STORMWATER & WASTEWATER

MAINTENANCE HANDBOOK

Route 128 Intermodal Transportation Facility
University Avenue
Westwood/Dedham, Massachusetts

Prepared for:

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1.0 INTRODUCTION

The purpose of the Massachusetts Bay Transportation Authority (MBTA) Stormwater & Wastewater Maintenance Handbook is to provide information to the person or entity responsible for operation and maintenance of the MBTA Route 128 Intermodal Transportation Facility (Facility) to ensure that the facility is adequately maintained to function as designed to achieve the appropriate level of stormwater and wastewater treatment. The information provided in the handbook will help the maintenance personnel understand the facility; provide guidance for inspection and maintenance operations; and provide mechanisms for ensuring that the long-term maintenance of the facility is performed.

1.1 Stormwater System

The stormwater system at the Facility must be properly maintained pursuant to a continuing requirement of the Massachusetts' Department of Environmental Protection (MADEP) Final Order of Conditions, issued on July 12th, 1999 (Condition #37) and the "*Route 128 Station Parking Garage Stormwater Management System Operation and Maintenance Plan*" dated May 4th, 1999. A copy of the Plan is located in Appendix A. The Stormwater Management System Operation and Maintenance (O&M) Plan provides a description of the requirements for maintenance of the stormwater management system and the recommended schedule of inspection and maintenance.

1.2 Wastewater System

The wastewater system at the Facility must be properly maintained pursuant to the Massachusetts' Department of Environmental Protection (MADEP) regulatory requirements set forth in the 314 CMR 12.00: Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges. A copy of the MADEP regulation is located in Appendix G. The operation and maintenance provisions of the 314 CMR 12.04 (4) state:

> "*Any person operating a sewer system shall cause the daily inspection of all pumping, ejector or lift stations on intercepting, trunk or main sewers. Said person shall maintain records of daily inspections and shall submit annually to the Department a report summarizing inspection activities for the previous year.*"

A description of the MBTA Route 128 Intermodal Transportation Facility wastewater system and the recommended schedule of inspection and maintenance is provided in Section 2.0, Routine Maintenance Activities.

2.0 ROUTINE MAINTENANCE ACTIVITIES

2.1 Stormwater System

The MBTA Route 128 Intermodal Transportation Facility stormwater system is designed to maintain the local hydrologic balance by limiting off-site runoff, to provide for on-site infiltration and to provide water quality treatment systems for stormwater flows. Proper maintenance of stormwater runoff is one of the most important factors in the long-term performance and effectiveness of the stormwater system. Periodic inspection and maintenance of system components to prevent sediment buildup and clogging, which reduces pollutant removal efficiency and may lead to failure of the system is integral to the successful operation of the stormwater system.

Routine stormwater maintenance activities for the MBTA Route 128 Intermodal Facility, and the frequency at which they must be conducted, are shown in Table 1.0.

NOTE: *Sodium Chloride is <u>not</u> to be used for deicing at the Route 128 Intermodal Facility.*

A Site Plan is available in order to identify the areas referenced below. A copy of the Site Plan is on file at the MBTA Headquarters at the following address:

ATTN: Manager of Environmental Compliance
Massachusetts Bay Transportation Authority
10 Park Plaza, Room 6720
Boston, Massachusetts 02116

TABLE 1.0
STORMWATER ROUTINE MAINTENANCE ACTIVITIES

No.	Maintenance Task	Frequency of Task
1.	Sweeping of the top deck of the parking garage, the access drive and the garage entrances	**Weekly**: At a minimum, once a year and then as needed. *Note: and as soon as possible after the winter snow melt*
2.	Vacuum Cleanout of Water Quality Inlets (Stormceptor™ Oil-Water Separator)	**Annually, as needed**
3.	Landscaping & Maintenance of Vegetated Swales	**Every Spring**: Fertilizing, lime, pruning, reseeding, weed & pest control. Manual removal of sand & debris **Every Fall**: Grass mowing, as needed. Manual removal of sand & debris. **As Needed**: Repair or replace stone at pipe ends
4.	Landscaping & Maintenance of Extended Detention Basin	**Annually:** Sediment removal **Every Spring**: Fertilizing, lime, pruning, reseeding, weed & pest control. **As Needed:** Removal of debris from pipe sub-drain outlet **Every Fall**: Grass mowing, as needed.
5.	Removal of Debris from Detention Basin Outlet Screens	**Monthly**
6.	Removal of Debris from Infiltration Trench	**Monthly**
7.	Sampling and Sediment Removal of Observation Ports	**Annually, as needed**
8.	Repair and/or Replacement of Isoflex Silicone	**As Needed**

2.2 Wastewater System

The MBTA Route 128 Intermodal Transportation Facility is a four-level three story parking structure with a total of 2,670 spaces for passenger vehicle parking. Floor drains within levels one (ground level), two and three connect to the Town of Westwood sewer system which in turn discharges to the Massachusetts Water Resources Authority (MWRA) sewer system. The floor drain system is equipped with oil/water separators and a wastewater pump station.

The wastewater pump station is a below ground concrete structure with access through two metal covers located in the center of the lower level of the parking garage (call line: G8NFGL).

The station contains two submersible pumps and their associated motors that pump to the MWRA sewer system. Pump station equipment and instrumentation includes the following: NOTE: *Refer to Appendix I for the manufacturer's manuals and documentation for the below-referenced equipment.*

- (2) 5HP Submersible Wastewater Pumps
- Duplex Pump Control Panel
- Dual Frequency Doppler Flowmeter

Routine inspections and preventative maintenance of the wastewater system is necessary to ensure the system operates as designed. Routine wastewater maintenance activities for the MBTA Route 128 Intermodal Facility, and the frequency at which they must be conducted, are shown in Table 2.0. Equipment maintenance should be performed in accordance with the procedures outlined in the manufacturer's manuals for the equipment. NOTE: *Disconnect the power supply to the pump and sump before servicing, whether for periodic inspections or routine maintenance activities.*

TABLE 2.0
WASTEWATER ROUTINE MAINTENANCE ACTIVITIES

No.	Maintenance Task	Frequency of Task
1.	Inspection of both pumps, including the impellers	**Every Six Months**
2.	Pumping out and cleaning the wet wells	**Every Six Months**
3.	Clean interior of control cabinet of oil, dirt and moisture	**Every Six Months**
4.	Inspection of all electrical equipment	**Annually**
5.	Check pilot device (float switch) operation	**Every Six Months**
6.	Inspection of the check valves	**Every Six Months**
7.	Clean and inspect the floats	**Every Six Months**
8.	Test all the panel lights on the Duplex Control Panel	**Every Six Months**
9.	Record amp and vibration readings	**Every Six Months**
10.	Daily inspection of the wastewater pump station	**Daily**
11.	Inspection of the Sanitary Oil-Water Separator	**Annually** AND following major storm events

3.0 INSPECTION AND MAINTENANCE CHECKLIST

An Inspection and Maintenance Checklist has been incorporated into the MBTA Stormwater & Wastewater Maintenance Handbook in order to meet the requirements of the MBTA Route 128 Station Parking Garage Stormwater Management System Operation and Maintenance Plan (refer to Appendix A) and the MADEP 314 CMR 12.00: Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges (refer to Appendix G).

The Inspection and Maintenance Checklist provides a guideline as to what tasks are required for stormwater and wastewater controls. All inspection and maintenance activities should be recorded on the checklist. Additional log sheets and/or documentation may be added as necessary.

4.0 INSPECTION, REPORTING AND SUBMITALL REQUIREMENTS

The MBTA, the owner of the Route 128 Intermodal Transportation Facility and the Contract Operator of the Facility are responsible for the implementation of the MBTA Route 128 Station Parking Garage Stormwater & Wastewater Management Maintenance Handbook. Adequate personnel and equipment must be maintained to facilitate these activities.

4.1 Inspection and Reporting Requirements

Routine inspection and reporting activities, and the frequency at which they must be conducted, are shown in Table 3.0.

TABLE 3.0
INSPECTION AND REPORTING REQUIREMENTS

STORMWATER SYSTEM	
Task	**Frequency of Task**
Inspection of Water Quality Inlets (Stormceptor™ Oil-Water Separator)	**Annually** AND following major storm events
Inspection of Vegetated Swales	**Semi-Annually**: Preferably in late April and early November **After Major Storm**
Inspection of Extended Detention Basin	**Semi-Annually**: Preferably in late April and early November **After Major Storm**
Inspection of Extended Detention Basin Outlet Structure	**Semi-Annually**: Preferably in late April and early November **After Major Storm**
Inspection of the Pipe Sub-Drain Outlet to the Wetland (Extended Detention Basin)	**As Needed**
Inspection of Infiltration Chamber System Overflow Manhole	**Annually**
Inspection of Spill Prevention Flashboards & Equipment	**Annually**
Submittal of the Annual Stormwater Inspection & Maintenance Checklist	**Annually:** By January 15th
Submittal of a Spot Grade Plan	**Every 10th Year:** Starting in 2001
WASTEWATER SYSTEM	
Task	**Frequency of Task**
Check the Duplex Pump Control Panel lights and alarm systems.	**Daily**
Doppler Flow Meter records. A logbook of flow records, dates and maintenance performed should be maintained. The flow meter provides an accurate record of how much flow is being processed through the system.	**Daily**
Visual inspect the pump station .	**Daily**
Open up the wet well and visually inspect the pumping of each pump. Check the pumps and piping visually for defects.	**Daily**
Record pump hours for each pump.	**Daily**
Inspection of the Sanitary Oil-Water Separator.	**Annually** AND following major storm events
Submittal of the Annual Wastewater Inspection and Maintenance Checklist .	**Annually:** By January 15th

4.2 Submittal Requirements

4.2.1 Contract Operator of the Facility Submittals

It is the responsibility of the Route 128 Contract Operator to maintain and submit completed quarterly and annual Inspection and Maintenance Checklists (refer to Appendices C, D and E) to the MBTA at the following address:

ATTN: Manager of Environmental Compliance
Massachusetts Bay Transportation Authority
10 Park Plaza, Room 6720
Boston, Massachusetts 02116

Quarterly and Annual Inspection and Maintenance Checklists must be submitted to the MBTA in accordance with the following timeline:

- First Quarter Checklist: by March 31st of each year
- Second Quarter Checklist: by June 30th of each year
- Third Quarter Checklist: by September 30th of each year
- Fourth Quarter Checklist: by December 31st of each year
- Annual Report: by January 15th of each year

4.2.2 MBTA Submittals

- Inspection and maintenance records must be maintained and an annual report is to be provided to the Dedham-Westwood Water District, the MADEP and the Dedham and Westwood Conservation Commissions by January 31st of each year, as required by the Continuing Condition #37 of the Final Order of Conditions. The Inspection and Maintenance Checklist must be sent by Certified Mail-Return Receipt to the following parties by the MBTA:

  Attention: Eileen M. Commane
  Executive Director
  Dedham-Westwood Water District
  50 Elm Street
  P.O. Box 9137
  Dedham, Massachusetts 02027 Phone: (781) 461-2779

  Dedham Conservation Commission
  26 Bryant Street
  P.O. box 306
  Dedham, Massachusetts 02026 Phone: (781) 751-9210
  Westwood Conservation Commission
  580 High Street
  Westwood, Massachusetts 02090 Phone: (781) 251-2580

  MASSDEP Northeast Region
  205B Lowell Street
  Wilmington, Massachusetts 01887 Phone: (978) 694-3200

- A Spot Grade Plan showing spot grades at no fewer than ten (10) equally distributed locations within the bottom of the detention basin, and at one location in each of the treatment swales must be submitted to the Dedham-Westwood Conservation Commission and the Dedham-Westwood Water District every tenth year beginning in 2001.

5.0 INCIDENT RESPONSE

The Contract Operator of the Facility shall be responsible for responding to emergency discharges, bypass or other environmental problems, including all wastewater alarm conditions occurring at the facilities on a 7 day per week, 24 hour per day basis. The Contract Operator shall immediately notify the MBTA Environmental Affairs Director in the event of an environmental incident at the Facility. The MBTA Environmental Affairs Director or designee shall be informed of the nature and location of the incident and will direct staff as appropriate. The MBTA is responsible for notifying the authorities and agencies listed below.

TABLE 4.0
EMERGENCY CONTACTS

Contacts	Address	Number
MBTA Environmental Affairs Directors	Massachusetts Bay Transportation Authority 10 Park Plaza, Room 6720 Boston, Massachusetts 02116	(617) 222-1592 – Mon-Fri
Massachusetts Department of Environmental Protection (MADEP)	MASSDEP Northeast Region 205B Lowell Street Wilmington, Massachusetts 01887	(888) 304-1133 – 24 hours
National Response Center (NRC)	National Response Center c/o United States Coast Guard (CG-5335) – Stop 7581 2100 2nd Street, SW Washington, DC 20593	(800) 424-8802 – 24 hours
U.S. Environmental Protection Agency (EPA)	U.S. EPA – Region 1 5 Post Office Square, Suite 100 Boston Massachusetts 02109	(617) 918-1111 – Mon-Fri (800) 424-8802 – after hours
Westwood Fire Department	Westwood Fire Department 637 High Street Westwood, Massachusetts 02090	(781) 326-3885 or 911
Dedham Fire Department	Dedham Fire Department 436 Washington Street Dedham, Massachusetts 02026	(781) 326-1313or 911

5.1 Wastewater Alarm System

The Contract Operator of the Facility is responsible for monitoring the wastewater pump station 24 hours a day, 7 day per week. The wastewater pump station is equipped with a duplex pump control panel that controls both station pumps. Each pump has an independent control circuit power supply. Each pump control circuit also serves as backup for the other pump control circuit. The control panel is mounted inside a fenced-in area adjacent to the wastewater pump station.

5.1.1 Notification Lights

The notification lights, switches and test buttons are mounted on the outer door as follows:

- Green Light: Indicates power to pump motor (one light per pump)
- Amber Light: Indicates control power on
- Red Light: Indicates motor overload condition and pump is off (one light per pump)

5.1.2 Alarm Notification

The high water horn (95 decibels) is mounted on the side of the control panel. The high water indicator light and test-auto-silence switch are mounted on the outer door of the panel.

- Alarm Dome Light: A red flashing light ontop of the panel indicates a motor overload or high water alarm condition. It could also indicate moisture on the motor or high motor temperature. The light will remain on until the situation is corrected.

APPENDIX A

Stormwater Management System
Operation and Maintenance Manual

Route 128 Station Parking Garage

Stormwater Management System

Operation and Maintenance Plan

MAY 4, 1999

Revised and Approved:

August 2013

Stormwater Management System

Operation and Maintenance Manual

1.0 Introduction

In accordance with the Massachusetts Department of Environmental Protection Stormwater Management Policy, the Route 128 Intermodal Transportation Facility incorporates a comprehensive system for the management of stormwater runoff. The system is designed to maintain the local hydrologic balance by limiting off-site runoff, to provide for on-site infiltration and to provide water quality treatment systems for stormwater flows. Integral to the successful operation of this system is periodic inspection and maintenance of system components.

2.0 Effects of Project on Stormwater

Understanding the effects of this specific type of development on stormwater runoff is important to the successful operation and maintenance of this system. This includes identification of receptors of stormwater from this site and identification of the types of pollutants that are generated by parking facilities.

2.1 Receptors. The site is located in Zone II of the Westwood-Dedham drinking water supply wells. All runoff from the portion of this site to the west of the tracks flows to the Fowl Meadow wetlands within an Area of Critical Environmental Concern (ACEC). Stormwater to the east of the tracks infiltrates into a depression, also within the ACEC. Thus, both water that runs off the site and water that infiltrates to groundwater reach sensitive receptors.

2.2 Potential Pollutants. Parking and transportation facilities generate oil and grease, hydrocarbons, sand and silt. Sodium chloride is not to be used for deicing at the Route 128 Intermodal facility. Only the upper deck of the parking garage will be open to rain and resulting runoff. In addition, the access driveways will generate a small amount of runoff.

2.3 Impermeable areas. Pavement and buildings preclude infiltration and thus generate additional runoff. To maintain groundwater recharge, stormwater from clean areas a portion of the treated stormwater from detention pond will be infiltrated.

3.0 System Components:

Each system component is described below with its function and maintenance requirements detailed.

3.1 Sweeping.

3.1.1 Description. Sweeping procedures are required to minimize the amount of sand, silt, grit and debris that reach stormwater treatment structures. Debris should be swept, collected and transported for disposal.

3.1.2 Location. Locations that require periodic sweeping include the top deck of the parking garage, the access drive, and the garage entrances.

3.1.3 Operation and Maintenance. Sweeping shall be conducted (when the site is not covered with ice and snow) at a minimum, once a year and then as needed. Sweeping will be conducted as soon as possible after winter snowmelt. Disposal of debris will be in accordance with State and local regulations.

3.2 Water Quality Inlets (Stormceptor ™).

3.2.1 Description. The water quality inlet is a structure designed to separate oil and sediment from stormwater runoff. Stormwater flows into a by-pass chamber via the storm sewer pipe. Low flows are diverted into a treatment chamber by a weir and drop pipe arrangement. The treatment chamber is always full of water. Water flows up through the outlet pipe based on the head at the inlet weir, and is discharged back into the by-pass chamber downstream of the weir. The downstream section of the by-pass chamber is connected to the outlet drain pipe. Oil and other liquids with a specific gravity less than water will rise in the treatment chamber and become trapped since the outlet pipe is submerged. Sediment will settle to the bottom of the chamber by gravity.

During high flow conditions, stormwater in the by-pass chamber will overtop the weir and be conveyed to the outlet pipe directly. Water that overflows the weir creates a backwater effect on the outlet pipe (head stabilization between the inlet drop pipe and outlet riser pipe) ensuring that excessive flow will not be forced into the treatment chamber, which could scour or re-suspend the settled material.

3.2.2 Location. Four structures are utilized. One structure is located to the north of the access drive to the north of the garage, treating flows from approximately 1 .12 acres of the top deck of the garage. The other three structures are located near the vegetated swales on the south side of the garage, and collect flows from approximately 3.61 acres of the top deck of the garage. The north structure drains to the 24-inch culvert under Route 128. The three

south structures drain to the vegetated swales on the south side of the garage.

3.2.3 Operation and Maintenance. The owner is responsible for contracting for vacuum cleanout of each structure at least once a year. Sediment collected on the bottom of the tank and pooled water with floating *oil* and grease must by evacuated during cleaning. All material removed from. the structure must be disposed of in accordance with applicable regulations. Each structure should be inspected following large storm events.

3.3 Vegetated Water Quality Swales.

3.3.1 Description. Vegetated water quality swales are designed to filter flows from most storms. The swales on this site are designed to convey up to the 100-year event without overtopping or erosion. Vegetation at the bottom of the swale is critical to its function. The swale along the maintenance access drive is lined with loam and seed. The swale on the south side of the garage is seeded with a wetland mix in loam. Rip rap at the inlets to the swales and check dams limit velocities. Low side slopes assist in maintenance of low velocities. The swales are designed to convey flows at low velocities that do not cause erosion.

3.3.2 Location.: Swales are located in two primary areas- between the emergency access drive and the Route 128 embankment, a swale collect flows from the access drive, the platform area, and the Route 128 embankment. This swale flows from the east and conveys flows to the 24" pipe under Route 128. The other swale is located between Blue Hill Drive and the south edge of the garage east of the ground floor entrance. Flows from this swale are conveyed to the extended detention basin on the west side of the site by University Avenue.

3.3.3 Operation and Maintenance. Swales must remain vegetated, must not be clogged with sediment and debris, and any erosion should be repaired.

3.3.3.1 Inspections. Swales should be inspected semi-annually, preferably in late April and early November as well as after severe storms. During the first 6 months of operation, swales should be inspected monthly for slope integrity, soil health, soil stability, soil compaction, soil erosion, pending and sedimentation.

3.3.3.2 Maintenance. Spring maintenance includes, fertilizing, liming, pruning, reseeding, and weed and pest control. Pesticides should not be used, and minimal fertilizer should

be employed. Grass mowing should occur annually in the late fall when the swales are dry. Grass should be maintained at least 4 inches tall. Sand and debris should be removed manually in spring and fall. Stone at pipe ends should be repaired or replaced as needed.

3.4 Extended Detention Basin.

3.4.1 Description. The extended detention basin is designed to allow the 1-inch storm to be detained long enough for silt and sediment to settle prior to runoff leaving the site. Larger storms are conveyed through the basin and are detained for only a short period of time. The basin is designed with a perforated pipe outlet that discharges the 1-inch storm very slowly, and with high-level outlets for larger storms. The basin also functions to reduce peak flows during larger storms by controlling the rate of outflow while providing adequate storage for larger storm volumes.

The basin is seeded with a wetland mix in a layer of loam.

3.4.2 Location. The basin is located on the western border of the site between the garage and University Avenue. Stormwater flows to the basin via an outlet from the water quality swale on the south side of the site east of the Blue Hill Drive entrance. The first outlet for the basin is perforated sub-drain along the west embankment of the basin. The outlet is designed to allow a slow outflow of the 1-inch storm into the wetland at the southwestern corner of the site. Stormwater flows through a sand berm into a perforated pipe (tile .drain) that drains to the wetland. As discharge to the wetland approaches existing amounts, higher flows will outlet to the north. This flow is controlled by a pipe which leads to the infiltration chamber system under the maintenance access drive. This infiltration chamber system leads to the 24-inch culvert under Route 128. Higher flows will flow over the weir to an 18" pipe in University Avenue.

3.4.3 Operation and Maintenance. The basin should be inspected in April and November and after heavy rainfall events for clogging of outlet structures, erosion, sediment accumulation around the outlet, adequacy of stone protection, and slope stability. The pipe sub-drain outlet to the wetland should also be inspected and debris removed as needed. Repairs should be made immediately. Sediment should be removed once a year and disposed of with sediment from swales, and sweeping activities. Spring maintenance includes, fertilizing, liming, pruning, reseeding, and weed and pest control. Pesticides should not be used, and minimal fertilizer should

be employed. Grass mowing should occur annually in the late fall when the basin is dry.

3.5 Extended Detention Basin Outlet Structure.

3.5.1 Description. The controlled outlet structure is designed to discharge larger storms from the basin. The flow passes through a vertical debris screen and discharges to an infiltration chamber system with overflow to the 24-inch culvert under Route 128. As flow in the basin increases, additional discharge passes over a weir {flashboards) and discharges to a pipe in University Avenue that drains *to* the north. In the event of a spill of oil or other hazardous material, additional flashboards are inserted to block the inlet to the structure and prevent discharge to wetlands further downstream. A debris and safety screen over the top of the structure protects the outlet.

3.5.2 Location. The outlet structure is located at the north end of the extended detention basin by the University Avenue garage entrance.

3.5.3 Operation and Maintenance. The outlet structure should be inspected in April and November and after heavy rainfall events for clogging, sediment accumulation around the outlet, and condition of the flashboards. Repairs should be made immediately. Debris should be removed monthly from the debris screens.

3.6 Infiltration Chamber System

3.6.1 Description. Infiltration chamber systems are designed to collect, store and infiltrate treated stormwater. The system provides recharge to groundwater through a layer of crushed stone covered with filter fabric.

3.6.2 Location. The infiltration chamber system is located under a portion of the emergency access drive that lies between the garage and the Route 128 embankment. Treated flow enters the system from the extended detention basin. An overflow is provided through a manhole which allows excess flow to discharge to the 24-inch culvert under Route 128.

3.6.3 Operation and Maintenance. Pretreatment of stormwater and the use of filter fabric minimizes the need for maintenance of the infiltration system. The overflow manhole should be inspected at least once a year.

3.7 Infiltration Trench

3.7.1 Description. Infiltration trenches are designed to collect and infiltrate rainwater from clean areas. The trenches provide recharge to groundwater. Trenches contain crushed stone and are lined with filter fabric.

3.7.2 Location. Trenches are located adjacent to the station to collect rainwater from the station roof.

3.7.3 Operation and Maintenance. Debris should be removed monthly from the surface of the trench. If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be inspected and cleaned.

4.0 Responsible Parties and Reporting Requirements.

The MBTA, the owner of the Route 128 lntermodal Transportation Facility site is responsible for the implementation of this operation and maintenance plan, through its contract operator, Central Parking Systems. Adequate personnel and equipment will be maintained to facilitate these activities. Quarterly operation and maintenance reports will be prepared. Copies of this report will be sent to the Dedham and Westwood Conservation Commissions and the Dedham and Westwood Water District. Copies of the operations and maintenance report will be kept on file in the contract operator's office at the Route 128 lntermodal Facility.

APPENDIX B

Route 128 Intermodal Transportation Facility
Emergency Response Plan

Route 128 Station Parking Garage

Emergency Spill Response Plan

April 30, 1999

Revised and Approved:

August 2013

Route 128 Parking Garage

Emergency Spill Response Plan

1.0 Introduction and Facility Description

The Route 128 Station parking garage is located on University Avenue within the Towns of Dedham and Westwood, Massachusetts. The parking garage is managed by a third party, under contract to the Massachusetts Bay Transportation Authority (MBTA).

The project site is bounded by Route 128 (Interstate 95) to the north, the MBTA railroad right of way on the east, Blue Hill Avenue to the south, and University Avenue to the west. The site is within the Fowl Meadow Area of Critical Environmental Concern and the aquifer (Zone II) that feeds public water supply wells operated by the Dedham-Westwood Water District.

The parking garage is a four-level three story parking structure with a total of 2,670 spaces for passenger vehicle parking. A drop-off area is on the ground floor with access for buses, vans and cars. Access to levels two, three and four of the garage is from University Avenue. Access to the ground floor is from Blue Hill Drive.

Floor drains within levels one (ground level), two and three connect to the Town of Westwood sewer system which in turn discharges to the Massachusetts Water Resources Authority sewer system. Oil and gas separators are provided for these drains. Stormwater catch basins are installed on the top deck of the garage. Stormwater is routed through sediment and oil separators (Stormceptors) and a series of Best Management Practices. The stormwater system for the garage discharges off-site to the Fowl Meadow wetland system.

2.0 Spill Potential

The Route 128 Station parking garage provides parking for passenger vehicles only. The ground level drop off area is designed to allow access for cars, vans and buses, although no bus service is currently scheduled for this facility. No vehicle maintenance will occur on the site.

The station structure and the snow melt apparatus for the top deck of the garage is fueled by natural gas. There are no underground or aboveground storage tanks on the site. Therefore there is no possibility of tank leaks or spillage from bulk fuel delivery.

The potential for spills at the Route 128 Station parking garage is minimal. The majority of the vehicles using the facility are passenger cars, although some vans use the ground floor area to pick-up and drop off passengers. The typical capacity of a passenger vehicle fuel tank is in the range of 10 to 16 gallons. Most fuel spills from

vehicles occur during an accident or a roll-over. Since all vehicles are restricted to travel at low speeds within the garage, the potential for such an occurrence is minimal. Most of the "spills" on the site are likely to be small leaks and drips from oil pans, transmissions etc., as is typically found in homeowners' garages.

In addition small quantities of materials typically used in the maintenance of the parking facility will be stored on site. These materials will be purchased and utilized only after documents disclosing the ingredients and composition of the products are reviewed for compliance with the guidelines for non-hazardous materials.

3.0 Past Spill Events

A review of the Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup Site lists for the Towns of Dedham and Westwood indicates that no spills have been reported at the site of the existing Route 128 Station parking lot.

4.0 Spill Response

When spills from vehicles are observed, garage employees will spread absorbent material over the area of the spill. If necessary, a containment device or temporary dike will be used to prevent migration of the spill into floor drains and stormwater catch basins. After the absorbent compound has soaked up the spill, the compound will be swept and containerized. Arrangements will be made with a licensed disposal service for the pick-up and disposal of the contaminated product. When necessary, the stormwater management system will be shut down to prevent any flows off site by the installation of flashboards in the detention basin outlet control structure located in the northwest comer of the site. Flashboards (2" x 6" boards in two foot lengths) to be used for this purpose are located in the area of the garage maintenance office.

In the instance of gasoline leaks, the local fire department will be notified to respond to and handle the discharge of the gasoline in an appropriate manner.

Employees will be trained in the appropriate procedures for response to spills. A spill containment kit containing the following items will be kept on site:

- containment booms
- absorbent pads
- containment socks
- absorbent pillows
- disposal bags with ties
- nitrile gloves
- Speedy Dri

A waste drum will also be maintained on site for the storage of spent absorbent materials until such time as they are picked-up by the licensed waste hauler.

5.0 Emergency Contacts

The following emergency contacts will be contacted by telephone or in person in the event of a spill of any quantity in the garage. Emergency contact numbers will be posted at the phone in the maintenance supervisor's office.

Emergency Response Coordinators

MBTA Director of Parking, Ronald Ross	(617) 222-4555 Office (617) 293-2796 Cell
LAZ Parking Regional Director, Randy Miller	(617) 275-5652 Office (617) 543-6288 Cell

6.0 Spill Reporting Procedures

The Emergency Response Coordinator or designee shall be informed of the nature and location of the spill and will direct staff as appropriate. The Coordinator shall have the authority to retain a spill contractor if necessary for the response effort.

A spill of greater than 10 gallons requires notification to the Massachusetts Department of Environmental Protection (DEP). An oil spill of any quantity that has reached a catch basin, sewer, storm drain, ditch, culvert or surface water is immediately reportable to the DEP and the National Response Center. The Emergency Response Coordinator is responsible for notification or reportable spills to the authorities and agencies listed below. In addition to the initial telephone call, a written spill report is also required for DEP. Immediate Response Actions should be coordinated with a Licensed Site Professional pursuant to the Massachusetts Contingency Plan (310 CMR 40.0000). Emergency phone numbers are posted at telephones in the garage maintenance area and in the offices of the Emergency Response Coordinator. Copies of all written documentation of spill incidents will be kept on file at the garage supervisor's office.

LIST OF EMERGENCY CONTACTS

Contact	Daytime Telephone#	Off Hours Telephone#	Address
Massachusetts Department of Environmental Protection (DEP)	(978) 661-7600 (Monday- Friday, 9am to 5pm)	State Police Communications Center (508) 820-2121	Emergency Response Branch Northeast Regional Office 205A Lowell Street Wilmington, MA 01887
National Response Center	1 -800-899-4672		

U.S. Environmental Protection Agency (24 Hours) (EPA)	(617) 223-7265		
Westwood Fire Department	911* (781) 326-3885		
Dedham Fire Department	911* (781) 326-2212		

*Department to respond to 911 will depend upon what phone number is assigned to the facility.

The following information should be provided when reporting a spill:

- Name of the caller
- Contact phone number
- Location of the spill
- Type of product spilled
- Approximate quantity spilled
- Extent of actual and/or potential water pollution
- Date and time of spill
- Cause of spill

Summary Discussion of Revised Drainage Design for Route 128 Intermodal Facility

All on-site flows will now discharge north to the Fowl Meadow Wetland. either through the existing 24” pipe under route 128 or through a new 18' pipe which will discharge under Route 128 along the exit ramp. The following table summarizes pre- and post-development flows.

Existing Flow to 24"		*Proposed Flows*		
Pipe Under Route 128		Flow from North Section Of site	Flow from West Section of site	Max combined Flow
Storm	Flow, cfs	Cfs	Cfs	Cfs
2-yr	14.4	4.8	6.3 + 1.8 = 8.1	12.9
10-yr	21.6	7.7	8.7 + 3.7 = 12.4	20.1
100-yr	33.3	12.9	10.4 + 6.6 = 17.0	29.9

Description of System Design

For the portion of the garage top deck which discharges south, the flow initially enters one of three "Stormceptor" chambers, designed to remove sediments, and oil and grease from the first inch of stormwater runoff. From the Stormceptor units, flow enters a series of detention/infiltration facilities. The first is the basin in which the Stormceptors are located. This basin provides storage space, and discharges through a 24" pipe to the detention basin on the West Side of the site. This basin or "South Swale" as it is called in the Hydrocad computations, also collects runoff from the upper segment of Blue Hill Drive, the embankment of Blue Hill Drive, the entrance driveway to the garage (flows through Stormceptors) and the roof of the Station building.

The detention basin is designed to provide the majority of storage and to control and direct outflows. Egress from this basin occurs in three ways. Along the west bank of the basin, a sand embankment with embedded slotted PVC pipe acts as an underdrain for the basin, allowing flow to infiltrate and discharge to wetland #2. The bottom of the basin is elevation 44.0, and the pipe will be seated at or slightly below elevation 44.0. The second discharge point occurs at the North end of the basin at the weir structure. An 18" pipe seated at elevation 44.0 directs flow to the Cultec infiltration system. The third egress point is via a 2' weir seated at elevation 45.5. Flow which discharges over this weir then enters a new 18" pipe that discharges under Route 128 to the Fowl Meadow wetland.

The Cultec chambers are a series of chambers designed to encourage infiltration of small storms through their base, and to allow overflow to occur though large, higher openings into the next chamber. The base of the system is set at 42.5, and the outflow level is 45.7.

The detention basin and Cultec system are designed so that outflow can only occur below elevation 45.5 via the underdrain or via the base of the Cultec system as infiltration. When stormwater is detained at levels above 45.5, discharge occurs over the weir and into the new 18" pipe and out of the Cultec system into the existing 24""pipe. Although the requirement for design is to account for the first inch of runoff, calculations show that this system will actually detain storms up to about 2" before outflow occurs via the surface drains. Once the ponds have again receded to a level below elevation 45.5, outflow will occur as infiltration through the underdrain and the Cultec chambers.

The following table summarizes inflows, outflows and storage thorough the system. The reported values are those the Hydrocad Model. The model is limited in that it does not compute backflow when storage is exceeded in the Cultec. Thus, the excess volume computed as storage in the Cultec was added to the detention basin storage to derive an adjusted elevation. This will also cause outflow to be increased thorough the 18" and decreased out of the 24", but the 18" is able to convey up to 10-11 cfs.

In summary, the system is designed

- to detain up to about 2" of runoff,
- to convey larger storms, and
- to store sufficient volume such that post-development flows do not exceed pre-development flows.

No flow will be conveyed from the site into the existing University Avenue drainage system or to the swale on the west side of University Avenue.

Summary of Flows, Storage and Elevations

Location	Storm	Size of Storm	Inflow	Outflow			Volume Detained	Excess Volume	Elevation Computed	Elevation Adjusted
South Swale	WQV	1”	4.4	3.2			2330		45.	
		2”	8.0	6.2			3526		46.	
	2-yr	3.2”	13.5	10.2			5395		46.5	
	10-yr	4.6”	20.1	13.2			8104		47	
	100-yr	6.9”	30.8	18.1			13908		48	
				Cultec (P)	Under drain	New 18”				
Detention Basin	WQV	1”	3.2	0.4	0.15		6672		45	45
		2”	6.2	2.8	0.15		9447		45.5	45.8
	2-yr	3.2”	10.3	6.3	0.15	1.8	12283		45.9	46.5
	10-yr	4.6”	13.6	8.7	0.15	3.7	14367		46.3	47.
	100-yr	6.9”	19.1	10.4	0.15	6.6	17182		46.5	47.8
Cultec	WQV	21”	0.4	0.0			1920			
		2”	2.8	0.6			8580	(2100)		
	2-yr	3.2”	6.3	3.0			11132	(5000)		
	10-yr	4.6”	8.7	6.0			14247	(8000)		
	100-yr	6.9”	6.9	10.4			17565	(11000)		

APPENDIX C

Stormwater Inspection and Maintenance Checklist
[Annual Report]

MBTA ROUTE 128 INTERMODAL PARKING FACILITY
Stormwater Inspection and Maintenance Checklist – Annual Report

Property Owner: *Massachusetts Bay Transportation Authority* **Submitted By:** _____
Property Address: *Parking Garage- University Avenue, Westwood, MA* **Date of Submittal:** _____

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
1. Sweeping	▪ Locations that require periodic sweeping include the top deck of the parking garage, the access drive, and the garage entrances. ▪ Sweeping shall be conducted when the site is not covered with ice and snow. Sweeping will be conducted as soon as possible after winter snow melt.	Yes No ☐ ☐ Sweeping conducted weekly Yes No ☐ ☐ Sweeping conducted after winter snow melt	NOTE: *quarterly checklists on file*
2. Vacuum Cleanout of Water Quality Inlets(Stormceptor™ Oil-Water Separators)	▪ Vacuum cleanout of the four (4) Oil Water Separators shall occur at least once a year. ▪ Sediment collected at the bottom of each tank and pooled water with floating oil and grease must be evacuated during the cleanout	Separator Date of Cleanout A _____ B _____ C _____ D _____	Vendor Contact Information: **Provide copies of disposal receipts with the Annual Report.*
3. Landscaping & Maintenance of Vegetated Water Quality Swales	▪ Spring maintenance includes fertilizing, liming, pruning, reseeding and week and pest control. ▪ Grass mowing should occur annually and in the late fall when the swales are dry. Grass should be maintained at least 4 inches tall. ▪ Sand and debris should be removed manually in the spring and fall. ▪ The stone at pipe ends should be repaired or replaces as needed.	Yes No ☐ ☐ Spring maintenance conducted Yes No ☐ ☐ Grass mowing conducted annually and in late Fall Yes No ☐ ☐ Sand and debris removed in Spring and Fall Yes No ☐ ☐ Stone repaired or replaced	NOTE: *quarterly checklists on file*

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
4. Landscaping & Maintenance of Extended Detention Basin	▪ Spring maintenance includes fertilizing, liming, pruning, reseeding and week and pest control. ▪ Sediment should be removed once a year. ▪ Debris should be removed from the pipe sub-drain outlet as needed ▪ Grass mowing should occur annually and in the late fall when the swales are dry.	Yes No ☐ ☐ Spring maintenance conducted Yes No ☐ ☐ Sediment removed annually Yes No ☐ ☐ Debris removed from pipe sub-drain outlet as needed Yes No ☐ ☐ Grass mowing conducted annually and in late Fall	NOTE: *quarterly checklists on file*
5. Removal of Debris from Detention Basin Outlet Screens	▪ Debris should be removed monthly from the debris screens	Yes No ☐ ☐ Debris removed monthly	NOTE: *quarterly checklists on file*
6. Removal of Debris from Infiltration Trench	▪ Debris should be removed monthly from the surface of the trench.	Yes No ☐ ☐ Debris removed monthly	NOTE: *quarterly checklists on file*
7. Maintenance of Observation Ports	▪ Maintenance on each of the three (3) observation ports located along the Emergency Road should be performed annually. ▪ Maintenance should be conducted after a rainfall event and include the following: - water quality sampling ▪ - removal of sediment	Yes No ☐ ☐ Annual maintenance conducted and after a rainfall event	

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
8. Repair and/or replacement of Isoflex Silicone	▪ The parking garage decks should remain water-tight. ▪ Contract Operator should report signs of leakage to the MBTA. ▪ Isoflex should be repaired and/or replaced whenever visual signs of damage are observed. (i.e., leakage of stormwater to the lower decks of the parking garage)	Yes No ☐ ☐ Isoflex repaired and/or replaced as needed	Vendor Contact Information Brief Description of Repairs:
9. Inspection of Water Quality Inlets (Stormceptor™ Oil-Water Separator)	▪ Each of the four (4) structures should be inspected following large storm events	Yes No ☐ ☐ Oil Water Separators inspected after large storm events	NOTE: *quarterly checklists on file*
10. Inspection of Spill Prevention Flashboards and Equipment	▪ The Stormwater system can be shutdown to prevent flows offsite by the installation of flashboards in the detention basin outlet structure. ▪ The Flashboards (2" x 6" boards in two foot lengths) are located in the garage maintenance office ▪ A spill containment kit containing the following supplies must be kept on site: - containment booms - absorbent pads - containment socks - absorbent pillows - disposal bags - nitrile gloves - speedi dry	Yes No ☐ ☐ Flashboards are located in the garage maintenance office Yes No ☐ ☐ A "fully stocked" Spill Containment Kit is located in the garage maintenance office	List inspection date:
11. Inspection of Vegetated Swales	▪ Swales should be inspected semi-annually, preferably in late April and early November. ▪ Swales should also be inspected after severe storms.	Yes No ☐ ☐ Swales inspected in late April Yes No ☐ ☐ Swales inspected in early November Yes No ☐ ☐ Swales inspected after severe storms	NOTE: *quarterly checklists on file*

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
12. Inspection of Extended Detention Basin	▪ Basin should be inspected in April and November and after heavy rainfalls for clogging of the outlet structures, erosion, sediment accumulation around the outlet, adequacy of stone protection and slope stability. ▪ The pipe sub-drain outlet to the wetland should also be inspected and debris removed as needed.	Yes No ☐ ☐ Basin inspected in April Yes No ☐ ☐ Basin inspected in November Yes No ☐ ☐ Basin inspected after heavy rainfalls Yes No ☐ ☐ Pipe sub-drain outlet inspected regularly	NOTE: *quarterly checklists on file*
13. Inspection of Extended Basin Outlet Structure	▪ The outlet structure should be inspected in April and November and after heavy rainfall events for clogging, sediment accumulation around the outlet, and condition of the flashboards. ▪ Debris should be removed monthly from the debris screens.	Yes No ☐ ☐ Outlet structure inspected in April Yes No ☐ ☐ Outlet structure inspected in November Yes No ☐ ☐ Outlet structure inspected after heavy rainfalls Yes No ☐ ☐ Debris removed from debris screens monthly	NOTE: *quarterly checklists on file*
14. Inspection of Infiltration Chamber System Overflow Manhole	▪ The overflow manhole should be inspected at least once a year.	Yes No ☐ ☐ Overflow manhole inspected annually	List inspection date:
15. Inspection of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be inspected.	Yes No ☐ ☐ Filter fabric is inspected as needed	NOTE: *quarterly checklists on file*

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
16. Inspection of Stop Logs	▪ The headwall is equipped with slots to allow for the insertion of stop logs to prevent flow in an emergency.	Yes No ☐ ☐ Stop logs are located in the garage maintenance office	
17. Submittal of Annual Tabular Stormwater Inspection and Maintenance Checklist	▪ The Stormwater Inspection and Maintenance Checklist must be submitted to the MBTA by January 15th of each year.	Yes No ☐ ☐ Annual Inspection and Maintenance Checklist submitted to the MBTA	Date submitted:
"MBTA REQUIREMENT" **18. Submittal of Annual Tabular Stormwater Inspection and Maintenance Checklist**	▪ The Stormwater Inspection and Maintenance Checklist must be submitted to the Dedham and Westwood Conservation Commissions and the Dedham-Westwood Water District by January 31st of each year. ▪ The Stormwater Inspection and Maintenance Checklist must be sent by Certified Mail-Return Receipt	Yes No ☐ ☐ Stormwater Inspection and Maintenance Checklist submitted by Certified-Mail Return Receipt	
"MBTA REQUIREMENT" **19. Submittal of Spot Grade Plan**	▪ A Spot Grade Plan showing spot grades at no fewer than ten (10) equally distributed locations within the bottom of the detention basin, and at one location in each of the treatment swales must be submitted to the Dedham-Westwood Conservation Commissions and the Dedham-Westwood Water District every tenth year beginning in 2001.	Yes No ☐ ☐ Spot Grad Plan submitted in accordance with the O&M schedule	

APPENDIX D

Stormwater Inspection and Maintenance Checklist
[Quarterly Submittals]

MBTA ROUTE 128 INTERMODAL PARKING FACILITY
Inspection and Maintenance - First Quarter Checklist
[January 1ST through March 31ST]

Property Owner: *Massachusetts Bay Transportation Authority*
Property Address: *Parking Garage- University Avenue, Westwood, MA*

Submitted By: _____
Date of Submittal: _____
Date of Most Recent Storm Event: _____

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
1. Sweeping	▪ Locations that require periodic sweeping include the top deck of the parking garage, the access drive, and the garage entrances. ▪ Sweeping shall be conducted when the site is not covered with ice and snow. Sweeping will be conducted as soon as possible after winter snow melt.	Yes No ❑ ❑ Sweeping conducted weekly Yes No ❑ ❑ Sweeping conducted after winter snow melt	
2. Removal of Debris from Detention Basin Outlet Screens	▪ Debris should be removed monthly from the debris screens	Yes No ❑ ❑ Debris removed monthly	
3. Removal of Debris from Infiltration Trench	▪ Debris should be removed monthly from the surface of the trench.	Yes No ❑ ❑ Debris removed monthly	
4. Cleaning of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be cleaned.	Yes No ❑ ❑ Filter fabric is cleaned as needed	If fabric was cleaned, list the date:
5. Inspection of Water Quality Inlets (Stormceptor™ Oil-Water Separator)	▪ Each of the four (4) structures should be inspected following large storm events	Yes No ❑ ❑ Oil Water Separators inspected after large storm events	List inspection dates:
6. Inspection of Vegetated Swales	▪ Swales should also be inspected after severe storms.	Yes No ❑ ❑ Swales inspected after severe storms	List inspection dates:

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
7. Inspection of Extended Detention Basin	▪ Basin should be inspected after heavy rainfalls for clogging of the outlet structures, erosion, sediment accumulation around the outlet, adequacy of stone protection and slope stability. ▪ The pipe sub-drain outlet to the wetland should also be inspected and debris removed as needed.	Yes No ❑ ❑ Basin inspected after heavy rainfalls Yes No ❑ ❑ Pipe sub-drain outlet inspected regularly	List inspection dates:
8. Inspection of Extended Basin Outlet Structure	▪ The outlet structure should be inspected after heavy rainfall events for clogging, sediment accumulation around the outlet, and condition of the flashboards. ▪ Debris should be removed monthly from the debris screens.	Yes No ❑ ❑ Outlet structure inspected after heavy rainfalls Yes No ❑ ❑ Debris removed from debris screens monthly	List inspection dates:
9. Inspection of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be inspected.	Yes No ❑ ❑ Filter fabric is inspected as needed	List inspection dates:
10. Maintenance of Observation Ports	▪ Maintenance on each of the three (3) observation ports located along the Emergency Road should be performed annually. ▪ Maintenance should be conducted after a rainfall event and include the following: - water quality sampling - removal of sediment	Yes No ❑ ❑ Annual maintenance conducted and after a rainfall event	Provide Details:
11. Inspection of Infiltration Chamber System Overflow Manhole	▪ The overflow manhole should be inspected at least once a year.	Yes No ❑ ❑ Overflow manhole inspected annually	List inspection date:
12. Submittal of First Quarter Tabular Inspection and Maintenance Checklist	▪ The Inspection and Maintenance Checklist must be submitted to the MBTA by March 31st of each year.	Yes No ❑ ❑ First Quarter Inspection and Maintenance Checklist submitted to the MBTA	Date submitted:

MBTA ROUTE 128 INTERMODAL PARKING FACILITY
Inspection and Maintenance Checklist – Second Quarter Checklist
[April 1ST through June 30th]

Property Owner: *Massachusetts Bay Transportation Authority*
Property Address: *Parking Garage- University Avenue, Westwood, MA*

Submitted By: _____
Date of Submittal: _____
Date of Most Recent Storm Event: _____

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
1. Sweeping	▪ Locations that require periodic sweeping include the top deck of the parking garage, the access drive, and the garage entrances. ▪ Sweeping shall be conducted when the site is not covered with ice and snow. Sweeping will be conducted as soon as possible after winter snow melt.	Yes No ❑ ❑ Sweeping conducted weekly Yes No ❑ ❑ Sweeping conducted after winter snow melt	
2. Landscaping & Maintenance of Vegetated Water Quality Swales	▪ Spring maintenance includes fertilizing, liming, pruning, reseeding and week and pest control. ▪ Grass mowing should occur annually. Grass should be maintained at least 4 inches tall. ▪ Sand and debris should be removed manually in the spring.	Yes No ❑ ❑ Spring maintenance conducted Yes No ❑ ❑ Grass mowing conducted annually Yes No ❑ ❑ Sand and debris removed in Spring	Provide details:
3. Landscaping & Maintenance of Extended Detention Basin	▪ Spring maintenance includes fertilizing, liming, pruning, reseeding and week and pest control. ▪ Debris should be removed from the pipe sub-drain outlet as needed. ▪ Sediment should be removed once a year. ▪ Grass mowing should occur annually.	Yes No ❑ ❑ Spring maintenance conducted Yes No ❑ ❑ Debris removed from pipe sub-drain outlet as needed Yes No ❑ ❑ Grass mowing conducted annually	Provide details:

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
4. Removal of Debris from Detention Basin Outlet Screens	▪ Debris should be removed monthly from the debris screens	Yes No ❑ ❑ Debris removed monthly	
5. Removal of Debris from Infiltration Trench	▪ Debris should be removed monthly from the surface of the trench.	Yes No ❑ ❑ Debris removed monthly	
6. Cleaning of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be cleaned.	Yes No ❑ ❑ Filter fabric is cleaned as needed	If fabric was cleaned, list the date:
7. Inspection of Water Quality Inlets (Stormceptor™ Oil-Water Separator)	▪ Each of the four (4) structures should be inspected following large storm events	Yes No ❑ ❑ Oil Water Separators inspected after large storm events	List inspection dates:
8. Inspection of Vegetated Swales	▪ Swales should be inspected in late April. ▪ Swales should also be inspected after severe storms.	Yes No ❑ ❑ Swales inspected in late April Yes No ❑ ❑ Swales inspected after severe storms	List inspection dates:
9. Inspection of Extended Detention Basin	▪ Basin should be inspected in April and after heavy rainfalls for clogging of the outlet structures, erosion, sediment accumulation around the outlet, adequacy of stone protection and slope stability. ▪ The pipe sub-drain outlet to the wetland should also be inspected and debris removed as needed.	Yes No ❑ ❑ Basin inspected in April Yes No ❑ ❑ Basin inspected after heavy rainfalls Yes No ❑ ❑ Pipe sub-drain outlet inspected regularly	List inspection dates:
10. Inspection of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric should be inspected.	Yes No ❑ ❑ Filter fabric is inspected as needed	List inspection dates:

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
11. Inspection of Extended Basin Outlet Structure	▪ The outlet structure should be inspected in April and after heavy rainfall events for clogging, sediment accumulation around the outlet, and condition of the flashboards. ▪ Debris should be removed monthly from the debris screens.	Yes No ❑ ❑ Outlet structure inspected in April Yes No ❑ ❑ Outlet structure inspected after heavy rainfalls Yes No ❑ ❑ Debris removed from debris screens monthly	List inspection dates:
12. Submittal of Second Quarter Tabular Inspection and Maintenance Checklist	▪ The Inspection and Maintenance Checklist must be submitted to the MBTA by June 30th of each year.	Yes No ❑ ❑ Second Quarter Inspection and Maintenance Checklist submitted to the MBTA	Date submitted:

MBTA ROUTE 128 INTERMODAL PARKING FACILITY
Inspection and Maintenance Checklist – Third Quarter Checklist
[July 1st through September 30th]

Property Owner: *Massachusetts Bay Transportation Authority*
Property Address: *Parking Garage- University Avenue, Westwood, MA*

Submitted By: _____
Date of Submittal: _____
Date of Most Recent Storm Event: _____

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
1. Sweeping	▪ Locations that require periodic sweeping include the top deck of the parking garage, the access drive, and the garage entrances.	Yes ❑ No ❑ Sweeping conducted weekly	
2. Landscaping & Maintenance of Vegetated Water Quality Swales	▪ Grass mowing should occur annually and in the late fall when the swales are dry. Grass should be maintained at least 4 inches tall. ▪ The stone at pipe ends should be repaired or replaces as needed.	Yes ❑ No ❑ Grass mowing conducted annually Yes ❑ No ❑ Stone repaired or replaced	
3. Landscaping & Maintenance of Extended Detention Basin	▪ Debris should be removed from the pipe sub-drain outlet as needed ▪ Grass mowing should occur annually.	Yes ❑ No ❑ Debris removed from pipe sub-drain outlet as needed Yes ❑ No ❑ Grass mowing conducted annually	
4. Removal of Debris from Detention Basin Outlet Screens	▪ Debris should be removed monthly from the debris screens	Yes ❑ No ❑ Debris removed monthly	
5. Removal of Debris from Infiltration Trench	▪ Debris should be removed monthly from the surface of the trench.	Yes ❑ No ❑ Debris removed monthly	
6. Cleaning of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be cleaned.	Yes ❑ No ❑ Filter fabric is cleaned as needed	If fabric was cleaned, list the date:

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
7. Inspection of Water Quality Inlets (Stormceptor™ Oil-Water Separator)	▪ Each of the four (4) structures should be inspected following large storm events	Yes No ❑ ❑ Oil Water Separators inspected after large storm events	List inspection dates:
8. Inspection of Vegetated Swales	▪ Swales should also be inspected after severe storms.	Yes No ❑ ❑ Swales inspected after severe storms	List inspection dates:
9. Inspection of Extended Detention Basin	▪ Basin should be inspected after heavy rainfalls for clogging of the outlet structures, erosion, sediment accumulation around the outlet, adequacy of stone protection and slope stability. ▪ The pipe sub-drain outlet to the wetland should also be inspected and debris removed as needed.	Yes No ❑ ❑ Basin inspected after heavy rainfalls Yes No ❑ ❑ Pipe sub-drain outlet inspected regularly	List inspection dates:
10. Inspection of Extended Basin Outlet Structure	▪ The outlet structure should be inspected after heavy rainfall events for clogging, sediment accumulation around the outlet, and condition of the flashboards. ▪ Debris should be removed monthly from the debris screens.	Yes No ❑ ❑ Outlet structure inspected after heavy rainfalls Yes No ❑ ❑ Debris removed from debris screens monthly	List inspection dates:
11. Inspection of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be inspected.	Yes No ❑ ❑ Filter fabric is inspected as needed	List inspection dates:
12. Vacuum Cleanout of Water Quality Inlets(Stormceptor™ Oil-Water Separators)	▪ Vacuum cleanout the four (4) Oil Water Separators. ▪ Sediment collected at the bottom of each tank and pooled water with floating oil and grease must be evacuated during the cleanout	Separator — Date of Cleanout A _____ B _____ C _____ D _____	Vendor Contact Information: **Provide copies of disposal receipts with the Annual Report.*
13. Submittal of Third Quarter Tabular Inspection and Maintenance Checklist	▪ The Inspection and Maintenance Checklist must be submitted to the MBTA by September 30th of each year.	Yes No ❑ ❑ Third Quarter Inspection and Maintenance Checklist submitted to the MBTA	Date submitted:

MBTA ROUTE 128 INTERMODAL PARKING FACILITY
Inspection and Maintenance Checklist – Fourth Quarter Checklist
[October 1st through December 31st]

Property Owner: *Massachusetts Bay Transportation Authority*
Property Address: *Parking Garage- University Avenue, Westwood, MA*

Submitted By: _____
Date of Submittal: _____
Date of Most Recent Storm Event: _____

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
1. Sweeping	▪ Locations that require periodic sweeping include the top deck of the parking garage, the access drive, and the garage entrances. ▪ Sweeping shall be conducted when the site is not covered with ice and snow. Sweeping will be conducted as soon as possible after winter snow melt.	Yes No ❑ ❑ Sweeping conducted weekly Yes No ❑ ❑ Sweeping conducted after winter snow melt	
2. Landscaping & Maintenance of Vegetated Water Quality Swales	▪ Grass mowing should occur annually and in the late fall when the swales are dry. Grass should be maintained at least 4 inches tall. ▪ Sand and debris should be removed manually in the fall. ▪ The stone at pipe ends should be repaired or replaces as needed.	Yes No ❑ ❑ Grass mowing conducted annually and in late Fall Yes No ❑ ❑ Sand and debris removed in Fall Yes No ❑ ❑ Stone repaired or replaced	
3. Landscaping & Maintenance of Extended Detention Basin	▪ Debris should be removed from the pipe sub-drain outlet as needed ▪ Grass mowing should occur annually and in the late fall when the swales are dry.	Yes No ❑ ❑ Debris removed from pipe sub-drain outlet as needed Yes No ❑ ❑ Grass mowing conducted annually and in late Fall	
4. Removal of Debris from Detention Basin Outlet Screens	▪ Debris should be removed monthly from the debris screens	Yes No ❑ ❑ Debris removed monthly	

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
5. Removal of Debris from Infiltration Trench	▪ Debris should be removed monthly from the surface of the trench.	Yes No ☐ ☐ Debris removed monthly	
6. Cleaning of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric below the surface layer of stone should be cleaned.	Yes No ☐ ☐ Filter fabric is cleaned as needed	If fabric was cleaned, list the date:
7. Inspection of Water Quality Inlets (Stormceptor™ Oil-Water Separator)	▪ Each of the four (4) structures should be inspected following large storm events	Yes No ☐ ☐ Oil Water Separators inspected after large storm events	List inspection dates:
8. Inspection of Vegetated Swales	▪ Swales should be inspected semi-annually, preferably in early November. ▪ Swales should also be inspected after severe storms.	Yes No ☐ ☐ Swales inspected in early November Yes No ☐ ☐ Swales inspected after severe storms	List inspection dates:
9. Inspection of Extended Detention Basin	▪ Basin should be inspected in November and after heavy rainfalls for clogging of the outlet structures, erosion, sediment accumulation around the outlet, adequacy of stone protection and slope stability. ▪ The pipe sub-drain outlet to the wetland should also be inspected and debris removed as needed.	Yes No ☐ ☐ Basin inspected in November Yes No ☐ ☐ Basin inspected after heavy rainfalls Yes No ☐ ☐ Pipe sub-drain outlet inspected regularly	List inspection dates:
10. Inspection of Infiltration Trench Filter Fabric	▪ If water is standing at the surface of the trench 2 days after a major storm, the filter fabric should be inspected.	Yes No ☐ ☐ Filter fabric is inspected as needed	List inspection dates:

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
11. Inspection of Extended Basin Outlet Structure	▪ The outlet structure should be inspected in November and after heavy rainfall events for clogging, sediment accumulation around the outlet, and condition of the flashboards. ▪ Debris should be removed monthly from the debris screens.	Yes No ☐ ☐ Outlet structure inspected in November Yes No ☐ ☐ Outlet structure inspected after heavy rainfalls Yes No ☐ ☐ Debris removed from debris screens monthly	List inspection dates:
12. Submittal of Fourth Quarter Tabular Inspection and Maintenance Checklist	▪ The Inspection and Maintenance Checklist must be submitted to the MBTA by December 31st of each year.	Yes No ☐ ☐ Fourth Quarter Inspection and Maintenance Checklist submitted to the MBTA	Date submitted:

APPENDIX E

Wastewater Inspection & Maintenance Checklist
[Annual Report]

MBTA ROUTE 128 INTERMODAL PARKING FACILITY
Wastewater Inspection and Maintenance Checklist – Annual Report

Property Owner: *Massachusetts Bay Transportation Authority*
Property Address: *Parking Garage- University Avenue, Westwood, MA*

Submitted By: _____
Date of Submittal: _____
Date of Alarm Event: _____

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
1. Pump Maintenance	▪ Inspect both pumps, including the impellers. Run each pump by hand/manual control and watch the level control go up and down to ensure pumps are working properly.	Yes No ☐ ☐ Pump maintenance conducted every six months	
2. Cleaning of the Wet Wells	▪ Completely pump out and clean the wet wells to prevent solids and grease build-up. Build-up of solids can create odors and damage to pumps.	Yes No ☐ ☐ Wet wells cleaned every six months	
3. Clean Duplex Control Panel	▪ Clean the interior of the control cabinet of oil, dirt and moisture.	Yes No ☐ ☐ Control panel cleaned every six months	
4. Inspection of Electrical Equipment	▪ Inspect all electrical equipment for poor connections or worn parts. Check conditions of contacts.	Yes No ☐ ☐ Electrical equipment inspected annually	
5. Inspection of Pilot Device	▪ Check pilot device (float switch) operation.	Yes No ☐ ☐ Inspection of pilot device conducted every six months	List inspection dates:
6. Inspection of Check Valves	▪ Inspect the check valves to ensure proper working order and to prevent backflow from the force main to the wet well.	Yes No ☐ ☐ Check valve inspection conducted every six months	List inspection dates:
7. Clean and Inspect the Floats	▪ Clean and inspect the floats to ensure proper performance. The buildup of grease prevents the floats from working properly.	Yes No ☐ ☐ Check valve inspection conducted every six months	List inspection dates:

TASK	DESCRIPTION	FREQUENCY OF TASK	COMMENTS (Initial that the task was completed and provide a brief description of the work or the inspection results)
8. Test Duplex Control Panel	▪ Test all panel lights on the Duplex Control Panel and change as needed to ensure proper operation.	Yes No ☐ ☐ Control panel lights tested every six months	
9. Record Amp and Vibration Readings	▪ If the readings do not meet the manufacturer's specifications, it is an indication that debris is lodged in the propellers within the motor, or water has entered the motor housing or the wiring.	Yes No ☐ ☐ Amp and vibration readings recorded every six months	Provide readings:
10. Vacuum Cleanout of Sanitary Oil-Water Separator	▪ Vacuum cleanout of the Oil Water Separator shall occur at least once a year. ▪ Sediment collected at the bottom of each tank and pooled water with floating oil and grease must be evacuated during the cleanout	Yes No ☐ ☐ Separator cleaned out annually Date of Cleanout _____	Vendor Contact Information: **Provide copies of disposal receipts with the Annual Report.*
11. Wastewater Pump Station Inspections	▪ Conduct a daily inspection of the wastewater pump station. ▪ Maintain records of daily inspections	Yes No ☐ ☐ Wastewater pump station inspection conducted on a daily basis Yes No ☐ ☐ Wastewater pump station daily inspection records maintained on file at the Facility.	NOTE: *daily checklists on file*
12. Submittal of Annual Tabular Wastewater Inspection and Maintenance Annual Checklist	▪ The Wastewater Inspection and Maintenance Checklist must be submitted to the MBTA by January 15th of each year.	Yes No ☐ ☐ Annual Inspection and Maintenance Checklist submitted to the MBTA	Date submitted:
"MBTA REQUIREMENT" **13. Submittal of Annual Tabular Wastewater Inspection and Maintenance Annual Checklist**	▪ The Wastewater Inspection and Maintenance Checklist must be submitted to the Massachusetts Department of Environmental Protection by January 31st of each year. ▪ The Inspection and Maintenance Checklist must be sent by Certified Mail-Return Receipt	Yes No ☐ ☐ Wastewater Inspection and Maintenance Checklist submitted by Certified-Mail Return Receipt	Date submitted:

APPENDIX F

Wastewater Daily Inspection Checklist

MBTA ROUTE 128 INTERMODAL PARKING FACILITY
Wastewater Daily Inspection Checklist
[As required by the Massachusetts Department of Environmental Protection under 314 CMR 12.04(4)]

Property Owner: *Massachusetts Bay Transportation Authority*
Property Address: *Parking Garage- University Avenue, Westwood, MA*
Inspector: _____
Date: _____

AREA	INSPECTION ITEMS	Yes	No	Comment
SITE	Visually inspect the pump station and grounds			
	Inspect and check proper operation of the metal hatch covers			
	Check for pooling and puddles			
	Inspect fencing and gate			
WETWELL	Visually inspect the interior structure of the wet wells			
	Visually inspect the floats			
PUMPS	Visually inspect the pumping of each pump Check the pumps visually for defects			
	Record the pump hours for each pump			Pump 1 hrs: Pump 2 hrs:
	Inspect cord and cord placement			
PIPING	Inspect piping for any visual defects			
	Inspect alignment of discharge piping			
CONTROL PANEL	Date of most recent alarm event	-	-	Date:
	Check the Duplex Pump control panel lights and alarm system.			
	Verify all panel lights are operational			
FLOW METER	A log of flow records, dates and maintenance should be maintained. The flow meter provides an accurate record of how much flow is being processed through the system.			Pump 1 meter reading: Pump 2 meter reading:
OTHER COMMENTS AND/OR REQUIRED MAINTENANCE:				

Completed checklists must be maintained onsite at the facility.

APPENDIX G

MADEP 314 CMR 12.00

[Operation and Maintenance and Pretreatment Standards for Wastewater]

314 CMR 12.00: OPERATION AND MAINTENANCE AND PRETREATMENT STANDARDS FOR WASTEWATER TREATMENT WORKS AND INDIRECT DISCHARGERS

Section

12.01: Purpose

The Department acting under the authority of M.G.L. c. 21, §§ 27(9), 27(12) and 34 hereby adopts and establishes 314 CMR 12.00 to insure proper operation and maintenance of wastewater treatment facilities and sewer systems within the Commonwealth.

12.02: Definitions

When used in 314 CMR 12.00 the following words and phrases shall have the following meanings:

Bypass - the intentional diversion of wastes from any portion of a treatment works.

Categorical Pretreatment Standard or Pretreatment Standard - any regulation containing pollutant discharge limits promulgated by the EPA in accordance with PL 92-500, § 307(b) and (c), which applies to Industrial Users. This term includes prohibitive discharge limits established pursuant 314 CMR 12.08(1) and (2).

Combined Sewer Overflows or CSO - any intermittent overflow, bypass or other discharge from a municipal combined sewer system which results from a flow in excess of the dry weather carrying capacity of the system.

Combined Sewer System - a sewer system which by design conveys both wastewaters and storm water runoff.

Department - the Massachusetts Department of Environmental Protection

Discharge or Discharge of Pollutants - any addition of any pollutant or combination of pollutants to waters of the Commonwealth from any source, including but not limited to, discharges from surface runoff which is collected or channelled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a POTW and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any indirect discharger.

Effluent - a discharge of pollutants into the environment, whether or not treated.

Effluent Limitation or Effluent Limit - any requirement, restriction, or standard imposed by the Department on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the Commonwealth or to publicly owned treatment works.

Environmental Protection Agency or EPA - the United States Environmental Protection Agency.

Federal Act - the Clean Water Act, P.L. 92-500, as amended by P.L. 95-217 and P.L. 95-576, 33 U.S.C. 1251 *et seq.*

12.02: continued

Hazardous Waste - a hazardous waste as defined in the Massachusetts Hazardous Waste Regulations, 310 CMR 30.000.

Indirect Discharge - the introduction of pollutants into a POTW from any non-domestic source regulated under PL 92-500, § 307(b), (c) or (d).

Industrial User or User - a source of indirect discharge.

Industrial Waste - any liquid, gaseous, or solid waste substance or a combination thereof resulting from any process of industry, manufacturing, trade, or business or from the development or recovery of any natural resources.

Interference - an inhibition or disruption of the POTW, its treatment processes or operations, or its sludge processes, use or disposal which is a cause of or significantly contributes to either a violation of any requirement of the POTW's permit (including an increase in the magnitude or duration of a violation) or to the prevention of sewage sludge use or disposal by the POTW in accordance with applicable Federal, State or local statutes and regulations or permits issued thereunder. An industrial user significantly contributes to such a permit violation or prevention of sludge use or disposal in accordance with applicable requirements whenever such user:

(a) discharges a daily pollutant loading in excess of that allowed by contract with the POTW or by Federal, State or local law;

(b) discharges wastewater which substantially differs in nature or constituents from the user's average discharge; or

(c) knows or has reason to know that its discharge, alone or in conjunction with discharges from other sources, would result in a POTW permit violation or prevent sewage sludge use or disposal in accordance with the applicable requirements as they apply to the POTW's selected method of sludge management.

Massachusetts Water Quality Standards - the Massachusetts Surface Water Quality Standards (314 CMR 4.00) and the Massachusetts Ground Water Quality Standards (314 CMR 6.00).

New Source - any building, structure, facility, or installation from which there is or may be a discharge, the construction of which commenced:

(a) After promulgation of pretreatment standards under the Clean Water Act, P.L. 92-500, 307(c) as amended by P.L. 95-217 and P.L. 95-576, 33 U.S.C. 1251 *et seq*, which are applicable to such source; or

(b) After proposal of pretreatment standards in accordance with PL 92-500, § 307(c) which are applicable to such source, but only if the standards are promulgated in accordance with PL 92-500, § 307(c) within 120 days of their proposal.

Pass Through - the discharge of pollutants through the POTW into waters of the Commonwealth in quantities or concentrations which are a cause of or significantly contribute to a violation of any requirement of the POTW's permit (including an increase in the magnitude or duration of a violation). An industrial user significantly contributes to such permit violation where it:

(a) Discharges a daily pollutant loading in excess of that allowed by contract with the POTW or by Federal, State or local law;

(b) Discharges wastewater which substantially differs in nature and constituents from the user's average discharge;

(c) Knows or has reason to know that its discharge, alone or in conjunction with discharges from other sources would result in a permit violation; or

(d) Knows or has reason to know that the POTW is, for any reason, violating its final effluent limitations in its permit and that such industrial user discharge either alone or in conjunction with discharges from other sources, increases the magnitude or duration of the POTW violations.

12.02: continued

Permit - an authorization issued pursuant to M.G.L. c. 21, § 43 and 314 CMR 2.00 and 3.00, 5.00, or 7.00, to implement the requirements of the Massachusetts Clean Waters Act, as amended, M.G.L. c. 21, §§ 26 through 53 and the Clean Water Act, P.L. 92-500, as amended by P.L. 95-217 and P.L. 95-576, 33 U.S.C. 1251 *et seq* and regulations adopted thereunder.

Person - any agency or political subdivision of the Commonwealth, the federal government, any public or private corporation or authority, individual, partnership or association, or other entity, including any officer of a public or private agency or organization, upon whom a duty may be imposed by or pursuant to any provisions of M.G.L. c. 21, §§ 26 through 53.

Pollutant - any element or property of sewage, agricultural, industrial or commercial waste, runoff, leachate, heated effluent, or other matter, in whatever form and whether originating at a point or major non-point source, which is or may be discharged, drained or otherwise introduced into any sewerage system, treatment works or waters of the Commonwealth.

Pollution - the presence in the environment of conditions or contaminants in quantities or characteristics which are or may be injurious to human, plant or animal life or to property or which unreasonably interfere with the comfortable enjoyment of life and property throughout such areas as may be affected thereby.

Pretreatment - the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW.

Public Entity - any city, town, special district, the Metropolitan District Commission or other existing governmental unit eligible to receive a grant for the construction of treatment works from the United States Environmental Protection Agency pursuant to Title II of the PL 92-500, as amended.

Publicly Owned Treatment Works or POTW - any device or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a public entity. A POTW includes any sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

RCRA - the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (P.L. 94-580, as amended by P.L. 95-609, 42 U.S.C. Section 6901 *et seq.*)

RCRA Facility - a hazardous waste management facility as defined in 314 CMR 8.03.

Sewage - the water-carried human or animal wastes from residences, buildings, industrial establishments or other places, together with such ground water infiltration and surface water as may be present.

Sewer System - pipelines or conduits, pumping stations, force mains, and all other structures, devices, appurtenances, and facilities used for collecting and conveying wastes to a site or works for treatment or disposal.

Sewer Connection - the sewer pipes and appurtenant works necessary to connect a building or estate to a sewer system.

Sewer Extension - the addition to a sewer system of a sewer pipe, together with appurtenant works, which when connected to the sewer system becomes the property of, and is operated and maintained by, the person owning the sewer system.

Septage - the liquid and solid wastes, primarily of sewage origin, that are removed from a cesspool, septic tank or similar receptacle.

State Act - the Massachusetts Clean Waters Act, as amended, M.G.L. c. 21, §§ 26 through 53.

12.02: continued

Toxic Pollutants - those pollutants identified in 314 CMR 3.16, or any other combination of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly through food chains, may, on the basis of information available to the Department, cause death, disease, behavioral abnormalities, cancer, mutations, physiological malfunctions, biochemical abnormalities, including malfunctions in reproduction, or physical deformations, in such organisms or their offspring.

Treatment Works - any and all devices, processes and properties, real or personal, used in the collection, pumping, transmission, storage, treatment, disposal, recycling, reclamation or reuse of waterborne pollutants, but not including any works receiving a hazardous waste from off the site of the works for the purpose of treatment, storage or disposal, or industrial wastewater holding tanks regulated under 314 CMR 18.00.

Wastewater - sewage, industrial waste, other wastes or any combination of the three.

Wastewater Treatment Facility or Wastewater Treatment Plant - any and all devices, processes and properties, real or personal, used in the storage, treatment, disposal, recycling, reclamation or reuse of waterborne pollutants, but not including any sewer system.

Waters of the Commonwealth - all waters within the jurisdiction of the Commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters, and ground waters.

12.03: Operations of Treatment Works

(1) No person shall make major physical modifications to existing wastewater treatment facility or such modifications as will significantly affect treatment efficiency without the prior written approval of the Department.

(2) No person shall increase the volume or strength or change the characteristics of any discharge in excess of that specified under any existing approval by the Department.

(3) Any person operating a wastewater treatment facility shall comply with the "Rules and Regulations for Certification of Operators of Wastewater Treatment Facilities" (257 CMR 2.00). Said operating personnel must demonstrate that they are trained and competent to provide services consistent with the equipment's specification, with the operation and maintenance requirements specified by the vendor and the designer, and with any specified by the Department. As appropriate, the operator will receive training from the technology vendor with certification that they are capable of operating the specific technology.

(4) No person shall construct, install, operate, or maintain a wastewater treatment facility, a sewer system or any extension thereof or connection thereto without the approval of the Department pursuant to applicable provisions of 314 CMR 3.00, 5.00, 7.00 and 8.00.

(5) Any person operating a system of sewers shall adopt, keep current and enforce a set of 314 CMR 12.00 for sewer use to provide for the protection of these works, the wastewater treatment plant and the receiving waters. 314 CMR 12.00 shall be subject to the approval of the Department. At a minimum 314 CMR 12.00 shall contain the specific limits necessary to comply with the provisions of 314 CMR 12.09(1).

(6) Any person operating a system of sewers shall prohibit the discharge of wastes into such sewers that will violate the provisions of 314 CMR 12.08. Such person shall take all reasonable measures to safeguard against the discharge of such wastes.

(7) All wastes shall receive appropriate treatment as required by 314 CMR 3.00 and 5.00.

12.03: continued

(8) No person responsible for the operation of treatment works shall permit wastes to bypass the facility or any portion, unit or part thereof, except as may be necessary under existing design limitations as approved by the Department, unless in accordance with the provisions of a discharge permit. If bypassing due to an emergency condition occurs, the Department shall be notified immediately. Such notification or its acknowledgement shall not be construed as permission by the Department to discharge wastes in contravention of the Massachusetts water quality standards.

(9) The Department may require that all valved waste bypass lines or outfalls which discharge to the waters of the Commonwealth have a seal installed at the valve such that the seal would be broken whenever the valve is opened. Such seals shall not be replaced without the approval of the Department or its authorized representatives. A schedule for periodic testing of valves must be approved by the appropriate Regional Environmental Engineer of the Department.

(10) All flow regulators and other like devices in a sewer system shall be so maintained that no discharge occurs at less than the designed overflow rate and in no instance less than the dry weather flow conditions if the designed overflow rate is not known.

(11) Any person operating a sewer system or wastewater treatment facility constructed after January 1, 1940 shall maintain permanent and adequate sets of plans for such facilities. Any person operating such facilities constructed on or before January 1, 1940 shall maintain permanent and adequate sets of plans which were available at the time of adoption 314 CMR 12.00. Sewer system plans shall indicate location, size, slope and type of material of the pipe and any appurtenances.

(12) All records referred to in 314 CMR 12.07 and all plans and descriptions of wastewater treatment facilities and related appurtenances required by 314 CMR 12.03(11) shall be made available to the Department upon request.

12.04: Maintenance of Treatment Works

(1) Any person operating wastewater treatment facilities shall prepare, adopt and keep current an operation and maintenance manual. The operation and maintenance manual shall contain information necessary for the operator of the treatment works to properly operate and maintain said treatment works in accordance with the requirements of 314 CMR 12.00 and shall include at a minimum the following items:

(a) Introduction
(b) Permits and Standards
(c) Description, Operation and Control of Wastewater Treatment Facilities
(d) Description, Operation and Control of Sludge Handling Facilities
(e) Description, Operation, Control and Testing of the Chemical Addition and Monitoring System
(f) Personnel
(g) Sampling and Laboratory Analysis
(h) Records and Reporting
(i) Maintenance
(j) Emergency Operating and Response Program
(k) Safety
(l) Utilities

(2) All wastewater treatment facilities shall be provided with adequate operating personnel to ensure proper operation and the required degree of treatment at all times.

(3) In order to assure proper operation and maintenance, the Department may determine and require a minimum number of shifts and personnel per shift for any wastewater treatment facility taking into consideration the size, complexity and safety requirements of the particular facility. Any person operating wastewater treatment facilities shall prepare and submit to the Department a staffing plan. Said staffing plan shall contain a description of the number and qualifications of personnel necessary to ensure proper and continuous operation of the facilities and shall address the following items:

12.04: continued

(a) Number of operational days per week;
(b) Number of operational hours per week;
(c) Number of shifts per day;
(d) Required personnel per shift;
(e) Saturday, Sunday and Holiday staff coverage; and
(f) Emergency operating personnel.

The staffing plan shall be updated every two years.

If the owner of the wastewater treatment facility intends to contract for operation of the facility, such contract shall be submitted to the Department for review and approval prior to execution of the contract and commencement of work.

The proposed contract operator must present a list of all other facilities, including personnel specific to each facility, for which the operator is responsible.

(4) Any person operating a sewer system shall cause the daily inspection of all pumping, ejector or lift stations on intercepting, trunk or main sewers. Said person shall maintain records of daily inspections and shall submit annually to the Department a report summarizing inspection activities for the previous year.

(5) All pumping, ejector or lift stations shall be provided with an adequate and operational alarm system that will transmit a warning of a malfunction at the facility to a manned facility. Operational alarm systems shall be tested at least twice annually.

(6) All pumping, ejector or lift stations shall be provided with an independent engine/generator-type source of electric power or a completely separate alternate source of power other than from the electric utility for emergency operations. This source shall be automatically activated by failure of any phase of the power supply or upon any fluctuation in voltage, the amount or duration of which would cause damage to the motors. As an alternative for small pumping ejector or lift stations which are not located adjacent to drinking water supplies, storage (including system storage) equal to the maximum amount of wastewater (including infiltration and inflow) which can be expected may be provided, or a portable standby generator may be used or a portable engine-driven pump may be supplied which can be readily connected to the force main. Electric generators and engine driven pumps shall be tested at least twice annually.

(7) Any person operating a treatment works shall control the discharge of septage so that its entry into the wastewater treatment facility will not interfere with the proper operation and maintenance of the facility, degrade the effluent or violate the current Massachusetts water quality standards.

(8) Any person operating treatment works shall maintain the facilities in a manner that will ensure proper operation of the facilities or any part thereof.

(9) Any person operating treatment works shall establish and implement a preventive maintenance program to assure the efficient operation of all facilities and equipment.

(10) Any person operating a treatment works shall provide sufficient and adequate tools, equipment, spare parts and supplies to maintain and operate all appurtenances of the facility on a continuing basis.

(11) A reserve supply of all parts and supplies having a high replacement rate shall be on hand at all times.

(12) All standby and other equipment shall be maintained in an operable condition.

(13) All tidegates and flap valves shall be maintained in an operable condition.

12.05: Safety Program

(1) All equipment and tools utilized by personnel working on treatment works shall be maintained by all persons in a safe and useable condition.

12.05: continued

(2) Any person at facilities maintaining chlorine equipment shall be provided with self-contained compressed air breathing apparatus and be instructed in its use. It is strongly suggested that an emergency tank repair kit be provided at facilities utilizing gaseous chlorine and that personnel be instructed in the use of such repair kit.

(3) Self-contained compressed air masks, air tanks and all connections thereto shall be inspected and tested at least once every six months for general condition or operating functions. The tank shall be inspected for safety and structural integrity once every five years.

(4) At least one spare fully charged cylinder shall be kept on hand when self-contained compressed air masks are provided as required under 314 CMR 12.05(2).

(5) Any person operating a sewer system or a wastewater treatment facility shall submit a report to the Department concerning any death or major injuries occurring at said facility. The report shall include as a minimum:

(a) the duties of the individual or individuals involved;
(b) what occurred;
(c) the cause (if known) of the accident;
(d) the extent of injuries; and
(e) the steps taken to minimize and prevent future accidents of like type.

(A copy of the insurance or municipal accident report will be accepted if the above items are included.)

(6) Personnel involved in the maintenance and operation of sewer systems and wastewater treatment facilities shall be provided access to properly operating devices to determine the degree of flammability of an atmosphere, the amount of oxygen in an atmosphere, safety harness, rope, and any other safety devices required according to the duties involved.

(7) Any person operating a sewer system or wastewater treatment facility shall provide adequate means for the practice of good personal hygiene by working personnel.

(8) At least one person on each shift should have an up-to-date certificate of training in basic or, preferably, advanced first aid obtainable through the American Red Cross.

(9) All wastewater treatment facilities personnel shall have immediate access to an approved first aid kit which shall be kept provided with adequate supplies at all times.

(10) Any person operating a treatment works receiving sewage shall provide personnel, working at such works, with tetanus toxoid inoculations and with inoculation of typhoid vaccine. Required inoculations shall be kept current according to the most recent Department of Public Health requirements.

(11) Water-proofed gloves shall be provided as a minimum for working personnel who are likely to come into contact with sewage. It is strongly suggested that a complete change of work clothes be provided during working hours.

(12) Any and all alarm systems provided by wastewater treatment facility operators and sewer system operators shall be maintained in an operable condition and so certified by them twice annually as to testing of said devices and the results submitted to the Department.

(13) Any and all chemical storage, metering systems, monitoring and associated alarms provided at a wastewater treatment facility for chemical addition shall be maintained in an operable condition and test monthly at a minimum. Operators shall certify annually as to the testing and calibration of the devices and the results submitted to the Department.

12.06: Sampling and Analysis

(1) Any person operating a wastewater treatment facility shall provide laboratory facilities as required by the Department.

12.06: continued

(2) All sampling and analysis required under 314 CMR 12.00 shall be in accordance with 40 CFR Part 136 or other methods approved by the Department.

(3) Any person operating a wastewater treatment facility shall provide adequate laboratory equipment and supplies. No reagents shall be used that are contaminated or beyond the age recommendations of the latest edition of "Standard Methods for the Examination of Water and Wastewater".

(4) The type and frequency of laboratory determinations and other data required to be submitted to the Department by each waste treatment facility shall be determined by the Department for each particular facility.

12.07: Record Keeping and Reporting

(1) Monthly operating records shall be maintained in accordance with the most recent edition of the Department's publication titled "Directions for Completing Monthly Report Form for Wastewater Treatment Plants" which shall be available from the Department on request.

All daily inspection logs consistent with the O & M Manual requirements shall be kept at the facility for a period of three years.

(2) Records of operation of wastewater treatment facilities or disposal systems required by the Department shall be submitted on forms supplied by the Department or on other forms approved by the Department for such use. Monthly reports shall be certified by the wastewater treatment plant operator in charge and submitted by the 10th calendar day of the following month, unless otherwise specified in the permit. The Department may change the date of submittal upon receiving a written request from the person explaining the reason that 314 CMR 12.00 imposes an unreasonable hardship.

(3) Records shall be maintained of pumping, ejector or lift station failures which shall provide as a minimum the reason for failure, length of time out of service, and total volume bypassed or overflowed. These records shall be submitted to the Department within five days of such failure. Any resulting overflow or bypass shall be reported to the Department in accordance with the provisions of 314 CMR 3.19(20)(e) and 5.19(20)(e).

(4) Records shall be maintained of septage discharged to the treatment works. They shall contain as a minimum, the date, time, source, volume discharged and whether or not the load contained industrial wastes. Septage discharged at a wastewater treatment facility shall be tested for pH. These records shall be made available to the Department or the appropriate Regional Environmental Engineer of the Department upon request.

(5) Data contained in the monthly operating records or other such records submitted to the Department shall be factual and accurate to the best knowledge of the person operating the wastewater treatment facility.

(6) Records of all monitoring information including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by 314 CMR 12.00 shall be retained, for a period of at least three years from the date of the sample, measurement, or report. This period may be extended by request of the Department at any time.

Records of monitoring information shall include:

(a) The date, exact place, and time of sampling or measurements;
(b) The name of the individual(s) who performed the sampling or measurement;
(c) The date(s) analyses were performed;
(d) The name of the individual(s) who performed the analyses;
(e) The analytical techniques or methods used; and
(f) The results of such analyses.

12.07: continued

(7) Every person owning a sewer system shall maintain records on all sanitary and industrial sewer connections authorized for the discharge to the owner's sewer system. By January 31st of each year, the owner of the sewer system shall submit a copy of the records for the preceding calendar year to the owner of the wastewater treatment facility receiving flow from the sewer system and, upon request shall submit a copy of the records, or make them available, to the Department.

12.08: Prohibitions and Standards for Discharge to POTWs

(1) General Prohibitions. No person shall discharge or cause to be discharged to a POTW any substances, materials, or wastewaters that can harm the sewers, wastewater treatment process, or equipment; have an adverse effect on the receiving waters or can otherwise endanger life, limb, public property, or constitute a nuisance. In determining the acceptability of these wastewaters, consideration shall be given to such factors as the quantities of such wastewaters in relation to flows and velocities in the sewers, materials or construction of sewers, nature of the wastewater treatment process, capacity of the wastewater treatment process, degree of treatability of such wastewaters in the wastewater treatment plant, and other pertinent factors. Pollutants introduced into POTW's by a non-domestic source shall not pass through the POTW or interfere with the operation or performance of the works. These general prohibitions and the specific prohibitions in 314 CMR 12.08(2) apply to all non-domestic sources introducing pollutants into a POTW whether or not the source is subject to other pretreatment standards or any other Federal, State, or local pretreatment requirements.

(2) Specific Prohibitions. In addition, the following pollutants shall not be introduced into a POTW:

(a) Pollutants which create a fire or explosion hazard in the POTW;

(b) Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.5, unless the works is specifically designed to accommodate such discharges;

(c) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;

(d) Any pollutant, including oxygen demanding pollutants released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW;

(e) Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40°C (104°F) unless the Department, upon request of the POTW, approves alternate temperature limits.

(3) Local Limits. Any indirect discharger shall comply with the local sewer use rules and regulations established pursuant to 314 CMR 12.03(5).

(4) Categorical Pretreatment Standards. In addition to the general and specific prohibitions and local limits established in 314 CMR 12.08(1), (2), and (3), industrial users shall comply with applicable categorical pretreatment standards established in 40 CFR Chapter I, Subchapter N.

(a) Deadline for Compliance. Compliance by existing sources with categorical pretreatment standards shall be within three years of the date the standard is effective unless a shorter compliance time is specified in applicable Federal law or regulations. Compliance with categorical pretreatment standards by new sources will be required upon promulgation.

(b) Dilution Prohibited. Except where expressly authorized to do so by an applicable categorical pretreatment standard, no industrial user shall ever increase the use of process water or, in any other way, attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with a categorical pretreatment standard.

(c) Combined Wastestreams. Where process effluent regulated by a categorical pretreatment standard is mixed with other wastewaters prior to treatment, fixed alternative discharge limits may be established in accordance with 40 CFR 403.6(e).

(d) POTW Removal Credits. Any POTW receiving wastes from an industrial user subject to categorical pretreatment standards may request revision of discharge limits for a specific pollutant based on the POTW's consistent removal of that pollutant. Any such request shall be made and determined in accordance with 40 CFR 403.7, 403.9 and 403.11.

12.08: continued

(e) Fundamentally Different Factors. Where factors relating to an industrial user are fundamentally different from the factors considered by EPA during the development of a categorical pretreatment standard, and the existence of those factors justifies a different discharge limit from that specified in the standard, any person may request a fundamentally different factors variance from the applicable categorical pretreatment standard. Requests for such variances shall be submitted and determined in accordance with 40 CFR 403.13.

(f) Category Determination Requests. A request for a determination as to whether an industrial user is included in a particular industrial category shall be submitted to and processed by the Department in accordance with the provisions of 40 CFR 403.6(a).

(g) Reporting Requirements. Any industrial user subject to categorical pretreatment standards shall prepare and submit the reports required by, and in accordance with 40 CFR 403.12.

(5) State-imposed Standards. Where necessary to enforce the prohibitions in 314 CMR 12.08(1) and (2), the Department may establish on a case-by-case basis, specific limits on the discharge of wastewater from any user. Such limits may be established as a condition of an individual sewer connection permit issued pursuant to 314 CMR 7.00 or an administrative order issued to the discharger pursuant to M.G.L. c. 21, § 44.

(6) Where more than one standard established under 314 CMR 12.08(1), (2), (3), (4), or (5) is applicable to an indirect discharge to a POTW the most stringent standard shall be applied.

(7) Any pretreatment facility which treats hazardous waste must also comply with the requirements of 310 CMR 30.000.

12.09: POTW Pretreatment Programs

(1) POTW-imposed Limits.

(a) POTW's developing POTW Pretreatment Programs pursuant to 314 CMR 12.09(2) shall develop and enforce specific limits to implement the prohibitions listed 314 CMR 12.08(1) and (2).

(b) All other POTW's shall, in cases where pollutants contributed by industrial user(s) result in interference or pass through, and such violation is likely to recur, develop and enforce specific effluent limits for industrial users, and all other users, as appropriate, which, together with appropriate changes in the POTW treatment plant or its operation, are necessary to ensure renewed and continued compliance with the POTW's permit or sludge use or disposal practices.

(c) Specific effluent limits shall not be developed and enforced without individual notice to persons or groups who have requested such notice and an opportunity to respond.

(d) Where specific prohibitions or limits on pollutants or pollutant parameters are developed by a POTW in accordance with 314 CMR 12.08(3)(a) and (b), such limits shall be deemed pretreatment standards for the purposes of PL 92-500, § 307(d).

(2) POTW Pretreatment Programs.

(a) POTWs Required to Develop a Pretreatment Program. Any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5,000,000 gallons per day (mgd) and receiving from industrial users pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards are required to establish a POTW Pretreatment Program. The Department may require that a POTW with a design flow of five mgd or less establish a POTW Pretreatment Program if the Department finds that the nature or volume of the industrial influent, treatment process upsets, violations of POTW effluent limitations, contamination of municipal sludge, or other circumstances warrant in order to prevent interference with the POTW or pass through. In addition, any POTW desiring to modify categorical pretreatment standards for pollutants removed by the POTW [as approved for by 314 CMR 12.08 (d)] must have an approved POTW Pretreatment Program prior to obtaining final approval of a removal allowance.

Requirements to develop a POTW pretreatment program, including a schedule for adoption of the program, shall be incorporated in the POTW discharge permit issued pursuant to 314 CMR 3.00 or 5.00, and may be a cause for modification of such permit.

12.09: continued

(b) Pretreatment Program Approval. A POTW which meets the criteria of 314 CMR 12.09(2)(a) shall receive approval of its pretreatment program in accordance with the applicable deadline established under the Clean Water Act, P.L. 92-500, as amended by P.L. 95-217 and P.L. 95-576, 33 U.S.C. 1251 *et seq.*

An approved POTW pretreatment program shall be incorporated as a condition of the POTWs discharge permit issued pursuant to 314 CMR 3.00 or 5.00, and incorporation of the approved program may be cause for modification of such permit.

A POTW pretreatment program shall meet the requirements of 40 CFR 403.8(f) and be approved in accordance with the requirements of 40 CFR 403.9 and 403.11.

(3) POTW Reporting. A POTW which has received authorization to modify categorical pretreatment standards for pollutants removed by the POTW in accordance with the requirements of 314 CMR 12.08(4)(d) shall submit the reports required by, and in accordance with the provisions of 40 CFR 403.12(i), (j) and (n).

12.10: Exemptions

(1) Except for 314 CMR 12.03(3), 12.04(2), 12.08(1) and (2), dry cleaners subject to 310 CMR 72.00 need not comply with any other provisions of 314 CMR 12.00.

(2) Photo processors subject to 310 CMR 71.00 need not comply with any provisions of 314 CMR 12.00.

(3) Printers subject to 310 CMR 71.00 need not comply with any provisions of 314 CMR 12.00.

(4) Industrial Users subject to 314 CMR 7.05(2)(g) need not comply with the provisions of 314 CMR 12.00, provided that such Industrial Users are in compliance with 314 CMR 7.00, as determined by the Department. The Department may also require an Industrial User to obtain a permit pursuant to the Department's authority under 314 CMR 7.03 or a plan approval pursuant to the Department's authority under 314 CMR 12.03(4) on a case-by-case basis.

(5) Dental facilities subject to 310 CMR 73.00 need not comply with any provisions of 314 CMR 12.00.

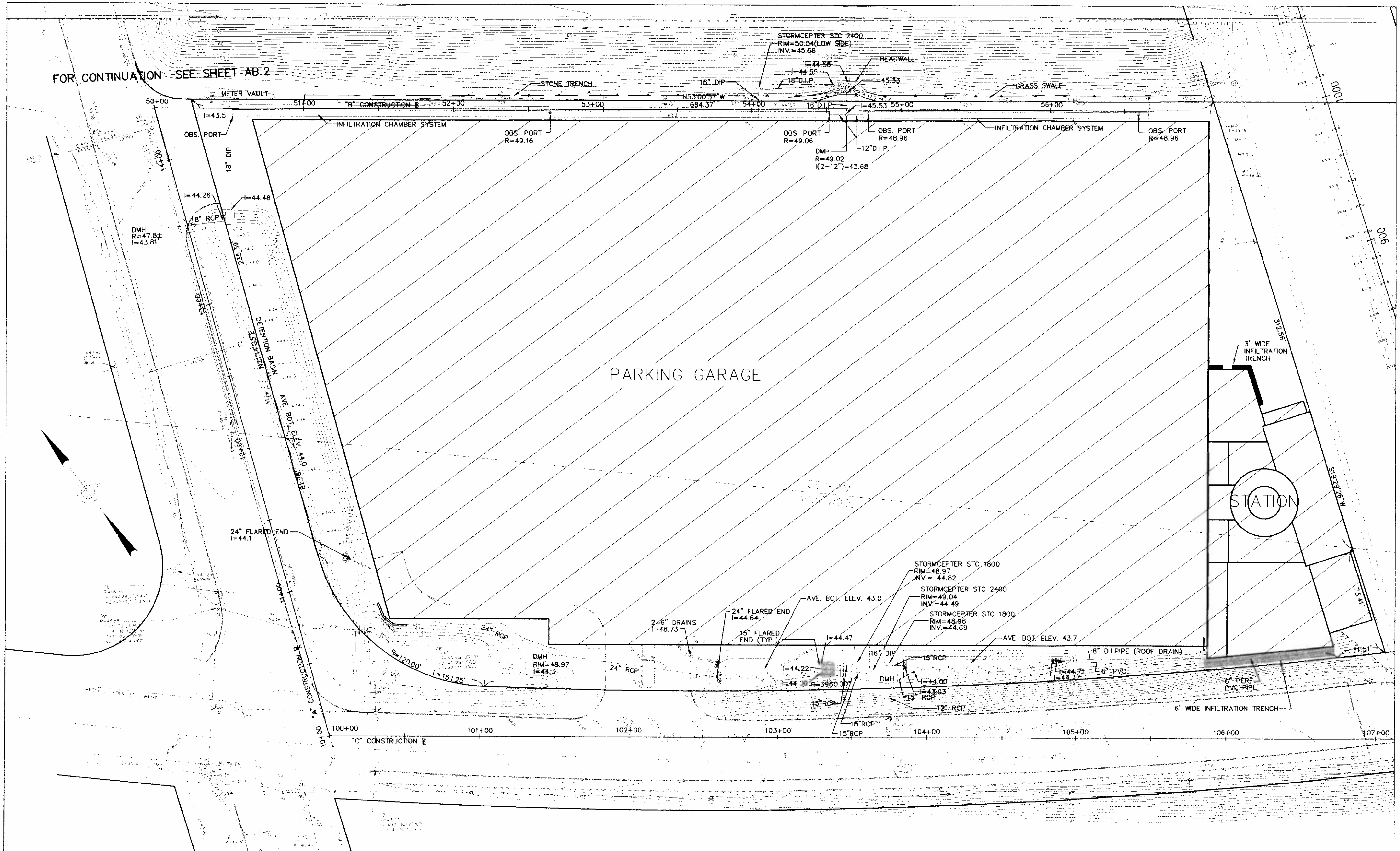
REGULATORY AUTHORITY

314 CMR 12.00: M.G.L. c. 21, §§ 27(12) and 34.

NON-TEXT PAGE

APPENDIX H

Site Grading and Drainage Plan

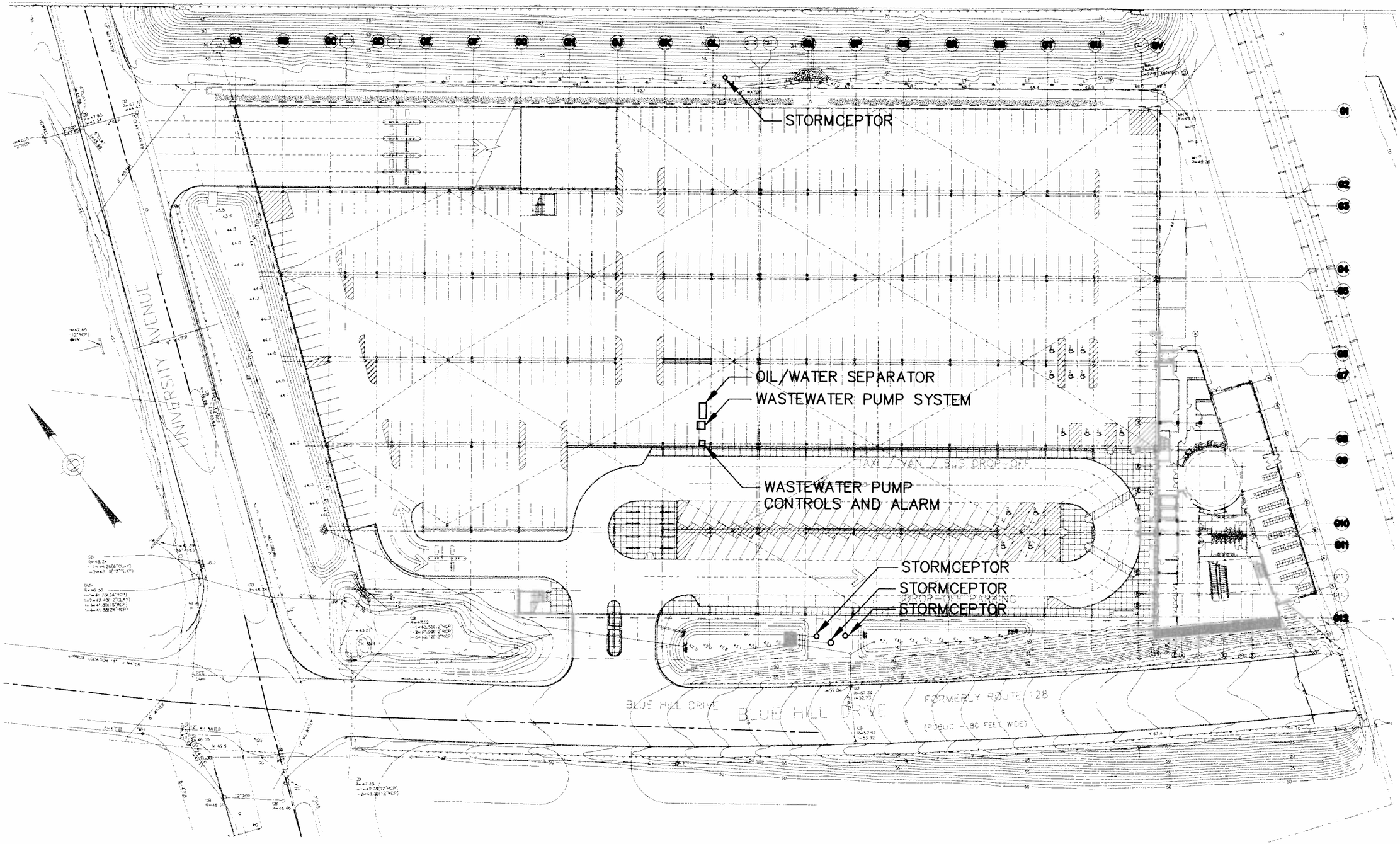


FOR CONTINUATION SEE SHEET AB.2
STORMCEPTER STC 2400
RIM=50.04(LOW SIDE)
INV.=45.66
HEADWALL
STONE TRENCH
METER VAULT
GRASS SWALE
"B" CONSTRUCTION ℄
INFILTRATION CHAMBER SYSTEM
OBS. PORT
R=49.16
R=49.06
R=48.96
DMH
R=49.02
I(2-12")=43.68
12"D.I.P.
16"D.I.P.
18" DIP
18" RCP
DMH
R=47.8±
I=43.81
DETENTION BASIN
AVE. BOT. ELEV. 44.0
PARKING GARAGE
STATION
3' WIDE INFILTRATION TRENCH
24" FLARED END
I=44.1
STORMCEPTER STC 1800
RIM=48.97
INV.= 44.82
STORMCEPTER STC 2400
RIM=49.04
INV.=44.49
STORMCEPTER STC 1800
RIM=48.96
INV.=44.69
AVE. BOT. ELEV. 43.0
AVE. BOT. ELEV. 43.7
2-6" DRAINS
I=48.73
24" FLARED END
I=44.64
15" FLARED END (TYP.)
8" D.I.PIPE (ROOF DRAIN)
6" PVC
6" PERF PVC PIPE
6' WIDE INFILTRATION TRENCH
DMH
RIM=48.97
I=44.3
24" RCP
15"RCP
12" RCP
R=120.00'
L=151.25'
R=3960.00'
"C" CONSTRUCTION ℄
100+00
101+00
102+00
103+00
104+00
105+00
106+00
107+00

DRAWN BY: JEB		PERINI CORPORATION CONTRACT NO.	SITE GRADING AND DRAINAGE PLAN	DATE: 02/23/01
DESIGN BY: ___		ROUTE 128 INTERMODAL FACILITY WESTWOOD/DEDHAM MASSACHUSETTS	SHEET 1 OF 2	SCALE: 1"=30'-0"
CHECKED BY: SWC	ISSUE / DATE / DESCRIPTION / BY / CHK'D / APP'D	Frederic R. Harris Inc. ENGINEERS ARCHITECTS PLANNERS BOSTON, MASSACHUSETTS	APPROVED: ______ PROJECT MANAGER APPROVED: ______ CONSULTANT	PLAN NO.

AB.1

SHEET



1 LOCATION PLAN OF DRAINAGE EQUIPMENT

SCALE: 1/32" = 1'-0"

APPENDIX I

Wastewater Pump Station Equipment

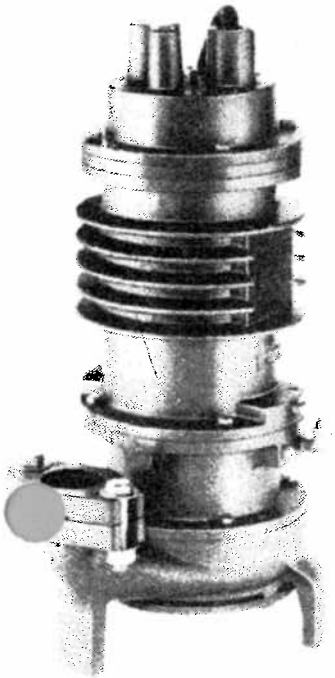
[Manufacturer's Documentation]

INSTALLATION • OPERATION • MAINTENANCE INSTRUCTION MANUAL FOR SERIES 1700 AND 2700 EXPLOSION PROOF (UL) SUBMERSIBLE PUMPS

Weil

MODELS: 2A-17X01X-X 2.5A-17X11X-X 3A-17X21X-X 3A-27X21X-X
4A-27X22X-X 4A-27X23X-X 4A-27X31X-X 4A-27X41X-X

NOVEMBER, 1994



INTRODUCTION

This manual contains complete instructions for installation, operation, maintenance and repair of your pump equipment. A careful and thorough study of this manual is advised before use of the equipment.

The pump is a well designed and sturdily constructed machine. When properly installed and reasonably maintained, it will give many years of trouble free service.

RECEIVING

The pump equipment should be checked for shortages and damage immediately upon arrival. Report promptly to the transportation company noting any loss or shortages on the freight bill or bill of lading. Claims for shortages must be made in writing to Weil Pump Co., no more than 14 days after receipt of equipment.

STORAGE

Submersible pumping equipment should be installed and put into operation as soon as possible. If it is necessary to store the equipment, precautions should be taken to prevent damage due to corrosion or oxidation. The storage area should be dry and have relatively constant temperature. If possible store the equipment indoors. Exposed machined surfaces (locknut and shaft end) should be coated with a rust preventative coating similar to "Rust Ban No. PH 6397" manufactured by Humble Oil Co. The entire unit should be sealed in a heavy plastic (polyethlene) bag. A desiccant such as VPI-20 manufactured by the Shell Oil Co., should be inserted in the bag before it is sealed. This particular vapor phase inhibitor, in crystalline form, should be used at a rate of approximately one (1) gram per cubic foot. Before sealing bag, arrange power cable, and moisture sensor cable (if so equipped) in gently curved loops to prevent cables from taking a permanent set.

During storage, the plastic bag should be opened at least once a month, and the rotating assembly of the pump turned several revolutions by hand. This will aid in preventing point of contact corrosion where bearing balls touch their races. Add vapor phase inhibitor before the bag is resealed. When installing pump after storage, check oil level in seal chamber by unscrewing plug. Add oil if level is below plug opening (Exxon-Univolt 60 or equivalent). No other lubrication is necessary. For additional information regarding rust preventation, reader is referred to American Society For Metals Handbook, under contents "Rust Preventive Compounds."

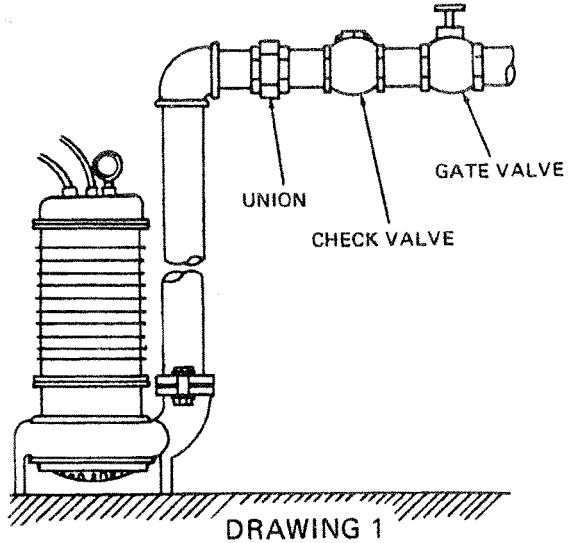
INSTALLATION

The pump is ready for installation as shipped. No lubrication or adjustment is required before initial operation. The pump is designed to stand at the bottom of a pit or sump having a solid floor. The sump/pit should be free of sand or other abrasives, since such materials may damage the mechanical seal. Raise and lower the unit by means of a chain or steel cable fastened to the eyebolt provided. **Do not raise, lower or support the unit by means of the electrical power cable or the moisture sensor cable.** When moving the pump, avoid placing strain on the electrical cables. Set the pump in its final location before connecting the cable(s). When electrical connections are complete, check that the impeller rotates in the correct direction. Provide adequate headroom above the sump/pit for future maintenance of the equipment. Install the associated liquid level controls so that the pump is properly immersed in the water or sewage. The minimum water level for continuous service is to have the cooling fins completely immersed. For intermittent service, the minimum water level should be at least 1" above the top of the casing.

PIPING CONNECTIONS
(Refer to Drawing 1)

The discharge outlet is flanged vertically upward. A tapered gasket and compression flange are supplied to allow connection of plain ended schedule 40 pipe to the pump. The pipe end should be deburred and lubricated before insertion into the compression gasket, then tighten bolts on compression flange. Piping connected to the outlet must be hung or supported independent of the pump connection. **DO NOT** use the pump to support the weight of piping and valves. The discharge line should include a swing check valve and a gate valve near the pump. Piping should be as short as possible, using a minimum number of fittings to reduce friction losses.

In a duplex installation, each pump must have its own check valve. One check valve in the common header is not sufficient, since the pumps will discharge back into the sump.



DRAWING 1

ELECTRICAL CONNECTIONS
(Refer to Drawings 2, 3, 4, 5, 6, or 7)

If the cables are not to be installed inside conduit, leave the phenolic bushings in place to protect the cables from the threads inside the compression nuts.

POWER CABLE

The electrical characteristics shown on the pump nameplate describe the power supply required to operate the pump motor. The user is responsible for providing appropriate branch circuit, motor starter and overload protection; also for satisfying local code requirements. Required motor starter must be adequate for motor HP rating and compatible with electrical service provided as regards number of phases, voltage and frequency. Starter enclosure must be compatible with environmental conditions of installation.

Electrical connections made in the pit, even though above the high water level, must be sealed, so that moisture cannot enter the junction boxes in the pit. Wiring diagrams for the pump motor are provided. Since manufacturers differ as to how their motors are to be connected, it is important to make connections according to the wiring diagram provided. Incorrect electrical connections may void the limited warranty.

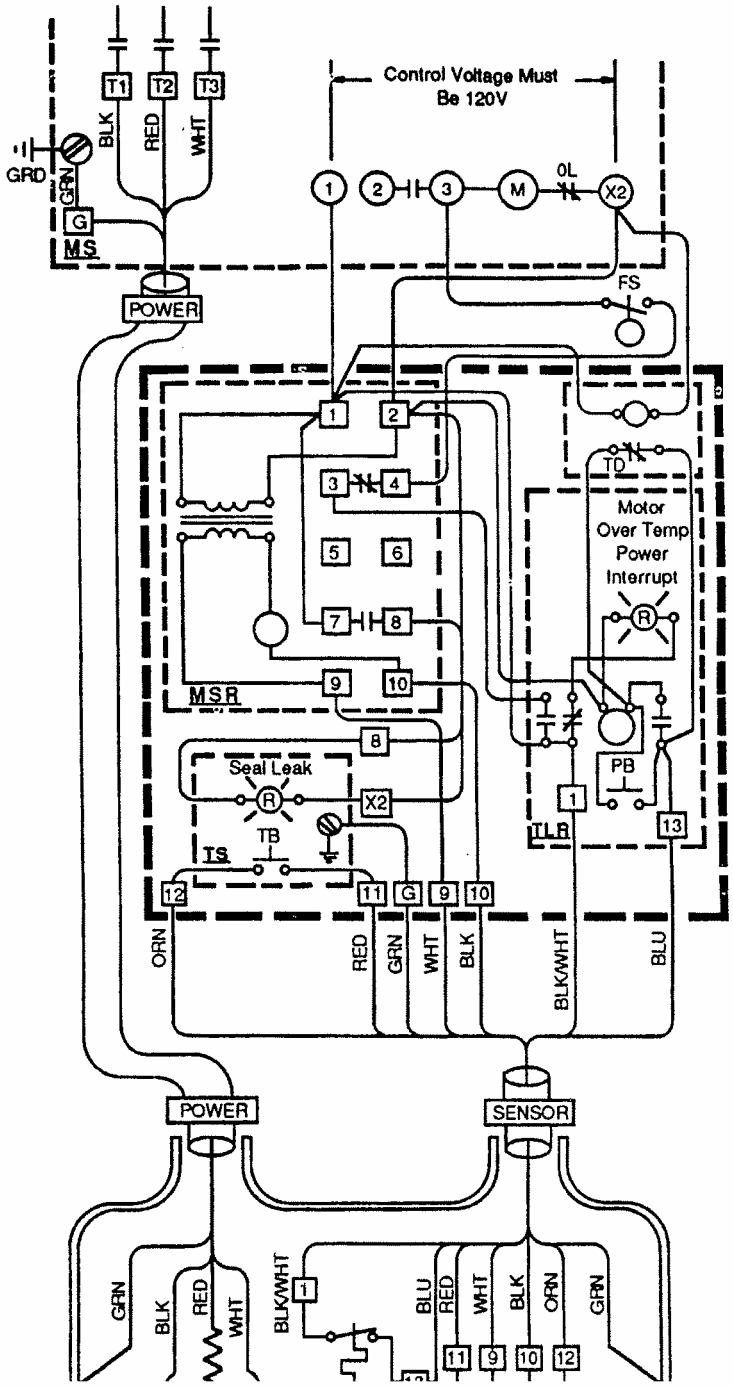
SENSOR CABLE

This pump is equipped with temperature limiting switches embedded in the stator windings to protect the insulation. A 120 volt relay, an indicating light and a manual restart pushbutton are to be connected (as in the appropriate wiring diagram) to the temperature limiting switches. The relay recommended for this purpose is Cutler-Hammer #D23MR21A (U.L. recognized component #E1230). Enclosure must be compatible with environmental conditions of installation.

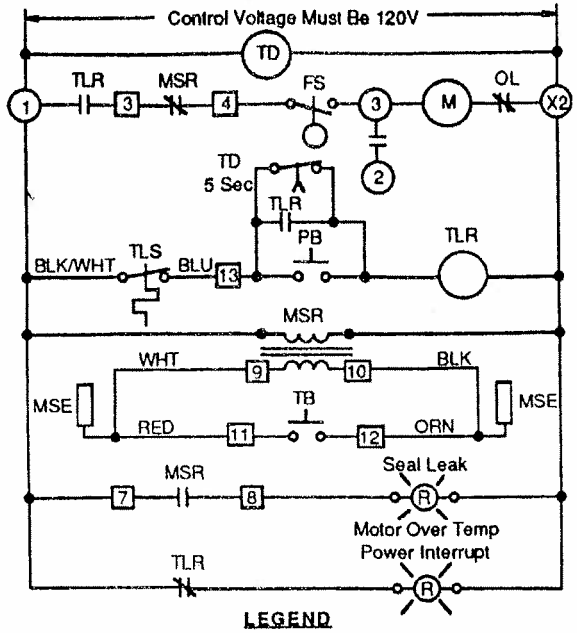
Moisture sensing probes are located in the motor shell to stop the motor if water enters the motor shell. A 120 volt relay, with one normally open and one normally closed set of contacts is to be connected (as in the appropriate wiring diagram) to the moisture sensing probes. The relay recommended for this purpose is C.F. Warwick Co. #1D1D0 FORM 50 (U.L. recognized component #MP1430). Enclosure must be compatible with environmental conditions of installation. A moisture sensor test-station is recommended to test the circuit. This test-station should include a normally open momentary contact pushbutton and an indicating light. Enclosure must be compatible with environmental conditions of installation. If the sensor cable is going to be connected

WIRING OF SIMPLEX EXPLOSION-PROOF CONTROL COMPONENTS (3 PH. 230/460V) PUMP MODELS X-171XXX, X-172XXX, X-177XXX, X-271XXX, X-272XXX, & X-277XXX

WIRING DIAGRAM



ELEMENTARY DIAGRAM



LEGEND

FS	Float Switch	PB	"Restart" Pushbutton
LLC	Liquid Level Control	TB	Moisture Test Pushbutton
M	Motor Starter Coil	TLR	Temperature Limiter Relay
MS	Motor Starter	TLS	Temperature Limiter Switch
MSE	Moisture Sensor Electrode	TS	Moisture Test Station
MSR	Moisture Sensor Relay	SP	Submersible Pump
OL	Starter Overload Contacts	TD	"On Time" Delay Relay

ALARM INDICATORS

"SEAL LEAK" - - Moisture in motor shell requiring operator attention.

"MOTOR OVER TEMP POWER INTERRUPT" - - Manual operation of "Restart" required to resume automatic operation.

OPERATION NOTES

MOISTURE SENSOR

If water enters the motor shell, the "Seal Leak" indicator will light and the motor starter control circuit will open. The pump cannot be re-started until the leakage condition is corrected.

To simulate leakage, and therby test the moisture sensor circuit, depress TB. The "Seal Leak" indicator will light, and the motor starter control circuit will open. When TB is released, the "Seal Leak" indicator will extinguish, and the pump will operate as demanded by the liquid level control.

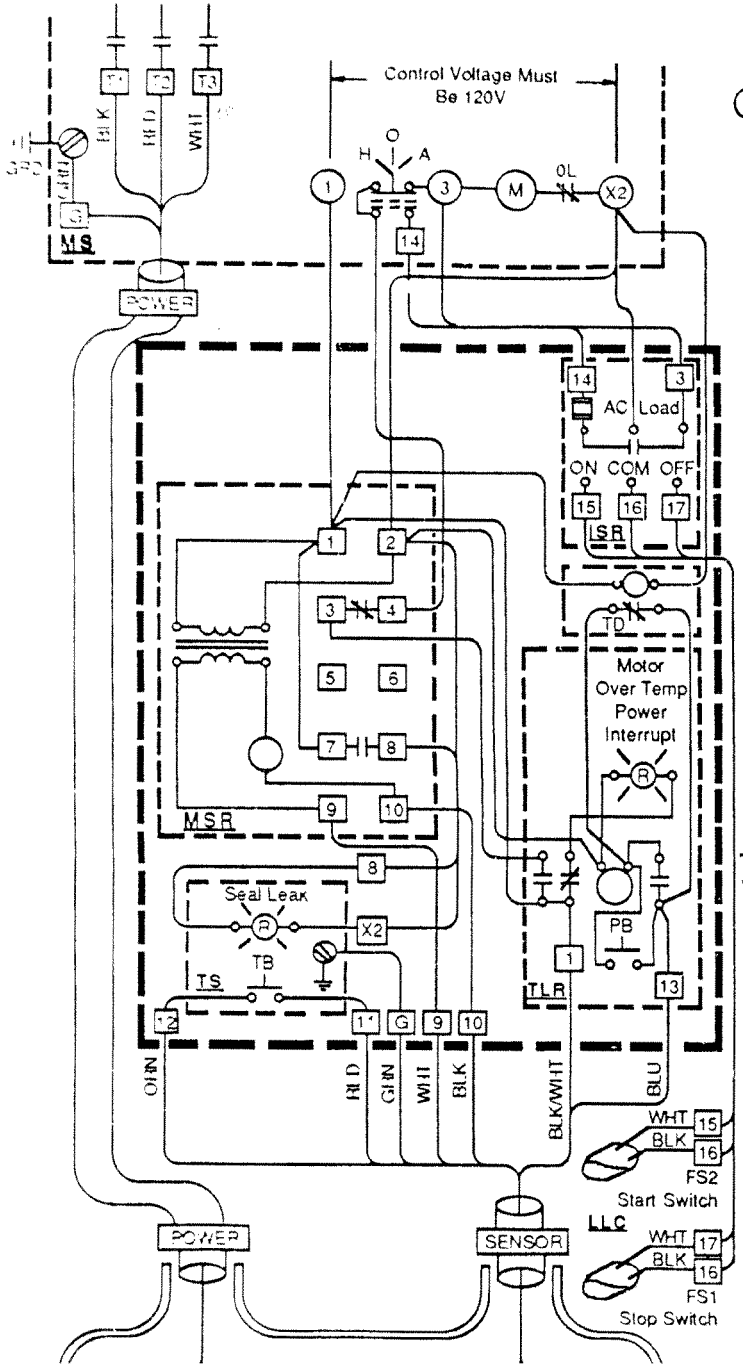
TEMPERATURE LIMITER

If the internal temperature of the motor rises to 155°C (310°F), the motor starter control circuit will open and the "MOTOR OVER TEMP POWER INTERRUPT" indicator will light.

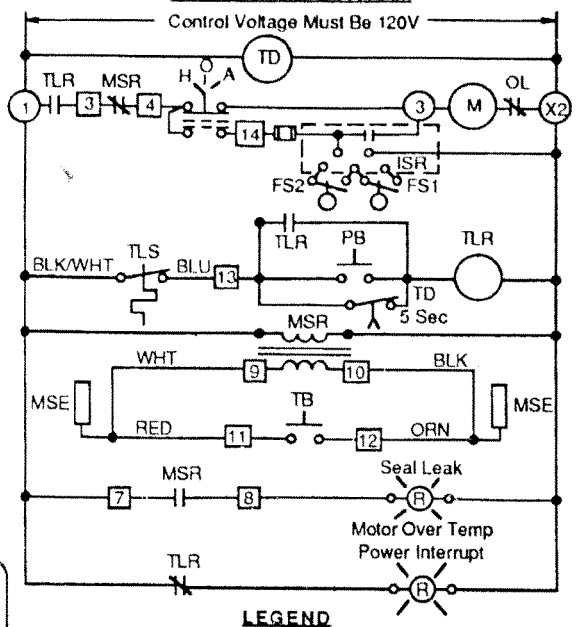
If pump stoppage is due to motor over temp. it can only be restarted after motor temperature has dropped to below 135°C (275°F) by de-

WIRING OF SIMPLEX EXPLOSION-PROOF CONTROL COMPONENTS (3 PH. 230/460V) (ISR)
PUMP MODELS X-171XXX, X-172XXX, X-177XXX, X-271XXX, X-272XXX, & X-277XXX

WIRING DIAGRAM



ELEMENTARY DIAGRAM



LEGEND

ISR	Intrinsically Safe Relay	PB	"Restart" Pushbutton
LLC	Liquid Level Control	TB	Moisture Test Pushbutton
M	Motor Starter Coil	TLR	Temperature Limiter Relay
MS	Motor Starter	TLS	Temperature Limiter Switch
MSE	Moisture Sensor Electrode	TS	Moisture Test Station
MSR	Moisture Sensor Relay	SP	Submersible Pump
OL	Starter Overload Contacts	TD	"On Time" Delay Relay

ALARM INDICATORS

"SEAL LEAK" - - Moisture in motor shell requiring operator attention.

"MOTOR OVER TEMP POWER INTERRUPT" - - Manual operation of "Restart" required to resume automatic operation.

OPERATION NOTES

MOISTURE SENSOR

If water enters the motor shell, the "Seal Leak" indicator will light and the motor starter control circuit will open. The pump cannot be re-started until the leakage condition is corrected.

To simulate leakage, and therby test the moisture sensor circuit, depress TB. The "Seal Leak" indicator will light, and the motor starter control circuit will open. When TB is released, the "Seal Leak" indicator will extinguish, and the pump will operate as demanded by the liquid level control.

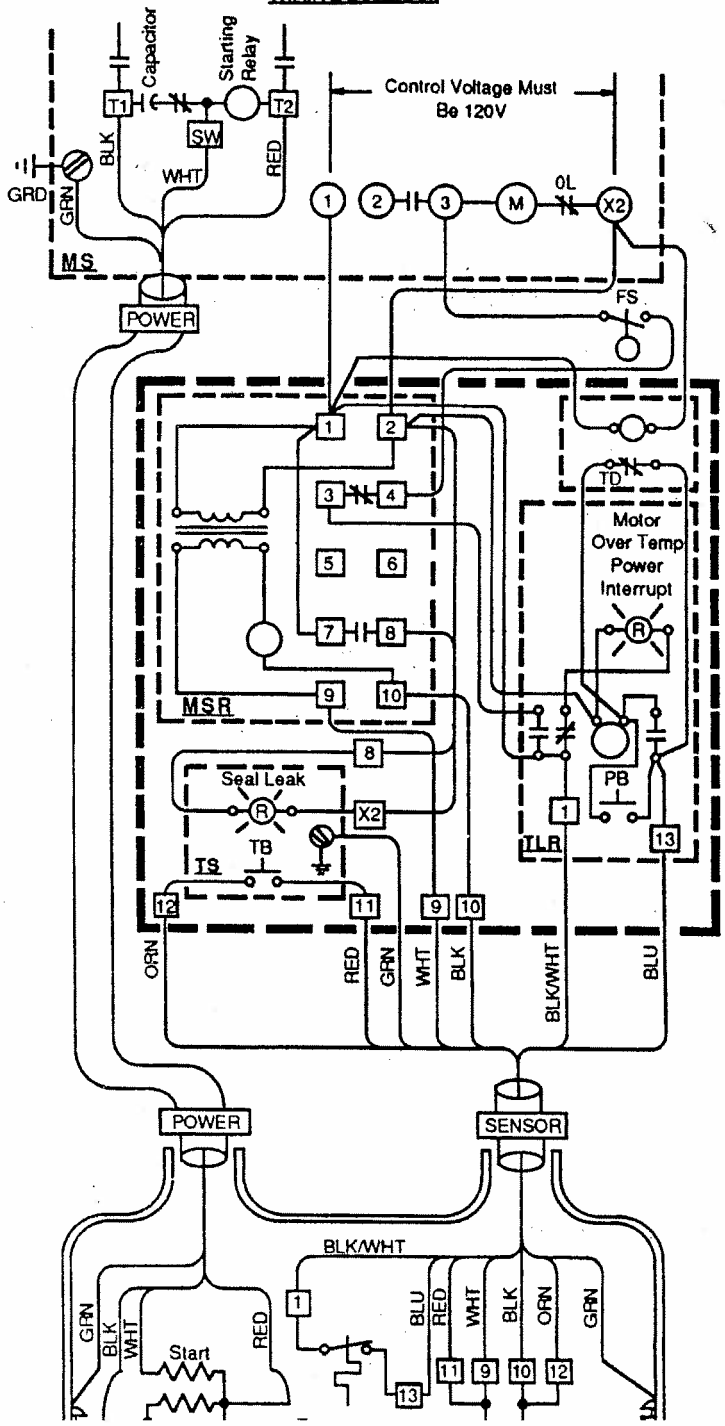
TEMPERATURE LIMITER

If the internal temperature of the motor rises to 155°C (310°F), the motor starter control circuit will open and the "MOTOR OVER TEMP POWER INTERRUPT" indicator will light.

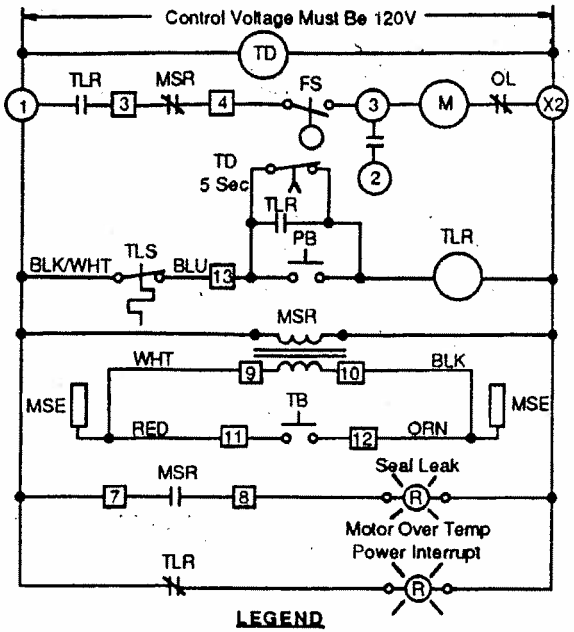
If pump stoppage is due to motor over temp. it can only be restarted

WIRING OF SIMPLEX EXPLOSION-PROOF CONTROL COMPONENTS (1 PH. 11[illegible]
PUMP MODELS X-171XXX, X-172XXX, X-177XXX, X-271XXX, X-272XXX, & X-277XXX

WIRING DIAGRAM



ELEMENTARY DIAGRAM



LEGEND

FS	Float Switch	PB	"Restart" Pushbutton
LLC	Liquid Level Control	TB	Moisture Test Pushbutton
M	Motor Starter Coil	TLR	Temperature Limiter Relay
MS	Motor Starter	TLS	Temperature Limiter Switch
MSE	Moisture Sensor Electrode	TS	Moisture Test Station
MSR	Moisture Sensor Relay	SP	Submersible Pump
OL	Starter Overload Contacts	TD	"On Time" Delay Relay

ALARM INDICATORS

"SEAL LEAK" - - Moisture in motor shell requiring operator attention.
"MOTOR OVER TEMP POWER INTERRUPT" - - Manual operation of "Restart" required to resume automatic operation.

OPERATION NOTES

MOISTURE SENSOR

If water enters the motor shell, the "Seal Leak" indicator will light and the motor starter control circuit will open. The pump cannot be re-started until the leakage condition is corrected.

To simulate leakage, and therby test the moisture sensor circuit, depress TB. The "Seal Leak" indicator will light, and the motor starter control circuit will open. When TB is released, the "Seal Leak" indicator will extinguish, and the pump will operate as demanded by the liquid level control.

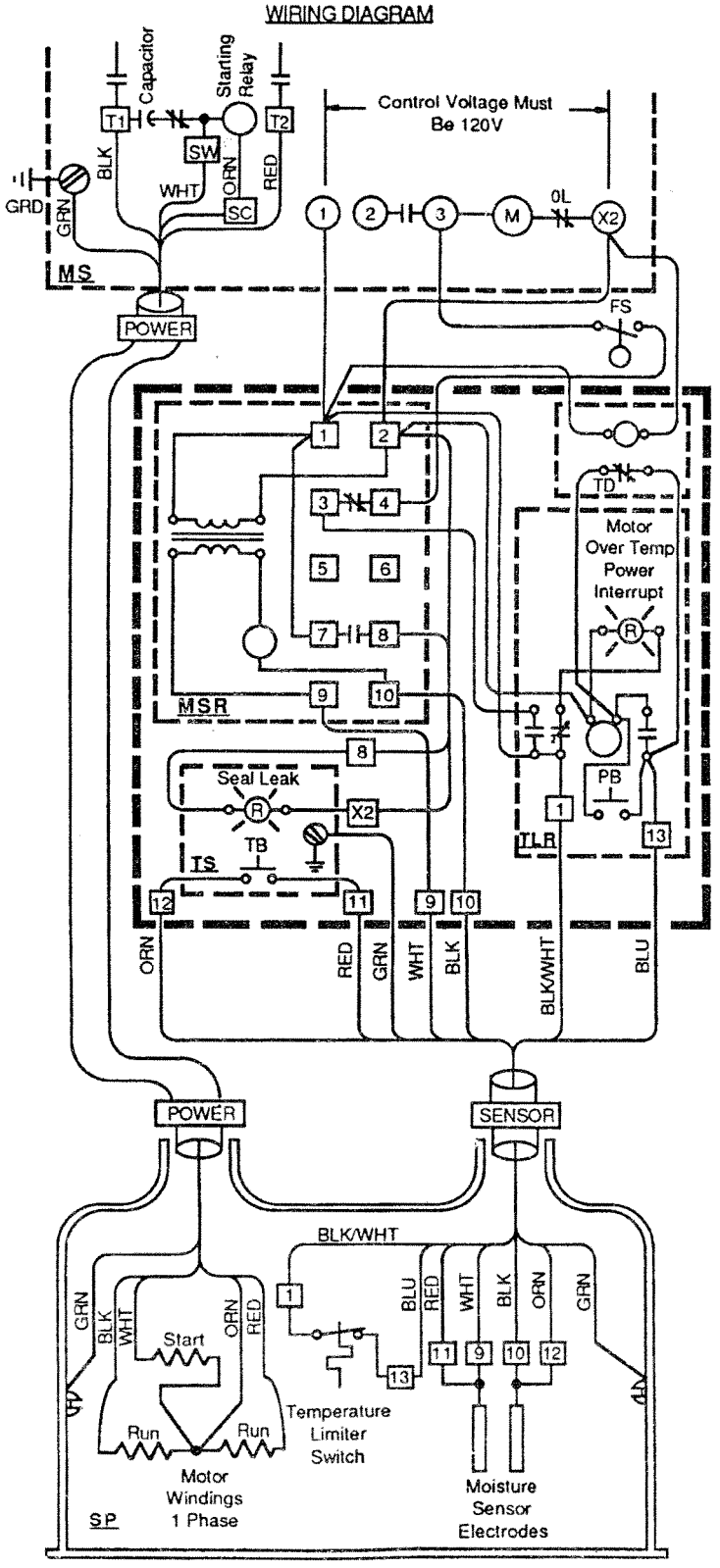
TEMPERATURE LIMITER

If the internal temperature of the motor rises to 155°C (310°F), the motor starter control circuit will open and the "MOTOR OVER TEMP POWER INTERRUPT" indicator will light.

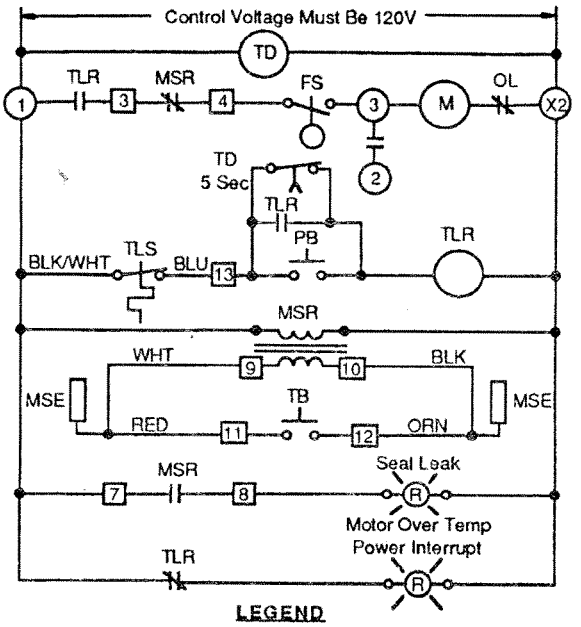
If pump stoppage is due to motor over temp. it can only be restarted after motor temperature has dropped to below 135°C (275°F) by de-pressing PB. When so restarted, "MOTOR OVER TEMP POWER

WIRING OF SIMPLEX EXPLOSION-PROOF CONTROL COMPONENTS (1 PH. 230V)
PUMP MODELS X-171XXX, X-172XXX, X-177XXX, X-271XXX, X-272XXX, & X-277XXX

WIRING DIAGRAM



ELEMENTARY DIAGRAM



LEGEND

FS	Float Switch	PB	"Restart" Pushbutton
LLC	Liquid Level Control	TB	Moisture Test Pushbutton
M	Motor Starter Coil	TLR	Temperature Limiter Relay
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MSR	Moisture Sensor Relay	SP	Submersible Pump
OL	Starter Overload Contacts	TD	"On Time" Delay Relay

ALARM INDICATORS

"SEAL LEAK" - - Moisture in motor shell requiring operator attention.

"MOTOR OVER TEMP POWER INTERRUPT" - - Manual operation of "Restart" required to resume automatic operation.

OPERATION NOTES

MOISTURE SENSOR

If water enters the motor shell, the "Seal Leak" indicator will light and the motor starter control circuit will open. The pump cannot be re-started until the leakage condition is corrected.

To simulate leakage, and therby test the moisture sensor circuit, depress TB. The "Seal Leak" indicator will light, and the motor starter control circuit will open. When TB is released, the "Seal Leak" indicator will extinguish, and the pump will operate as demanded by the liquid level control.

TEMPERATURE LIMITER

If the internal temperature of the motor rises to 155°C (310°F), the motor starter control circuit will open and the "MOTOR OVER TEMP POWER INTERRUPT" indicator will light.

If pump stoppage is due to motor over temp. it can only be restarted after motor temperature has dropped to below 135°C (275°F) by de-pressing PB. When so restarted, "MOTOR OVER TEMP POWER INTERRUPT" indicator will extinguish, and pump will operate auto-matically as demanded by the liquid level control.

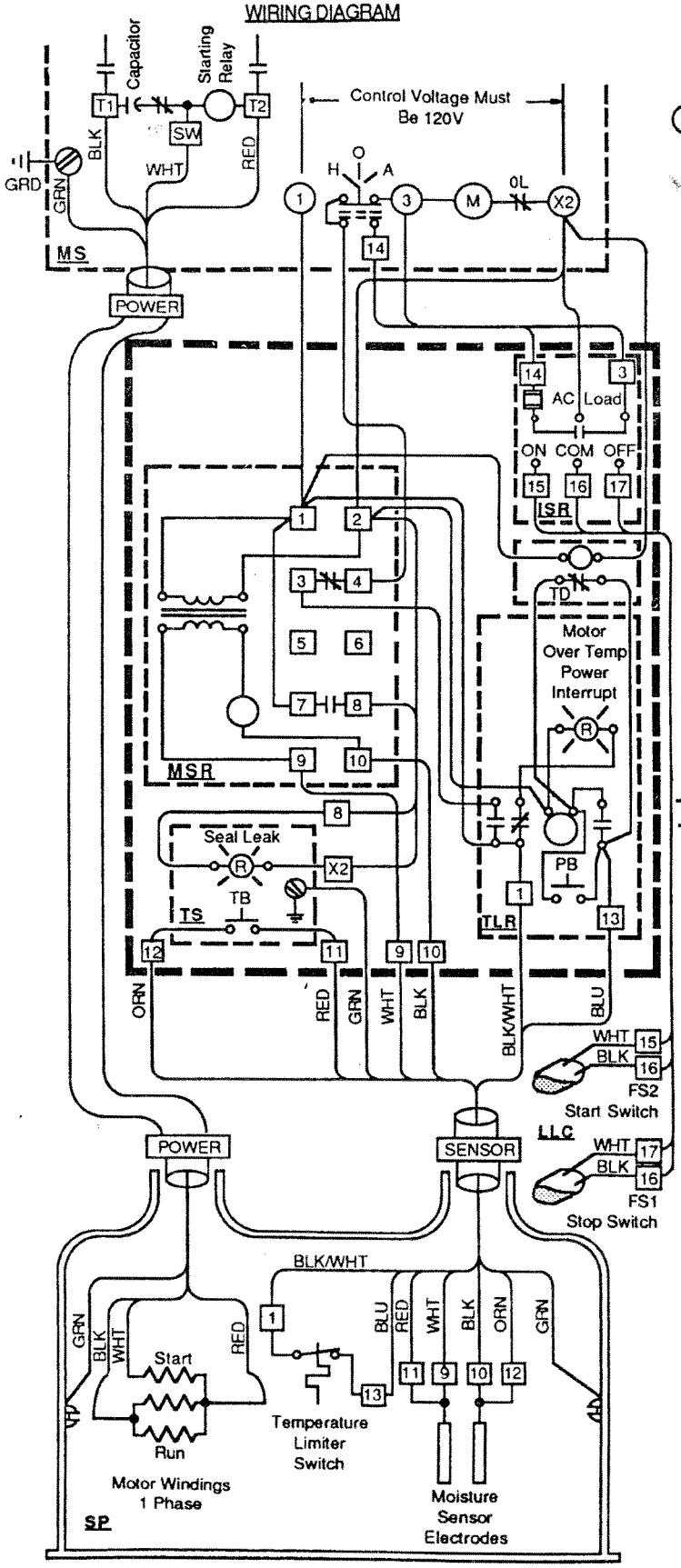
POWER INTERRUPTION

If the power to the pump is interrupted for any reason the control circuit will be automatically reset for normal operation.

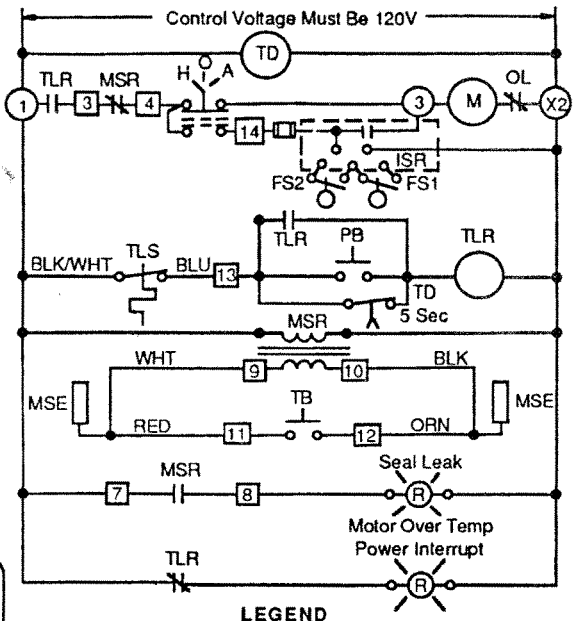
REFERENCE: U.L. File E40352 and E40353

WIRING OF SIMPLEX EXPLOSION-PROOF CONTROL COMPONENTS (1 PH. 115V) (ISR)
PUMP MODELS X-171XXX, X-172XXX, X-177XXX, X-271XXX, X-272XXX, & X-277XXX

WIRING DIAGRAM



ELEMENTARY DIAGRAM



LEGEND

ISR	Intrinsically Safe Relay	PB	"Restart" Pushbutton
LLC	Liquid Level Control	TB	Moisture Test Pushbutton
M	Motor Starter Coil	TLR	Temperature Limiter Relay
MS	Motor Starter	TLS	Temperature Limiter Switch
MSE	Moisture Sensor Electrode	TS	Moisture Test Station
MSR	Moisture Sensor Relay	SP	Submersible Pump
OL	Starter Overload Contacts	TD	"On Time" Delay Relay

ALARM INDICATORS

"SEAL LEAK" - - Moisture in motor shell requiring operator attention.

"MOTOR OVER TEMP POWER INTERRUPT" - - Manual operation of "Restart" required to resume automatic operation.

OPERATION NOTES

MOISTURE SENSOR

If water enters the motor shell, the "Seal Leak" indicator will light and the motor starter control circuit will open. The pump cannot be re-started until the leakage condition is corrected.

To simulate leakage, and therby test the moisture sensor circuit, depress TB. The "Seal Leak" indicator will light, and the motor starter control circuit will open. When TB is released, the "Seal Leak" indicator will extinguish, and the pump will operate as demanded by the liquid level control.

TEMPERATURE LIMITER

If the internal temperature of the motor rises to 155°C (310°F), the motor starter control circuit will open and the "MOTOR OVER TEMP POWER INTERRUPT" indicator will light.

If pump stoppage is due to motor over temp. it can only be restarted after motor temperature has dropped to below 135°C (275°F) by de-pressing PB. When so restarted, "MOTOR OVER TEMP POWER INTERRUPT" indicator will extinguish, and pump will operate auto-matically as demanded by the liquid level control.

POWER INTERRUPTION

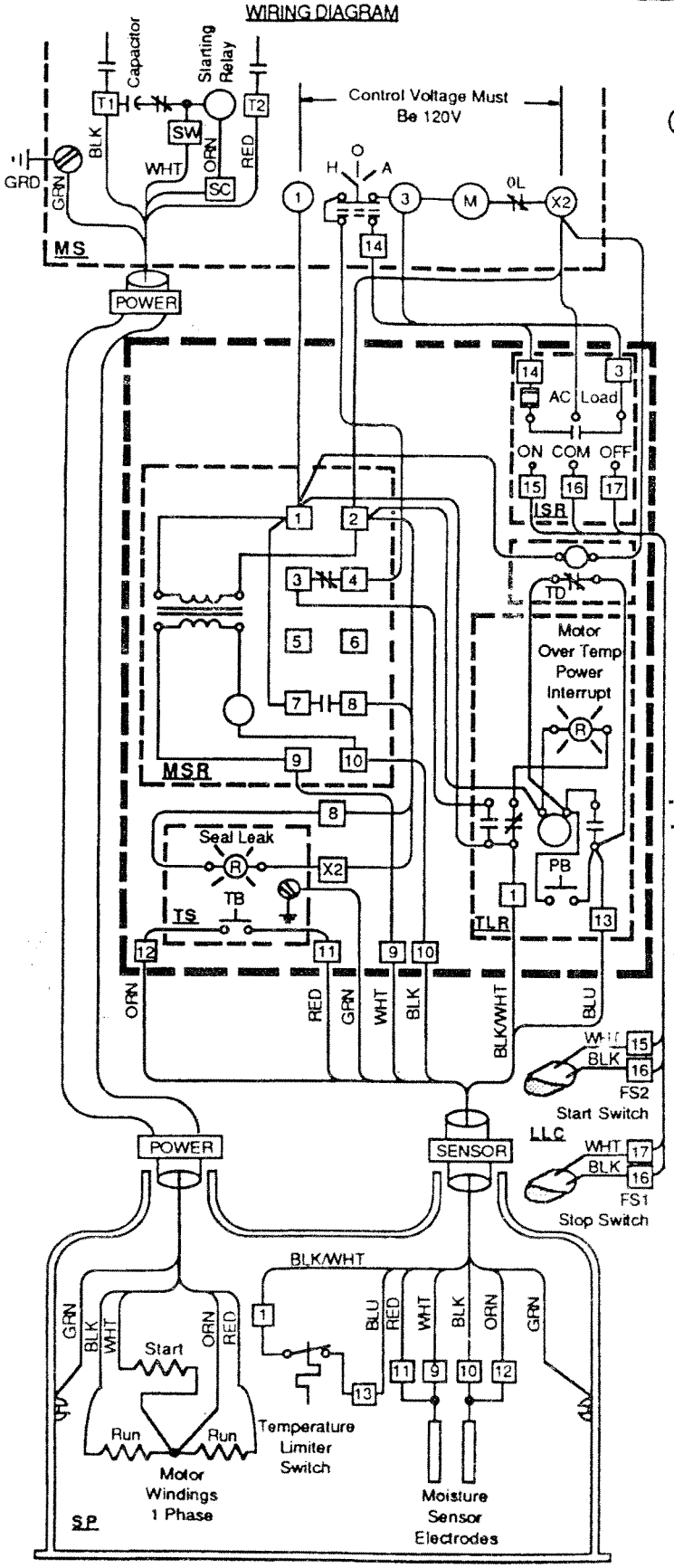
If the power to the pump is interrupted for any reason the control circuit will be automatically reset for normal operation.

REFERENCE: U.L. File E40352 and E40353

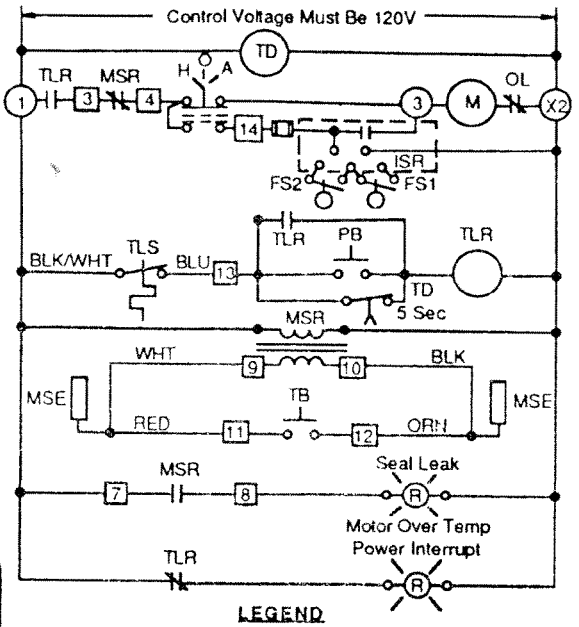
DRAWING 6

WIRING OF SIMPLEX EXPLOSION-PROOF CONTROL COMPONENTS (1 PH. 230V) (ISR) PUMP MODELS X-171XXX, X-172XXX, X-177XXX, X-271XXX, X-272XXX, & X-277XXX

WIRING DIAGRAM



ELEMENTARY DIAGRAM



LEGEND

ISR	Intrinsically Safe Relay	PB	"Restart" Pushbutton
LLC	Liquid Level Control	TB	Moisture Test Pushbutton
M	Motor Starter Coil	TLR	Temperature Limiter Relay
MS	Motor Starter	TLS	Temperature Limiter Switch
MSE	Moisture Sensor Electrode	TS	Moisture Test Station
MSR	Moisture Sensor Relay	SP	Submersible Pump
OL	Starter Overload Contacts	TD	"On Time" Delay Relay

ALARM INDICATORS

"SEAL LEAK" - - Moisture in motor shell requiring operator attention.

"MOTOR OVER TEMP POWER INTERRUPT" - - Manual operation of "Restart" required to resume automatic operation.

OPERATION NOTES

MOISTURE SENSOR

If water enters the motor shell, the "Seal Leak" indicator will light and the motor starter control circuit will open. The pump cannot be re-started until the leakage condition is corrected.

To simulate leakage, and therby test the moisture sensor circuit, depress TB. The "Seal Leak" indicator will light, and the motor starter control circuit will open. When TB is released, the "Seal Leak" indicator will extinguish, and the pump will operate as demanded by the liquid level control.

TEMPERATURE LIMITER

If the internal temperature of the motor rises to 155°C (310°F), the motor starter control circuit will open and the "MOTOR OVER TEMP POWER INTERRUPT" indicator will light.

If pump stoppage is due to motor over temp, it can only be restarted after motor temperature has dropped to below 135°C (275°F) by depressing PB. When so restarted, "MOTOR OVER TEMP POWER INTERRUPT" indicator will extinguish, and pump will operate automatically as demanded by the liquid level control.

POWER INTERRUPTION

If the power to the pump is interrupted for any reason the control circuit will be automatically reset for normal operation.

REFERENCE: U.L. File E40352 and E40353

DRAWING 7

PRE-START-UP CHECK LIST

Before initial start-up check the following:

1. Voltage, number of phases and frequency of power supply must agree with values stamped on nameplate of pump.

2. Check direction of rotation by momentarily energizing motor. The impeller must rotate in direction indicated by arrow on casing. Continued rotation of the impeller in incorrect direction will void warranty.

3. See that fuses or heaters in the electrical circuits are correctly sized according to nameplate ratings and are properly installed.

4. If lights dim excessively on pump start-up, check for overloaded electrical circuits.

5. Weil submersible pumps may be run at no load, unsubmerged, without damage. Under load we recommend that the pump be kept submerged at all times (See Drawing 1).

SAFETY PRECAUTIONS

Before Servicing Pump

1. Disconnect the power supply to the pump and pit before servicing, whether for periodic inspections or emergency repairs.

2. In case of severe vibration or unusual noise, **SHUT OFF** the pump at once, then determine the cause.

3. If frequent tripping of overload protection device occurs a qualified electrician should be called to analyze and correct the problem.

TROUBLESHOOTING

Problem	Probable Cause
Insufficient or No Liquid Flow.	1. Discharge head too high. 2. Clogged or damaged impeller. 3. Incorrect direction of rotation. 4. Check valve closed or improperly installed. Gate valve closed. 5. Liquid level below discharge casing (no liquid supply). 6. Tripping of automatic overload protection device, blown fuses, open circuit breaker.

TROUBLESHOOTING (Continued)

Insufficient Pressure.	1. Low or high (more than ± 10%) of specified voltage or unbalanced phases. 2. Clogged or damaged impeller. 3. Incorrect direction of rotation. 4. Liquid level occasionally below discharge casing.
Noisy or Vibrating Pump.	1. Liquid level below discharge casing. 2. Clogged or damaged impeller. 3. Damaged bearings. 4. Incorrect direction of rotation.
Pump Runs Continuously	1. Faulty pilot device. (i.e. liquid level switch). 2. Improper starter wiring.
Pump Does Not Run.	1. Faulty pilot device. 2. Water level does not reach "ON" level of switch. 3. Blown fuse, open circuit breaker or overload device in starter tripped.

LUBRICATION

The Weil submersible pump is equipped with double sealed pre-lubricated bearings, which require no further lubrication.

PERIODIC INSPECTION (Refer to Drawing 12)

Periodic inspections of the pump and pit should be scheduled at six month intervals. The sump should be cleaned of accumulated abrasive particles. Interior of control cabinet should be cleaned of oil, dirt and moisture. Check condition of contacts of electrical equipment. Pilot device operation (i.e. float switch) should be checked. Seal chamber should be checked for presence of liquid being pumped. Such presence may be determined by placing pump in a horizontal position in a Vee block, with seal chamber plugs (14) and (76) at lowest position. Remove plugs and drain the seal chamber into a transparent container. Allow drained liquid to settle. If no water (pumped liquid) settles to bottom of container, the chamber can be refilled with dielectric oil and plugs (14) and (76) replaced.

If water (pumped liquid) settles in container, the source of the liquid must be determined; and worn or damaged seals, "O"-rings, etc., must be replaced (see "REPLACEMENT OF MECHANICAL SEAL").

SEE PAGE 16 FOR **"PROCEDURE FOR ENDBELL FIELD REPLACEMENT"**

IMPORTANT NOTICE

PUMP UNITS UNDER WARRANTY MUST BE RETURNED TO THE FACTORY OR AUTHORIZED REPAIR STATION FOR REPAIR, OR WARRANTY WILL BE VOIDED. Read the warranty statement on the last page of this manual.

The motor, moisture sensor or temperature limiter can only be repaired at the factory or at an authorized repair station.

If service or repair is required during or after the warranty period, the following instructions are to be carefully read and followed.

SERVICE PROCEDURE
(Refer to Drawing 12)

Before service or repair of the unit:

1. Disconnect all electrical power supplied to the pump and pit.
2. Disconnect discharge piping and move pump so that it will clear piping projecting into the pit.
3. Lift pump from pit by means of a steel cable or chain attached to eyebolt at top of pump. **Do Not** use the electrical cables to lift the pump.
4. Move pump to a clean, dry location for servicing.
5. If the motor housing and/or seal chamber is opened, we recommend new 'O'-rings be used to replace exposed 'O'-rings.
6. If power cable or sensor cable is to be replaced, complete new end bell and cables assembly must be installed.

CLEANING CLOGGED STRAINER
(Refer to Drawings 14 and 15)

Remove screws (86) and remove strainer (84). Remove paper, rags and other debris from passages of strainer and thoroughly flush with water until clean. Reassemble strainer, tightening screws securely.

CLEANING OR REPLACEMENT OF IMPELLER
MODEL 2A-17X01X-X AND ALL SERIES 2700 PUMPS
(Refer to Drawings 12, 14 and 16)

With pump standing vertically on its feet, remove screws (21). Next, carefully lift motor assembly out of the casing. Lay this unit on its side in Vee blocks with impeller overhanging. Rotate impeller by hand, dislodging any solids (wood, rags, paper, etc.) trapped in the impeller channels and scrape off any deposits on impeller.

After impeller is cleaned, inspect for any damage, cracks or breaks. If necessary, replace impeller according to the following procedure.

Remove locknut (33) with socket wrench, taking care not to mar threads on shaft (12). Tap hub of impeller (24) with lead hammer to loosen, and gently attempt to pry impeller off shaft, using opposed pry bars or medium size screwdrivers. If impeller does not move easily, tap with lead hammer again and attempt to pry impeller off a second time. If this does not permit easy removal of impeller. Set aside the square key (34) and any shims (40).

NOTE: If the pump is equipped with tandem mechanical seals (Refer to Drawings 17 and 18). Do not adjust or remove the mechanical seal parts on the shaft above the impeller.

To reassemble the impeller (new or repaired) on the shaft, replace any shims against shaft shoulder and insert key into its seat. Align the impeller keyway with the key and carefully push the impeller onto the shaft, tapping gently with a lead hammer. The key must be retained in its seat.

When the impeller is mounted on the shaft, install and tighten the locknut. Rotate the impeller by hand to insure that it turns freely. Replace gasket (41) if damaged, and position the motor assembly into the casing (35), insert and tighten screws (21).

CLEANING OR REPLACEMENT OF IMPELLER
MODELS 2.5A-17X11X AND 3A-17X21X
(Refer to Drawing 15)

Lay unit on its side in Vee block, or wedge unit on its side so it cannot roll. Remove screws (86) and strainer (84). Remove screws (87) and suction plate (29) from casing (35). Immobilize the impeller (24) by wedging a piece of wood into the casing. Remove the locknut (33) using a socket wrench, taking care not to mar the threads on the shaft (12).

Remove the wooden wedge. Loosen the impeller by tapping the hub with a lead hammer. Grasp impeller vanes with two pair of Vise-Grip pliers. Pull impeller off shaft and set aside square key (34) and any shims (40).

Scrape off any deposits on impeller. After impeller is cleaned, inspect for any damage, cracks or breaks. Replace or repair impeller as required.

NOTE: If the pump is equipped with tandem mechanical seals (Refer to Drawings 17 and 18). Do not adjust or remove the mechanical seal parts on the shaft above the impeller.

To reassemble the impeller (24) (new or repaired) on the shaft (12), insert the square key (34) into its seat and replace any shims (40) against the shoulder of the shaft. Align the impeller keyway with the square key and carefully push the impeller onto the shaft, tapping gently with a lead hammer. The key must be retained in its seat.

When the impeller is mounted on the shaft, install and tighten the locknut. Rotate the impeller by hand to insure it turns freely. Replace suction plate (29) and insert and tighten screws. Install strainer (84) tightening screws securely.

OPTIONAL WEARING RINGS REMOVAL AND REPLACEMENT MODELS 4A-27X23X-X AND 4A-27X41X-X (Refer to Drawing 19)

The wearing rings are cemented into specially machined seats on the impeller and in the casing. Removal of the wearing rings can only be achieved after disassembling both the impeller and the casing as described in CLEANING OR REPLACEMENT OF IMPELLER. The wearing rings may then be machined out from the impeller and casing. Take care during machining not to enlarge the seat in the casing.

Replacement wearing rings are available from the Weil Pump Company Service Department. The wearing ring seat of both impeller and casing should be cleaned of deposits, particles, oil or grease. Use any volatile solvent to degrease the surfaces. Apply Loctite RC680 adhesive or other anaerobic adhesive of equivalent strength on the mating surfaces of the wearing ring and impeller, also on the mating surfaces of the wearing ring and casing. Place the wearing rings on their respective mating surfaces, making certain they abut properly. Allow four to six hours for the adhesive to cure. Assemble the unit as described in CLEANING OR REPLACEMENT OF IMPELLER.

REPLACEMENT OF MECHANICAL SEALS (Refer to Drawing 12)

Failure of the lower seal of the standard double seal or optional tandem seals is indicated by the presence of the liquid being pumped (other than oil) in the seal chamber. Failure of the upper seal of the standard double seal or optional tandem seals is indicated by the presence of oil or a mixture of oil and water in the motor shell. Water alone in the motor shell usually indicates electric cable seal, or 'O'-ring failure. Such failures will normally be noticed during the periodic inspection, or by the moisture sensor activating an alarm signal (if so equipped).

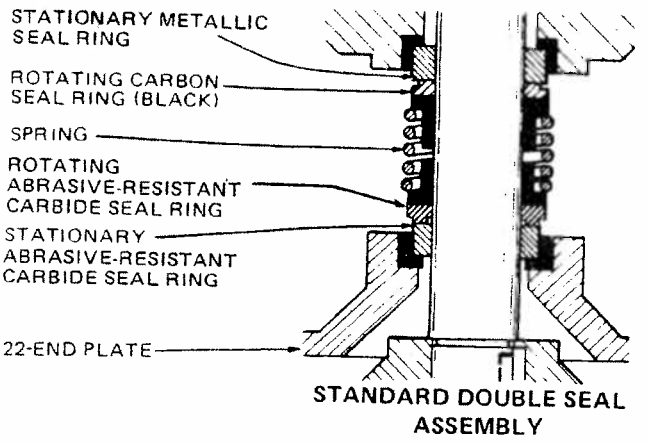
When it is determined that the mechanical seal has to be replaced, check that the replacement is identical in type, shaft size and material.

Disassemble casing (35) from unit and remove impeller (24) as described in CLEANING OR REPLACEMENT OF IMPELLER. Drain oil from seal chamber (19) by removing two pipe plugs (76 and 14) and placing unit on its side with drain holes down.

STANDARD DOUBLE SEAL DISASSEMBLY (Refer to Drawings 8 and 12)

Remove round head machine screws (23) and end plate (22). Press lower stationary seal ring out of end plate. Remove lower shaft mounted seal bellows taking care not to score shaft. Two medium size screwdrivers may assist in this removal. Next remove the spring and upper (rotating) seal bellows (again two screwdrivers may be needed) carefully so as not to damage shaft. Finally the upper stationary seal ring is to be removed. Attempt this first by pulling with a hooked pick either behind the seal ring or between the shaft and the seal ring (be careful not to scratch the shaft). If this method fails, break the seal ring by means of a small chisel and remove pieces.

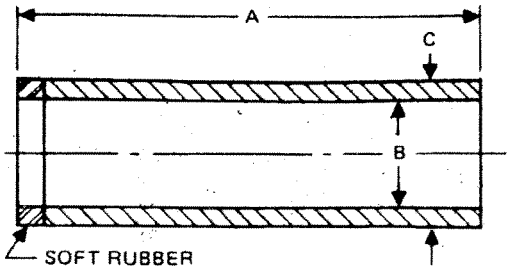
The mounting seat of both stationary seal rings must be cleaned of any adhering particles or deposits before a replacement seal can be properly installed. Steel wool may be used for this purpose, finally wiping with a clean rag or soft paper. The shaft must also be cleaned carefully.



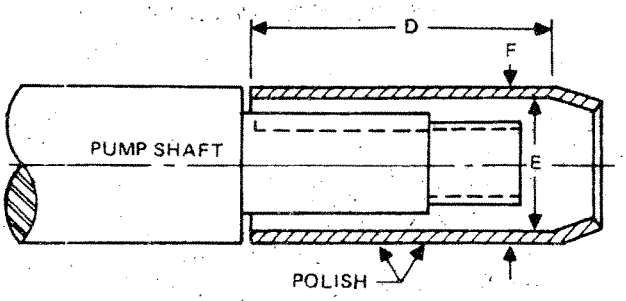
DRAWING 8

STANDARD DOUBLE SEAL ASSEMBLY (Refer to Drawings 8, 9 and 12)

First check replacement seal to insure that it is the same type, shaft size and material as the original seal. Next, check the shaft (12), end plate (22) and seal chamber (19) to insure no particles or deposits are present. These parts must be clean. Apply a thin coating of lubricating oil or jelly to outside surfaces of rubber cup of stationary seal ring with metallic face. TAKE CARE NOT TO MAR OR DAMAGE SEAL FACE. Position seal ring on shaft with polished white face toward threaded end of shaft. Gently press seal into its seat in seal chamber using rubber faced special tool 1 shown in Drawing 9. APPLY EVEN PRESSURE TO SEAL FACE. Cleanliness of the rubber faced special tool is important to the expected life of the seal. The sealing surfaces must be kept clean. The metallic seal may be assumed seated to its full depth, when the rubber seating cup is flush with the surface of the seal chamber (19). The rotating seals must not be interchanged. . **Metallic mates with Carbon (Black) in seal chamber. Abrasive-Resistant Carbide mates with Abrasive-Resistant Carbide in end plate.** Install rotating black carbon seal ring onto shaft using special tool 2 in Drawing 9. Apply lubricating oil or jelly to inside surface of bellows and install on shaft so that mating faces touch. Special tool 2 should allow assembly without rubber bellows of rotating seal ring touching threads on shaft. With special tool 2 still in place install spring. Lightly lubricate inside of bellows of remaining rotating seal ring and slide onto shaft so that seal face is toward threaded end of shaft, and spring loads both rotating seals.



SPECIAL TOOL 1



SPECIAL TOOL 2

		TOOL 1			TOOL 2		
		A	B	C	D	E	F
NOMINAL SEAL SIZE EQUALS SHAFT O.D.	1-1/8	6	1-5/32	1-3/4	1-5/8	7/8	1-1/8
	1-1/2	6	1-9/16	2	3	1-5/16	1-1/2

DRAWING 9

Lubricate lower stationary seal ring and using rubber faced special tool 1, press seal ring into mounting seat in end plate with polished surface away from end plate. Again, cleanliness of the seal ring is important to the seal life. Place end plate carefully on shaft. Gently slide end plate into contact with seal chamber, and install and tighten round head machine screws (23). Remove special tool 2. Assemble impeller and casing as described under CLEANING OR REPLACEMENT OF IMPELLER.

Move pump unit to vertical position. Fill seal chamber with dialectric oil (Shell Diala AX or equivalent) by placing funnel in elbow (47). With pipe plugs removed, fill chamber until oil flows outside. Install and tighten plugs.

OPTIONAL TANDEM SEAL DISASSEMBLY (Refer to Drawing 10)

To remove lower seal, first remove the retaining ring (66) from the shaft using external retaining ring pliers. Then remove the spring holder (65) and straight spring (67). Again using pry bars or screwdrivers, slide rotating seal ring carefully off the shaft, taking care not to scratch the shaft.

Next, remove the round head machine screw (23), end plate (63), and press out stationary seal ring from the end plate, using a hand press if necessary. Clean the seal seat with steel wool and wipe with a clean rag.

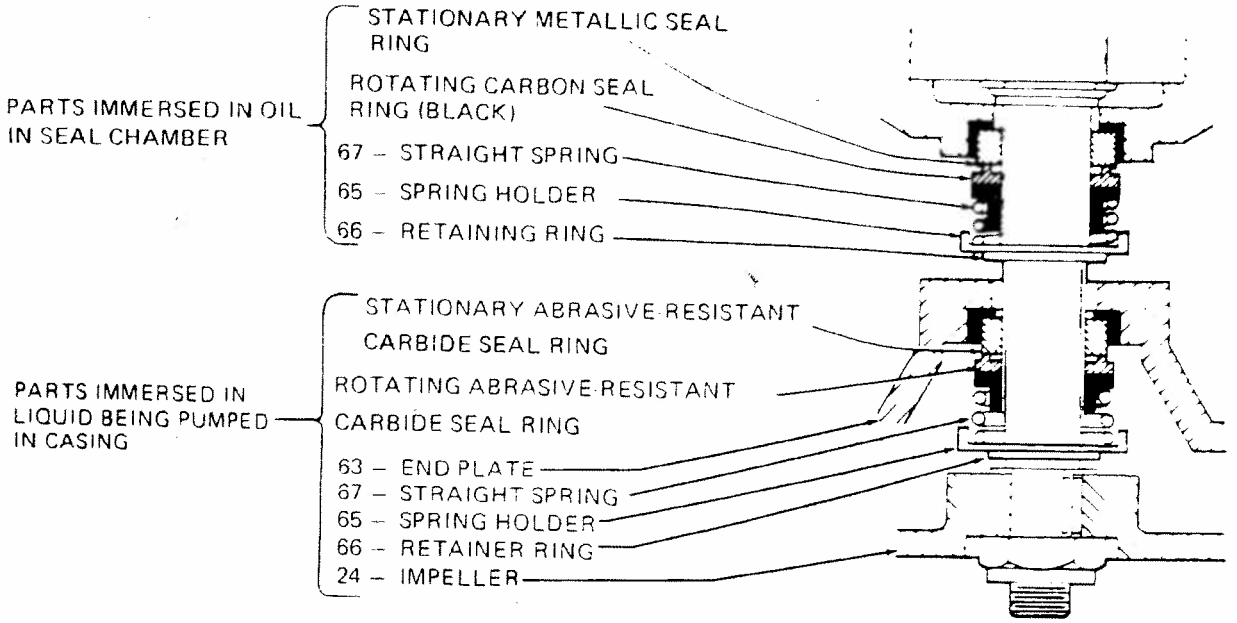
Finally, remove upper seal inside seal chamber in the same manner. It may be necessary to use a hooked pick to remove the upper stationary seal ring. The upper seat must also be cleaned with steel wool then wiped with a soft cloth.

OPTIONAL TANDEM SEAL ASSEMBLY (Refer to Drawings 9, 10 and 12)

Check replacement seal to insure that it is the same type, shaft size and length as the original seal. Check the shaft (12), end plate (63) and seal chamber (19) to insure that no deposits or particles are present. These parts must be clean. Apply a thin coating of lubricating oil or jelly to outside surface of rubber cup of stationary metallic seal ring. TAKE CARE NOT TO MAR OR DAMAGE SEAL FACE. Install seal ring on shaft with polished face toward threaded end of shaft. Gently press seal ring into its seat in seal chamber using rubber faced special tool 1 shown in Drawing 9. APPLY EVEN PRESSURE TO SEAL FACE. Cleanliness of the rubber faced special tool is important to the expected life of the seal. The sealing surfaces must be kept clean. The metallic seal may be assumed seated to its full depth, when the rubber seating cup is flush with surface of the seal chamber (19). The rotating seals must not be interchanged. **Metallic mates with Carbon (Black) in seal chamber. Abrasive-Resistant Carbide mates with Abrasive-Resistant Carbide in end plate.**

Apply lubricating oil or jelly to inside diameter of bellows and slide rotating black carbon seal ring onto shaft, using special tool 2 shown in Drawing 9, until the seal face contacts the metallic ring. Special tool 2 should allow assembly without rubber bore of rotating seal ring touching threads on shaft. Remove special tool 2 from shaft, and install straight spring, spring holder, and retaining ring using retaining ring pliers.

Position end plate on shaft and install and tighten the round head machine screws. Check seal seat in end plate and shaft to insure no particles or deposits are present. Apply a thin coat of lubricating oil or jelly to outside surfaces of rubber cup of stationary seal ring with polished face toward threaded end of shaft. Gently press seal ring into its seat in end plate using rubber faced special tool 1 shown in Drawing 9. APPLY EVEN PRESSURE TO SEAL FACE. Rubber faced tool must be clean. The stationary (Abrasive-Resistant Carbide) seal may be assumed seated to its full depth when the rubber seating cup is flush with the surface of the end plate. Place special tool 2 on end of shaft, and apply a thin coat of lubricating oil or jelly to inside diameter of rubber bellows. Install rotating carbide seal ring on shaft and slide into position so that seal faces touch. Install straight spring, spring holder and retaining ring on shaft. Install key (34) , any shims (40), impeller (24) and locknut (33) on the shaft. Move pump unit to vertical position. Fill seal chamber with dielectric oil (Shell Diala AX or equivalent) by placing funnel in elbow (47) with opposing pipe plug removed. Fill through funnel until oil flows out opposite side. Install and tighten plugs (14) and (76).



OPTIONAL TANDEM SEAL ASSEMBLY

DRAWING 10

OPTIONAL TANDEM SEAL DISASSEMBLY WITH CRANE TYPE 9 LOWER SEAL (Refer to Drawings 11 and 12)

Remove lower seal (Type 9) from shaft by loosening the retainer set screws with an Allen wrench. Slide the retainer off the shaft and repair indentations in the shaft with emery cloth. Remove round head machine screws (23) and slide end plate (63) off the shaft. Press stationary seal ring out of end plate and clean seat with steel wool.

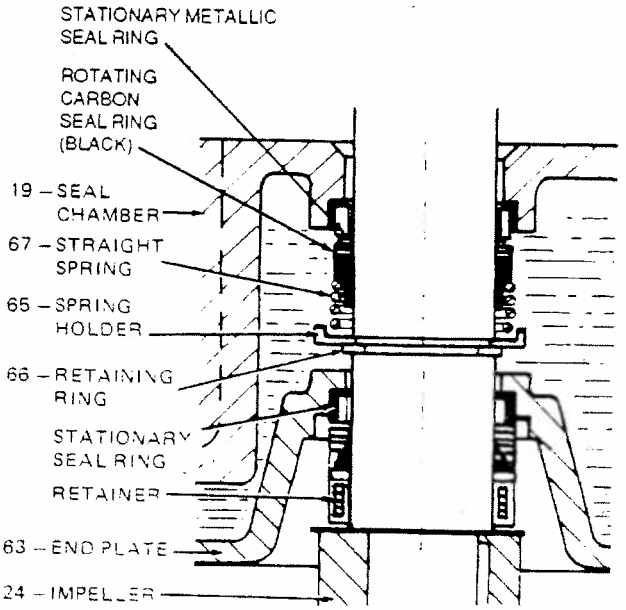
Remove upper seal as described previously. All parts must be kept clean.

OPTIONAL TANDEM SEAL ASSEMBLY WITH CRANE TYPE 9 LOWER SEAL (Refer to Drawings 9 and 11)

Check replacement seal to insure that it is the same type, shaft size and material as the original seal. Install upper seal as previously described. Install the end plate, inserting round head machine screws.

With end plate installed, apply a thin coat of lubricating oil or jelly to outside surfaces of rubber cup of stationary seal ring. Using special tool 1 with rubber face, gently press stationary seal ring into its seat. Apply even pressure to seal face.

Apply a thin coat of oil or lubricating jelly to inside diameter of rotating assembly. With clips in place, slide rotating assembly onto shaft over special tool 2, with set screws toward the shaft end. Tighten set screws so that they are not at their previous position on the shaft. Remove clips. Reassemble impeller and fill seal chamber as described at the end of "Optional Tandem Seal Assembly".



OPTIONAL TANDEM SEAL ASSEMBLY WITH CRANE TYPE 9 LOWER SEAL

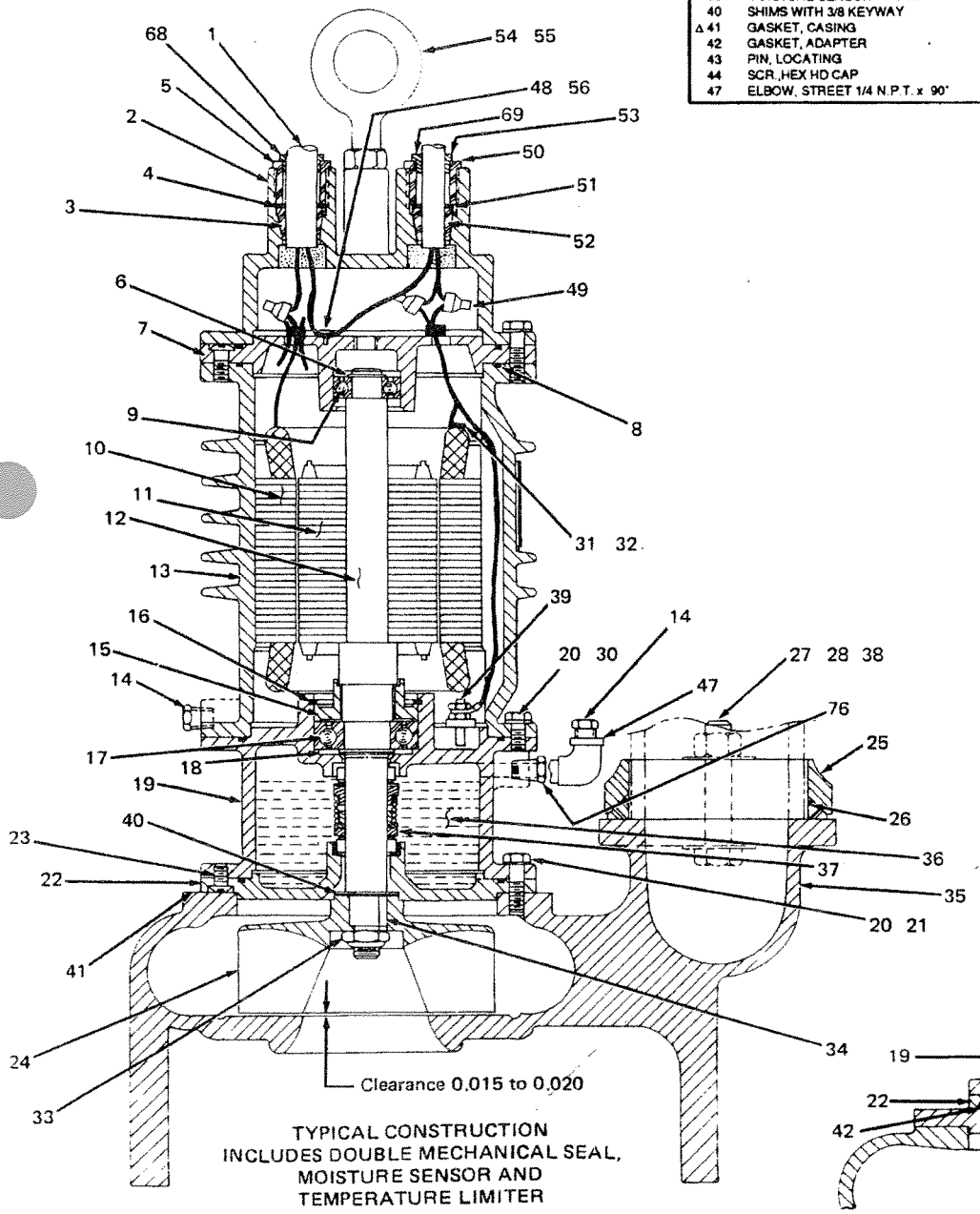
DRAWING 11

IMPORTANT NOTICE

REPAIR OR REPLACEMENT OF ELECTRICAL CABLES, STATOR, ROTOR, MOISTURE SENSOR, TEMPERATURE LIMITER, BEARINGS OR INTERNAL WIRING BY OTHER THAN UNDERWRITERS LABORATORIES APPROVED ELECTRIC MOTOR REPAIR FACILITY WILL VOID UL LISTING AND LIMITED WEIL WARRANTY.

STANDARD CONSTRUCT. (DWG.12 thru 16)		
ITEM	PART DESCRIPTION	QTY
1	CABLE, POWER	1
2	BELL, END	
	POWER CABLE SEAL ASSEMBLY	1
3	BUSHING, CORD GRIP	1
4	WASHER, FLAT	1
5	NUT, COMPRESSION	1
6	RING RETAINING	1
7	SUPPORT, UPPER BRG.	1
▲8	"O" RING	1
9	BEARING, BALL	1
	MOTOR ASSEMBLY	
10	STATOR	1
11	ROTOR	1
12	SHAFT	
13	SHELL, MOTOR	1
14	PLUG, 14 N.P.T. PIPE	2
15	FLAME ARRESTER	1
16	RING, RETAINING	1
17	BEARING, BALL	1
18	RING, RETAINING	1
19	CHAMBER, SEAL	1
20	LOCKWASHER	36
21	SCR., HEX HD CAP	8
22	END PLATE, DOUBLE SEAL	1
23	SCR., RD HD MACH	6
24	IMPELLER	1
25	FLANGE, DISCHARGE	1
26	GASKET, DISCHARGE	1
27	WASHER, FLAT	4
28	SCR., HEX HD CAP	2
29	PLT. SUCTION	1
30	SCR.,HEX HD CAP	16
31	WIRE, 18G	AR
32	LIMITER TEMPERATURE	3
▲33	LOCKNUT	1
▲34	KEY	1
35	CASING, VOLUTE	1
36	OIL, DIELECTRIC	AR
▲37	SEAL, MECH DOUBLE ASS'Y	1
38	NIPPLE, PIPE 1/4 N.P.T.	1
39	MOISTURE SENSOR PROBE ASS'Y	2
40	SHIMS WITH 3/8 KEYWAY	AR
▲41	GASKET, CASING	1
42	GASKET, ADAPTER	1
43	PIN, LOCATING	1
44	SCR.,HEX HD CAP	6
47	ELBOW, STREET 1/4 N.P.T. x 90°	1
48	SCR., SELF TAPPING	1
49	CONNECTOR, WIRE (PIGTAIL TYPE)	AR
	SENSOR CABLE SEAL ASS'Y	1
50	NUT, COMPRESSION	1
51	WASHER, FLAT	
52	BUSHING, CABLE GRIP	
53	CABLE, SENSOR	1
54	NUT, HEX	1
55	BOLT, EYE	1
56	TERMINAL, WIRE (RING TYPE)	AR
68	BUSHING, INSUL POWER	1
69	BUSHING, INSUL SENSOR	1
74	SCR.,HEX HD CAP	AR
75	ADAPTER	1
76	PLUG, HEX RECESSED MAGN 1/4	1
▲77	GASKET, SUCTION PLATE	1
78	LOCKWASHER	6
84	STRAINER	1
85	WASHER, FLAT	3
86	SCR.,HEX HD CAP	3

OPTIONAL CONSTRUCTION		
OPTION B TANDEM SEALS		(DWG. 17)
63	END PLATE (TANDEM SEAL)	1
	TANDEM SEAL ASS'Y	
▲64	SEAL, MECH	2
65	HOLDER, SPRING	2
66	RING, RET. EXT.	2
67	SPRING, STRAIGHT	2
OPTION E WEARING RINGS		(DWG. 19)
80	IMPELLER MACH'D FOR W.R.	1
81	SUCT. PLT. MACH'D FOR W.R.	1
▲82	WEARING RING FOR IMPELLER	1
▲83	WEARING RING FOR CASING	1
OPTION G TANDEM SEALS		(DWG. 18)
▲62	SEAL, MECH TYPE 9	1
63	END PLATE (TANDEM SEAL)	1
	TANDEM SEAL ASS'Y	
▲64	SEAL, MECH	1
65	HOLDER, SPRING	1
66	RING, RET. EXT.	1
67	SPRING, STRAIGHT	1



TYPICAL CONSTRUCTION
INCLUDES DOUBLE MECHANICAL SEAL,
MOISTURE SENSOR AND
TEMPERATURE LIMITER

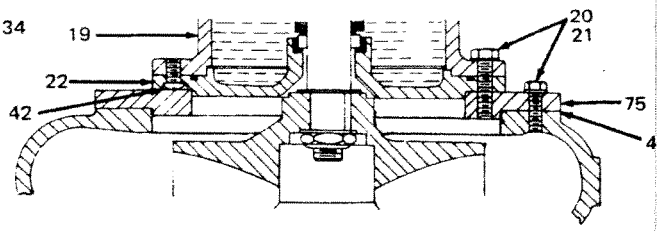
MODEL:3A-27X21X-X
4A-27X22X-X
4A-27X31X-X
TYPICAL IMPELLER & CASING

DRAWING 12

▲ RECOMMENDED SPARE PARTS

• **ITEM NOT ILLUSTRATED**

WHEN ORDERING REPLACEMENT PARTS, GIVE THE SALES REPRESENTATIVE IN YOUR TERRITORY THE PUMP SERIAL AND MODEL NUMBERS FROM THE NAMEPLATE AND THE ITEM NUMBERS FROM THIS PAGE.

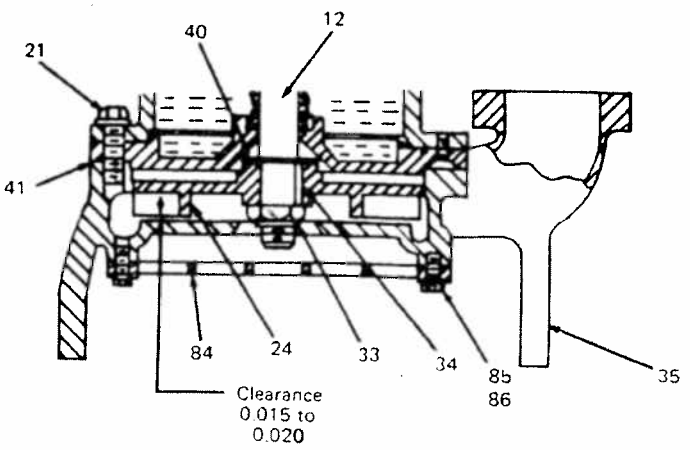


SHOWN WITH ADAPTER
AND ALTERNATE MOTOR FRAME

DRAWING 13

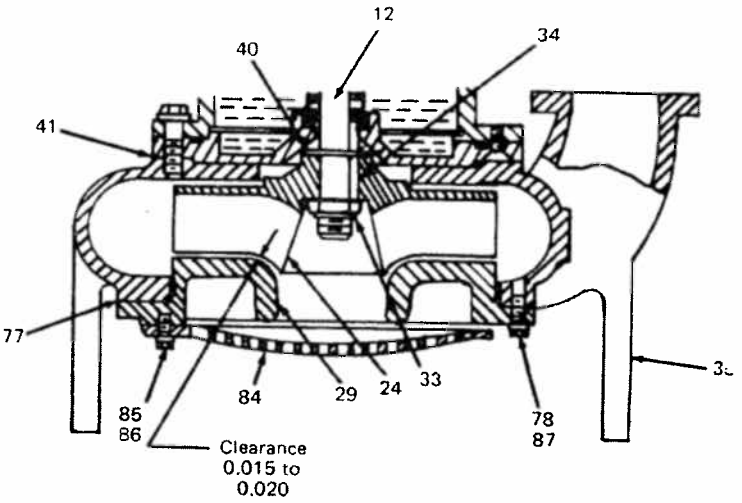
MODEL 2A-17X01X-X
IMPELLER & CASING

DRAWING 14



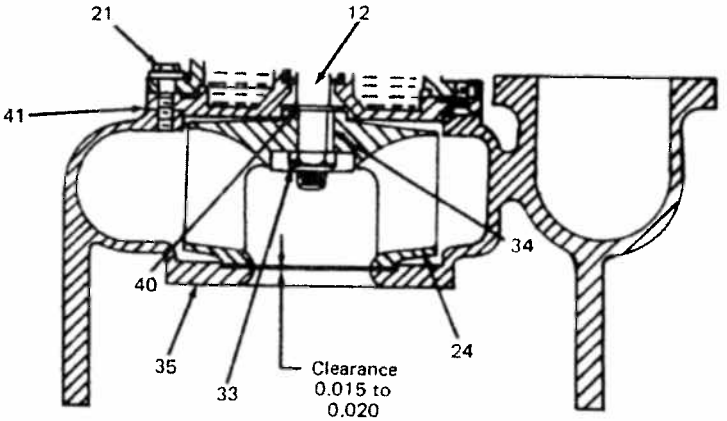
MODEL: 2.5A-17X11X-X
3A-17X21X-X
TYPICAL IMPELLER & CASING

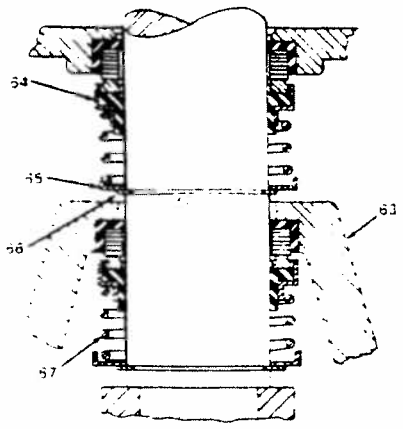
DRAWING 15



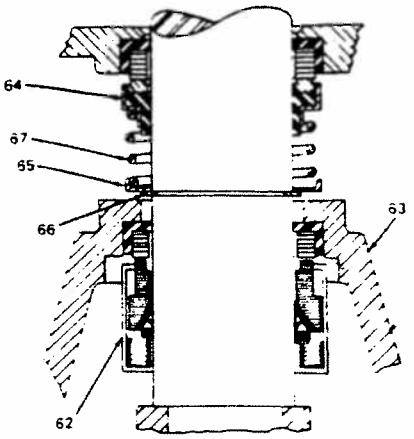
MODEL:4A-27X23X-X
4A-27X41X-X
TYPICAL IMPELLER & CASING

DRAWING 16

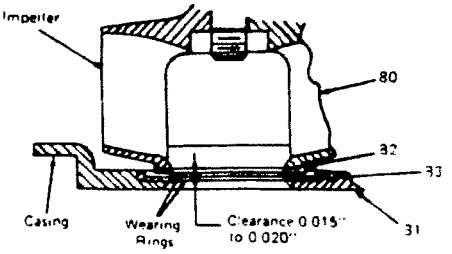




DRAWING 17
OPTION 'B'
TANDEM SEAL ARRANGEMENT



DRAWING 18
OPTION 'G'
TANDEM SEAL ARRANGEMENT
WITH CRANE TYPE 9 LOWER SEAL



DRAWING 19
OPTION 'E'
WEARING RINGS
(AVAILABLE ONLY WITH
MODELS 4A-27X23X-X
AND 4A-27X41X-X

PROCEDURE FOR ENDBELL FIELD REPLACEMENT

STEP BY STEP INSTRUCTIONS FOR REPLACEMENT:

1. Turn off power to pump.
2. Remove bolts that secure endbell to motor shell.
3. With a slight turn action, lift endbell off motor shell. (Note orientation of lift bolt)
4. Turn endbell out to expose wiring and secure endbell to shell with (1) of the removed bolts.
5. Remove electrical tape from wire nuts.
6. Remove wire nuts, noting wire connections.
7. Remove old endbell.
8. Attach new endbell to motor shell in same position as old endbell. (See step 3)
9. Reconnect wires with wire nuts, then seal with electrical tape.
10. Examine rubber seal ring. Make sure it is in groove.
11. Apply small amount of grease to seal ring.
12. Remove (1) bolt and replace endbell with slight turn action, align to same position as original endbell.
13. Replace endbell bolts.

Submersible Wastewater Pump

S.O. Number 506-307 G11

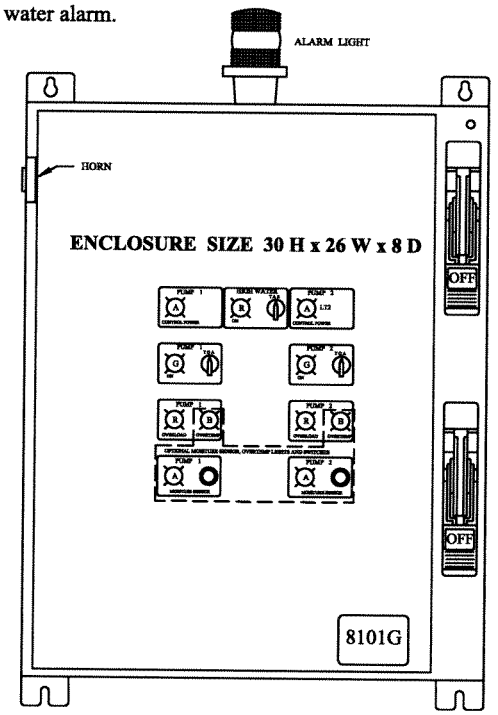
Model W-2519-11
Discharge Size 4 Type ANSI
Impeller 638 IRON
Motor W-9701-4T50G101 HP 5
Mounting Style REMOVAL

WEIL Cedarburg, WI 53012

WEIL Duplex Alternating Pump Control Panel 8101G

Flanged Disconnect - Independent Control Circuits - Type 4 Enclosure Duplex

- The 8101G is a full featured duplex panel that controls two pumps. It is a specification grade panel that utilizes two flanged fusible disconnects with mechanical door interlocks.
- Each pump has an independent control circuit power supply. Each pump control circuit also serves as backup for the other pump control circuit.
- Panel can be operated on 50 or 60 Hertz power.
- Type 4 enclosure for indoor or outdoor use. Provides protection against falling rain, splashing water or hose-directed water; undamaged by the formation of ice on the enclosure.
- Exceeds Type 1, 3R and 12 requirements.
- Select level controls
  - 8213 Lever
  - 8220 Pressure Diaphragm
  - 8230 Tethered Float
- Requires one 8213 lever or four 8220 or 8230 level switches- three switches for level control and one switch for the high water alarm.



Panel Includes

- U/L Listed Label
- Lights, switches, and test buttons are mounted on outer door.
- Two flanged fusible disconnects with mechanical door interlock. Mechanical interlock prevents the door from being opened when the disconnect is in the on position. Fuses not supplied.
  - 115, 208 and 230 volts, single or three phase require LP-J fuses.
  - 460-volt requires LP-J fuses.
  - Fuses should be sized at 1 1/2 times the full load amps of the pump motor.
- Padlocking hasp - on outer door, padlock not included.
- Two lockable pump disconnects, one for each pump motor. Lock is not provided.
- Electric Alternator. Two Contactors-Industrial Duty.
- Two Overloads - one per pump. Ambient compensated bi metallic (Class 10) motor overload circuit protector. Instantaneous magnetic trip for short circuit protection. Single-phase protection for three-phase motors. Field adjustable within the amp range.
- Two Control Transformers with fused primary and fused secondary on all three-phase and single-phase 208-230-volt. Single phase 115-volt has two fused control circuits.
- Pump run switches - one per pump. Three position TOA (test-off-automatic) with spring return to off from test.
- Green light indicates power to pump motor. One light per pump.
- Amber light indicates control power on. One light per control circuit. Light is rated for 100,000 hours.
- Red overload light indicates motor overload condition and pump is off. Light remains on and pump remains off until reset. One light per pump.
- High Water Alarm System.
  - HWA red light and Test-Auto-Silence switch mounted on door.
  - HWA horn, 95 dB, mounted on side of enclosure.
  - Two isolated contacts for remote monitoring and/or telephone connection.
  - Alarm circuit may be field modified to use 115-volt AC external power source.
- Alarm Dome Light - Lexan, red flashing on top of enclosure. Light indicates a motor overload or high water alarm condition. Would also indicate moisture in motor or motor over temperature if moisture sensor/temperature limiter option is ordered. Light remains on until condition is corrected.
- Control Terminal board, numbered and wired.
- Layout and schematic CAD diagrams are provided. Installer connections at terminal board are clearly marked.

Motor Protrector Amp Range	Order Number			Approx. Weight Lbs.
	Single-Phase 115 Volts	Single-phase 208 or 230 Volts	Three-Phase 208, 230,460 Volts	
1.0 - 1.6	8101G-L-016	8101G-D-016	8101G-T-016	120
1.6 - 2.5	8101G-L-025	8101G-D-025	8101G-T-025	120
2.5 - 4.0	8101G-L-040	8101G-D-040	8101G-T-040	120
4.0 - 6.3	8101G-L-063	8101G-D-063	8101G-T-063	120
6.3 - 10.0	8101G-L-100	8101G-D-100	8101G-T-100	120
10.0 - 16.0	8101G-L-160	8101G-D-160	8101G-T-160	121
16.0 - 20.0	8101G-L-200	8101G-D-200	8101G-T-200	121
20.0 - 25.0	8101G-L-250	8101G-D-250	8101G-T-250	121

Control Panel Selection Guide
- Determine Phase and Voltage
- Determine maximum run current in amps required by the pump motor.

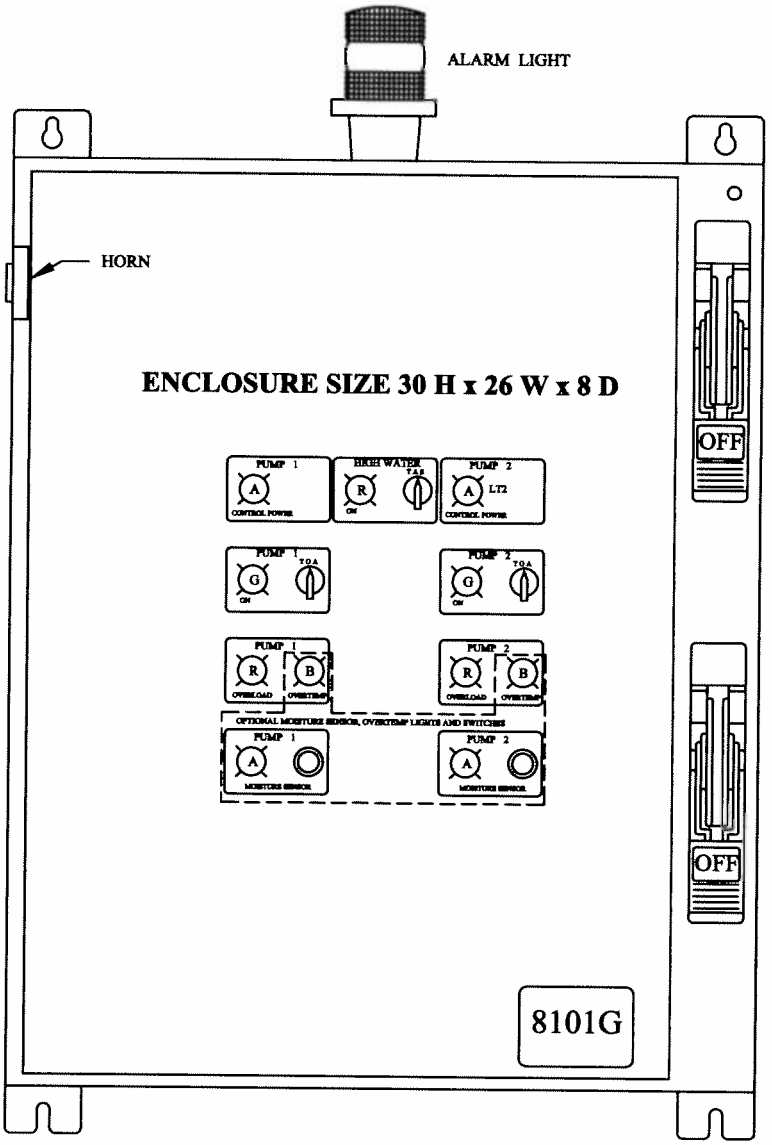
Options

8100K7224D Option is for a duplex set of pumps with standard Non-Explosion-Proof Motor.
- Moisture sensor relay and test button. Two Amber lights indicate moisture in the pump motor.
- Temperature limiter circuit shuts down pump motor when motor over temperature is sensed. The temperature limiter circuit automatically resets when the motor temperature falls to a normal temperature operating range. Two Blue lights indicates motor over temperature.

How to Order: Specify the Order Number, System Phase and Voltage, Pump Motor HP and any options.
F.O.B. Cedar burg (Milwaukee), Wisconsin

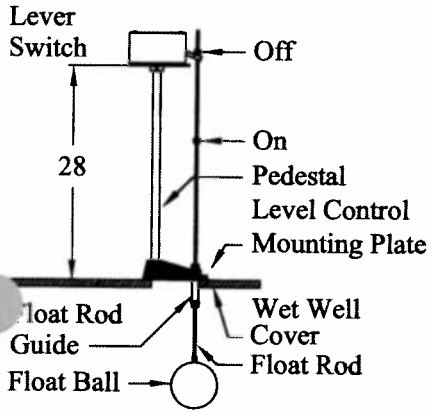
WEIL Duplex Alternating Pump Control Panel 8101G

Flanged Disconnect - Independent Control Circuits - Type 4 Enclosure Duplex

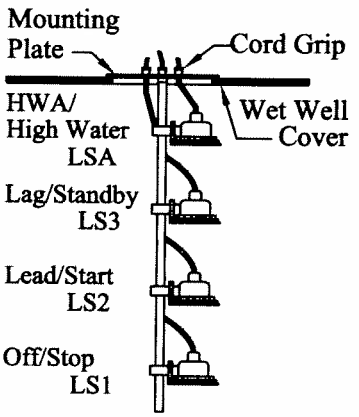


Use any of the three level controls with duplex control panel.

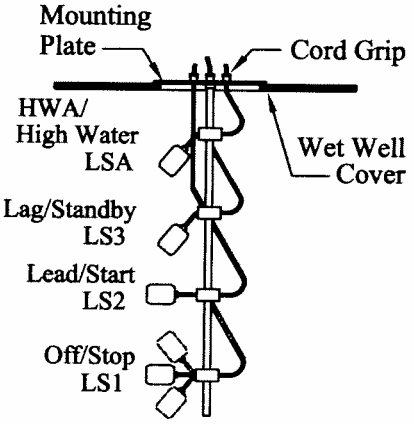
8213 Lever



8220 Pressure Diaphragm



8230 Tethered



WEIL 2-Inch Submersible Grinder Pump 2516

Heavy duty pump for commercial and industrial applications.
Solids are reduced to 3/8 diameter or less.

Pump Type	Grinder
Disch. Size	2 Inch
Disch. Type	ANSI
Mounting Style	2613 Removal

Pump

Case - Cast Iron
Impeller - Cast Iron
Rotating Cutter - 440C Stainless Steel Rockwell 58C
Shredder Ring - 440C Stainless Steel Rockwell 58C
Stainless Steel Hardware
Stainless Steel Lifting Cable - 20 Feet

Motor

Double Seal - Tandem
- Upper - Carbon against Ceramic
- Lower - Silicon Carbide against Silicon Carbide

Air-Filled Hermetically Sealed
Shaft - Stainless Steel Series 300
Motor Shell - Cast Iron
Insulation - Class F
Ball Bearings - 2 - Double Sealed
Power Cable Length - 25 ft
Three-phase motor
- 1750 RPM and 3450 RPM
- 60 Hz, 208-230 or 460 volts

Single-phase capacitor start motor
- 1750 RPM
- 60 Hz, 115 or 208-230 volts
- Automatic reset thermal and overload protection

Options

Bronze Impeller
UL Explosion Proof Motor
Moisture Sensor and Temperature Limiter
Additional Power Cable Lengths

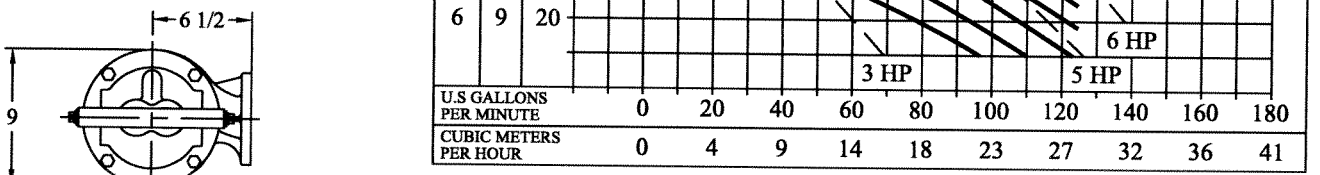
Capacities - Wet Wells

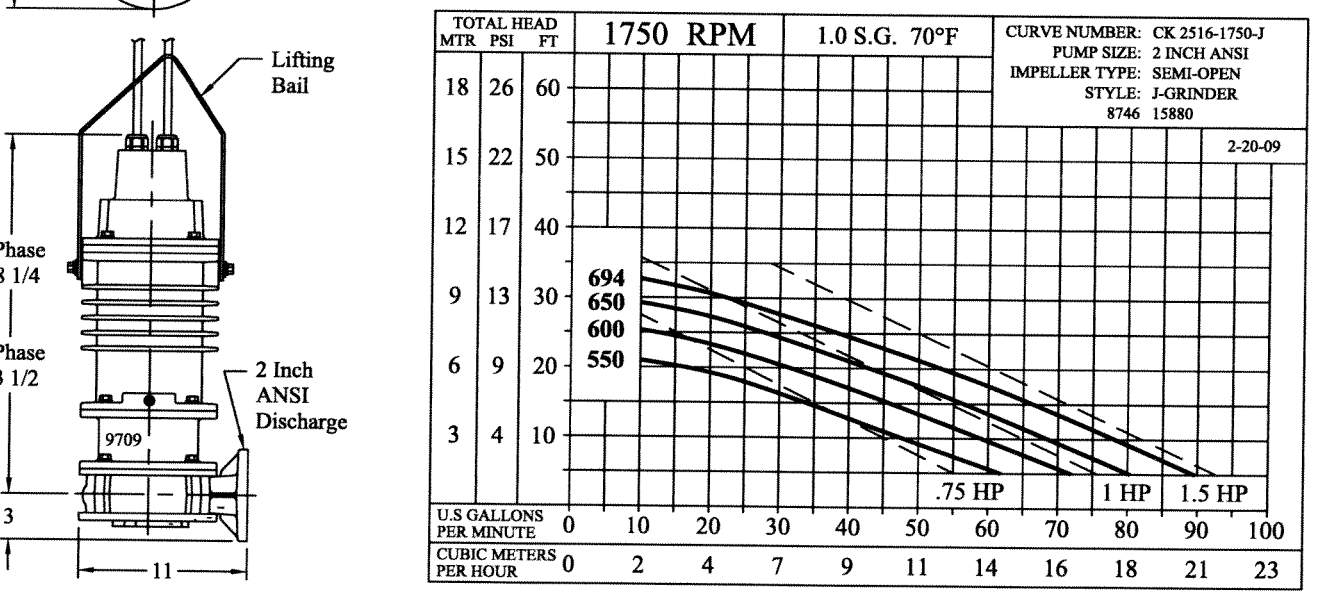
Dia or Side Inches	Gallons per Foot of Depth	
	Round	Square
24	24	30
30	37	47
36	53	67
48	94	120
60	147	187
72	212	269

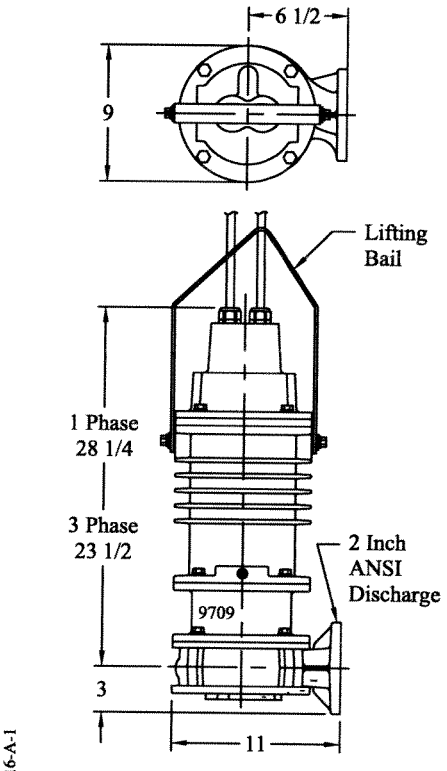
Flow - To prevent solids from settling out

Discharge Pipe Size Dia Inches	Minimum Flow GPM
1 1/2	15
2	25
3	50

Good wet well design
Maximum 10 starts per hour.
Minimum run time - 1 1/2 minutes.





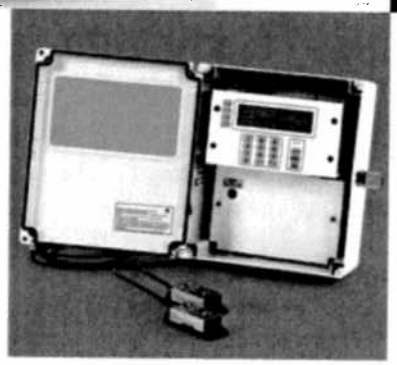


Product Specifications

Combining Dual Frequency Doppler (DFD) technology with digital signal processing, the Polysonics SX40 is immune to much higher levels of external noises than with standard Doppler technology. The DFD technique reduces errors in flow measurement of fluids which contain particulates thus improving the ability to operate in what were previously considered marginal applications.

Polysonics SX40

Dedicated Dual Frequency Doppler Flowmeter



Applications

- Primary sludge
- Digested sludge
- Thickened sludge
- Waste activated sludge
- Return activated sludge
- Slurries
- Dredging

Features and Benefits

- Accuracy to ±1% of velocity fullscale
- Password protection
- Backlit graphics display
- Excellent noise immunity
- Easy to install and set up
- AC or DC supply operation
- Powerful 90,000 point data logger

Unlike conventional Doppler flowmeters which operate at a single frequency, the Polysonics SX40 generates two independent ultrasonic signals at different frequencies. By correlating these frequencies, the instrument automatically identifies and eliminates noise errors from sources such as variable frequency drives.

In addition, the operation of the instrument is enhanced by an Expert System which allows the flowmeter to automatically "learn" the application parameters. As a result, the Polysonics SX40 can be easily commissioned in a fraction of the time necessary to configure competitive ultrasonic flowmeters.

Housed in a NEMA 4X (IP65) enclosure, the instrument is well suited to most municipal and industrial environments. The backlit graphics display provides excellent visibility even in poorly lit conditions. Outputs include a 12-bit, optically isolated, 4-20 mA analog signal and up to four independent programmable relays. The relays can be used for pump control, fault indication, limit switching, sampler activation, power down alarming or remote totalizer driving. In addition, a contact closure activated by a remote pump or other control device is available to eliminate unwanted or erroneous flow volume data when backflow conditions are present. A powerful 90,000 point data logger with non-volatile memory is also incorporated in the instrument. This avoids the additional cost of a chart recorder or external data logger for applications where continuous flow recording is required.

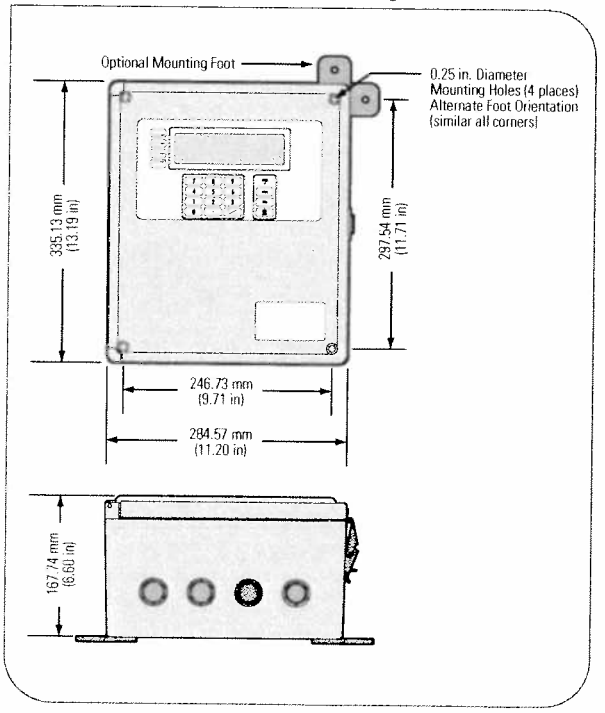
Thermo Electron Corporation manufactures a comprehensive range of ultrasonic flowmeters for closed full pipe, partially filled pipe and open channel applications. Models are available for raw sewage, centrates, filtrates, plant effluent, raw water, surface water, groundwater, finished water and chemicals.

Formerly Thermo Polysonics

Polysonics SX40 Dedicated Dual Frequency Doppler Flowmeter

Specifications	
Performance Specifications	
Velocity Range	0.06 to 5.5 m/s (0.2 to 18 ft/s), volumetric value based on cross-sectional area of pipe
Accuracy	±1% of velocity full scale
Fluids	Liquids containing particulate or entrained gas bubbles
Pipe Size	12 to 5000 mm (0.5 to 200 in)
Physical Specifications	
Transmitter	NEMA 4X (IP65), flame retardant fiberglass-reinforced polyester
Transducers	Two encapsulated dual frequency sensor heads suitable for underground service Encased in stainless steel shrouds with integral transducer clamps 9 m (30 ft) cable length - standard
Weight	Approximately 5.4 kg (12 lbs)
Functional Specifications	
Outputs	4-20 mA (into 750 ohms); 12-bit, 5 kV, opto-isolated, loop or self-powered; RS232 serial interface
Power Supply	90-132 Vac or 190-250 Vac, 50/60 Hz (switch selectable); 11-28 Vdc
Temperature Range	Transducers: pipe surface -40° to +121°C (-40° to +250°F); ambiant air limited to +80°C (+176°F) Electronics: -29° to +60°C (-20° to +140°F) With integral heater: -40° to +60°C (-40° to +140°F)
Keypad	19 key with tactile action
Display	Backlit, 240 x 60 dot, high resolution graphics display
Data Logger	90,000 point data logger Programmable in log intervals of 30 sec, 1, 5, 15, 30, 60 mins *HydraScan* retrieval software for Windows® included as standard Compatible with Microsoft® Excel, Lotus® 1-2-3 and other similar packages
Compliance	Hazardous area certifications (see ordering information below)

Figure 1 – Polysonics SX40 Dimensional Diagram



Ordering Information

MODEL NUMBER
SX40: Polysonics SX40 Dedicated DFD Flowmeter

POWER SUPPLY
1: 90-132 Vac, 50/60 Hz
2: 190-250 Vac, 50/60 Hz
3: 11-28 Vdc

OUTPUTS
0: 4-20 mA, no relay (standard)
1: One relay, 5 amp, SPDT, programmable
2: 2 relays, 5 amp, SPDT, programmable
3: 3 relays, 5 amp, SPDT, programmable
4: 4 relays, 5 amp, SPDT, programmable

TRANSMITTER ENCLOSURE
1: NEMA 4X (standard)
2: NEMA 7

TRANSDUCER CABLE LENGTH
X30: 9 m (30 ft) standard cable
XXX: Optional cable length in feet, XXX = 050, 075, 100, 125, 150, 200, 250 or 300

HAZARDOUS AREA CERTIFICATION
A: CSA (Class I or II, Div. 2)
B: CSA (Class I, II or III, Div. 1)

SX40 A B C D E

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