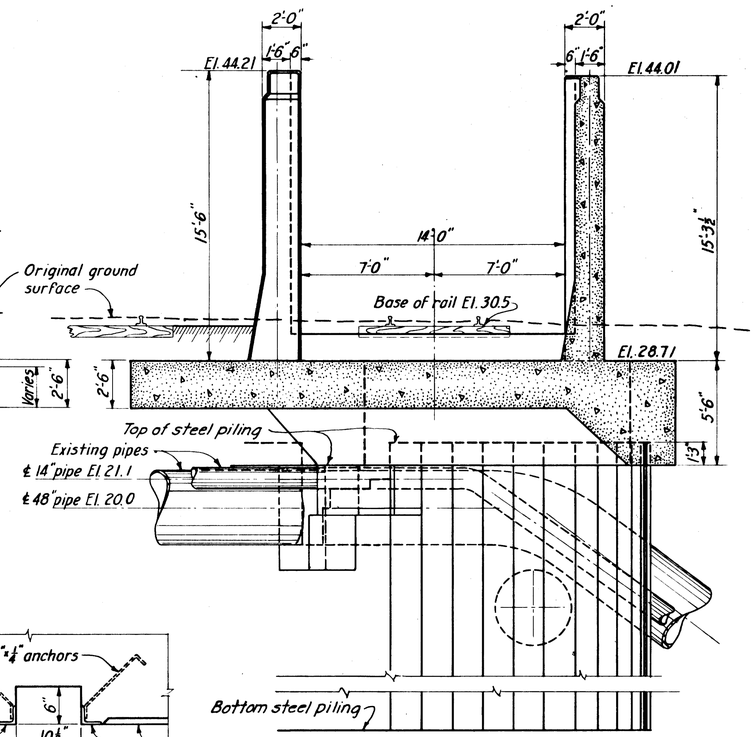
Ht. 587b



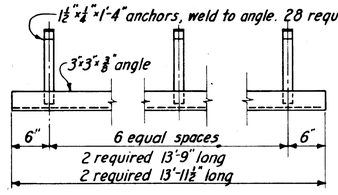

**PLAN**
SCALE 1" = 1'-0"



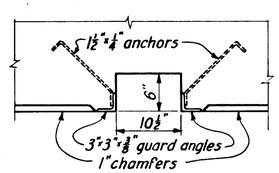

**SECTION A 65**
SCALE 1" = 1'-0"




**SECTION B 65**
SCALE 1" = 1'-0"



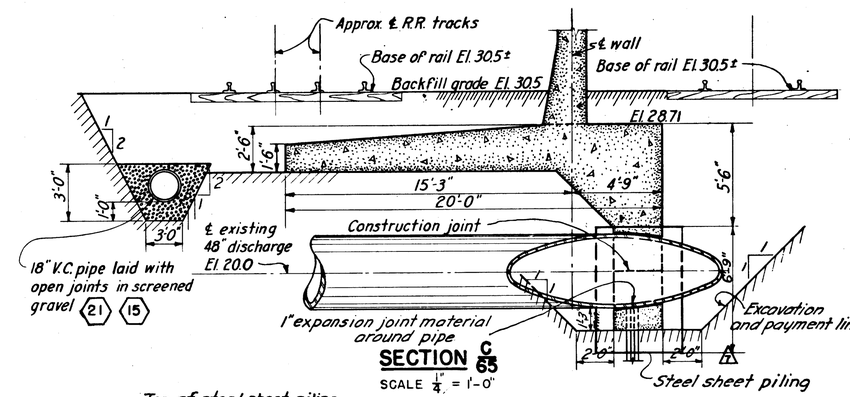

**DETAIL OF STOP-LOG GROOVE ANGLE**
4 REQUIRED (30)
SCALE 1" = 1'-0"



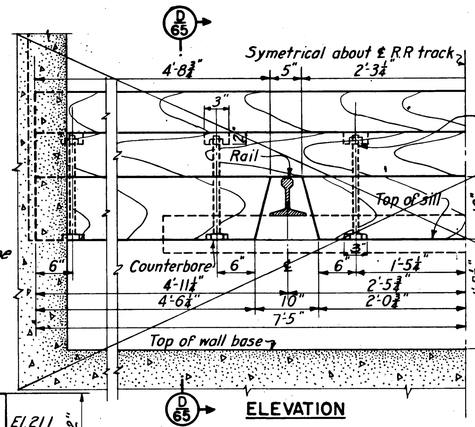

**DETAIL OF STOP-LOG GROOVE**
SCALE 1" = 1'-0"




**DETAIL OF STOP-LOGS 3 TO 21**
22 REQUIRED (34)
SCALE 1" = 1'-0"



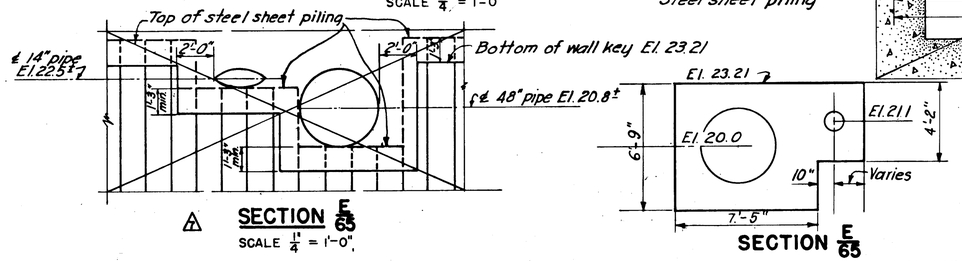

**SECTION C 65**
SCALE 1" = 1'-0"




**ELEVATION**

**SECTION D 65**

**DETAIL OF STOP-LOG CLOSURE** 22 single logs placed at the request of the H. E. L. f. Co.
ONE REQUIRED
SCALE 1" = 1'-0"




**SECTION E 65**
SCALE 1" = 1'-0"

**SECTION E 65**

## NOTES

For general notes applying to this sheet see Sheet No. 20.
For steel reinforcing details see Sheets No. 118 and 119.
For plan and profile see Sheet No. 61.

| KEY | DATE | REVISION (Indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| △ | 3-10-41 | Section added. Sheet piling changed | WGE | RGL | JKB |

CONNECTICUT RIVER FLOOD CONTROL
**HARTFORD DIKE**
RIVERFRONT, MORGAN ST. TO STA. 96+73
**STOP-LOG STRUCTURE NO. 2**
SOUTH MEADOW STATION

CONNECTICUT RIVER — CONNECTICUT
IN 135 SHEETS — SCALE: 1/4 IN. = 1 FT. — SHEET NO. 65

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY 1940

SUBMITTED: Howard D. Nielsen, SENIOR ENGINEER, HEAD, DESIGN SECTION
APPROVAL RECOMMENDED: J. H. Burma, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.
APPROVED: [illegible], BY, COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DESIGNED: [illegible], ASSOC. ENGINEER
DRAWN: W.C.B.
TRACED: N.B.
CHECKED: WGE
FISCAL YEAR 1940
FILE NO. CT-4-2525

Ht. 587b (65)

HD-47

PRINTED ON "ARKWRIGHT" TRACING CLOTH K & E CO., N. Y.

HD-47

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE

FEEDER

Wet Area

Wet Area

Wet Area

Power Line

Wet Area

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

N 34°-13'-40" W
591.36'
P.I. - P.C.

RESERVE ROAD

#38 M.S. BROKEN

#39 M.S. BROKEN

#26 C.M.S. (FD)

359.26'

210.72'

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

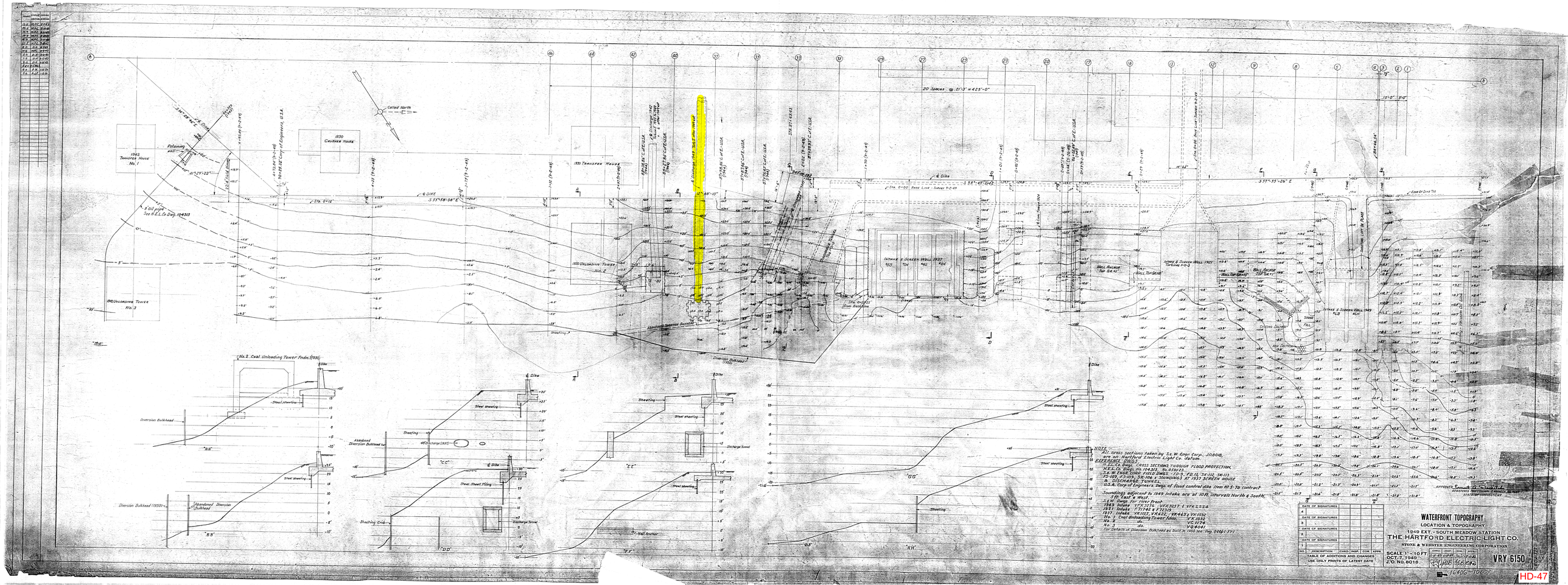
SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY
PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 89-1.54 DWG NO. 50532 VS. H-17-1
SHEET 2 OF 4




| DATE OF SIGNATURES | | | | |
|---|---|---|---|---|
| 4 | | | | |
| DATE OF SIGNATURES | | | | |
| 3 | | | | |
| DATE OF SIGNATURES | | | | |
| 2 | | | | |
| DATE OF SIGNATURES | | | | |
| 1 | | | | |
| NO. | DESCRIPTION | CHKD. | INSP. | FOR APPR. |

TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE

APPROVED Samuel G. Sewall
STATISTICS PORTSMOUTH, NEW HAMPSHIRE
STATE OF CONNECTICUT

# WATERFRONT TOPOGRAPHY
LOCATION & TOPOGRAPHY
1949 EXT. - SOUTH MEADOW STATION
THE HARTFORD ELECTRIC LIGHT CO.
STONE & WEBSTER ENGINEERING CORPORATION

SCALE 1" = 10 FT
OCT. 7, 1949
J.O. NO. 8018

VRY-6150

1640G-10607

HD-47

f

A

41'-9"

34

Government Dike Wall

Berm

Existing 48" Discharge

148'-2⅜" NTS

48" Discharge

Riprap

Existing 14" Discharge

Existing 48" Discharge

Existing Discharge Tunnel

1937 Screen Well House

Called North

Berm

12"

7'-1"

Riprap

+2.41'

1942 Outfall

+2.55'

+1.07'

1937 Outfall

+4.22'

5'-3"  5'-3"

PLAN

A

℄ Dike Wall

Gr. 31.0'

Gr. 28.71'

Riprap

48" Discharge

Grade top of Sheeting to conform to riprap slope to be determined by field

Gr. 11.50'

Pipe Opening Seal

Gr. ±0.00'

Sheet piling MZ-38 30' lengths

Tremie mat 2'0" Min. Depth

Framing above & below pipe welded to Sheeting full section either side beyond Opng. to be provided by field from available material.

Gr. -4.66'

Gr. -8.66'

"A-A"

Notes:
Scale 1/8"=1'-0"
Grades referred to ~~U.S. Army Eng. ...~~ "Hartford Datum"
BM #1 71
For Pipe Opening Seal in Government Dike see Dwg VFX 4745.
Steel sheet Piling "MZ 38"
For details of 1942 Discharge Well see Dwg. VP 2357.
to be used for Turbin...

NOTE: Yellow notations made 11-24-48 per Steve Kusmik.

APPROVED Ernest A Dochstader
REGISTERED PROFESSIONAL ENGINEER NO. 1287
STATE OF CONNECTICUT

WORK this with VFY3831

16406-10015

To Be Used Fo... RBINE No. 5

| NO. | DESCRIPTION | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|---|
| 4 | DATE OF SIGNATURES | | | | |
| 3 | DATE OF SIGNATURES | | | | |
| 2 | DATE OF SIGNATURES | | | | |
| 1 | DATE OF SIGNATURES | | | | |
| | 01 | | 8/15 | 86 | MR |

TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE

# DETAILS - 48 INCH PIPE DICHARGE OUTFALL

SUBSTRUCTURE

1949 EXT. - SOUTH MEADOW STATION

THE HARTFORD ELECTRIC LIGHT CO.

STONE & WEBSTER ENGINEERING CORPORATION

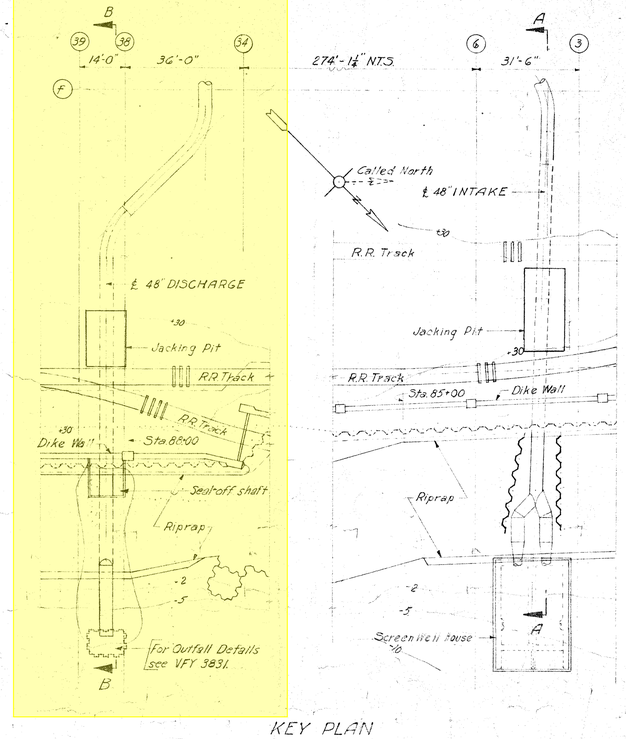
SCALE GIVEN
SEPT. 27, 1948
J. O. NO. 8018

| | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|
| P.G.N. | 10-5-48 | 10-5-48 | 10-... | 11-16-48 |
| R.W.B. | | | | |

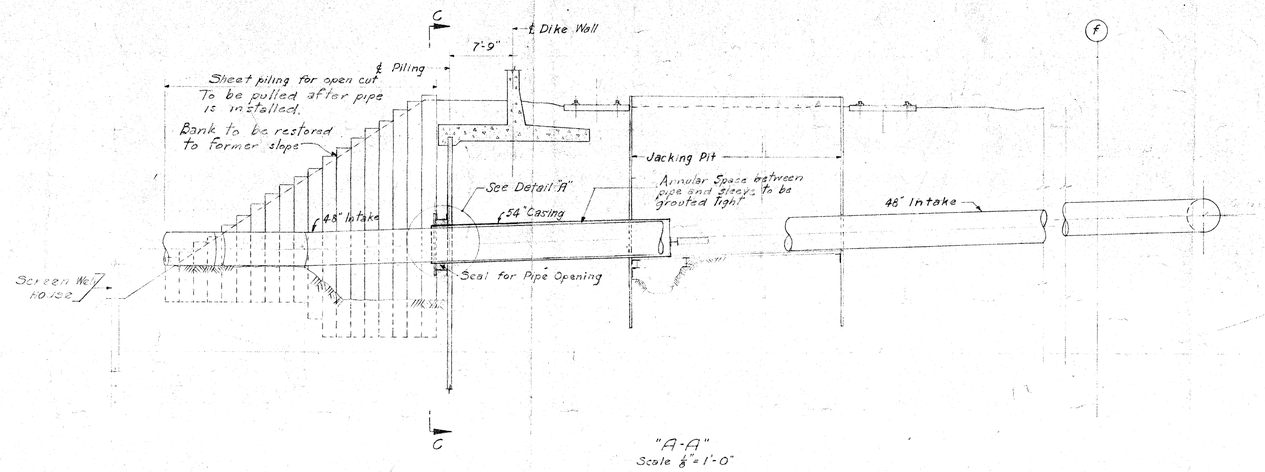
VHX 6126

R.C. 13336

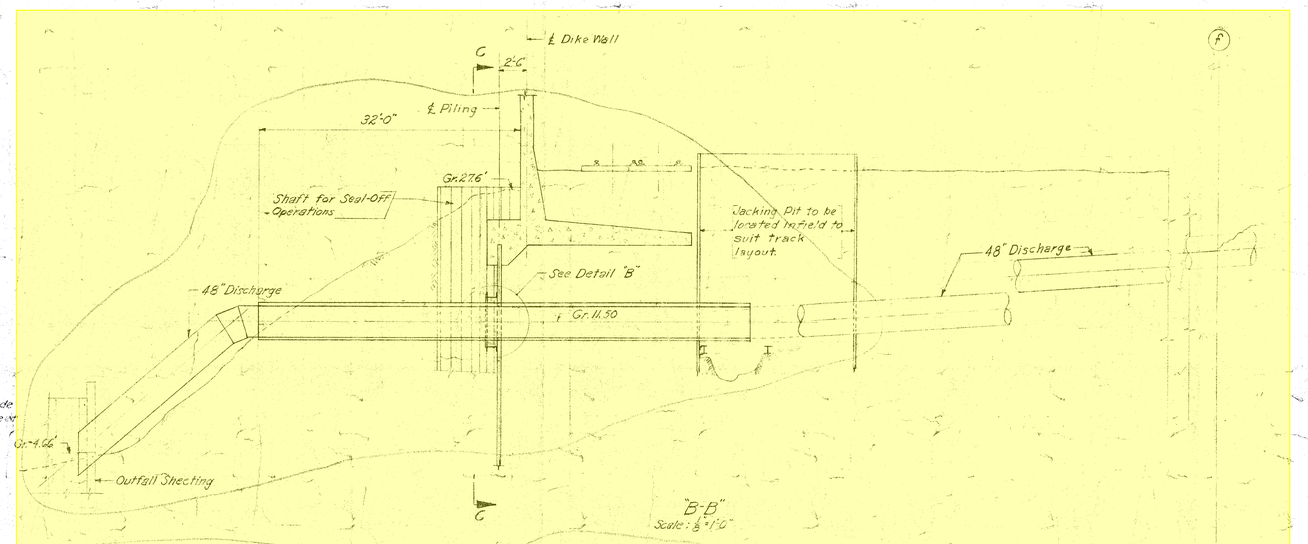
HD-47



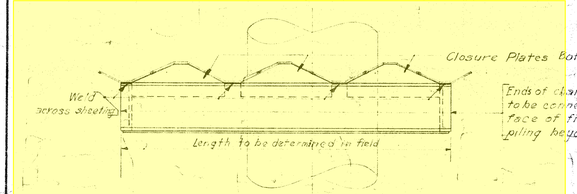

KEY PLAN
INTAKE & DISCHARGE
Scale 1"=20'-0"



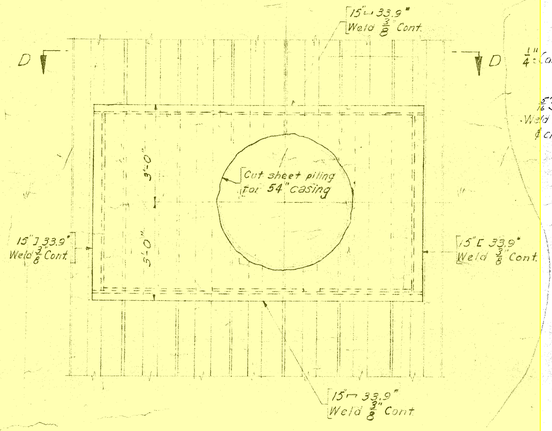

"A-A"
Scale ⅛"=1'-0"



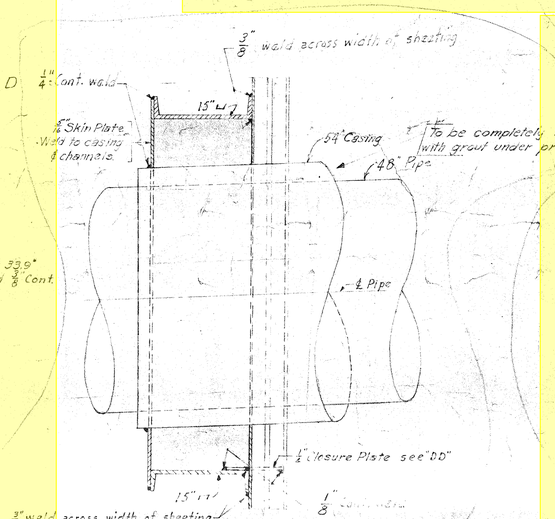

"B-B"
Scale: ⅛"=1'0"



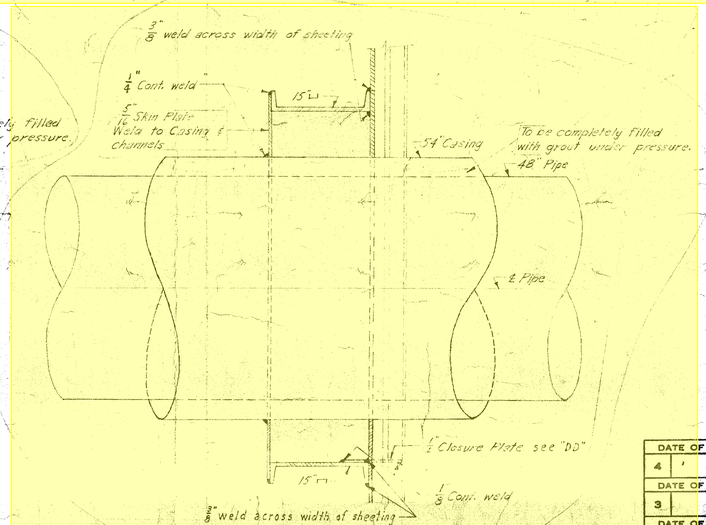

"D-D"




"C-C"
PIPE OPENING SEAL
Scale ½"=1'-0"




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




DETAIL "B"
Scale: 1"=1'-0"

Notes:
Scale as shown.
For Intake & Discharge Lines, See Dwgs. VFX 3512 & VFX 3511

APPROVED Ernest A. Dochstader
REGISTERED PROFESSIONAL ENG. No. 1287
STATE OF CONNECTICUT

| NO. | DESCRIPTION | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|---|
| 4 | | | | | |
| DATE OF SIGNATURES | | | | | |
| 3 | | | | | |
| DATE OF SIGNATURES | | | | | |
| 2 | | | | | |
| DATE OF SIGNATURES | | 6-27-49 | 6-27-49 | 6/30/49 | 6/30/49 |
| 1 | DISCHARGE INLETING & CONC. CHAN. WITH & APRON | P.J. | W.K. | G.B. | WAFF. |

TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE.

# DETAILS THRU DIKE AT CIRCULATING WATER LINES

SUBSTRUCTURE

1949 EXT. - SOUTH MEADOW STATION

THE HARTFORD ELECTRIC LIGHT CO.

STONE & WEBSTER ENGINEERING CORPORATION

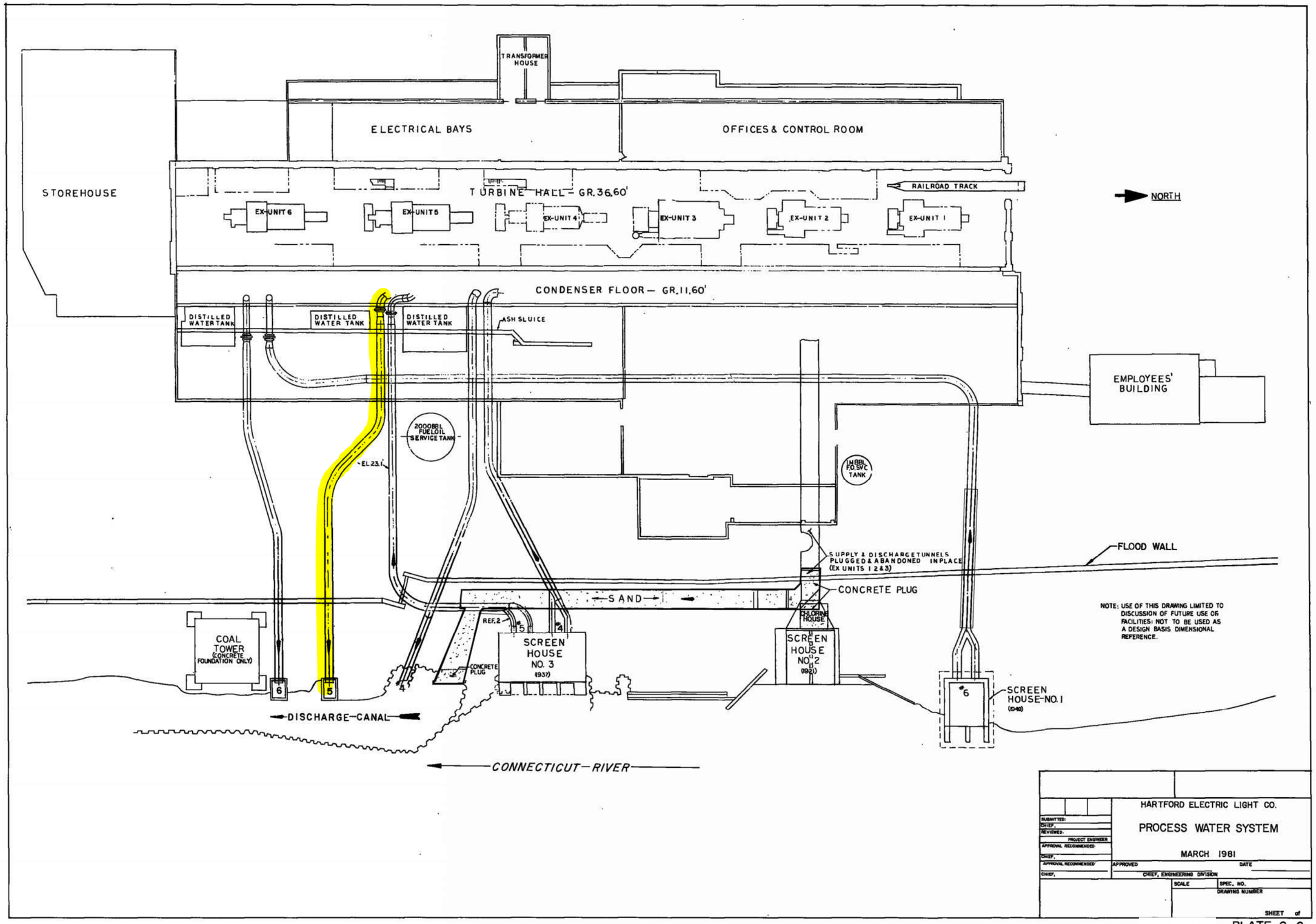
SCALE GIVEN
JULY 26, 1948
J. O. NO. 8018

| CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|
| 7-30-49 | 7-30-49 | 8-4-49 | 8-4-49 |
| P.J. | Kurt L. | G.B. | E.A.D. |

VFX 4745

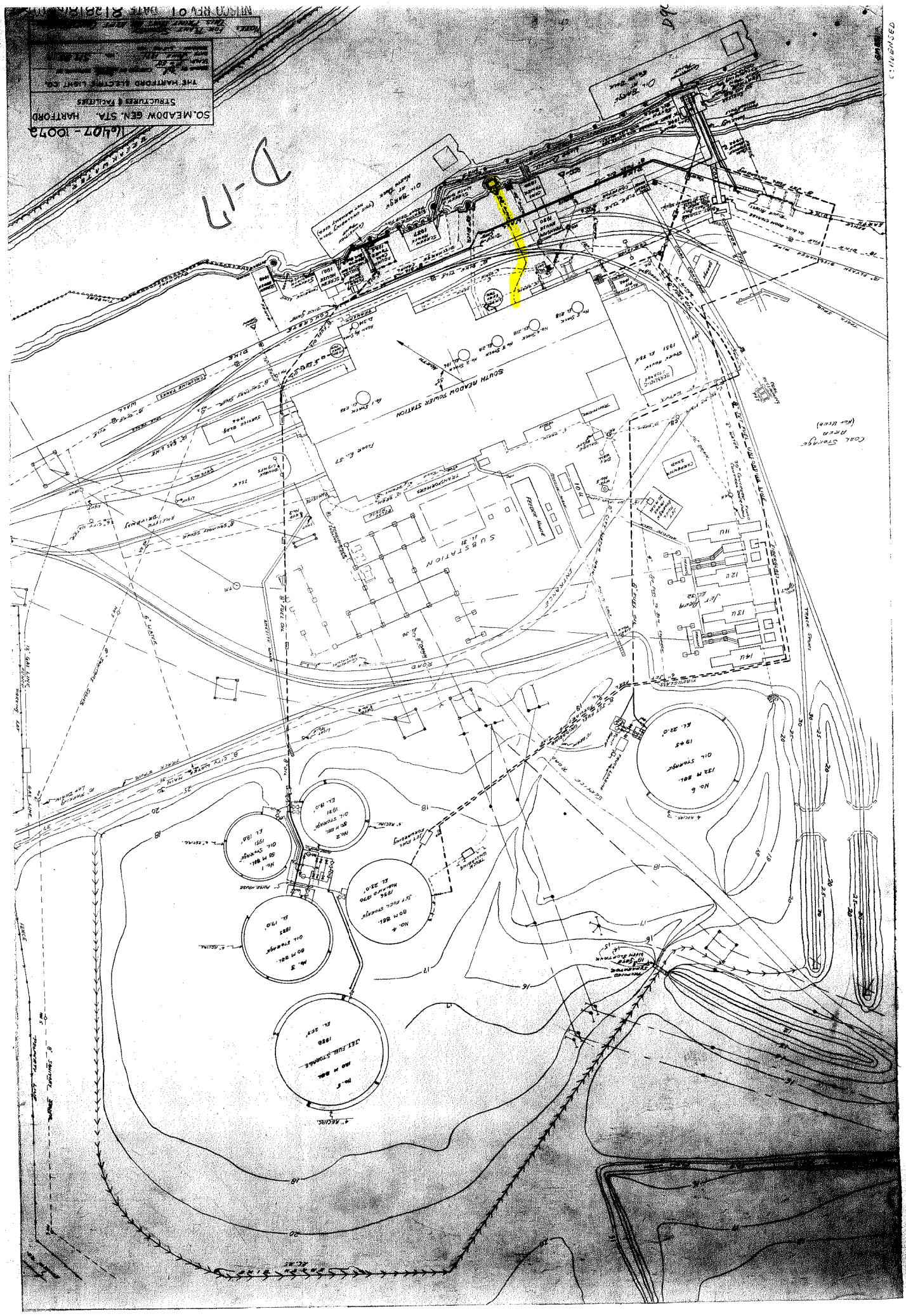
B.C. 11016

16406-11017 HD-47




| | |
|---|---|
| SUBMITTED: CHIEF, | HARTFORD ELECTRIC LIGHT CO. |
| REVIEWED: PROJECT ENGINEER | PROCESS WATER SYSTEM |
| APPROVAL RECOMMENDED: CHIEF, | MARCH 1981 |
| APPROVAL RECOMMENDED: CHIEF, | APPROVED DATE CHIEF, ENGINEERING DIVISION |
| | SCALE SPEC. NO. DRAWING NUMBER |
| | SHEET of |

PLATE C-6


SOUTH MEADOW POWER STATION
SUBSTATION
SO. MEADOW GEN. STA. HARTFORD
STRUCTURES & FACILITIES
THE HARTFORD ELECTRIC LIGHT CO.
D-17
HD-47

Called North

TRANSFER HOUSE

UNLOADING TOWER No. 2

℄ DIKE

℄ 1942 DISCHARGE

℄ 1949 DISCHARGE

℄ 1937 DISCHARGE

DISCHARGE TUNNEL

INTAKE & SCREEN WELL - 1937

EXISTING DIVERSION BULKHEAD

Proposed Diversion Bulkhead

Unloading boom to be swung to 90° & with line of pile clusters.

X

PLAN
Scale 1" = 10.0'

NOTE
For sections and details north of this location see S & W dwg R.C. 26590 Proposed Waterfront Alterations, dated May 16, 1950.

℄ Dike

Proposed Bulkhead 50' lengths of sheet piling.

Existing Bulkhead to be cut off at Gr. -2.0'

Water

M.L.W. Gr. +2.0'?

℄ Rock Paving Gr. -2.0'

℄ Gravel Fill Gr. -4.0'

SECT "X-X"
Scale: 1" = 10.0'

D-

PROPOSED WATERFRONT ALTERATIONS
SOUTH MEADOW STATION
THE HARTFORD ELECTRIC LIGHT CO.
STONE & WEBSTER ENG. CORP. - BOSTON, MASS.

Scale As Noted
Aug. 23, 1950, Rev Aug. 29, 1950
J. O. 8446-1

1-26590

HD-47

HD-47a

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE SERVICE

HOUSE FEEDER

Wet Area

Wet Area

Power Line

Wet Area

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

RESERVE ROAD

N 34°-13'-40" W
591.36'
P.T. - P.C.

359.26'
210.72'

#26 C.M.S. (FD)

#38 M.S. BROKEN

#39 M.S. BROKEN

#10 #11 D.H. #12 #20 #21 #22 PK-SPK #52 #54

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

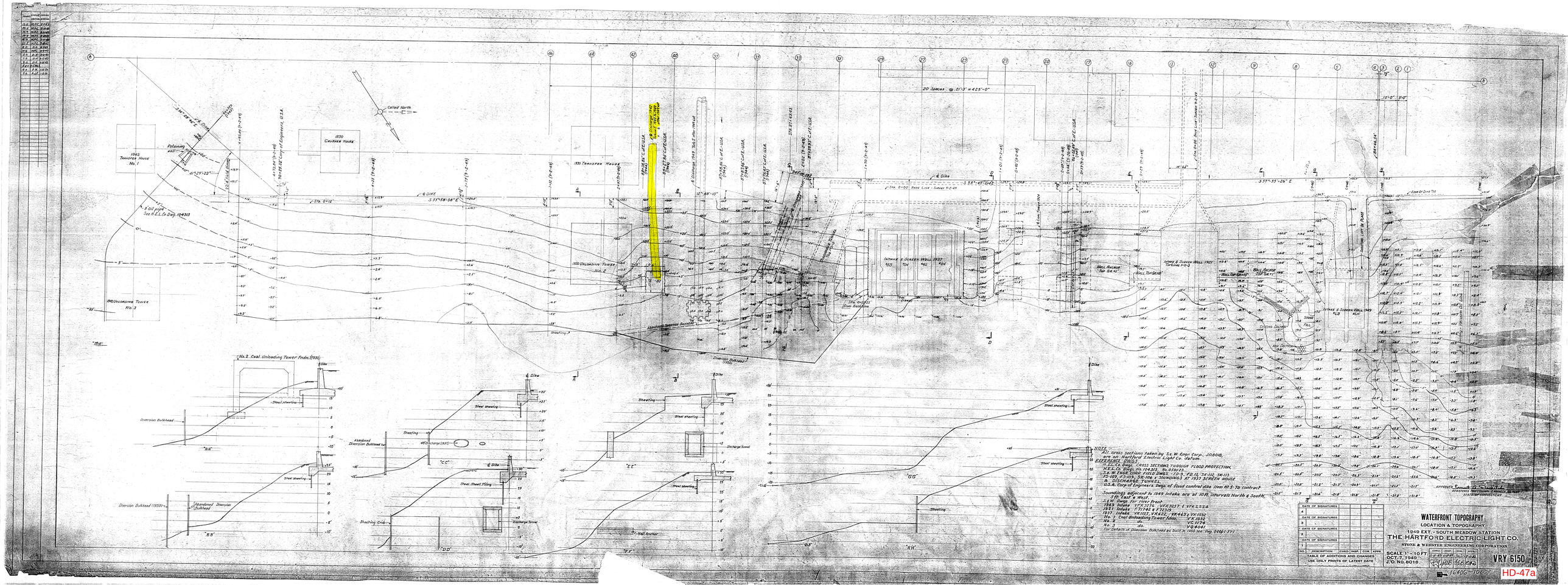
PREPARED BY NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY

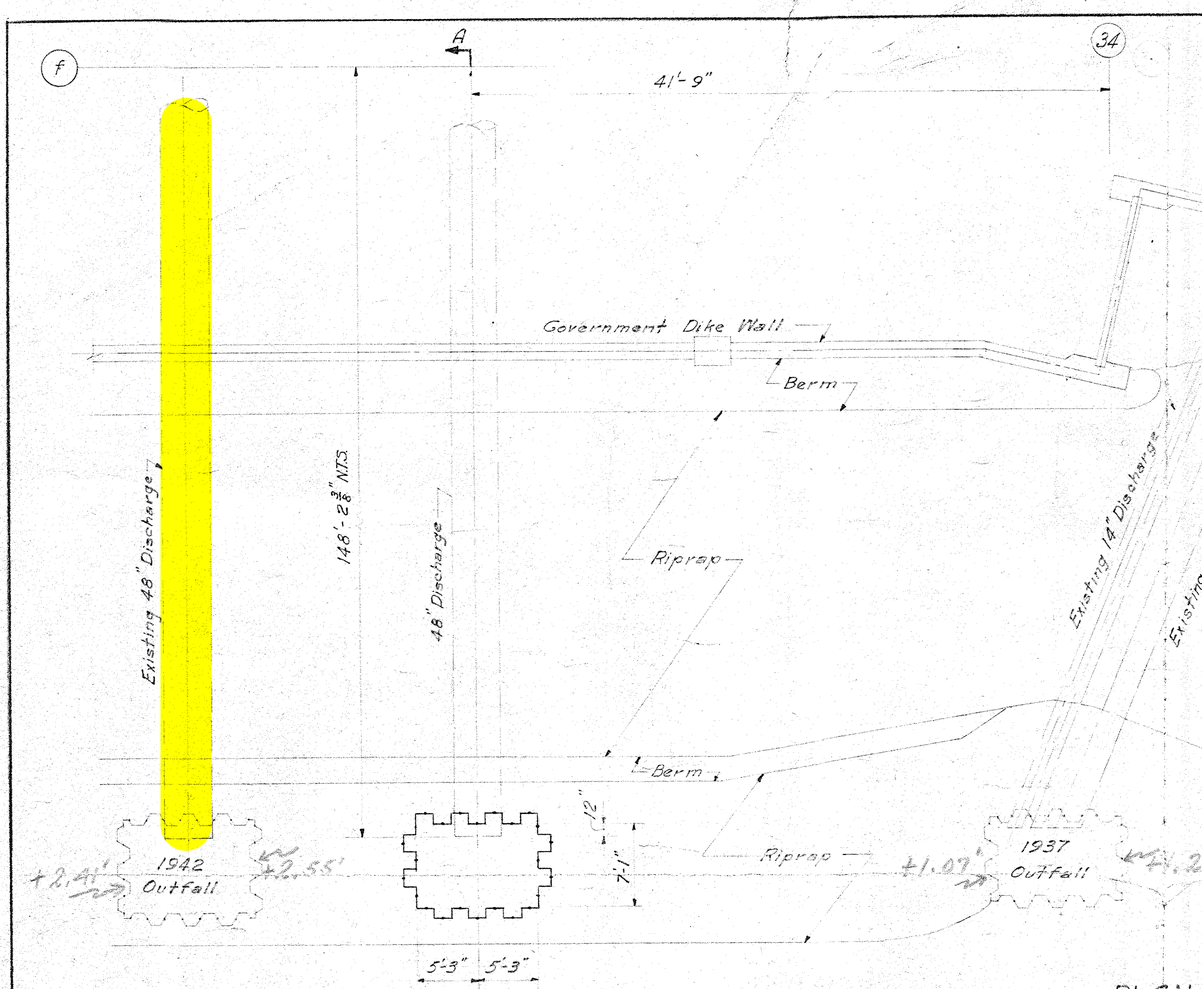
PROJECT SOUTH MEADOW GENERATING STATION

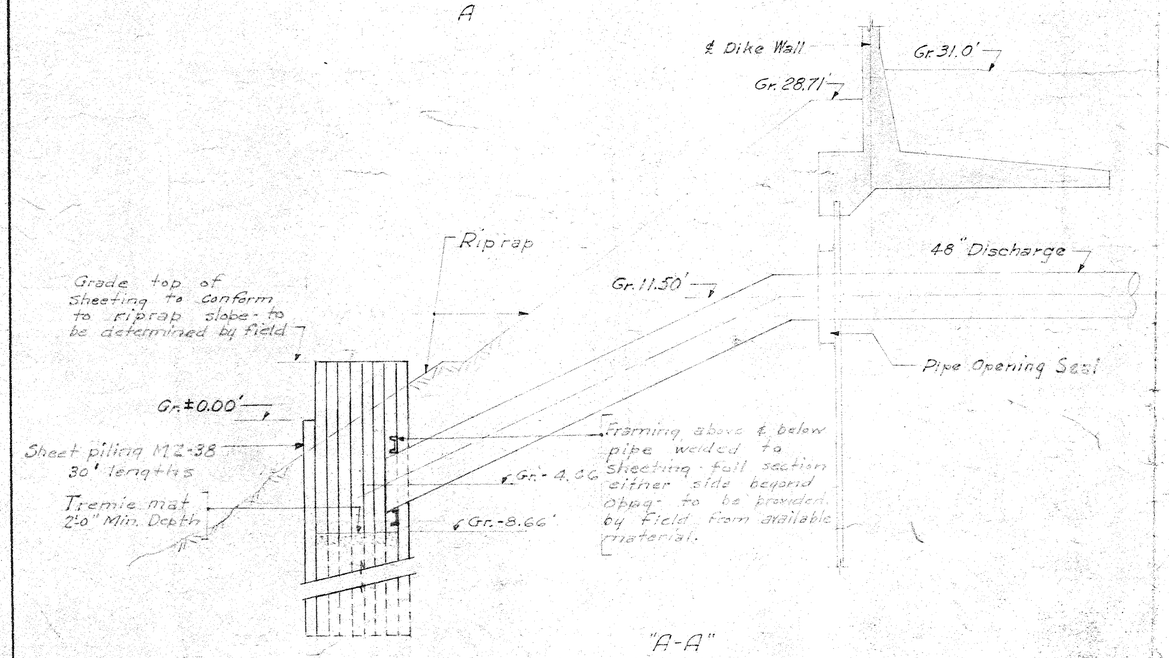
| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 89-1.54 DWG NO. 50532 VOL. H-17-1

SHEET 2 OF 4


20 Spaces @ 21'-3" = 425'-0"
1948 Tenafly House No. 1
1930 Crushing House
1930 Tenafly House
1930 Unloading Tower No. 2
1941 Unloading Tower No. 3
Intake & Screen Well 1937
Intake & Screen Well 1949
Wall Anchor Top Gr. #1
Wall Top Grade
Edge of Dike Fill
Existing Top of Slope
Existing Toe of Slope
Steel Sheeting
Diversion Bulkhead
Abandoned Diversion Bulkhead
Sheeting Crib
Discharge Tunnel
Dike
Called North
"No. 2 Coal Unloading Tower Frdtn. (1930)"
"AA"
"BB"
"CC"
"DD"
"EE"
"FF"
"GG"
"HH"
NOTE -
All cross sections taken by Sx. W. Engr. Corp., JOB018, are on Hartford Electric Light Co. datum.
REFERENCE DWGS
H.E.L.Co. Dwgs. CROSS SECTIONS THROUGH FLOOD PROTECTION
H.E.L.Co. Dwgs. Nos. 104313, No. 050123.
S.W. ENGR. CORP. FIELD DWGS. - F2-3, F2-11, SK-112, SK-113
F3-107, F3-109, SK-106, & SOUNDINGS AT 1937 SCREEN HOUSE
& DISCHARGE TUNNEL.
U.S.A. Corp of Engineers Dwgs. of flood control dike Item III S-76 contract
Soundings referred to 1949 intake are at 10 ft. intervals North & South;
at 5 ft. Dwgs. for 1949
1943 Intake VK1325 & VK2327 & VK2328
1921 Intake VK1745 & VK2539
1937 Intake VK1157, VK422, VK443 & VK1032
No. 1 Coal Unloading Tower Intake VK1032
No. 2 do. VC1076
No. 3 do. VC4441
For Details of Diversion Bulkhead as Built in 1950 see Dwg. 08461-FP1
WATERFRONT TOPOGRAPHY
LOCATION & TOPOGRAPHY
1949 EXT. - SOUTH MEADOW STATION
THE HARTFORD ELECTRIC LIGHT CO.
STONE & WEBSTER ENGINEERING CORPORATION
SCALE 1" = 10 FT.
OCT. 7, 1949
J.O. NO. 8018
VRY 6150
TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE
1640C-1067
HD-47a




Notes:
Scale ⅛"=1'-0"
Grades referred to ~~U.S. Army Engineers~~ "~~Hartford~~ Datum"
BM #1 71
For Pipe Opening Seal in Government Dike see Dwg VFX 4745.
Steel sheet Piling "MZ 38"
For details of 1942 Discharge Well see Dwg. VP 2357.
to be used for Turbin

NOTE: Yellow notations made 11-24-48 per Steve Kusmik.

APPROVED Ernest A Dochstader
REGISTERED PROFESSIONAL ENGINEER NO. 1287
STATE OF CONNECTICUT

WORK this with VFY3831

16406-10015

To Be Used Fo... RBINE No. 5

| NO. | DESCRIPTION | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|---|
| 4 | DATE OF SIGNATURES | | | | |
| 3 | DATE OF SIGNATURES | | | | |
| 2 | DATE OF SIGNATURES | | | | |
| 1 | DATE OF SIGNATURES | | | | |
| | 01 | | 8/15 | 86 | MR |

TABLE OF ADDITIONS AND CHANGES
USE ONLY PRINTS OF LATEST DATE

# DETAILS - 48 INCH PIPE DICHARGE OUTFALL

SUBSTRUCTURE

1949 EXT. - SOUTH MEADOW STATION

THE HARTFORD ELECTRIC LIGHT CO.

STONE & WEBSTER ENGINEERING CORPORATION

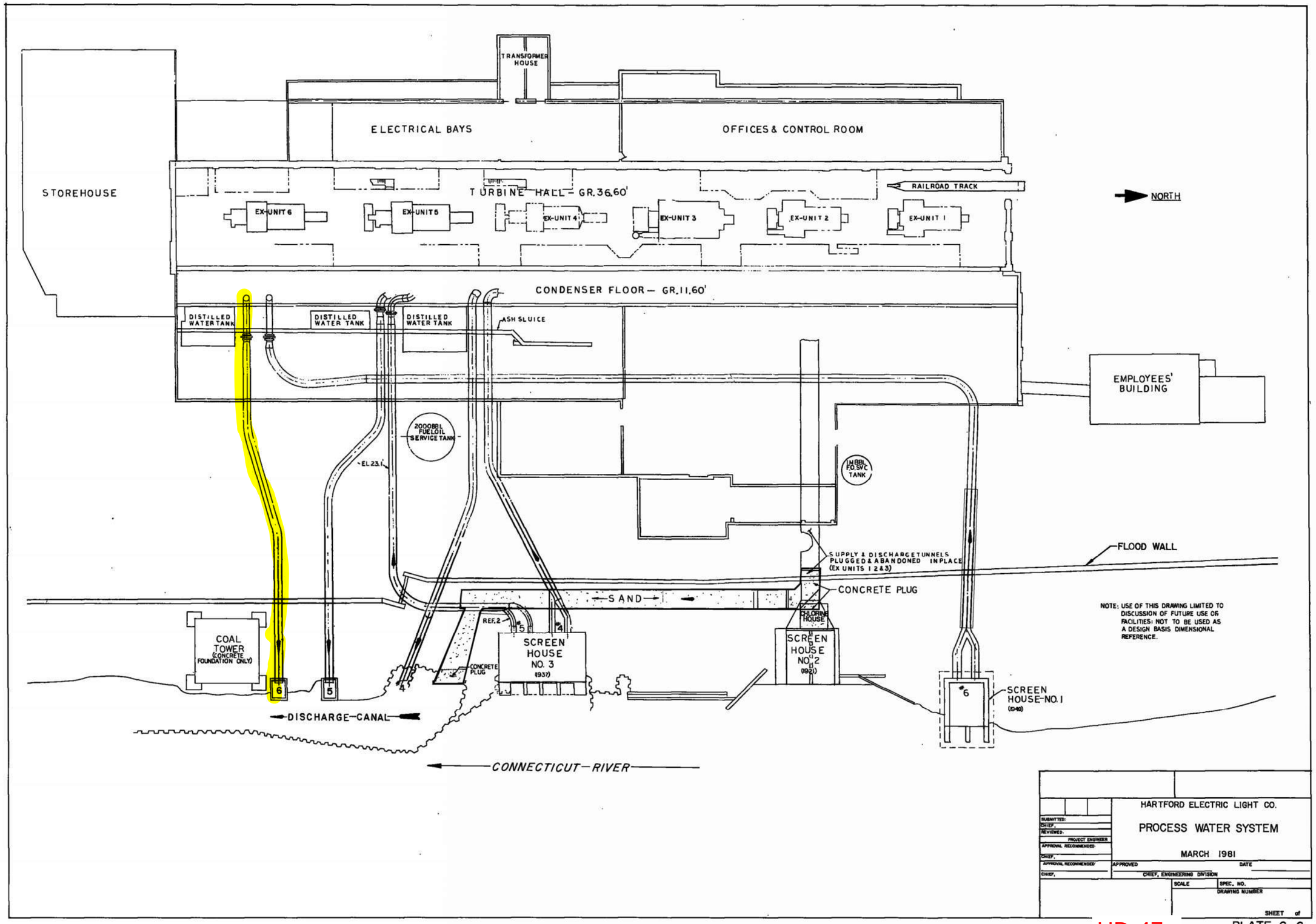
SCALE GIVEN
SEPT. 27, 1948
J. O. NO. 8018

| | CHKD. | INSP. | COR. | APPR. |
|---|---|---|---|---|
| | 10-5-48 | 10-5-48 | 10-... | 11-16-48 |
| | P.G. N. | R.W.B. | E.L. | EGD |

VHX 6126

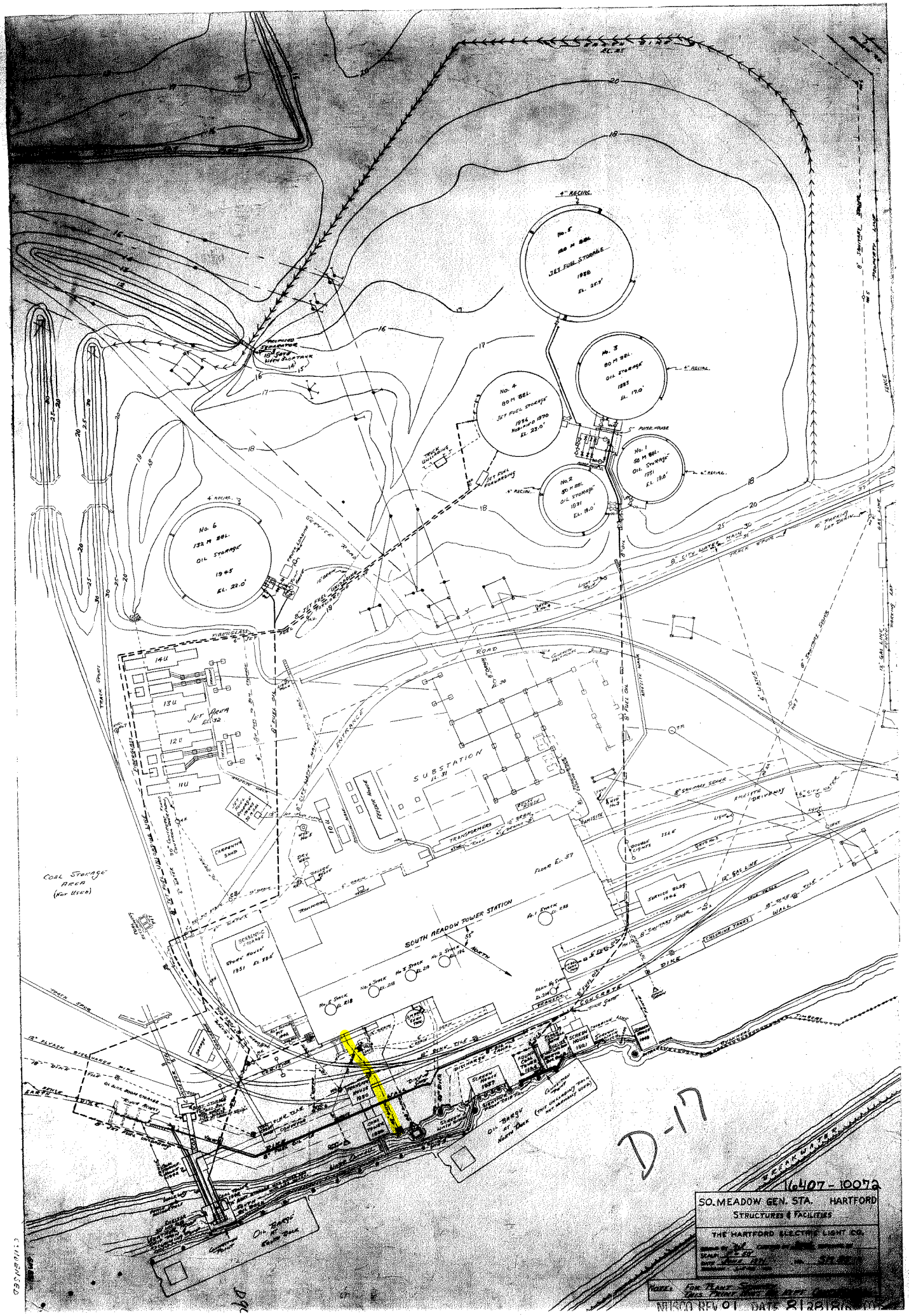
R.C. 13336

HD-47a




HD-47a

PLATE C-6


No. 5
150 M BBL.
JET FUEL STORAGE
1958
EL. 25.5'
No. 4
80 M BBL.
JET FUEL STORAGE
1956
EL. 23.0'
No. 3
80 M BBL.
OIL STORAGE
1953
EL. 19.0'
No. 2
50 M BBL.
OIL STORAGE
1931
EL. 19.0'
No. 1
50 M BBL.
OIL STORAGE
1931
EL. 19.6'
No. 6
132 M BBL.
OIL STORAGE
1945
EL. 22.0'
4" RECIRC.
PUMP HOUSE
SUBSTATION
TRANSFORMERS
SOUTH MEADOW POWER STATION
FLOOR EL. 57
No. 1 STACK EL. 238
No. 2 STACK EL. 196
No. 3 STACK EL. 218
No. 4 STACK EL. 218
No. 5 STACK EL. 218
CHLORINE TANKS
DIKE
CONCRETE
OIL BARGE AT NORTH DOCK
COAL STORAGE AREA (Not Used)
JET AREA EL. 32
ROAD
ENTRANCE
TRACK SPUR
8" CITY WATER MAIN
8" SANITARY SEWER
12" GAS LINE
16" GAS LINE
16" OIL FUEL LINE
10" DIKE
16" RISER
16" SLUICE
16" SLUICE WALL
16" SLUICE TILE
16" BLOCK TILE
16" SLUICE TILE
16" SLUICE TILE
16" SLUICE

Called North

TRANSFER HOUSE

UNLOADING TOWER No. 2

℄ 1942 DISCHARGE

℄ 1949 DISCHARGE

℄ 1937 DISCHARGE

DISCHARGE TUNNEL

INTAKE & SCREEN WELL - 1937

℄ DIKE

EXISTING DIVERSION BULKHEAD

Proposed Diversion Bulkhead

Unloading boom to be swung to 90° & with line of pile clusters.

PLAN
Scale 1" = 10.0'

NOTE
For sections and details north of this location see S & W dwg R.C. 26590 Proposed Waterfront Alterations, dated May 16, 1950.

Proposed Bulkhead 50' lengths of sheet piling.

Existing Bulkhead to be cut off at Gr. -2.0'

Water

M.L.W. Gr. +2.0'?

℄ Rock Paving Gr. -2.0'

℄ Gravel Fill Gr. -4.0'

SECT "X-X"
Scale: 1" = 10.0'

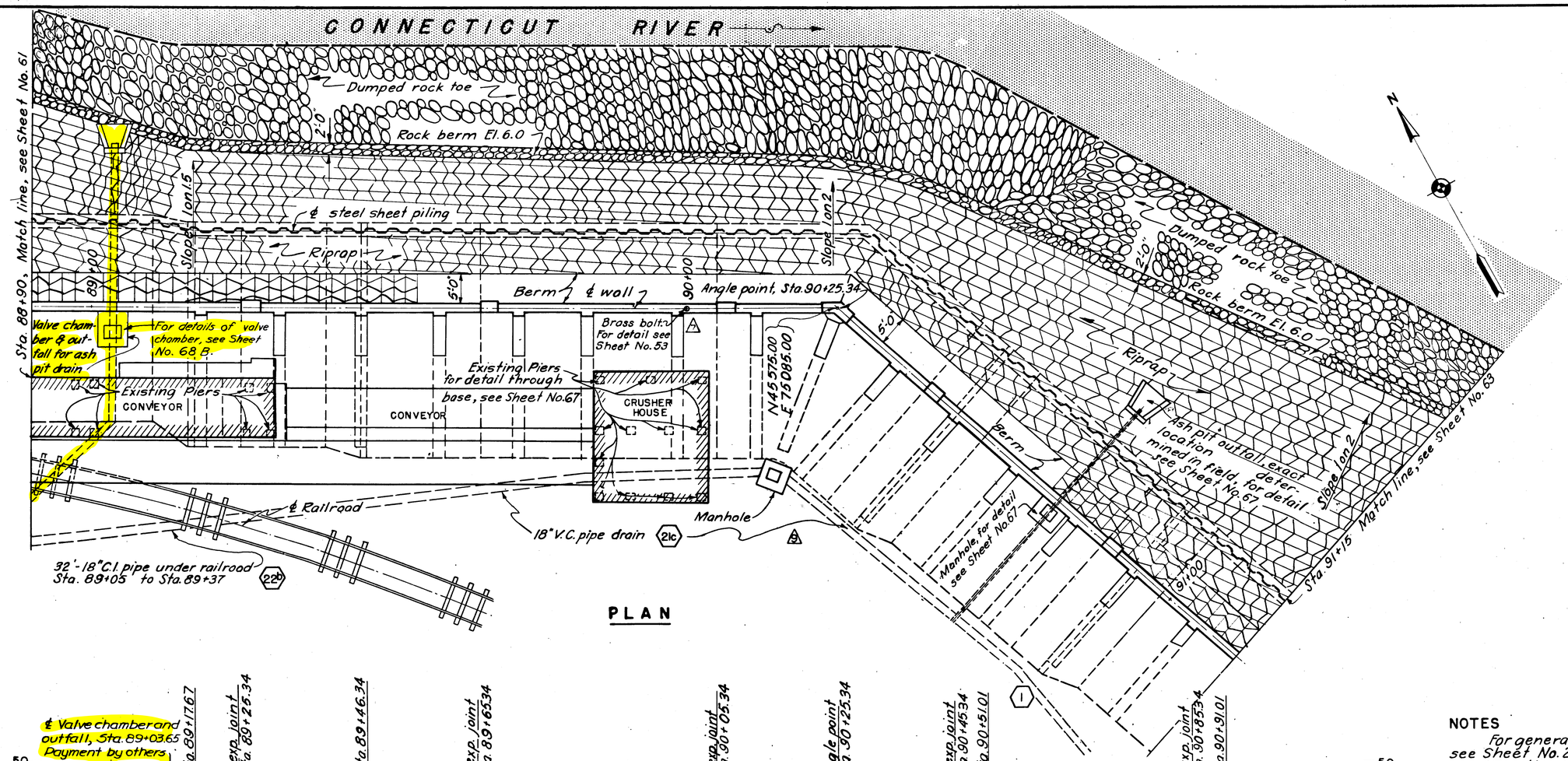
D-

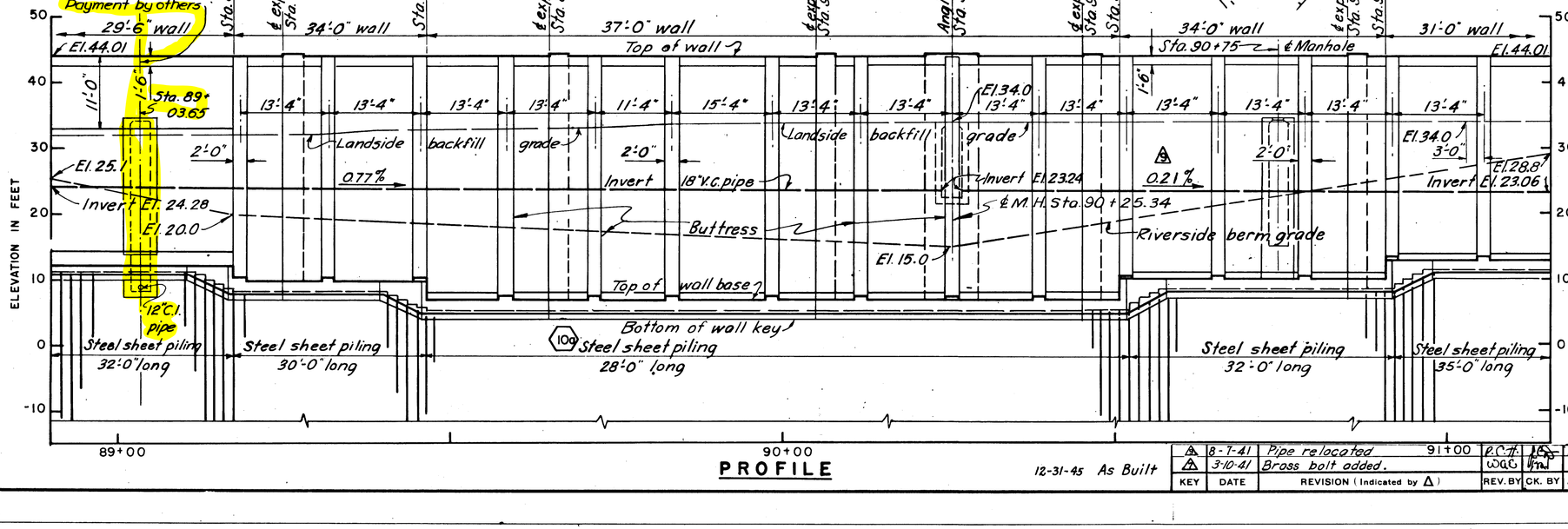
PROPOSED WATERFRONT ALTERATIONS
SOUTH MEADOW STATION
THE HARTFORD ELECTRIC LIGHT CO.
STONE & WEBSTER ENG. CORP. - BOSTON, MASS.

Scale As Noted
Aug. 23, 1950, Rev Aug. 29, 1950
J.O. 8446-1

1-26590

HD-47a




NOTES

For general notes applying to this sheet see Sheet No. 20.

Existing piers encountered shall be wrapped with 1" expansion joint material before base slab is poured, for detail see Sheet No. 67.

Pilasters on buttressed walls are on riverside only.

For concrete details, see Sheet No. 75.

For landside backfill grading scheme, see Sheet No. 23.

| KEY | DATE | REVISION (Indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| △ | 12-31-45 | As built revisions | | | |
| △ | 8-7-41 | Pipe relocated | P.C.T. | | |
| △ | 3-10-41 | Brass bolt added. | WAE | | |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

## DETAIL PLAN AND PROFILE

STA. 88+90. TO STA. 91+15.

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE: 1 IN = 10 FT. — SHEET NO. 62

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Senior Engineer, Head, Design Section

APPROVAL RECOMMENDED: Principal Engineer, Chief, F.C. Engineering Div.

APPROVED: Col. Corps of Engineers, District Engineer

DESIGNED: Assoc. Engineer

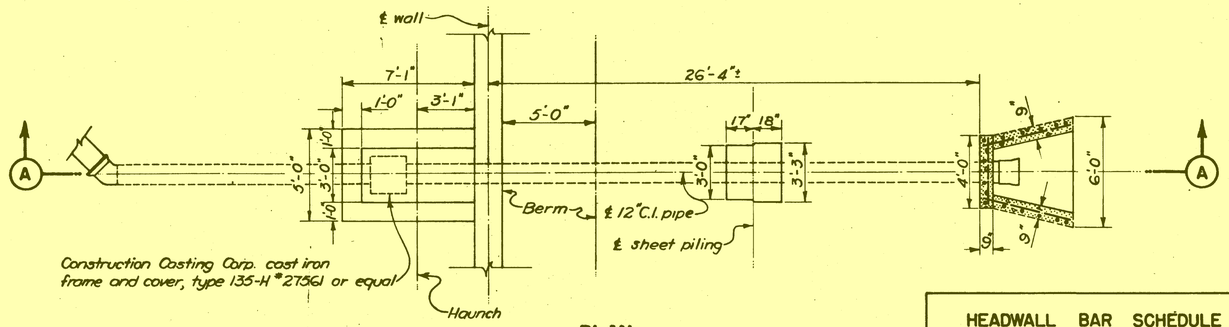
DRAWN: F.F.C. TRACED: W.R.H. CHECKED: WAE

FISCAL YEAR 1940

FILE NO. CT-4-2522

PRINTED ON "ARKWRIGHT" TRACING CLOTH

HD-48



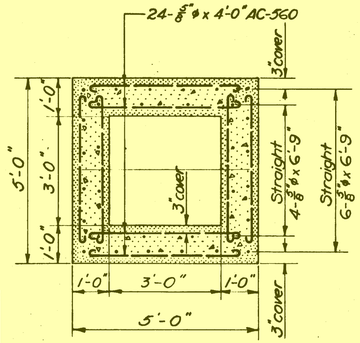

## PLAN

SCALE: 1" = 1'-0

## HEADWALL BAR SCHEDULE

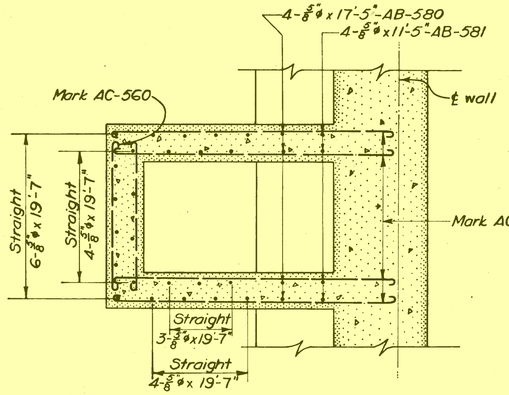
Type 'A' Type 'B' Type 'C'

| No. Pcs | Type | Size | Length | a | b | c | d | e | h |
|---|---|---|---|---|---|---|---|---|---|
| 3 | – | ⅝" | 3'-6" | Straight | | | | | |
| 3 | – | ⅝" | 5'-6" | Straight | | | | | |
| 1 | A | ⅝" | 8'-1" | 1'-6" | 5'-1" | 1'-6" | | | |
| 1 | A | ⅝" | 8'-8" | 2'-0" | 4'-8" | 2'-0" | | | |
| 1 | A | ⅝" | 9'-3" | 2'-6" | 4'-3" | 2'-6" | | | |
| 1 | A | ⅝" | 9'-9" | 3'-0" | 3'-9" | 3'-0" | | | |
| 4 | B | ⅝" | 7'-0" | 3'-11" | 3'-1" | | | | 0'-6" |
| 6 | C | ½" | 5'-7" | | | | 3'-1" | 2'-6" | 0'-6" |



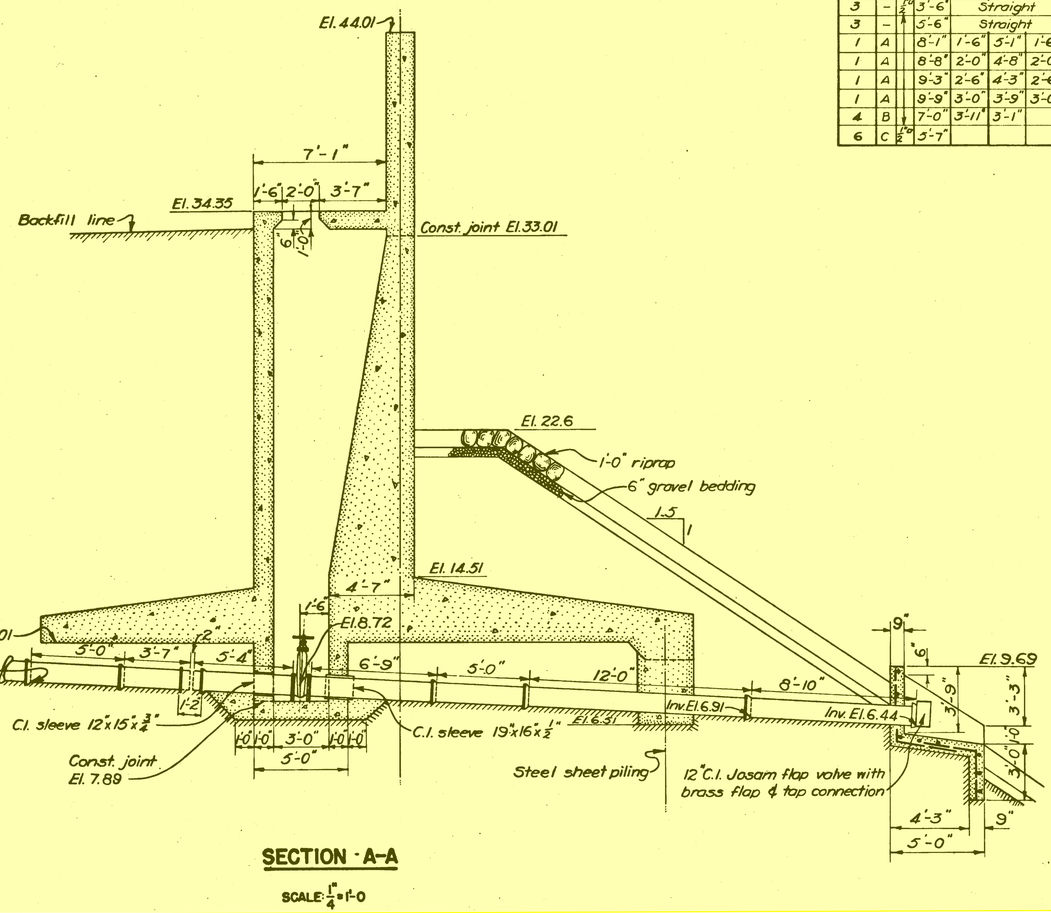

## SECTION B-B

SCALE: ½" = 1'-0"



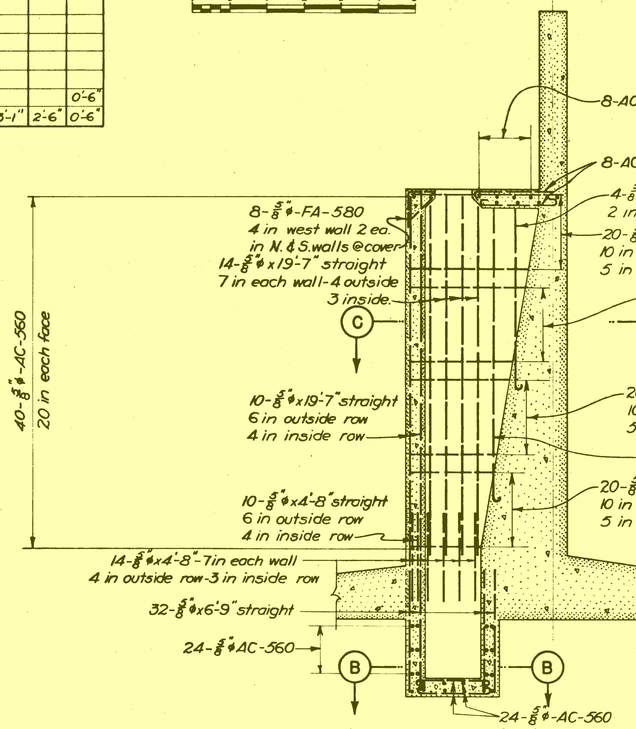

## SECTION C-C

SCALE: ½" = 1'-0




## SECTION · A-A

SCALE: 1" = 1'-0




## SECTION A-A

SCALE 1" = 1'-0

### NOTES

This valve chamber was requested by and constructed for the Hartford Electric Light Co.
The minimum cover for main steel reinforcement shall be 3" except where concrete is poured against earth in which case it shall be 4".
All elevations refer to Mean Sea Level datum.

| KEY | DATE | REVISION (Indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | | | | | |

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

CONCRETE & STEEL DETAIL OF VALVE CHAMBER STATION 89+03.65

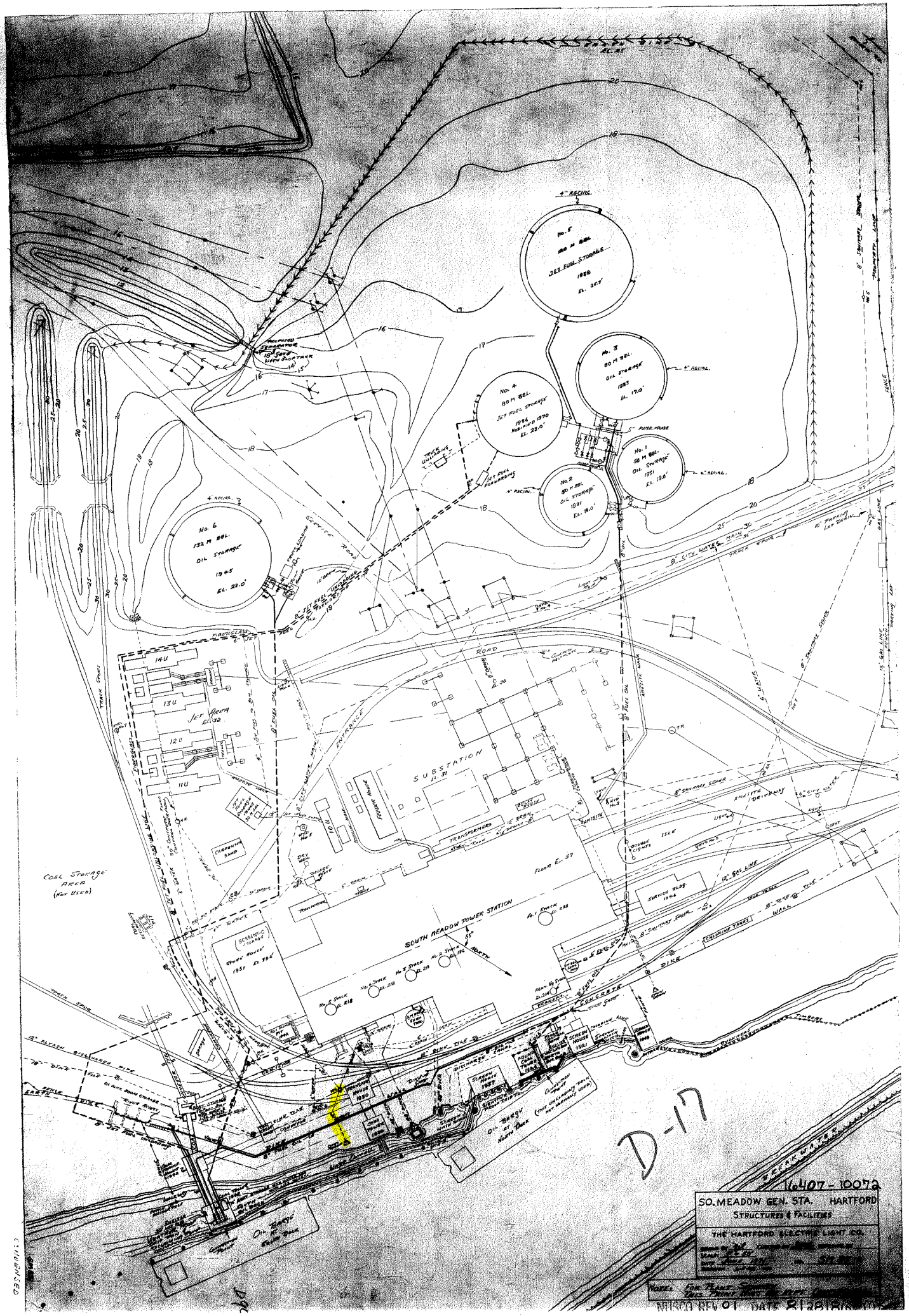
CONNECTICUT RIVER CONNECTICUT

IN SHEETS SCALE: 1/4 IN. = 1 FT. SHEET NO. 68B

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., SEPT. 1941

PREPARED BY AREA OFFICE
HARTFORD, CONN.

FILE NO. CT-4-3920


No. 5
150 M BBL.
JET FUEL STORAGE
1958
EL. 25.5'
No. 4
80 M BBL.
JET FUEL STORAGE
1956
EL. 23.0'
No. 3
80 M BBL.
OIL STORAGE
1955
EL. 19.0'
No. 2
50 M BBL.
OIL STORAGE
1951
EL. 19.0'
No. 1
50 M BBL.
OIL STORAGE
1951
EL. 19.6'
No. 6
132 M BBL.
OIL STORAGE
1945
EL. 22.0'
4" RECIRC.
PUMP HOUSE
SUBSTATION
TRANSFORMERS
SOUTH MEADOW POWER STATION
FLOOR EL. 57
No. 1 STACK EL. 238
No. 2 STACK EL. 196
No. 3 STACK EL. 218
No. 4 STACK EL. 218
No. 5 STACK EL. 218
No. 6 STACK EL. 218
CHLORINE TANKS
DIKE
CONCRETE
COAL STORAGE AREA (Not Used)
JET AREA EL. 32
ROAD
ENTRANCE
TRACK SPURS
OIL BARGE AT NORTH DOCK
OIL BARGE AT SOUTH DOCK
D-17
16407 - 10072
SO. MEADOW GEN. STA. HARTFORD
STRUCTURES & FACILITIES
THE HARTFORD ELECTRIC LIGHT CO.
REVISED REV 01 DATE 8/28/81

HD-48

CM 83

10226-CSTU-S3302

E400 E600 E800 E1000

N5200 N5000 N4800

8" CITY WATER

EMH

8" OIL 2½" STEAM 1½" RETURN

EXISTING VALVE PIT

HYD

4" FUEL

1½" FUEL

MH

6" WATER

10"

30"

8" BARGE 6" FUEL 2" RETURN

8" OIL 2½" STEAM 1½" RETURN

2-8" ASH SUMP DRAINS

CIRC WATER (TYP 5 PLCS)

15"

18"

12"

CB

SEPTIC TANK

SANITARY SEWER

8" OIL 2½" STEAM 1½" RETURN

1½" STEAM 1¼" RETURN

REMOVE TRACKS & TIES

SECN 71.0101-48

/// UTILITIES TO BE REMOVED

| NO. | DATE | REVISIONS AND RECORD OF ISSUE | BY | CHK | APP'L |
|---|---|---|---|---|---|
| 1 | 7-8-88 | CONFORMED TO CONSTRUCTION RECORDS | EL | VBD | |
| 0 | 12-11-85 | RELEASED FOR CONST SPEC 71.0101 | VD | LK | |

TRUE PLANT

SCALE: 1" = 20'

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF CONNECTICUT

SIGNED _____ DATE 12-12-85 REG NO. 13073

STATE OF CONNECTICUT — 13073 — REGISTERED PROFESSIONAL ENGINEER

BLACK & VEATCH ENGINEERS-ARCHITECTS

ENGINEER VBD DRAWN MDB CHECKED DATE

This drawing is the property of RESOURCE RECOVERY SYSTEMS COMBUSTION ENGINEERING, INCORPORATED, WINDSOR, CONNECTICUT 06095 AND IS NOT TO BE REPRODUCED OR USED TO FURNISH ANY INFORMATION FOR MAKING OF DRAWINGS OR APPARATUS EXCEPT WHERE PROVIDED FOR BY AGREEMENT WITH SAID COMPANY

COMBUSTION ENGINEERING

CONNECTICUT RESOURCES RECOVERY AUTHORITY
MID - CONNECTICUT PROJECT

SITE - UNDERGROUND SYSTEMS
AREA II - EXISTING UTILITIES

PROJECT 10226-CSTU-S3302 DRAWING NUMBER REV 1

CODE AREA

HD-48

10226-CSTU-S3303. 10

E400 E600 E800 E1000 N5200 N5000 N4800

8" CITY WATER
STG EL 24.5
12
EMH
CDB11
WWB EL SLOPES
4 CISP
N5197.0
EL 26.5
N5185.75
EL 26.5
WWB EL SLOPES
4 CISP N5182.0
B&V EL 24.0
G&H N5182.25
E722.58
CDB01
DPC EL SLOPES
2 CISP
SANITARY LIFT STATION
SEE DWG S3305 FOR DETAILS
E794.0
N5194.75
FOR CONT SEE
DWG 55216
WWB EL 27.0
2 FRP
N5182.42
N5181.42
SECN # 71.0402-30
WWA EL SLOPES
4 FRP
WWB EL SLOPES
4 CISP E681.15
B&V EL 24.9
G&H N5163.0
E622.0
HYD
HYD -05
N5173.33
ECB EL 24.0
2½ B N5173.33
ECB EL 24.0
2½ S N5172.33
E655.0
EL 25.85
TYP 2B 305
N5185.78
EL 26.5
E670.40
2C 305
E667.75
E781.25
CDB02
N5159.0
CMH01
E770.0
EL 26.2
E780.33
E797.0
EL 26.5
ECB EL 24.0
4 B E818.16
ECB EL 24.0
4 B E819.16
4" NOTE: OLD 4" PIPE TO BE LOCATED & NEW 4" CISP TO BE INSTALLED TO E800 BY SPEC 71.0402. PROVIDE TEMPORARY DRAINAGE UNTIL CONSTRUCTION OF TRENCH DRAINAGE SYSTEM. TRENCHES AND REMAINING DRAIN PIPE INSTALLED BY SPEC 71.0202, UNLESS NOTED OTHERWISE
ABANDONED 8" OIL 2½" STEAM 1½" RETURN
4" FUEL
NOTE: FOR ELEC DUCT BANK DET, SEE DWG E3201, E3202, E3203, E3204
ECB EL 24.0
2 B E640.17
ECB EL 24.0
2 B E641.17
N5124.33
CDB03
E797.0
SEE DET A, DWG S3306
CDB04
N5090.7
SLOPE
CMH02
CDB04
N5092.0
SECN #71.0402-14
FPB EL 24.9
4 A E623.0
E655.0
EL 26.5
2A 305
6 305
CDB10
N5092.0
ECB EL 25.0
1½ B
N5077.0
N5076.0
CDB05
E797.0
ECB EL 24.0
1½ B E640.17
ECB EL 24.0
1½ B E641.17
N5070.0
5 305
N5070.0
WSC EL 25.58
3 A E826.85
NOT RELEASED FOR CONSTRUCTION
L TYP 305 6 PLCS
TYP 7 305 5 PLCS
CDB05
E797.0
EL 26.5
N5015.0
EL 25.1
2A 305
E705.25
EL 25.25
9 305
N5014.75
EL 26.5
10 TYP 305 6 PLCS
71.0202
71.0402
STF EL SLOPES
24 RCP E655.0
N5000.00
E772.67
SLOPE
25'-0"
EL 24.38
N5005.76
E803.88
EL 25.25
N5005.21
E802.72
EL 25.75
N5003.40
E801.99
TOD EL 24.00
BOD EL 20.83
NOTE: OLD SANITARY SEWER TO BE LOCATED & REMOVED BACK TO THE EXISTING STORE HOUSE & REPLACED WITH NEW CISP OF THE ..½ DIAMETER. REMOVAL OF OLD PIPE & INSTALLATION OF NEW PIPE BY SPEC 71.0402
SANITARY SEWER
B&V EL 26.0
G&H N5025.50
B&V EL 26.0
G&H N5024.00
FWF EL 27.0
4 A E1030.0
FWF EL 27.0
4 A E1031.0
B&V (INV EL 22.89)
G&H E1035.0
WWA EL SLOPES
6 FRP E1010.25
WSD EL 26.0
6
STG EL 26.0
8
71.0402
71.0101
STF EL SLOPES
12 RCP E1040.0
DPC EL SLOPES
4 CISP
CB-01
CB-02
WWC EL 24.75
4 PIP N4958.30
B&V INV EL 24.59
G&H E1038.0
EXISTING VALVE PIT
STF EL SLOPES
12 RCP
NOT RELEASED FOR CONSTRUCTION
B&V INV EL 24.89
G&H N4933.0
E1039.00
WWB EL SLOPES
4 CISP
N4917.61
N4930.0
INV EL 22.0
½" STEAM
½" RETURN
14" CASING
WSD EL 26.0
STG EL 26.0
12
N4915.0
INV EL 23.1
N4915.0
INV EL 23.76
CB-03
NOTE: FOR CONDENSATE STORAGE TANK DRAIN AND DEMINERALIZED WATER STORAGE TANK DRAIN, SEE DET F, DWG S3305. BY SPEC 71.0101.
CIRC WATER (TYP 5 PLCS)
WWB INV EL 24.0
4
STG EL 24.0
12
8" OIL 2½" STEAM 1½" RETURN MH-13
U16 U15 U14 U13 U12 U11 U10 U9
8" FUEL
SECN #71.0403-66
30°
CDB06C2 EL 25.5
5 PVC N4905.0
SEE DET C, DWG S3307
U4 FIELD VERIFY INTERFERENCE
CB-06
CB-05
MH-10
STF EL SLOPES
24 RCP E655.0
STF EL SLOPES
18 RCP N4922.75
71.0402
71.0101
U1 E750.0
CDB06
E750.0
U5 U11
MH-11
STF EL SLOPES
18 RCP
CB-04
EXISTING VALVE PIT
U17 20° CASING
U18
MH-01
U10
U6
U19
U20
MH-12
EXISTING VALVE PIT
MH-2
WSG EL 23.0
4 A N4903.5
TOD EL 19.5
BOD EL 17.5
WWC EL SLOPES
3 E505.84
STF EL SLOPES
24 RCP N4900.0
NOTE: FOR DUCT BANK DET, SEE DWG E3501
5'-0"R
N4882.0
E740.0
N4886.0
EL 23.0
10'-0"R
ON HYD
CDB08
8" OIL 2½" STEAM 1½" RETURN (20" CASING)
U3 U2
B M4705
STF EL SLOPES
18 RCP
EXISTING VALVE PIT
N4867.0
INV EL 24.0
STG EL 27.4C
18
WWC EL SLOPES
4 CISP
WWC EL SLOPES
4 CISP
U8 MH-17
N4860.0
B&V EL 27.0
G&H N4845.0
E1005.75
E1004.75
E1003.0
71.0402 EL 27.0
71.0403 N4845.0
71.0402 INV EL 29.25
71.0403 N4845.0
71.0402 INV EL 27.0
71.0403 N4845.0
DPC EL SLOPES
6 CISP E1018.17
EL 20.45
N4922.26
E746.54
EL 19.99
N4917.85
E742.85
EL 19.37
N4917.34
E743.54
SECN 71.0402-8
SECN 71.0101-49
WSC EL 24.0
N4860.0
E 782.52
WWC EL SLOPES
6 CISP N4833.5
B&V EL 27.0
G&H N4845.0
WWC EL SLOPES
6 CISP E969.5
71.0402 INV EL 27.5
71.0403 N4830.0
EXISTING VALVE PIT
REF DWG: 55520
CDB09
2-3" RGS CONDUITS EL 27.0
CMH04
71.0402
71.0101
71.0403
N4775.0
NOTE: FOR DUCT BANK DETAIL, SEE DWG E3502
150'-0"R
N4760.0
E791.47
MH-14
HYD-09
STG EL 26.0
MH-15
ABANDON EXISTING DRAIN PIPE AND INSTALL NEW PIPE SLOPE UNIFORMLY BETWEEN MANHOLES SEE DET B, DWG S3305 BY SPEC 71.0101
25'-0"R (TYP)
SECN 71.0101-48
SLOPE
12"
12 307
CL CDB09 SAME AS CL CONV 513
NOTE: ALL UTILITIES TO BE INSTALLED BY SPEC 71.0402 UNLESS NOTED OTHERWISE
FUTURE PAVING

| EXISTING UTILITIES | | | | |
|---|---|---|---|---|
| MARK NO | NORTH | EAST | EL | REMARKS |
| U1 | 4924.5 | 756.0 | 24.45 | TOP OF PIPE |
| U2 | 4875.9 | 892.1 | 29.65 | |
| U3 | 4879.1 | 889.8 | 29.65 | |
| U4 | 4906.8 | 632.3 | 27.15 | |
| U5 | 4900.9 | 792.8 | | |
| U6 | 4891.5 | 795.8 | 27.13 | TOP OF PIPE |
| U7 | 4867.8 | 795.8 | 27.13 | TOP OF PIPE |
| U8 | 4871.71 | 1073.77 | | |
| U9 | 4901.21 | 1096.24 | | |
| U10 | 4903.83 | 588.32 | 25.46 | TOP OF PIPE |
| U11 | 4903.83 | 795.8 | 28.03 | |
| U12 | 4900.66 | 696.71 | 27.79 | |
| U13 | 4924.33 | 494.72 | 25 46 | |
| U14 | 4917.92 | 571.40 | 26.55 | |
| U15 | 4961.24 | 400.79 | 26.55 | |
| U16 | 4953 24 | 393.63 | 25.20 | |
| U17 | 4903.83 | 636.00 | 25.46 | |
| U18 | 4903.83 | 644.18 | 27.45 | |
| U19 | | | 28.58 | |
| U20 | 4912.03 | 962.63 | | |

| NO. | DATE | REVISIONS AND RECORD OF ISSUE | BY | CHK | APP'L |
|---|---|---|---|---|---|
| 8 | 02-13-87 | GENERAL REVISIONS | VD | LK | |
| 7 | 10-24-86 | GENERAL REVISIONS | VD | LK | |
| 6 | 08-29-86 | ISSUED FOR CONSTRUCTION | VD | LK | |
| 5 | 06-13-86 | RELEASED FOR CONSTR SPEC 71.0403 | VD | LK | |
| 4 | 03-27-86 | GENERAL REVISIONS | VD | LK | |
| 3 | 02-28-86 | GENERAL REVISIONS | VD | LK | |
| 2 | 01-31-86 | RELEASED FOR CONSTR, SPEC 71.0402 | VD | LK | |
| 1 | 01-03-86 | RELEASED FOR CONSTR. SPEC 71.0101 | VD | LK | |
| 0 | 12-12-85 | INITIAL ISSUE | VD | LK | |
| 10 | 7-8-88 | CONFORMED TO CONSTRUCTION RECORDS | BL | VD | |
| 9 | 13-30-87 | RELEASED FOR CONSTR SPEC 71.0202 | VD | LK | |

TRUE PLANT
SCALE: 1" = 20'

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF CONNECTICUT.
SIGNED
DATE 1-8-86 REG NO. 18077

BLACK & VEATCH ENGINEERS-ARCHITECTS
ENGINEER VBD DRAWN MJB
CHECKED JCH DATE 3-27-86

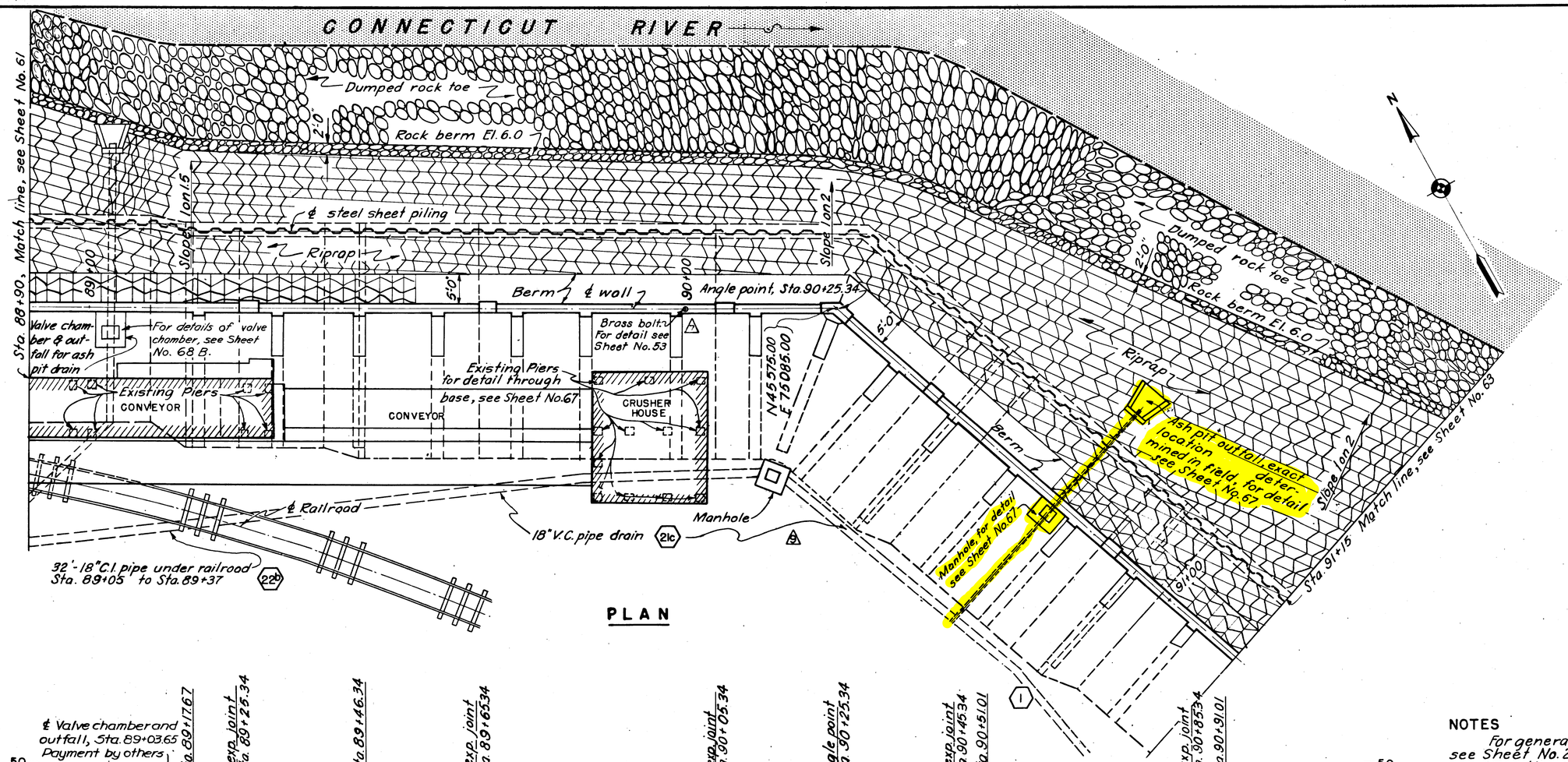
This drawing is the property of RESOURCE RECOVERY SYSTEMS LIMITED PARTNERSHIP, COMBUSTION ENGINEERING, INCORPORATED, WINDSOR, CONNECTICUT 06095 AND IS NOT TO BE REPRODUCED OR USED TO FURNISH ANY INFORMATION FOR MAKING OF DRAWINGS OR APPARATUS EXCEPT WHERE PROVIDED FOR BY AGREEMENT WITH SAID COMPANY

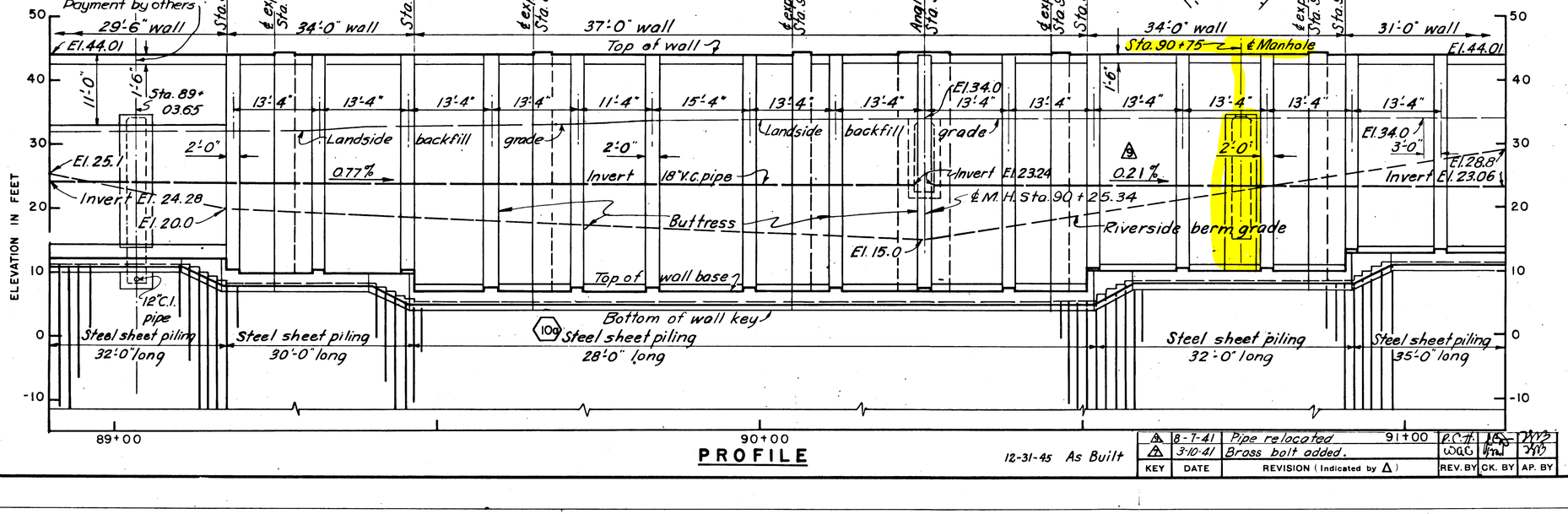
COMBUSTION ENGINEERING

CONNECTICUT RESOURCES RECOVERY AUTHORITY
MID - CONNECTICUT PROJECT
SITE - UNDERGROUND SYSTEMS
AREA II - FINAL UTILITIES

PROJECT 10226-CSTU-S3303 DRAWING NUMBER REV 10
CODE
AREA

HD-48




12-31-45 As built

| KEY | DATE | REVISION (Indicated by △) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| 2 | 12-31-45 | As built revisions | | | |
| 1 | 8-7-41 | Pipe relocated | P.C.T. | WAE | WMS |
| 1 | 3-10-41 | Brass bolt added. | WAE | WMS | WMS |

## NOTES

For general notes applying to this sheet see Sheet No. 20.

Existing piers encountered shall be wrapped with 1" expansion joint material before base slab is poured, for detail see Sheet No. 67.

Pilasters on buttressed walls are on riverside only.

For concrete details, see Sheet No. 75.

For landside backfill grading scheme, see Sheet No. 23.

CONNECTICUT RIVER FLOOD CONTROL

# HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 97+05

## DETAIL PLAN AND PROFILE

STA. 88+90. TO STA. 91+15.

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE: 1 IN = 10 FT. — SHEET NO. 62

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: SENIOR ENGINEER, HEAD, DESIGN SECTION

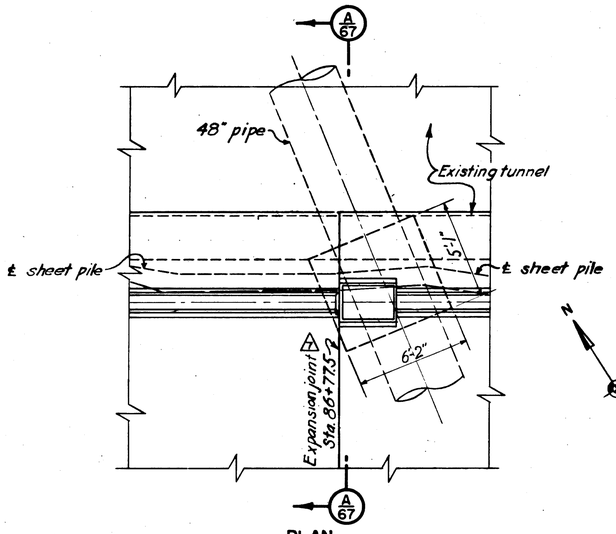
APPROVAL RECOMMENDED: PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: COL. CORPS OF ENGINEERS, DISTRICT ENGINEER

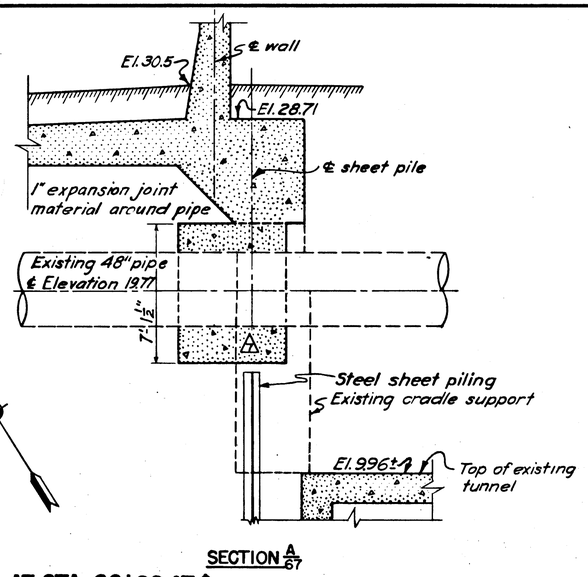
DESIGNED: ASSOC. ENGINEER

DRAWN: F.F.C.
TRACED: W.R.H.
CHECKED: WAE

FISCAL YEAR 1940
FILE NO. CT-4-2522



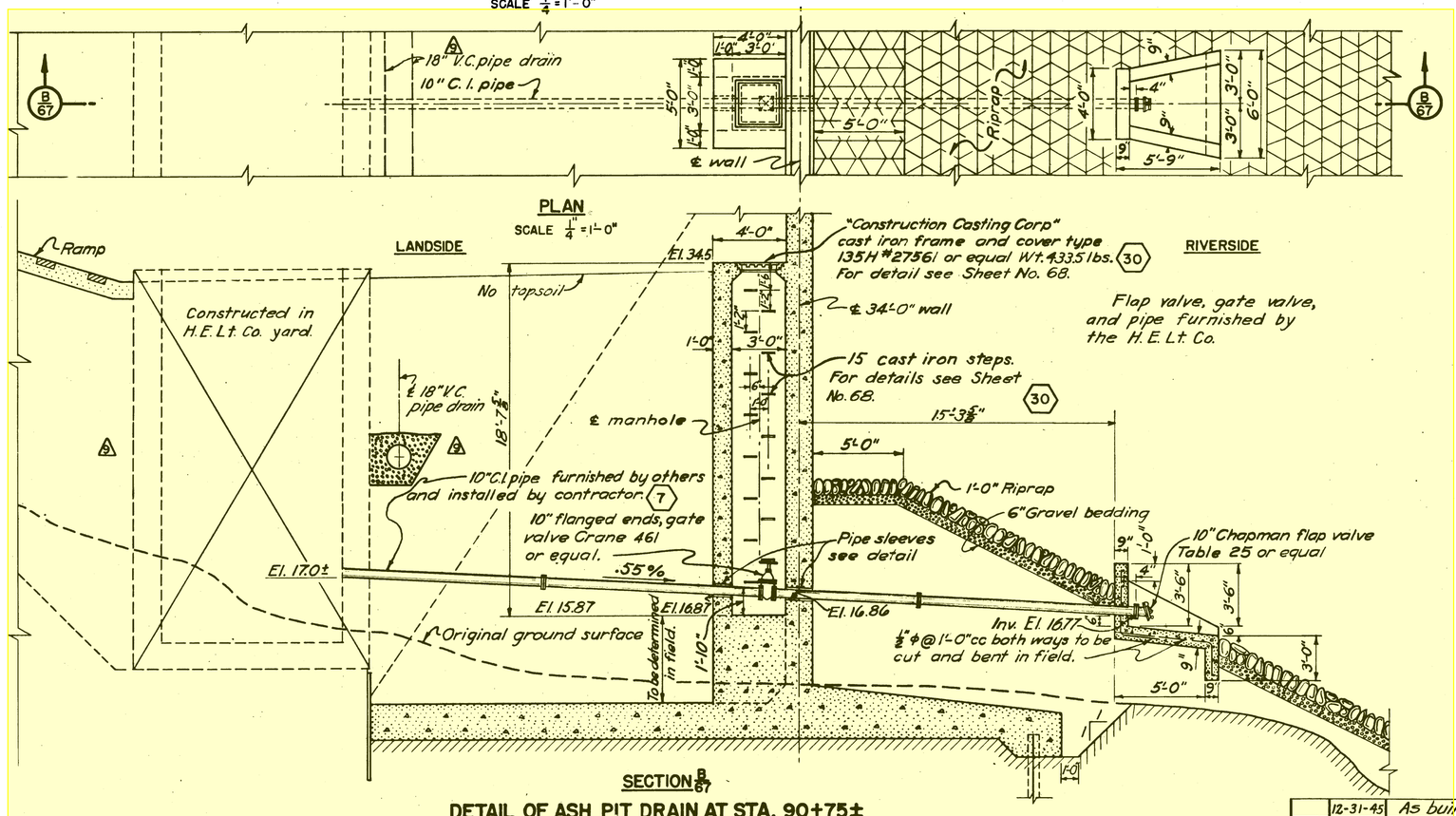

PLAN




SECTION A/67

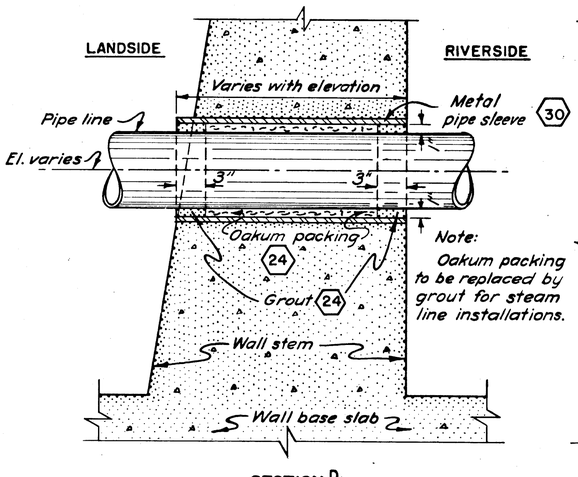
## DETAIL OF CURTAIN WALL AT STA. 86+80 AT ℄

SCALE 1/4" = 1'-0"

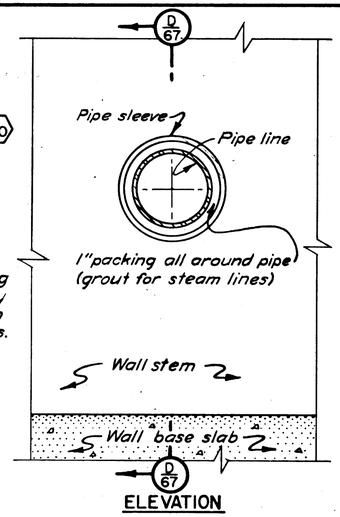



## DETAIL OF ASH PIT DRAIN AT STA. 90+75±

SCALE 1/4" = 1'-0"




SECTION D/67

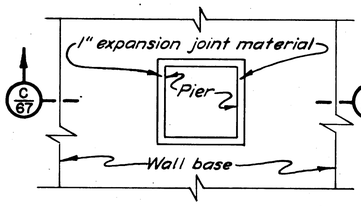



ELEVATION

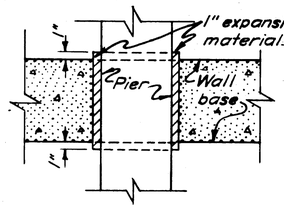
## TYPICAL DETAIL OF PIPE SLEEVE THRU WALL

SCALE 1½" = 1'-0"

12" 9" 6" 3" 0 6" 12"




PLAN




SECTION C/67

## TYPICAL DETAIL OF PIER THRU BASE SLAB

FOR LOCATION SEE SHEET NO. 62

NOT TO SCALE

### NOTES

For general notes applying to this sheet see Sheet No. 20.

For Plan and Profile see Sheet No. 62.

For steel reinforcing details see Sheets No. 120 & 126.

| KEY | DATE | REVISION (Indicated by Δ) | REV. BY | CK. BY | AP. BY |
|---|---|---|---|---|---|
| | 12-31-45 | As built revisions | | | |
| Δ | 8-7-41 | 18" V.C. pipe drain relocated | PCH | JAO | JHB |
| Δ | 3/10/41 | Curtain wall removed. | WQE | JAO | JHB |

CONNECTICUT RIVER FLOOD CONTROL

HARTFORD DIKE

RIVERFRONT, MORGAN ST. TO STA. 96+73

MISCELLANEOUS CONCRETE DETAILS NO. 2

SOUTH MEADOWS STATION

CONNECTICUT RIVER — CONNECTICUT

IN 135 SHEETS — SCALE 1/4 IN = 1 FT. — SHEET NO. 67

U. S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Howard B. Nichols, SENIOR ENGINEER, HEAD, DESIGN SECTION

APPROVAL RECOMMENDED: J. J. Sirrine, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: [illegible], LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: J. Nichols, ASSOC. ENGINEER

DRAWN: W.C.B. & A.K.

TRACED: R.K.J.

CHECKED: W.Q.E.

FISCAL YEAR 1940

FILE NO. CT-4-2527

PRINTED ON "ARMWRIGHT" TRACING CLOTH K & E CO., N.Y.

SO. MEADOW GEN. STA. HARTFORD

STRUCTURES & FACILITIES

THE HARTFORD ELECTRIC LIGHT CO.

16407-10072

DEC 01 1981

HD-49

SM 83

HD-49

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

HOUSE

FEEDER

Wet Area

Wet Area

Wet Area

Power Line

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

RESERVE ROAD

N 34°-13'-40" W
591.36'
P.T. - P.C.

#26 C.M.S. (FD)

#38 M.S. BROKEN

#39 M.S. BROKEN

359.26'

210.72'

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARKINGS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

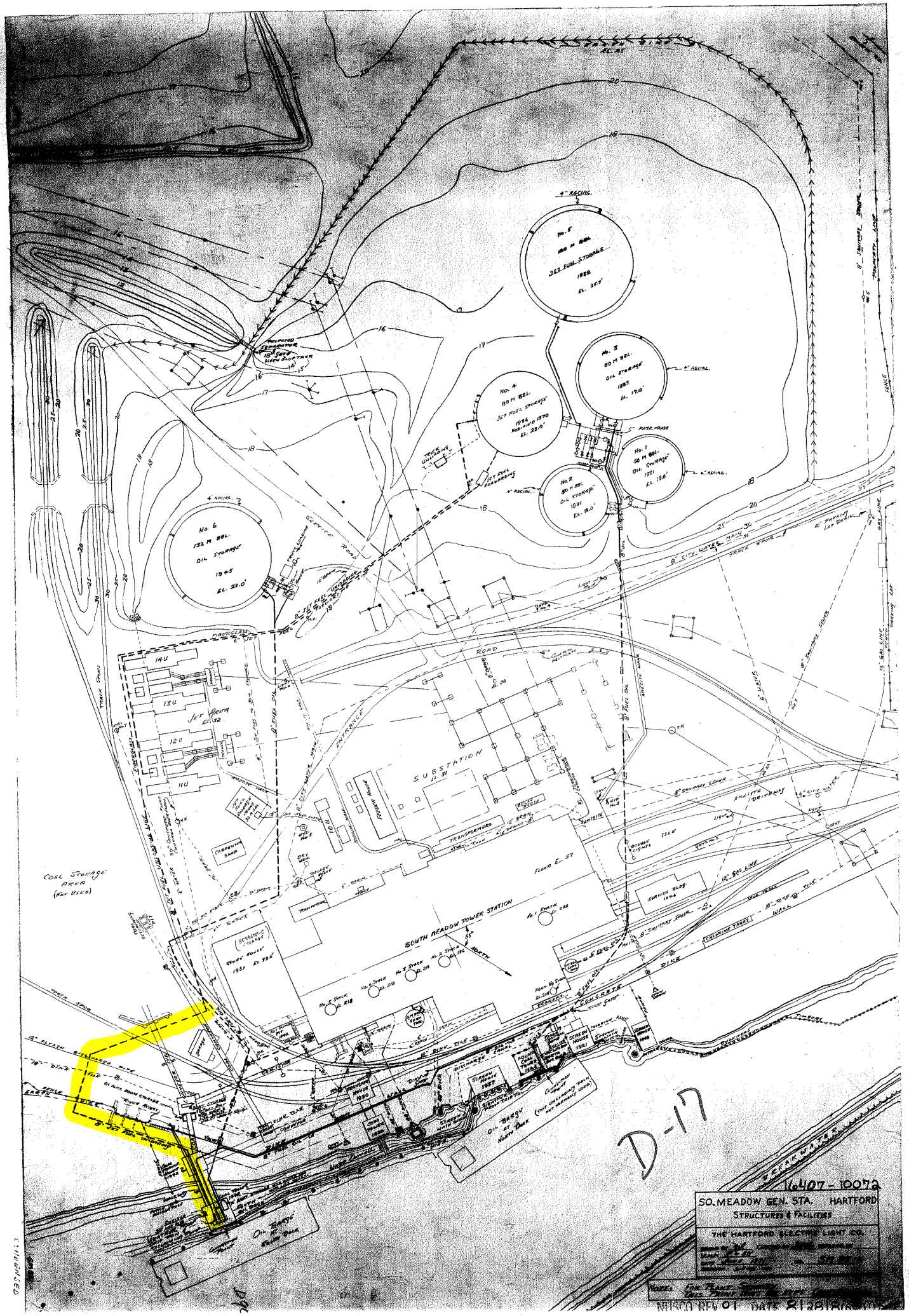
SCALE 1"=40' DATE JUNE 1989 NO. 50532

PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY

PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 89-1.54 DWG NO. 50532 VS. H-17-1
SHEET 2 OF 4


No. 5
80 M BBL.
JET FUEL STORAGE
1958
EL. 263'
No. 4
80 M BBL.
JET FUEL STORAGE
1956
EL. 23.0'
No. 3
80 M BBL.
OIL STORAGE
1955
EL. 19.0'
No. 1
50 M BBL.
OIL STORAGE
1951
EL. 19.6'
No. 2
50 M BBL.
OIL STORAGE
1951
EL. 19.0'
No. 6
132 M BBL.
OIL STORAGE
1945
EL. 22.0'
SUBSTATION
SOUTH MEADOW POWER STATION
COAL STORAGE AREA
(Not Used)
TRANSFORMERS
PUMP HOUSE
CONCRETE DIKE
16407 - 10072
SO. MEADOW GEN. STA. HARTFORD
STRUCTURES & FACILITIES
THE HARTFORD ELECTRIC LIGHT CO.
D-17

HD-50a

CM 83

HD-50a

CHANNEL ENCROACHMENT LINE

SOUTH MEADOW POWER STATION

#10 #11 D.H. #12 #20 #21 #22 PK-SPK #52 #54

HOUSE SERVICE

HOUSE FEEDER

Wet Area

Wet Area

Wet Area

Power Line

THE CONNECTICUT LIGHT & POWER COMPANY

SOUTH MEADOW GENERATING STATION

AREA = 89.9 AC. ±

N 34°-13'-40" W
591.36'
P.T. - P.C.

#26 C.M.S. (FD)

#38 M.S. BROKEN

#39 M.S. BROKEN

#3

359.26'

210.72'

RESERVE ROAD

DRAINAGE DITCH

PROPOSED FORCE MAIN

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 1

SHEET INDEX

NOTES:
1. UNDERGROUND UTILITIES SHOWN WERE COMPILED FROM FIELD MARK-OUTS AND RECORDS. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY

THE CONNECTICUT LIGHT AND POWER COMPANY
BERLIN, CONN.

SURVEY PLAN OF SOUTH MEADOW GENERATING STATION
SHOWING APPROXIMATE LOCATION OF UNDERGROUND UTILITIES

SCALE 1"=40' DATE JUNE 1989 NO. 50532

PREPARED BY
NORTHEAST UTILITIES SERVICE COMPANY
SYSTEM REAL ESTATE DEPARTMENT
DRAWN BY JRF CHECKED BY

PROJECT SOUTH MEADOW GENERATING STATION

| DATE | REVISION | APP. |
|---|---|---|
| | | |

PROJ NO. 69-1.54 DWG NO. 50532 VOL H-17-1
SHEET 2 OF 4

# APPENDIX E2

EMERGENCY PREPAREDNESS PLAN

# FLOODWALL PENETRATION EMERGENCY PREPAREDNESS PLAN

**Materials Innovation and Recycling Authority**
**Resource Recovery Facility**
**Hartford, CT**
**23 January 2025**




**PREPARED FOR**
**MIRA Dissolution Authority**
300 Maxim Road
Hartford, CT  06114

**PREPARED BY**
**Simpson Gumpertz & Heger Associates, Inc.**
480 Totten Pond Road
Waltham, MA  02451
**O:** 781.907.9000

23 January 2025

Christopher Shepard, P.E.
Environmental Compliance Manager
MIRA Dissolution Authority
300 Maxim Road
Hartford, CT 06114

Project 240840 – Floodwall Penetration Emergency Preparedness Plan (EPP), Former MIRA Facility, 100 Reserve Road and 300 Maxim Road, Hartford, CT

Dear Mr. Shepard:

At your request, Simpson Gumpertz & Heger Associates, Inc. (SGH) prepared the attached EPP defining the roles and responsibilities of those in charge of monitoring for and responding to emergency conditions involving penetrations of utility penetrations through the Hartford Flood Control System floodwall that passes through the Materials Innovation and Recycling Authority Resource Recovery Facility. The companion to the EPP is the Floodwall Penetration Operation, Maintenance, and Inspection Plan, which is submitted under separate cover.

Please contact Justin A. Dominguez at 617-909-6844 or jadominguez@sgh.com if you have any questions.

Sincerely yours,

23 January 2025

Justin A. Dominguez, P.E.
Senior Project Manager
CT License No. PEN.0037690

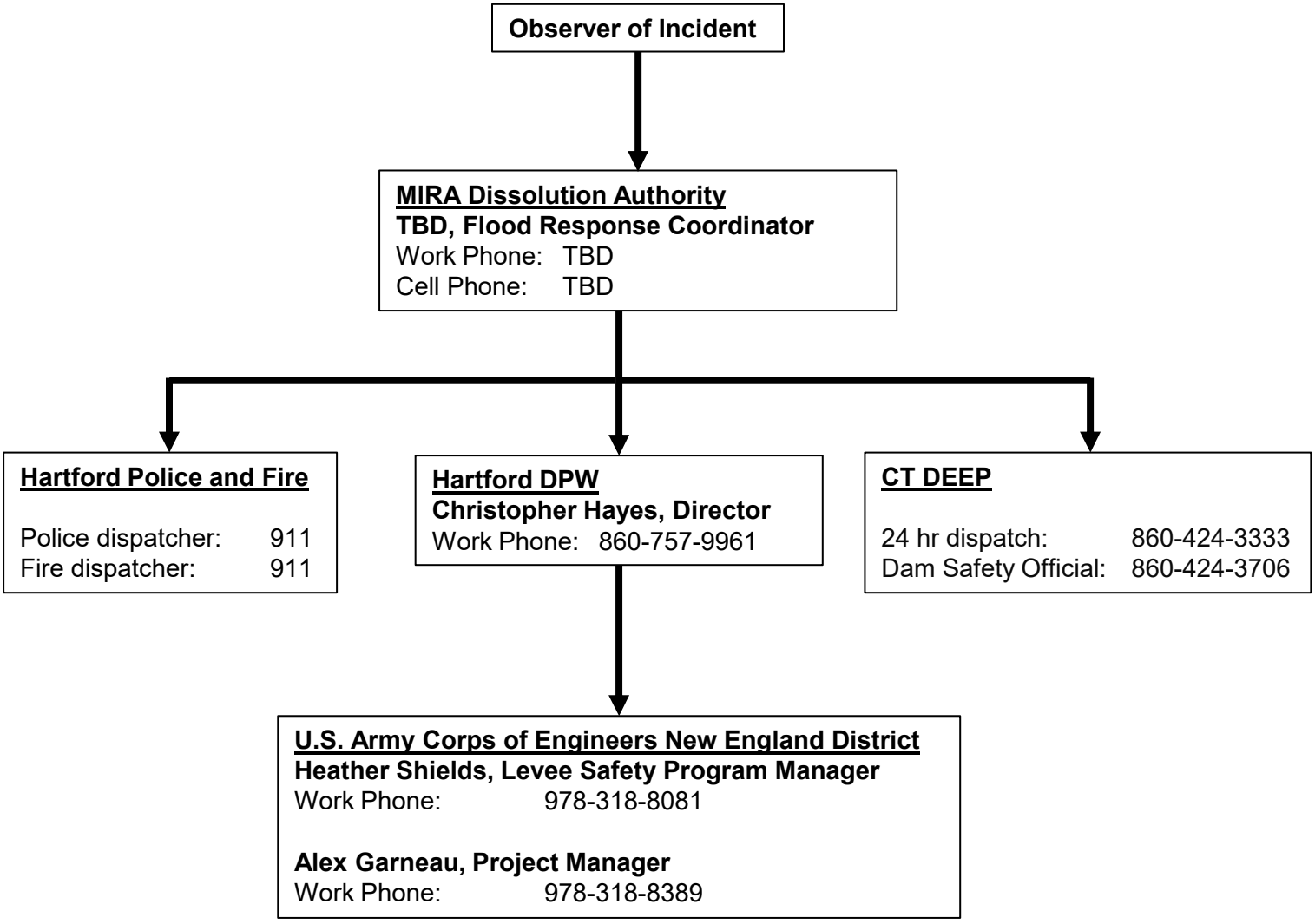
Bryan P. Strohman, P.E.
Principal
CT License No. PEN.0033461

I:\BOS\Projects\2024\240840.00-MIRA\WP\003JADominguez-L-240840.00.kri.docx

Encls.

# NOTIFICATION FLOWCHART

MIRA RESOURCE RECOVERY FACILITY FLOODWALL PENETRATIONS
EMERGENCY PREPAREDNESS PLAN
MIRA DISSOLUTION AUTHORITY



# Emergency Contact List

Floodwall Penetration Emergency Preparedness Plan

Materials Innovation and Recycling Authority

Resource Recovery Facility

| Title | Name | Phone | Other Phone | Email |
|---|---|---|---|---|
| **MIRA Dissolution Authority** | | | | |
| Flood Reponse Coordinator | TBD | | | |
| Superintendent | TBD | | | |
| | | | | |
| **City of Hartford** | | | | |
| Fire Department Dispatcher | | 911 | | |
| Police Department Dispatcher | | 911 | | |
| Director of Public Works | Christopher Hayes | 860-757-9961 | | christopher.hayes@hartford.gov |
| Deputy Director of Public Works | Petrel Maylor | 860-757-9968 | | maylp002@hartford.gov |
| **Greater Hartford Flood Commission** | | | | |
| Frank Dellaripa | Director | 860-757-9975 | | frank.dellaripa@hartford.gov |
| | | | | |
| **U.S. Army Corps of Engineers New England District** | | | | |
| Main Office | | 978-318-8111 | | |
| Operations Division (office hours) | | 978-318-8326 | | |
| Emergency Management Office | | 978-318-8274 | | |
| Heather Shields, Levee Safety Program Manager | | 978-318-8081 | | |
| Alex Garneau, Project Manager | | 978-318-8389 | | |
| **CT DEEP** | | | | |
| 24 hr dispatch | | 860-424-3333 | | |
| Dam Safety Official | | 860-424-3706 | | |
| **National Weather Service** | | | | |
| Lead Forecaster (all hours) | | 508-823-1983 | | |
| River Forecast Center | | 508-824-4799 | | |
| Connecticut River at Bulkeley Bridge Gage | https://water.noaa.gov/gauges/HFDC3 | | | |
| **Local Contractors/Equipment Rental** | | | | |
| TBD | | | | |
| | | | | |
| | | | | |

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**APPENDIX**

APPENDIX A – USACE Flood Fighting Techniques

## ABBREVIATIONS

| | |
|---|---|
| cfs | Cubic feet per second |
| CT DEEP | Connecticut Department of Energy & Environmental Protection |
| CTDOT | Connecticut Department of Transportation |
| DPW | Department of Public Works |
| dia. | Diameter |
| El. | Elevation |
| EPP | Emergency Preparedness Plan |
| ft | Feet |
| GHFC | Greater Hartford Flood Control System |
| HFCS | Hartford Flood Control System |
| in. | Inch, inches |
| MDA | MIRA Dissolution Authority |
| MIRA | Materials Innovation and Recycling Authority |
| M.S.L. | Mean Sea Level |
| NGVD 29 | National Geodetic Vertical Datum of 1929 |
| No. | Number |
| NWS | National Weather Service |
| PBF | Power Block Facility |
| USACE | U.S. Army Corps of Engineers |
| WPF | Waste Processing Facility |

## 1. SUMMARY OF EMERGENCY PREPAREDNESS PLAN RESPONSIBILITIES

| Entity | Responsibilities |
|---|---|
| MIRA Dissolution Authority (MDA) | • Inspect and patrol floodwall penetrations at the Facility.<br>• Identify and assess emergency conditions for penetrations at the Facility.<br>• Notify Hartford DPW of emergency conditions.<br>• Take corrective action at the Facility.<br>• Issue penetration condition status reports to Hartford DPW.<br>• Maintain the levee easement to ensure a safe work environment.<br>• Monitor and patrol infrastructure within Facility buildings.<br>• Support DPW during emergencies. |
| City of Hartford Department of Public Works (DPW) | • Inspect and patrol the Hartford Flood Control System (HFCS), including the portion that passes through the Facility.<br>• Identify and assess emergency conditions for the floodwalls and levees at the Facility and along the rest of the system.<br>• Receive penetration condition status reports from MDA.<br>• Notify MDA of changes in flood response phase.<br>• Issue flood prediction.<br>• Issue HFCS condition status reports and assistance requests to Hartford Police and Fire.<br>• Issue assistance requests to the USACE.<br>• Support MDA in taking corrective action at the Facility with restrictions. DPW support will be associated with the HFCS and its stability. DPW will not enter Facility buildings as part of flood monitoring or corrective actions. |
| CT DEEP | • Jurisdictional oversight over the HFCS as a Class C, High Hazard Dam. |
| City of Hartford Police, Fire, and Rescue | • Receive HFCS condition status reports and assistance requests from Hartford DPW.<br>• Notify the public in the event an evacuation is necessary.<br>• Conduct evacuation from inundation areas, if required.<br>• Render assistance to Hartford DPW, as necessary.<br>• Render assistance to MDA, as necessary. |
| City of Hartford Mayor, Chief Executive Officer, or Fire Chief | • Issue evacuation orders in accordance with the City's Emergency Operation Plan. |
| U.S. Army Corps of Engineers (USACE) New England Division | • Render assistance to Hartford DPW, as necessary. |
| National Weather Service (NWS) | • Issue reports weather forecasts to the general public.<br>• Maintain the Northeast River Forecast Center, which issues flood watches, warnings and forecasts for the Connecticut River Basin. |

## 2. NOTIFICATION FLOWCHART

The notification flowchart is located at the beginning of this document and is also located in the MDA's administrative office. A copy has also been provided to the Greater Hartford Flood Commission (GHFC) for incorporation into the HFCS Operation and Maintenance Manual.

Use of this notification flowchart assumes that MDA's Flood Response Coordinator (the Coordinator) will be contacted upon first identification of a potential emergency situation.

## 3. PURPOSE

This Emergency Preparedness Plan (EPP) defines the roles and responsibilities of those in charge of monitoring for and responding to emergency conditions involving penetrations through the floodwalls at the Materials Innovation and Recycling Authority (MIRA) Resource Recovery Facility (the Facility). The companion to this EPP is the latest version of the Floodwall Penetration Operations, Maintenance, and Inspection Plan, which outlines routine activities involving the penetrations.

# 4. FACILITY AND SYSTEM DESCRIPTION

## 4.1 Facility

The Facility is a shuttered trash-to-energy power plant in the South Meadows Section of Hartford, Connecticut (Fig. 1). The Facility, constructed in the 1920s, was originally coal-fired, then transitioned to a combination of oil and coal. In the 1980s, a waste processing facility (WPF) was constructed at the site and the power plant was converted for trash-to-energy use. The power plant portion of the site is referred to as the power block facility (PBF) to differentiate it from the WPF. The Facility stopped receiving, processing, and combusting waste in July 2022. Over the life of the Facility, there were six generating units, two of which (Units 5 and 6) were in use when operations ceased.

## 4.2 Flood Control System

The Facility is located along the west bank of the Connecticut River. In response to the devastating floods in 1936 and 1938, the U.S. Army Corps of Engineers constructed a flood control system to reduce flooding risks. The HFCS consists of earthen dike, concrete floodwalls, and structures to facilitate drainage inside the protected area. The HFCS passes through the Facility, with most of the area adjacent to the PBF consisting of concrete floodwall. Several penetrations through the floodwall allow for passage of pipes between the landside and the riverside.

## 4.3 Penetrations

### 4.3.1 General

Descriptions for the penetrations within the Facility are provided below. Over time, some penetrations through the floodwall have been properly abandoned, either by removing them or filling them with concrete as they cross through or under the floodwall. To reduce confusion, these abandoned penetrations are not listed in this EPP. The remaining, non-abandoned penetrations are shown in Figs. 2 and 3 and summarized in Table 1. Most of these penetrations are inactive. Inactive means that the penetration is no longer used but has not been removed or properly abandoned. Inactive status does not mean that a penetration does not pose a potential risk to the flood control system.

### 4.3.2 HD-35 (Three Inactive Oil Lines)

HD-35 consists of three 8 in. steel oil pipes passing through the above-grade portion of the floodwall stem, just south of the transition from earthen dike to floodwall. The pipe inverts are at approximately El. 31 ft. The pipes each have a valve on the landside of the floodwall stem and have been cut at the riverside of the floodwall stem, with blind flanges covering the riverside ends. These lines are inactive.

### 4.3.3 HD-36 (Roof Drain Outfall)

HD-36 is a 12 in. cast-iron roof drainpipe passing below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, north of Screenhouse No. 1. The pipe invert elevation at the floodwall centerline is at El. 21.92 ft. The pipe passes through a valve chamber adjacent to the floodwall on the landside. The pipe has a gate valve in the valve chamber immediately to the landside of the floodwall and a flap valve at the outfall end of the pipe on the riverside. This line is active.

### 4.3.4 HD-37 (Inactive Compressed Air and Water)

HD-37 consists of three pipes (1 in. dia. compressed air, 1.5 in. dia. city water, and 6 in. dia. service water) passing through the floodwall base and leading to the abandoned Chlorine House. The pipe inverts at the floodwall centerline are at El. 25.0 ft. The pipe material is unknown. These lines are inactive.

### 4.3.5 HD-38 (Inactive Unit 6 Process Water Intake)

HD-38 is a 48 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe formerly served as the process water intake for Unit 6. The pipe invert at the floodwall centerline is at approximately El. 9.5 ft. Two pumps in Screenhouse No. 1 draw water from the river and discharge into two pipes that merge on the riverside of the floodwall. The line continues as the single, 48 in. pipe into the PBF. Gate valves are provided on the discharge side of the pumps and in the PBF. These gate valves are intended to be permanently closed. This line is inactive.

### 4.3.6 HD-43 (Inactive Service Water Intake)

HD-43 is a 24 in. metal pipe inside a 48 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. The 48 in. pipe formerly served as the process water intake for Unit 4. The 24 in. inner pipe, which was installed later, served as a service water intake. It is not known if the inner pipe was grouted inside the 48 in. diameter pipe or simply placed inside. The pipe invert at the floodwall centerline is at approximately El. 19.25 ft. Two pumps in Screenhouse No. 3 draw water from the river and discharge into two pipes that merge inside the screenhouse. The line continues as the single, 24 in. pipe into the PBF. Gate valves are provided on the discharge side of the pumps. These gate valves are intended to be permanently closed. This line is inactive.

### 4.3.7 HD-44 (Inactive Unit 5 Process Water Intake)

HD-44 is a 48 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, at Closure Structure No. 4. This pipe formerly served as the process water intake for Unit 5. The pipe invert at the floodwall centerline is at El. 16.3 ft. Two pumps in Screenhouse No. 3 draw water from the river and discharge into two pipes that merge on the riverside of the floodwall. The line continues as the single, 48 in. pipe into the PBF. Gate valves are provided in Screenhouse No. 3 on the riverside and in the PBF. This line is inactive.

### 4.3.8 HD-45 (Inactive Water Discharge)

HD-45 is a 14 in. cast-iron water discharge pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of Screenhouse No. 3. This pipe is adjacent and parallel to HD-46. The pipe invert at the floodwall centerline is at El. 22.25 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. It is unclear whether there are any valves on this line or where they might be located. This line is inactive.

### 4.3.9 HD-46 (Inactive Service Water Discharge)

HD-46 is a 48 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of Screenhouse No. 3. This pipe

formerly served as the service water discharge and is adjacent and parallel to HD-45. The pipe invert at the floodwall centerline is at El. 18.0 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. It is unclear whether there are any valves on this line or where they might be located. This line is inactive.

### 4.3.10 HD-47 (Inactive Unit 5 Process Water Discharge)

HD-47 is a 48 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of Closure Structure No. 4. This pipe formerly served as the process water discharge for Unit 5. The pipe invert at the floodwall centerline is at El. 17.13 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. It is unclear whether there are any valves on this line or where they might be located. This line is inactive.

### 4.3.11 HD-47a (Inactive Unit 6 Process Water Discharge)

HD-47a is a 48 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, north of the former coal tower foundation. This pipe formerly served as the process water discharge for Unit 6. The pipe invert at the floodwall centerline is at El. 17.13 ft. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river. This line is inactive.

### 4.3.12 HD-48 (Inactive Former Ash Pit Outfall)

HD-48 is a 12 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing, south of the former coal tower foundation. The pipe invert at the floodwall centerline is at approximately El. 9.5 ft. The pipe has a gate valve in the valve chamber immediately to the landside of the floodwall and a flap valve at the outfall end of the pipe on the riverside. Formerly an ash pit outfall, the pipe was later cut and capped landward of the valve chamber. This line is inactive.

### 4.3.13 HD-49 (Inactive Oil Line in Former Ash Pit Outfall)

HD-49 is an 8 in. cast-iron pipe that was placed inside of a 10 in. pipe that passes through the below-grade portion of the floodwall stem, near the coal unloading facility. The outer pipe invert

at the floodwall centerline is at El. 16.86 ft. The original 10 in. pipe was an outfall for a former ash pit. The pipe discharged at a headwall on the riverbank on the riverside of the floodwall. On the landside of the floodwall, the pipe passed through a valve chamber and towards the ash pit. The 8 in. oil line runs from the south dock to the headwall, where it enters the original pipe. The newer oil line runs into the valve chamber, where the original pipe was cut. The pipe then bends 90° and rises vertically in the valve chamber to approximately 5 ft below the top of the chamber. The pipe then bends 90° and runs horizontally through the landside wall of the valve chamber, into a second valve chamber that shares a wall with the first, and then towards the Facility. The pipe has been cut inside the valve chamber, with blind flanges attached to both cut ends. This line is inactive.

#### 4.3.14 HD-50a (Inactive Jet Fuel Line)

HD-50a is an 8 in. steel pipe, formerly carrying jet fuel. The pipe runs from the south dock and then turns south (downriver) and then runs just below the ground surface in a 2 ft by 2 ft concrete encasement up on the dike riverside slope (the flood protection system transitions from floodwall to earth embankment just south of the south dock). The pipe then runs up over the dike crest, and down the landside dike slope. The top of the encasement is flush with the surrounding ground surface. The pipe invert at the dike centerline is approximately El. 42.5 ft. The pipe terminates at the south dock with a gate valve and blind flange. This line is inactive.

## 5. FLOOD RESPONSE PROCESS

The flood response process outlined below is based on guidance in the USACE Levee Owner's Manual for Non-Federal Flood Control Works, dated March 2006, and is consistent with the flood response process in the HFCS Operation and Manual, dated June 2009.

Flood response is divided into four phases:

- **Notification Phase:** Alert all response personnel of possible flooding.
- **Phase 1:** Preliminary Response Activities (before river reaches flood stage).
- **Phase 2:** Full Response Activities (after river reaches flood stage).
- **Phase 3:** Cessation (after flood recedes to non-damaging level).

Operating personnel shall follow the instructions below. Hartford DPW will notify MDA of the triggering of each phase, in accordance with the HFCS Operation and Maintenance Manual.

### 5.1 Notification Phase

The Notification Phase will begin if any of these conditions are met:

1. The NWS issues a report on a storm posing a threat to southern New England or issues a flood watch.
2. The Connecticut River at Bulkeley Bridge gage reaches a stage of **11.0 ft**[1] or discharge of **37,000 cubic feet per second (cfs)**.
3. The Park River at Pope Park Pumping Station gage reaches a stage of **22.0 ft** or discharge of **4,000 cfs**.

If the Notification Phase is reached, the Coordinator shall notify response personnel of the potential for activation.

### 5.2 Phase 1 – Preliminary Response

Phase 1 will begin if any of these conditions are met:

1. The NWS River Forecast Center issues a flood warning for southern New England.

[1] The elevations in this manual are referenced to the National Geodetic Vertical Datum of 1929 (NGVD or NGVD 29), also referred to as Mean Sea Level (M.S.L.) in USACE record drawings for the HFCS. The Bulkeley Bridge gage zero is set to NGVD, so all gage readings are water elevations in ft NGVD.

2. NWS indicates on their website that high flows could occur on the Connecticut or Park Rivers.

3. The Connecticut River at Bulkeley Bridge gage reaches a stage of 12.0 ft or discharge of 42,000 cfs.

4. The Park River at Pope Park Pumping Station gage reaches a stage of 23.6 ft or discharge of 5,400 cfs.

Phase 1 activities shall be completed before the Connecticut River at Bulkeley Bridge gage reaches a stage of **16.0 ft**. Phase 1 activities consist of the following:

- Initial mobilization of response personnel.
- Completing a pre-flood inspection.
- Patrolling the Facility daily.

### 5.2.1 Initial Mobilization

Initial mobilization consists of the following tasks:

- Launch a skeleton organization capable of quick expansion. Assign responsibilities to staff members, including pre-flooding inspection, daily floodwall patrol, and daily monitoring of the PBF.
- Review this EPP and previous lessons learned and identify problem areas.
- Provide all staff with required keys, controls, rosters, and a list and plan of project features.
- Coordinate with Hartford DPW to allow their flood response activities and ensure worker safety. DPW activities during Phase 1 include performing an initial pre-flood inspection, and patrolling the HCFS at least once a day.
- Begin keeping a log of emergency operations activities.

### 5.2.2 Pre-Flood Inspection

The pre-flood inspection will be carried out as outlined in the Facility's Floodwall Penetration Operation, Inspection, and Maintenance Plan. Particular attention should be paid to ensuring that all gate valves are closed, except for the HD-36 (12 in. dia. storm drain) valve. The HD-36 gate valve and flap valve must be trial-operated to confirm that they are in an operable condition. If not, immediate steps should be taken to repair. If the flap gate cannot be closed, it should be blocked with sandbags and plastic sheeting.

### 5.2.3 Phase 1 General Maintenance

Once the pre-flood inspection has been completed, the Coordinator should evaluate the results and organize personnel to take care of any pressing maintenance issues, before the river rises further. Emergency maintenance activities are no substitute for normal annual maintenance. Maintenance activities should not wait until high water.

### 5.2.4 Other Phase 1 Activities

Once the pre-flood inspection has been completed, the Coordinator should organize personnel to complete the following activities:

- Review assignments for patrols. Each patrol will consist of at least two people. Staffing assignments must consider that flooding can sometimes last several weeks.
- Obtain lists of all construction equipment, motorboats, cars, earthmoving equipment, and trucks that can be made available.Vendors and contractors shall be identified and procurement agreements established during non-emergency times, so that equipment and personnel can be mobilized in a timely manner.
- Assess needed support (vehicles, radios, etc.).
- Verify serviceability of flood-fighting equipment.

### 5.2.5 Patrols

The Facility shall be patrolled at least once per day during the Phase 1 Preliminary Response. Guidance for patrols is provided in Section 5.5.

### 5.2.6 Closure of HD-36 (Storm Drain Outfall) Gate Valve

The HD-36 pipe invert at the floodwall centerline is at El. 21.9 ft. The landside gate valve shall be **closed** when the Connecticut River at Bulkeley Bridge gage is predicted to reach a stage of **20.0 ft**. The gate valve shall remain closed until the gage falls below a stage of 21.0 ft.

## 5.3 Phase 2 – Full Response

Phase 2 will begin when the Connecticut River at Bulkeley Bridge gage reaches a stage of **24 ft**, and patrols shall be increased to every 4 hrs. When the gage reaches a stage of **28 ft**, patrols shall be increased to a continuous basis.

### 5.3.1 Activation of Project Facilities

The only gate valve that is not permanently closed is located at HD-36. Closure Structure No. 4, will be closed by Hartford DPW when the Connecticut River at Bulkeley Bridge gage reaches a stage of 28.5 ft and will remain in place until waters recede to a stage of 29.5 ft. The activation of the closure will reduce access to the riverside, but access is still possible via the stairways over the floodwall. Coordinate with DPW to ensure that DPW can install the closure structure panels in a timely manner. Access to the riverside of the floodwall will be limited once the closure structure is closed. Access over the floodwall via stairs must be limited to ensure safety of personnel.

### 5.3.2 Continuing Activities

The following activities shall be performed during the Phase 2 Full Response:

- Patrol at the prescribed frequency, 24/7, and at increased frequency as the situation requires.
- Be sure gates are closed, and all maintenance is complete, as described in Phase 1.
- Completely remove padlocks from interior access gates to facilitate patrols.
- Monitor inventory of flood fighting equipment, materials, and supplies as they are used.
- Repair any erosion and seepage problems identified by patrols as quickly as possible, as described in Section 5.6 and Appendix A.
- Portable pumps may be used to pump water over the floodwall, if water is ponding in undesirable areas or is rising too quickly in ponding areas. Ponding areas should be continually patrolled during high water.
- Coordinate with Hartford DPW to allow their flood response activities and ensure worker safety. DPW activities during Phase 2 include patrolling the HCFS every 4 hrs.

### 5.3.3 Evacuation

The City of Hartford maintains a comprehensive plan for the evacuation of areas protected by the HFCS in case of a levee failure or other flood emergency. Such an evacuation could be activated if a threshold river flood elevation is reached or based on observations by flood response personnel of an emergency condition (e.g., potential levee breach). Evacuation orders

will be issued by the City of Hartford to the general public, but the Hartford DPW might also relay these orders to MDA. For this reason, it is essential that communication between the MDA and Hartford DPW be maintained during a flood event.

### 5.4 Phase 3 – Cessation

Flood operations will cease once the Connecticut River returns to non-damaging levels. Phase 3 will begin when the following conditions are met:

1. The Connecticut River at Bulkeley Bridge gage recedes to a stage of 12.0 ft or discharge of 44,500 cfs.
2. The Park River at Pope Park Pumping Station gage reaches a stage of 24.0 ft or discharge of 7,400 cfs.

Once the water has subsided and it is not predicted to rise again, the Facility should be returned to the pre-flood condition:

- Reopen the HD-36 gate valve once the Connecticut River at Bulkeley Bridge gage has receded to a stage of **21.0 ft**.
- Remove and properly dispose of all temporary protection measures (e.g., sandbags and material placed during flood fighting).
- Relock all access gates.
- Take an inventory of all remaining flood-fighting equipment, sandbags, plastic, and other supplies. Repair or replace damaged equipment and restock supplies such as sandbags or plastic in preparation for the next flood event.
- Salvage any materials and supplies.
- Return all borrowed equipment.
- Identify whether remaining materials can be reused within the community.
- Inspect the area around each penetration, noting locations of damage and the extent of damage at each location.
- Coordinate potential rehabilitation with the GHFC.
- Soon after the event, meet with key personnel, volunteer representatives, and community partners to debrief, share remaining concerns, and discuss lessons that were learned during the event.

- Document the event: keep a map record of the Facility, indicating areas that were in stress at the time of the flooding. This is useful for making repairs or improvements, and for use as a guide to focus attention on these areas during the next flood event.
- Revise this EPP to account for lessons learned and changes to recommended procedures.
- For future planning, locate and keep records of the flood's high-water marks; keep these records along with any rainfall and river data gathered.
- Make repairs to the penetrations as soon as possible, in preparation for the next flood event.

### 5.5 Patrols

The purpose of patrolling is to detect problems early so that they can be addressed promptly. Patrols should be conducted in teams rather than by individuals. The frequency of patrols is as follows:

| Flood Response Phase | Connecticut River at Bulkeley Bridge Stage (ft) | Frequency |
|---|---|---|
| Phase 1 | 12.0 – 24.0 | Once per day |
| Phase 2 | 24.0 – 28.0 | Every 4 hrs |
| | 28.0+ | Continuously |

Any signs of distress or potential issues should be reported to the Coordinator, who will notify Hartford DPW.

#### 5.5.1 Responsibilities

Patrol responsibilities include the following:

- Take photographs of all significant issues.
- On the landside of the floodwall, look for sand boils, wet areas, soft areas, seepage, or sinkholes surrounding penetrations.
- Look for slides or sloughs around outfall headwalls.
- Look for wave wash or scouring around outfall headwalls.
- Check flap and gate valves for proper closure.
- Look for settlement or movement of the floodwall around penetrations.

- Look for sand boils and seepage in the PBF, particularly along intake and discharge pipes that penetrate the floodwall.

### 5.5.2 Equipment for Patrols

Equipment for patrols includes the following:

- This Floodwall Penetration Emergency Preparedness Plan.
- Floodwall Penetration Operation, Inspection, and Maintenance Plan.
- Portable radio or cell phone.
- Watch.
- Logbook.
- Weather gear.
- Flashlights and headlamps.
- Life jackets.
- Probing rod.
- Mark-out supplies (wooden stakes, flagging, and spray paint).
- 40 ft of 1/2 in. nylon safety line to connect team members.
- Camera.
- Ladder.

### 5.5.3 Safety Precautions

When patrolling on the riverside of the floodwall, all patrol members shall wear life jackets. Any patrol operations that require a patrol member to descend a dike or riverbank slope should wear a safety line attached to another member at the top of the slope. Note that the riverbank slopes that are covered with grouted riprap are very steep and will be impossible to access safely. Do not attempt to descend these slopes.

Once Hartford DPW operates Closure Structure No. 4, access and sightlines to the riverside will be limited. The tops of the floodwalls are approximately 10 to 15 ft above the surrounding grade. When patrolling floodwalls, the patrol should not attempt to walk the top of the wall.

Conditions on the waterside can be observed using a ladder or the two stairs that go over the floodwall.

Each person on the patrol should be thoroughly familiar with the community evacuation plan and signals. If evacuation is necessary, the patrol team should move to a predetermined location and keep the team intact. If evacuated, when returning to the Facility, physical conditions may be considerably different from those observed prior to the evacuation, especially if the floodwall or dikes were overtopped. If overtopping occurs during the darkness, patrols shall not be resumed until daylight, though there may be cases where this recommendation cannot be followed.

### 5.6 Flood Fighting

Any signs of distress or potential issues should be reported to the Coordinator, who will notify Hartford DPW of the emergency condition. MDA personnel should attempt to repair issues immediately. The Coordinator must compare staffing levels, equipment, and supplies to those required, and clearly communicate the need for assistance if necessary.

The penetrations at the Facility either pass through the concrete floodwall or through the sheet pile seepage cutoff wall embedded in the riverside toe of the floodwall. Therefore, they represent a hole in the flood control system. Floodwaters will try to make their way to the landside, and the penetrations represent a spot of potential weakness. Water can flow either through the pipes or in the soil alongside the pipe.

Guidance for flood fighting is provided in Appendix A, which is the flood fighting appendix of the USACE Levee Owner's Manual. Particular attention should be paid to Section 3 - Seepage (pp. 15 - 20 of the appendix). Note that other signs of distress may occur, which are also addressed in Appendix A.

The rings of stacked sandbags to address sand boils outlined in Appendix A may not be sufficient to stop sand boils that develop around a penetration. The continued loss of soil from a

boil can increase seepage flow rates, which further accelerates the loss of soil. This situation can quickly undermine the floodwall, leading to a breach.

If a boil cannot be stopped using a sandbag ring, place an inverted filter over the boil. An inverted filter consists of sand first, then crushed stone, and then riprap. The footprint of the inverted filter should extend at least 5 ft beyond the extent of the boil. Each layer of the filter should be at least 2 ft thick.

## 6. ROLES AND RESPONSIBILITIES

### 6.1 MIRA Dissolution Authority

The MDA is responsible for the operations, inspection, and maintenance of the penetrations through the HFCS within the Facility, including flood response in coordination with Hartford DPW.

Flood response responsibilities include the following:

- Inspecting and patrolling floodwall penetrations at the Facility.
- Identifying and assessing emergency conditions for penetrations at the Facility.
- Notifying Hartford DPW of emergency conditions.
- Taking corrective action at the Facility.
- Issuing penetration condition status reports to Hartford DPW.
- Maintaining the levee easement to ensure a safe working environment.
- Monitoring and patrolling infrastructure within Facility Buildings.

### 6.2 Greater Hartford Flood Commission

The GHFC is the regulatory authority with stewardship over public works constructed in the Greater Hartford area for the purpose of flood control on the Connecticut and Park Rivers, and on the tributaries of the Park River.

The GHFC delegates operation, inspection, and maintenance duties to the Hartford DPW, as described below.

### 6.3 Hartford DPW

Maintenance of the HFCS is conducted by a permanent staff under the direction and supervision of the Hartford DPW. Hartford DPW's areas of responsibility include:

- Complete operation of the project during flood periods.
- Determining phases of preparedness, mobilization, and operations based on: NWS river and weather forecasts, and river stages on the Park River at Pope Park pumping station and on the Connecticut River at Hartford (Bulkeley Bridge).

- Training personnel in specific duties and holding periodic practice sessions to ensure efficient and effective maintenance and operation.
- Maintaining adequate contact with the NWS to obtain weather and flood forecasts.
- Maintenance of all project features.

DPW's support during flooding operations will associated with the HFCS and its stability. DPW will not enter facility buildings as part of flood monitoring or corrective actions.

### 6.4 Hartford Police and Fire

Hartford Police and Fire responsibilities include:

- Receiving HFCS condition status reports and assistance requests from Hartford DPW.
- Notifying the public in the event an evacuation is necessary.
- Conducting evacuation from inundation areas, if required.
- Rendering assistance to Hartford DPW, as necessary.
- Rendering assistance to MDA, as necessary.

### 6.5 National Weather Service

The NWS has no direct role in the operations of the project; however, it has the responsibility of issuing weather and flood forecasts to the general public. The NWS maintains the Northeast River Forecast Center at Bloomfield, Connecticut, which is the official agency for issuing flood watches, warnings, and forecasts in the Connecticut River basin. River forecasts for the Connecticut River (U.S. Geologic Survey Gage # 01190070 at the Bulkeley Bridge) can be viewed online, at https://water.noaa.gov/gauges/HFDC3. Weather forecasts and reports for the area are issued by the NWS office at Bradley Field in Windsor Locks.

### 6.6 U.S. Army Corps of Engineers

The USACE Reservoir Control Center continually monitors rainfall and runoff conditions in much of New England. This climatologic and hydrologic information is available upon request online at http://www.reservoircontrol.com.

Representatives of the USACE Division Engineer stand ready to assist the City of Hartford in the operation of the HFCS. This in no way lessens the responsibility of the City of Hartford in the operation of the project or MDA in the operation of floodwall penetrations at the Facility.

The USACE New England Division Levee Safety Program has regulatory oversight of the HFCS, which it refers to in its reporting as the Connecticut River Right Bank – Hartford, CT Flood Risk Management System.

### 6.7 Connecticut Department of Energy & Environmental Protection (CT DEEP)

CT DEEP administers the state's Dam Safety Regulatory Program, whose mission is to ensure the safety of dams to protect life, property, and the environment by ensuring that all dams are designed, constructed, operated, and maintained safely and effectively.

CT DEEP Dam Safety has regulatory oversight of the HFCS, as it is classified as a Class C, High Hazard Dam.

### 6.8 Notification and Communication Responsibilities

The notification and coordination responsibilities are as follows:

MDA to Hartford DPW:

- Notify Hartford DPW of emergency conditions and termination of emergencies.
- Issue Hartford DPW penetration condition status reports.

Hartford DPW to MDA:

- Notify MDA of activation or change in flood response status.

Hartford DPW to Hartford Police and Fire:

- Issue HFCS condition status reports and assistance requests.

### 6.9 Evacuation Responsibilities

The City of Hartford Mayor, Chief Executive Officer, or anyone legally administering that office is responsible for issuing evacuation orders, in accordance with their Emergency Operation Plan. In addition, the Fire Chief or senior fire officer-in-charge (Incident Commander) has statutory authority to order an evacuation.

Evacuation orders will be issued to the general public, so the City will not notify MDA specifically. Depending on timing, the Hartford DPW might notify MDA of an imminent evacuation order prior to general public notification.

### 6.10 Flood Response Coordinator Responsibilities

The Flood Response Coordinator is an MDA employee who will be in charge of flood response. The Coordinator is responsible for managing the flood response program, developing and maintaining the staffing roster for flood response personnel, and organizing training sessions. During flood response, the Coordinator will be the main point of contact with the GHFC and City of Hartford emergency personnel.

## 7. PREPAREDNESS

### 7.1 Access to the Site

Access to the site is restricted via a chain-link fence. There are three roadway access gates to the Facility, as shown in Fig. 3:

1. South gate (Maxim Road).
2. West gate (Reserve Road).
3. North gate (Reserve Road).

Additionally, there are two gates separating the PBF and the WPF.

On the riverside of the floodwall, chain link fences restrict access to the screenhouses and coal unloading facility.

During flood response, the Coordinator will direct all access in and out of the site. All flood response personnel shall be given gate access codes and keys to the gates.

### 7.2 Response During Periods of Darkness

The Facility is well-lit for operational use during periods of darkness and as an aid to inspection. However, some areas riverward of the floodwall may not be well-lit. Should electrical power be unavailable, lighting for inspections and patrols will be provided by headlamps and flashlights. A light tower will also be available for lighting of specific areas. If additional lighting is required, it will be acquired by the Coordinator.

### 7.3 Response during Weekends and Holidays

Procedures for contacting or notifying personnel during weekends and holidays will be consistent with the Notification Flowchart, which provides 24 hr phone numbers for individuals and entities who are required to be notified.

### 7.4 Response During Adverse Weather

Severe weather may occur during flood response activities. During lightning or winds exceeding 60 mph, MDA personnel will remain indoors and will not conduct repairs or inspections until conditions are safe.

### 7.5 Emergency Supplies and Information

The following equipment will be kept onsite to aid in flood response:

- Front-end loader.
- Sandbags.
- Plastic sheeting.
- Shovels.
- Emergency lighting (light tower, flashlights, and headlamps).
- Two-way radios.
- Life jackets.
- Pumps and hoses.
- Bolt cutters.
- Ladders.
- Mark-out supplies (wooden stakes, flagging, and spray paint).
- Probing rods.

The following materials shall be stockpiled:

- Sand for sandbags (no specific gradation): 25 tons.
- Sand for inverted filter (Connecticut Dept. of Transportation [CTDOT] M.01.03 Fine Aggregate): 25 tons.
- Crushed stone for inverted filter (CTDOT M.01.02 Coarse Aggregate No. 67): 25 tons.
- Riprap for inverted filter (CTDOT M.12.02 Modified Riprap): 25 tons.

## 7.6 Training and Exercise

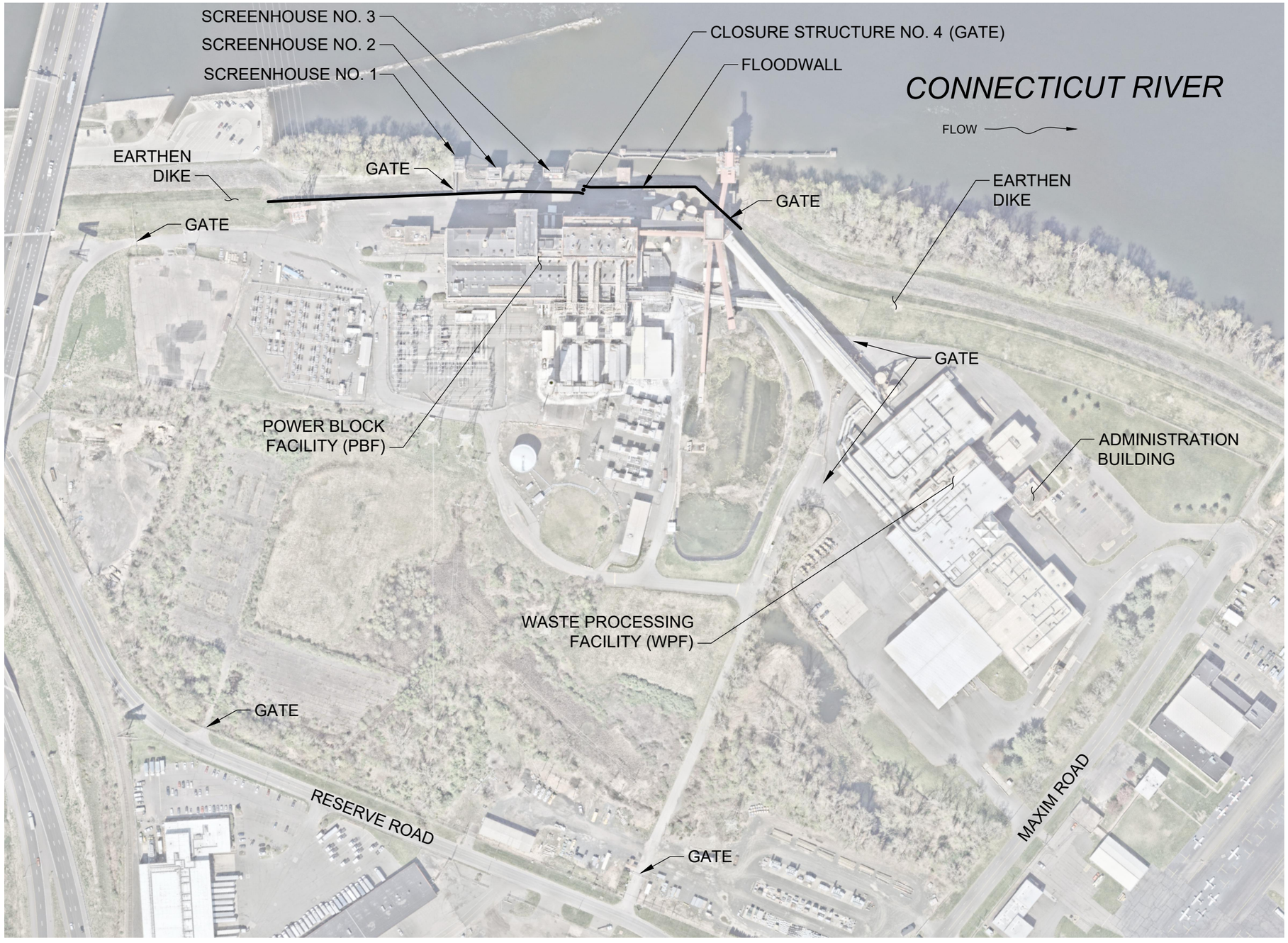
Flood response personnel shall be trained to operate, inspect, and maintain the floodwall penetrations. Training shall be held at least annually. Additional training sessions may be held as needed to train new personnel. At the end of each training session, a feedback session should be held to discuss areas of improvement. Training records shall be kept for all flood response personnel.

Training shall include the following:

- Site walk to visit all penetrations, all valves (exterior, in Screenhouses, and in the PBF), emergency supply storerooms, and emergency stockpiles.
- Walkthrough of notification process and communications protocol, including a trial exercise.
- Operations, inspections, and maintenance procedures.
- Signs of distress during flooding.
- Flood-fighting techniques.
- Communication system testing.

**Table 1. Floodwall Penetration Inventory**
**MIRA Dissolution Authority**

| ID No. | Station | Description | Diameter/Size and Material of Penetration | Invert Elevation at Floodwall Centerline (ft NGVD 29) | Status | Backflow Prevention Measures |
|---|---|---|---|---|---|---|
| HD-36 | 84+21M | Roof drain outfall | 12 in. dia. pipe - Cast Iron | 21.92 | Active | Flap valve at riverside outfall, gate valve in valve chamber immediately landside |
| HD-37 | 85+28M | Compressed air and water | 1.5 in. dia. city water<br>1 in. dia. compressed air<br>6 in. dia. service water | 25.0 | Inactive | Unknown |
| HD-38 | 84+55M | Non-contact cooling water intake (Unit 6) | 48 in. dia. pipe - Steel | ~9.5 | Inactive | Two gate valves in Screenhouse No. 1 on riverside, one on each intake pump |
| HD-43 | 86+77.5M | Service water intake | 24 in. dia. pipe placed inside<br>48 in. dia. pipe - Steel | 17.77 | Inactive | Two gate valves in Screenhouse No. 3 on riverside, one on each intake pump |
| HD-44 | 87+65M | Non-contact cooling water intake (Unit 5) | 48 in. dia. pipe - Steel | 16.3 | Inactive | Two gate valves in Screenhouse No. 3 on riverside, one on each intake pump |
| HD-45 | 87+40.6M | Water discharge (Source unknown) | 14 in. dia. pipe - Cast Iron | 22.25 | Inactive | Unknown |
| HD-46 | 87+35.85M | Service water discharge | 48 in. dia. pipe - Steel | 18.0 | Inactive | Unknown |
| HD-47 | 87+85M | Non-contact cooling water discharge (Unit 5) | 48 in. dia. pipe - Steel | ~9.5 | Inactive | Gate valve in turbine hall on landside |
| HD-47a | 88+34M | Non-contact cooling water discharge (Unit 6) | 48 in. dia. pipe - Steel | 17.13 | Inactive | Gate valve in turbine hall on landside |
| HD-48 | 89+36.5M | Storm drain (former ash pit outfall) | 12 in. dia. pipe - Cast Iron | 7.72 | Inactive | Flap valve at riverside outfall, gate valve in valve chamber immediately landside |
| HD-49 | 90+75M | Oil pipe in former ash pit outfall | 8 in. dia. oil line (Steel) placed inside<br>10 in. dia. drain line (Cast Iron) | 16.86 | Inactive | Blind flange and gate valve at south dock on riverside, blind flange in valve chamber immediately landside |
| HD-50a | 92+31.7M | Liquid fuel line | 8 in. steel pipe encased in concrete | ~43.5 | Inactive | Blind flange and gate valve at south dock on riverside |



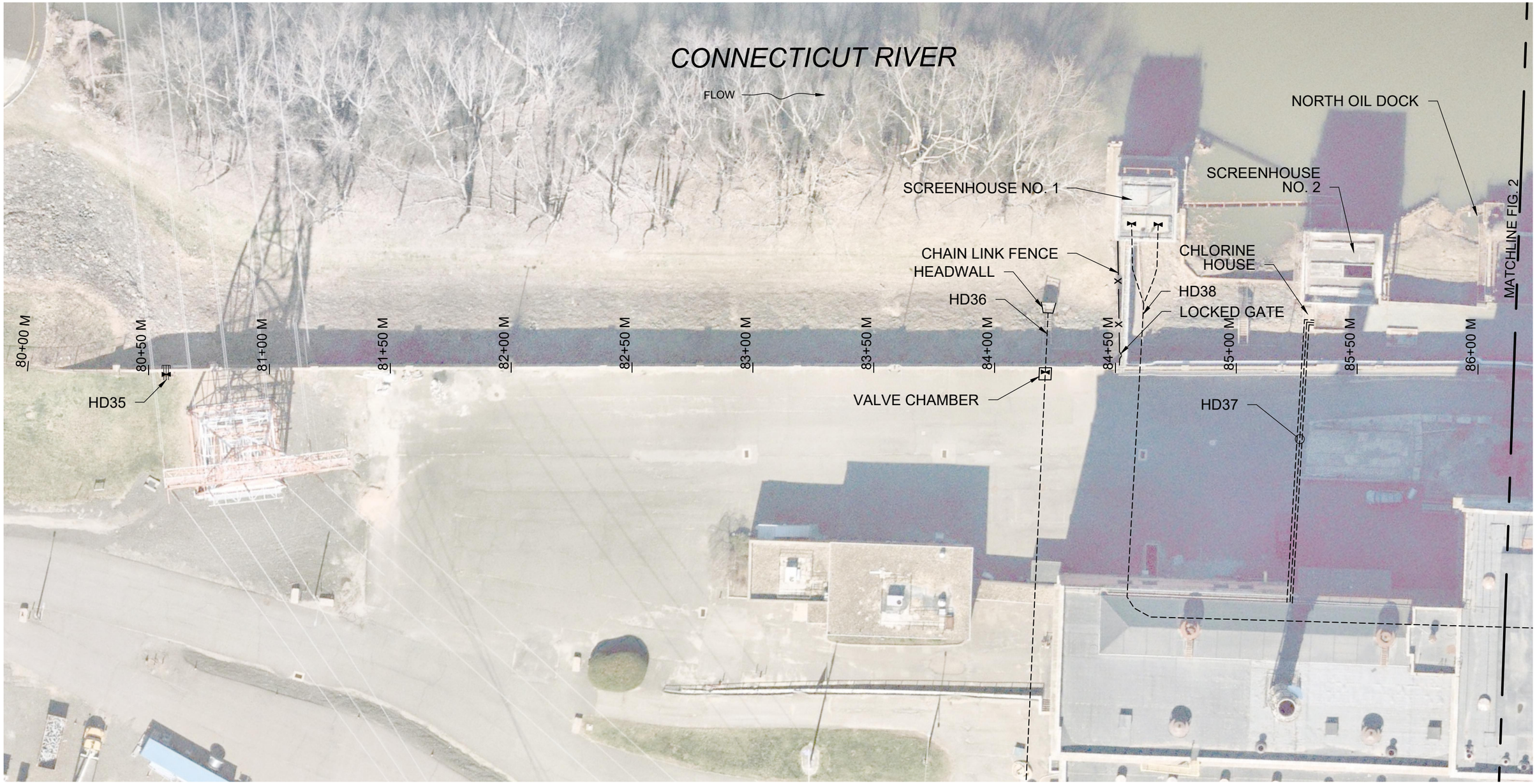

NOTES:
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0 125' 250' 500' 750' 1000'

1" = 250'-0"

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| | | | | | |
|---|---|---|---|---|---|
| Project: MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION EMERGENCY PREPAREDNESS PLAN | | | | Drawing No.: | FIG. 1 |
| Title: SITE PLAN | | | | Scale: | 1" = 250'-0" |
| Drawn: RKP | Checked: JAD | Approved: BPS | Project No.: 240840 | Date: | 9/13/2024 |




NOTES:
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2. LOCATIONS AND FLOOD CONTROL SYSTEM STATIONING HAVE NOT BEEN VERIFIED WITH SITE SURVEY AND THEREFORE, SHOULD BE CONSIDERED APPROXIMATE.

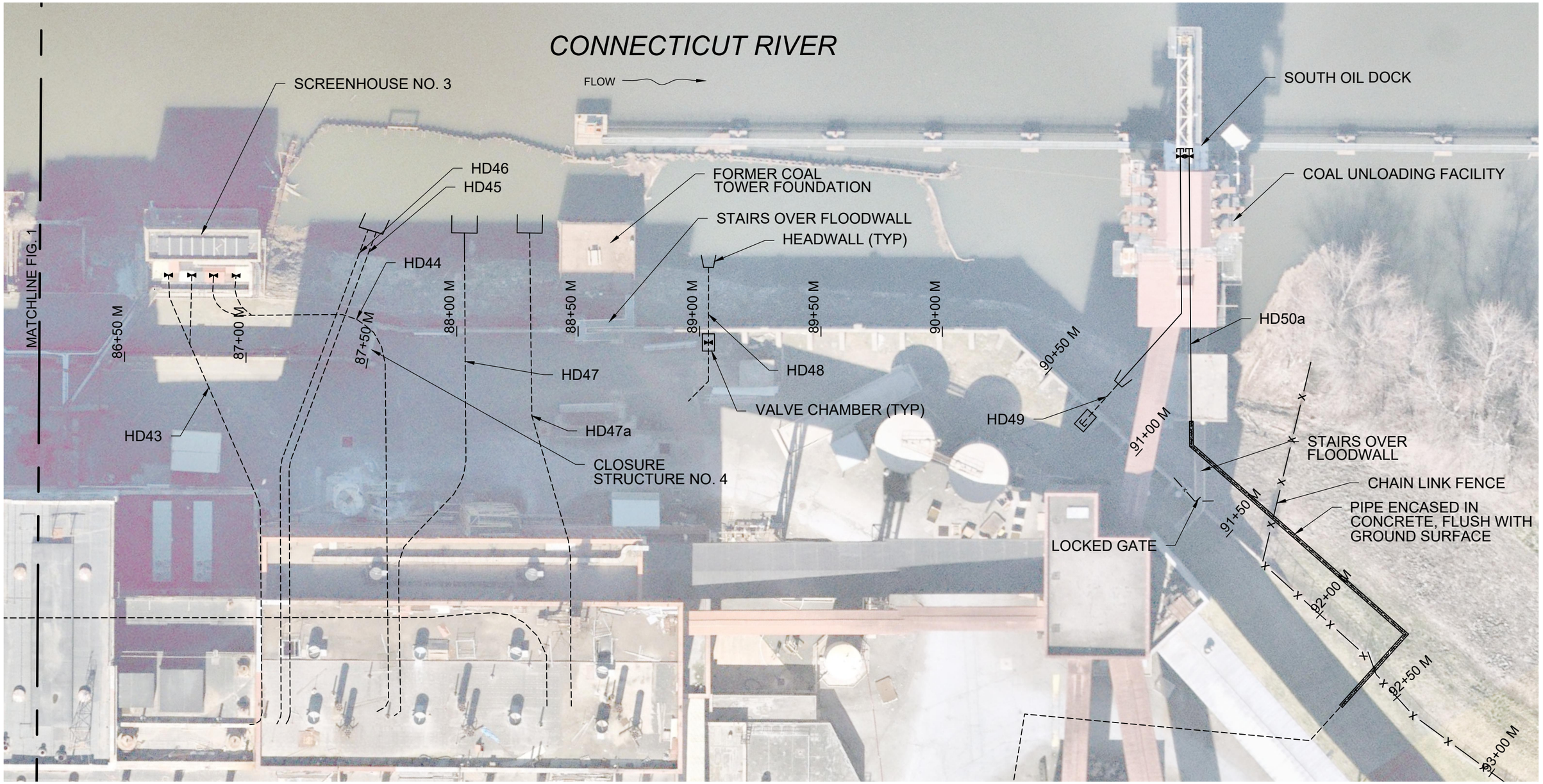
LEGEND:
- BELOW GROUND PIPE
- ABOVE GROUND PIPE
- GATE VALVE
- BLIND FLANGE

0 20' 40' 80' 120' 160'

1" = 40'-0"

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| | | | | |
|---|---|---|---|---|
| Project: MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION EMERGENCY PREPAREDNESS PLAN | | | | Drawing No.: FIG. 2 |
| Title: PENETRATION LOCATIONS | | | | Scale: 1" = 40'-0" |
| Drawn: RKP | Checked: JAD | Approved: BPS | Project No.: 240840 | Date: 9/16/2024 |




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LEGEND:
- BELOW GROUND PIPE
- ABOVE GROUND PIPE
- GATE VALVE
- BLIND FLANGE

0 20' 40' 80' 120' 160'

1" = 40'-0"

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| Project: | MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION EMERGENCY PREPAREDNESS PLAN |
| Title: | PENETRATION LOCATIONS |
| Drawn: | RKP |
| Checked: | JAD |
| Approved: | BPS |
| Project No.: | 240840 |
| Drawing No.: | FIG. 3 |
| Scale: | 1" = 40'-0" |
| Date: | 9/16/2024 |

# APPENDIX A

# APPENDIX D: Flood Fighting Techniques on Levees

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# 1. Introduction

If a well-constructed levee of correct cross section is properly maintained and is not overtopped, it should hold throughout any major flood event. However, the levee is still in potential danger whenever there is water against it. The danger increases with the height of water, the duration of the flood stage, the intensity of the current, and the wave action against the levee face. There are three primary factors that lead to levee failures.

1. Overtopping
2. Seepage problems such as sandboils or slides
3. Erosion from the current or waves

Potential levee failures may be prevented if prompt action is taken and proper methods of treatment are employed. This appendix describes some of the general actions that should be taken to raise the crown of a levee or to respond to sandboils, seepage problems, or wave wash if these problems are identified during a patrol. The methods described have been developed from many years of experience in dealing with problems that arise as a result of high water, and should be followed as closely as possible. (The intent of this isn't to destroy personal initiative when dealing with unusual emergencies. On the contrary, if a dangerous situation occurs along a levee line, immediate action is demanded using the materials and labor at hand. However, an emergency is not a time in which to experiment, and these proven methods should be employed wherever possible.) Conditions and problems may arise which are not adequately covered by the suggestions provided or if there's any doubt as to the proper procedure that should be taken, the local U.S. Army Corps of Engineers district Emergency Management Office should immediately be consulted for advice and assistance.

# 2. Overtopping

A levee is overtopped when water flows over the levee crown. Low reaches in the levee crown must be identified as early as possible and raised to a uniform level. If the stream is predicted to approach or exceed the height of the existing levee, immediate attention should be given to raising the levee crown.

On the other hand, if the stream is likely to crest many feet beyond the elevation of the levee, the best approach may be to simply allow the levee to overtop, so that flood fight efforts can be redirected to other areas. If this is the case, low reaches in the levee crown need to be raised, leveled or otherwise prepared so that it overtops uniformly, to keep the damage to a minimum. Ideally, the levee should be allowed to overtop uniformly along the downstream portion of the system, so the protected area is "backfilled" with flood water. If the levee is breached due to the overtopping along the downstream portion of the FCW, it prevents the full force of the river's current from flowing into the protected area. An upstream breach will allow the river current to bring in much more debris (for example, entire trees), and would possibly cause much more scouring damage to the protected area than a downstream overtopping breach. It's very important that you contact the Corps district office when faced with decisions relating to the overtopping of a levee, as the Corps has a great deal of experience with flood fighting and can provide technical assistance and guidance as needed.

Generally, emergency barriers are constructed 2 feet above the current predicted river crest. For example, if the river is predicted to rise 1 1/2 feet beyond the elevation of the levee, then a 3 ½ foot capping would be necessary in order to maintain two feet of freeboard as a factor of safety. If the crest prediction increases during construction, additional height must be added.

### 2.1 Options for Raising a Levee

There are a number of ways that the levee crown can be raised. Provided the work is done well in advance of the high water, in areas where there is sufficient space for construction and with the proper equipment, the most efficient means of raising low stretches of the levee is to scarify the surface, haul in fill material and compact it in place, as discussed in section 2.2, below. However, this is not always possible. No heavy equipment should be used on a levee when water is near the top, as the vibration may cause a failure. In no case should such equipment be allowed on an earthen levee after the levee has commenced to seep. For these reasons, raising the elevation with compacted earthen fill may not be an option. The levee crown may alternately be raised with a sandbag capping or with flashboard structures. Jersey barriers have also successfully been converted into floodwalls during emergency situations.

Additionally, there are a large number of contemporary technologies that may be used to raise an emergency levee; including bladders, structurally supported membranes, and lightweight shells that are filled with sand from a bucket loader. The Corps' Engineer Research and Development Center has recently completed a rigorous and impartial study on several of these flood fight technologies. You are encouraged to visit http://chl.erdc.usace.army.mil/ffs for details on the tests and products, since this site will have the Corps' most current information on the subject, and the website will be updated as additional products are tested.

With so many options available for raising a flood barrier, there are several things you should consider as you decide how to best protect your community:

**a. Cost of materials and labor**

The materials for sandbag construction are generally much less expensive than the alternatives. Sandbag construction is very labor intensive, but at the same time, volunteer labor is often readily available during high water.

**b. Available time**

Flashboards or contemporary options are better suited to conditions when there is little time available for the construction, because they typically require less labor and can be put in place much faster than sandbag levees.

**c. Allowable seepage**

Most construction methods will allow some degree of seepage through the structure. As is the case with sandbags, modifications may be made to the basic designs so that the seepage is reduced, but these modifications usually take additional time to construct.

**d. Suitability for construction in the given area**

Sandbags are extremely versatile and sandbag structures can be constructed almost anywhere. Sandbags can be used to close small roads or to fill gaps, or can be built into long stretches of levees if there is adequate time and manpower. Flashboards and newer technologies are generally not as versatile, but depending on the technology and the construction, they are typically well suited for raising the elevation over longer stretches.

**e. Equipment requirements**

Sandbag structures can be built without heavy machinery, which may be required for some other options. There are a number of situations where it's not possible to use even light earthmoving machinery. For example, there might not be enough space for the machinery, or the foundations might be too unstable. Also, individual landowners may object to the use of machinery over their properties.

**f. Necessary elevation**

Though sandbag levees are best suited for elevations of 3 feet or less, they have successfully been used to raise elevations by 20 feet or more in extreme flooding situations. Flashboards are typically only built to a maximum of 3 feet, and the elevation provided by other technologies varies. In deciding between the various options, it's important to consider how reliably they can forecast the crest height of the river. If the river stage might rise several feet beyond what is currently predicted, a sandbag levee could be raised higher, while it would be much more difficult to raise something like a flashboard or Jersey barrier structure.

**g. Disposal**

Burlap sandbags are biodegradable and relatively easy to remove and dispose of. Other options typically take much longer to remove and create more waste. Some are reusable.

Situations may arise when one of the more contemporary products may be readily available and appropriate for the given conditions, when there would be insufficient workers available to protect the area with sandbags or when time was extremely limited; and in these situations the cost of using these products may be justified. While it would be prohibitively expensive for the Corps to stockpile enough inventories to adequately address all problems that might be faced across the country, the Corps may purchase such items and make them available for public sponsors if conditions warrant. However, in the majority of situations, sandbags are almost always preferred and recommended during flood fights when construction with earthen fill is not possible. The following sections provide specific guidance on raising levees using earthen fill, sandbags, and flashboards.

## 2.2 Raising a Levee with Earthen Fill

**a. Borrow Area and Haul Road**

Borrow material can become a critical item of supply in some areas due to long haul, project isolation, or for other reasons. The two prime requisites for a borrow area are that adequate material be available and that the site be accessible at all times. The quantity estimate plus an additional 50 percent should provide the basis for the area requirement, in order to provide suitable materials for levee construction as covered below. The area must be located so that it will not become isolated from the project by high water. Local contractors and local officials are the best source of information on available borrow areas. In undeveloped areas, the area should be cleared of brush, trees, and debris, with topsoil and humus being stripped. In early spring, it will probably be necessary to rip the area to remove frozen material. An effort should be made to borrow from the area in such a manner that the area will be relatively smooth and free draining when the operation is complete. The haul road may be an existing road or street, or it may have to be constructed. To mitigate damages, it is highly desirable to use unpaved trails and roads, or to construct a road if the haul distance is short. In any case, the road should be maintained to avoid unnecessary traffic delays. The use of flagmen and warning signs is mandatory at major crossings, such as highways, near schools, and at major pedestrian crossings. It may become necessary to stockpile material near anticipated trouble areas.

**b. Equipment**

One of the important considerations in earthwork construction is the selection of proper equipment to do the work. Under emergency conditions, obtaining normally specified earthwork equipment will be difficult and the work will generally be done with locally available equipment. It may be wise to call for technical assistance in the early contract stage to ensure that proper and efficient equipment use is proposed. If possible, compaction equipment should be used in flood barrier construction. This may

involve sheepsfoot, rubber-tired, or vibratory rollers. Scrapers should be used for hauling when possible because of speed (on short haul) and large capacity. Truck haul, however, has been the most widely used. A ripper is almost essential for opening borrow areas in the early spring. A bulldozer of some size is mandatory on the job to help spread dumped fill and provide some compaction.

**c. Foundation preparation**

One of the primary differences in the construction of emergency levees and the construction of permanent levees lies in the preparation of the foundation. Prior to any embankment construction, it's very important that the foundation is prepared, particularly if the levee is to be left in place. For emergency construction during spring flooding, the first item of work will probably be snow removal. The snow should be pushed riverward so as to decrease ponding when it melts. Any trees that might be present should be cut and the stumps removed. If at all possible, any obstructions above the ground (brush or similar debris) should be removed. The foundation should then be stripped of topsoil and surface humus. (Clearing and grubbing, structure removal and stripping should be performed only if time permits.) Stripping may be impossible if the ground is frozen, and in this case, the foundation should be ripped or scarified, if possible, to provide a tough surface for the material to bond to. Every effort should be made to remove all ice or soil containing ice lenses. Frost or frozen ground can give a false sense of security in the early stages of a flood fight. It can act as a rigid boundary and support the levee, but when it thaws, the soil strength may be reduced sufficiently for cracking or the development of slides. The ice also forms an impervious barrier to prevent seepage. This may result in a considerable build-up in pressure under the soils landward of the levee and, upon thawing, pressure may be sufficient to cause sudden blowouts. If this condition exists, it must be monitored, and one must be prepared to act quickly if sliding or boiling starts. If stripping is possible, the material should be pushed landward and riverward of the toe of levee and windrowed. After the flood, this material can be spread on the slopes to provide topsoil for vegetation.

**d. Materials**

Earth fill materials for emergency levees will come from local borrow areas. An attempt should be made to utilize materials which are compatible with the foundation materials as explained below. However, due to time limitation, any local materials may be used if reasonable construction procedures are followed. The materials should not contain large frozen pieces of earth.

**i. Clay**

Clay is preferred because the section can be made smaller (steeper side slopes). Also, clay is relatively impervious, and has relatively high resistance to erosion when it's compacted. A disadvantage in using clay is that adequate compaction is difficult to obtain without proper equipment. Additionally, the water content in impervious fill can impact the compaction needs. Efforts are typically made at the borrow site to obtain material with the optimal moisture; otherwise, if that is not

possible, more time may be required for compaction. Another disadvantage is that the clay may be wet and sub-freezing temperatures may cause the material to freeze in the borrow pit and in the hauling equipment. Weather could cause delays and should definitely be considered in the overall construction effort.

**ii. Sand**

If sand is used, the section should comply as closely as possible with recommendations in the paragraph titled Levee Section, below. Flat slopes are important, as steep slopes without poly coverage will cause seepage through the levee to outcrop high on the landward slope, and may cause the slope to slump.

**iii. Silt**

Material that is primarily silt should be avoided, and if it is used, poly facing must be applied to the river slope. Silt, upon wetting, tends to collapse under its own weight and is very susceptible to erosion.

**e. Levee Section**

In standard levees, the foundation soils and available construction materials generally dictate the design configuration of the levee. Therefore, even under emergency conditions, an attempt should be made to make the embankment compatible with the foundation. Information on foundation soils may be available from local officials or engineers, and it should be utilized. The three foundation conditions and the levee sections cited below are classical and idealized, and usual field conditions depart from them to various degrees. However, they should be used as a guide so that possible serious flood fight problems might be lessened during high water. In determining the top width of any type of section, consideration should be given as to whether a revised forecast will require additional fill to be placed. A top width adequate for construction equipment will facilitate raising the levee. Finally, actual levee construction will in cases, depend on time, materials, and right-of-way available.

**i. Sand Foundation**

If the foundation material under the emergency levee is sand or some other pervious material, the following guidance is provided:

- If the levee section is to be made of sand, use a minimum of 1V (Vertical) on 3H (Horizontal) river slopes. A 1V on 4H river slope is preferable, and will be less susceptible to erosion, but a 1V on 3H slope is considered an adequate minimum for emergency purposes. Use 1V on 5H for the landward slope, and 10-foot top width.

- If the levee section is to be made of clay, use 1V on 2 1/2 H for both slopes. 1V on 3H slopes are preferable, but 1V on 1 ½ H is an acceptable minimum for emergency purposes. The bottom width should comply with creep ratio criteria; i.e., L (across bottom) should be equal to C x H; where C=9 for fine gravel and 15 for fine sand in the foundation, and H is levee height.

This criteria can be met by using berms either landward or riverward of the levee. Berm thickness should be 3 feet or greater. Berms are used mainly to control or to relieve uplift pressures and will not reduce seepage significantly.

**ii. Clay Foundation**

If the foundation material under the emergency levee is clay, the following guidance is provided:

- If the levee section is to be made of sand, it should be constructed with 1V on 3H for the river slope. Again, a 1V on 4H is preferable, but the steeper slope is considered adequate for emergency purposes. Use 1V on 5H for the landward slope, and a 10-foot top width, as described in the previous section.

- If the levee section is to be made of clay, use 1V on 2 1/2 H for both slopes. 1V on 3H slopes are preferable for clay levees, but 1V on 1 ½ H is an acceptable minimum for emergency purposes. With a clay foundation, there is no need to construct additional berms.

**iii. Clay Layer over a Sand Foundation**

If the foundation material is such that there is an impervious clay layer resting over a pervious sand layer, the following guidance is provided:

- If the levee section is to be made of sand, use a minimum of 1V (Vertical) on 3H (Horizontal) river slopes for emergency purposes. A 1V on 4H slope is preferable, if this construction is possible. 1V on 5H landward slope, and 10-foot top width. In addition, a landside berm of sufficient thickness may be necessary to prevent rupture of the clay layer. The berm may be constructed of sand, gravel, or clay, but since berms made of clay generally need to be wider and thicker than those made of pervious materials, it would probably reduce the construction effort to build the berm with sand or gravel, if these materials were available. Standard design of berms requires considerable information and detailed analysis of soil conditions. However, prior technical assistance may reduce berm construction requirements in any emergency situation.

- If the levee section is to be made of clay, use 1 V on 2 1/2 H for both slopes. Again, 1V on 3H slopes are preferable, but 1V on 1 ½ H is an acceptable minimum for emergency purposes. Additionally, a berm may be necessary to prevent rupture of the impervious top stratum.

**f. Placement**

Layers should be started out to the full width of the embankment base, and subsequent lifts shall be placed so that the tops are substantially horizontal. In general, the levee

section should be homogeneous. However, when materials of varying permeability are encountered in the borrow area, the more pervious material should be placed on the landside of the embankment.

**g. Compaction**

As stated above, obtaining proper compaction equipment for a given soil type will be difficult. It is expected in most cases that the only compaction will be from that due to the hauling and spreading equipment, i.e., construction traffic routed over the fill. It is to be realized that even the minimum requirements may not be possible or feasible, and, if situation demands, material should be placed and compacted in any way possible and the levee observed closely for signs of distress. A construction engineer should ideally oversee the design of emergency levees. Use of these guidelines should not be taken as a guarantee that a safe structure will be constructed.

**i. Pervious Fill**

Material shall be placed in layers not more than 12 inches in thickness prior to compaction. In emergency situations, each layer should be compacted at the very minimum by one pass of the hauling equipment. However, whenever time, cost and availability of equipment will permit, a much safer structure will result if each layer gets compacted by a minimum of 3 complete passes of a crawler-type tractor, or by 2 passes of a vibratory roller.

**ii. Impervious Fill**

Fill material shall be placed in layers not exceeding 9 inches prior to compaction. In emergency situations, each layer should receive at least one complete coverage of the track or wheel of the placing equipment or equivalent. However, whenever time, cost and availability of equipment will permit, a much safer structure will result if each layer gets compacted by a minimum of 4-6 complete passes of a tamping type roller or 4 complete passes of a rubber-tired roller.

## 2.3 Raising a Levee with Sandbags

**a. Sandbags**

Sandbags are available in plastic and in burlap. The preferred bags are untreated, close weave burlap sacks available at feed or hardware stores. Empty bags should be stockpiled for emergency use, and can be stored for approximately 8 years in a rodent-free environment with low humidity. Don't fill the bags ahead of time, because they will deteriorate quickly. Commercial polypropylene sandbags are also effective in a flood fight, but since plastic bags are not readily biodegradable, burlap bags will allow more options for disposal if the bags are not going to be reused. (No sandbags should be left in place after the flood fight, regardless of whether they are burlap or plastic.) Do not use garbage bags, as they are too slick to stack; and don't use feed sacks, as they are too large to handle. Experience shows that bags work well if they are approximately 14 inches wide and 24 inches deep.

**b. Fill Material**

A sandy soil is most desirable for filling sandbags, as it's easiest to shovel, and the bags can most easily be shaped as needed. Fine sand tends to leak through the weave in the bag, and if it is used it should be double bagged. Silty soils also tend to leak through the bags, and both silty soils and clays are difficult to shape into place. Gravelly or rocky soils are generally poor choices for sandbag structures because of their permeability, though rocks and gravel may be used in sandbags in order to divert water flows, to fill holes, or to hold objects in position. However, any usable material at or near the site has definite advantages. Material should generally not be removed from within 500 feet of the landward toe of a levee, except for in extreme emergency situations.

**c. Sandbag Filling**

Filling sandbags manually requires two people. One member of the team folds the throat of the bag outward to form a collar, and holds it open so that the other person can shovel in material. The one holding the bag should hold it between or slightly in front of his or her feet, either crouching with his elbows resting on his knees or standing with his knees slightly flexed, while keeping his head and face as far away from the shovel as possible. Both people should be wearing gloves to protect their hands, and safety goggles may also be desirable, especially on dry or windy days.



***Figure D.1*** *This two-person team is positioned properly for sandbag filling.*

If they are available during large-scale operations, bag-holding racks and power loading equipment can expedite the operation. Sandbag filling machines can be very effective if they are functioning correctly. Alternately, some people have reported success with improvised sandbag filling devices during a flood response. Inverted traffic cones or large metal funnels have been placed into holes in a table, and feeding bins with doors in their bases have been used to pour sand into bags.

Regardless of what method you use to fill them, bags should be filled between one-half (1/2) to two-thirds (2/3) of their capacity. This keeps the bag from getting too heavy, but more importantly, sandbag structures do not seal or keep out water as well if the bags are more than 2/3 full. Be very careful not to overfill or under fill the bags.

**d. Tied vs. Untied Bags**

Although tied sandbags are generally easier to handle and stockpile, untied sandbags are recommended for most situations, because untied bags make a better seal when they're stacked. Since the bags aren't more than 2/3 full, they can be transported almost as easily whether they're tied or untied. Tied sandbags should be used only for

special situations when the bags need to be pre-filled and stockpiled, or for specific purposes such as filling holes or for holding objects in position.

**e. Preparing the Ground**

Any debris must be removed from the area before the bags are laid in place. Typically, flat headed shovels are used to scrape up ("scarp") the sod or gravel where they are to be laid, to get down to the solid ground where the bags are to be laid. Do not scarp the ground beyond the area directly under the sandbags, because the sod cover in other areas is needed to protect the ground from erosion.

Before laying the bags along the entire length of an area to raise the levee, it's important that you first fill in any low areas with sandbags or with tightly packed earth, so that subsequent sandbag layers will be kept level.

**f. Sandbag Placement**

When laying the sandbags, the open end of the unfilled portion of the bag is folded over to form a triangle. If tied bags are used, flatten or flare the tied end. Place the partially filled bags lengthwise and parallel to the direction of flow, so the bottom of the bag faces downstream and the folded end faces upstream. (This positioning reduces the chance that floating debris will snag on the tucks and open the bags.)

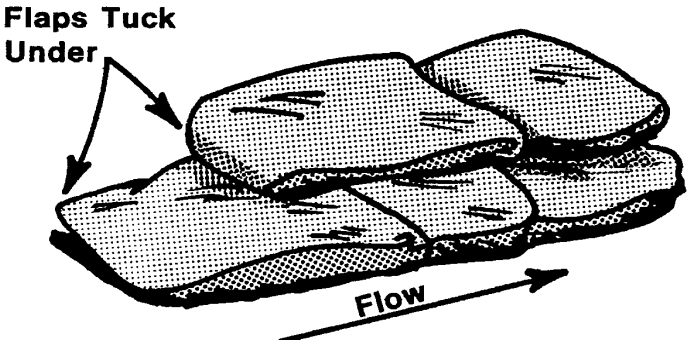



***Figure D.2*** *Sandbag placement – tucking in the flaps.*

Tuck the flaps under, keeping the unfilled portion under the weight of the sack. Overlap the next bag slightly over the one before it, so that the top of that sandbag layer can be flattened without leaving any gaps between the bags. Once a bag is placed, it's very important that you then walk over it, stomp on it, or maul it into place to eliminate voids and form a tight seal.




***Figure D.3*** *Sandbag placement – compacting bags together.*

When succeeding layers are added, stagger the bags like bricks, so that each one is placed over the gap between the two below it. This ensures that each seam is interlocked between bags and strengthens the structure. (There should never be less than 1/3 the length of a bag overlapping with the ones beneath it.) When placed properly, each bag should raise the elevation of the structure by 4 inches.

**g. Sandbag Levees**

Sandbags can be used to raise the height of an existing levee or can be used over open ground to protect an area with no levee at all. Any time a sandbag levee will be constructed over one layer high; the bag should be stacked in a pyramid structure to ensure stability. The basic rules of thumb in constructing these structures is that they must be approximately three times as wide as they are high, and the sandbags should be staggered within each layers just as they are staggered from one layer to the next. The directions of the bags (transverse or longitudinal) may be alternated, as long as no loose ends are left exposed. Use this rule of thumb in determining the dimensions of the pyramid:

- 1 bag in length equals about 1 foot
- 3 bags in width equals about 2 ½ feet
- 3 bags in height equals about 1 foot

When building these structures on top of an existing levee, the bags should begin 1 foot from the riverward crown (shoulder) of the levee. Where space is extremely limited on the levee crown, this distance may be reduced but the structure should never be built less than 6 inches from the edge of the levee crown. Stamp each bag in place, overlap sacks, maintain staggered joint placement, and tuck in any loose ends.

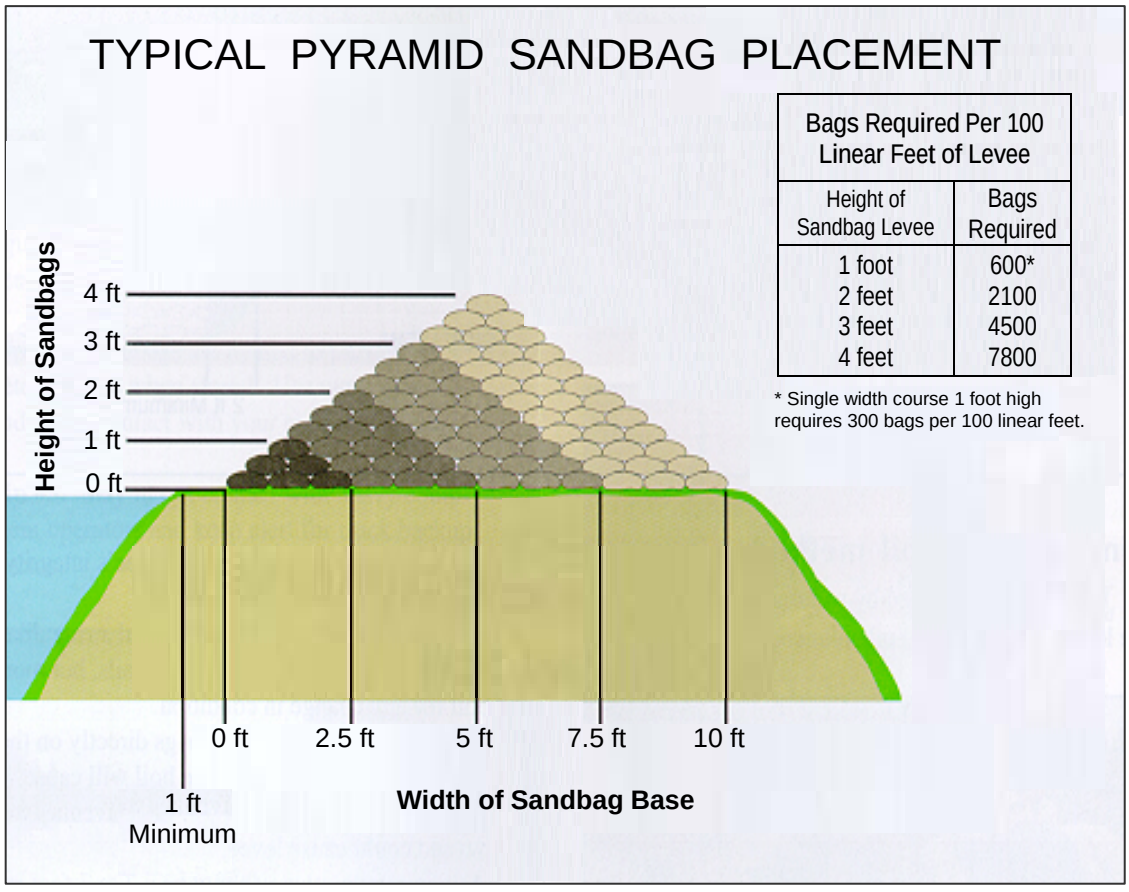



***Figure D.4*** *Pyramid sandbag placement.*

### h. Material, Tools, and Labor Requirements for Sandbag Levee

Listed below are the materials, tools, and labor required to construct 100 linear feet of sandbag levee, two feet high, with a haul distance of 1 mile round trip.

#### i. Materials and Tools

1,800 Sandbags
10 Shovels
27 Flash lights
10 Tons sand (approx)
2 Emergency light sets
2 Radios or cell phones (one at filling site; one at laying site)
6 Pickup trucks

#### ii. Labor Requirements:

10 Filling sandbags
5 Loading
6 Hauling
5 Laying
2 Foremen (1 at sandbag filling site, 1 at work site)
***28 People required, total***

#### iii. Time Requirements:

With given resources, the time for completion is estimated at 2 ½ hours, from start to finish.

### i. Bonding Trench and Plastic Sheeting

Seepage through a sandbag structure can be kept to a minimum if the structure is built carefully using untied bags. One method that's been successfully used to reduce the seepage through a sandbag levee and to increase the horizontal stability is to construct a bonding trench under the structure before the sandbags are laid in place, as pictured below. An additional precaution is to build the structure over some plastic sheeting, which is pulled up and over the structure once it's complete.

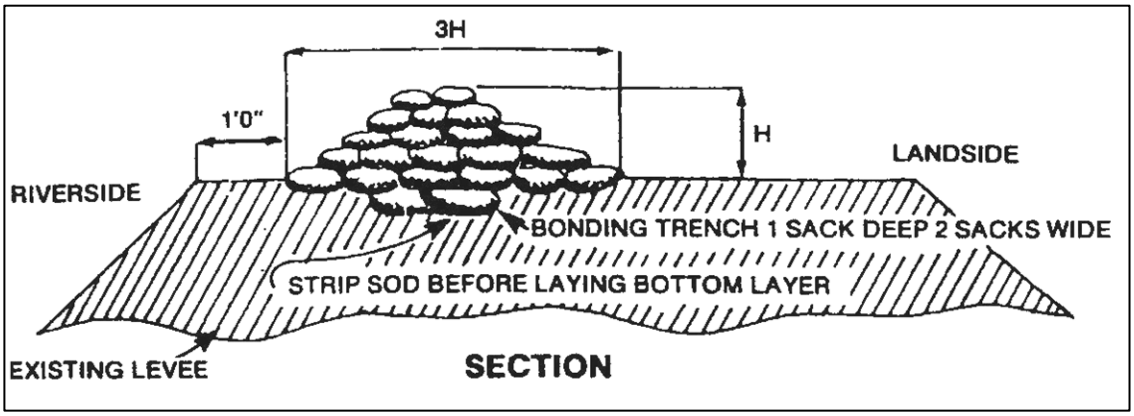



**Figure D.5** *Sketch of a typical levee raise with bonding trench.*

While it's always recommended at least to scarp the ground before the bags are laid, the decision to dig this trench or use the plastic sheeting depends on local conditions, as well as on the expected height of the structure and the time that's available to build it. One of the primary concerns when considering bonding trenches and/or plastic sheeting is the amount of time that's available. If there's sufficient time and adequate material, the seepage can be reduced, but if there is very little time available, the ground should be scarped and a typical sandbag structure constructed with no bonding trench at all. An additional concern is whether the sandbag levee would have to be raised in the future, because any plastic sheeting has to be removed before the structure can be raised.

If plastic sheeting is to be used in conjunction with the sandbag levee, begin by digging a bonding trench 2 sandbags wide and one sandbag deep. The edge of the plastic is placed in the hole and weighed down with sandbags, with most of the plastic laying out in the direction of the river. It's very important that the plastic is never laid across the entire width of the sandbag levee base. Sandbag levees are held together by frictional forces between the bags and with the ground surface; sandbag structures are much less stable when wrapped with plastic, and can slide apart under high water. Construct the sandbag levee over the sheeting, pull the plastic up and overtop of the structure and weigh it down with sandbags on the landward side. Always work from downstream to upstream so that the upstream plastic seams all overlap the ones downstream, in order to prevent debris from snagging the plastic and pulling the sandbag levee apart.

### 2.4 Raising the levee with Flashboards or Lumber and Sack Cappings

If it appears that the levee raise would have to hold back more than 18 inches of water, consideration should be given to use of a lumber and sack capping or a flashboard capping. A lumber and sack capping is shown in plate 3, which may be used as a guide to estimate the materials required for a levee raise of about 3 feet. A flashboard structure is very similar, but the face of the structure is constructed of plywood instead of boards. These wooden facings provide a more positive control against excessive through seepage than is provided by sandbags alone. Either structure can be supported from behind with either sandbags or with compacted earthen fill, depending on how accessible the crown of the levee is to earthmoving machinery.

Additionally, plastic sheeting may be installed on the riverside face of the plywood or flashboards, to protect the wood and reduce seepage through the flashboards. Flashboards do tend to leak a little, depending on how they are constructed and how the boards expand when they're wet; though these structures are never constructed without a sandbag backing. If plastic sheeting is to be used, it should extend 1' riverward from the riverside bottom of the plywood/flashboard. A row of sandbags should then be stamped into place along the riverside bottom edge of the plywood/flashboards to help prevent seepage under the flashboard system. The plastic is brought up the riverside of the plywood/flashboards and over the top to the landside supports and held in place by sandbags or nails where necessary. Field conditions, the available time, and the availability of materials would dictate the actual requirements.

# 3. Seepage

As a river or stream rises, the hydrostatic pressure against a levee slope increases significantly and can force water into and under the levee embankment. Even when a levee is properly constructed and of such mass to resist the destructive action of flood water, this seepage tends to push its way through regions of least resistance (such as sandy layers under the levee or animal burrows) out to the surface on the landward side of the structure. If there isn't sufficient pressure on the landward side to hold back the seepage water, it will break through the ground surface on the landward side, in the form of bubbling springs, which erode and carry soil particles from under the levee.

Seepage is almost impossible to eliminate and attempt to do so may create a much more severe condition. Seepage is generally not a problem unless 1) the landward levee slope becomes saturated over a large area, 2) seepage water is carrying material from the levee, or 3) pumping capacity is exceeded. Pumping of seepage should be held to a minimum, and ponding should be allowed during high water to the extent that it doesn't cause damages. Several levees were endangered during past floods by attempts to keep low areas pumped dry, and additional time and effort were expended in controlling sandboils caused by pumping. Therefore, seepage should be permitted if no apparent ill-effects are observed and if adequate pumping capacity is available.

## 3.1 Effects of Underseepage

Underseepage can produce three distinctly different effects on a levee, depending upon the condition of flow under the levee.

### a. Piping Flow

In extreme conditions of excessive underseepage, the movement of seepage water erodes the foundation materials, and a clearly defined pipe or tube develops under the levee. Unless corrective actions are taken, water continues to erode and enlarge this pipe, so that a cavern develops under the levee, and levee material collapses to fill in the void. In an advanced state, piping under the levee can be identified by a slumping of the levee crown, and the levee can quickly fail if it's overtopped through this low spot. To prevent this condition from developing, any boils found to be transporting soil material need to be treated as early as possible.

### b. Non-Piping Flow

In this case, seepage water flows under the levee without following a well-defined path, and results in one or more boils outcropping at or near the landside toe. The flow from these boils tends to undercut and ravel the landside toe, resulting in sloughing of the landward slope. Sloughing is the movement of small amounts of soils from the embankment slopes. Sloughing may also occur if the levee embankment becomes saturated as a result of prolonged high creek stages. Evidence of this type of failure is found in undercutting and raveling at the landside toe.

### c. Saturating Flow

In this case, numerous small boils, many of which are scarcely noticeable, outcrop at or near the landside toe. While no boil may appear dangerous in itself, a group of boils may cause significant damage. The flowing water may erode away supporting material and/or keep the area saturated and cause flotation ("quickness") of the soil, reducing the shearing strength of the material at the toe (where maximum shearing stress occurs) which could lead to slope failure. In a slope failure condition, a substantial section of the levee embankment breaks away along a clearly defined crack and slides away from the levee. The displacement of the soil will result in a reduction in the cross sectional area of the levee and poses a major threat to the integrity of the structure.

## 3.2 Sandboils

### a. Identification of Sand Boils

Sandboils usually occur within 10 to 300 feet from the landside toe of the levee and, in some instances, have occurred up to 1,000 feet away. Boils will have an obvious exit (such as a rodent hole), but the hole may be very small. When material is carried upward through a boil, it is deposited in a circular pattern around the exit location, and is comparable to an ant hill or volcano. Alternately, sandboils may exit into standing water. In this case, they may be difficult to identify, especially if the hole is small and the water cloudy from siltation. If you see any movement in what appears to be standing water on the landward side of the structure, this may be the exit point for a sandboil. Carefully approach the site, disturbing the water as little as possible, and let the water settle in order to look for the exit point. If there is no distinct hole, the water flow is not a threat. All boils should be conspicuously marked with flagging so that patrols can locate them without difficulty and observe changes in their condition.

You can tell how serious a boil is by the color of the water that is coming out. If the water is relatively clear, it means that there is relatively little material being eroded away through the boil. The site should be monitored regularly for changes, but nothing else should be done to treat the clear boil. If it’s dark or muddy, then it’s full of material that’s been eroded away from under the levee, and must be treated immediately. Boils may quickly grow very large, and boils, which are discharging clear water, may suddenly begin to discharge soil materials along with the seepage flows. For this reason, any boil, whether the flow is clear or muddy, can potentially lead to the failure of the levee and must be monitored closely.

### b. Treatment of Sandboils

The most common and accepted method of treating sandboils that are displacing soil is to construct a ring of sandbags around the boil(s) as illustrated in Figure D.7. The purpose of the ring is to raise a head of water over the boil to counterbalance the upward pressure of the seepage flow. The height of the water column is adjusted so that the water exiting the boil runs clear and no longer removes soil from the levee foundation. It’s extremely important that the flow of water is never stopped

completely, as this may cause additional boils to break out nearby. Treated areas should be kept under constant surveillance until the water recedes.

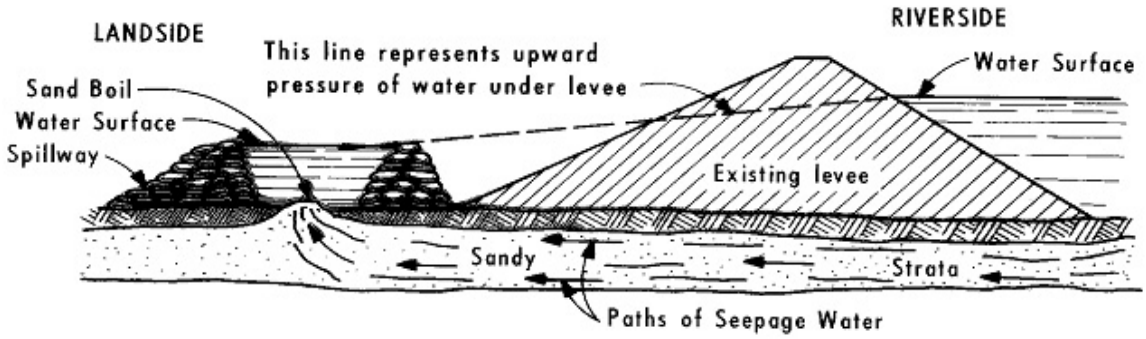



**Figure D.6** *To treat the sandboil, the pressure of the seepage water is counterbalanced by hydrostatic pressure from the column of water in the ring levee.*

The diameter and height of the ring will depend on the actual conditions at each sandboil. The base width should be at least 1½ times the contemplated height, and the inner ring of sandbags should begin between one and three feet from outer edge of the sandboil. "Weak" or "quick" ground near a boil should be included within the sack ring to prevent these areas from developing into new boils when the active boil is treated. Where several sandboils develop in a localized area, a ring levee of sandbags should be constructed around the entire area. The ring should ideally be of sufficient diameter to permit sacking operations to keep ahead of the flow of water. When a sandboil is located near the levee toe, the sandbag ring may be tied into the landside slope of the levee, as shown in Figure D.8.

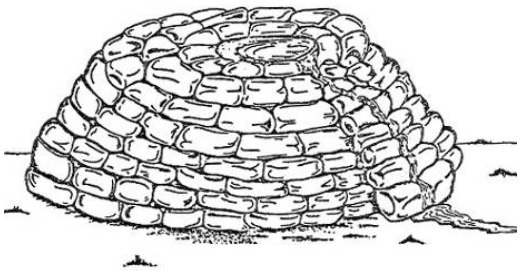


**Figure D.7** *Sketch of a typical ring levee with spillway.*

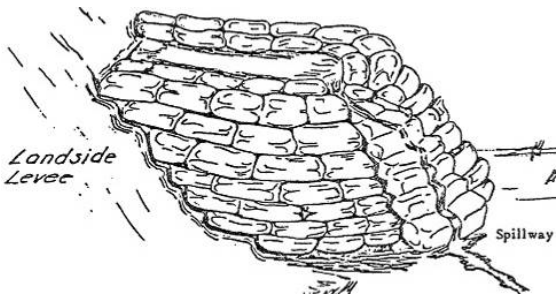



**Figure D.8** *Sketch of ring levee tied to a levee slope, with spillway. Construction against the levee slope results in a U-shaped sandbag "chimney."*

The base or foundation for the sack ring should be cleared of debris and scarified to provide a reasonably watertight bond between the ground surface and the sandbags. The ring is constructed with sacks filled approximately two-thirds (2/3) full of sand, and tamped firmly into place. Do not tie the ends of the sacks. When adding subsequent layers, the joints should be staggered for stability and water tightness. The untied ends of sandbags should be laid towards the inside of the ring and folded under. The height of the sack ring should be only sufficient to slow the flow until the water

exiting the boil runs clean. Never place sandbags directly over the sandboil or attempt to completely stop the flow through the boils, as this may result in other boils developing nearby.

A spillway or exit channel should be constructed on the top of the sack ring so that the level of the water in the ring levee can be adjusted, and the overflow water can be carried a safe distance from the boil, away from the direction of the levee. Because the height of the water is the critical factor in adjusting the rate of flow through the boil, the spillway will require constant monitoring and adjustment once the sandbag ring levee is filled with water. This spillway is normally constructed of sandbags, but alternately, a V-shaped drain can be constructed of two boards; or PVC pipe, plastic sheeting, or other materials may be helpful in building the spillway.

**c. Material, Tools, and Labor Requirements for Sandbag Ring Levee:**
Materials, tools, and labor required to construct a Sandbag Ring Levee 2½ feet high and 10 feet in diameter with a haul distance of 1 mile round trip.

**i. Materials and Tools:**
1,125 Sandbags
5 Shovels, long or short handle
9 Tons of sand (approximately)
5 Pick up trucks
2 Radios or cell phones (one at filling site; one at laying site)
2 Emergency light sets
15 Flashlights
15 Pairs of work gloves

**ii. Labor Requirements:**
4 Filling sandbags
3 Loading/ carrying
5 Hauling to work site
3 Laying (placement)
2 Foremen (1 at sandbag filling site 1 at work site)
***17 People required, total***

**iii. Time Requirements:**
With given resources, time for construction is estimated to be 1-½ hours from start to finish.

**d. Alternate Methods of Treating Sandboils**

An alternate method of ringing sandboils is by use of corrugated sheet-steel piling, as shown in Figure D.9. The area is cleared of debris, and the piling is driven about 1-½ feet into the ground around the boil. This method accomplishes the same task faster than sandbagging, but is limited in use by the availability of material, equipment, and the location and foundation condition of boils. Expedient methods can be improvised in other ways, to include using sections of corrugated metal piping. Special care must be taken with the design of these structures to make sure there is a reliable means for adjusting the water level, so the water column doesn't completely stop the flow of water through the boil.

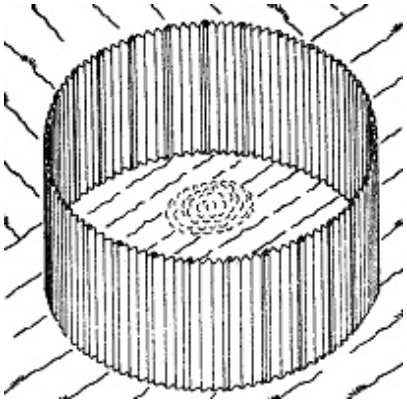


**Figure D.9** *A ring of steel-sheet piling can alternately be used to ring the boil, if conditions permit.*

Alternately, it may sometimes be possible to locate the inlet side of a boil under the water on the riverward bank of the levee. A swirl may be observed in the water at this point, or the location of the entry point may have been identified after a previous high water event. Sometimes, because of the current, the swirling vortex appears on the water's surface slightly downstream of the actual opening. If the opening is located, it may be possible to block the seepage flow at its entry point, since blocking the entry point may take much less time than constructing a sandbag ring levee. If the entry point is located, it can be blocked by anchoring a sheet of plastic over the area, using rope and sandbags. It may sometimes be possible to plug a flooded animal burrow by placing a mixture of manure and straw or dry hay into the water at the burrow entrance. If the entry point is blocked, both the blockage and the location of boil need to be closely monitored for any changes.

### 3.3 Sloughs

If seepage causes saturation and sloughing of the landward slope, the slope should ideally be flattened to 1V (vertical) on 4H (horizontal) or flatter. Material for flattening should be at least as pervious as the embankment material. If any sloughs develop in the levee, all soft areas should be thoroughly drained by excavating shallow ditches in the side slopes, as shown in Plate 4. Contact your Corps district office before undertaking this method.

### 3.4 Floating Soil Conditions

When seepage exits landward of the levee toe at a pressure that creates a sensation like the soil is fluid, the levee and foundation become susceptible to sliding and/or sloughing which can lead to an embankment failure. A fluid soil condition is an indicator that soil particles or the soil mass is floating, and the soil's ability to support a load such as a vehicle or heavy equipment and/or the levee embankment itself has been reduced. When this condition is observed, the safety, health and welfare of those individuals who are responding to the flood fight and/or those who live within the protected area must come first. Consideration must be given to evacuating the area. If the sod layer appears to pop loose or lift up, evacuate the area immediately. In a past flood, this condition was observed and successfully solved with the placement of clean, free-draining sand fill, classified as SP medium to fine sand, with less than 5 percent fines passing the number 200 sieve. The sand was brought in from another location (away from the levee), and a bulldozer was used to push the sand over the area, creating a blanket some 3 feet in thickness and some 20 feet in width. The thickness and width necessary may vary depending on the observed conditions.

### 3.5 Other Seepage Related Considerations

Any basement or similar depression near the levee should be closely watched for heaving of floors, caving of walls, and boil activity. It may become necessary to support basement walls or weight down basement floors by intentionally flooding the basement with clean water, to prevent walls from caving in, piping, or excessive seepage.

# 4. Erosion

## 4.1 Wave Wash

During high water, continuing wave action against a levee slope can erode wide terraces along the length of the levee. This causes scour or beaching along the riverward slope of the levee and reduces the cross sectional area, which can potentially lead to a failure. This type of damage doesn't typically arise during short (hour-long) storms, especially if the slope has good sod cover. However, during longer periods of high water, especially during windy or icy conditions, the damage can develop very rapidly. The section leader should study the levee beforehand to assess the potential for wave wash. All potential trouble areas should be located well in advance, and section leaders should assemble a reserve supply of materials (filled sandbags, lumber, stakes, plastic sheeting, rock, etc) close to locations most likely to experience such damage. During periods of high wind and high water, when waves attack a levee, ample labor should be assembled and experienced personnel should patrol the areas to identify the beginnings of scour, washouts, or breaching. Because wave wash damage can spread rapidly, it is important that damaged areas are treated as soon as they are identified. There are a number of accepted methods of protecting a levee against wave wash.

### a. Sandbags

In emergency situations, the preferred treatment method is to place sandbags in to the cut as shown in Plate 5. The filled sacks should be laid in sections of sufficient length to give protection well above the anticipated rise.

### b. Plastic Sheeting and Sandbags

Experience has shown that a combination of plastic sheeting and sandbags is one of the most expedient, effective and economical methods of combating slope attack in a flood situation. Other materials such as snow fence, cotton, or burlap have successfully been used in place of the plastic in the past. Poly and sandbags can be used in a variety of combinations, and time becomes the factor that may determine which combination to use. Ideally, poly and sandbag protection should be placed in the dry. However, many cases of unexpected slope attack will occur during high water, and a method for placement in the wet is covered below. See Plates 6 and 7 for recommended methods of laying poly and sandbags. Plate 8 shows a minimal configuration for emergency use. Since each flood fight project is generally unique (river, personnel available, materials, etc.), specific details of placement and materials handling will not be covered, though some guidelines are provided below. Field personnel must be aware of resources available when using poly and sandbags.

#### i. Dry Placement

Anchoring the poly along the riverward toe is important for a successful job. It may be done in three different ways: 1) after completion of the levee, a trench excavated along the toe, poly placed in the trench, and the trench backfilled; 2) poly placed flat-out away from the toe, and earth pushed over the flap; 3) poly placed flat-out from the toe and one or more rows of sandbags placed over the flap. The poly should then be unrolled up the slope and over the top enough to allow for

anchoring with sandbags. Poly should be placed from downstream to upstream along the slopes and overlapped at least two feet. The poly is now ready for the "hold-down" sandbags.

It is mandatory that poly placed on levee slopes be held down along the slopes as well. An effective method of anchoring poly is a grid system of sandbags, unless extremely high velocities, heavy debris or a large amount of ice is anticipated. Then, a solid blanket of bags over the poly should be used. A grid system can be constructed faster and requires fewer bags and much less labor than a total covering. Various grid systems include vertical rows of lapped bags, two-by-four lumber held down by attached bags, and rows of bags held by a continuous rope tied to each bag. Poly has been held down by a system using two bags tied with rope and the rope saddled over the levee crown with a bag on each slope.

**ii. Placement in the Wet**

In many situations during high water, poly and sandbags placed in the wet must provide the emergency protection. Wet placement may also be required to replace or maintain damaged poly or poly displaced by current action. Plate 7 shows a typical section of levee covered in the wet. Sandbag anchors are formed at the bottom edge and ends of the poly by bunching the poly around a fistful of sand or rock, and tying the sandbags to this fist-sized ball. Counterweights consisting of two or more sandbags connected by a length of 1/4-inch rope are used to hold the center portion of the poly down. The number of counterweights will depend on the uniformity of the levee slope and current velocity. Placement of the poly consists of first casting out the poly sheet with the bottom weights and then adding counterweights to slowly sink the poly sheet into place. The poly, in most cases, will continue to move down slope until the bottom edge reaches the toe of the slope. Sufficient counterweights should be added to insure that no air voids exist between the poly and the levee face and to keep the poly from flapping or being carried away in the current. For this reason, it is important to have enough counterweights prepared prior to the placement of the sheet.

**iii. Overuse of Plastic Sheeting**

In past floods, there has been a tendency to overuse and in some cases misuse poly on slopes. For example, on well-compacted clay embankments, in areas of relatively low velocities, use of poly would be excessive. Plastic should never be used on the landward slopes, as it holds through-seepage against the levee slope. A critical analysis of a situation should be made before poly and sandbags are used, with a view toward less waste and more efficient use of these materials and available manpower. However, if a situation is doubtful, poly should be used rather than risk a failure. Critical areas should have priority.

### c. Moveable Panels

Wave wash may also be effectively checked by the use of movable panels constructed of lumber. These panels are anchored in place on the levee slope with stakes and are weighted down with sandbags or stone as shown on Plate 9. A portable bulkhead constructed with lumber and staked into placed is another alternate type of wave wash protection.

### d. Miscellaneous Measures

Several other methods of slope protection have been used. Straw bales pegged into the slope were successful against wave action, as was straw spread on the slope and overlain with snow fence.

## 4.2 Scours

Scouring occurs when the current velocity against the levee is adequate to remove levee embankment materials. Once scouring begins to occur, the protective sod cover is damaged or destroyed and additional scour may develop very quickly. Careful observation should be made along the entire length of the riverside of the levee during high water periods, and especially in locations where the current flow is two feet per second or more. Scouring will most likely develop at road crossing ramps and at locations where pipes, sewers, and other structures penetrate the levee. It may also develop in ditches, excavations or building basements near the levee, around riverside stability berms, or in other locations where there is an obstruction to the smooth flow of water along the levee face. If any scour is observed, soundings should be taken if possible to determine the extent of damage and the amount of treatment required.

### a. Deflection Weirs

Deflection weirs (also known as bendway weirs), extending 10 feet or more into the channel have been effective in deflecting current away from the levees. These emergency structures can be constructed using lumber, stakes, brush, sandbags, and stone, and are tied in place as shown on Plates 10 and 11. Snow fence, plain riprap, compacted earth or any other substantial materials available may also be used; even old car bodies have been used in the past. Preferably, the weirs should be placed in the dry at locations where severe scour may be anticipated, because construction during high water will be very difficult. A series of weirs may be needed to protect the area, or a longer weir may be constructed in the water parallel to the levee. Care should be given in the placement of weirs, because haphazard placement may be shift the current towards other banks and lead to even worse scouring. Hydraulic technical assistance should be sought if questions arise in the use of emergency weirs.

### b. Plastic Sheeting

Plastic sheeting may be useful in protecting the embankment from scouring, as described under the previous section on wave wash.

### c. Other Protection

If scour begins to take place after water is up on the levee, a protective berm should be constructed over the entire scour area using stone, slag, or other durable material with sufficient size and weight withstand the erosive velocity of the current. Construction of this berm will generally require equipment capable of operating from the levee crown. Riprap has been used to provide slope protection where erosive forces were too large to be effectively controlled by other means. Objections to using riprap when flood fighting include the cost and the large quantities that are typically necessary to protect a given area. It's usually very difficult to control the placement of the riprap, particularly during times of high water, but careful use of an excavator has been effective even in difficult conditions.



**Figure D.10** *Placement of Riprap. Careful use of an excavator may allow for more accurate placement than is shown above.*

## 4.3 Ice and Floating Debris

Sometimes ice conditions are such that protection provided by the methods outlined above will not be totally effective. The primary method for protecting a levee slope from debris or ice attack is to construct a floating boom parallel to the levee embankment. Logs, driftwood, or any available timber are cabled together end to end and moored to the ground in such a way that they float out in the current about 15 feet from the water's edge. Depending on the size of the logs, the boom will deflect floating objects. Since a detailed discussion of ice jams lies beyond the scope of this manual, please refer to the references in Appendix I for additional information.

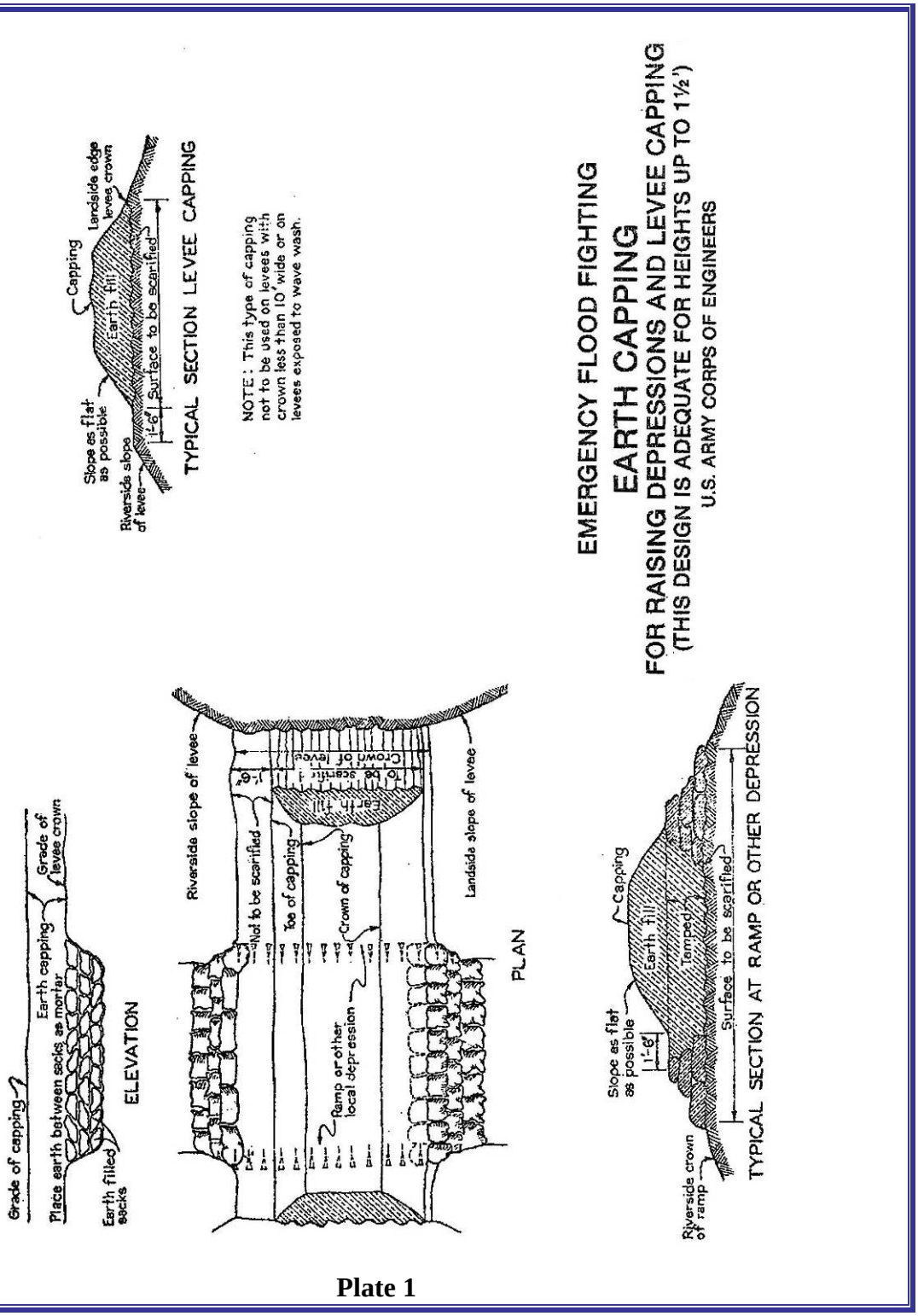

EMERGENCY FLOOD FIGHTING
EARTH CAPPING
FOR RAISING DEPRESSIONS AND LEVEE CAPPING
(THIS DESIGN IS ADEQUATE FOR HEIGHTS UP TO 1½')
U.S. ARMY CORPS OF ENGINEERS
Capping
Landside edge levee crown
Earth fill
Surface to be scarified
Slope as flat as possible
Riverside slope of levee
1'-0'
TYPICAL SECTION LEVEE CAPPING
NOTE: This type of capping not to be used on levees with crown less than 10' wide or on levees exposed to wave wash.
Grade of capping
Earth capping
Grade of levee crown
Place earth between sacks as mortar
Earth filled sacks
ELEVATION
Riverside slope of levee
Not to be scarified
Toe of capping
Crown of capping
Ramp or other local depression
Earth fill
Crown of levee
To be scarified
Landside slope of levee
PLAN
Capping
Earth fill
Tamped
Slope as flat as possible
1'-0'
Surface to be scarified
Riverside crown of ramp
TYPICAL SECTION AT RAMP OR OTHER DEPRESSION

**Plate 1**

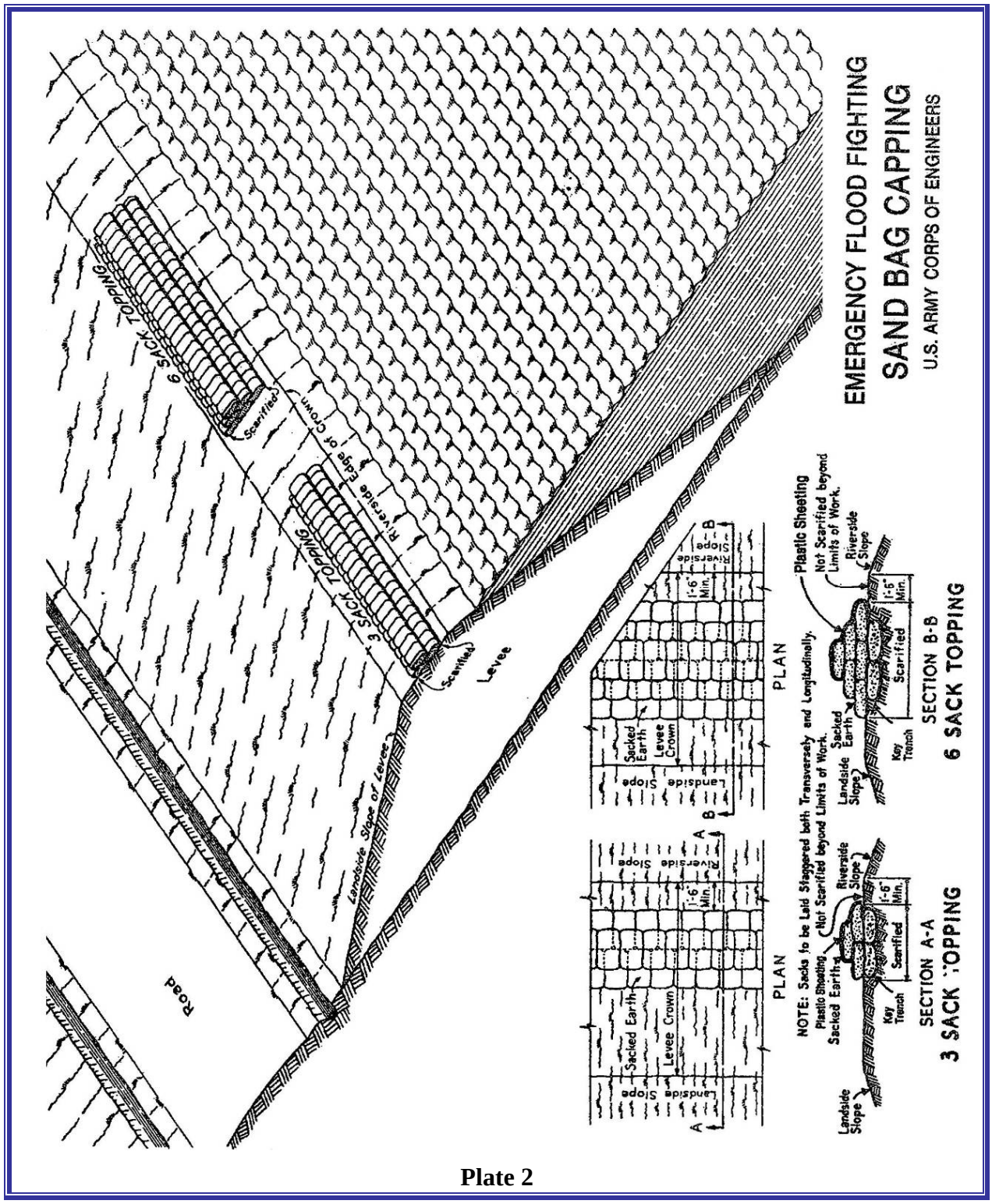
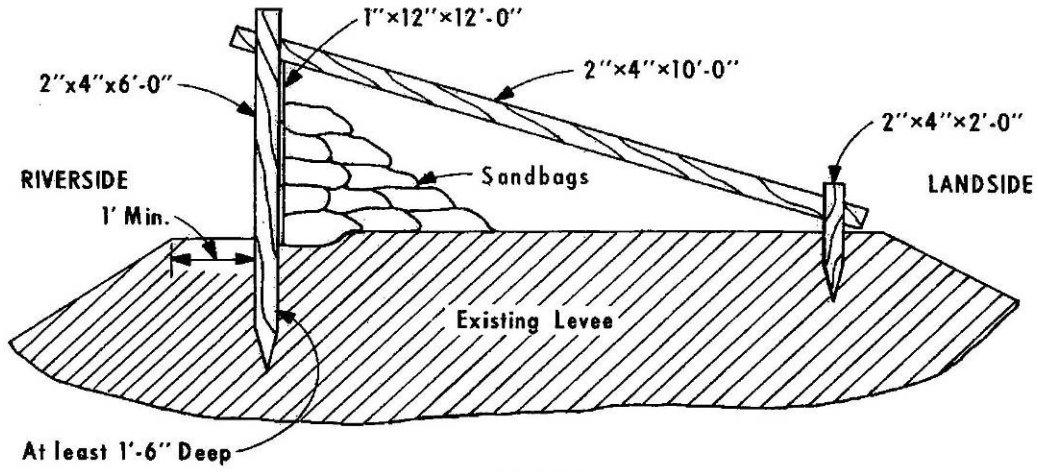
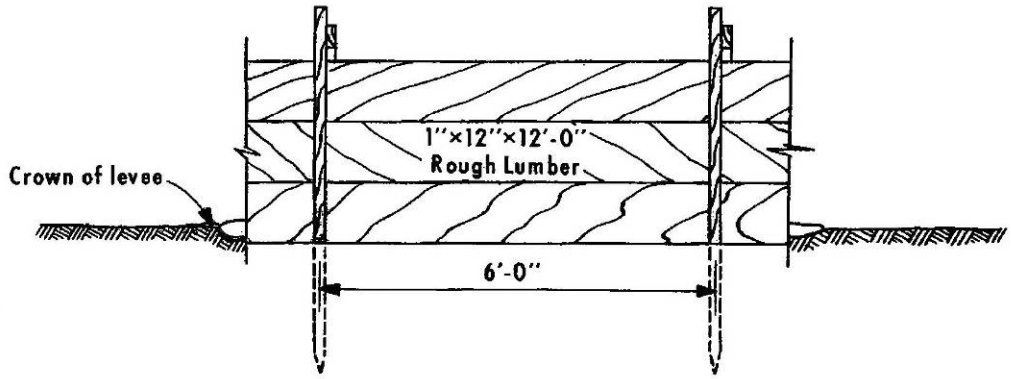

EMERGENCY FLOOD FIGHTING
SAND BAG CAPPING
U.S. ARMY CORPS OF ENGINEERS
6 SACK TOPPING
3 SACK TOPPING
Road
Levee
Scarified
Landside Slope of Levee
Riverside Edge of Crown
PLAN
SECTION A-A
SECTION B-B
Sacked Earth
Levee Crown
Landside Slope
Riverside Slope
Key Trench
Plastic Sheeting
Not Scarified beyond Limits of Work.
NOTE: Sacks to be Laid Staggered both Transversely and Longitudinally.

**Plate 2**




SECTION




FRONT ELEVATION

| BILL OF MATERIAL FOR 100 FT. |
|---|
| LUMBER<br>25 pieces 1"×12"×12'-0"<br>17 pieces 2"×4"×10'-0"<br>17 pieces 2"×4"×6'-0"<br>17 pieces 2"×4"×2'-0" |
| NAILS<br>2 lbs 8d Common<br>2 lbs 16d Common |
| SANDBAGS<br>1100 Filled Bags |

**CONSTRUCTION METHODS**
FOR
HIGH WATER
**LUMBER AND SACK TOPPING**
U. S. ARMY CORPS OF ENGINEERS

**Plate 3**

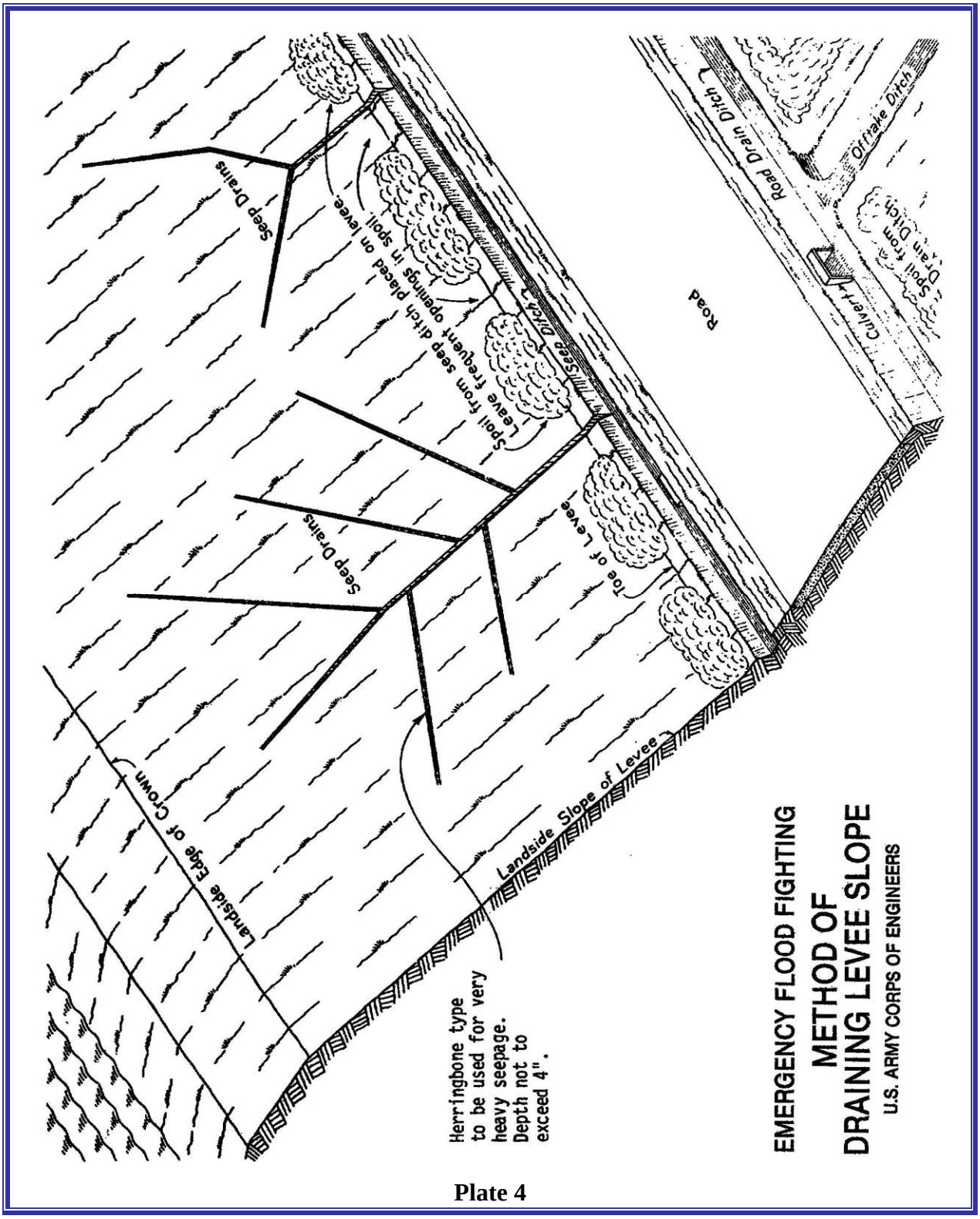

EMERGENCY FLOOD FIGHTING
METHOD OF
DRAINING LEVEE SLOPE
U.S. ARMY CORPS OF ENGINEERS
Herringbone type to be used for very heavy seepage. Depth not to exceed 4".
Landside Slope of Levee
Landside Edge of Crown
Seep Drains
Seep Drains
Toe of Levee
Spoil from seep ditch placed on levee. Leave frequent openings in spoil.
Seep Ditch
Road
Road Drain Ditch
Offtake Ditch
Culvert
Spoil from Drain Ditch

**Plate 4**

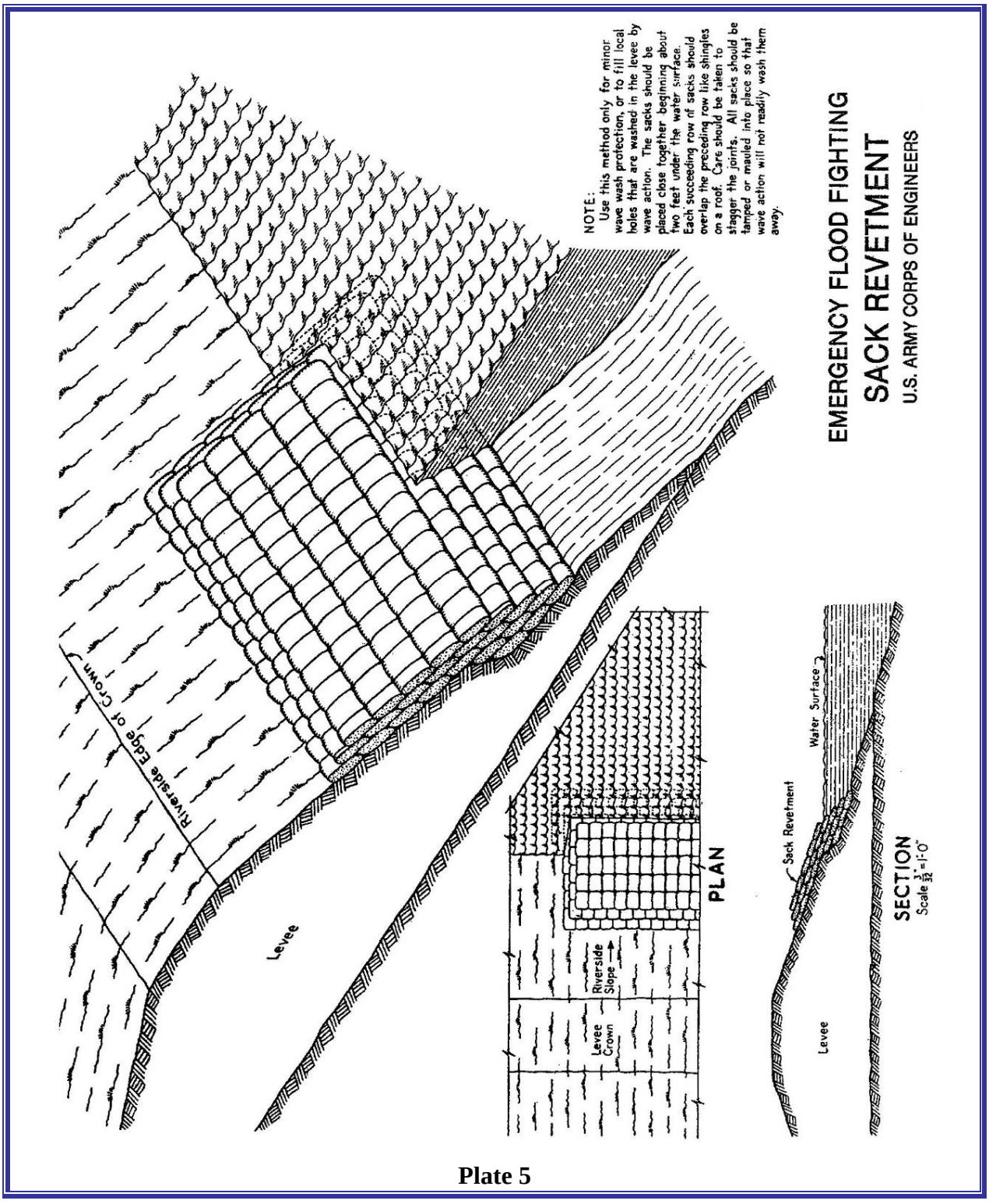
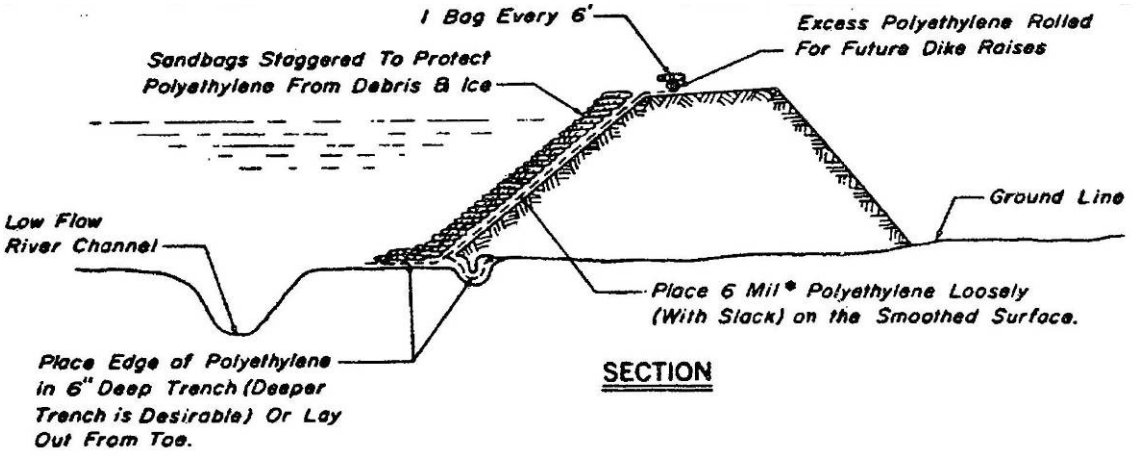
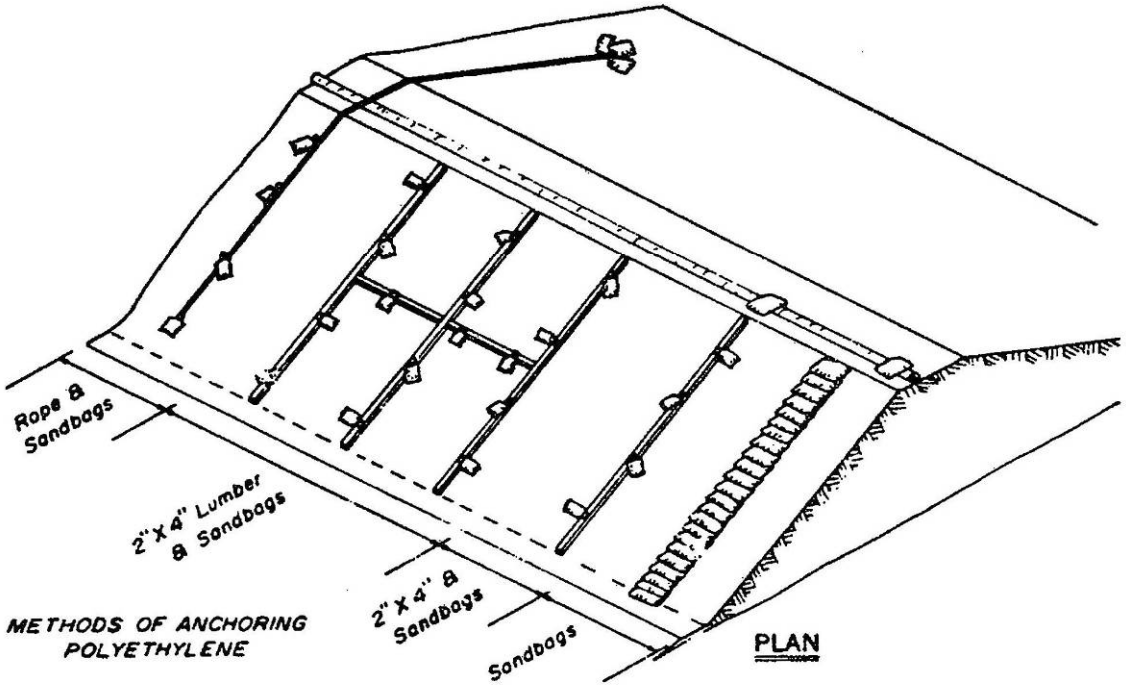

EMERGENCY FLOOD FIGHTING
SACK REVETMENT
U.S. ARMY CORPS OF ENGINEERS
NOTE:
Use this method only for minor wave wash protection, or to fill local holes that are washed in the levee by wave action. The sacks should be placed close together beginning about two feet under the water surface. Each succeeding row of sacks should overlap the preceding row like shingles on a roof. Care should be taken to stagger the joints. All sacks should be tamped or mauled into place so that wave action will not readily wash them away.
Riverside Edge of Crown
Levee
Levee Crown
Riverside Slope
PLAN
Water Surface
Sack Revetment
Levee
SECTION
Scale 3/32"=1'-0"

**Plate 5**

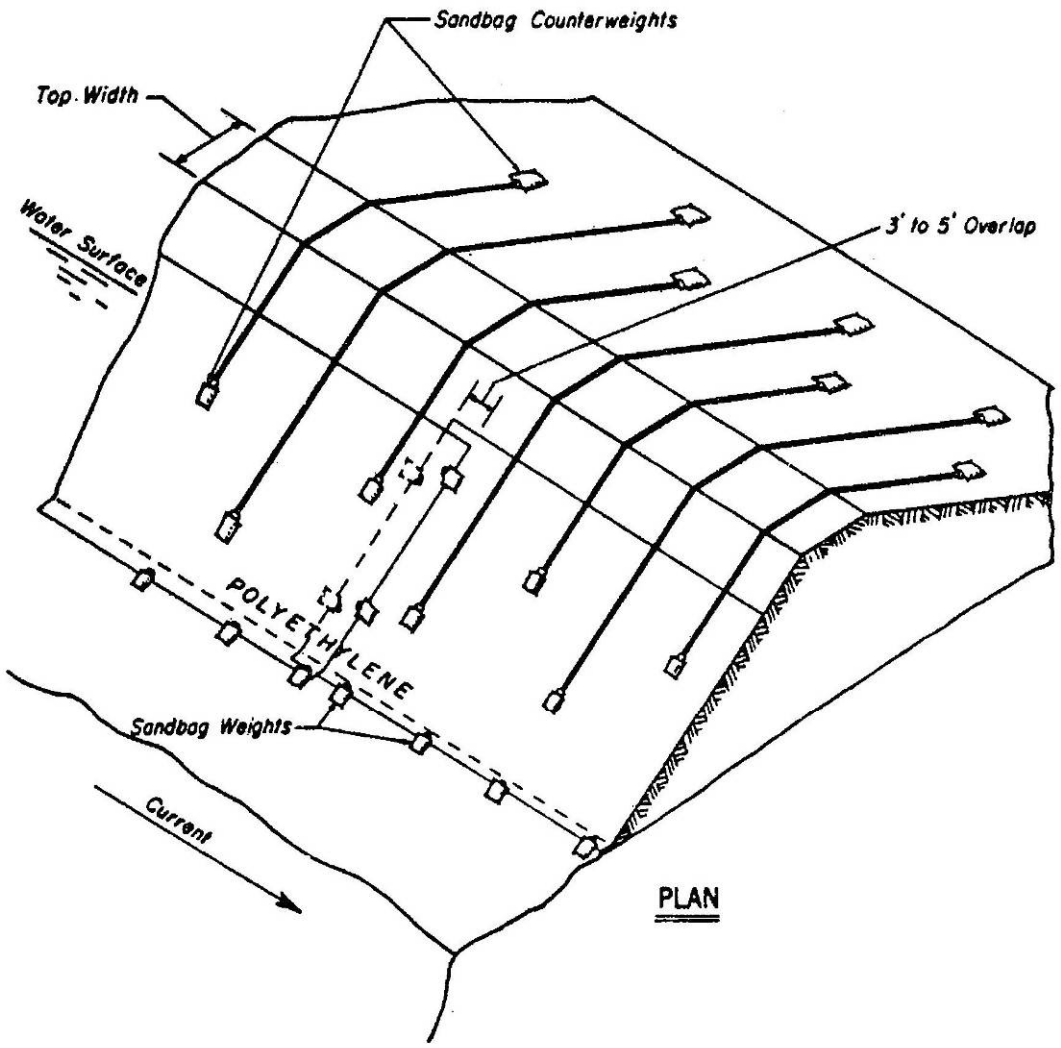



* 6 Mil Black Polyethylene is the most Desirable, 6 Mil Clear Second, 4 Mil Black Third, 4 Mil Clear Fourth & 2 Mil Polyethylene Should Only Be Used As A Last Resort.

EMERGENCY FLOOD FIGHTING
POLYETHYLENE
LEVEE PROTECTION
U.S. ARMY CORPS OF ENGINEERS

**Plate 6**

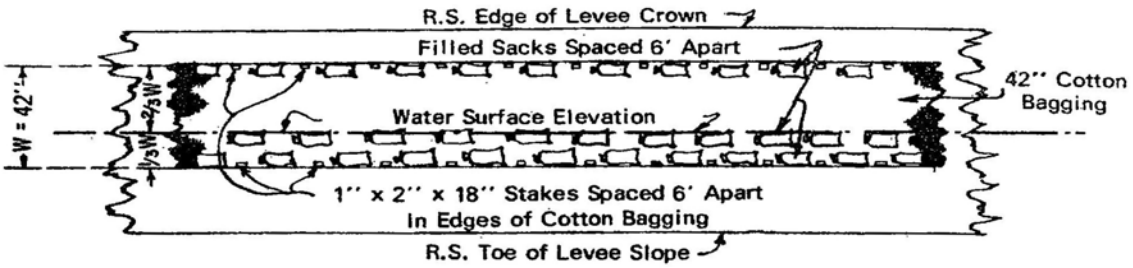



EMERGENCY FLOOD FIGHTING

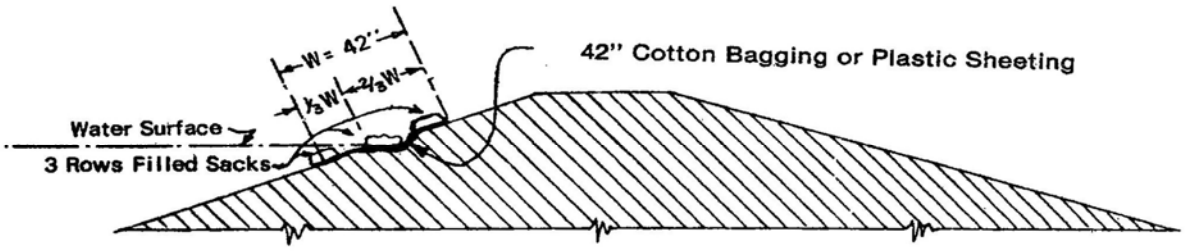
PLACEMENT OF POLYETHYLENE SHEETING IN THE WET

U.S. ARMY CORPS OF ENGINEERS

**Plate 7**




PLAN




CROSS SECTION

**BILL OF MATERIAL**
**TO CONSTRUCT 180 FT.**

1 Roll Jute Cotton Bagging 42" x 180'
90 Filled Sacks
60 Stakes 1" x 2" x 18" = 15 Bd. Ft.

**INSTRUCTIONS**

Lay 42" cotton bagging (Jute) longitudinally along riverside slope of levee with approximate 2/3 width above water surface.

Weight bagging along edges and at water surface with filled sacks spaced approximately 6' apart. Drive stakes alternately between sacks along both edges of bagging.

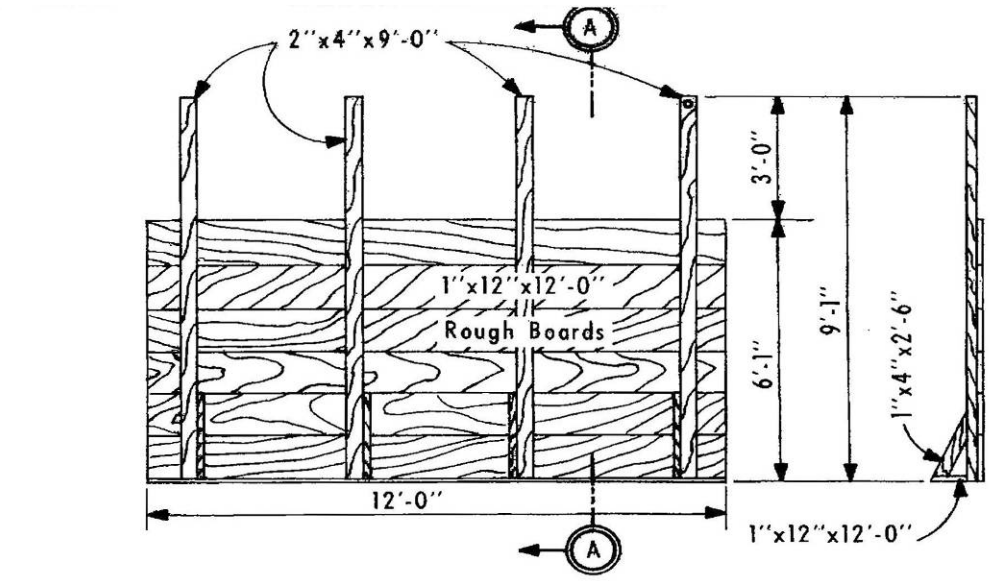
If additional width is required, lace two or more widths of bagging together and lay as desired.

EMERGENCY FLOOD FIGHTING

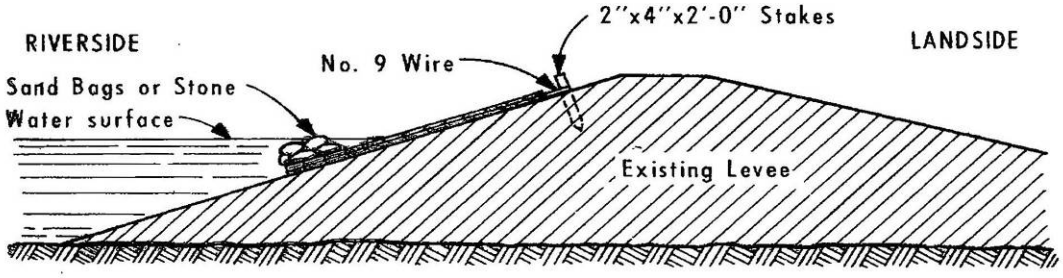
# TYPE OF WAVEWASH PROTECTION

U.S. ARMY CORPS OF ENGINEERS

**Plate 8**




PLAN SECTION A-A




SECTION

| BILL OF MATERIAL FOR 100 FT. |
|---|
| LUMBER<br>55 Pieces 1''x12''x12'-0''<br>32 Pieces 1''x4''x2'-6''<br>32 Pieces 2''x4''x9'-0''<br>32 Pieces 2''x4''x2'-0'' |
| WIRE<br>100 Ft. No. 9 |
| NAILS<br>6lbs. 8d Common |

## CONSTRUCTION METHODS
FOR
HIGH WATER
## WAVE WASH PROTECTION MOVABLE
U. S. ARMY CORPS OF ENGINEERS

**Plate 9**

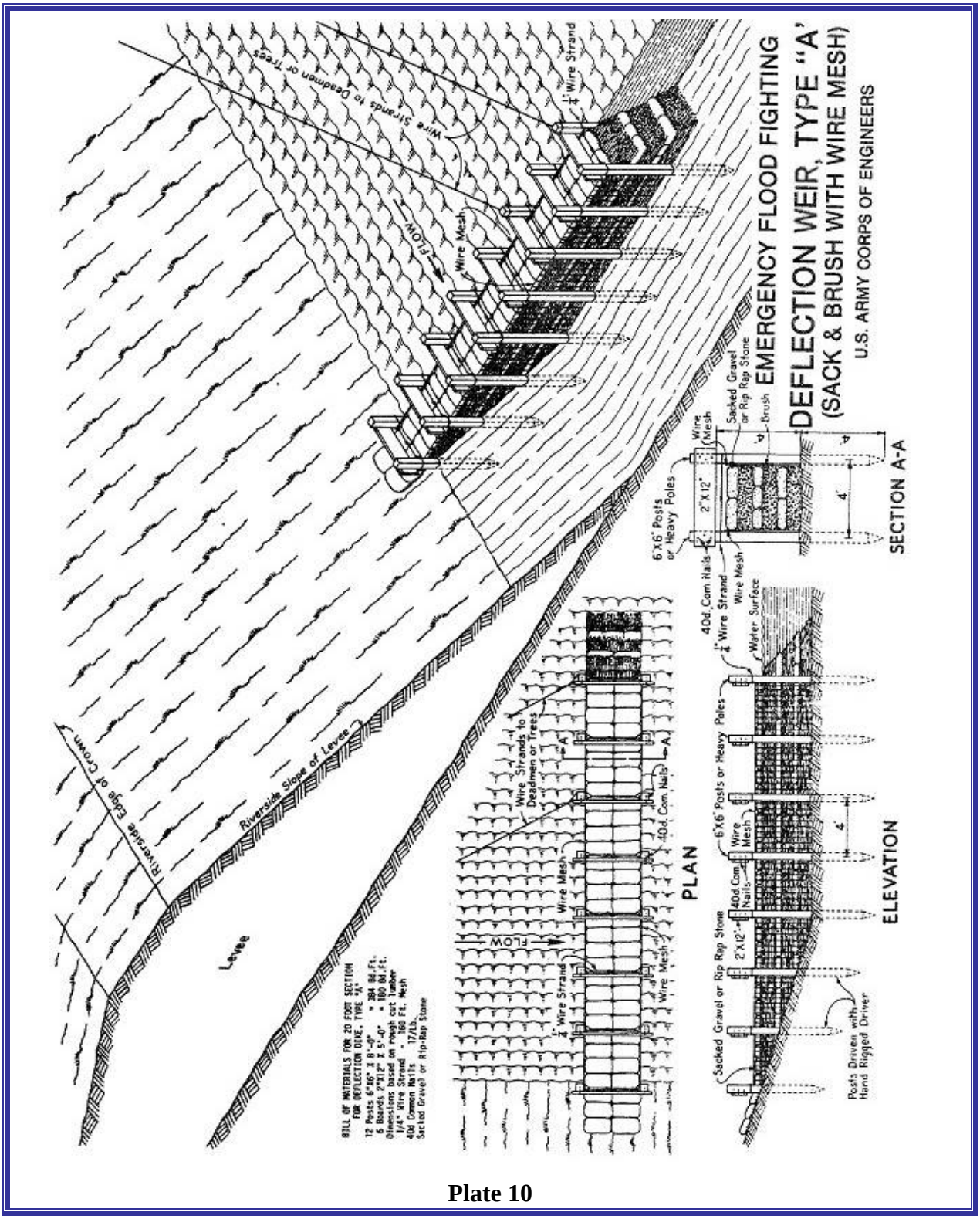

DEFLECTION WEIR, TYPE "A"
(SACK & BRUSH WITH WIRE MESH)
EMERGENCY FLOOD FIGHTING
U.S. ARMY CORPS OF ENGINEERS
Riverside Edge of Crown
Riverside Slope of Levee
Levee
Wire Strands to Deadmen or Trees
Wire Mesh
FLOW
1" Wire Strand
BILL OF MATERIALS FOR 20 FOOT SECTION
FOR DEFLECTION DIKE, TYPE "A"
12 Posts 6"x6" X 8'-0" = 384 Bd.Ft.
6 Boards 2"x12" X 5'-0" = 180 Bd.Ft.
Dimensions based on rough cut lumber
1/4" Wire Strand - 160 Ft. Mesh
40d Common Nails - 17/Lb.
Sacked Gravel or Rip-Rap Stone
PLAN
ELEVATION
SECTION A-A
6"X6" Posts or Heavy Poles
2"X12"
40d Com Nails
Wire Mesh
Sacked Gravel or Rip Rap Stone
Brush
Water Surface
Posts Driven with Hand Rigged Driver

**Plate 10**

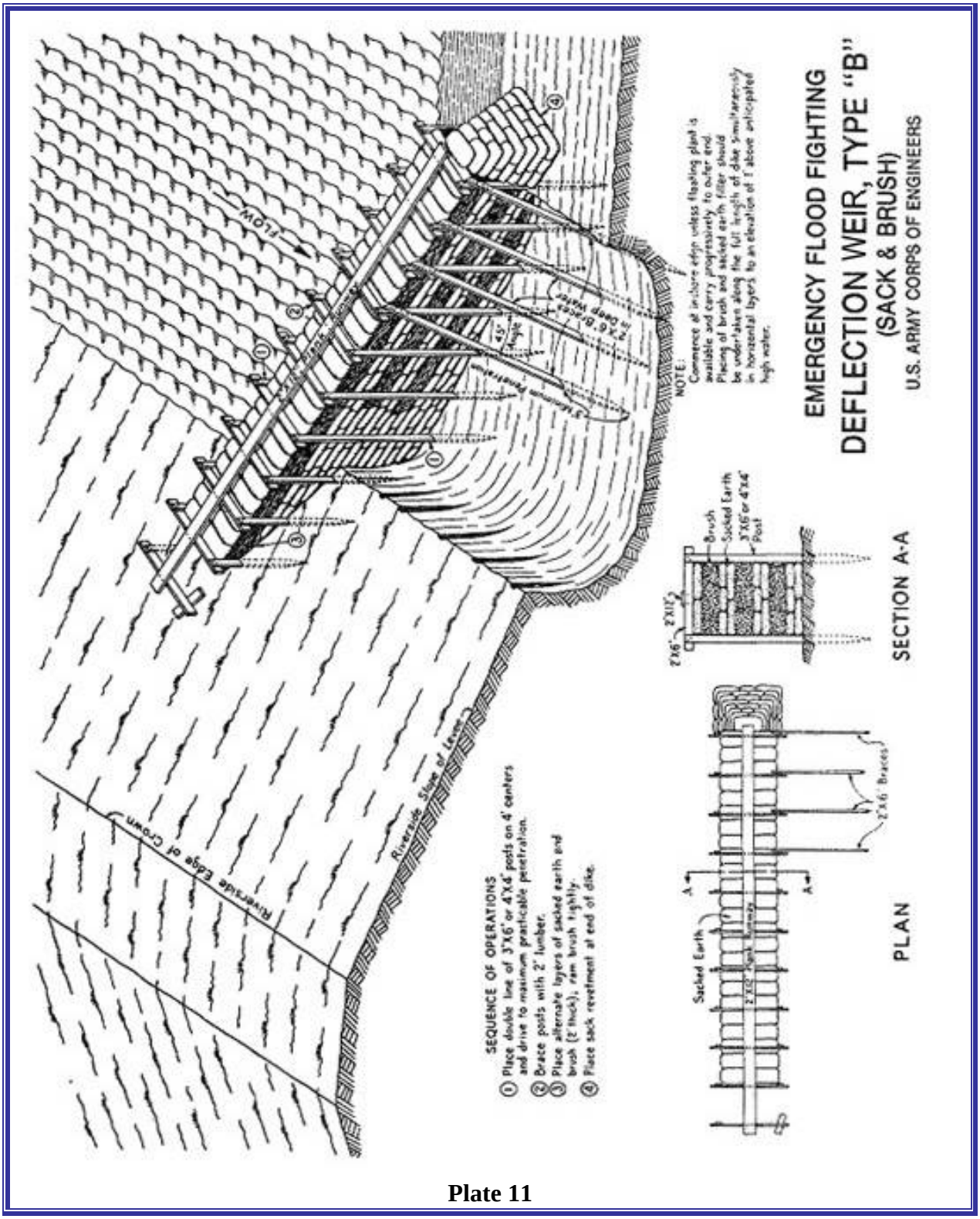

EMERGENCY FLOOD FIGHTING
DEFLECTION WEIR, TYPE "B"
(SACK & BRUSH)
U.S. ARMY CORPS OF ENGINEERS
SECTION A-A
PLAN
SEQUENCE OF OPERATIONS
① Place double line of 3"X6' or 4"X4' posts on 4' centers and drive to maximum practicable penetration.
② Brace posts with 2" lumber.
③ Place alternate layers of sacked earth and brush (2' thick), ram brush tightly.
④ Place sack revetment at end of dike.
NOTE:
Riverside Edge of Crown
Riverside Slope of Levee
FLOW
Sacked Earth
Brush
Sacked Earth
3"X6" or 4"X4" Post
2"X6" Braces

**Plate 11**

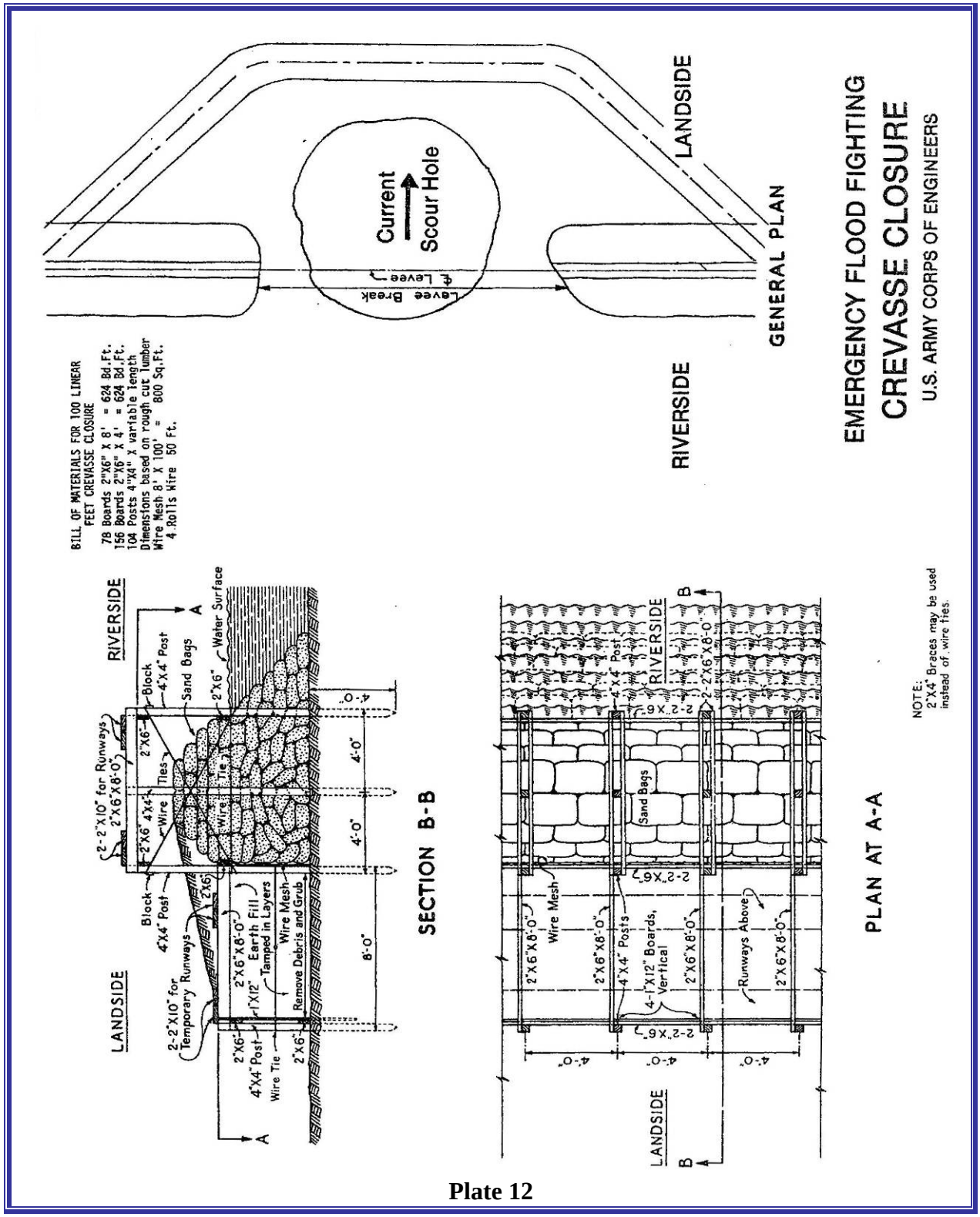
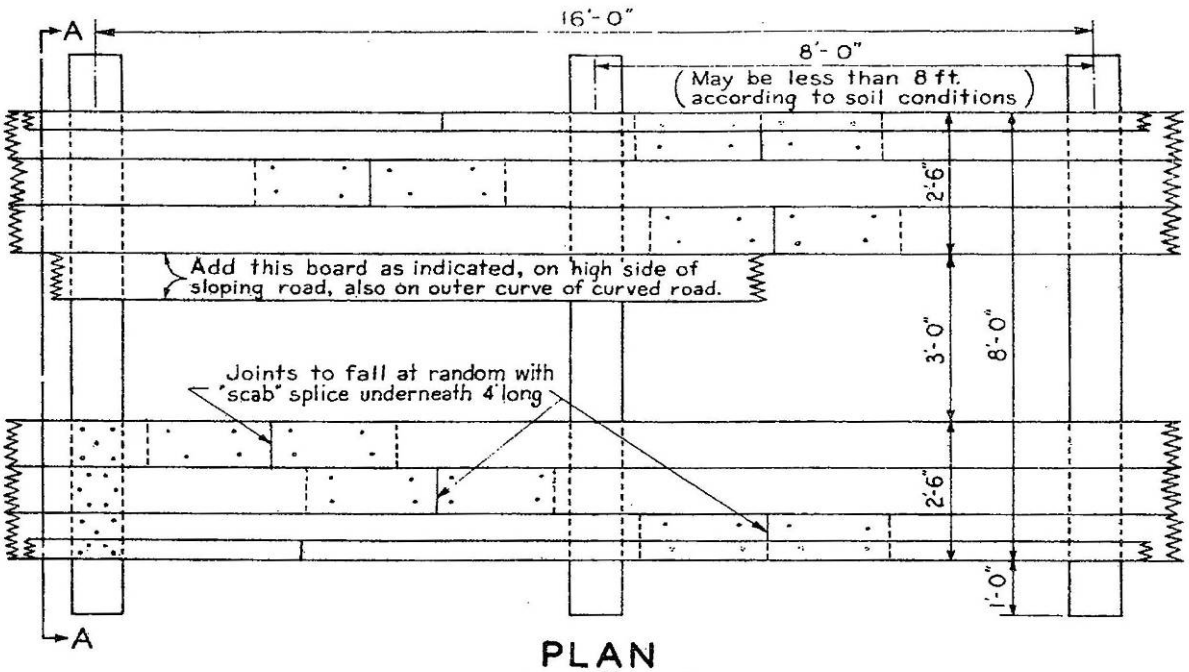
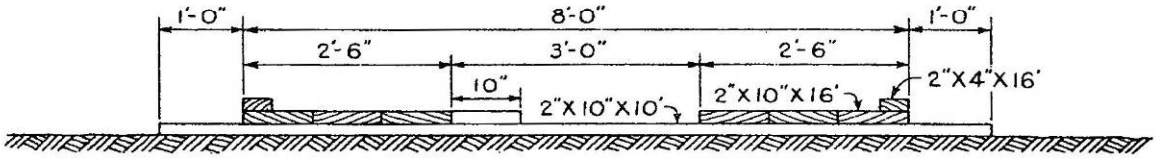

EMERGENCY FLOOD FIGHTING
CREVASSE CLOSURE
U.S. ARMY CORPS OF ENGINEERS
GENERAL PLAN
LANDSIDE
RIVERSIDE
Current
Scour Hole
Levee Break
℄ Levee
BILL OF MATERIALS FOR 100 LINEAR FEET CREVASSE CLOSURE
78 Boards 2"X6" X 8' = 624 Bd.Ft.
156 Boards 2"X6" X 4' = 624 Bd.Ft.
104 Posts 4"X4" X variable length
Dimensions based on rough cut lumber
Wire Mesh 8' X 100' = 800 Sq.Ft.
4 Rolls Wire 50 Ft.
SECTION B-B
PLAN AT A-A
NOTE:
2"X4" Braces may be used instead of wire ties.

**Plate 12**




PLAN
Scale $\frac{3}{8}$" = 1'-0"




SECTION A-A
Scale $\frac{1}{2}$" = 1'-0"

BILL OF MATERIALS FOR
100 LINEAR FEET OF ROADWAY

| | | |
|---|---|---|
| Cross Members | 13 Pcs. 2"X10"X10' = | 217 Bd. Ft. |
| Road Bed | 38 Pcs. 2"X10"X16'* = | 1014 Bd. Ft. |
| Guard Rail | 13 Pcs. 2"X4"X16'* = | 139 Bd. Ft. |
| | Total | 1370 Bd. Ft. |

18 Lbs. 30d. Common Nails
10 Lbs. 60d. Common Nails
Kind of Lumber: Hardwood, Rough.
Actual quantities. No allowance made for waste.

NOTE:
Where foundation is very soft, 12 ft. flooring should be used with cross members at 6 ft. centers. In this case add approximately 33$\frac{1}{3}$% or $\frac{1}{3}$ to Bill of Materials at left, for 100 ft. of roadway.

*Random not less than 12'

EMERGENCY FLOOD FIGHTING
PLANK ROAD
U.S. ARMY CORPS OF ENGINEERS

**Plate 13**

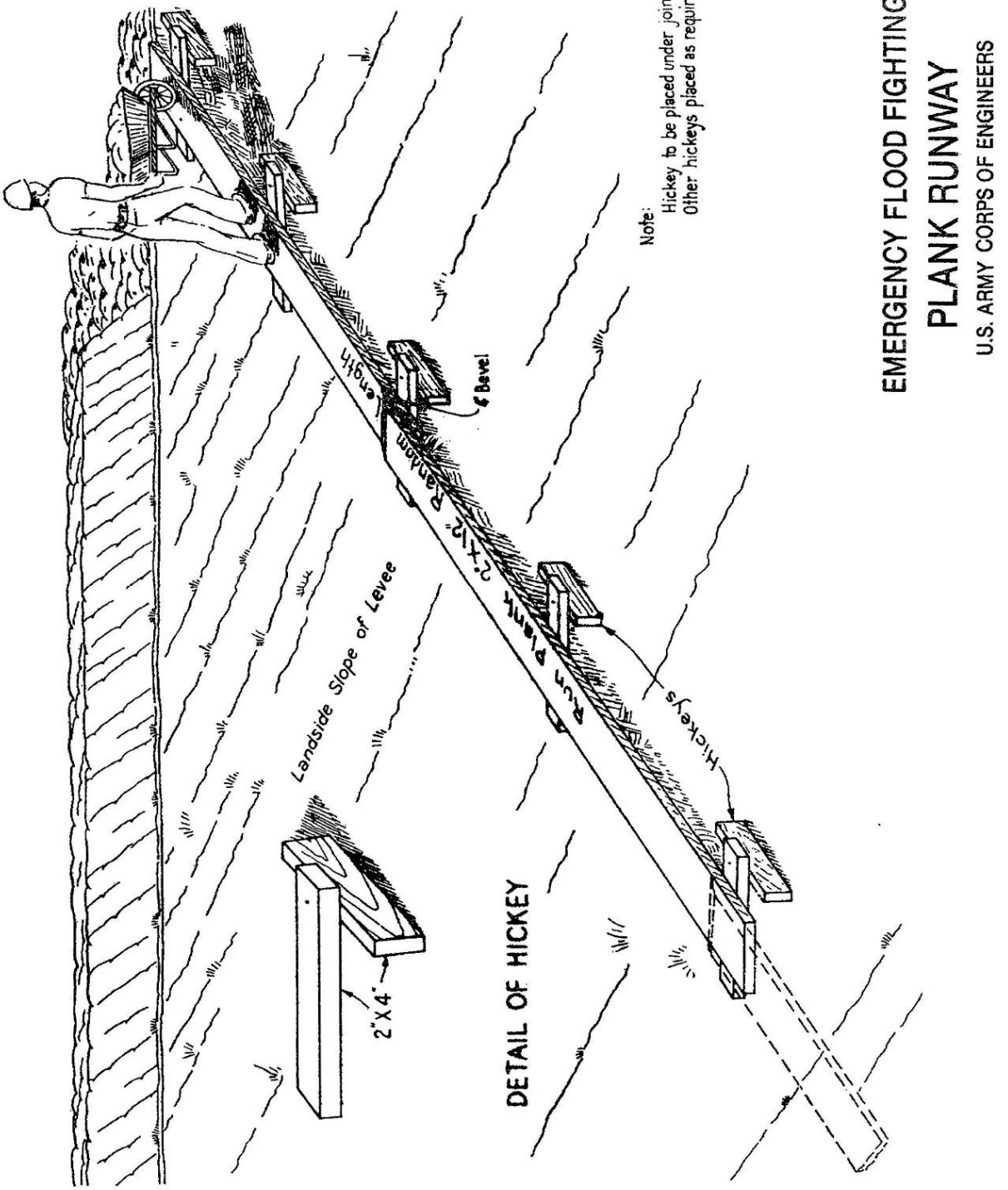

EMERGENCY FLOOD FIGHTING
PLANK RUNWAY
U.S. ARMY CORPS OF ENGINEERS
Note:
Hickey to be placed under joint.
Other hickeys placed as required.
Bevel
Hickeys
Landside Slope of Levee
DETAIL OF HICKEY
2"X4"

**Plate 14**

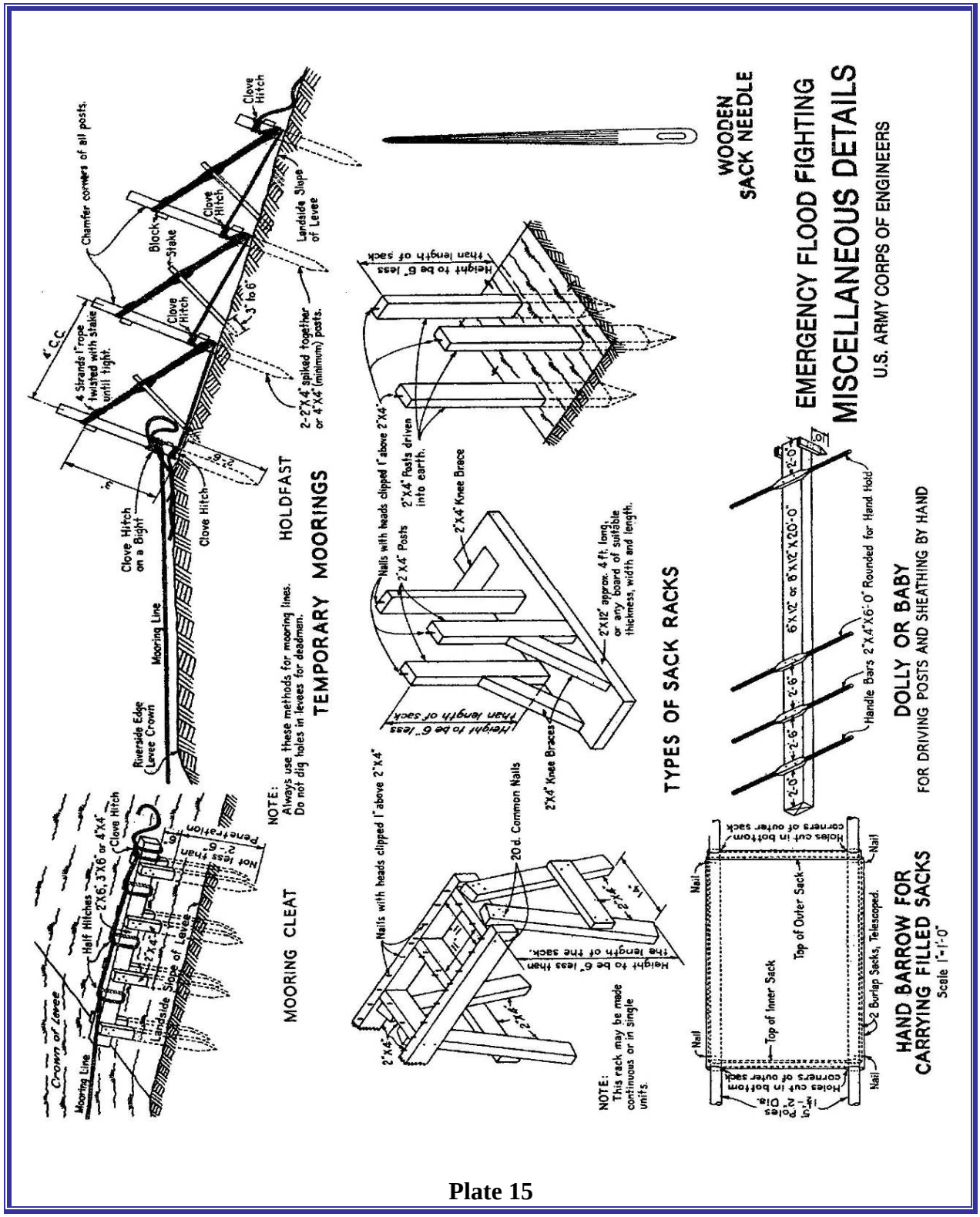

EMERGENCY FLOOD FIGHTING
MISCELLANEOUS DETAILS
U.S. ARMY CORPS OF ENGINEERS
TEMPORARY MOORINGS
HOLDFAST
Clove Hitch on a Bight
Mooring Line
Riverside Edge Levee Crown
Clove Hitch
Block or Stake
Chamfer corners of all posts.
4 Strands 1" rope twisted with stake until tight.
4' C.C.
3' to 6'
Landside Slope of Levee
2-2"X4" spiked together or 4"X4" (minimum) posts.
NOTE: Always use these methods for mooring lines. Do not dig holes in levees for deadmen.
MOORING CLEAT
Crown of Levee
Mooring Line
Half Hitches
2"X6", 3"X6" or 4"X4"
Clove Hitch
Not less than 2'-6"
Penetration 6'
Landside Slope of Levee
TYPES OF SACK RACKS
Nails with heads clipped 1" above 2"X4"
2"X4" Posts
2"X4" Knee Brace
2"X12" approx. 4 ft. long, or any board of suitable thickness, width and length.
Height to be 6" less than length of sack
2"X4" Knee Braces
20d. Common Nails
Height to be 6" less than the length of the sack.
NOTE: This rack may be made continuous or in single units.
WOODEN SACK NEEDLE
DOLLY OR BABY
FOR DRIVING POSTS AND SHEATHING BY HAND
6"X12" or 8"X12"X20'-0"
Handle Bars 2"X4"X6'-0" Rounded for Hand Hold
HAND BARROW FOR CARRYING FILLED SACKS
Scale 1"=1'-0"
Holes cut in bottom corners of outer sack
Top of Outer Sack
Top of Inner Sack
Nail
2 Burlap Sacks, Telescoped.

**Plate 15**

# APPENDIX E3

PROPER ABANDONMENT / REMOVAL OF PENETRATIONS AND ENCROACHMENTS

23 January 2025

Christopher Shepard, P.E.
Environmental Compliance Manager
MIRA Dissolution Authority
300 Maxim Road
Hartford, CT 06114

Project 240840 – Abandonment and Removal of Penetrations and Encroachments, Former MIRA Facility, 100 Reserve Road and 300 Maxim Road, Hartford, CT

Dear Mr. Shepard:

At your request, Simpson Gumpertz & Heger Associates, Inc. (SGH) evaluated the existing utilities passing through or under the Hartford Flood Control System (HFCS) floodwall that extend through the former Materials Innovation and Recycling Authority (MIRA) Resource Recovery Facility (the Facility). As the utilities no longer serve a useful purpose, they must be removed or properly abandoned. This report describes the work required to remove the existing utilities and encroachments and provides a preliminary cost estimate for this work.

## 1. INTRODUCTION

### 1.1 Background

The Facility is a shuttered trash-to-energy power plant in the South Meadows Section of Hartford, Connecticut (Fig. 1). The Facility, constructed in the 1920s, was originally coal-fired, then transitioned to a combination of oil and coal. In the 1980s, a waste processing facility (WPF) was constructed at the site, and the power plant was converted for trash-to-energy use. The power plant portion of the site is referred to as the power block facility (PBF) to differentiate it from the WPF. The Facility stopped receiving, processing, and combusting waste in July 2022. Over the life of the Facility, there were six generating units, two of which (Units 5 and 6) were in use when operations ceased.

The Facility is located along the west bank of the Connecticut River. In response to the devastating floods in 1936 and 1938, the U.S. Army Corps of Engineers constructed a flood control system to reduce flooding risks. The HFCS consists of earthen dikes, concrete floodwalls, closure structures, and structures to facilitate drainage inside the protected area. The HFCS passes through the Facility, with most of the area adjacent to the PBF consisting of concrete

floodwall. Several penetrations through or under the floodwall allow for the passage of pipes between the landside and the riverside.

The Greater Hartford Flood Commission (GHFC), which is the regulatory agency with stewardship over the HFCS, has expressed concerns that the existing utilities represent a risk to the HFCS. The potential transition of ownership and redevelopment increases this risk, as the new owner might not be as familiar with the operations and maintenance of these utilities. Therefore, the successor to MIRA, the MIRA Dissolution Authority (MDA) is developing a plan to abandon the existing utilities and remove the floodwall encroachments.

### 1.2 Objective

The objective of our assignment is to evaluate the scope of work required to abandon existing penetrations through or under the floodwall at the Facility, remove encroachments on the floodwall, and develop a cost estimate for this work.

### 1.3 Scope of Work

Our scope of work included the following tasks:

- Reviewing relevant documents provided to us by MDA and readily available public information.
- Visiting the site to observe the existing conditions and search for record drawings in the Facility's plan room.
- Attending a meeting with MDA and GHFC to discuss the work and understand GHFC's concerns regarding penetrations and encroachment.
- Preparing an Operations, Inspection, and Maintenance Plan and Emergency Preparedness Plan (both issued under separate cover).
- Developing a scope of work and cost estimate for utility abandonment and encroachment removal.
- Preparing this summary report.

## 2. EXISTING PENETRATIONS AND ENCROACHMENTS

### 2.1 Penetrations

Table 1 lists the existing utility penetrations through or under the floodwall. The penetrations are also shown in Figs. 2 and 3. Identification numbers consistent with the HFCS Operation and Maintenance Manual are provided for reference.

**Table 1. Utility penetrations at the Facility.**

| ID No. | Station | Description | Diameter/Size and Material of Penetration | Status |
|---|---|---|---|---|
| HD-36 | 84+21M | Storm drain | 12 in. dia. pipe - Cast Iron | Active |
| HD-37 | 85+28M | Compressed air and water | 1.5 in. dia. city water<br>1 in. dia. compressed air<br>6 in. dia. service water | Inactive |
| HD-38 | 84+55M | Non-contact cooling water intake (Unit 6) | 48 in. dia. pipe - Steel | Inactive |
| HD-43 | 86+77.5M | Service water intake | 24 in. dia. pipe placed inside 48 in. dia. pipe - Steel | Inactive |
| HD-44 | 87+65M | Non-contact cooling water intake (Unit 5) | 48 in. dia. pipe - Steel | Inactive |
| HD-45 | 87+40.6M | Water discharge (Source unknown) | 14 in. dia. pipe - Cast Iron | Inactive |
| HD-46 | 87+35.85M | Service water discharge | 48 in. dia. pipe - Steel | Inactive |
| HD-47 | 87+85M | Non-contact cooling water discharge (Unit 5) | 48 in. dia. pipe - Steel | Inactive |
| HD-47a | 88+34M | Non-contact cooling water discharge (Unit 6) | 48 in. dia. pipe - Steel | Inactive |
| HD-48 | 89+36.5M | Storm drain (former ash pit) | 12 in. dia. pipe - Cast Iron | Inactive |
| HD-49 | 90+75M | Oil pipe in former ash pit drain | 8 in. dia. oil line (Steel) placed inside 10 in. dia. drain line (Cast iron) | Inactive |
| HD-50a | 92+31.7M | Jet fuel line | 8 in. dia. pipe - Steel | Inactive |

There are no penetrations numbered HD-39 to HD-42.

### 2.2 Encroachments

Encroachments on or around the floodwall are also shown in Figs. 2 and 3 include the following:

- Pipes mounted on the riverside face of the floodwall and along the south oil dock.
- Cable trays mounted to the top of the floodwall.
- A utility bridge spanning from the PBF to the top of the floodwall.
- Catwalks spanning from Screenhouses No. 1 and No. 3 to the top of the floodwall.
- Two stairways over the floodwall.

## 2.3 Intake and Discharge Tunnels

The cooling water for previously retired and removed Units 1 and 2 was conveyed by 9.5 ft tall by 7 ft wide concrete tunnels. The tunnels predate the floodwall construction. The intake tunnel runs from Screenhouse No. 2 to the PBF, roughly perpendicular to the floodwall (Fig. 4). The discharge tunnel runs directly above the intake tunnel in an integrated, double-barrel configuration, then runs south on the riverside of the floodwall, and finally turns eastward toward the river, where the tunnel outlets into a discharge channel, which is separated from the main river channel by a steel sheet pile wall. The floodwall includes a steel sheet pile cutoff wall embedded in its riverside toe. The tips of the sheet piles are at approximately El. -20 ft[1]. The sheet piles extend full depth up to the exterior face of the vertical tunnel walls, and where they cross the tunnels, extend to the discharge (upper) tunnel roof. A dumped concrete seal is placed on either side of the sheet pile on the tunnel roof. There do not appear to be any seals between the full-depth sheet piles and the tunnel walls. The bottom of the intake (lower) tunnel is at approximately El. -14 ft, about 6 ft above the full-depth sheet pile tips.

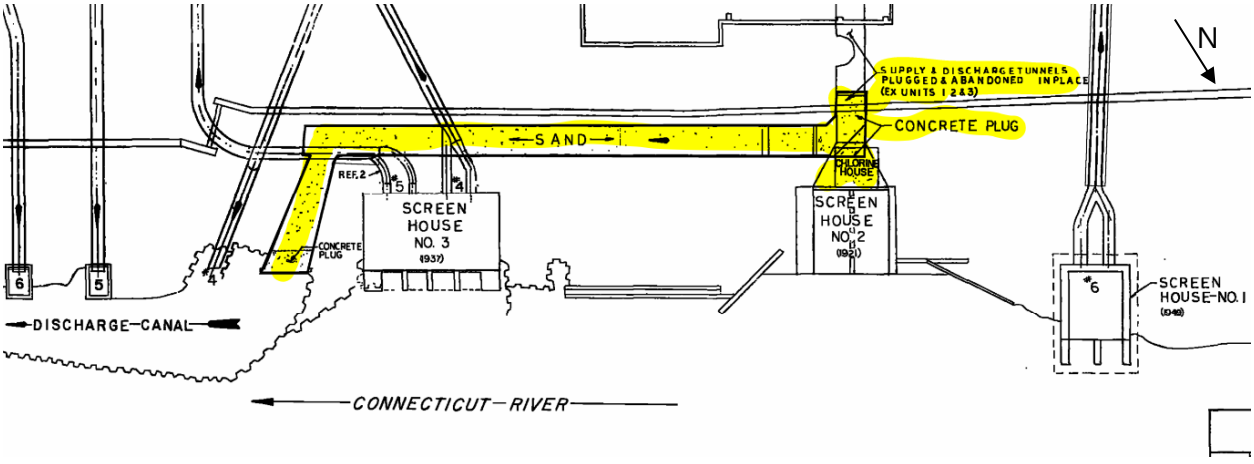



**Figure 4. Plan view showing intake and discharge tunnels for former Units 1 and 2 (from HFCS 1981 Operation and Maintenance Manual).**

[1] Elevations in this report are referenced to the National Geodetic Vertical Datum of 1929.

After the retirement of Units 1 and 2 in the 1970s, both tunnels were abandoned. Based on a 1977 Northeast Utilities drawing, both tunnels were abandoned by bulkheading the tunnels on either side of the floodwall and filling them with concrete to create an internal concrete plug. On the riverside, the discharge tunnel was filled with sand from the concrete plug to a second concrete plug at the discharge canal.

The GHFC has expressed concern that if the concrete plug in the discharge tunnel in the discharge canal were to be damaged, the sand could ravel out of the tunnel. If the empty tunnel were then to collapse, undermining of the floodwall toe could occur. In our opinion, the probability of these multiple events occurring is remote and unlikely to occur in one flooding event. However, given that the Facility has permanently ceased operation and is no longer staffed on a daily basis, it is possible that these multiple events could begin and progress for a period of time before being discovered during a periodic inspection.

To reduce the likelihood of this potential failure mode, MDA should consider replacing the sand fill with a more erosion-resistant material, such as flowable fill.

The width of the gaps between the steel sheet piles and the vertical tunnel walls is unknown. Seepage tends to concentrate around openings in seepage barriers, potentially leading to excessive seepage flow and sand boils. As part of the design, seepage analyses should be performed to estimate the seepage gradients for a hypothetical gap width. If the gradients exceed USACE maximums, it may be necessary to perform jet or permeation grouting to seal the gap. Grouting involves drilling a series of holes near the sheet pile-tunnel interface and injecting cement or chemical grout to reduce the soil permeability in the vicinity of the gap. Costs of grouting are not included in our evaluation because neither the necessity nor the scope of grouting can be determined without performing the seepage analyses.

Groundwater infiltration into the tunnels landside of the concrete plugs has been observed in the past. In a December 1999 report, HRP documented observed groundwater infiltration through cracks in the concrete tunnel walls and recommended sealing the leaks. HRP documented the sealing of the cracks, which was performed by injecting chemical grouts and hydraulic cement, HRP reported that the repairs “virtually eliminated” the groundwater infiltration. We are not aware of any additional groundwater infiltration, but we understand that the basement of the facility does flood from time to time, now that sumps are not running continuously. It is unclear if the intake and discharge tunnels are the source of the flooding. We recommend that MDA consider filling the landside portions of the tunnel with concrete or removing them. The costs of this work are not included in the cost estimate provided below.

## 3. GUIDELINES FOR ABANDONMENT OF PENETRATIONS

Guidelines for abandonment of penetrations are provided in USACE Engineer Manual EM 1110-2-2902, Engineering and Design, Conduits, Pipes, and Culverts Associated with Dams and Levee Systems, dated 31 December 2020. The two methods outlined in the USACE manual are removal and in-place decommissioning (i.e., infilling a pipe).

USACE indicates that in most cases, in-place decommissioning is more feasible than pipe removal due to technical and cost considerations. Except for the shallow burial depth of HD-50a, pipe removal is infeasible. Most of the pipes pass under the floodwall and through the steel sheet pile cutoff wall embedded in the toe of the floodwall footing. Removal would be very challenging, as it would require accessing the underside of the footing, supporting it during the work, and patching holes in the sheet pile cutoff wall.

The infilling process consists of bulkheading the pipe on both ends, cleaning and inspecting the interior of the pipe, and filling the pipe. Infilling materials include conventional concrete, cellular concrete (which includes a foaming agent to reduce its density), and cement grout. Filling is achieved by pumping the infill material into a port in one bulkhead until the pipe is filled. A port is also provided in the other bulkhead to allow for venting of air. If the pipe is sloped, the infill is pumped into the low side of the pipe to reduce the likelihood of trapping air in the pipe.

## 4. SCOPE OF WORK FOR ABANDONMENT OF UTILITIES AND REMOVAL OF ENCROACHMENTS

The scope of work for the abandonment of each utility and removal of encroachments is described below. While the process for abandoning each utility is similar, the configuration and access requirements vary. Many of the pipes require excavations to provide access to the pipe exterior. To minimize the footprint of the excavation, the sides of the excavation are often supported with a support of excavation (SOE) system. The SOE, which is typically designed by the contractor as part of their means and methods, could consist of sheet piles, timber sheeting, or a prefabricated trench box.

For pipes with diameters 14 in. and smaller, cement grout should be used due to flowability considerations. For pipes with diameters larger than 14 in., concrete can be used as a backfill material.

It is important to note that the property is subject to an Environmental Land Use Restriction (ELUR) that has been recorded in the City of Hartford's Land Records. The ELUR serves as an institutional control over site-wide soil contamination, and it includes a prohibition against any on-site soil disturbance activities without first obtaining approval (a temporary release of the ELUR) from the Connecticut Department of Energy & Environmental Protection (CT DEEP). A soil management plan will have to be implemented to ensure that contaminated soil encountered

during project work is properly controlled to protect human health and the environment, and all excavation, backfilling, and surface restoration work will have to be overseen by a Connecticut Licensed Environmental Professional (LEP).

### 4.1 HD-36 (Roof Drain Outfall)

*Existing Conditions*

HD-36 is a 12 in. cast-iron roof drainpipe passing below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe also receives stormwater runoff from the paved parking lot area located between the floodwall and the Facility's administrative building. The pipe invert is located approximately 9 ft below existing grade. The pipe has a gate valve in the valve chamber immediately to the landside of the floodwall and a flap valve at the outfall end of the pipe on the riverside.

*Abandonment Scope*

- Reroute the roof drain and parking lot catch basins to other storm drainage facilities.
- Cut pipe inside valve chamber and remove gate valve.
- Clean and inspect the pipe.
- Install internal bulkheads.
- Fill the pipe with cement grout from the riverside bulkhead.
- Cap the pipe ends[2].
- Fill the valve chamber with cellular concrete[3].

### 4.2 HD-37 (Inactive Compressed Air and Water)

*Existing Conditions*

HD-37 consists of three pipes with diameters of 1, 1.5, and 6 in., leading to the abandoned Chlorine House. The pipe inverts are located approximately 5 ft below existing grade.

[2] Bulkheads can remain in place if they do not interfere with the installation of the caps at the pipe ends.
[3] Cellular concrete includes a foaming agent to reduce its density. The use of cellular concrete instead of higher density concrete can reduce the risk of settlement of the valve chamber due to the weight of the concrete.

*Abandonment Scope*

- Excavate an access pit on each side of the floodwall.
- Cut the pipes on each side of the floodwall.
- Clean and inspect the pipe.
- Install internal bulkheads.
- Fill the pipes with cement grout.
- Cap the pipe ends.
- Backfill the excavations and restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.3 HD-38 (Inactive Unit 6 Non-Contact Cooling Water Intake)

*Existing Conditions*

HD-38 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe formerly served as the cooling water intake for the Unit 6 steam condenser. The pipe runs from pumps inside Screenhouse No. 1 to the PBF. The pipe invert is approximately 21 ft below existing grade.

*Abandonment Scope*

- Install SOE on the landside of the pipe. The SOE will need to be set back about 25 ft from the floodwall stem to avoid conflicting with the floodwall footing and toe drain.
- Cut the pipe inside the SOE and at the discharge side of the pump in Screenhouse No. 1.
- Clean and inspect the pipe.
- Install internal bulkheads.
- Fill the pipe with concrete.
- Cap the pipe ends.
- Backfill the excavation and remove the SOE.

- Restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.4 HD-43 (Inactive Service Water Intake)

*Existing Conditions*

HD-43 is a 24 in. metal pipe inside a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. The 48 in. pipe formerly served as the cooling water intake for the Unit 4 steam condenser. The 24 in. inner pipe, which was installed later, served as a service water intake. It is not known if the inner pipe was grouted inside the 48 in. diameter pipe or simply placed inside. This should be confirmed prior to and as part of the design process. The pipes run from pumps inside Screenhouse No. 3 to the PBF. The outer pipe invert is approximately 11 ft below existing grade.

*Abandonment Scope*

- Install SOE on the landside of the pipe. The SOE will need to be set back about 25 ft from the floodwall stem to avoid conflicting with the existing floodwall footing and toe drain.
- Cut the pipes inside the SOE and at the discharge side of the pump in Screenhouse No. 3.
- Clean and inspect the 24 in. inner pipe. Remove the inner pipe if the annulus between the inner 24 in. and outer 48 in. pipes is not grouted.
- Install internal bulkheads.
- Fill the 24 in. pipe with concrete.
- Cap the pipe ends.
- Backfill the excavation and remove the SOE.
- Restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.5 HD-44 (Inactive Unit 5 Non-Contact Cooling Water Intake)

*Existing Conditions*

HD-44 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe formerly served as the cooling water intake for the Unit 5 steam condenser. The pipe invert is approximately 14 ft below existing grade. The pipe runs from pumps inside Screenhouse No. 3 to the PBF.

*Abandonment Scope*

- Install SOE on the landside of the pipe. The SOE will need to be set back about 45 ft from the floodwall stem to avoid conflicting with the existing floodwall footing and toe drain.
- Cut the pipe inside the SOE and at the discharge side of the pumps in Screenhouse No. 3.
- Clean and inspect the pipe.
- Install internal bulkheads.
- Fill the pipe with concrete.
- Cap the pipe ends.
- Backfill the excavation and remove the SOE.
- Restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.6 HD-45 (Inactive Water Discharge)

*Existing Conditions*

HD-45 is a 14 in. cast-iron water discharge pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe is adjacent and parallel to HD-46. The pipe invert is approximately 11 ft below existing grade. The pipe runs from the PBF to an outfall headwall in the river.

*Abandonment Scope*

- Install SOE on the landside of the pipe. This SOE will also include HD-46. The SOE will need to be set back about 25 ft from the floodwall stem to avoid conflicting with the existing floodwall footing and toe drain.
- Clean and inspect the pipe.
- Install an internal bulkhead on the riverside of the floodwall. To avoid excavation on the riverside of the floodwall or accessing the pipe through its discharge end, which is typically submerged, the riverside bulkhead could be a sacrificial, inflatable balloon plug installed 20 ft from the floodwall toe toward the outfall end.
- Install a short elbow section on the landside end, pointing upward, with its top about 6 in. higher than the crown of the existing pipe.
- Fill the pipe with cement grout via a tremie pipe inserted from the landside, extending to the riverside bulkhead. Pump until the grout overflows the elbow.
- Cap the landside end of the pipe.
- Backfill the excavation and remove the SOE.
- Restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.7 HD-46 (Inactive Service Water Discharge)

*Existing Conditions*

HD-46 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe formerly served as the service water discharge and is adjacent and parallel to HD-45. The pipe invert is approximately 14 ft below existing grade. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river.

*Abandonment Scope*

- Install SOE on the landside of the pipe. This SOE will also include HD-45. The SOE will need to be set back about 25 ft from the floodwall stem to avoid conflicting with the existing floodwall footing and toe drain.
- Cut the pipe inside the SOE.

- Clean and inspect the pipe.
- Install an inflatable balloon plug 20 ft from the floodwall toe toward the outfall.
- Install an internal bulkhead on the landside end of the pipe.
- Fill the pipe with concrete via a tremie pipe inserted from the landside, extending to the riverside bulkhead. Pump until the concrete overflows the elbow.
- Cap the landside end of the pipe.
- Backfill the excavation and remove the SOE.
- Restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.8 HD-47 (Inactive Unit 5 Non-Contact Cooling Water Discharge)

*Existing Conditions*

HD-47 is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe formerly served as the cooling water discharge for the Unit 5 steam condenser. The pipe invert is approximately 21 ft below existing grade. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river.

*Abandonment Scope*

- Install SOE on the landside of the pipe. The SOE will need to be set back about 45 ft from the floodwall stem to avoid conflicting with the existing floodwall footing and toe drain.
- Cut the pipe inside the SOE.
- Clean and inspect the pipe.
- Install an inflatable balloon plug 20 ft from the floodwall toe toward the outfall.
- Install an internal bulkhead on the landside end of the pipe.
- Fill the pipe with concrete via a tremie pipe inserted from the landside, extending to the riverside bulkhead. Pump until the concrete overflows the elbow.
- Cap the landside end of the pipe.

- Backfill the excavation and remove the SOE.
- Restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.9 HD-47a (Inactive Unit 6 Non-Contact Cooling Water Discharge)

*Existing Conditions*

HD-47a is a 48 in. steel pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. This pipe formerly served as the cooling water discharge for the Unit 6 steam condenser. The pipe invert is approximately 14 ft below existing grade. The pipe runs from the PBF to a steel sheet pile outfall headwall in the river.

*Abandonment Scope*

- Install SOE on the landside of the pipe. The SOE will need to be set back about 45 ft from the floodwall stem to avoid conflicting with the existing floodwall footing and toe drain.
- Clean and inspect the pipe.
- Install an inflatable balloon plug 20 ft from the floodwall toe toward the outfall.
- Install an internal bulkhead on the landside end of the pipe.
- Fill the pipe with concrete via a tremie pipe inserted from the landside, extending to the riverside bulkhead. Pump until the concrete overflows the elbow.
- Cap the landside end of the pipe.
- Backfill the excavation and remove the SOE.
- Restore ground surface elevations and conditions to match the elevations and conditions prior to excavation (including pavement).

### 4.10 HD-48 (Inactive Former Ash Pit Outfall)

*Existing Conditions*

HD-48 is a 12 in. cast-iron pipe that passes below the base of the floodwall and through the sheet pile wall below the toe of the floodwall footing. The pipe invert is approximately 25 ft below existing grade. The pipe has a gate valve in the valve chamber immediately to the

landside of the floodwall and a flap valve at the outfall end of the pipe on the riverside. Formerly an ash pit outfall, the pipe was later cut and capped landward of the valve chamber.

*Abandonment Scope*

- Cut pipe inside valve chamber and remove gate valve. Remove the flap valve at the outfall end.
- Clean and inspect the pipe.
- Install internal bulkheads.
- Fill the pipe with cement grout from the riverside bulkhead.
- Cap the pipe ends.
- Fill the valve chamber with cellular concrete.

### 4.11 HD-49 (Inactive Oil Line in Former Ash Pit Outfall)

*Existing Conditions*

HD-49 is an 8 in. steel pipe that was placed inside of a 10 in. cast-iron pipe that passes through the below-grade portion of the floodwall stem. The outer pipe invert is approximately 16 ft below existing grade. The original 10 in. pipe was an outfall for a former ash pit. The pipe discharged at a headwall on the riverbank on the riverside of the floodwall. On the landside of the floodwall, the pipe passed through a valve chamber and towards the ash pit. The 8 in. oil line runs from the south dock to the headwall, where it enters the original pipe. The newer oil line runs into the valve chamber, where the original pipe was cut. The pipe then bends 90 degrees and rises vertically in the valve chamber to approximately 5 ft below the top of the chamber. The pipe then bends 90 degrees and runs horizontally through the landside wall of the valve chamber, into a second valve chamber that shares a wall with the first, and then towards the Facility. The pipe has been cut inside the second valve chamber, with blind flanges attached to both cut ends.

*Abandonment Scope*

- Remove, containerize, and properly dispose offsite any residual fuel remaining in the pipe, without spilling any into the environment. Remove the 8 in. pipe from the south dock to the headwall.

- Cut the 8 in. pipe at the riverward valve chamber and remove the pipe within the valve chambers.
- Clean and inspect the 8 in. inner pipe. Remove the inner pipe if the annulus between the inner 8 in. and outer 10 in. pipes is not grouted.
- Install bulkheads.
- Fill the pipe with cement grout from the riverside bulkhead.
- Cap the 10 in. pipe ends.
- Fill the valve chambers with cellular concrete.

### 4.12 HD-50a (Inactive Liquid Fuel Line)

*Existing Conditions*

HD-50a is an 8 in. steel pipe, formerly carrying liquid fuel. The pipe runs from the south dock and then turns south (downriver) and then runs just below the ground surface in a 2 ft by 2 ft concrete encasement up on the dike riverside slope (the flood protection system transitions from floodwall to earth embankment just south of the south dock). The pipe then runs up over the dike crest, and down the landside dike slope. The top of the encasement is flush with the surrounding ground surface. The pipe terminates at the south dock with a gate valve and blind flange. The pipe invert is approximately 1 ft below existing grade.

*Abandonment Scope*

- Remove, containerize, and properly dispose offsite any residual fuel remaining in the pipe, without spilling any into the environment.
- Remove the pipe and concrete encasement from the end of the south dock to the landside dike toe.
- Backfill the excavation on the dike slope with compacted fill consistent with the surrounding soils (low-permeability clay topped with riprap on the riverside, sand topped with topsoil and seed on the landside).

### 4.13 Miscellaneous Encroachment Removal

There are several miscellaneous encroachments at or above grade. All miscellaneous encroachments can be removed with conventional construction equipment. Anchor holes should be patched appropriately with caulk or grout, with special attention paid to any holes

that pass through the entire floodwall. We have included the costs of removing the two stairways over the floodwall, but MDA should discuss with GHFC and USACE if the stairways should remain, as they may provide a benefit to inspection and flood fighting.

### 4.14 Discharge Tunnel Re-Backfilling

*Re-Backfilling Scope*

- Install SOE on the riverside of the floodwall, on top of the tunnel, to access the tunnel roof.
- Cut hole in the tunnel roof.
- Excavate sand backfill. Vacuum excavation methods could be used to clear enough room to lower a skid steer into the tunnel to complete the excavation.
- Clean and inspect tunnel walls.
- Backfill the tunnel with flowable fill.
- Backfill the excavation and remove the SOE.

### 4.15 General Site Work

In addition to the work described above, the work requires general site work, including:

- Development of a soil management plan to ensure proper handling of contaminated soil that will likely be encountered during excavation activities.
- Mobilization and demobilization.
- Site preparation, including installation of erosion and sediment controls, removal and disposing of asphalt, and establishment of soil management area(s).
- Dewatering, including pumping, system maintenance, and treatment of dewatering effluent. The normal river level is below the pipe invert elevations. However, the flow rate into the dewatering systems is expected to increase during periods of higher water (not necessarily flooding conditions). This is particularly true for HD-38 and HD-47, which are deeper than the other pipes.
- Utility location, including ground penetrating radar (GPR) survey and potholing to confirm GPR results.

- Restoration of surface conditions to meet pre-existing elevations and materials (i.e., asphalt pavement at least 3 in. thick).
- As-built survey and drawings and LEP documentation and certification for the work.

## 5. COST ESTIMATE

The estimated cost of the work described in Section 4 is about $2.65 million. Table 2 provides a further breakdown of the cost estimate. The estimate carries a 40% contingency, which reflects the conceptual level of project development at present. The cost estimate does not include disposal of asbestos-containing materials, any other hazardous building materials, or hazardous materials within the existing lines. The cost estimate assumes that the excavated soils can be reused as backfill. If environmental testing indicates that the soil cannot be reused as backfill, we estimate the additional cost to dispose of soil offsite and backfill the excavations with imported fill is $550,000.

**Table 2. Cost estimate for utility abandonment and penetration removal.**

| Item | Cost |
|---|---|
| Mobilization and demobilization | $25,000 |
| Site preparation | $70,000 |
| Dewatering and treatment of effluent | $115,000 |
| Utility location | $70,000 |
| Excavate, clean, and bulkhead pipes | $660,000 |
| Fill pipes and valve chambers | $175,000 |
| Miscellaneous encroachment removal | $30,000 |
| Tunnel re-backfilling | $400,000 |
| As-builts | $20,000 |
| Restoration of surface conditions | $10,000 |
| LEP services | $42,000 |
| **Subtotal:** | **$1,617,000** |
| Overhead, profit, insurance, and payment bond (17%) | $274,890 |
| **Subtotal:** | **$1,891,890** |
| Contingency (40%) | $756,756 |
| **Estimated total construction cost:** | **$2,648,646** |

We estimate that the design, permitting, and bidding of this work will take approximately eighteen months, and construction will take about nine months. Assuming a start of design work in August 2025 and an escalation rate of 3.1% per year, the estimated construction cost escalated to the midpoint of the estimated nine-month construction duration is $2.85 million.

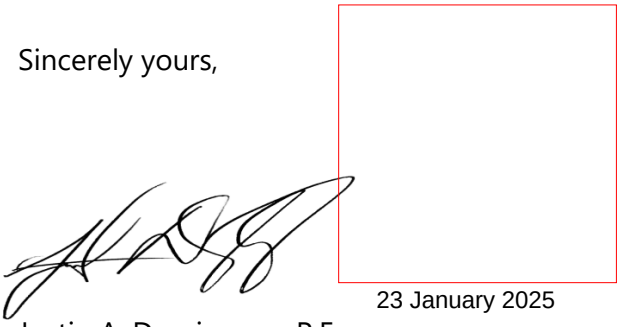
The cost estimate does not include design and permitting for the work. Permits that may be required include:

- USACE Section 404 Discharge of Dredged or Fill Material into Waters of the U.S.
- USACE Section 408 Request to Alter a USACE Civil Works Project, including a statement of no objection from the City of Hartford.
- CT DEEP Section 401 Water Quality Certification.
- CT DEEP Dam Safety Permit.
- CT DEEP General Stormwater Permit.
- Temporary release from the Environmental Land Use Restrictions by CT DEEP Remediation Division.
- GHFC permit.

## 6. LIMITATIONS

These construction cost estimates presented herein are opinions of the probable construction cost made by an engineering consultant. Neither the client nor SGH has control over the cost of labor, equipment, materials, or the contractor's means and methods of determining constructability, pricing, or schedule. These opinions of probable construction costs are based on our reasonable professional judgment and experience and do not constitute a warranty, express or implied, that contractor bids or negotiated prices for the work will not vary from those provided herein.

Sincerely yours,

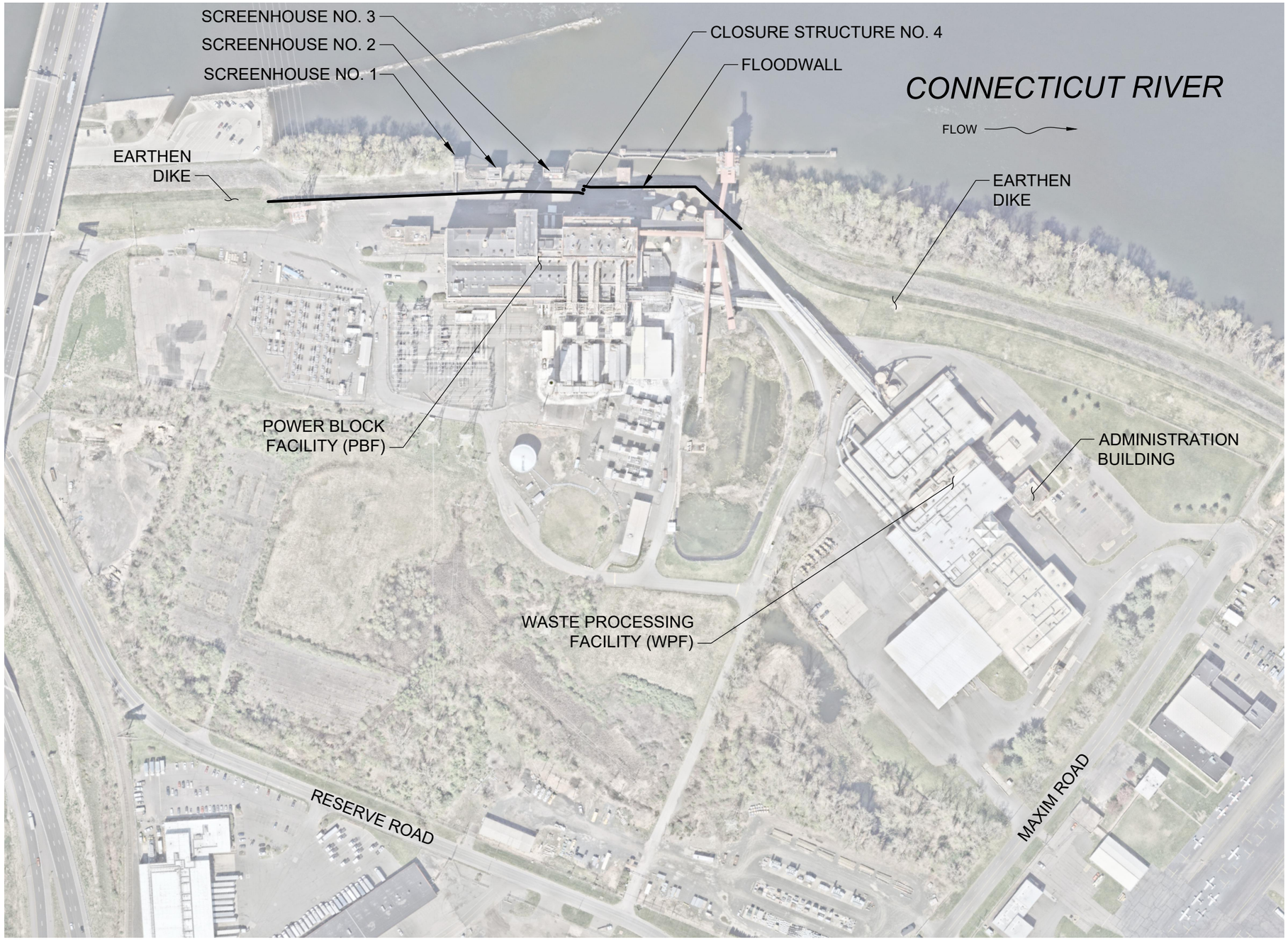



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Encls.
cc: Robert Carr, P.E., LEP, Weston & Sampson



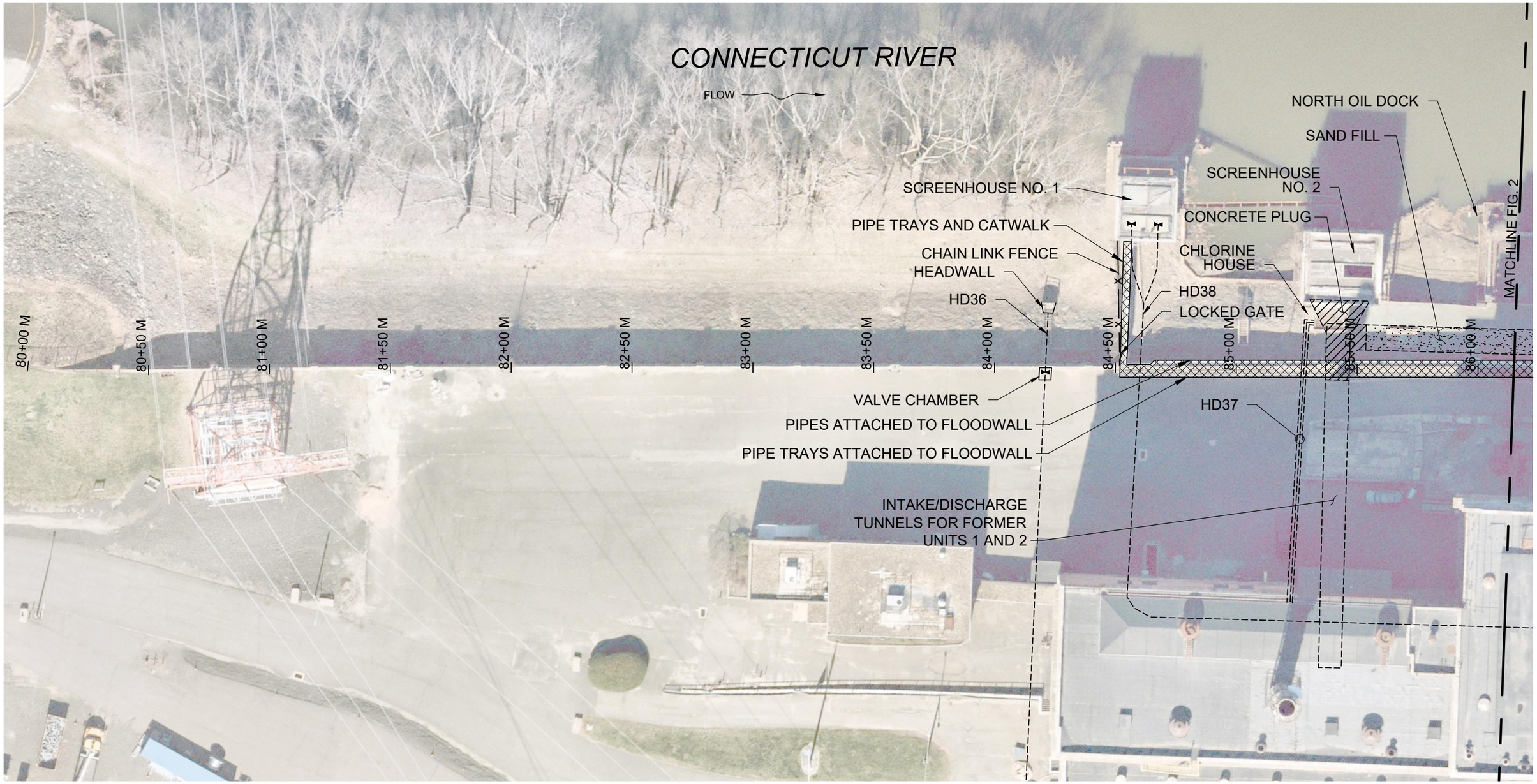

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0 125' 250' 500' 750' 1000'

1" = 250'-0"

SIMPSON GUMPERTZ & HEGER
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Waltham, MA 02451
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sgh.com

| | | | | | |
|---|---|---|---|---|---|
| Project: MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION ABANDONMENT AND ENCROACHMENT REMOVAL | | | | Drawing No.: | FIG. 1 |
| Title: SITE PLAN | | | | Scale: | 1" = 250'-0" |
| Drawn: RKP | Checked: JAD | Approved: BPS | Project No.: 240840 | Date: | 9/13/2024 |




NOTES:
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2. LOCATIONS AND FLOOD CONTROL SYSTEM STATIONING HAVE NOT BEEN VERIFIED WITH SITE SURVEY AND THEREFORE, SHOULD BE CONSIDERED APPROXIMATE.

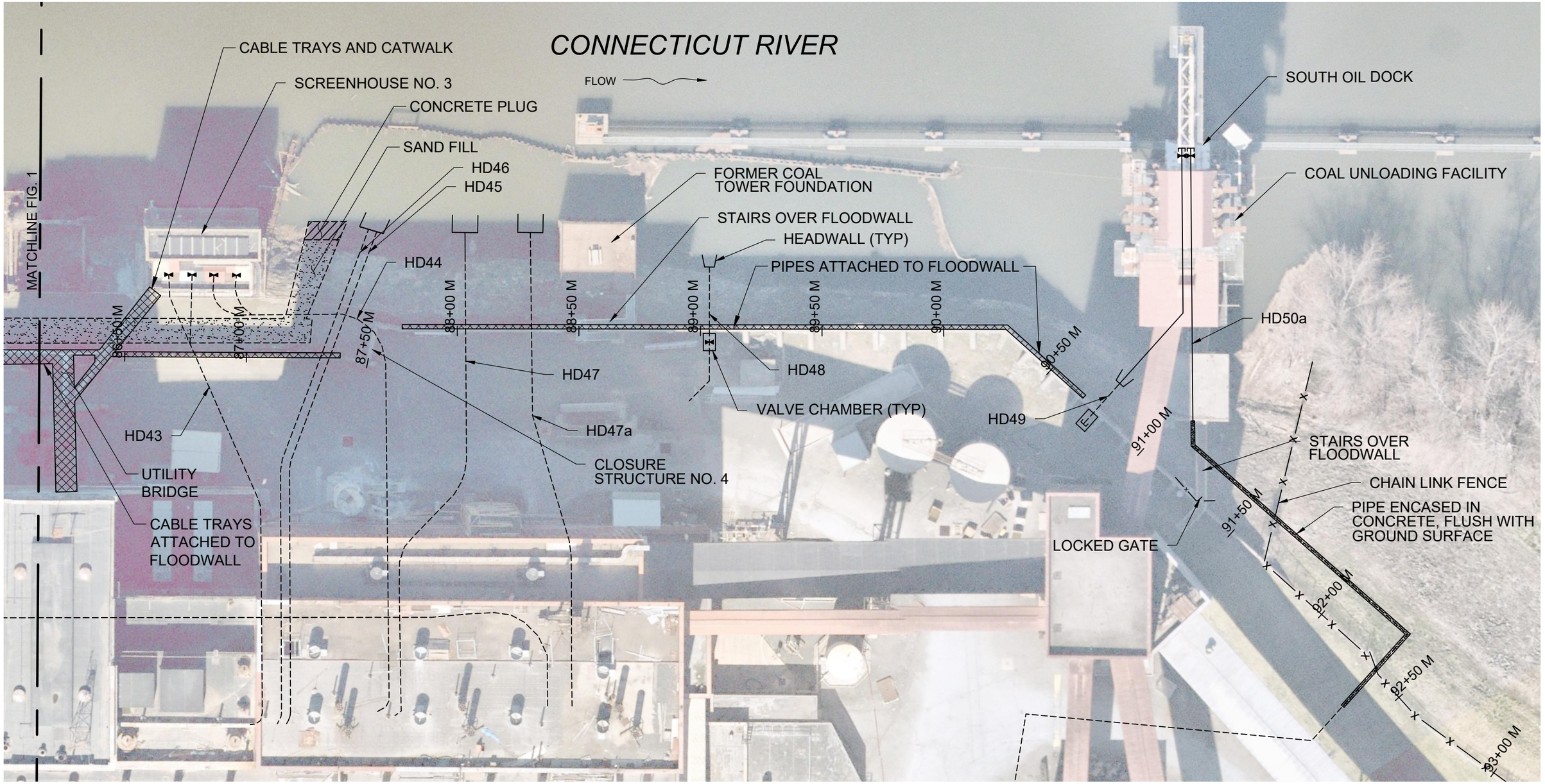
LEGEND:
- BELOW GROUND PIPE
- ABOVE GROUND PIPE
- GATE VALVE
- BLIND FLANGE

0 20' 40' 80' 120' 160'

1" = 40'-0"

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| | | | | |
|---|---|---|---|---|
| Project: MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION ABANDONMENT AND ENCROACHMENT REMOVAL | | | | Drawing No.: FIG. 2 |
| Title: PENETRATION LOCATIONS | | | | Scale: 1" = 40'-0" |
| Drawn: RKP | Checked: JAD | Approved: BPS | Project No.: 240840 | Date: 10/2/2024 |




NOTES:
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2. LOCATIONS AND FLOOD CONTROL SYSTEM STATIONING HAVE NOT BEEN VERIFIED WITH SITE SURVEY AND THEREFORE, SHOULD BE CONSIDERED APPROXIMATE

LEGEND:
- BELOW GROUND PIPE
- ABOVE GROUND PIPE
- GATE VALVE
- BLIND FLANGE

0 20' 40' 80' 120' 160'

1" = 40'-0"

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| | |
|---|---|
| Project: | MIRA DISSOLUTION AUTHORITY FLOODWALL PENETRATION ABANDONMENT AND ENCROACHMENT REMOVAL |
| Title: | PENETRATION LOCATIONS |
| Drawn: | RKP |
| Checked: | JAD |
| Approved: | BPS |
| Project No.: | 240840 |
| Drawing No.: | FIG. 3 |
| Scale: | 1" = 40'-0" |
| Date: | 10/2/2024 |

# APPENDIX F

SUBSTATION RELOCATION COST ESTIMATE

TETRA TECH

March 7, 2025

Robert J. Carr, PE, LEP
Senior Technical Leader
Weston & Sampson
712 Brook Street, Suite 103
Rocky Hill, CT 06067

RE: **Substation Relocation Cost Estimate Study**
MIRA Dissolution Authority
SOUTH MEADOWS REDEVELOPMENT CONSIDERATIONS
OPINION OF COST ESTIMATE UPDATE
Hartford, Connecticut

Further to our initial letter sent on January 31, 2025, regarding the substation relocation cost estimate study, we have conducted a study-level opinion-of-cost exercise based on Weston & Sampson's instructions. The estimate is prepared for the newly proposed location at Parcel 1, as requested. Please find attached a **conceptual site layout** illustrating the relocation plan.

**Key Considerations for Parcel 1 Development**

During our review, we identified several potential challenges with using **Parcel 1** for future substation development:

- **Aviation Restrictions** – A small airport is located near the proposed site, which may impose height limitations on transmission structures due to aviation safety regulations. Further investigation is required to confirm these restrictions.
- **Stormwater Detention Basin** – A stormwater detention basin exists within the proposed area, and modifications may require replacement or reconfiguration. This reduces the amount of usable land available for the new substation.
- **Existing Overhead Lines** – Several existing transmission and distribution lines run through the area. Placing a new substation here would necessitate extensive re-routing of these lines, increasing costs and introducing the risk of temporary power disruptions.

**Opinion of Cost Estimate**

The estimated cost for the substation relocation is summarized below:

| Substation Name | Engineering, Procurement and Construction Management | Procurement for Equipment and Materials | Construction Work | Testing, Commissioning & Hand-over | Other and Staging | Total Including Contingency, Escalation and IDC |
|---|---|---|---|---|---|---|
| **115 kV Switchyard** | $13,700,000 | $6,500,000 | $15,700,000 | $1,600,000 | $7,100,000 | **$ 44,600,000** |
| **23 kV Switchyard** | $35,400,000 | $20,600,000 | $39,000,000 | $5,600,000 | $10,900,000 | **$ 111,500,000** |
| | | | | | **TOTAL** | **$ 156,100,000** |

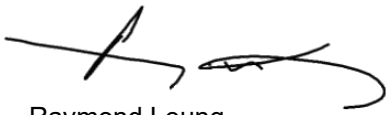
**Basis of Estimate**

- The estimate is classified as an AACE Class 5 estimate, with an accuracy range of -50% to +100%, suitable for conceptual-level planning.
- 2025 cost rates for Hartford, Connecticut, were used, referencing RSMeans Cost Indexes and standard cost databases.
- Contingency factors of 40% for material costs and 50% for construction activities have been applied to account for project uncertainties.
- The estimate is based on existing site photos and Google Earth analysis; no formal design or geotechnical studies have been completed.
- Demolition and reclamation allowances have been included for the existing substation sites.
- Engineering, Procurement & Construction Management (EPCM) costs have been estimated as a percentage of total project costs.

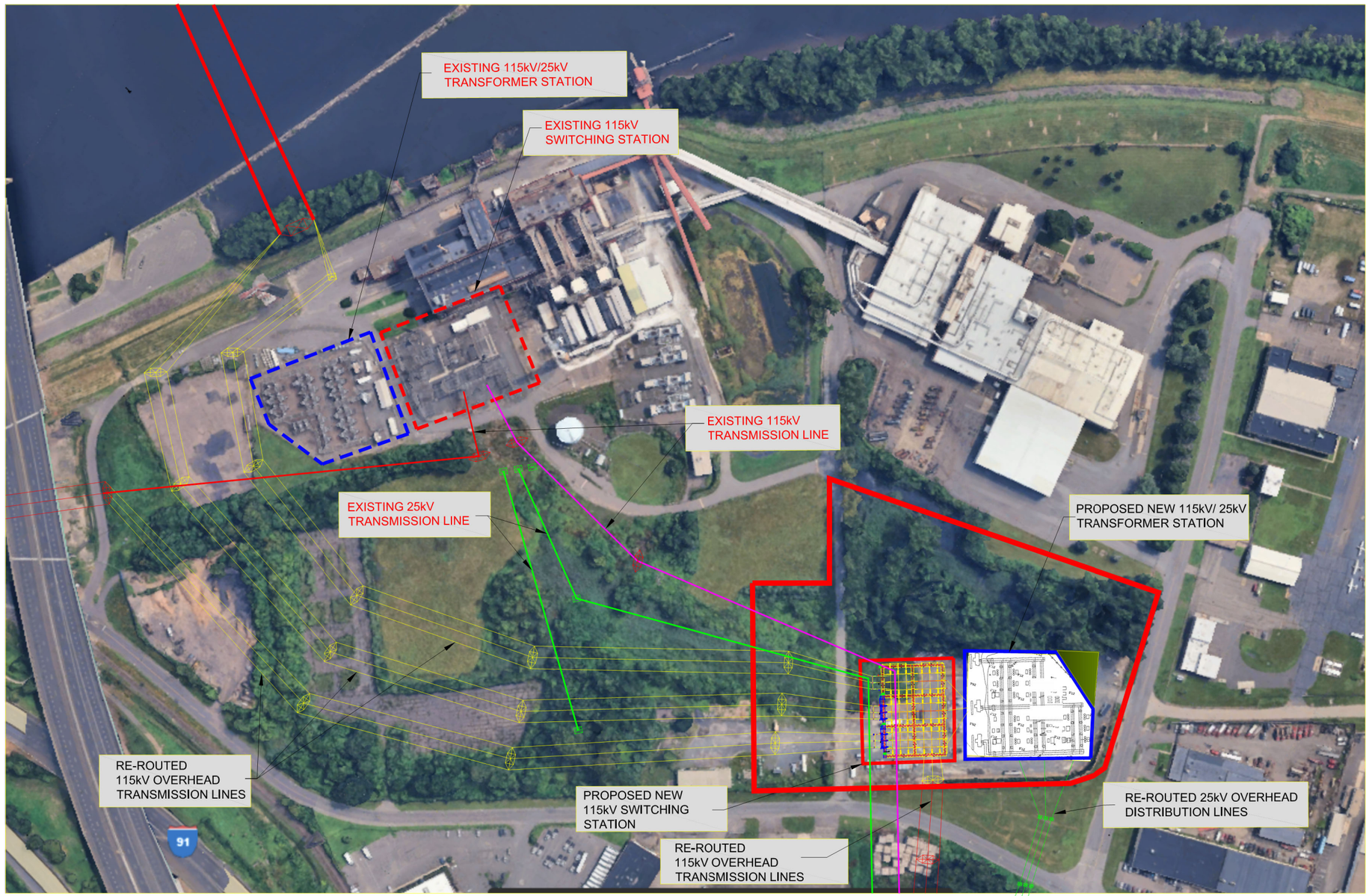
Given the high-level nature of this estimate and the challenges associated with Parcel 1, further refinement will be necessary as the project develops. We look forward to discussing the next steps and any additional requirements.

Please let us know if you need further clarifications.

Sincerely,
**Tetra Tech**



Raymond Leung
Director of Engineering, Power




LEGENDS:

- EXISTING 115kV TRANSMISSION LINE
- EXISTING 115kV OVERHEAD TRANSMISSION LINE
- EXISTING 25kV OVERHEAD TRANSMISSION LINE
- (PROPOSED) RE-ROUTED 115kV TRANSMISSION LINE
- (PROPOSED) RE-ROUTED 25kV DISTRIBUTION LINE
- PARCEL 1 BORDER
- (PROPOSED) NEW 115KV SWITCHING STATION
- (PROPOSED) NEW 115kV/25kV TRANSFORMER STATION
- EXISTING TRANSMISSION STRUCTURE
- EXISTING DISTRIBUTION STRUCTURE

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION

TETRA TECH

DOCUMENT CONTROL NUMBER
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| A | ISSUED FOR REVIEW | AK | AK | RL | RL | 2025-02-28 |

| | | | |
|---|---|---|---|
| SCALE: NONE | | | DATE |
| DESIGNED BY: | A. KWONG | | 2025-01-31 |
| DRAWN BY: | A. KWONG | | 2025-01-31 |
| CHECKED BY: | R. LEUNG | | 2025-01-31 |
| APPROVED BY: | R. LEUNG | | 2025-01-31 |
| CLIENT APPROVAL: | | | |

# MIRA SUBSTATION RELOCATION STUDY - CONCEPTUAL SITE PLAN

| DRAWING NUMBER | REV. |
|---|---|
| SK-00001-00 | A |

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# APPENDIX G

POTENTIAL FUNDING

| Grant Name | Source Type | URL | Short Description & Details | EligibleStates | Recurrence |
|---|---|---|---|---|---|
| Bring Back the Natives Grant Program | Federal | www.nfwf.org/bbn | Offered by National Fish and Wildlife Foundation (NFWF)<br><br>Funds on-the-ground efforts to restore native aquatic species to their historic range. Projects should involve partnerships between communities, agencies, private landowners, and organizations that seek to rehabilitate streamside and watershed habitats.<br><br>Timing: Pre-proposal Due Date: January of each year; Full Proposal Due Date: March of each year<br><br>Pre-proposal due June 3, 2021.<br><br>Eligible non-federal matching sources can include cash, in-kind donations, and/or volunteer labor which are directly related to the project proposed for funding. | All | Yearly |
| Brownfields Assessment Grants - U.S. EPA | Federal | www.epa.gov/brownfields/types-epa-brownfield-grant-funding | Assessment Grants provide funding for brownfield inventories, planning, environmental assessments, and community outreach. Applicant cannot be responsible for contamination<br><br>Community-wide Assessment Grants<br><br>A Community-wide Assessment Grant is appropriate when a specific site is not identified and the applicant plans to spend grant funds on more than one brownfield site in its community.<br><br>An applicant may request up to $300,000 to assess sites contaminated by hazardous substances, pollutants, contaminants (including hazardous substances co-mingled with petroleum), and/or petroleum. | ALL | Yearly |
| Brownfields Cleanup Grants - U.S. EPA | Federal | https://www.epa.gov/brownfields/brownfields-and-land-revitalization-connecticut-maine-massachusetts-new-hampshire-rhode | Cleanup Grants provide funding to eligilble entities to carry out cleanup activities at brownfield sites owned by the applicant. Must own site and cannot be liable for contamination (due diligence requirements) / Sites where Cleanup Grant funds were previously expeneded may NOT receive additional funding<br><br>An applicant may request up to $500,000 to address one brownfield site, or multiple brownfield sites, contaminated by hazardous substances, pollutants, contaminants (including hazardous substances co-mingled with petroleum), and/or petroleum.<br><br>Applicants may submit one Cleanup Grant proposal each competition cycle. | ALL | Yearly |
| Brownfields Multipurpose Grants - U.S. EPA | Federal | https://www.epa.gov/brownfields/brownfields-and-land-revitalization-connecticut-maine-massachusetts-new-hampshire-rhode | Multipurpose (MP) Grants provide funding to conduct a range of eligible assessment and cleanup activities at one or more brownfield sites in a target area. The target area may not include communities that are located in distinctly different geographic areas. Must own a site and cannot be liable for contamination (due diligence requirements) where Cleanup activites may be conducted<br><br>Grant Application Recurrance = Every Other Year<br><br>An applicant can apply for up to $800,000 and should demonstrate how grant funds will result in at least:<br><br>one Phase II environmental site assessment; | ALL | Every Other Year |
| Brownfields Revolving Loan Fund (RLF) Grants - U.S. EPA | Federal | https://www.epa.gov/brownfields/brownfields-revolving-loan-fund-rlf-grants | Revolving Loan Fund (RLF) Grants provide funding to capitalize a revolving loan fund and to provide subgrants / loans that are used to clean up brownfield sites.<br><br>GRANTS APPLICATION REOCCURANCE = EVERLY OTHER YEAR<br><br>Through these grants, EPA strengthens the marketplace and encourages stakeholders to leverage resources to clean up and redevelop brownfields. When loans are repaid, the loan amount is returned into the fund and re-lent to other borrowers, providing an ongoing source of capital within a community.<br><br>An eligible RLF Grant applicant may apply as an individual entity or as a RLF Coalition comprised of two or more entities. A RLF Grant applicant may apply for up to $1,000,000 to address brownfield sites contaminated by hazardous substances, pollutants, contaminants (including hazardous substances co-mingled with petroleum), and/or petroleum.<br><br>Some features of the RLF Grants include: | ALL | Every Other Year |

| Grant Name | Source Type | URL | Short Description & Details | EligibleStates | Recurrence |
|---|---|---|---|---|---|
| Building Resilent Infrastructure and Communities Program (BRIC) | Federal | Ct.gov | | Connecticut | Rolling |
| Building Resilient Infrastructure and Communities (BRIC) | Federal | | Offering Agency - Federal Emergency Management Agency (FEMA)<br><br>Partnership: State emergency management office<br><br>Deadlines: Multiple and depends upon state. In Massachusetts, Statement of Interests are due October 15th, the BCA is due November 15th, and the full FEMA GO application is due December 6th.<br><br>Match: may be lower for low-income or rural communities<br><br>Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program.<br><br>Assessment - design - construction - hazard mitigation - flooding - green infrastrucuture - resilience - resilient - planning | All | Yearly |
| Building Resilient Infrastructure and Communities (BRIC) - FEMA | | | Provides support for states and local communities on hazard mitigation projects, reducing the risks they face from disasters and natural hazards. Funding may be used for capability and capacity building activities, mitigation projects, and management costs. Award Amount: $1,000,000<br><br>Guiding Principles:<br><br>•Supporting communities through capability- and capacity-building<br><br>•Encouraging and enabling innovation<br><br>•Promoting partnerships<br><br>•Enabling large projects<br><br>•Maintaining flexibility<br><br>•Providing consistency | e Agency and Municpa | Yearly |
| CDBG Block Grants | Federal | https://www.cdbgsc.com/ | Most CDBG funds are awarded competitively.<br><br>2 funding rounds per year. March request/April submittal. Aug request/Sept submittal<br><br>Application requests must be submitted at least 30 days prior to application deadline. | | Yearly |
| Climate Program Office (NOAA) | Federal | https://cpo.noaa.gov/Funding-Opportunities/FY-2021-Notice-of-Funding-Opportunity | climate research, essential oceanic and atmospheric observations, modeling, information management, assessments, interdisciplinary decision support research, outreach, education, and stakeholder partnership development. 1) Improved scientific understanding of the changing climate system and its impacts; 2) Assessments of current and future states of the climate system that identify potential impacts and inform science, service, and stewardship decisions; 3) Mitigation and adaptation choices supported by sustained, reliable, and timely climate services; and 4) A climate-literate public that understands its vulnerabilities to a changing climate and makes informed decisions.<br><br>Contact/ Assistance: NOAA Climate Program Office FY 2014/ Please visit the CPO website for further information http://www.climate.noaa.gov/ or contact the CPO Grants Manager, Diane Brown, by mail (see address above) or at <diane.brown@noaa.gov>. Please allow up to two weeks after receipt for a response.<br><br>Timing: Letters of Intent for all Competitions sAugust 2016 Closing Date for Applications: variable | All | |
| Coastal and Estuarine Land Conservation Program - CELCP | Federal | https://coast.noaa.gov/czm/landconservation/applying/ | protecting important coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion from their natural, undeveloped, or recreational state to other uses. Purposes include: Safeguarding coastal water quality;<br><br>Contact/Assistance: Federal Agency Name(s): National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce/ The CELCP Guidelines can be found at http://coastalmanagement.noaa.gov/land/media/CELCPfinal02Guidelines.pdf.<br><br>CELCP plan is available at http://coastalmanagement.noaa.gov/land/media/CELCPplans_web.pdf<br><br>NOAA will evaluate it for readiness and feasibility of completion within an 18 month timeframe<br><br>Timing: October1 | Coastal States | Yearly |
| Community Placemaking Grants | | https://www.pps.org/community-placemaking-grants | Enable US-based nonprofits and governments agencies to address this inequality of access by working directly with local stakeholders to transform public spaces or co-create new ones.<br><br>This year's round is for Arkansas (2024). | ALL | Yearly |
| CT - Brownfield Area-Wide Revitalization (BAR) Planning Grants | State | Ct.gov | | Connecticut | Rolling |

| Grant Name | Source Type | URL | Short Description & Details | EligibleStates | Recurrence |
|---|---|---|---|---|---|
| CT - Brownfield Municipal Grant Program | | https://portal.ct.gov/DECD/Content/Community-Development/03_Funding_Opportunities/Brownfields-Remediation/Brownfield-Municipal-Grant-Program | The Brownfield Municipal Grant Program is a competitive program for municipalities and municipal entities, designed to assist with brownfield redevelopment projects in their communities that will make a significant economic impact. Only municipalities and municipal entities are eligible to apply.<br><br>Please refer to the NOFA posted for each competitive round for details on allowable funding amounts, award criteria, deadlines for submission and other information. Some of the general criteria that will be used to review the applications include:<br><br>Shovel-readiness and merits of project<br><br>The economic and community development impact of the project and the projected tax revenues associated with returning a brownfield to productive use | Connecticut | Custom (set your round dates) |
| CT - Energy Conscious Blueprint | State | uinet.com | | Connecticut | Rolling |
| CT - Energy Opportunities | State | uinet.com | | Connecticut | Rolling |
| CT - Energy Rebates | State | uinet.com | | Connecticut | Rolling |
| CT - Local Bridge Program | State | ctgov.com | | Connecticut | Rolling |
| CT - Local Capital Improvment Program (LoCIP) | State | Ct.gov | | Connecticut | Rolling |
| CT - Local Transportation Capital Improvment Program (LOTCIP) | State | Ctgov.com | | Connecticut | Rolling |
| CT - Recreational Trails Program | Federal | https://portal.ct.gov/DEEP/Outdoor-Recreation/Trails/CRT--Funding | Construction of new trails, maintenance and restoration of existing trails, purchase or lease of equipment, acquisition of trail easements, and developing trail access for people with disabilities. | Connecticut | Every Other Year |
| CT - Responsible Growth & Transit Oriented Develoment (RGTOD) Grant | State | Ct.gov | | Connecticut | Rolling |
| CT - Small Town Economic Assistance Program (STEAP) | State | https://portal.ct.gov/OPM/Bud-Other-Projects/STEAP/STEAP_Home | Preserving the historical integrity and beauty of our small towns is vital to our economy and quality of life. The Small Town Economic Assistance Program (CGS Section 4-66g) funds economic development, community conservation and quality-of-life capital projects for localities that are ineligible to receive Urban Action (CGS Section 4-66c) bonds. This program is managed by the Office of Policy and Management, and the grants are administered by various state agencies. | Connecticut | Every Other Year |
| CT - Targeted Brownfield Development Loan Program Summary | State | https://portal.ct.gov/DECD/Content/Community-Development/03_Funding_Opportunities/Brownfields-Remediation/Targeted-Brownfield-Development-Loan-Program | Potential brownfield purchasers and current brownfield owners (including municipalities and economic development agencies) | Connecticut | Rolling |
| CT - Transit-Oriented Development Fund | State | Ct.gov | | Connecticut | Rolling |
| CT - Urban Act Grant Program | State | Ct.gov | | Connecticut | Yearly |
| CT - Urban Act Grants | State | Ct.gov | | Connecticut | Rolling |
| Economic Adjustment (water,sewer) | Federal | https://eda.gov/funding-opportunities/ | Assists state and local interests in designing and implementing strategies to adjust or bring about change to an economy. The program focuses on areas that have experienced or are under threat of serious structural damage to the underlying economic base.<br><br>How to apply: Application packages are available at www.grants.gov. Applications will be accepted on an ongoing basis until the publication of a new EDAP FFO. | All | Rolling |
| Emergency Community Water Assistance Grants (water) | Federal | https://www.rd.usda.gov/programs-services/emergency-community-water-assistance-grants | This grant program is designed to assist rural communities that have experienced a significant decline in quantity or quality of drinking water due to an emergency, or in which such decline is considered imminent, to obtain or maintain adequate quantities of water that meets the standards set by the Safe Drinking Water Act.<br><br>Applications are accepted on a rolling basis. Paper applications are accepted, or applicants can register for and use RD Apply. Information is available here: http://www.rd.usda.gov/programs-services/rd-apply | All | Rolling |
| Environmental Education Grants | Federal | https://www.epa.gov/education/environmental-education-ee-grants | Educational Institution, Nonprofit Groups, State/Territorial Agency, Tribal Agency; to support environmental education projects that promote environmental stewardship and help develop knowledgeable and responsible students, teachers, and citizens. This grant program provides financial support for projects that design, demonstrate, and/or disseminate environmental education practices, methods, or techniques as described in the solicitation notices<br><br>Contact/ Assistance: contact your regional coordinator: http://www.epa.gov/enviroed/grants_contacts.html U.S. Environmental Protection Agency<br><br>1200 Pennsylvania Avenue, N.W. (1704A)<br><br>Washington, DC 20460<br><br>https://www.epa.gov/education/forms/contact-us-about-environmental-education-0<br><br>Timing:Usually in spring; sometimes a second round in the fall | All | Yearly |
| Federal Aid in Sport Fish Restoration Act | Federal | Ct.gov | | Connecticut | Rolling |
| Federal Aid in Wildlife Restoration Act | Federal | Ct.gov | | Connecticut | Rolling |
| Federal Land & Water Conservation Fund | Federal | https://www.blm.gov/programs/land-and-water-conservation-fund | Funding for the acquisition, development, and renovation of parks, trails, and conservation areas.<br><br>Contact your local BLM office for more information about the LWCF or to nominate land for acquisition. | All | Rolling |

| Grant Name | Source Type | URL | Short Description & Details | EligibleStates | Recurrence |
|---|---|---|---|---|---|
| Five-Star Restoration Program | Federal | https://www.nfwf.org/programs/five-star-and-urban-waters-restoration-grant-program/five-star-and-urban-waters-restoration-grant-program-2021-request-proposals | groups then make subgrants to support community-based wetland and riparian restoration projects. Competitive projects will have a strong on-the-ground habitat restoration component that provides long-term ecological, educational, and/or socioeconomic benefits to the people and their community. Preference will be given to projects that are part of a larger watershed or community stewardship effort<br><br>Contact: U.S. Environmental Protection Agency<br><br>Room 6105 (4502 T)<br><br>USEPA Wetlands Division<br><br>Ariel Rios Bldg., 1200 Pennsylvania Ave., NW<br><br>Washington, DC 20460 www.epa.gov/wetlands/restore/5star/ | All | Yearly |
| Flood Mitigation Assistance (FMA) | Federal | http://www.fema.gov/government/grant/pdm/ | Implement cost-effective measures that reduce or eliminate the long-term risk of flood damage - Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. | Connecticut | Yearly |
| Flood Mitigation Assistance Program | Federal | http://www.fema.gov/flood-mitigation-assistance-program | The Flood Mitigation Assistance (FMA) program provides funding to states, federally-recognized Indian tribal governments, and communities so that cost-effective measures are taken to reduce or eliminate the long-term risk of flood damage. Communities typically apply as subgrantees through their respective States.<br><br>Assistance: http://www.fema.gov/media-library/assets/documents/33634?id=7851<br><br>Timing- March 13 | All | |
| Hazard Mitigation | Federal | Ctgov.com;FEMA.com | | Connecticut | Rolling |
| Hazard Mitigation Grant Program (HMGP) | Federal | https://riema.ri.gov/planning-mitigation/resources-rhode-island-citizens/hazard-mitigation | Provides funding after a disaster to significantly reduce or permanently eliminate future risk to lives and property from natural hazards | Connecticut | Rolling |
| Healthy Communities Grant Program | Federal | https://www.epa.gov/newenglandhc/healthy-communities-grant-program-new-england | The Healthy Communities Grant Program will identify and fund projects that:<br><br>Target resources to benefit communities at risk (environmental justice areas of potential concern and/or sensitive populations [e.g., children, elderly, tribes, urban and rural residents, and others at increased risk]).<br><br>Assess, understand, and reduce environmental and human health risks.<br><br>Increase collaboration through partnerships and community-based projects.<br><br>Build institutional and community capacity to understand and solve environmental and human health problems | MA, NH, RI, VT, Trib | Yearly |
| Nation Fish Habitat Action Plan | Federal | Ct.gov | | Connecticut | Yearly |
| National Fish Passage Program | Federal | Ct.gov | | Connecticut | Yearly |
| NAWCA Small Grants | Federal | https://www.fws.gov/birds/grants/north-american-wetland-conservation-act/small-grants.php | public-private partnerships carrying out projects in the United States that further the goals of the North American Wetlands Conservation Act (Act). These projects must involve long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats for the benefit of all wetlands-associated migratory birds.<br><br>Contact/Assistance: Fish and Wildlife Service/ Small Grants Program Coordinator, Rodecia McKnight (rodecia_mcknight@fws.gov), (703) 358-2266<br><br>https://www.fws.gov/migratorybirds/pdf/grants/ProposalInstructions.pdf<br><br>https://www.fws.gov/migratorybirds/pdf/grants/ProposalInstructions.pdf | All | Yearly |
| NOAA Climate Resilience Regional Challenge Grant | Federal | https://www.grants.gov/web/grants/view-opportunity.html?oppId=348810 | The NOAA Climate Resilience Regional Challenge (Challenge) will support collaborative approaches to achieving resilience in coastal regions with an emphasis on risk reduction, regional collaboration, equity, and building enduring capacity. The Challenge is a $575 million competition with a Letter of Intent phase and two exclusive funding tracks designed to meet the needs of coastal communities wherever they are in the resilience and adaptation process. Regional Collaborative Building and Strategy Development (Track One) supports building capacity for, development of, and collaboration on transformational resilience and adaptation strategies for coastal communities. Successful applicants will receive $500,000 to $2,000,000 to support regional scale coordination, engagement, planning, advancement of equitable outcomes, and capacity building for resilience and adaptation. Total funding for all Track One awards may be up to $25 million. Implementation of Resilience and Adaptation Actions (Track Two) supports implementation of transformational resilience and adaptation strategies and associated actions for coastal communities anchored in previous planning efforts. Applicants must propose a suite of complementary adaptation actions that together build the resilience of multiple communities within a coastal region, including those that have been marginalized, underserved, or underrepresented. Applicants can apply for not less than $15,000,000 and not more than $75,000,000, with most awards being between $25,000,000 and $50,000,000. Total funding available for all Track Two awards is up to $550,000,000. | Coastal States | Yearly |

| Grant Name | Source Type | URL | Short Description & Details | EligibleStates | Recurrence |
|---|---|---|---|---|---|
| Public Works (water, sewer) | Federal | https://www.eda.gov/pdf/about/Public-Works-Program-1-Pager.pdf | Empowers distressed communities to revitalize, expand, and upgrade their physical infrastructure, and generate or retain long-term, private sector jobs and investment.<br><br>Application packages are available at www.grants.gov. Applications will be accepted on an ongoing basis until the publication of a new EDAP FFO. | All | Rolling |
| Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Discretionary Grants (Previously BUILD and TIGER) | Federal | | Provides support for road, rail, transit and port projects that promise to achieve national objectives and have significant local or regional impacts. Eligible projects include capital projects and planning projects (planning, preparation, or design) wide ranging. Projects that replace or rehabilitate a culvert or prevent stormwater runoff for the purpose of improving habitat for aquatic species while advancing the goals of the RAISE program are also eligible.<br><br>Projects evaluated on:<br><br>•Safety<br><br>•Environmental sustainability<br><br>•Quality of life<br><br>•Economic competitiveness and opportunity<br><br>•State of good repair | All | Yearly |
| Reconnecting Communities Pilot Program – Planning Grants and Capital Construction Grants | Federal | | Federal program dedicated to reconnecting communities that were previously cut off from economic opportunities by transportation infrastructure. Funding supports planning grants and capital construction grants, as well as technical assistance, to restore community connectivity through the removal, retrofit, mitigation, or replacement of eligible transportation infrastructure facilities.<br><br>https://www.transportation.gov/grants/reconnecting-communities<br><br>Go to www.transportation.gov/reconnecting and sign up for email updates to get information when the application opens up in 2024 for the next round of funding.<br><br>Has 2 more years to go - Ends 2026. | All | Yearly |
| Rivers and Harbors Grant Program | Federal | | Grants requiring matching funds for studies, surveys, design & engineering, environmental permitting and construction that addresses problems on coastal & inland waterways, lakes, ponds and great ponds. categories: 1) Coastal Waterways - for commercial and recreational navigation safety & to improve coastal habitat by improving tidal interchange; 2) Inland Waterways - to improve recreational use, water quality & wildlife habitats; 3) Erosion Control - to protect public facilities and reduce downstream sedimentation; 4) Flood Control - to reduce flood potentials. | Coastal States | Rolling |
| Small Flood Damage Reduction Projects (CAP Section 205) | Federal | http://www.nae.usace.army.mil/Missions/PublicServices/ContinuingAuthoritiesProgram/Section205.aspx | local protection from flooding by the construction or improvement of structural flood damage reduction features such as levees, channels, and dams. Non-structural alternatives are also considered<br><br>Contact/ Assistance: Conservation Engineering Division/ Chris Hatfield of the Special Studies Section at 978-318-8520.<br><br>Timing: Initiation letter at any time | All | Rolling |
| Solid Waste Management Grant | Federal | usda.gov | | ALL | Yearly |
| Surface Transportation Block Grant (STBG) Program | Federal | https://www.fhwa.dot.gov/bipartisan-infrastructure-law/stbg.cfm | Projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. | Connecticut | Rolling |
| TD Green Space Grant | Private | https://www.arborday.org/programs/TDGreenSpaceGrants/grant-information.cfm | TD Green Space Grants support green infrastructure development, tree planting, forestry stewardship, and community green space expansion as a way to advance environmental and economic benefits toward a low-carbon economy. Through the program, municipalities in the United States and Canada are eligible to receive $20,000 (USD) – $25,000 (CAD) grants in support of local forestry projects in areas of great need within a community.<br><br>To be eligible for a TD Green Space Grant, your municipality must meet the following criteria:<br><br>Projects must take place within TD's footprint in the United States or Canada. Preference will be given to projects in areas that primarily serve low- to moderate-income residents or take place in equity-seeking communities.<br><br>Primary applicant must have a vested interest in the success of the project and local connection to the community. Preference will be given to applicants based in the community where the project is taking place.<br><br>Special consideration will be given to those projects that address the current year's program theme, "Using Green Infrastructure to Cool Vulnerable Neighborhoods" | all | Yearly |
| TD Green Streets Grant Program | Private | http://www.arborday.org/programs/tdgreenstreets/grant-information.cfm | grants in support of local forestry projects in low- to moderate-income (LMI) neighborhoods. To be eligible for a TD Green Streets grant, municipalities must be current Arbor Day Foundation Tree City USA®-recognized communities within TD Bank's footprint.<br><br>municipalities must be current Arbor Day Foundation Tree City USA®-recognized communities within TD Bank's footprint | All | Rolling |

# APPENDIX H

DEMOLITION COST STUDY REPORT

MIRA Dissolution Authority

# South Meadows Redevelopment Demolition Cost Estimate

300 Maxim Road | Hartford, Connecticut

**Prepared for: WESTON AND SAMPSON**



PRIVILEGED AND CONFIDENTIAL

PROJECT# 117-085236-24001

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Figure 1 – Site Plan with PBF & WPF


# Attachments


Attachment 1: Detailed Demolition Estimate Summary

# 1. EXECUTIVE SUMMARY

Tetra Tech was tasked with developing a demolition cost estimate for the buildings and structures associated with the MIRA Dissolution Authority South Meadows Redevelopment site (MIRA), located at 300 Maxim Road, Hartford, Connecticut (Site). The Site has a long history dating back to the 1920s when it began as a coal fired power plant (referred to as the Power Block Facility [PBF]), then converted to oil, and natural gas, then in the 1980's, the Waste Processing Facility (WPF) was added to convert waste to energy in the PBF. The site was eventually closed and now awaits some sort of redevelopment.

Tetra Tech's scope of work was to develop a demolition cost estimates for buildings and structures associated with the PBF, and WPF and are listed in Table 2 & Table 3 within this report. The demolition scope of work at the PBF includes all aspects of demolishing the facilities to 4' below existing grade, including asbestos abatement, removal of all hazardous/regulated building materials from all structures, segregating and recycling of all ferrous and non-ferrous metals, removal and disposal of brick, crushing and re-using concrete on-site as fill for sub-grade structures. Demolition at the WPF includes the same as the PBF, except all existing slabs at grade level will be left behind so as not to disturb sub-grade on the southern portion of the Site.

Environmental site remediation (sub-grade) is to be estimated by others. Other details such as specific buildings and structures to be abated and demolished are described in the report.

Tetra Tech was asked to develop a cost scenario to abate all asbestos and hazardous and regulated materials if the buildings were renovated instead of full demolition. We considered this, and determined that this would be difficult to develop without consideration of a myriad of decisions would have to be developed and discussed with the future commercial use to develop a reasonable cost number.

It is our opinion that the costs provided below in line items labelled, ACM / Regulated Materials Abatement - PBF and ACM / Regulated Materials Abatement – WPF would suffice as for either scenario, full demolition of said structures, or some level of asbestos abatement with buildings remaining. At this time, we do not have sufficient information on how some materials would be managed in place for a renovation scenario. We want to point out, that full abatement without demolition is likely not possible, given the configuration of ACMs in the buildings. Here are two examples:

- Tar mastic on concrete under the brick on the admin building – this material would likely be managed in place instead of abatement, because abatement can only be performed if all exterior brick is demolished. Cost for abatement of this material assumes full demolition of this building, if we were to figure abatement of this material without demolition, the costs would be different and much higher.
- 15,000 SF of ACM tar mastic on exterior block of powerblock building. Removal of this material is would not be warranted in a renovation scenario as its likely providing some value as a sealant to the building envelope. And a renovation scenario would likely cover this material in a new more aesthetically pleasing siding. The cost included for abatement of this ACM in this estimate is based on a demolition scenario, if renovation without demolition is chosen, a different abatement method would be required, and the costs and access to abate the material would be much higher.

Tetra Tech developed Class IV estimates in accordance with the AACE International Recommended Practice 18R-97: Cost Estimate Classification System. A Class IV estimate assumes the project maturity level is 1–15% with an expected accuracy low range of -30% to a high range of +50%. The estimates for this site were developed for the scope of work in its current level of study and feasibility, then the low high %'s added as shown below.

The cost estimates for demolition and abatement were separated into two major areas.

- Area 1 – Power Block Facility (PBF)

- Area 2 – Waste Processing Facility (WPF)

Refer to **Figure 1** for the site plan and break point for the two areas. The following table summarizes the total demolition probable costs for the work.

Refer to a rollup of probable demolition costs (**Attachment 1**) that provides additional detail to the cost in Table 1 below.

**Table 1 – Demolition Probable Cost Summary (in USD)**

| | | Class IV Estimate Range | |
|---|---|---|---|
| **Description** | **Total Cost (Forecast)** | **-30%** | **50%** |
| **Total Demolition Project Costs** | **$35,199,882.84** | **$24,639,917.99** | **$52,799,824.26** |
| | | | |
| PLANNING - PRE MOB ACTIVITIES | $110,500.00 | $77,350.00 | $165,750.00 |
| CONTRACTOR ENGINEERING SUPPORT | $65,000.00 | $45,500.00 | $97,500.00 |
| MOBILIZATION & DEMOBILIZATION | $241,550.85 | $169,085.59 | $362,326.27 |
| TEMPORARY FACILITIES | $182,145.60 | $127,501.92 | $273,218.40 |
| SITE SUPERVISION & MANAGEMENT | $3,092,813.44 | $2,164,969.41 | $4,639,220.16 |
| LOTO / AIR GAP | $18,971.21 | $13,279.85 | $28,456.81 |
| MISC MATERIAL SURVEY & SAMPLING | $233,210.80 | $163,247.56 | $349,816.20 |
| ACM / REGULATED MATERIAL ABATEMENT - PBF | $8,719,525.73 | $6,103,668.01 | $13,079,288.60 |
| ACM / REGULATED MATERIAL ABATEMENT - WPF | $317,898.87 | $222,529.21 | $476,848.31 |
| PCB/LEAD IMPACTED STEEL DISPOSAL* | $6,091,624.00 | $4,264,136.80 | $9,137,436.00 |
| DEMOLITION - PBF | $6,808,338.32 | $4,765,836.82 | $10,212,507.48 |
| DEMOLITION - WPF | $2,566,806.16 | $1,796,764.31 | $3,850,209.23 |
| CONTRACTOR MARKUPS | $10,869,367.87 | $7,608,557.51 | $16,304,051.81 |
| **SCRAP CREDIT** | **-$4,117,870.00** | **-$2,882,509.00** | **-$6,176,805.00** |
| PBF | -$3,075,475.00 | -$2,152,832.50 | -$4,613,212.50 |
| WPF | -$1,042,395.00 | -$729,676.50 | -$1,563,592.50 |

* PCBs as well as high concentrations of lead (Pb) have been identified in various green paints throughout the 1920s and 30s powerblock buildings Because of the PCBs in paint (>50 ppm and <500 ppm), the steel with this paint cannot be recycled for scrap credit. Therefore, these metals must be disposed as a PCB bulk product waste. Because the paint has a high concentration of lead (Pb), we believe that lead (Pb) in the paint will be the driver for disposal.

Therefore, the cost for disposal included in this table is reflective of the cost for disposal of 4,340 net tons of steel in a Sub-title C landfill as hazardous waste.

We do believe there are several options to reduce the overall disposal costs of green painted steel from the PBF, however, the cost to explore these options is beyond the scope of this study. These options may include;

- Feasibility of removing green paint from the steel, in place prior to demolition,
  - Using chemical paint removers, or media blasting
  - This PCB and Lead (Pb) paint would be collected and disposed accordingly
  - Thus, allowing the steel to be recycled
- Feasibility of removing green paints from steel after demolition,
  - In a negative pressure enclosure using media blasting

- Using chemical paint removers
- This PCB and Lead (Pb) paint would be collected and disposed accordingly
- Thus, allowing the steel to be recycled

- Treatment of the high concentration lead in paint on the steel to pass a TCLP as it relates to the hazardous waste designation
  - It should be noted, that if this option is chosen, it would still require the steel to be disposed as PCB bulk product waste, resulting in a disposal cost of approximately $3.7 million vs. the $6 million described above.

# 2. INTRODUCTION

Tetra Tech was tasked with developing a demolition cost estimate for the buildings and structures associated with the MIRA Dissolution Authority South Meadows Redevelopment site (MIRA), located at 300 Maxim Road, Hartford, Connecticut (Site). The buildings and structures on the Site make up a shuttered trash-to-energy power plant in the South Meadows Section of Hartford, Connecticut (**Figure 1**). The Site was originally constructed in the 1920s, was originally coal-fired, then transitioned to a combination of oil and coal. In the 1980s, a waste processing facility (WPF) was constructed at the Site, and the power plant was converted for trash-to-energy use. The power plant portion of the site is referred to as the power block facility (PBF) to differentiate it from the WPF. The Facility stopped receiving, processing, and combusting waste in July 2022. Over the life of the Facility, there were six generating units, two of which (Units 5 and 6) were in use when operations ceased.

The Site is located along the west bank of the Connecticut River. In response to the devastating floods in 1936 and 1938, the U.S. Army Corps of Engineers constructed a flood control system to reduce flooding risks. The Hartford Flood Control System (HFCS) consists of earthen dikes, concrete floodwalls, closure structures, and structures to facilitate drainage inside the protected area. The HFCS passes through the Site, with most of the area adjacent to the PBF is a concrete floodwall. Several penetrations through or under the floodwall allow for the passage of intake and outfall pipes associated with the PBF, as well as storm drain piping between the landside and the riverside of the Site.

Tetra Tech's scope of work was to develop demolition cost estimates for select structures and buildings associated with the PBF, and WPF. The demolition scope of work at the PBF includes demolishing the facilities to 4' below the existing grade of approximately 31 feet elevation. The demolition will include asbestos abatement, removal of all regulated wastes, segregating and recycling of all ferrous and non-ferrous metals, removal and disposal of brick, crushing and re-using concrete on-site as fill for sub-grade structures. Demolition at the WPF includes the same as the PBF, except all existing slabs at grade level will be left behind so as not to disturb assumed sub-grade contaminated soils on the southern portion of the Site. All existing pavements, roads, etc. will remain following demolition. Sub-grade basements in PBF will generally be cleaned out, holes will be punched in basements that remain for drainage, and be backfilled with clean recycled concrete generated by the demolition of above grade structures.

The cost estimates for demolition of the existing structures are just part of the overall redevelopment plans and must be viewed as such. Other considerations for environmental site remediation, final site restoration and grading is to be performed by others. Costs for demolition on the riverside of the flood wall is limited to screen houses, barge unloading structure, and some above grade concrete structures. Closure of intake and outfall piping that passes through the floodwall to be performed as a separate project and not included in this demolition estimate. Redevelopment at the site is to be estimated by others.

For a graphic representation of the two demolition areas versus the remaining areas at the MIRA Site, refer to **Figure 1**.

## 2.1 Basis for Demolition Cost Study

This section describes our basis for the demolition cost estimate. It describes what is included and excluded from our estimate, and attempts to provide a basis for the demolition scope of work and how it will interact with the other phases of work such as remediation of the entire MIRA Site, redevelopment at the waterfront of the PBF on the river side, and the west side of the flood wall. It describes what is intended for the switchyard and other areas around the site that are not expected to be disturbed during demolition. It should be noted that these design basis are likely to change as plans for overall site re-development are refined. This is not meant to be the redevelopment plans for the Site.

### 2.1.1 Basis of Estimate Common to Both Areas

- Asset recovery evaluation assumes that all equipment including the Jets and processing equipment within the WPF, will be scrapped with no additional value provided for any potential resale. We understand that some assets are currently in process of trying to be sold, and this will have to be adjusted when assets are removed prior to final demolition planning.
- The scrap quantities has been completed on a visual takeoff and the valuation is based on current market conditions at the time of the estimate including costs for transportation. The scrap breakdown provides a value for prepared materials as well as potential market fluctuations. The scrap valuation estimate reflects the total value of the material on site but does not and cannot predict what credit any contractor will provide on their estimate proposal.
- Asbestos Abatement and removal of all hazardous building materials to be performed in accordance with the quantities outlined in the Hazardous Building Materials Inspection Report for the MIRA Resource Recovery Facility and Jet Turbine Facility, dated November 20, 2024, by Eagle Environmental, Inc.
- Prior to backfill all basements, pits and basins will be broken for percolation.
- All roads, parking lots, concrete pads, surrounding the plants to remain intact during demolition activities.
- To the extent as feasible, existing storm drainage infrastructure to remain intact. All areas of backfill will be left with positive drainage. Costs for final restoration for the Site following environmental site remediation and other re-development activities is excluded.
- The cost estimate assumes that all clean concrete will be put through a mobile crushing unit that will produce 1-inch minus miscellaneous base material. The base material is a usable product that can be placed into any existing voids created by the removal of concrete foundations located below grade or any voids that exist onsite. The base material would be used to support the levelling of the overall Site, and any excess material would be stockpiled in a central location (like the slabs on grade left at the WPF) to be used as future endeavors such as construction and or road installation. It is assumed that water flow will not be an issue and will allow for dry placement.
- The provided estimate makes general assumptions regarding the regulations associated with standard demolition activities and considers governing agencies such as Fed-OSHA and the EPA but has not accounted for any specialty requirements that may be required by Local, State or Federal entities that may require any items outside of normal demolition practices.
- The equipment costs within the estimate reflect generally accepted market pricing but cannot account for any internal costed rates associated with a contractor internal equipment pricing program. Labor and Operator rates are based on Prevailing Wage Rates in the area and may vary based on the Open Shop or Union contractors. The rate also reflects current market fuel costs which will fluctuate and require adjustments at the time of the project start.

### 2.1.2 Area 1 – Power Block Facility (PBF)

- Demolish all buildings to 4’ below the existing grade at the 31’ elevation, which corresponds to the base of the floodwall.
- All basements/structures below the 31’ elevation will be cleaned out of brick, equipment, steel, etc., prior to backfill with either rubble fill, crushed concrete, or low-density flow fill material.
- Screen Houses will have all equipment, piping, screen structures, removed, then complete demolition and removal of the brick portion of screen houses down to the base of concrete, which is currently the top of a sheet pile wall. Concrete bases are to be filled and the concrete

structure that remains will be left with smooth concrete. PCBs as well as high concentrations of lead (Pb) have been identified in various green paints throughout the 1920's and 30's powerblock building(s), which includes all structural steel in the boiler room, coal bunker section, combustion units, turbine hall, northeast utilities building and warehouse structures.

- Limited data regarding the spread of PCBs in paint is available, and no waste characterization testing has been performed at this time.
- The green paint with PCBs and lead (Pb) is flaking and in general poor condition throughout the plant.
- The plant requires a washdown prior to demolition to handle the accumulated ash on horizontal surfaces. This washdown is anticipated to be performed using (up to) 4000 pounds per square inch (psi) power washers, which is also handles removal of loose and flakey PCB and lead containing paint from structural steel. All washdown materials will be collected, and are assumed to be disposed as hazardous waste.
- After power washing is complete, a majority of paint is assumed to remain on the steel. Because of the PCBs in paint (>50 ppm and <500 ppm), the steel with this paint cannot be recycled for scrap credit. Therefore, these metals must be disposed as a PCB bulk product waste. Because the paint has a high concentration of lead (Pb), we believe that lead (Pb) in the paint will be the driver for disposal of the steel.
- We do believe there are several options to reduce the overall disposal costs of green painted steel from the PBF, however, the cost to explore these options is beyond the scope of this study.

- In a separate project not included in the demolition estimate; the intake and outfall piping that remains, will be opened, and filled with low density flow fill material. Asbestos abatement of the coating on the exteriors of these large intake/outfall pipes is included in the demolition abatement estimate. These intake/outfall pipes are exposed in the basement/dirt cellar of the Boiler House and must be abated, other areas where they are buried and never expected to be removed or disturbed, may remain unabated. These details will have to be worked out when final redevelopment plans are finalized.
- The existing switchyards will remain, and be protected during demolition. Removal of leads from power plant to transformer inside switchyard is included in this estimate. The demolition estimate assumes the transformer in the switchyard will not be demolished and remain onsite, likely sold to the local power authority.
- Concrete structures from former coal offloading south of Screen house #3 will be removed to level with ground so as not to disturb existing riverbank.
- Current coal unloading structure will be demolished, but the concrete foundations just above the seawall will remain.
- Subgrade coal unloading structures at the south end of the Boiler house, and within the coal yard will be dewatered, cleaned out, roofs removed, before the bottoms are broken for percolation, and then backfilled with clean crushed concrete.
- Brick material associated with Turbine hall contains an assumed lead glazing material attached to it and it is assumed this brick will all be disposed as debris not likely to be recycled. Based on the thickness of the brick and the exposed portion of the brick containing the glazing, it has been assumed that one third of the brick will be disposed of and the remaining two thirds can be recycled, off-site. The estimate does not account for the lead-glazed brick waste characterizing as hazardous waste.
- All clean brick that is not removed as part of asbestos abatement, will be segregated, and recycled or disposed off-site and not used as fill on the Site.

- East of the floodwall, all sheet piling to remain in place.
- The dock and dolphins will remain in place.

### 2.1.3 Area 2 – Waste Processing Facility

- Demolish all buildings to slabs on grade. Concrete slabs and footings to remain and will be demolished following environmental remediation. Cost for removal of slabs and footing and utilities under slabs to be provided by others.
- All concrete curbs, column bases, equipment bases, etc. to be removed level with slabs that remain.
- All drains that remain in slabs that remain will be grouted smooth.

## 2.2 Site Description

The overall MIRA Site covers approximately 75 acres of land, and includes areas that have old infrastructure in place such as roads, parking lots, etc. The WPF and the PBF demolition areas account for a much smaller part of the overall MIRA Site. Buildings and structures described in Table 2 and Table 3 related to the WPF and PBF are the focus of this cost study. Structures such as the Eversource Switchyards, Transmission and Distribution towers, and any other structure not listed in Table 2 or Table 3 is excluded from this estimate.

### 2.2.1 Area 1 – PBF

The PBF buildings and structures generally include all structures to the north of the transfer house see **Figure 1**. A brief description of the limits of demolition is described below in Table 2 below.

**Table 2 – PBF Structures and Assumed Demolition Extents**

| # | Building/Structure | Demolition Extents |
|---|---|---|
| 1 | Northwest Guard shack | Demo to 4’ below grade, remove all footings |
| 2 | 2 Small Buildings in Employee Parking Lot | Demo to 4’ below grade, remove all footings |
| 3 | Administration Building | Demo to 4’ below grade, remove all footings |
| 4 | Screen House #1, #2 & #3 | Demo all brick, leave concrete base structures at sheet pile wall |
| 5 | Former coal unloading concrete structures riverside of floodwall | Demo to grade, limited bank disturbance. |
| 6 | Former coal unloading structures west of floodwall | Demo to 4’ below grade, backfill to 31' grade |
| 7 | Boiler House | Demo to 4’ below grade, backfill to 31' grade |
| 8 | Turbine Hall | Demo to 4’ below grade, backfill to 31' grade |
| 9 | Northeast Utilities Building | Demo to 4’ below grade, backfill to 31' grade |
| 10 | Warehouse | Demo to 4’ below grade, backfill to 31' grade |
| 11 | Dry Scrubbers 1, 2 & 3 | Demo to 4’ below grade, remove all footings |
| 12 | Baghouse 1, 2 & 3 | Demo to 4’ below grade, remove all footings |
| 13 | Scrubber Control Building | Demo to 4’ below grade, remove all footings |
| 14 | Lime Slurry | Demo to 4’ below grade, remove all footings |
| 15 | Concrete Stack | Demo to 4’ below grade, leave remainder of footings |
| 16 | Gas Turbine Generator #11, #12, #13 & #14 | Demo to 4’ below grade, remove all footings |
| 17 | Jet Shop | Demo to 4’ below grade, remove all footings |

| # | Building/Structure | Demolition Extents |
|---|---|---|
| 18 | Ash Storage | Demo to 4’ below grade, remove all footings |
| 19 | Pug Mill | Demo with Boiler house |
| 20 | Gate 40 Warehouse Building | Demo to 4’ below grade, remove all footings |
| 21 | Coal Barge Unloading Structure | Demo all structure down to concrete base, just above seawall |
| 22 | Coal Conveyors & RDF conveyors | Demo to 4’ below grade, remove all footings |
| 23 | Transfer Buildings | Demo to 4’ below grade, remove all footings |
| 24 | Maintenance Garage | Demo to 4’ below grade, remove all footings |
| 25 | Truck wheel wash building | Demo to 4’ below grade, remove all footings |
| 26 | Sub-grade mineralization tank | Demo to 4’ below grade, backfill to 31' grade |
| 27 | Coal pond pump house | Demo to 4’ below grade, remove all footings |
| 28 | Sub-grade reclaim hopper structure | Demo to 4’ below grade, backfill to create positive drainage |

### 2.2.2 Area 2 – WPF

The WPF buildings and structures generally include all structures to the south of the transfer house see **Figure 1**. A brief description of the limits of demolition is described below in Table 3 below.

**Table 3 – WPF Structures and Assumed Demolition Extents**

| # | Building/Structure | Demolition Extents |
|---|---|---|
| 1 | Processing Building | Demo to slab on grade |
| 2 | Odor Control Equipment | Demo to slab on grade |
| 3 | Small Processing Building (between Processing building and Refuse Derived Storage Building) | Demo to slab on grade |
| 4 | MSW Receiving and Storage | Demo to slab on grade |
| 5 | Maneuvering Hall | Demo to slab on grade |
| 6 | RDF conveyor from Refuse Derived Storage Building to Transfer Building in PBF. | Demo conveyors, remove support concrete to surrounding grade |
| 7 | Administrative Building | Demo to slab on grade |
| 8 | Tool Storage | Demo to slab on grade |
| 9 | Scale House #1, #2 & #3 | Demo to slab on grade |

# 3. APPROACH

Our approach for developing the cost estimate for the two areas required the definition of what is included in the scope of work as it relates to the overall re-development of the site, which has not been determined. Therefore, we made some assumptions to the demolition extents and limits on the overall MIRA site. The demolition extents takes the site to a point in time where the next phase of environmental remediation, and eventual site restoration that should consider future re-development plans.

Tetra Tech participated in team meetings with the Weston and Sampson team as site redevelopment scenarios were being discussed. Upon reviewing the probable scenarios for redevelopment, it was determined that the site is best broken out into two distinct working areas. The Tetra Tech team determined these work areas to be logical breakpoints of work for a Demolition Contractor because of their past uses and different way each areas would be left for environmental remediation, and future redevelopment.

## 3.1 Review of Existing Information

The overall approach to the demolition estimate included obtaining and reviewing available records from MIRA, including past reports, a limited number of available site drawings, and a current hazardous building materials survey, dated 11/20/2024, and limited PCB sampling data of caulking and paints throughout the plant by Weston and Sampson, 1/14/2025. In addition, Tetra Tech abatement and demolition experts visited the site. From this information, we performed quantity take-offs for equipment, steel, concrete, and brick.

### 3.1.1 Drawings

Tetra Tech reviewed drawings or lists provided by MIRA and Weston and Sampson. Drawings reviewed included:

- 13 drawings labelled General Arrangement drawings for the PBF
- 4 drawings labelled as Stack drawings
- 3 drawings labelled as Service Water Piping Details
- 14 drawings listed as Part 6 Elevations
- 20 drawings listed as Part 3 Drawings
- 53 drawings that are random elevations, site details, floor plans, general structural

### 3.1.2 Asbestos and other Hazardous Building Materials and Environmental Reports

Teta Tech was provided with the following records of past asbestos abatement or environmental history at the site including:

- A report for survey and abatement at the NU building.
- Asbestos abatement reports for 2017 PBF roof, 2018-19 Turbine 6 Stator Insulation, 2019 PBF Roof
- MIRA South Meadows Verification Report May 2018,
- 3 Reports labelled as MIRA Closure Plans, along with Responses to CTDEEP, 1-5, 2022

As part of the overall MIRA Site redevelopment, Weston, and Sampson's sub-consultant Eagle Environmental, Inc., conducted a Hazardous Building Materials Inspection (HBMI) of the PBF and the WPF. Tetra Tech reviewed the HBMI as it was being performed, and times our site visit to tour the site after the first draft version was prepared. We also reviewed the final draft dated 11/20/2024.

The HBMI included an extensive asbestos-containing materials (ACM) inspection including sampling of suspect ACM, lead-containing paint sampling used in coatings on structural steel, and some equipment, polychlorinated biphenyls (PCBs) bulk sampling of paints, caulking, and visual assessment and quantities of other regulated building materials including mercury found in temperature gauges, float switches, etc., and chlorofluorohydrocarbons (CFCs) containing items such as air conditioners, refrigerators, etc..

The cost estimate for abatement was developed using the quantities derived in the HBMI, and incorporated the configuration of several key ACMs that were found, and taking into account the additional equipment and demolition required to remove such items such as; the quantity of ACM tar found at the 1920's to 1930's building dividing line of the Boiler Houses, Turbine Houses, and Northeast Utilities Buildings.

### 3.1.3 Future Use of Site

The site's future use is unknown at this time. Therefore, the parameters for demolition are based on common end state brownfield conditions left at similar types of facilities. Parameters for how the site was to be left were guided with input from the Weston and Sampson team.

### 3.1.4 Contracting Strategy

How the demolition contract will be packaged is unknown at this time. However, it is understood that the demolition work will likely occur in conjunction with some sort of site redevelopment and environmental remediation. The assumption for the contracting for this cost estimate for demolition assumes that the abatement and demolition bid package will be a combined package all performed simultaneously generally starting with abatement and removal of hazardous building materials, then standard demolition wrecking of outbuildings, moving to the larger boiler house, turbine house, and Northeast utilities building. The general contractor is assumed to be a large demolition contractor with experience demolishing power plants on tight sites while protecting a closing existing switchyard, and protecting a flood wall.

## 3.2 Environmental and Permitting Requirements

This section does not account for other site environmental remediation, which is being prepared by others.

Where local state, and federal laws and regulations or established guidelines or permits apply, those must be complied with by the Demolition Contractor and have been accounted for in this demolition estimate. The Demolition Contractor will implement appropriate best management practices (BMPs) found within the United States (U.S.) regulations (e.g., federal U.S. Environmental Protection Agency [EPA] regulations or permit requirements) during the project that prevent Environmental Pollution and Damage and provide Environmental Protection to the Site.

The cost estimates for demolition assume environmental compliance as stated herein.

### 3.2.1 Regulatory Notifications and Permits

Local permits and/or notifications are required for owner/operator MIRA and the Demolition Contractor. Any notifications and permits that are not designated for "Owner" responsibility are the responsibility of the Demolition Contractor.

# 4. COST ESTIMATE

## 4.1 Scrap Quantities

The following outlines the general quantities of scrap;

**Table 4 – PBF Scrap Quantities**

| Material | Type | Estimated Quantities | Units |
|---|---|---|---|
| Plate and Structural (P&S) | Ferrous | 8,485* | Net Tons |
| Heavy Melting Steel (HMS) | Ferrous | 5,550* | Net Tons |
| Tin | Ferrous | 95 | Net Tons |
| Torch | Ferrous | 930* | Net Tons |
| Rebar | Ferrous | 675 | Net Tons |
| Insulated Copper Wire (ICW) - 70% | Non-Ferrous | 215,000 | Pounds |
| Stainless Steel (SS) 304 Tubes | Non-Ferrous | 20,000 | Pounds |
| 304 SS | Non-Ferrous | 160,000 | Pounds |
| Aluminum Sheet | Non-Ferrous | 180,000 | Pounds |
| Stator/Rotor | Non-Ferrous | 80,000 | Pounds |
| Transformer Windings | Non-Ferrous | 120,000 | Pounds |

* Please note, due to the PCBs in paint designation in green paint on metals, our team has estimated that 4,340 net tons of these metals; P&S (3,405 net tons), HMS (460 net tons), and Torch (475 net tons) in the powerblock will be diverted from a recycle scrap credit, to appropriate landfill disposal.

**Table 5 – WPF Scrap Quantities**

| Material | Type | Estimated Quantities | Units |
|---|---|---|---|
| P&S | Ferrous | 2,975 | Net Tons |
| HMS | Ferrous | 1,170 | Net Tons |
| Tin | Ferrous | 75 | Net Tons |
| Torch | Ferrous | 350 | Net Tons |
| Rebar | Ferrous | 140 | Net Tons |
| ICW - 70% | Non-Ferrous | 35,000 | Pounds |

Assumptions on Scrap quantities and costs:

- Ferrous Scrap Prices reflect an estimated value for the month of January 2025 and a prepared condition
- Non-Ferrous Scrap price represent current market value of January 2025, and can change based on location and condition
- ICW represents insulated copper wire and is based on visual observation of open electrical panels, wire quantity has a limited estimate based on an assumption a portion of the wire contains asbestos and will be disposed of and not recycled.
- Scrap quantities are estimates only based on a visual inspection
- Low Value represents potential drop in market and a potential for sending unprepared material

### 4.1.1 Labor Cost Pricing Basis

The labor rates were developed using the Davis-Bacon Act Wage Determination for Hartford, Connecticut. Specifically for Heavy construction projects, following general decision number CT20250014 1/3/2025, which superseded general decision number CT20240014.

### 4.1.2 Construction Management Costs

Construction management costs have been included in the detailed demolition costs sheets attached, based on historical information for similar type projects. The scope covered by construction management include the following:

- Temporary Construction Facilities Includes labor and material costs for temporary construction facilities such as office trailers, construction warehouse, laydown areas etc. includes temporary utilities such as heat, electricity, water, etc.
- Construction Management Field Staff and Expenses includes labor and expenses for the lump sum contractor support for construction (site construction manager, discipline superintendents), site engineering, safety, turnover, HSE, QA/QC, materials, and project controls.
- Construction Services, Supplies and Expense includes labor and material costs for construction services such as medical and first aid, third-party inspection testing, communications/repro., etc.

### 4.1.3 Contractor Markups and Escalation

The markup on the contractor includes;

- 5% for home office
- 25% for overhead and profit
- 5% for bonding and insurance
- Municipal Permits (allowance)
- No escalation was added to the demolition estimates

### 4.1.4 Contingency

Cost contingencies were added to various cost categories at either 10%, 30%, or 40%. the total costs including contractor markups. The contingency includes considerations for unknowns and other items that may not have been included in this level of cost estimate which are fully expected to occur, but which cannot be specifically identified at the time of the estimate, and, if not considered, underestimate the final cost and result in an overrun. Contingency is not meant to cover functional scope changes (contracting strategy, schedule; these must be estimated separate from Contingency), acts of God, unusual economic situations, or gross estimate inaccuracies.

Broad factors affecting Contingency:

- Project Definition completeness
- Technological Innovation
- Contracting Strategy
- Project Type
- Location

Examples of other, more specific unknown factors include:

- Manpower availability
- Productivity versus estimated
- Labor Density
- Wage Rates versus estimated
- Turnover
- Absenteeism
- Material Prices versus estimated
- Material availability

As result of this risk assessment, the recommended contingencies of 10%, 30% and 40% has been included in the estimate to cover the unforeseen cost elements. This allowance is valid based on an intended 50/50 chance of overrun/underrun. If a lower risk of overrun is intended, then a higher contingency would be required. Conversely, if a higher risk of overrun is intended, then a lower contingency is appropriate.

The contingencies were applied to the following cost elements:

- 10% contingency
  - PCB/Lead Impacted Steel Disposal
- 40% contingency
  - ACM / Regulated Materials Abatement – PBF
  - ACM / Regulated Materials Abatement – WPF
- 30% Contingency
  - Applied to all other cost categories

### 4.1.5 Detailed Demolition Estimate Summary

The following table illustrates a summary of probably demolition costs. Additional demolition costs including labor, materials, and equipment, are summarized in the Detailed Demolition Cost Summary Sheets, **Attachment 1.** The rollup summary costs included in Table 6 below are correlated to Attachment 1 by the CBS position code.

**Table 6 – Summary of Probable Demolition Costs**

| CBS Position Code | Description | Forecast (T/O) Quantity | Unit of Measure | Unit Cost | Total Cost (Forecast) |
|---|---|---|---|---|---|
| | **Total Demolition Project Costs** | **1.00** | **Lump Sum** | **$35,199,882.84** | **$35,199,882.84** |
| | | | | | |
| **1** | **PLANNING - PRE MOB ACTIVITIES** | **1.00** | **Lump Sum** | **$110,500.00** | **$110,500.00** |
| 1.1 | Traffic Control Plan | 1.00 | Lump Sum | $10,000.00 | $10,000.00 |
| 1.2 | Work Plan | 1.00 | Lump Sum | $30,000.00 | $30,000.00 |
| 1.3 | Waste Management Plan | 1.00 | Lump Sum | $15,000.00 | $15,000.00 |
| 1.4 | Environmental Remediation Plan | 1.00 | Lump Sum | $15,000.00 | $15,000.00 |
| 1.5 | Dust Control Plan | 1.00 | Lump Sum | $5,000.00 | $5,000.00 |
| 1.6 | Accident Prevention Plan | 1.00 | Lump Sum | $5,000.00 | $5,000.00 |
| 1.7 | Asbestos Abatement Plan | 1.00 | Lump Sum | $5,000.00 | $5,000.00 |
| 1.8 | Contingency - 30% | 1.00 | Lump Sum | -- | $25,500.00 |
| | | | | | |
| **2** | **CONTRACTOR ENGINEERING SUPPORT** | **1.00** | **Lump Sum** | **$65,000.00** | **$65,000.00** |
| 2.1 | Allowance | 1.00 | Lump Sum | $50,000.00 | $50,000.00 |
| 2.2 | Contingency - 30% | 1.00 | Lump Sum | -- | $15,000.00 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **3** | **MOBILIZATION & DEMOBILIZATION** | **1.00** | **Lump Sum** | **$241,550.85** | **$241,550.85** |
| 3.1 | Equipment & Facilities | 1.00 | Lump Sum | $156,646.27 | $156,646.27 |
| 3.2 | Staff | 1.00 | Lump Sum | $21,927.12 | $21,927.12 |
| 3.3 | Erosion Controls | 1.00 | Lump Sum | $7,235.06 | $7,235.06 |
| 3.4 | Contingency - 30% | 1.00 | Lump Sum | -- | $55,742.40 |
| | | | | | |
| **4** | **TEMPORARY FACILITIES** | **18.00** | **Month** | **$10,119.20** | **$182,145.60** |
| 4.1 | Temporary Facilities | 18.00 | Month | $6,784.00 | $122,112.00 |
| 4.2 | Utilities | 18.00 | Month | $1,000.00 | $18,000.00 |
| 4.3 | Contingency - 30% | 1.00 | Lump Sum | -- | $42,033.60 |
| | | | | | |
| **5** | **SITE SUPERVISION & MANAGEMENT** | **18.00** | **Month** | **$171,822.97** | **$3,092,813.44** |
| 5.1 | Staff | 18.00 | Month | $120,599.16 | $2,170,784.88 |
| 5.2 | Regulatory Specialist (PT During Demolition) | 14.00 | Month | $6,591.85 | $92,285.90 |
| 5.3 | Regulatory Specialist (FT During PCB Impacted Steel Disposition) | 4.00 | Month | $29,004.14 | $116,016.56 |
| 5.4 | Contingency - 30% | 1.00 | Lump Sum | -- | $713,726.10 |
| | | | | | |
| **6** | **LOTO / AIR GAP** | **1.00** | **Lump Sum** | **$18,971.21** | **$18,971.21** |
| 6.1 | LOTO / Air Gap | 5.00 | Day | $2,918.66 | $14,593.31 |
| 6.2 | Contingency - 30% | 1.00 | Lump Sum | -- | $4,377.90 |
| | | | | | |
| **7** | **MISC MATERIAL SURVEY & SAMPLING** | **1.00** | **Lump Sum** | **$233,210.80** | **$233,210.80** |

| | | | | | |
|---|---|---|---|---|---|
| 7.1 | Sampling Crew | 15.00 | Day | $5,292.86 | $79,392.90 |
| 7.2 | Lab Cost Allowance | 1.00 | Lump Sum | $100,000.00 | $100,000.00 |
| 7.3 | Contingency - 30% | 1.00 | Lump Sum | -- | $53,817.90 |
| | | | | | |
| **8** | **ACM / REGULATED MATERIAL ABATEMENT - PBF** | **1.00** | **Lump Sum** | **$8,719,525.73** | **$8,719,525.73** |
| 8.1 | Power Block | 1.00 | Lump Sum | $6,209,427.00 | $6,209,427.00 |
| 8.2 | Contingency - 40% | 1.00 | Lump Sum | -- | $2,510,098.73 |
| | | | | | |
| **9** | **ACM / REGULATED MATERIAL ABATEMENT - WPF** | **1.00** | **Lump Sum** | **$317,898.87** | **$317,898.87** |
| 9.1 | Waste Processing | 1.00 | Lump Sum | $226,385.00 | $226,385.00 |
| 9.2 | Contingency - 40% | 1.00 | Lump Sum | -- | $91,513.87 |
| | | | | | |
| **10** | **PCB/LEAD IMPACTED STEEL DISPOSAL** | **1.00** | **Lump Sum** | **$6,091,624.00** | **$6,091,624.00** |
| 10.1 | PCB Impacted Steel Disposal | 1.00 | Lump Sum | $5,537,840.00 | $5,537,840.00 |
| 10.1.1 | P&S | 3,405.00 | Ton | $1,276.00 | $4,344,780.00 |
| 10.1.2 | HMS | 460.00 | Ton | $1,276.00 | $586,960.00 |
| 10.1.3 | Torch | 475.00 | Ton | $1,276.00 | $606,100.00 |
| 10.2 | Contingency - 10% | 1.00 | Lump Sum | -- | $553,784.00 |
| | | | | | |
| **11** | **DEMOLITION - PBF** | **1.00** | **Lump Sum** | **$6,808,338.32** | **$6,808,338.32** |
| 11.1 | Northwest Gaurdshack | 1.00 | Day | $11,033.01 | $11,033.01 |

| | | | | | |
|---|---|---|---|---|---|
| 11.2 | Employee Parking Lot - Trailers | 1.00 | Day | $7,467.72 | $7,467.72 |
| 11.3 | PBF Administration Building | 2.00 | Day | $28,384.23 | $56,768.47 |
| 11.4 | Screen House #1 | 1.00 | Day | $15,142.41 | $15,142.41 |
| 11.5 | Screen House #2 | 1.00 | Day | $15,142.41 | $15,142.41 |
| 11.6 | Screen House #3 | 2.00 | Day | $15,142.41 | $30,284.82 |
| 11.7 | Concrete Structure | 1.00 | Day | $15,142.41 | $15,142.41 |
| 11.8 | Former Coal Unloading Structures | 2.00 | Day | $15,142.41 | $30,284.82 |
| 11.9 | Boiler Room (North) | 4.00 | Day | $15,142.41 | $60,569.64 |
| 11.10 | Coal Bunker Section | 3.00 | Day | $15,142.41 | $45,427.23 |
| 11.11 | Boiler Room (mid South) | 2.00 | Day | $15,142.41 | $30,284.82 |
| 11.12 | Boiler Room (mid south, low roof) | 2.00 | Day | $15,142.41 | $30,284.82 |
| 11.13 | Boiler Room South - Combustion Unit #11 | 2.00 | Day | $17,351.22 | $34,702.45 |
| 11.14 | Combustion Unit #12 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.15 | Combustion Unit #13 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.16 | Turbine Hall (all) | 5.00 | Day | $15,142.41 | $75,712.04 |
| 11.17 | Northeast Utilities Building (all) | 4.00 | Day | $15,142.41 | $60,569.64 |
| 11.18 | Warehouse (off turbine hall) | 3.00 | Day | $15,142.41 | $45,427.23 |
| 11.19 | Dry Scrubber 1, Unit 11 | 2.00 | Day | $28,384.23 | $56,768.47 |
| 11.20 | Dry Scrubber 2, Unit 12 | 2.00 | Day | $28,384.23 | $56,768.47 |
| 11.21 | Dry Scrubber 3, Unit 13 | 2.00 | Day | $28,384.23 | $56,768.47 |
| 11.22 | Baghouse 1, Unit 11 | 2.00 | Day | $28,384.23 | $56,768.47 |
| 11.23 | Baghouse 2, Unit 12 | 2.00 | Day | $28,384.23 | $56,768.47 |
| 11.24 | Baghouse 3, Unit 13 | 2.00 | Day | $28,384.23 | $56,768.47 |
| 11.25 | Scrubber Control Building | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.26 | Lime Slurry | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.27 | Stack | 10.00 | Day | $25,142.41 | $251,424.09 |
| 11.28 | Gas Turbine Generator #11 | 1.00 | Day | $28,384.23 | $28,384.23 |
| 11.29 | Gas Turbine Generator #12 | 1.00 | Day | $28,384.23 | $28,384.23 |
| 11.30 | Gas Turbine Generator #13 | 1.00 | Day | $28,384.23 | $28,384.23 |
| 11.31 | Gas Turbine Generator #14 | 1.00 | Day | $28,384.23 | $28,384.23 |
| 11.32 | Jet Shop | 2.00 | Day | $17,351.22 | $34,702.45 |

| | | | | | |
|---|---|---|---|---|---|
| 11.33 | Ash Storage | 4.00 | Day | $28,384.23 | $113,536.94 |
| 11.34 | Pug Mill | 2.00 | Day | $15,142.41 | $30,284.82 |
| 11.35 | Gate 40 Warehouse Building | 2.00 | Day | $17,351.22 | $34,702.45 |
| 11.36 | RDF Supply Conveyor #517 | 2.00 | Day | $17,351.22 | $34,702.45 |
| 11.37 | RDF Supply Conveyor #519 | 2.00 | Day | $17,351.22 | $34,702.45 |
| 11.38 | RDF Supply Conveyor #515 | 2.00 | Day | $17,351.22 | $34,702.45 |
| 11.39 | Dock | 3.00 | Day | $28,384.23 | $85,152.70 |
| 11.40 | Truck Wheel Wash Building | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.41 | Coal Barge Unloading Structure | 2.00 | Day | $17,351.22 | $34,702.45 |
| 11.42 | Coal Unloading Conveyor #1 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.43 | Transfer Building | 2.00 | Day | $17,351.22 | $34,702.45 |
| 11.44 | Coal Conveyor #2 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.45 | Coal Conveyor #3 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.46 | Maintenance Garage | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.47 | Subgrade Mineralization Tank | 3.00 | Day | $15,142.41 | $45,427.23 |
| 11.48 | Coal Pond Pump House | 1.00 | Day | $17,351.22 | $17,351.22 |
| 11.49 | Sub-Grade Reclaim Hopper Structure | 2.00 | Day | $15,142.41 | $30,284.82 |
| 11.50 | Steel Sizing | 44.00 | Day | $23,521.00 | $1,034,924.04 |
| 11.51 | Scrap Metal Transport | 16,123.00 | Ton | $60.00 | $967,380.00 |
| 11.52 | Crushed Concrete - From Demo Activities | 35,803.00 | Cubic Yard | $23.89 | $855,179.44 |
| 11.52.1 | Concrete Crushing | 71,606.00 | Ton | $9.89 | $707,951.38 |
| 11.52.2 | Load, Haul & Deliver | 35,803.00 | Cubic Yard | $2.35 | $84,095.24 |
| 11.52.3 | Placement & Compaction | 35,803.00 | Cubic Yard | $1.76 | $63,132.81 |
| 11.53 | Contingency - 40% | 1.00 | Lump Sum | -- | $1,959,923.25 |
| | | | | | |
| **12** | **DEMOLITION - WPF** | **1.00** | **Lump Sum** | **$2,566,806.16** | **$2,566,806.16** |
| 12.1 | Refuse Derived Conveyor | 4.00 | Day | $5,829.93 | $23,319.71 |

| | | | | | |
|---|---|---|---|---|---|
| 12.2 | Odor Control Equipment | 4.00 | Day | $17,351.22 | $69,404.89 |
| 12.3 | Refuse Derived Storage Building | 6.00 | Day | $32,493.63 | $194,961.79 |
| 12.4 | Processing Building | 6.00 | Day | $17,351.22 | $104,107.34 |
| 12.5 | Small Processing Building | 2.00 | Day | $17,351.22 | $34,702.45 |
| 12.6 | MSW Receiving and Storage | 10.00 | Day | $32,493.63 | $324,936.32 |
| 12.7 | Maneuvering Hall | 5.00 | Day | $28,384.23 | $141,921.17 |
| 12.8 | Administrative Building | 2.00 | Day | $17,351.22 | $34,702.45 |
| 12.9 | Tool Storage | 2.00 | Day | $17,351.22 | $34,702.45 |
| 12.10 | Scale House #1 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 12.11 | Scale House #2 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 12.12 | Scale House #3 | 1.00 | Day | $17,351.22 | $17,351.22 |
| 12.13 | Steel Sizing | 22.00 | Day | $23,521.00 | $517,462.02 |
| 12.14 | Scrap Metal Transport | 4,728.00 | Ton | $60.00 | $283,680.00 |
| 12.15 | Crushed Concrete - From Demo Activities | 500.00 | Cubic Yard | $23.89 | $11,942.85 |
| 12.15.1 | Concrete Crushing | 1,000.00 | Ton | $9.89 | $9,886.76 |
| 12.15.2 | Load, Haul & Deliver | 500.00 | Cubic Yard | $2.35 | $1,174.42 |
| 12.15.3 | Placement & Compaction | 500.00 | Cubic Yard | $1.76 | $881.67 |
| 12.16 | Contingency - 40% | 1.00 | Lump Sum | -- | $738,909.07 |
| | | | | | |
| **13** | **CONTRACTOR MARKUPS** | **1.00** | **Lump Sum** | **$10,869,367.87** | **$10,869,367.87** |
| 13.1 | Home Office - 5% | 1.00 | Lump Sum | $1,386,730.60 | $1,386,730.60 |
| 13.2 | OH & Fee - 25% | 1.00 | Lump Sum | $7,280,335.75 | $7,280,335.75 |
| 13.3 | Bonding & Insurance - 5% | 1.00 | Lump Sum | $1,820,083.90 | $1,820,083.90 |

| | | | | | |
|---|---|---|---|---|---|
| 13.4 | Municipal Permits - 1% | 1.00 | Lump Sum | $382,217.62 | $382,217.62 |
| | | | | | |
| **14** | **SCRAP CREDIT** | **1.00** | **Lump Sum** | **-$4,117,870.00** | **-$4,117,870.00** |
| 14.1 | PBF | 1.00 | Lump Sum | -$3,075,475.00 | -$3,075,475.00 |
| 14.1.1 | P&S | 5,080.00 | Ton | -$215.00 | -$1,092,200.00 |
| 14.1.2 | HMS | 5,090.00 | Ton | -$205.00 | -$1,043,450.00 |
| 14.1.3 | Tin | 95.00 | Ton | -$160.00 | -$15,200.00 |
| 14.1.4 | Torch | 455.00 | Ton | -$175.00 | -$79,625.00 |
| 14.1.5 | Rebar | 675.00 | Ton | -$158.00 | -$106,650.00 |
| 14.1.6 | ICW - 70% | 215,000.00 | Pound | -$1.93 | -$414,950.00 |
| 14.1.7 | SS 304 Tubes | 20,000.00 | Pound | -$0.36 | -$7,200.00 |
| 14.1.8 | SS 304 | 160,000.00 | Pound | -$0.36 | -$57,600.00 |
| 14.1.9 | Aluminum Sheet | 180,000.00 | Pound | -$0.67 | -$120,600.00 |
| 14.1.10 | Stator / Rotor | 80,000.00 | Pound | -$0.45 | -$36,000.00 |
| 14.1.11 | Transformer Windings | 120,000.00 | Pound | -$0.85 | -$102,000.00 |
| 14.2 | WPF | 1.00 | Lump Sum | -$1,042,395.00 | -$1,042,395.00 |
| 14.2.1 | P&S | 2,975.00 | Ton | -$215.00 | -$639,625.00 |
| 14.2.2 | HMS | 1,170.00 | Ton | -$205.00 | -$239,850.00 |
| 14.2.3 | Tin | 75.00 | Ton | -$160.00 | -$12,000.00 |
| 14.2.4 | Torch | 350.00 | Ton | -$175.00 | -$61,250.00 |
| 14.2.5 | Rebar | 140.00 | Ton | -$158.00 | -$22,120.00 |
| 14.2.6 | ICW - 70% | 35,000.00 | Pound | -$1.93 | -$67,550.00 |

### 4.1.6 Assumptions/Risks

The assumptions relate to how the project is assumed to be performed based on the limited definition and design. The risks listed are not an exhaustive list. Tetra Tech recommends building on this list while developing a comprehensive risk register as the project gains more definition and the scope is better defined.

- The cost estimate assumes and is based on a program where concrete generated from the demolition work would be prepared and crushed on site to a 1 inch minus type of base material and stockpiled in place while the majority of asphalt paving making up the roadways would remain.
- The estimate assumes that demolition activities will be completed on a continuous basis and does not account for any requirements to account for clean-up or any specialty grading requirements and does not include any contingency factor for unknown or unforeseen conditions at the site.
- Engineering: It is assumed the demolition work does not require any critical lifts and that the structures can be removed with the use of heavy equipment and felling, and the budget estimate therefore does not include any costs for engineering. The estimate assumes that explosive demolition will not be performed onsite.
- Residuals: The provided estimate assumes that all equipment, tanks, pipelines and any equipment or material is free of residual material and does not include any costs for the handling, transportation, or disposal of, nor any costs for associated delays that may occur as a result of its presence beyond 5% residuals which is what would be expected after plant decommissioning.
- Site Restoration: The estimate assumes the site will be rough graded for proper drainage, however any effort for specific grading and contouring of the site has not been included. In addition, no costs have been included for any reseeding, planting, or native restorative efforts and any engineered compaction.
- Security: It is assumed those items to secure the site will be left in place at the conclusion of the work. No additional costs have been included to account for any specific security requirements.
- Dust Control: The subject estimate assumes that water will be available of pressure and volume that will support the needed dust control for site operations as well as the filling and use of a water truck and that there would be no fee for this.
- The estimate accounts for recycling and reusing clean concrete generated during the demolition. Any excess concrete generated during demolition would be crushed and stored onsite for future use elsewhere.
- The estimate does not assume any equipment or inventory sales.
- PCB containing paint and high concentrations of lead in paint will impact all aspects of abatement, washdowns, characterization and disposal. Options to remove all paint, or stabilize in a manner to change the manner and landfill that is required for disposal should be explored.
- Backfill and Voids. It is assumed that all on site voids will be filled with crushed concrete and standard heavy equipment will be adequate for any compaction without the need for engineered compaction.
- Contaminated Soil: All site remediation for contaminated soils removal has not been accounted for in this estimate.

- Risk – Need to allow in schedule for additional asbestos, PCB in paint, and waste characterization testing as the plant is decommissioned and plant is brought to cold dark and dry condition.
- Risk – High groundwater table and the re-use of crushed concrete leads to high pH levels in groundwater, thus reducing the use of recycled concrete to backfill areas.

**Buildings / Area Included in PBF Demolition Estimate**

**Buildings / Area Included in WPF Demolition Estimate**

CONNECTICUT RIVER

Power Block Facility

Waste Processing Facility

REFUSE DERIVED FUEL CONVEYOR

COAL PILE

COAL PILE RUNOFF

SWITCHYARD

CAPLUGGE PARKING LOT

JET SHOP

JET FUEL

CHARTER OAK BRIDGE ENTRANCE

CHARTER OAK

GATE 20 ENTRANCE

GATE 40 ENTRANCE

RESERVE ROAD

NOTE: BASE DRAWING OF THE MIRA SITE WAS PREPARED BY OTHERS. TETRA TECH MAKES NO WARRANTY TO THE ACCURACY OF THE DRAWING.

KEY:

- 1990's CONSTRUCTION
- 1960's CONSTRUCTION
- 1970'S CONSTRUCTION
- 1950'S CONSTRUCTION
- 1940'S CONSTRUCTION
- 1930'S CONSTRUCTION
- 1920'S CONSTRUCTION
- AREA NOT IN SCOPE

0 100 200 400

Feet

Bar Measures 1 inch

TETRA TECH
www.tetratech.com
400 112TH AVENUE
BELLEVUE, WA 98004
PHONE: 425.732.5651

WESTON & SAMPSON SOUTH MEADOWS
100 RESERVE ROAD & 300 MAXIM ROAD
HARTFORD, CONNECTICUT

# OVERALL SITE PLAN

| | |
|---|---|
| Project No.: | 117-085236-24001 |
| Date: | 12/18/24 |
| Drawn By: | CP |
| Checked By: | DB |

FIGURE
1

12/18/2024 10:46:09 AM - P:\ACAD\085236-24001-EAGL\085236-24001-001A.DWG - PAUGH, CHRISTINA

# Attachment 1:
# Detailed Demolition Estimate Summary

**Estimate Summary**
**TETRA TECH, INC.**
**Job Code: MIRA Resource Recovery Demolition**
**Description: Facility Demolition**

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | Lump Sum | PLANNING - PRE MOB ACTIVITIES | 0.00 | Detail | U.S. Dollar | 110,500.00 | 110,500.00 |
| 1.1 | 1.00 | Lump Sum | Traffic Control Plan | 0.00 | Detail | U.S. Dollar | 10,000.00 | 10,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 10,000.00 | Each | U.S. Dollar | 1.00 | 10,000.00 |
| 1.2 | 1.00 | Lump Sum | Work Plan | 0.00 | Detail | U.S. Dollar | 30,000.00 | 30,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 30,000.00 | Each | U.S. Dollar | 1.00 | 30,000.00 |
| 1.3 | 1.00 | Lump Sum | Waste Management Plan | 0.00 | Detail | U.S. Dollar | 15,000.00 | 15,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 15,000.00 | Each | U.S. Dollar | 1.00 | 15,000.00 |
| 1.4 | 1.00 | Lump Sum | Environmental Remediation Plan | 0.00 | Detail | U.S. Dollar | 15,000.00 | 15,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 15,000.00 | Each | U.S. Dollar | 1.00 | 15,000.00 |
| 1.5 | 1.00 | Lump Sum | Dust Control Plan | 0.00 | Detail | U.S. Dollar | 5,000.00 | 5,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 5,000.00 | Each | U.S. Dollar | 1.00 | 5,000.00 |
| 1.6 | 1.00 | Lump Sum | Accident Prevention Plan | 0.00 | Detail | U.S. Dollar | 5,000.00 | 5,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 5,000.00 | Each | U.S. Dollar | 1.00 | 5,000.00 |
| 1.7 | 1.00 | Lump Sum | Asbestos Abatement Plan | 0.00 | Detail | U.S. Dollar | 5,000.00 | 5,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 5,000.00 | Each | U.S. Dollar | 1.00 | 5,000.00 |
| 1.8 | 1.00 | Lump Sum | Contingency - 30% | 0.00 | Detail | U.S. Dollar | 25,500.00 | 25,500.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMARKUP30 | 30% Markup | | | 85,000.00 | Each | U.S. Dollar | 0.30 | 25,500.00 |
| 2 | 1.00 | Lump Sum | CONTRACTOR ENGINEERING SUPPORT | 0.00 | Detail | U.S. Dollar | 65,000.00 | 65,000.00 |
| 2.1 | 1.00 | Lump Sum | Allowance | 0.00 | Detail | U.S. Dollar | 50,000.00 | 50,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | 50,000.00 | Each | U.S. Dollar | 1.00 | 50,000.00 |
| 2.2 | 1.00 | Lump Sum | Contingency - 30% | 0.00 | Detail | U.S. Dollar | 15,000.00 | 15,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| USMARKUP30 | 30% Markup | | | 50,000.00 | Each | U.S. Dollar | 0.30 | 15,000.00 |
| 3 | 1.00 | Lump Sum | MOBILIZATION & DEMOBILIZATION | 0.09 | Detail | U.S. Dollar | 241,550.85 | 241,550.85 |
| 3.1 | 1.00 | Lump Sum | Equipment & Facilities | 0.25 | Detail | U.S. Dollar | 156,646.27 | 156,646.27 |
| **Resource Code** | **Description** | | **Hours** | **Quantity** | **UM** | **Currency** | **Unit Cost** | **Total Cost** |
| UERNTRLG | Rental Equip Transp-Large | | | 12.00 | Each | U.S. Dollar | 10,000.00 | 120,000.00 |
| UERNTRSM | Rental Equip Transp-Small | | | 12.00 | Each | U.S. Dollar | 1,000.00 | 12,000.00 |
| UOCONMOB | Connex Box Mob | | | 4.00 | Each | U.S. Dollar | 300.00 | 1,200.00 |


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| Cost Item | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CBS Position Code | Quantity UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
| UOELCTHK | Electrical Hookup | | | 2.00 Lump Sum | U.S. Dollar | | 1,500.00 | 3,000.00 |
| UOTOIMOB | Portable Toilet Mob/Demob | | | 4.00 Each | U.S. Dollar | | 84.80 | 339.20 |
| UOTRLTRN | Trailer Trnsp/Setup/Trdwn | | | 4.00 Each | U.S. Dollar | | 1,590.00 | 6,360.00 |
| L010101 | OPERATOR | | 80.00 | 2.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | 80.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |
| 3.2 | 1.00 Lump Sum | Staff | | 0.25 | Detail | U.S. Dollar | 21,927.12 | 21,927.12 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| L90FXX02 | Field - Proj Superintendent | | 40.00 | 1.00 Each (hourly) | U.S. Dollar | | 140.40 | 5,616.00 |
| L90FXX03 | Field - SHSO | | 40.00 | 1.00 Each (hourly) | U.S. Dollar | | 118.03 | 4,721.20 |
| L90FEJ00 | Field - Asst. Engr. | | 80.00 | 2.00 Each (hourly) | U.S. Dollar | | 118.80 | 9,504.00 |
| RPUTRK05 | F-250 4X4 3/4 TON PICKUP | | 160.00 | 4.00 Each (hourly) | U.S. Dollar | | 13.04 | 2,085.92 |
| 3.3 | 1.00 Lump Sum | Erosion Controls | | 0.33 | Detail | U.S. Dollar | 7,235.06 | 7,235.06 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| SMSCSUPL | Misc. Supplies/Materials | | | 2,000.00 Lump Sum | U.S. Dollar | | 1.06 | 2,120.00 |
| L060100 | GENERAL LABORER | | 60.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 4,439.10 |
| *RFELWH06 | BOBCAT 742B LOADER | | 30.00 | 1.00 Each (hourly) | U.S. Dollar | | 22.53 | 675.96 |
| 3.4 | 1.00 Lump Sum | Contingency - 30% | | 0.00 | Detail | U.S. Dollar | 55,742.40 | 55,742.40 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMARKUP30 | 30% Markup | | | 185,808.00 Each | U.S. Dollar | | 0.30 | 55,742.40 |
| 4 | 18.00 Month | TEMPORARY FACILITIES | | 0.00 | Detail | U.S. Dollar | 10,119.20 | 182,145.60 |
| 4.1 | 18.00 Month | Temporary Facilities | | 0.00 | Detail | U.S. Dollar | 6,784.00 | 122,112.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| URCONNEX | Connex Box | | | 36.00 Month | U.S. Dollar | | 318.00 | 11,448.00 |
| UROFFTRL | Office Trailer -12x60 | | | 36.00 Month | U.S. Dollar | | 1,590.00 | 57,240.00 |
| URPRTAJH | Port-a-John Unit(s) (4) | | | 36.00 Month | U.S. Dollar | | 848.00 | 30,528.00 |
| UOOFFSUP | Office Supplies($/prs/mo) | | | 36.00 Month | U.S. Dollar | | 106.00 | 3,816.00 |
| UOPOTWTR | Potable Water | | | 18.00 Month | U.S. Dollar | | 530.00 | 9,540.00 |
| UOSFTYSP | Safety Supplies | | | 18.00 Month | U.S. Dollar | | 530.00 | 9,540.00 |
| 4.2 | 18.00 Month | Utilities | | 0.00 | Detail | U.S. Dollar | 1,000.00 | 18,000.00 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UOELECT | Electrical Charges-Month | | | 36.00 Month | U.S. Dollar | | 500.00 | 18,000.00 |
| 4.3 | 1.00 Lump Sum | Contingency - 30% | | 0.00 | Detail | U.S. Dollar | 42,033.60 | 42,033.60 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMARKUP30 | 30% Markup | | | 140,112.00 Each | U.S. Dollar | | 0.30 | 42,033.60 |
| 5 | 18.00 Month | SITE SUPERVISION & MANAGEMENT | | 0.03 | Detail | U.S. Dollar | 171,822.97 | 3,092,813.44 |
| 5.1 | 18.00 Month | Staff | | 0.05 | Detail | U.S. Dollar | 120,599.16 | 2,170,784.88 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| RPUTRK05 | F-250 4X4 3/4 TON PICKUP | | 15,840.00 | 4.00 Each (hourly) | U.S. Dollar | | 13.04 | 206,506.08 |
| L90FXX02 | Field - Proj Superintendent | | 3,960.00 | 1.00 Each (hourly) | U.S. Dollar | | 140.40 | 555,984.00 |
| L90FXX03 | Field - SHSO | | 3,960.00 | 1.00 Each (hourly) | U.S. Dollar | | 118.03 | 467,398.80 |
| L90FEJ00 | Field - Asst. Engr. | | 7,920.00 | 2.00 Each (hourly) | U.S. Dollar | | 118.80 | 940,896.00 |
| 5.2 | 14.00 Month | Regulatory Specialist (PT During Demolition) | | 0.20 | Detail | U.S. Dollar | 6,591.85 | 92,285.90 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| L90FEJ00 | Field - Asst. Engr. | | 700.00 | 1.00 Each (hourly) | U.S. Dollar | | 118.80 | 83,160.00 |


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| CBS Position Code | Quantity | UM | Description | Hours | Quantity | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cost Item | | | | | | |
| RPUTRK05 | F-250 4X4 3/4 TON PICKUP | | | 700.00 | 1.00 | Each (hourly) | U.S. Dollar | | 13.04 | 9,125.90 |
| 5.3 | 4.00 | Month | Regulatory Specialist (FT During PCB Impacted Steel Disposition) | | 0.05 | | Detail | U.S. Dollar | 29,004.14 | 116,016.56 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| L90FEJ00 | Field - Asst. Engr. | | | 880.00 | 1.00 | Each (hourly) | U.S. Dollar | | 118.80 | 104,544.00 |
| RPUTRK05 | F-250 4X4 3/4 TON PICKUP | | | 880.00 | 1.00 | Each (hourly) | U.S. Dollar | | 13.04 | 11,472.56 |
| 5.4 | 1.00 | Lump Sum | Contingency - 30% | | 0.00 | | Detail | U.S. Dollar | 713,726.10 | 713,726.10 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMARKUP30 | 30% Markup | | | | 2,379,087.00 | Each | U.S. Dollar | | 0.30 | 713,726.10 |
| 6 | 1.00 | Lump Sum | LOTO / AIR GAP | | 0.20 | | Detail | U.S. Dollar | 18,971.21 | 18,971.21 |
| 6.1 | 5.00 | Day | LOTO / Air Gap | | 1.00 | | Detail | U.S. Dollar | 2,918.66 | 14,593.31 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| L060100 | GENERAL LABORER | | | 100.00 | 2.00 | Each (hourly) | U.S. Dollar | | 73.99 | 7,398.50 |
| RLIFTS10 | TELE LFT GAS 41ft 2500lbs | | | 50.00 | 1.00 | Each (hourly) | U.S. Dollar | | 25.38 | 1,268.80 |
| RPUTRK05 | F-250 4X4 3/4 TON PICKUP | | | 100.00 | 2.00 | Each (hourly) | U.S. Dollar | | 13.04 | 1,303.70 |
| L010010 | SKILLED LABOR | | | 100.00 | 2.00 | Each (hourly) | U.S. Dollar | | 46.22 | 4,622.31 |
| 6.2 | 1.00 | Lump Sum | Contingency - 30% | | 0.00 | | Detail | U.S. Dollar | 4,377.90 | 4,377.90 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMARKUP30 | 30% Markup | | | | 14,593.00 | Each | U.S. Dollar | | 0.30 | 4,377.90 |
| 7 | 1.00 | Lump Sum | MISC MATERIAL SURVEY & SAMPLING | | 0.07 | | Detail | U.S. Dollar | 233,210.80 | 233,210.80 |
| 7.1 | 15.00 | Day | Sampling Crew | | 1.00 | | Detail | U.S. Dollar | 5,292.86 | 79,392.90 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| L060100 | GENERAL LABORER | | | 900.00 | 6.00 | Each (hourly) | U.S. Dollar | | 73.99 | 66,586.50 |
| RLIFTS10 | TELE LFT GAS 41ft 2500lbs | | | 150.00 | 1.00 | Each (hourly) | U.S. Dollar | | 25.38 | 3,806.40 |
| UMISCODC | Misc ODC's | | | | 9,000.00 | Each | U.S. Dollar | | 1.00 | 9,000.00 |
| 7.2 | 1.00 | Lump Sum | Lab Cost Allowance | | 0.00 | | Detail | U.S. Dollar | 100,000.00 | 100,000.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USUBGS | Lab Cost | | | | 100,000.00 | Each | U.S. Dollar | | 1.00 | 100,000.00 |
| 7.3 | 1.00 | Lump Sum | Contingency - 30% | | 0.00 | | Detail | U.S. Dollar | 53,817.90 | 53,817.90 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMARKUP30 | 30% Markup | | | | 179,393.00 | Each | U.S. Dollar | | 0.30 | 53,817.90 |
| 8 | 1.00 | Lump Sum | ACM / REGULATED MATERIAL ABATEMENT - POWER BLOCK | | 0.00 | | Detail | U.S. Dollar | 8,719,525.73 | 8,719,525.73 |
| 8.1 | 1.00 | Lump Sum | Power Block | | 0.00 | | Detail | U.S. Dollar | 6,209,427.00 | 6,209,427.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | | 6,209,427.00 | Each | U.S. Dollar | | 1.00 | 6,209,427.00 |
| 8.2 | 1.00 | Lump Sum | Contingency - 40% | | 0.00 | | Detail | U.S. Dollar | 2,510,098.73 | 2,510,098.73 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USCONTINGENCY | 40% Contingency | | | | 6,275,246.83 | Each | U.S. Dollar | | 0.40 | 2,510,098.73 |
| 9 | 1.00 | Lump Sum | ACM / REGULATED MATERIAL ABATEMENT - WASTE PROCESSING | | 0.00 | | Detail | U.S. Dollar | 317,898.87 | 317,898.87 |
| 9.1 | 1.00 | Lump Sum | Waste Processing | | 0.00 | | Detail | U.S. Dollar | 226,385.00 | 226,385.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity** | **UM** | **Currency** | | **Unit Cost** | **Total Cost** |


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| CBS Position Code | Quantity | UM | Description | Hours | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| | | | **Cost Item** | | | | | | |
| USMISC | Misc Sub | | | | 226,385.00 Each | U.S. Dollar | | 1.00 | 226,385.00 |
| 9.2 | 1.00 | Lump Sum | Contingency - 40% | | 0.00 | Detail | U.S. Dollar | 91,513.87 | 91,513.87 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USCONTINGENCY | 40% Contingency | | | | 228,784.68 Each | U.S. Dollar | | 0.40 | 91,513.87 |
| 10 | 1.00 | Lump Sum | PCB/LEAD IMPACTED STEEL DISPOSAL | | 0.00 | Detail | U.S. Dollar | 6,091,624.00 | 6,091,624.00 |
| 10.1 | 1.00 | Lump Sum | PCB Impacted Steel Disposal | | 0.00 | Detail | U.S. Dollar | 5,537,840.00 | 5,537,840.00 |
| 10.1.1 | 3,405.00 | Ton | P&S | | 0.00 | Detail | U.S. Dollar | 1,276.00 | 4,344,780.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USREGMAT | Regulated Material T&D | | | | 3,405.00 Ton | U.S. Dollar | | 1,276.00 | 4,344,780.00 |
| 10.1.2 | 460.00 | Ton | HMS | | 0.00 | Detail | U.S. Dollar | 1,276.00 | 586,960.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USREGMAT | Regulated Material T&D | | | | 460.00 Ton | U.S. Dollar | | 1,276.00 | 586,960.00 |
| 10.1.3 | 475.00 | Ton | Torch | | 0.00 | Detail | U.S. Dollar | 1,276.00 | 606,100.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USREGMAT | Regulated Material T&D | | | | 475.00 Ton | U.S. Dollar | | 1,276.00 | 606,100.00 |
| 10.2 | 1.00 | Lump Sum | Contingency - 10% | | 0.00 | Detail | U.S. Dollar | 553,784.00 | 553,784.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMARKUP15 | 10% Markup | | | | 5,537,840.00 Each | U.S. Dollar | | 0.10 | 553,784.00 |
| 11 | 1.00 | Lump Sum | FACILITIES DEMOLITION - POWER BLOCK | | 0.00 | Detail | U.S. Dollar | 6,808,338.32 | 6,808,338.32 |
| 11.1 | 1.00 | Day | Northwest Gaurdshack | | 1.00 | Detail | U.S. Dollar | 11,033.01 | 11,033.01 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *REXCAV06B | Excav 100K w/ Concrete Processor | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 223.06 | 2,230.56 |
| *REXCAV06C | Excav 100K w/ Hammer | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 1,868.04 |
| *RFELWH08C | CAT 980 LOADER | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 1,039.42 |
| L010101 | OPERATOR | | | 30.00 | 3.00 Each (hourly) | U.S. Dollar | | 97.85 | 2,935.60 |
| L060100 | GENERAL LABORER | | | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,959.40 |
| 11.2 | 1.00 | Day | Employee Parking Lot - Trailers | | 1.00 | Detail | U.S. Dollar | 7,467.72 | 7,467.72 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *REXCAV06A | Excav 100K w/ Bucket & Grapple | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 135.29 | 1,352.88 |
| *REXCAV06E | Excav 100K w/ Shear | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 2,076.11 |
| L010101 | OPERATOR | | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 97.85 | 1,957.07 |
| L060100 | GENERAL LABORER | | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 1,479.70 |
| RLIFTS05 | JCB 508C, 8,000lbs FRKLFT | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 34.76 | 347.56 |
| STORCH | Torch's & Consumables Per Man Day | | | | 4.00 Each | U.S. Dollar | | 63.60 | 254.40 |
| 11.3 | 2.00 | Day | PBF Administration Building | | 1.00 | Detail | U.S. Dollar | 28,384.23 | 56,768.47 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 6,725.91 |
| L010101 | OPERATOR | | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | | | 14.00 Each | U.S. Dollar | | 63.60 | 890.40 |


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| Cost Item | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CBS Position Code | Quantity UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
| *REXCAV06B | Excav 100K w/ Concrete Processor | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 223.06 | 4,461.11 |
| *REXCAV06C | Excav 100K w/ Hammer | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *RFELWH08C | CAT 980 LOADER | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| L010101 | OPERATOR | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 97.85 | 5,871.20 |
| L060100 | GENERAL LABORER | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |
| 11.4 | 1.00 Day | Screen House #1 | | 1.00 | Detail | U.S. Dollar | 15,142.41 | 15,142.41 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RFELWH08C | CAT 980 LOADER | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 1,039.42 |
| *REXCAV06C | Excav 100K w/ Hammer | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *REXCAV08C | Excav 240K w/ Hammer | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 497.31 | 4,973.08 |
| L010101 | OPERATOR | | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 1,479.70 |
| 11.5 | 1.00 Day | Screen House #2 | | 1.00 | Detail | U.S. Dollar | 15,142.41 | 15,142.41 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RFELWH08C | CAT 980 LOADER | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 1,039.42 |
| *REXCAV06C | Excav 100K w/ Hammer | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *REXCAV08C | Excav 240K w/ Hammer | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 497.31 | 4,973.08 |
| L010101 | OPERATOR | | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 1,479.70 |
| 11.6 | 2.00 Day | Screen House #3 | | 1.00 | Detail | U.S. Dollar | 15,142.41 | 30,284.82 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RFELWH08C | CAT 980 LOADER | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| *REXCAV06C | Excav 100K w/ Hammer | | 40.00 | 2.00 Each (hourly) | U.S. Dollar | | 186.80 | 7,472.14 |
| *REXCAV08C | Excav 240K w/ Hammer | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 497.31 | 9,946.17 |
| L010101 | OPERATOR | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | 40.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,959.40 |
| 11.7 | 1.00 Day | Concrete Structure | | 1.00 | Detail | U.S. Dollar | 15,142.41 | 15,142.41 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RFELWH08C | CAT 980 LOADER | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 1,039.42 |
| *REXCAV06C | Excav 100K w/ Hammer | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *REXCAV08C | Excav 240K w/ Hammer | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 497.31 | 4,973.08 |
| L010101 | OPERATOR | | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | | 20.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 1,479.70 |
| 11.8 | 2.00 Day | Former Coal Unloading Structures | | 1.00 | Detail | U.S. Dollar | 15,142.41 | 30,284.82 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RFELWH08C | CAT 980 LOADER | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| *REXCAV06C | Excav 100K w/ Hammer | | 40.00 | 2.00 Each (hourly) | U.S. Dollar | | 186.80 | 7,472.14 |
| *REXCAV08C | Excav 240K w/ Hammer | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 497.31 | 9,946.17 |
| L010101 | OPERATOR | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | 40.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,959.40 |
| 11.9 | 4.00 Day | Boiler Room (North) | | 1.00 | Detail | U.S. Dollar | 15,142.41 | 60,569.64 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RFELWH08C | CAT 980 LOADER | | 40.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 4,157.68 |
| *REXCAV06C | Excav 100K w/ Hammer | | 80.00 | 2.00 Each (hourly) | U.S. Dollar | | 186.80 | 14,944.29 |
| *REXCAV08C | Excav 240K w/ Hammer | | 40.00 | 1.00 Each (hourly) | U.S. Dollar | | 497.31 | 19,892.34 |
| L010101 | OPERATOR | | 160.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 15,656.53 |
| L060100 | GENERAL LABORER | | 80.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |


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| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.10 | 3.00 | Day | Coal Bunker Section | 1.00 | Detail | U.S. Dollar | 15,142.41 | 45,427.23 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 30.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 3,118.26 |
| *REXCAV06C | Excav 100K w/ Hammer | 60.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 11,208.22 |
| *REXCAV08C | Excav 240K w/ Hammer | 30.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 14,919.25 |
| L010101 | OPERATOR | 120.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 11,742.40 |
| L060100 | GENERAL LABORER | 60.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.11 | 2.00 | Day | Boiler Room (mid South) | 1.00 | Detail | U.S. Dollar | 15,142.41 | 30,284.82 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 2,078.84 |
| *REXCAV06C | Excav 100K w/ Hammer | 40.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 7,472.14 |
| *REXCAV08C | Excav 240K w/ Hammer | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 9,946.17 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 40.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,959.40 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.12 | 2.00 | Day | Boiler Room (mid south, low roof) | 1.00 | Detail | U.S. Dollar | 15,142.41 | 30,284.82 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 2,078.84 |
| *REXCAV06C | Excav 100K w/ Hammer | 40.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 7,472.14 |
| *REXCAV08C | Excav 240K w/ Hammer | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 9,946.17 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 40.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,959.40 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.13 | 2.00 | Day | Boiler Room South - Combustion Unit #11 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 | Each | U.S. Dollar | 63.60 | 890.40 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.14 | 1.00 | Day | Combustion Unit #12 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 | Each | U.S. Dollar | 63.60 | 445.20 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.15 | 1.00 | Day | Combustion Unit #13 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 | Each | U.S. Dollar | 63.60 | 445.20 |


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| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.16 | 5.00 | Day | Turbine Hall (all) | 1.00 | Detail | U.S. Dollar | 15,142.41 | 75,712.04 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 50.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 5,197.10 |
| *REXCAV06C | Excav 100K w/ Hammer | 100.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 18,680.36 |
| *REXCAV08C | Excav 240K w/ Hammer | 50.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 24,865.42 |
| L010101 | OPERATOR | 200.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 19,570.66 |
| L060100 | GENERAL LABORER | 100.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 7,398.50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.17 | 4.00 | Day | Northeast Utilities Building (all) | 1.00 | Detail | U.S. Dollar | 15,142.41 | 60,569.64 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 4,157.68 |
| *REXCAV06C | Excav 100K w/ Hammer | 80.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 14,944.29 |
| *REXCAV08C | Excav 240K w/ Hammer | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 19,892.34 |
| L010101 | OPERATOR | 160.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 15,656.53 |
| L060100 | GENERAL LABORER | 80.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 5,918.80 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.18 | 3.00 | Day | Warehouse (off turbine hall) | 1.00 | Detail | U.S. Dollar | 15,142.41 | 45,427.23 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 30.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 3,118.26 |
| *REXCAV06C | Excav 100K w/ Hammer | 60.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 11,208.22 |
| *REXCAV08C | Excav 240K w/ Hammer | 30.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 14,919.25 |
| L010101 | OPERATOR | 120.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 11,742.40 |
| L060100 | GENERAL LABORER | 60.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.19 | 2.00 | Day | Dry Scrubber 1, Unit 11 | 1.00 | Detail | U.S. Dollar | 28,384.23 | 56,768.47 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 | Each | U.S. Dollar | 63.60 | 890.40 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 223.06 | 4,461.11 |
| *REXCAV06C | Excav 100K w/ Hammer | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 186.80 | 3,736.07 |
| *RFELWH08C | CAT 980 LOADER | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 2,078.84 |
| L010101 | OPERATOR | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 97.85 | 5,871.20 |
| L060100 | GENERAL LABORER | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 73.99 | 5,918.80 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.20 | 2.00 | Day | Dry Scrubber 2, Unit 12 | 1.00 | Detail | U.S. Dollar | 28,384.23 | 56,768.47 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 | Each | U.S. Dollar | 63.60 | 890.40 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 223.06 | 4,461.11 |
| *REXCAV06C | Excav 100K w/ Hammer | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 186.80 | 3,736.07 |
| *RFELWH08C | CAT 980 LOADER | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 2,078.84 |
| L010101 | OPERATOR | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 97.85 | 5,871.20 |


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| CBS Position Code | Quantity UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| | | | Cost Item | | | | | |
| L060100 | GENERAL LABORER | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |
| 11.21 | 2.00 Day | Dry Scrubber 3, Unit 13 | | 1.00 | Detail | U.S. Dollar | 28,384.23 | 56,768.47 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 6,725.91 |
| L010101 | OPERATOR | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | | 14.00 Each | U.S. Dollar | | 63.60 | 890.40 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 223.06 | 4,461.11 |
| *REXCAV06C | Excav 100K w/ Hammer | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *RFELWH08C | CAT 980 LOADER | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| L010101 | OPERATOR | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 97.85 | 5,871.20 |
| L060100 | GENERAL LABORER | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |
| 11.22 | 2.00 Day | Baghouse 1, Unit 11 | | 1.00 | Detail | U.S. Dollar | 28,384.23 | 56,768.47 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 6,725.91 |
| L010101 | OPERATOR | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | | 14.00 Each | U.S. Dollar | | 63.60 | 890.40 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 223.06 | 4,461.11 |
| *REXCAV06C | Excav 100K w/ Hammer | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *RFELWH08C | CAT 980 LOADER | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| L010101 | OPERATOR | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 97.85 | 5,871.20 |
| L060100 | GENERAL LABORER | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |
| 11.23 | 2.00 Day | Baghouse 2, Unit 12 | | 1.00 | Detail | U.S. Dollar | 28,384.23 | 56,768.47 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 6,725.91 |
| L010101 | OPERATOR | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | | 14.00 Each | U.S. Dollar | | 63.60 | 890.40 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 223.06 | 4,461.11 |
| *REXCAV06C | Excav 100K w/ Hammer | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *RFELWH08C | CAT 980 LOADER | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| L010101 | OPERATOR | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 97.85 | 5,871.20 |
| L060100 | GENERAL LABORER | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |
| 11.24 | 2.00 Day | Baghouse 3, Unit 13 | | 1.00 | Detail | U.S. Dollar | 28,384.23 | 56,768.47 |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 6,725.91 |


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| CBS Position Code | Quantity | UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| L010101 | OPERATOR | | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | | | 14.00 Each | U.S. Dollar | | 63.60 | 890.40 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 223.06 | 4,461.11 |
| *REXCAV06C | Excav 100K w/ Hammer | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 3,736.07 |
| *RFELWH08C | CAT 980 LOADER | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| L010101 | OPERATOR | | | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 97.85 | 5,871.20 |
| L060100 | GENERAL LABORER | | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 73.99 | 5,918.80 |
| 11.25 | 1.00 | Day | Scrubber Control Building | | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 | Each | U.S. Dollar | 63.60 | 445.20 |

| CBS Position Code | Quantity | UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| 11.26 | 1.00 | Day | Lime Slurry | | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 | Each | U.S. Dollar | 63.60 | 445.20 |

| CBS Position Code | Quantity | UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| 11.27 | 10.00 | Day | Stack | | 1.00 | Detail | U.S. Dollar | 25,142.41 | 251,424.09 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 100.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 10,394.20 |
| *REXCAV06C | Excav 100K w/ Hammer | 200.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 37,360.72 |
| *REXCAV08C | Excav 240K w/ Hammer | 100.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 49,730.84 |
| L010101 | OPERATOR | 400.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 39,141.33 |
| L060100 | GENERAL LABORER | 200.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 14,797.00 |
| USBLAST | Blasting Sub | | 100,000.00 | Each | U.S. Dollar | 1.00 | 100,000.00 |

| CBS Position Code | Quantity | UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 | 1.00 | Day | Gas Turbine Generator #11 | | 1.00 | Detail | U.S. Dollar | 28,384.23 | 28,384.23 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 | Each | U.S. Dollar | 63.60 | 445.20 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 223.06 | 2,230.56 |
| *REXCAV06C | Excav 100K w/ Hammer | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 186.80 | 1,868.04 |
| *RFELWH08C | CAT 980 LOADER | 10.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 1,039.42 |
| L010101 | OPERATOR | 30.00 | 3.00 | Each (hourly) | U.S. Dollar | 97.85 | 2,935.60 |
| L060100 | GENERAL LABORER | 40.00 | 4.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,959.40 |

| CBS Position Code | Quantity | UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| 11.29 | 1.00 | Day | Gas Turbine Generator #12 | | 1.00 | Detail | U.S. Dollar | 28,384.23 | 28,384.23 |


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| CBS Position Code | Quantity UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | 63.60 | 445.20 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 223.06 | 2,230.56 |
| *REXCAV06C | Excav 100K w/ Hammer | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 186.80 | 1,868.04 |
| *RFELWH08C | CAT 980 LOADER | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 1,039.42 |
| L010101 | OPERATOR | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 97.85 | 2,935.60 |
| L060100 | GENERAL LABORER | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 73.99 | 2,959.40 |

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|---|---|---|---|---|---|---|---|
| 11.30 | 1.00 Day | Gas Turbine Generator #13 | 1.00 | Detail | U.S. Dollar | 28,384.23 | 28,384.23 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | 63.60 | 445.20 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 223.06 | 2,230.56 |
| *REXCAV06C | Excav 100K w/ Hammer | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 186.80 | 1,868.04 |
| *RFELWH08C | CAT 980 LOADER | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 1,039.42 |
| L010101 | OPERATOR | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 97.85 | 2,935.60 |
| L060100 | GENERAL LABORER | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 73.99 | 2,959.40 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.31 | 1.00 Day | Gas Turbine Generator #14 | 1.00 | Detail | U.S. Dollar | 28,384.23 | 28,384.23 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | 63.60 | 445.20 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 223.06 | 2,230.56 |
| *REXCAV06C | Excav 100K w/ Hammer | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 186.80 | 1,868.04 |
| *RFELWH08C | CAT 980 LOADER | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 1,039.42 |
| L010101 | OPERATOR | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 97.85 | 2,935.60 |
| L060100 | GENERAL LABORER | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 73.99 | 2,959.40 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.32 | 2.00 Day | Jet Shop | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 Each | U.S. Dollar | 63.60 | 890.40 |


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| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.33 | 4.00 | Day | Ash Storage | 1.00 | Detail | U.S. Dollar | 28,384.23 | 113,536.94 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 4,522.80 |
| *REXCAV06E | Excav 100K w/ Shear | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 8,304.46 |
| *REXCAV08 | Excav 240K w/ Shear | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 16,810.28 |
| *REXCAV08A | Excav 180K w/ Shear | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 13,451.82 |
| L010101 | OPERATOR | 160.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 15,656.53 |
| L060100 | GENERAL LABORER | 120.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 8,878.20 |
| STORCH | Torch's & Consumables Per Man Day | | 28.00 | Each | U.S. Dollar | 63.60 | 1,780.80 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 223.06 | 8,922.22 |
| *REXCAV06C | Excav 100K w/ Hammer | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 186.80 | 7,472.14 |
| *RFELWH08C | CAT 980 LOADER | 40.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 4,157.68 |
| L010101 | OPERATOR | 120.00 | 3.00 | Each (hourly) | U.S. Dollar | 97.85 | 11,742.40 |
| L060100 | GENERAL LABORER | 160.00 | 4.00 | Each (hourly) | U.S. Dollar | 73.99 | 11,837.60 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.34 | 2.00 | Day | Pug Mill | 1.00 | Detail | U.S. Dollar | 15,142.41 | 30,284.82 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 103.94 | 2,078.84 |
| *REXCAV06C | Excav 100K w/ Hammer | 40.00 | 2.00 | Each (hourly) | U.S. Dollar | 186.80 | 7,472.14 |
| *REXCAV08C | Excav 240K w/ Hammer | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 497.31 | 9,946.17 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 40.00 | 2.00 | Each (hourly) | U.S. Dollar | 73.99 | 2,959.40 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.35 | 2.00 | Day | Gate 40 Warehouse Building | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 | Each | U.S. Dollar | 63.60 | 890.40 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.36 | 2.00 | Day | RDF Supply Conveyor #517 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 | Each | U.S. Dollar | 63.60 | 890.40 |

| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| 11.37 | 2.00 | Day | RDF Supply Conveyor #519 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 | Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 | Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 | Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 | Each | U.S. Dollar | 63.60 | 890.40 |


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| CBS Position Code | Quantity UM | Description | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| | | **Cost Item** | | | | | |
| 11.38 | 2.00 Day | RDF Supply Conveyor #515 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 Each | U.S. Dollar | 63.60 | 890.40 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.39 | 3.00 Day | Dock | 1.00 | Detail | U.S. Dollar | 28,384.23 | 85,152.70 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 3,392.10 |
| *REXCAV06E | Excav 100K w/ Shear | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 6,228.34 |
| *REXCAV08 | Excav 240K w/ Shear | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 12,607.71 |
| *REXCAV08A | Excav 180K w/ Shear | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 10,088.87 |
| L010101 | OPERATOR | 120.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 11,742.40 |
| L060100 | GENERAL LABORER | 90.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 6,658.65 |
| STORCH | Torch's & Consumables Per Man Day | | 21.00 Each | U.S. Dollar | 63.60 | 1,335.60 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 223.06 | 6,691.67 |
| *REXCAV06C | Excav 100K w/ Hammer | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 186.80 | 5,604.11 |
| *RFELWH08C | CAT 980 LOADER | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 3,118.26 |
| L010101 | OPERATOR | 90.00 | 3.00 Each (hourly) | U.S. Dollar | 97.85 | 8,806.80 |
| L060100 | GENERAL LABORER | 120.00 | 4.00 Each (hourly) | U.S. Dollar | 73.99 | 8,878.20 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.40 | 1.00 Day | Truck Wheel Wash Building | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | 63.60 | 445.20 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.41 | 2.00 Day | Coal Barge Unloading Sturcture | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 Each | U.S. Dollar | 63.60 | 890.40 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11.42 | 1.00 Day | Coal Unloading Conveyor #1 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |


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| CBS Position Code | Quantity UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | | 63.60 | 445.20 |
| 11.43 | 2.00 Day | Transfer Building | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 Each | U.S. Dollar | 63.60 | 890.40 |
| 11.44 | 1.00 Day | Coal Conveyor #2 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | 63.60 | 445.20 |
| 11.45 | 1.00 Day | Coal Conveyor #3 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | 63.60 | 445.20 |
| 11.46 | 1.00 Day | Maintenance Garage | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | 63.60 | 445.20 |
| 11.47 | 3.00 Day | Subgrade Mineraliztion Tank | 1.00 | Detail | U.S. Dollar | 15,142.41 | 45,427.23 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RFELWH08C | CAT 980 LOADER | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 3,118.26 |
| *REXCAV06C | Excav 100K w/ Hammer | 60.00 | 2.00 Each (hourly) | U.S. Dollar | 186.80 | 11,208.22 |
| *REXCAV08C | Excav 240K w/ Hammer | 30.00 | 1.00 Each (hourly) | U.S. Dollar | 497.31 | 14,919.25 |
| L010101 | OPERATOR | 120.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 11,742.40 |
| L060100 | GENERAL LABORER | 60.00 | 2.00 Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| 11.48 | 1.00 Day | Coal Pond Pump House | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 1,130.70 |


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| CBS Position Code | Quantity | UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|---|
| *REXCAV06E | Excav 100K w/ Shear | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | | | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 3,362.96 |
| L010101 | OPERATOR | | | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | | | 30.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | | | 7.00 Each | U.S. Dollar | | 63.60 | 445.20 |
| 11.49 | 2.00 | Day | Sub-Grade Reclaim Hopper Structure | | 1.00 | Detail | U.S. Dollar | 15,142.41 | 30,284.82 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RFELWH08C | CAT 980 LOADER | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 103.94 | 2,078.84 |
| *REXCAV06C | Excav 100K w/ Hammer | | | 40.00 | 2.00 Each (hourly) | U.S. Dollar | | 186.80 | 7,472.14 |
| *REXCAV08C | Excav 240K w/ Hammer | | | 20.00 | 1.00 Each (hourly) | U.S. Dollar | | 497.31 | 9,946.17 |
| L010101 | OPERATOR | | | 80.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | | | 40.00 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,959.40 |
| 11.50 | 44.00 | Day | Steel Sizing | | 1.00 | Detail | U.S. Dollar | 23,521.00 | 1,034,924.04 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | | | 440.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 49,750.80 |
| *REXCAV06E | Excav 100K w/ Shear | | | 880.00 | 2.00 Each (hourly) | U.S. Dollar | | 207.61 | 182,698.03 |
| *REXCAV08 | Excav 240K w/ Shear | | | 880.00 | 2.00 Each (hourly) | U.S. Dollar | | 420.26 | 369,826.16 |
| L010101 | OPERATOR | | | 1,760.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 172,221.84 |
| L060100 | GENERAL LABORER | | | 3,520.00 | 8.00 Each (hourly) | U.S. Dollar | | 73.99 | 260,427.20 |
| 11.51 | 16,123.00 | Ton | Scrap Metal Transport | | 0.00 | Detail | U.S. Dollar | 60.00 | 967,380.00 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | | | 967,380.00 Each | U.S. Dollar | | 1.00 | 967,380.00 |
| 11.52 | 35,803.00 | Cubic Yard | Crushed Concrete - From Demo Activities | | 553.25 | Detail | U.S. Dollar | 23.89 | 855,179.44 |
| 11.52.1 | 71,606.00 | Ton | Concrete Crushing | | 1,200.00 | Detail | U.S. Dollar | 9.89 | 707,951.38 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC24 | SCREEN TWO DECK 5' X 10' 51HP | | | 596.72 | 1.00 Each (hourly) | U.S. Dollar | | 97.64 | 58,263.65 |
| *RXMISC25 | Concrete Crushing Plant | | | 596.72 | 1.00 Each (hourly) | U.S. Dollar | | 154.70 | 92,312.07 |
| *RFELWH08C | CAT 980 LOADER | | | 1,193.43 | 2.00 Each (hourly) | U.S. Dollar | | 103.94 | 124,047.85 |
| *REXCAV06C | Excav 100K w/ Hammer | | | 596.72 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 111,468.82 |
| L010101 | OPERATOR | | | 2,386.87 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 233,562.83 |
| L060100 | GENERAL LABORER | | | 1,193.43 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 88,296.17 |
| 11.52.2 | 35,803.00 | Cubic Yard | Load, Haul & Deliver | | 14,200.00 | Detail | U.S. Dollar | 2.35 | 84,095.24 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| L010101 | OPERATOR | | | 151.28 | 6.00 Each (hourly) | U.S. Dollar | | 97.85 | 14,803.28 |
| L080940 | TEAMSTER | | | 201.71 | 8.00 Each (hourly) | U.S. Dollar | | 73.81 | 14,888.58 |
| RDOZER12 | CAT D8T | | | 75.64 | 3.00 Each (hourly) | U.S. Dollar | | 165.52 | 12,520.15 |
| REXCAV07 | CAT 350 EXCAVATOR, 3.50CY | | | 75.64 | 3.00 Each (hourly) | U.S. Dollar | | 148.87 | 11,260.88 |
| RDUTRK07 | CAT D400D, 21CY-29CY | | | 201.71 | 8.00 Each (hourly) | U.S. Dollar | | 151.82 | 30,622.36 |
| 11.52.3 | 35,803.00 | Cubic Yard | Placement & Compaction | | 14,200.00 | Detail | U.S. Dollar | 1.76 | 63,132.81 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| L010101 | OPERATOR | | | 252.13 | 10.00 Each (hourly) | U.S. Dollar | | 97.85 | 24,672.13 |
| RDOZER12 | CAT D8T | | | 151.28 | 6.00 Each (hourly) | U.S. Dollar | | 165.52 | 25,040.31 |
| RROLLR05 | CAT 825C PADFOOT | | | 100.85 | 4.00 Each (hourly) | U.S. Dollar | | 133.07 | 13,420.38 |
| 11.53 | 1.00 | Lump Sum | Contingency - 40% | | 0.00 | Detail | U.S. Dollar | 1,959,923.25 | 1,959,923.25 |
| **Resource Code** | **Description** | | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |


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| CBS Position Code | Quantity UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| USCONTINGENCY | 40% Contingency | | 4,899,808.13 Each | U.S. Dollar | | 0.40 | 1,959,923.25 |
| 12 | 1.00 Lump Sum | FACILITIES DEMOLITION - WASTE PROCESSING | 0.01 | Detail | U.S. Dollar | 2,566,806.16 | 2,566,806.16 |
| 12.1 | 4.00 Day | Refuse Derived Conveyor | 1.00 | Detail | U.S. Dollar | 5,829.93 | 23,319.71 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| RHYDCR06 | GROVE RT880 73 TON | 40.00 | 1.00 Each (hourly) | U.S. Dollar | 137.07 | 5,482.66 |
| *RXMISC14 | MAN LIFT GAS 125ft | 80.00 | 2.00 Each (hourly) | U.S. Dollar | 63.06 | 5,044.72 |
| L010101 | OPERATOR | 40.00 | 1.00 Each (hourly) | U.S. Dollar | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 120.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 8,878.20 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12.2 | 4.00 Day | Odor Control Equipment | 1.00 | Detail | U.S. Dollar | 17,351.22 | 69,404.89 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 40.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 4,522.80 |
| *REXCAV06E | Excav 100K w/ Shear | 40.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 8,304.46 |
| *REXCAV08 | Excav 240K w/ Shear | 40.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 16,810.28 |
| *REXCAV08A | Excav 180K w/ Shear | 40.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 13,451.82 |
| L010101 | OPERATOR | 160.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 15,656.53 |
| L060100 | GENERAL LABORER | 120.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 8,878.20 |
| STORCH | Torch's & Consumables Per Man Day | | 28.00 Each | U.S. Dollar | 63.60 | 1,780.80 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12.3 | 6.00 Day | Refuse Derived Storage Building | 1.00 | Detail | U.S. Dollar | 32,493.63 | 194,961.79 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 6,784.20 |
| *REXCAV06E | Excav 100K w/ Shear | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 12,456.68 |
| *REXCAV08 | Excav 240K w/ Shear | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 25,215.42 |
| *REXCAV08A | Excav 180K w/ Shear | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 20,177.74 |
| L010101 | OPERATOR | 240.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 23,484.80 |
| L060100 | GENERAL LABORER | 180.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 13,317.30 |
| STORCH | Torch's & Consumables Per Man Day | | 42.00 Each | U.S. Dollar | 63.60 | 2,671.20 |
| *RFELWH08C | CAT 980 LOADER | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 6,236.52 |
| *REXCAV06C | Excav 100K w/ Hammer | 120.00 | 2.00 Each (hourly) | U.S. Dollar | 186.80 | 22,416.43 |
| *REXCAV08C | Excav 240K w/ Hammer | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 497.31 | 29,838.50 |
| L010101 | OPERATOR | 240.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 23,484.80 |
| L060100 | GENERAL LABORER | 120.00 | 2.00 Each (hourly) | U.S. Dollar | 73.99 | 8,878.20 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12.4 | 6.00 Day | Processing Building | 1.00 | Detail | U.S. Dollar | 17,351.22 | 104,107.34 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 6,784.20 |
| *REXCAV06E | Excav 100K w/ Shear | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 12,456.68 |
| *REXCAV08 | Excav 240K w/ Shear | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 25,215.42 |
| *REXCAV08A | Excav 180K w/ Shear | 60.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 20,177.74 |
| L010101 | OPERATOR | 240.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 23,484.80 |
| L060100 | GENERAL LABORER | 180.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 13,317.30 |
| STORCH | Torch's & Consumables Per Man Day | | 42.00 Each | U.S. Dollar | 63.60 | 2,671.20 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12.5 | 2.00 Day | Small Processing Building | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |


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| CBS Position Code | Quantity UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| L060100 | GENERAL LABORER | 60.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 Each | U.S. Dollar | | 63.60 | 890.40 |
| 12.6 | 10.00 Day | MSW Receiving and Storage | 1.00 | Detail | U.S. Dollar | 32,493.63 | 324,936.32 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 100.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 11,307.00 |
| *REXCAV06E | Excav 100K w/ Shear | 100.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 20,761.14 |
| *REXCAV08 | Excav 240K w/ Shear | 100.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 42,025.70 |
| *REXCAV08A | Excav 180K w/ Shear | 100.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 33,629.56 |
| L010101 | OPERATOR | 400.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 39,141.33 |
| L060100 | GENERAL LABORER | 300.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 22,195.50 |
| STORCH | Torch's & Consumables Per Man Day | | 70.00 Each | U.S. Dollar | 63.60 | 4,452.00 |
| *RFELWH08C | CAT 980 LOADER | 100.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 10,394.20 |
| *REXCAV06C | Excav 100K w/ Hammer | 200.00 | 2.00 Each (hourly) | U.S. Dollar | 186.80 | 37,360.72 |
| *REXCAV08C | Excav 240K w/ Hammer | 100.00 | 1.00 Each (hourly) | U.S. Dollar | 497.31 | 49,730.84 |
| L010101 | OPERATOR | 400.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 39,141.33 |
| L060100 | GENERAL LABORER | 200.00 | 2.00 Each (hourly) | U.S. Dollar | 73.99 | 14,797.00 |
| 12.7 | 5.00 Day | Maneuvering Hall | 1.00 | Detail | U.S. Dollar | 28,384.23 | 141,921.17 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 50.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 5,653.50 |
| *REXCAV06E | Excav 100K w/ Shear | 50.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 10,380.57 |
| *REXCAV08 | Excav 240K w/ Shear | 50.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 21,012.85 |
| *REXCAV08A | Excav 180K w/ Shear | 50.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 16,814.78 |
| L010101 | OPERATOR | 200.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 19,570.66 |
| L060100 | GENERAL LABORER | 150.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 11,097.75 |
| STORCH | Torch's & Consumables Per Man Day | | 35.00 Each | U.S. Dollar | 63.60 | 2,226.00 |
| *REXCAV06B | Excav 100K w/ Concrete Processor | 50.00 | 1.00 Each (hourly) | U.S. Dollar | 223.06 | 11,152.78 |
| *REXCAV06C | Excav 100K w/ Hammer | 50.00 | 1.00 Each (hourly) | U.S. Dollar | 186.80 | 9,340.18 |
| *RFELWH08C | CAT 980 LOADER | 50.00 | 1.00 Each (hourly) | U.S. Dollar | 103.94 | 5,197.10 |
| L010101 | OPERATOR | 150.00 | 3.00 Each (hourly) | U.S. Dollar | 97.85 | 14,678.00 |
| L060100 | GENERAL LABORER | 200.00 | 4.00 Each (hourly) | U.S. Dollar | 73.99 | 14,797.00 |
| 12.8 | 2.00 Day | Administrative Building | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 Each | U.S. Dollar | 63.60 | 890.40 |
| 12.9 | 2.00 Day | Tool Storage | 1.00 | Detail | U.S. Dollar | 17,351.22 | 34,702.45 |

| Resource Code | Description | Hours | Quantity UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| *RXMISC19 | Material Handler | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 113.07 | 2,261.40 |
| *REXCAV06E | Excav 100K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 207.61 | 4,152.23 |
| *REXCAV08 | Excav 240K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 420.26 | 8,405.14 |
| *REXCAV08A | Excav 180K w/ Shear | 20.00 | 1.00 Each (hourly) | U.S. Dollar | 336.30 | 6,725.91 |
| L010101 | OPERATOR | 80.00 | 4.00 Each (hourly) | U.S. Dollar | 97.85 | 7,828.27 |
| L060100 | GENERAL LABORER | 60.00 | 3.00 Each (hourly) | U.S. Dollar | 73.99 | 4,439.10 |
| STORCH | Torch's & Consumables Per Man Day | | 14.00 Each | U.S. Dollar | 63.60 | 890.40 |
| 12.10 | 1.00 Day | Scale House #1 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |


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| CBS Position Code | Quantity UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| **Resource Code** | **Description** | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | | 63.60 | 445.20 |
| 12.11 | 1.00 Day | Scale House #2 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |
| **Resource Code** | **Description** | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | | 63.60 | 445.20 |
| 12.12 | 1.00 Day | Scale House #3 | 1.00 | Detail | U.S. Dollar | 17,351.22 | 17,351.22 |
| **Resource Code** | **Description** | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 1,130.70 |
| *REXCAV06E | Excav 100K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 207.61 | 2,076.11 |
| *REXCAV08 | Excav 240K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 420.26 | 4,202.57 |
| *REXCAV08A | Excav 180K w/ Shear | 10.00 | 1.00 Each (hourly) | U.S. Dollar | | 336.30 | 3,362.96 |
| L010101 | OPERATOR | 40.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,914.13 |
| L060100 | GENERAL LABORER | 30.00 | 3.00 Each (hourly) | U.S. Dollar | | 73.99 | 2,219.55 |
| STORCH | Torch's & Consumables Per Man Day | | 7.00 Each | U.S. Dollar | | 63.60 | 445.20 |
| 12.13 | 22.00 Day | Steel Sizing | 1.00 | Detail | U.S. Dollar | 23,521.00 | 517,462.02 |
| **Resource Code** | **Description** | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC19 | Material Handler | 220.00 | 1.00 Each (hourly) | U.S. Dollar | | 113.07 | 24,875.40 |
| *REXCAV06E | Excav 100K w/ Shear | 440.00 | 2.00 Each (hourly) | U.S. Dollar | | 207.61 | 91,349.02 |
| *REXCAV08 | Excav 240K w/ Shear | 440.00 | 2.00 Each (hourly) | U.S. Dollar | | 420.26 | 184,913.08 |
| L010101 | OPERATOR | 880.00 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 86,110.92 |
| L060100 | GENERAL LABORER | 1,760.00 | 8.00 Each (hourly) | U.S. Dollar | | 73.99 | 130,213.60 |
| 12.14 | 4,728.00 Ton | Scrap Metal Transport | 0.00 | Detail | U.S. Dollar | 60.00 | 283,680.00 |
| **Resource Code** | **Description** | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| USMISC | Misc Sub | | 283,680.00 Each | U.S. Dollar | | 1.00 | 283,680.00 |
| 12.15 | 500.00 Cubic Yard | Crushed Concrete - From Demo Activities | 553.25 | Detail | U.S. Dollar | 23.89 | 11,942.85 |
| 12.15.1 | 1,000.00 Ton | Concrete Crushing | 1,200.00 | Detail | U.S. Dollar | 9.89 | 9,886.76 |
| **Resource Code** | **Description** | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| *RXMISC24 | SCREEN TWO DECK 5' X 10' 51HP | 8.33 | 1.00 Each (hourly) | U.S. Dollar | | 97.64 | 813.67 |
| *RXMISC25 | Concrete Crushing Plant | 8.33 | 1.00 Each (hourly) | U.S. Dollar | | 154.70 | 1,289.17 |
| *RFELWH08C | CAT 980 LOADER | 16.67 | 2.00 Each (hourly) | U.S. Dollar | | 103.94 | 1,732.37 |
| *REXCAV06C | Excav 100K w/ Hammer | 8.33 | 1.00 Each (hourly) | U.S. Dollar | | 186.80 | 1,556.70 |
| L010101 | OPERATOR | 33.33 | 4.00 Each (hourly) | U.S. Dollar | | 97.85 | 3,261.78 |
| L060100 | GENERAL LABORER | 16.67 | 2.00 Each (hourly) | U.S. Dollar | | 73.99 | 1,233.08 |
| 12.15.2 | 500.00 Cubic Yard | Load, Haul & Deliver | 14,200.00 | Detail | U.S. Dollar | 2.35 | 1,174.42 |
| **Resource Code** | **Description** | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |


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| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| L010101 | OPERATOR | | | 2.11 6.00 Each (hourly) | U.S. Dollar | | 97.85 | 206.73 |
| L080940 | TEAMSTER | | | 2.82 8.00 Each (hourly) | U.S. Dollar | | 73.81 | 207.92 |
| RDOZER12 | CAT D8T | | | 1.06 3.00 Each (hourly) | U.S. Dollar | | 165.52 | 174.85 |
| REXCAV07 | CAT 350 EXCAVATOR, 3.50CY | | | 1.06 3.00 Each (hourly) | U.S. Dollar | | 148.87 | 157.26 |
| RDUTRK07 | CAT D400D, 21CY-29CY | | | 2.82 8.00 Each (hourly) | U.S. Dollar | | 151.82 | 427.65 |
| 12.15.3 | 500.00 | Cubic Yard | Placement & Compaction | 14,200.00 | Detail | U.S. Dollar | 1.76 | 881.67 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| L010101 | OPERATOR | 3.52 | 10.00 | Each (hourly) | U.S. Dollar | 97.85 | 344.55 |
| RDOZER12 | CAT D8T | 2.11 | 6.00 | Each (hourly) | U.S. Dollar | 165.52 | 349.70 |
| RROLLR05 | CAT 825C PADFOOT | 1.41 | 4.00 | Each (hourly) | U.S. Dollar | 133.07 | 187.42 |
| 12.16 | 1.00 | Lump Sum | Contingency - 40% | 0.00 | Detail | U.S. Dollar | 738,909.07 | 738,909.07 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| USCONTINGENCY | 40% Contingency | | 1,847,272.68 | Each | U.S. Dollar | 0.40 | 738,909.07 |
| 13 | 1.00 | Lump Sum | CONTRACTOR MARKUPS | 0.00 | Detail | U.S. Dollar | 10,869,367.87 | 10,869,367.87 |
| 13.1 | 1.00 | Lump Sum | Home Office - 5% | 0.00 | Detail | U.S. Dollar | 1,386,730.60 | 1,386,730.60 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| USMARKUP5 | 5% Markup | | 27,734,612.00 | Each | U.S. Dollar | 0.05 | 1,386,730.60 |
| 13.2 | 1.00 | Lump Sum | OH & Fee - 25% | 0.00 | Detail | U.S. Dollar | 7,280,335.75 | 7,280,335.75 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| USMARKUP25 | 25% Markup | | 29,121,343.00 | Each | U.S. Dollar | 0.25 | 7,280,335.75 |
| 13.3 | 1.00 | Lump Sum | Bonding & Insurance - 5% | 0.00 | Detail | U.S. Dollar | 1,820,083.90 | 1,820,083.90 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| USMARKUP5 | 5% Markup | | 36,401,678.00 | Each | U.S. Dollar | 0.05 | 1,820,083.90 |
| 13.4 | 1.00 | Lump Sum | Municipal Permits - 1% | 0.00 | Detail | U.S. Dollar | 382,217.62 | 382,217.62 |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| UODCPERMITS | Permit Fees | | 38,221,762.00 | Each | U.S. Dollar | 0.01 | 382,217.62 |
| 14 | 1.00 | Lump Sum | SCRAP CREDIT | 0.00 | Detail | U.S. Dollar | (4,117,870.00) | (4,117,870.00) |
| 14.1 | 1.00 | Lump Sum | Power House | 0.00 | Detail | U.S. Dollar | (3,075,475.00) | (3,075,475.00) |
| 14.1.1 | 5,080.00 | Ton | P&S | 0.00 | Detail | U.S. Dollar | (215.00) | (1,092,200.00) |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| UODCSCRAP | Scrap Credit | | 1,092,200.00 | Each | U.S. Dollar | (1.00) | (1,092,200.00) |
| 14.1.2 | 5,090.00 | Ton | HMS | 0.00 | Detail | U.S. Dollar | (205.00) | (1,043,450.00) |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| UODCSCRAP | Scrap Credit | | 1,043,450.00 | Each | U.S. Dollar | (1.00) | (1,043,450.00) |
| 14.1.3 | 95.00 | Ton | Tin | 0.00 | Detail | U.S. Dollar | (160.00) | (15,200.00) |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| UODCSCRAP | Scrap Credit | | 15,200.00 | Each | U.S. Dollar | (1.00) | (15,200.00) |
| 14.1.4 | 455.00 | Ton | Torch | 0.00 | Detail | U.S. Dollar | (175.00) | (79,625.00) |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|
| UODCSCRAP | Scrap Credit | | 79,625.00 | Each | U.S. Dollar | (1.00) | (79,625.00) |
| 14.1.5 | 675.00 | Ton | Rebar | 0.00 | Detail | U.S. Dollar | (158.00) | (106,650.00) |

| Resource Code | Description | Hours | Quantity | UM | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|


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| Cost Item | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CBS Position Code | Quantity UM | Description | | UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
| UODCSCRAP | Scrap Credit | | | 106,650.00 Each | U.S. Dollar | | (1.00) | (106,650.00) |
| 14.1.6 | 215,000.00 Pound | ICW - 70% | | 0.00 | Detail | U.S. Dollar | (1.93) | (414,950.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 414,950.00 Each | U.S. Dollar | | (1.00) | (414,950.00) |
| 14.1.7 | 20,000.00 Pound | SS 304 Tubes | | 0.00 | Detail | U.S. Dollar | (0.36) | (7,200.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 7,200.00 Each | U.S. Dollar | | (1.00) | (7,200.00) |
| 14.1.8 | 160,000.00 Pound | SS 304 | | 0.00 | Detail | U.S. Dollar | (0.36) | (57,600.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 57,600.00 Each | U.S. Dollar | | (1.00) | (57,600.00) |
| 14.1.9 | 180,000.00 Pound | Aluminum Sheet | | 0.00 | Detail | U.S. Dollar | (0.67) | (120,600.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 120,600.00 Each | U.S. Dollar | | (1.00) | (120,600.00) |
| 14.1.10 | 80,000.00 Pound | Stator / Rotor | | 0.00 | Detail | U.S. Dollar | (0.45) | (36,000.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 36,000.00 Each | U.S. Dollar | | (1.00) | (36,000.00) |
| 14.1.11 | 120,000.00 Pound | Transformer Windings | | 0.00 | Detail | U.S. Dollar | (0.85) | (102,000.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 102,000.00 Each | U.S. Dollar | | (1.00) | (102,000.00) |
| 14.2 | 1.00 Lump Sum | Waste Processing Facility | | 0.00 | Detail | U.S. Dollar | (1,042,395.00) | (1,042,395.00) |
| 14.2.1 | 2,975.00 Ton | P&S | | 0.00 | Detail | U.S. Dollar | (215.00) | (639,625.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 639,625.00 Each | U.S. Dollar | | (1.00) | (639,625.00) |
| 14.2.2 | 1,170.00 Ton | HMS | | 0.00 | Detail | U.S. Dollar | (205.00) | (239,850.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 239,850.00 Each | U.S. Dollar | | (1.00) | (239,850.00) |
| 14.2.3 | 75.00 Ton | Tin | | 0.00 | Detail | U.S. Dollar | (160.00) | (12,000.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 12,000.00 Each | U.S. Dollar | | (1.00) | (12,000.00) |
| 14.2.4 | 350.00 Ton | Torch | | 0.00 | Detail | U.S. Dollar | (175.00) | (61,250.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 61,250.00 Each | U.S. Dollar | | (1.00) | (61,250.00) |
| 14.2.5 | 140.00 Ton | Rebar | | 0.00 | Detail | U.S. Dollar | (158.00) | (22,120.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 22,120.00 Each | U.S. Dollar | | (1.00) | (22,120.00) |
| 14.2.6 | 35,000.00 Pound | ICW - 70% | | 0.00 | Detail | U.S. Dollar | (1.93) | (67,550.00) |
| **Resource Code** | **Description** | | **Hours** | **Quantity UM** | **Currency** | | **Unit Cost** | **Total Cost** |
| UODCSCRAP | Scrap Credit | | | 67,550.00 Each | U.S. Dollar | | (1.00) | (67,550.00) |
| Report Total: | | | | | | | | 35,199,882.84 |


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| CBS Position Code | Quantity | UM | Description | Cost Item UM/Day | Cost Source | Currency | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|---|---|
| **Category** | | | | | | | | **Total** |
| Labor | | | | | | | | 4,396,018.78 |
| Rented Equipment | | | | | | | | 3,349,154.67 |
| Supplies | | | | | | | | 12,600.00 |
| Materials | | | | | | | | 40,460.00 |
| Subcontract | | | | | | | | 31,325,506.70 |
| Taxes-Bond-Fees | | | | | | | | 147,492.70 |
| ODCs | | | | | | | | 46,520.00 |
| Other Costs | | | | | | | | (4,117,870.00) |


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