Chapter 4-11: Equipment

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4-11.01 General

4-11.01A Work Included

This chapter includes guidelines for inspecting the installation of the following equipment furnished by the Contractor: stationary high-pressure washers, portable high-pressure washers, fuel dispensing equipment, liquefied petroleum gas (LPG) dispensing systems, lubrication and compressed air systems, exhaust evacuation hose reels and fans, clarifier tanks, above-ground oil/water separators, underground oil/water separators, sewage pumping station equipment, recycle process units, workbenches, and other common items.

Review any Standard Special Provisions (SSPs) from Section 99[1], *Building Construction,* Division 11, *Equipment*, that have been included in the project *Special Provisions*, since much of the information therein typically will not be repeated in the following sections of this chapter.

Review the plans and authorized submittals carefully for these pieces of equipment. Utility connections for equipment such as electrical, gas, water, compressed air, and lubrication could interfere with conduit for the building itself. It is critical that any conflicts are identified early so that impacts can be more easily mitigated.

4-11.01B Materials

Mechanical, water, and wastewater-associated equipment are not commonly source-inspected by Materials Engineering and Testing Services (METS). These types of equipment usually receive a Form TL-28, *Notice of Materials to Be Inspected at Job Site*, and representatives from the Office of Electrical, Mechanical, Water and Wastewater (OEMWW) will be responsible for testing these items at the job site. Refer to *Quality Assurance and Source Inspection (QASI) Manual* Section 99-F, *Electrical Mechanical Water and Wastewater*, for more information. Coordinate with the Materials Representative (METS Rep) for equipment testing.

4-11.02 High-Pressure Washer (Stationary)

This section contains information regarding stationary high-pressure washers and their accessories, which include pressure washer pipe and fittings, drum dolly, vent stack, hose and gun reel, soap/water mixing meter, non-emulsifying soap, and expansion anchors. SSP 99-15060, *Pipe, Fittings, and Valves*, or SSP 99-02750, *Wash Water System,* is required if the project involves installation of a stationary high-pressure washer; check the project *Special Provisions* to verify that this is the case.

[1] Caltrans internal use only

Stationary high-pressure washers are anchored to the facility's floor, typically in the washer room with a hose running through a wall to a wash area. They are used to wash equipment and for general cleanup. Sometimes referred to as "power washers", these items are components of a "wash rack" along with clarifier tanks and oil/water separators. An example of a stationary high-pressure washer is shown in Figure 4-11.1 below. There are controls on the washer unit, and any additional controls will be mounted on the exterior of the building. The facility's end user may prefer to have quick release fittings on the pressure washer hose and gun in order to lock up the external parts at the end of each work shift – discuss this with the Project Architect prior to authorization of the submittal. Stationary high-pressure washers must have a natural gas-fired heating unit; LPG heating units are not allowed. A reduced pressure backflow preventer must be installed in the water line prior to connection to the stationary high-pressure washer. Verify that a "DANGER Do Not Drink This Water" sign is shown on the plans; this sign must be installed on the building wall above the hose reel assembly.



Figure 4-11.1. A Stationary High-Pressure Washer

The following submittals are required for stationary high-pressure washers: product data and operation and maintenance instructions (with parts lists). Refer to the *Special Provisions* for further information. Verify that the manufacturer has provided a warranty for the stationary high-pressure washer unit prior to contract acceptance.

Witness the Contractor's testing of the stationary high-pressure washer once installation is complete.

4-11.03 High-Pressure Washer (Portable)

This section contains information regarding portable high-pressure washers and their accessories, which include a drum dolly and non-emulsifying soap. SSP 99-15060, *Pipe, Fittings, and Valves*, is required if the project involves installation of a portable high-pressure washer. These types of high-pressure washers must have a diesel heating unit.

The following submittals are required for portable high-pressure washers: product data and operation and maintenance instructions (with parts lists); refer to the project *Special Provisions* for further information. Verify that the manufacturer has provided a warranty for the portable high-pressure washer unit prior to contract acceptance.

Witness the Contractor's testing of the portable high-pressure washer once installation is complete.

4-11.04 Fuel Dispensing Equipment

This section contains information regarding fuel dispensing equipment, including fuel pumps, fuel dispensers, air and water service, and fire extinguishers. See Figure 4-11.2 below for an example of a fuel dispensing system.

A permit is required for the vapor recovery system for gasoline fuel systems. This is governed by the local air pollution control district. Discuss the fuel dispensing system with both the mechanical and electrical engineers; they can provide further information concerning the local air quality management district and permit requirements.



Figure 4-11.2. Fuel Dispensing Equipment

The State Fire Marshal will make periodic inspections during construction of the fuel dispensing system. The State Fire Marshal will review the emergency disconnect for the fuel dispensing system, including the above-ground fuel tank, to verify compliance with the applicable California Fire Code. Refer to Chapter 3, *Contract Administration*, Section 3-8.01B, *During Construction*, for additional information on in-process inspection performed by the State Fire Marshal.

Additional inspection by the local hazardous materials regulatory agency may be required. This inspection will involve numerous aspects of the fuel dispensing system, such as secondary containment, pressure tests of the piping and tanks, leak detection sensors, monitoring systems for audible and visual alarms, and underground monitoring wells.

The following submittals are required for fuel dispensing equipment: product data and operation and maintenance instructions (with parts lists); refer to the project *Special Provisions* for further information. Verify that the manufacturer has provided a warranty for the fuel dispensing equipment prior to contract acceptance.

Reinforced thermosetting resin pipe (RTRP) must be pressure tested as described in the *Special Provisions*. Witness the Contractor's general performance test to demonstrate the proper operation of the fuel island equipment. Note that the fuel for the general performance test is Department-furnished; coordinate fuel acquisition with the Resident Engineer and discuss the testing schedule with the Contractor to avoid causing delays.

4-11.05 Liquefied Petroleum Gas (LPG) Dispensing System

This section contains information regarding liquefied petroleum gas (LPG) dispensing systems, which include an LPG tank, warning signs, pump, dispenser, pipe, fittings, and valves.

An LPG dispensing system is a preassembled, skid-mounted above-ground tank system suitable for filling portable LPG bottles and containers. The tank must be 1200 gallons or less, and Department-furnished LPG fuel is required to operate the system. SSP 99-10522, *Fire Extinguishers and Cabinets,* and SSP 99-15060, *Pipe, Fittings, and Valves*, are both required if the project involves installation of an LPG dispensing system; check the *Special Provisions* to verify that this is the case.

The LPG tank and its gas piping may be located away from the building. In this case, it is necessary to coordinate the gas piping installation with the other underground utilities in the vicinity. See Figure 4-11.3 below for an example of an LPG dispensing system.

A Division of Industrial Safety permit is required to operate pressure vessels, and this permit is required to be posted under glass at the site of the work.

The State Fire Marshal will make periodic inspections during construction of the LPG dispensing system. The State Fire Marshal will review the system as a whole, as well as individual ancillary components such as warning signs, hazardous materials signage, the emergency fuel shut-off or disconnect switch, and perimeter bollard spacing around the tank. Refer to Chapter 3, *Contract Administration*, Section 3-8.01B, *During Construction*, of this manual for additional information on in-process inspection performed by the State Fire Marshal. Additional inspection of the LPG dispensing system may be required by the local hazardous materials regulatory agency.

The following submittals are required for LPG dispensing systems: product data and operation and maintenance instructions (with parts lists); refer to the *Special Provisions* for further information.

Note that the LPG dispensing system manufacturer is not required to provide a warranty for the system in accordance with the *Special Provisions*. The general guarantee clause of *Standard Specifications* Section 5-1.47, *Control of Work – Guarantee*, will apply in this case.

Once installation is complete, testing of the LPG dispensing system is required; refer to the *Special Provisions* for further information. As noted above, LPG fuel is a Department-furnished material; coordinate fuel acquisition with the Resident Engineer and discuss the testing schedule with the Contractor to avoid causing delays.



Figure 4-11.3. LPG Dispensing System

The delivery company responsible for the first delivery of LPG fuel will do an independent check on the system prior to filling the tank. The Structure Representative or other designated personnel must be present to accept the delivery and sign the delivery receipt.

4-11.06 Lubrication and Compressed Air Systems

This section contains information regarding lubrication and compressed air systems.

Lubrication systems consist of drum dollies for holding lubricants, overhead hose reels, pneumatic pumps for dispensing lubricants (chassis lubricant, motor oil, automatic transmission fluid, gear lubricant, and antifreeze), overhead electric lights, and connecting pipelines, hoses, accessories, and mounting assemblies. See Figures 4-11.4 and 4-11.5 below for illustrations of lubrication system components. It should be

noted that drum dollies do **not** meet the requirements for secondary containment. However, if drum dollies are desired, they can still be used with a ramp as part of the secondary containment trays.



Figure 4-11.4. Lube Reel Hoses Connected to Distribution Piping



Figure 4-11.5. Lube Drum Dollies

Compressed air systems include a compressor, regulators, gauges, and compressed air piping. See Figure 4-11.6 below for an example of a free-standing air compressor. Be aware that there are different Cal/OSHA requirements for compressed air systems depending on the activities that will be performed inside the building (for example, a maintenance building versus a shop building). A Division of Industrial Safety permit is required to operate pressure vessels, and this permit is required to be posted under glass at the site of the work.



Figure 4-11.6. A Free-Standing Air Compressor Unit

One problem that comes up is the mounting of piping and hose reels to pre-manufactured roof trusses for support. Verify that any supports attached to roof trusses have been approved by the manufacturer of the trusses. Drilling holes in the bottom chords of the trusses can weaken the trusses. The frame mounting for the hose reels may be found in the authorized submittals. Hose reels can also be mounted on a framework built above the lubricant drums.

The lubrication system may require inspection by the local hazardous materials regulatory agency and may require a permit as well. Their main interest would typically be the secondary containment of the fluids and not allowing any type of lube fluid in the sewer or area drainage system. As a note, a mechanic's shop might use its own recycled oil system or recycled antifreeze system; these would also be subject to a permit from the local hazardous materials regulatory agency.

The following submittals are required for lubrication and compressed air systems: product data and operation and maintenance instructions (with parts lists); refer to the *Special Provisions* for further information. Verify that the manufacturer has provided a warranty for the system prior to contract acceptance.

All required tests for lubrication and compressed air systems that are listed in the *Special Provisions* must be performed in the presence of the Engineer. Note that the drums and lubricating material for testing the lubrication system are Department-furnished; coordinate the acquisition of these materials with the Resident Engineer and discuss the testing schedule with the Contractor to avoid causing delays.

4-11.07 Exhaust Evacuation Hose Reel and Fan

This section contains information regarding exhaust evacuation hose reels and fans. This equipment consists of an overhead fume exhaust fan, hose reel, hose, and remote operating station.

Exhaust evacuation hose reel and fan equipment are usually mounted below the roof trusses on a steel angle frame to fit the unit, and the basic design will be included in the structural section of the project plans.

This in-place unit is normally used by the shop mechanics to connect to the exhaust pipe on the vehicles in order to vent vehicle exhaust to the exterior of the building.

The only required submittal for exhaust evacuation hose reel and fan equipment is product data, although this submittal consists of many components: manufacturer's descriptive data and installation instructions, shop drawings, a schematic diagram, and an interconnection diagram showing reel installation mounting brackets.

Note that the manufacturer is not required to provide a warranty for exhaust evacuation hose reel and fan equipment in accordance with the *Special Provisions*. The general guarantee clause of *Standard Specifications* Section 5-1.47, *Control of Work – Guarantee,* will apply in this case.

Witness the Contractor’s general performance testing of the exhaust evacuation hose reel and fan equipment once installation is complete.

4-11.08 Clarifier Tanks

This section contains information regarding precast concrete clarifier tanks. Clarifier tanks allow for continuous removal of solids (deposited by sedimentation) from water. Clarifier tanks can be components of a “wash rack” along with high-pressure washers and oil/water separators. See Figure 4-11.7 below for an example of a clarifier tank being installed. In this photo, the clarifier tank is being installed within an excavated area that is stepped. For underground installation of clarifier tanks, temporary shoring may be needed.



Figure 4-11.7. A Clarifier Tank Being Installed

The following submittals are required for clarifier tank components: a materials list (including manufacturer's descriptive data and catalog cuts), shop drawings, and certificates of compliance. Refer to the *Special Provisions* for further information.

It is important that the manhole access is above the surrounding grade to prevent the entry of stormwater.

Note that the manufacturer is not required to provide a warranty for clarifier tank equipment in accordance with the *Special Provisions*. The general guarantee clause of *Standard Specifications* Section 5-1.47, *Guarantee,* will apply in this case.

Once installation is complete, the clarifier tank must be tested for water leakage as described in the *Special Provisions*.

4-11.09 Oil/Water Separators (Above-Ground)

This section contains information regarding above-ground oil/water separators. Oil/water separators are flow-through devices that are designed to separate oils from industrial wastewater, process water, and stormwater. Oil/water separators can be components of a “wash rack” along with high-pressure washers and clarifier tanks.

The following submittals are required for above-ground oil/water separators and their appurtenances: product data, shop drawings, certificates of compliance, and operation and maintenance instructions (with parts lists). Refer to the project *Special Provisions* for further information.

Note that the manufacturer is not required to provide a warranty for above-ground oil/water separator systems in accordance with the Special Provisions. The general guarantee clause of *Standard Specifications* Section 5-1.47, *Guarantee,* will apply in this case.

Above-ground oil/water separator systems must be tested for leakage as described in the *Special Provisions*. A manufacturer's representative must be present during both installation and testing of the oil/water process unit system. Remind the Contractor of this requirement prior to the start of work.

Some equipment used to service the separator will be supplied to the Resident Engineer or the Structure Representative at the jobsite. Also, the separator will need to be inspected by the local hazardous materials agency and the local sewer permit agency. Local agencies will require periodic sampling and testing of the water entering the oil/water separator unit. There is an additional permit required through the local sewer permit agency if engine steam cleaning will occur.

4-11.10 Oil/Water Separators (Underground)

This section contains information regarding underground oil/water separators. These systems are very similar to those described in the previous section. Earthwork required for the installation of underground oil/water separator systems must comply with SSP 99-02220, *Earthwork for Building Work*. For underground oil/water separator installation, a temporary shoring plan may be needed.

The following submittals are required for underground oil/water separators and their appurtenances: product data, shop drawings, certificates of compliance, and operation and maintenance instructions (with parts lists). Refer to the *Special Provisions* for further information.

Tanks must be designed to support all the loads and pressures resulting from the vertical and lateral earth loading described in the *Special Provisions*. The tank manufacturer must provide a warranty stating that the tank will not fail from internal or exterior corrosion for a period of 30 years from the date of purchase.

Underground oil/water separator systems must be tested for leakage as described in the *Special Provisions*.

4-11.11 Sewage Pumping Station Equipment

This section contains information regarding sewage pumping station equipment. This equipment consists of a sewage pump, check valve, discharge pipe and fittings, flexible couplings, lifting cable, access cover, and valve box.

The following submittals are required for sewage pumping station equipment: product data, shop drawings, certificates of compliance, and operation and maintenance instructions (with parts lists). Refer to the *Special Provisions* for further information.

Verify that the manufacturer has provided a warranty for the sewage pumping station equipment prior to contract acceptance.

For underground tank installation, temporary shoring may be needed, as shown in Figure 4-11.8 below; verify that a shoring plan has been submitted and authorized prior to installation of the equipment.



Figure 4-11.8. Temporary Shoring Measures Used During Installation of an Underground Septic Tank

Sewage pumping station equipment must be tested as described in the project *Special Provisions*.

A permit is required if the sewage is going to a city or community sewer district. Funding to pay for permit fees may be included in the Supplemental Funding for the project. The local agency will likely require testing if there are other types of wastewater going to the sewer. An example would be wastewater from the wash rack that is pretreated by the oil/water separator; in this case, testing will be done prior to the water entering the oil/water separator. Also, if there is engine cleaning, an additional sewer permit from the local agency and more frequent testing would be required, in accordance with the Industrial Waste Discharge Regulations from the local agency in the area.

4-11.12 Recycle Process Units

This section contains information regarding wash water recycle process units (RPUs). SSP 99-02750, *Wash Water System*, is required if the project involves installation of an RPU; check the *Special Provisions* to verify that this is the case.

The following submittals are required for RPUs: product data, shop drawings and seismic design calculations, certificates of compliance, and operation and maintenance instructions (with parts lists). Refer to the *Special Provisions* for further information.

The manufacturer must provide a warranty for the RPU for a minimum of one year from startup.

RPUs must be tested for leakage as described in the *Special Provisions*. Operational testing in accordance with the aforementioned SSP 99-02750 is also required. Once commissioned, a 2-hour training session for the facility operators must be conducted by the RPU manufacturer's representative.

4-11.13 Workbenches

This section contains information regarding workbenches.

The only required submittal for workbenches is product data, which consists of manufacturer's descriptive data and a standard color palette.

Verify that the workbenches are level and the legs are securely anchored to the floor in accordance with the manufacturer's instructions.

No manufacturer's warranty is required in accordance with the *Special Provisions*.

4-11.14 Other Common Items

Other common items that may be specified for building projects include four-post vehicle lifts and appliances such as ice machines, refrigerators, and microwaves. Requirements for these items will be included in the contract specifications via non-standard special provisions. If specified, verify that these items are supplied in accordance with the authorized submittals and installed in accordance with the manufacturer's recommendations.