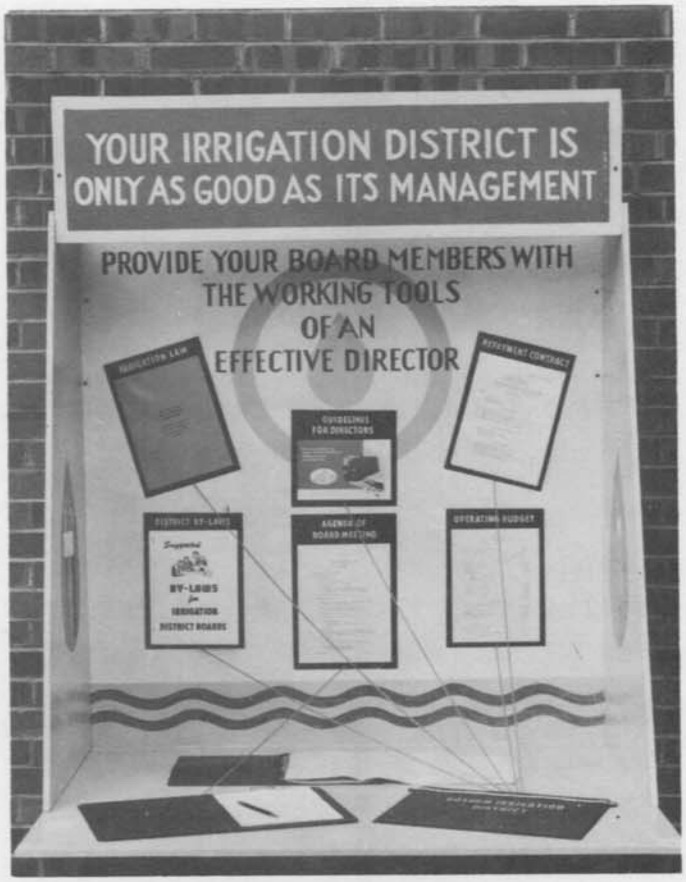
United States Department of the Interior, Bureau of Reclamation

IRRIGATION OPERATION AND MAINTENANCE

BULLETIN NO. 72

April, May, June 1970



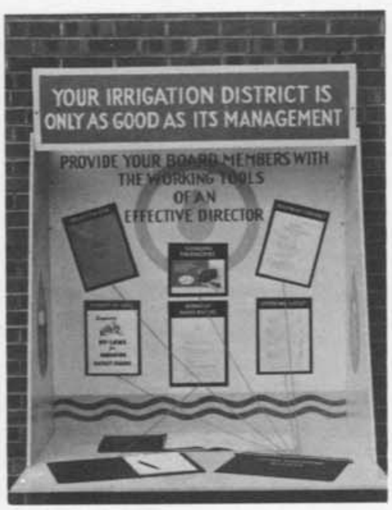
In This Issue:

The Irrigation Operation and Maintenance bulletin is published quarterly, for the benefit of irrigation project people. Its principal purpose is to serve as a medium of exchanging operation and maintenance information. It is hoped that the reports herein concerning labor-saving devices and less costly equipment and procedures, developed by resourceful project people, will result in improved efficiency and reduced costs of the systems for those operators adapting these ideas to their needs.

To assure proper recognition of those individuals whose suggestions are published in the bulletins, the suggestion number as well as the person's name is given. All Bureau offices are reminded to notify their Suggestions Award Committee when a suggestion is adopted.

* * * * *

Division of Irrigation Operations
Office of Chief Engineer
Denver, Colorado 80225



COVER PHOTOGRAPH:
The cover photograph is of a display that is available on loan from the Regional Director, Region 7, Denver, Colorado. It is approximately 4 feet square and comes in a wooden box ready for assembly. Photo PX-D-66663NA

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INTRODUCTION

The article "Your Irrigation District is Only as Good as It's Management," on page 1, describes a display for use at meetings of managers and directors of irrigation districts. Also on page 1, an article entitled "Ultrasound," describes a portable electrical cleaning instrument now available.

An article from Western Construction, starting on page 2, discusses 12 important tips on engine care. A source of information on methods used in repairing runners of pumps and turbines will be found on page 5.

An access ladder in the article on page 6, was installed by the personnel on the All-American Canal System. It was fabricated and installed on the pipe stand-box for safety and easy handling when in the process of replacing or removing irrigation flow meters.

A suggestion jointly submitted by three employees of the Flaming Gorge Field Division, for cleaning the debris from rails of a gantry crane can be found on page 7.

Water measurement over submerged weirs occasionally becomes necessary in field operations. The article starting on page 9, on this very subject, you will find most helpful.

Descriptive data and sketches for an airlift recommended for the removal of gravel from a stilling basin at Canyon Ferry Dam begins on page 13.

A hand truck for use in handling heavy steel drums of grease is described in the article "Drum and Barrel Truck," on page 19.

Mandatory requirements by one irrigation district for the ventilation of manhole and vault structures, before they can be entered and while working in them, is on page 20.

On page 22 is an article describing the removal of pondweeds with rubber-tired logging tractors that can be used in lieu of track type tractors.

YOUR IRRIGATION DISTRICT IS ONLY AS GOOD AS IT'S MANAGEMENT

A portable display shown on the cover of this issue of the bulletin was prepared under the direction of Mr. Nat Tolman, Supervisor of Land and Water Operations, Regional Office, U.S. Bureau of Reclamation, Denver, Colorado. It has received much attention at water user meetings in Region 7 and elsewhere. The black and white photograph on the cover does not do justice to the effective use of color in the attractive display unit.

First used at a recent Four-State irrigation conference in Denver, the display has attracted much attention to the kinds of documents, references, and guidelines district managers should make available to board members and others concerned with the operation of Irrigation and other water-supply projects. The documents shown include, irrigation law, repayment contracts, district by-laws, operating budgets, agenda of board meetings and guidelines for directors.

The portable display is made of plywood and is relatively compact, it can be set up in a minimum base space of 30 inches by 18 inches, stands about 3-1/2 feet high, and can be folded to about 30 inches by 40 inches for shipping purposes.

This display unit and copies of the displayed documents can be made available by writing to: Regional Director, Attention: Code 400, Region 7, Building 20, Denver Federal Center, Denver, Colorado 80225.

* * * * *

ULTRASOUND

An electrically powered "ultrasonic" device widely used in industry for cleaning and testing purposes, is one that generates high-frequency vibrational energy that can't be heard by the human ear. A manufacturer recently developed a portable cleaning device that runs on ordinary electrical house current. It can be used to clean many kinds of objects that might warrant consideration by some, from fine jewelry and delicate sea shells to wrenches, carburetors, and instruments, etc.

The machine has three major working parts--a generator, a transducer, and a cleaning tank that fills with water. Dirty objects are placed in the tank. The generator then produces high-frequency electrical impulses that are subsequently converted to ultrasonic energy waves by the transducer. When these waves enter the water-filled cleaning tank, they create millions of microscopic bubbles that produce an action similar in effect to that of tiny scrub brushes, removing the dirt and contaminants from the dirty object.

Supervisory Management

TWELVE TIPS ON ENGINE CARE 1/
by
C. F. Bender

Some engine maintenance practices lead to trouble that is often blamed on the wrong causes. Twelve of them are discussed in this article. Mechanics have labeled them "the dirty dozen."

Using Electric Welder to Turn Engine Starting Motors

Starting motors on construction machinery are designed for either a 6, 12 or 24-volt power source with controlled amperage input. Using a higher voltage, high current welder as a power source may damage the starting motor or its related components in several ways:

a. Spinning the starter at higher than rated speeds can throw windings and commutator bars from the armature, and if prolonged, will cause insulation failure due to overheating.

b. High speed engagement of the drive member with the flywheel ring gear can severely damage the drive member and drive housing, and may "wrap up" the Bendix spring. In some cases when drive teeth are not fully engaged (due to high speed rotation), the resulting jack-screw force breaks the commutator end frame.

c. Surges of high current will permanently deform the contact discs and/or blades in solenoid or magnetic switches on starting motors so equipped.

Improper or Excessive Use of Starting Fluids

Despite the easy starting of modern diesels, cold weather conditions still require starting aids. Because ether starting fluids ignite at a much lower temperature than fuel, they must be introduced into the combustion chambers in a fine mist or vapor and in quantities determined for the prevailing temperatures. Never insert starting fluids in a fluid state--it causes extreme explosive pressures at initial combustion and can result in piston damage.

Avoid excessive use of starting fluids. If the engine does not start after several attempts, shut the fuel off and crank the engine for about 20 seconds to clear the compression chambers of fluid. Then, check compression of one or two cylinders.

Excessive starting fluid washes the lubricant from the cylinder walls and fumes may even pass the piston rings and enter the engine crankcase. This can result in engine oil dilution and possible explosion in the crankcase.

1/ Reprinted by special permission of the Editor, from an article that appeared in the January 1970 issue of Western Construction.

Increasing Fuel on Fuel Pump Governors

Proper combustion depends on the correct fuel/air ratio. Increasing the fuel supply beyond specifications upsets this ratio. On a naturally aspirated engine it provides more fuel than can be consumed with the air available. This increases temperature, pressure and fuel consumption, and leaves raw fuel in the combustion chambers which "afterburns" in an uncontrolled state. Excessive fuel is usually indicated by black exhaust smoke.

Since a turbocharged engine operates with excess air, when more fuel is added the turbocharger speed increases (due to the combustion temperature rise), and supplies still more air. Exhaust temperature increases to where severe damage could occur to the engine and/or turbocharger. Governor settings on turbocharged engines must never be set in the field without properly determining manifold temperatures and pressures.

Improper Placement of Electric Ground when Welding on Assembled Machinery

Always clamp the ground cable as near to the area that is to be welded as possible.

It is common practice to place the ground in any convenient location, disregarding the arcing between metal-to-metal clearances of components between the ground and the welding electrode.

During welding, any close metal-to-metal clearances--bearing settings (roller or cup), valves and seats, or between metallic seals and adjacent metal components--which may be in the current flow are subject to high amperage arcing which repeated many times, results in pitting. These pits or craters enlarge rapidly in use to the point of severe damage and possible ultimate failure.

Working on Equipment Without First Detaching Battery Grounds

A 24-volt electrical system can cause severe bodily injury by short circuiting at a bare connection with a metal tool. Finger rings have been known to cause severe burns on such occasions. Sparks from the arc can cause eye injury. The tremendous current surge can also damage the entire electrical system. Always disconnect it.

Filling or Adding Coolant

When filling a drained cooling system protected by a radiator pressure cap, or when adding coolant in excess of approximately 20% of system capacity, open the thermostat vent cock. Add coolant until it flows from the open vent cock, then close the vent and fill to one inch below the bottom of the radiator filler neck.

After-boil can occur if the engine is stopped without idling it for two or three minutes. Temperature can rise as much as 100 degrees, turning coolant to steam. The expanding steam lifts the pressure cap valve and allows the coolant to escape through the overflow. As engine temperature drops, coolant condenses and pulls down the vacuum valve in the pressure cap, replacing the lost coolant with air to cause overheating unless the radiator is refilled.

A leak at the water pump or any point between the pump and the radiator may draw in air. Turbulence in the top tank or a leak in the radiator core can also draw air.

Using Starting Motor to Turn Engine and Prime Fuel System

After changing fuel filter elements, fuel pumps, fuel lines, or after running out of fuel, manually prime the fuel system before cranking the engine. Cranking the engine with a dry fuel system not only discharges the battery and overheats the starter, but may score the close-fitting fuel pump plungers and barrels. The plunger will reciprocate and on certain fuel pumps will also revolve in the barrel without the lubrication normally supplied by fuel oil.

Use of Contaminated or Improper Grade Fuel Oil

Nearly all major oil companies furnish fuel that is clean and uncontaminated; any contamination, therefore, results after the fuel leaves the refinery. Minute particles of abrasive material or water can severely damage the highly polished, close fitting parts of fuel injection pumps and nozzles.

Failure to Polarize Generator After Disconnecting Generator-Regulator Leads (Excluding Alternators)

When reinstalling a generator or a regulator or when reconnecting wiring between the generator and the regulator, always polarize the generator with respect to the battery before starting the engine. Regulators are designed for either negative or positive ground. Using the wrong polarity will burn or stick the contact points and cause early failure.

Improper Starting and Stopping of Engine

After a cold start, operate at part throttle for a short time to assure lubrication to all parts. Work the unit at part load until pressures and temperatures stabilize, then operate at most efficient speed.

When stopping an engine which has reached operating temperature, reduce to idle speed and operate there from three to five minutes. This will normalize engine temperatures and prevent after-boil. It will also allow a turbocharger to slow down to a safe stopping speed, avoiding damage to shaft and bearings due to insufficient lubrication during the coast-down period of the turbocharger.

Improper Maintenance of Air Cleaners

A restricted or partially clogged air cleaner upsets the fuel/air ratio and usually shows more exhaust smoke on naturally aspirated engines. On turbocharged engines, exhaust color change may not be too noticeable, but some darkening should occur. Operating with a partially clogged or restricted air cleaner not only results in higher temperatures with a resultant horsepower loss, but also allows unfiltered air, conducive to rapid engine wear, to enter the engine.

Prolonged Engine Idling of Torque Converter Units

Extensive idling of engines on torque converter units should be avoided to minimize temperature buildup of converter fluid. Depending on type of cooler used, this heat may be transferred to the engine.

On units having both torque converters and engine clutches, operating at low idle speed with the engine clutch engaged raises converter fluid temperature. This can damage seals and/or melt the grease from the turbine and impeller ball bearings. If the torque converter is cooled by the engine coolant, the engine operating temperature will increase.

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WELDING REPAIR TO HYDRAULIC EQUIPMENT
(Power O&M Bulletin No. 24)

Power O&M Bulletin No. 24 entitled, "Welding Repair to Hydraulic Equipment," contains information about the methods of repairing runners of pumps and turbines.

Any Project which operates and maintains pumps will find the above bulletin most useful.

This publication can be obtained by writing to the: Office of Chief Engineer, Bureau of Reclamation, Building 67, Denver Federal Center, Denver, Colorado 80225, Attention: Code 841.

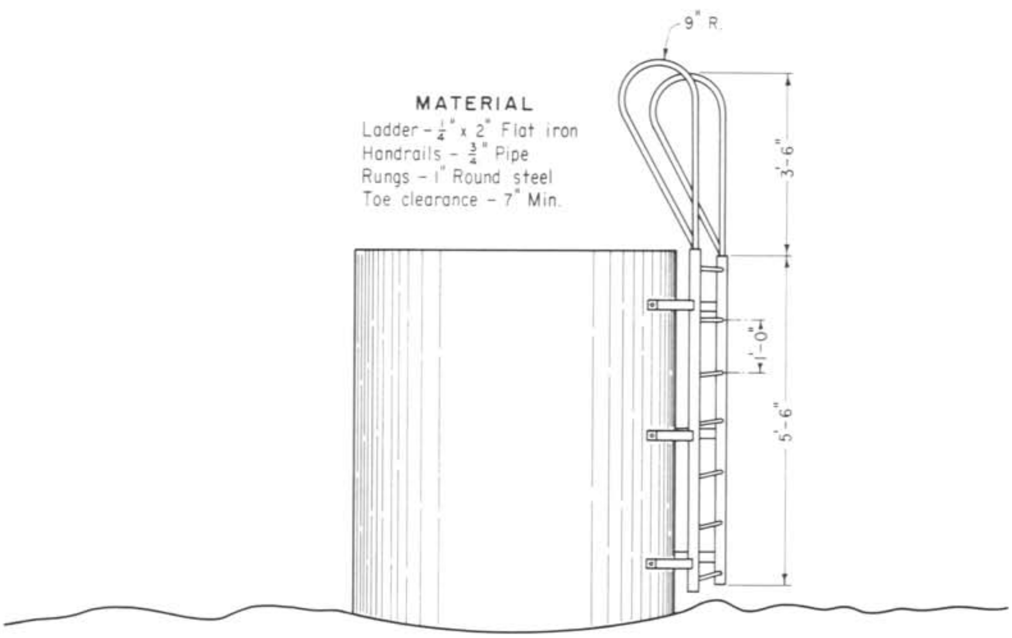
* * * * *

ACCESS LADDER

The access ladder on the pipe stand-box shown in photograph at left, Photo P50-D-66665NA, was installed to facilitate installation and removal of irrigation flow meters. A heavy steel grating is also used to cover the top part of pipe stand-box.

This access ladder was fabricated and installed by shop personnel, Yuma-Mesa Division, Gila Project, All-American Canal System, Yuma, Arizona, and it meets all requirements set forth in the Construction Safety Standards.

The galvanized pipe handrail on the upper part of the ladder is of sufficient height to permit standing erect on the top rung and entrance into the pipe stand with an extension ladder can be accomplished without bending or stooping. As shown in the sketch below, materials include: 1/4- by 2-inch flat iron for the ladder; 3/4 inch for the handrails; and 1-inch round steel bars for ladder rungs. Toe clearance should be approximately 7 inches.



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TRACK CLEANER FOR GANTRY CRANE
(Suggestion R4-CRSP-69S-15)

This suggestion for cleaning the rails of the gantry crane at the powerhouse at Flaming Gorge Dam, was submitted jointly by James Coe, Lloyd Wright and Floyde Gale, employees of the Flaming Gorge Field Division, Dutch John, Utah. The device was planned and fabricated by these employees and improvements were made as needed for a smooth operation. The units were built from scraps of material (angle and bar iron), and the only cost involved in material was the four mounting bolts.

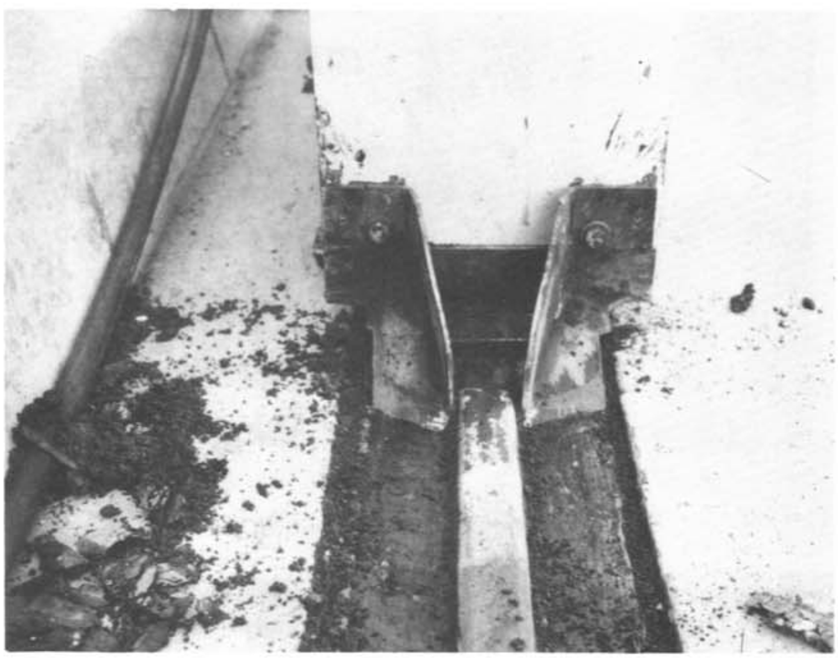
The debris as shown in Photograph 1 below extended the full length of the rails on both tracks across the dam, this material was an excessive buildup of heater sealing tar, stones, dirt, etc. To clean these rails manually would have involved many hours of work.

Photograph 1
(Photo P591-D-66666NA)

It has been reported that the device as suggested proved to be very effective for the kind of job it was designed to do, and it can be remounted in minutes for cleaning the track when the gantry crane is in use. This cleaning device could be adopted to any similar location where a gantry crane is used.

Photograph 2 on the next page shows how the units are bolted to the existing plates that are provided for cleaning the rails ahead of the wheels on the crane. These units can be set for any depth desired, and it was stated that they can be easily revised to be used on any type of crane or track setup.

Photograph 2 (Photo P591-D-66667NA)



Photograph 3 (Photo P591-D-66668NA)

Photograph 3 above shows how the device slices tar-bound material, and leaves a flat base on each side of the rail.

* * * * *

MEASUREMENT OF WATER OVER SUBMERGED WEIRS

Discharge measurements on submerged weirs are reliable only to an approximate degree, and if continuous submergence of a weir is experienced, consideration should be given to selecting another type of measuring device. The Bureau's Water Measurement Manual in Section 24 states that "Accurate measurements cannot be made of submerged weir discharges because of lack of extensive, accurate experiments for determining discharge coefficients." The manual also states that "If accuracies appreciably better than about 5 percent are needed for submerged-weir measuring stations, the weir, or one like it must be carefully calibrated under field conditions."

At times it does become necessary to measure water over submerged weirs. For example, when farm ditches become clogged with weed growth a temporary flooding or partial submergence may result. Under such circumstances if limitations of the methods are recognized, it is possible to make an estimated discharge measurement which may be far better than operating without any measurement at all. Two common methods of making this estimate are described in this article.

Method No. 1

Coefficients or multipliers are given in the table (Figure 1) below, which can be used to determine discharges for varying degrees of submergence.

DISCHARGE CORRECTION MULTIPLIERS 1/
DETERMINING EFFECT OF WEIR SUBMERGENCE

d ÷ H Tenths / Hundredths	0.00	0.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
0.1	1.01	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98
0.2	0.98	.97	.97	.97	.96	.96	.96	.95	.95	.94
0.3	.94	.94	.93	.93	.92	.92	.91	.91	.90	.90
0.4	.90	.89	.89	.88	.88	.87	.87	.86	.85	.85
0.5	.84	.84	.83	.82	.82	.81	.81	.80	.79	.79
0.6	.78	.77	.76	.76	.75	.74	.73	.72	.72	.71
0.7	.70	.69	.68	.67	.66	.65	.64	.63	.62	.60
0.8	.59	.58	.56	.55	.53	.52	.50	.49	.47	.45
0.9	.44	.42	.40	.38	.35	.32	.29	.26	.21	.14

Figure 1

1/ Taken from the Water Measurement Manual, Table 13, which is available from the Bureau of Reclamation, Attention: Code 841, Building 67, Denver Federal Center, Denver, Colorado 80225.

These multipliers can be used to obtain the approximate discharge of a submerged weir by first obtaining the free-flow discharge, using the upstream head "H." The free-flow discharge of the weir, as taken from appropriate tables for the head on the upstream side of the weir, is simply multiplied by the appropriate figure obtained from the table.

For example: Find the discharge over a submerged standard Cipolletti weir with a crest length of 3 feet. When the Head on upstream side is: H = 1.32 feet, and the downstream Head 1/ is: d = 0.33 foot.

As shown in a standard weir discharge table the free-flow discharge of the weir is:

With "H" equal to 1.32 ft

then "Q_H" equal to 15.7 cfs

and "d/H" equal to $\frac{0.33}{1.32} = 0.25$

From the table (Figure 1) the coefficient or multiplier = 0.96

Then the discharge of the submerged weir = 0.96 x 15.7 = 15.1 cfs.

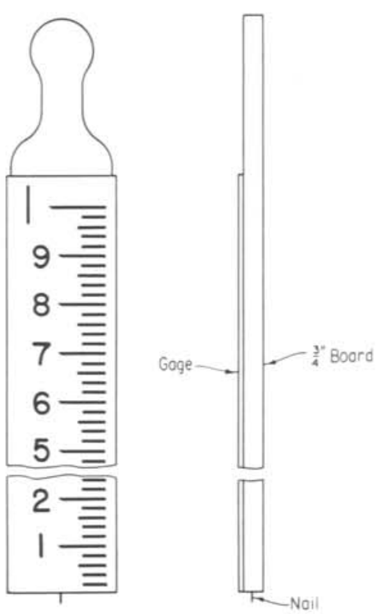


FIGURE 2

Method No. II

A second approximate method for obtaining the discharge of a submerged weir was developed in the field and has been used successfully for many years. This method also depends upon finding the upstream head "H" and downstream head "d." This is accomplished by "sticking the weir."

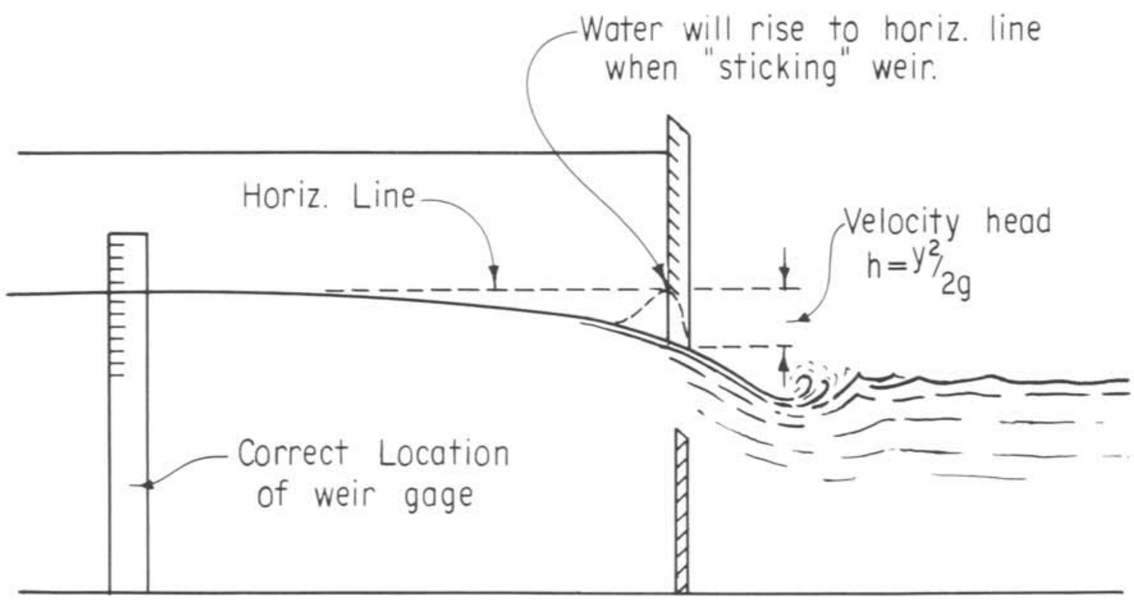
In this method a standard enameled staff gage is used. For convenience, a 3/4-inch board can be attached to the gage with a nail inserted in the end of the board as shown in Figure 2 at left.

The staff gage is placed vertically on the center of the weir

1/ In the experimental work on which the table on page 9 was developed, the downstream Head was obtained by hook gage in a still pool near the bulkhead several feet laterally from the weir crest.

crest and rotated 90° upstream into the flow. The head on the weir is then taken to be the maximum height to which the water rises on the weir gage. With care reasonable results can be secured, but a standard weir gage should be used. This practice should not be used where close measurement of discharge is necessary. In addition, the errors involved are always such as to make the measurement low. Thus, the water user receives more than his allowance of water.

The principle of this type of measurement is illustrated in Figure 3 below, in an upstream reading.



"STICKING" WEIR

FIGURE 3

The water surface at the weir blade is lower than the water surface 5 or 10 feet upstream. The decrease in elevation of the water surface between the head gage and the weir is called the velocity head and represents the potential required to produce the increase in velocity between the points. "Sticking" the weir merely transforms this velocity head into measurable elevation head. Therefore, the water elevation on the weir gage would read nearly the same as a weir gage properly placed upstream from the weir.

The downstream head is measured like the upstream head except that the enameled gage is placed downstream to obtain "d." If the staff gage is wetted and dusted, a close reading can be obtained.

After obtaining the upstream and downstream heads "H" and "d" the following method of calculation can be used to obtain the approximate discharge of a submerged weir:

1. Using the upstream "H," first obtain the free-flow discharge of the weir as taken from an appropriate table.

2. Using the downstream "d," obtain the free-flow discharge of the weir as taken from the same table, then divide this discharge by 2.

3. For final calculation, subtract this result from the discharge found by using the upstream head "H."

As an example, using the same figures as in the explanation given above for Method 1:

H equal to 1.32 ft

d equal to 0.33 ft

From a table, the free-flow discharge of the same head is:

$H = 1.32$ ft $\qquad Q_H = 15.7$ cfs

$d = 0.33$ ft $\qquad Q_d = 1.9$ cfs

Then the discharge of the submerged weir $= 15.7$ cfs $- 1.9/2$

$= 14.8$ cfs

This is approximately equal to the discharge of 15.1 cfs found in the first example.

This method should not be used when d/H is greater than 0.8. If the ratio d/H is greater than 0.8, the error of discharge will increase rapidly. However, if carefully performed, and used within this limit it should provide a measurement within 5 to 10 percent of the actual flow.

* * * * *

AIRLIFT INSTALLATION 1/

To remove gravel from the stilling basin at Canyon Ferry Dam, Missouri River Basin Project, Helena, Montana, without dewatering, engineers in the Office of Chief Engineer, Denver, Colorado, recommended that an airlift be used. This same idea could be used in other places where similar problems exist. It is very effective, simple, and inexpensive for removing mud, sand, gravel, and rocks up to a size that will pass through a 12-inch pipe. We have no experience with airlifts larger than 12-inch diameter. Sizes down to 4 inches have been used for removing fine materials from small areas.

The airlift operates upon the same principle as a smoke stack. Compressed air is introduced at the lower end of a water column, and the rising bubbles reduce the density of the mixture within the column, causing it to rise above the surrounding water level. Flow velocity depends upon the pressure difference that can be developed at the lower end or entrance. Obviously, greater differentials and higher flow velocities can be attained in deep water than in shallow water, just as a higher smokestack develops more draft. Therefore, with deeper water, the discharge can be elevated higher above the water surface and heavier materials can be lifted. We have successfully dredged silt and fine gravel from water 10 feet deep, lifting it 3 or 4 feet above the water surface, but the effectiveness of an airlift will decrease sharply as water depth becomes less than 10 feet. Submergence of an airlift is the vertical height from the pipe entrance to the water surface. Lift is the vertical height from the water surface to the discharge centerline. Generally, the lift should not be more than 35 percent of the submergence, and for dredging rocks it is better to keep it below 20 percent.

Sketches on the following pages show a 12-inch airlift with a 16-inch discharge line and rafts to support and move them in the Canyon Ferry Dam stilling basin area. Adequate mooring lines should be provided for the rafts. The overall height of the airlift as shown in the sketches is 54 feet. If a different water depth is anticipated, the height of the airlift should be adjusted accordingly. Air injection orifice area should also be designed according to water depth.

As shown in Sketch 1, the airlift is being used to clean the bottom of a stilling basin in an area where damage has occurred, discharging the gravel into areas where repairs are not necessary. If it

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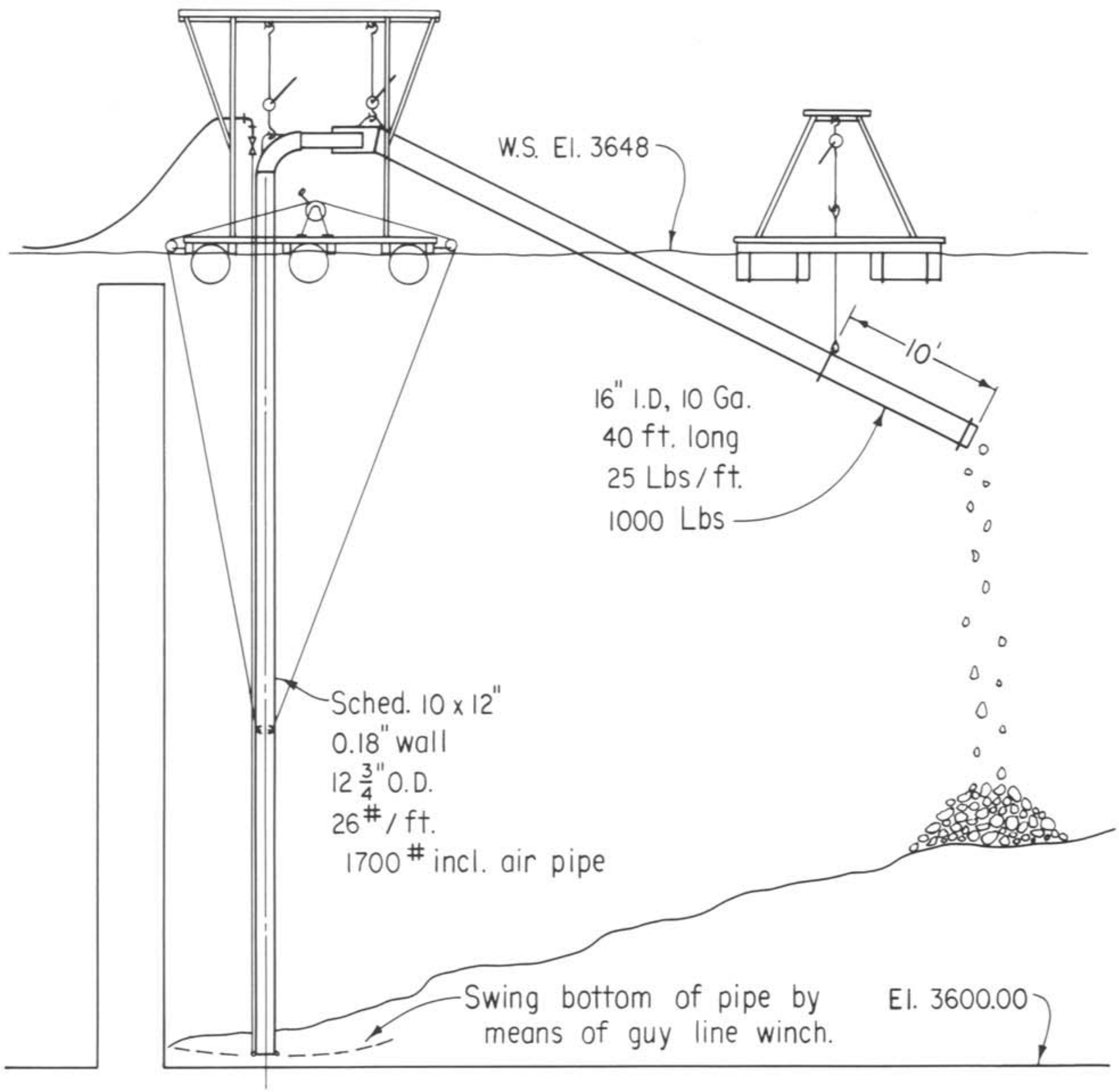
1/ Suggested by R. W. Fowler, Acting Chief, Equipment Installation and Inspection Branch, Division of Construction, Office of Chief Engineer, USBR, Denver, Colorado.



AIR LIFT INSTALLATION

Sketch 1

had been necessary to clean the entire basin or to remove large quantities of gravel, the discharge pipe could be shortened to dump the gravel into skips or barges for transporting it out of the area.

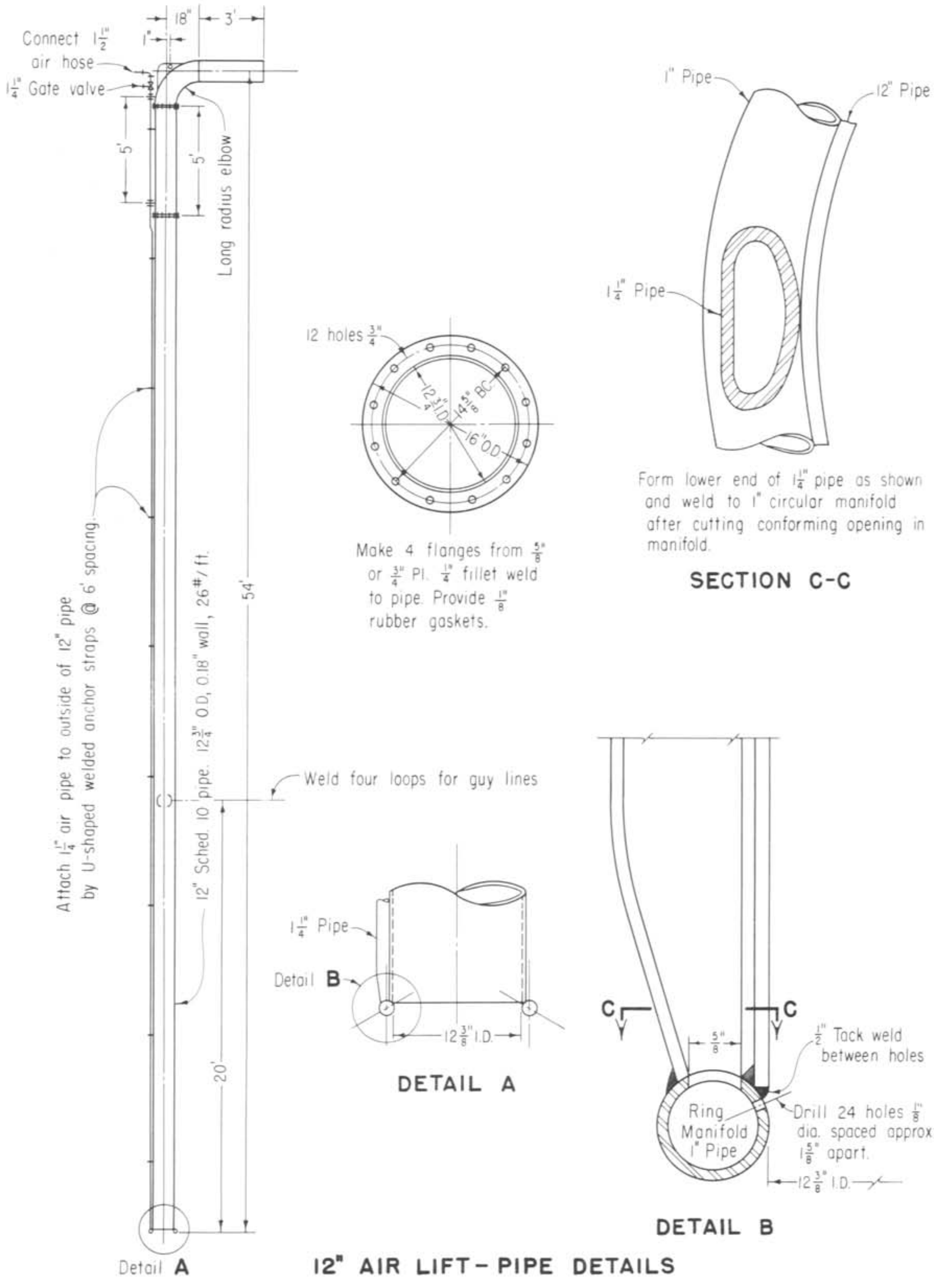
Schedule No. 10 pipe as shown in Sketch 2, is suggested, if using a 12-inch airlift. The raft shown in Sketches 3 and 4, is designed to balance this weight. If Schedule No. 10 pipe is not available, smooth line pipe should be used and should weigh 20 to 30 pounds per foot, with 12-3/4-inch outside diameter. The 12-inch long-radius elbow may have to be Schedule No. 30 or 40. A 5-foot removable section is provided near the top of the airlift to be removed when it is necessary to remove rocks which may jam in the elbow, and to permit shortening of the column for use in shallower water.

To achieve the proper alinement, when installing the homemade pipe flanges it is suggested they be fastened together in pairs by three or four bolts, being careful to square them on the pipe ends and aline the pipe sections before tack-welding the flanges to the pipe. Apply the one-fourth fillet weld in 2-inch beads, skipping 180°, then 90° alternately to minimize warpage of the flange faces. Matchmark the mating flanges so they will always be connected in the same relationship. It is important that the air manifold at the bottom of the airlift be round, that it aline with the inside of the 12-3/8-inside-diameter pipe, and that it be securely welded to the lower end of the pipe so rocks will not beat it off.

The discharge pipe should be smooth, lightweight, and 16 or 18 inches in diameter. Several round support collars should be lightly welded to keep the pipe round. Means to raise or lower this pipe should be provided on the small raft, to insure free flow of the rocks.

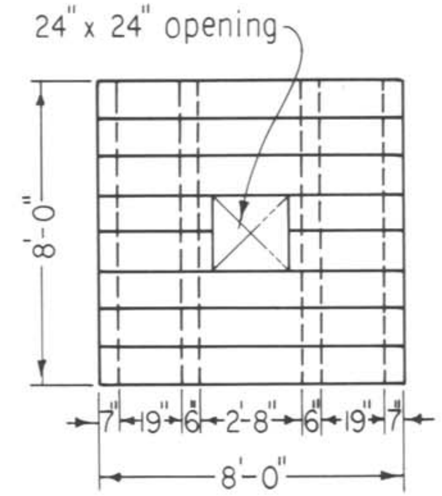
To clean a larger path through the gravel, the bottom end of the airlift can be swung in a short arc. This can be done by tugging on the guy ropes, but a small hand winch makes it easier. The winch drum could be made from a wood block if no other is available.

The estimated air requirement for the 12-inch airlift is 200 cfm, but 300-cfm compressor capacity should be available and the best air rate should be determined by experimentation.



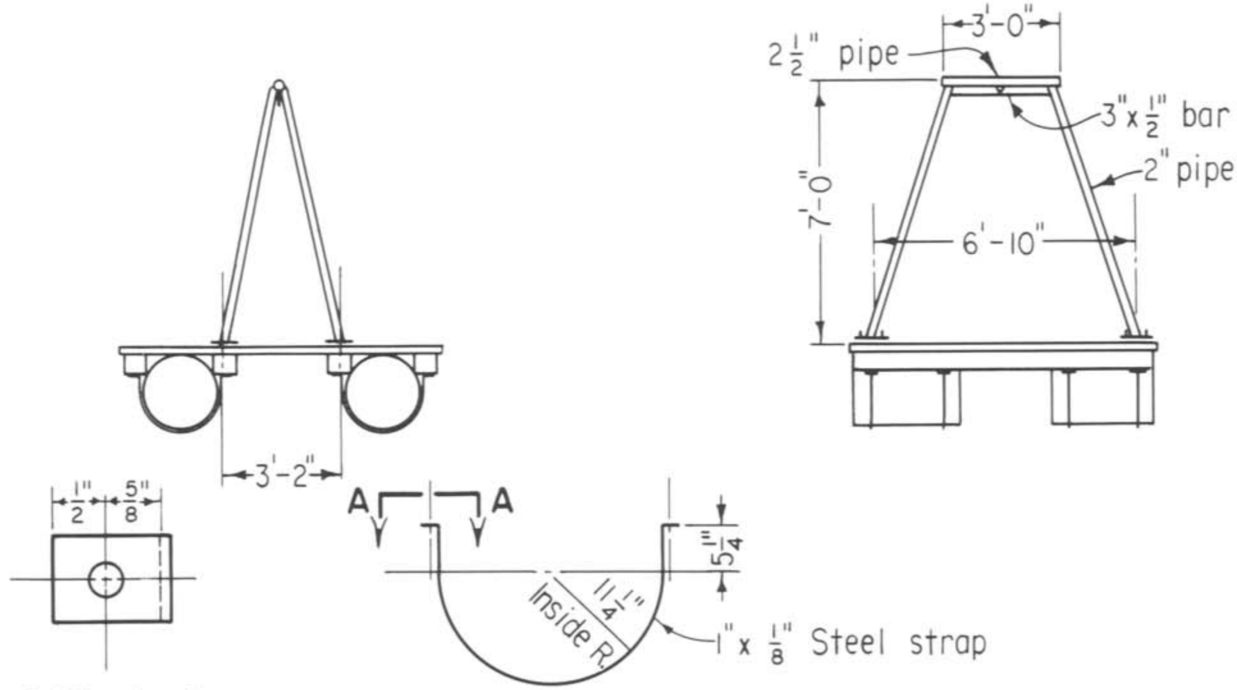
12" AIR LIFT-PIPE DETAILS

Sketch 2



BILL OF MATERIALS

Rough planks 2" x 12" x 8' ---- 8 only
Rough timbers 6" x 6" x 8' ----- 4 only
Std. steel pipe $2\frac{1}{2}$" x 3' ----- 1 only
Std. steel pipe 2" x 7'-4" ----- 4 only
Steel bar 3" x $\frac{1}{2}$" x 3' --------- 1 only
Steel baseplate $\frac{3}{8}$" x 6" x 12" --- 4 only
Oil drums, 55 gallon ----- 4 only
Steel strap, 1" x $\frac{1}{8}$" x 4'-$1\frac{1}{2}$ --- 8 only
Machine bolts, $\frac{1}{2}$" x 10" ------ 8 only
Lag screws, $\frac{5}{16}$" x 3" ------ 20 only
Lag screws, $\frac{3}{8}$" x 6" ------- 20 only
Washers, Nails, Etc.

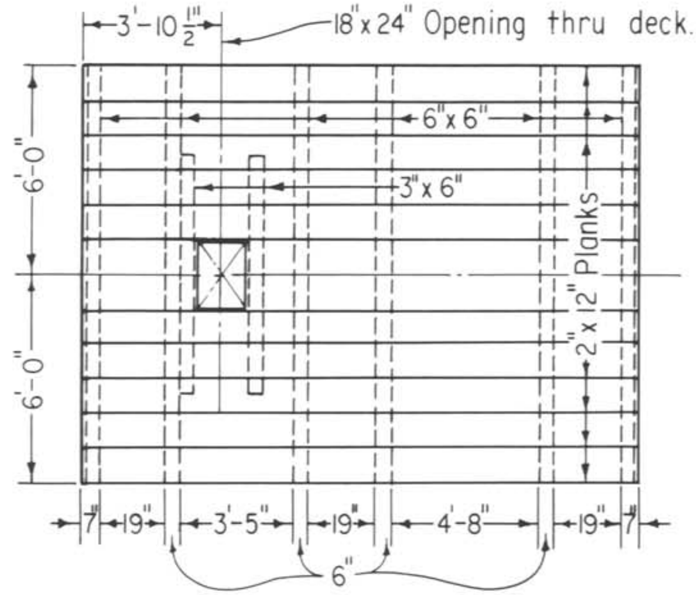


SEC. A-A

DETAIL OF BARREL STRAP

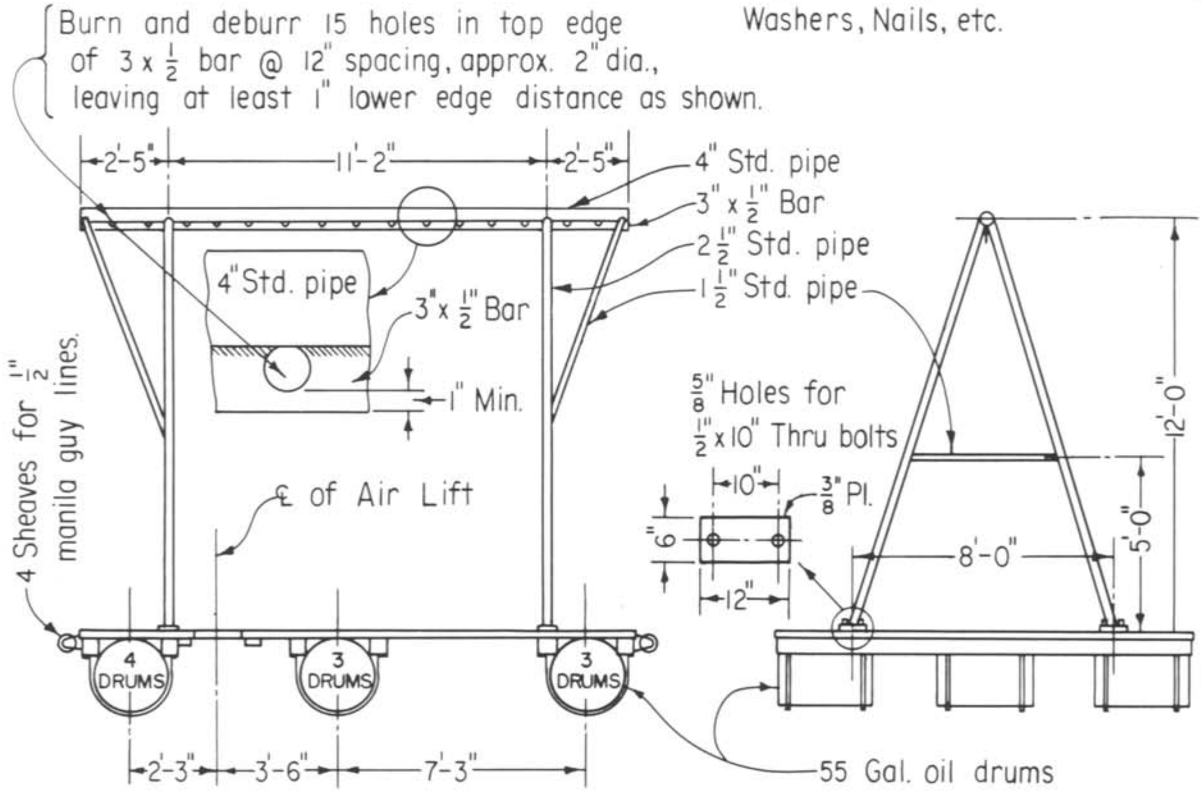
RAFT FOR 16" DISCHARGE LINE

Sketch 3



BILL OF MATERIALS

Sheaves for 1/2" manila rope	4 only
Rough planks 2 x 12 x 16	12 only
Rough timbers 3 x 6 x 7'	2 only
Rough timbers 6 x 6 x 12'	6 only
Std. steel pipe 4" x 16'	1 only
Std. steel pipe 2 1/2 x 12'-9"	4 only
Std. steel pipe 1 1/2 x 7'	4 only
Std. steel pipe 1 1/2 x 4'-6"	2 only
Steel bar 3" x 1/2" x 16'	1 only
Steel plate 3/8" x 6" x 12"	4 only
Oil drums, 55 gal.	10 only
Steel strap 1" x 1/8" x 4'-1 1/2"	20 only
Machine bolts 1/2" x 10"	8 only
Lag. screws 5/16" x 3"	60 only
Lag. screws 3/8" x 6"	72 only
Washers, Nails, etc.	



RAFT FOR AIR LIFT

Sketch 4

* * * * *

DRUM AND BARREL TRUCK
(Suggestion R1-70S-8)

A suggestion we feel worth passing along was made by Emmett L. Olmsted, of the Palisades Power Field Branch, Minidoka Project, Burley, Idaho. Mr. Olmsted suggested that a drum or barrel hand truck commercially available be purchased for use in the powerhouse, for safety and ease of handling barrels of grease when moving them from the storage room to the work area. The truck has proven to be a very worthwhile idea.

This hand truck purchased and shown above is especially designed to handle steel drums easily and safely (Photo P456-D-66669NA). It is of sturdy design, has a capacity of 1,000 lbs., and has rubber-tired wheels.

* * * * *

When goals are exceeded it is too often considered one not requiring management action. In fact, managers frequently feel that everyone should do his best--"He's being paid a good salary and quality work is no more than management has a right to expect." This "quick to criticize, slow to praise" type of management leads to employee apathy which is usually expressed as "they don't care or give any credit for good work." This is a corrosive attitude which destroys employee motivation. No organization can afford to allow it to develop.

Civil Service Journal

MANHOLE AND VAULT STRUCTURE VENTILATION

The Ventura River Municipal Water District has found that there has been a severe ventilation problem in some of their valve and meter vaults and as corrective actions, maintenance personnel are required to pump air in the vault systems before entering them. The requirement for such a program followed a near tragedy to one of the District employees. To prevent this from happening again the following procedures have been made mandatory:

"When It is necessary to enter a manhole or vault at various structures throughout the system, the following safe practices will be followed by all personnel:

1. Before entering unvented manholes or vaults of depths of 6 feet or over, a portable blower will be used to displace the stale air in the hole and provide needed oxygen. The blower will be run at least 5 minutes prior to entering.

2. This practice will also apply to deep holes even if they are vented. Good judgement should apply in determining these.

3. A portable 12-volt blower with hoses will be furnished as part of inventory on each of the following trucks:

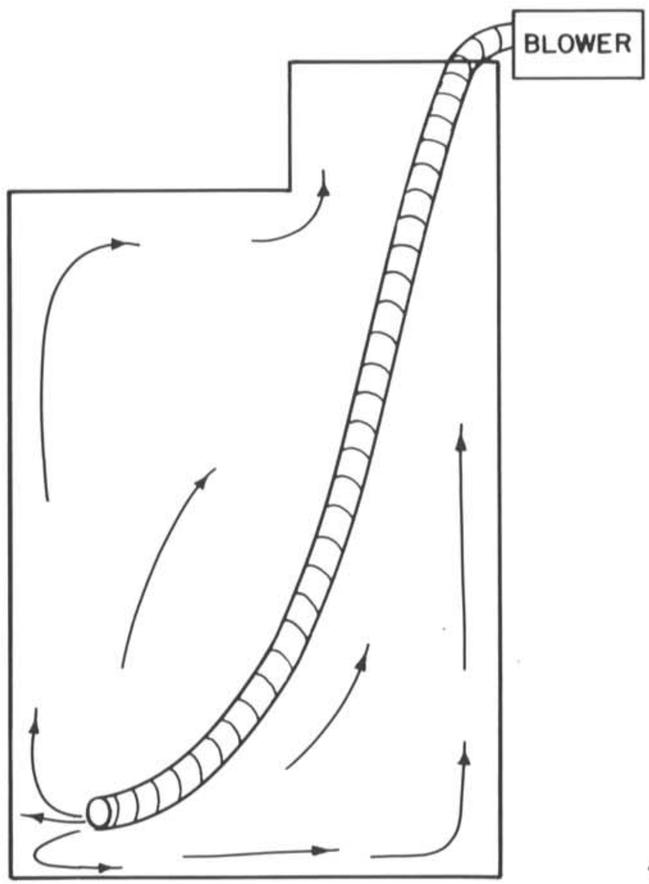
   a. Painter's truck

   b. Valve and pipeline distribution truck

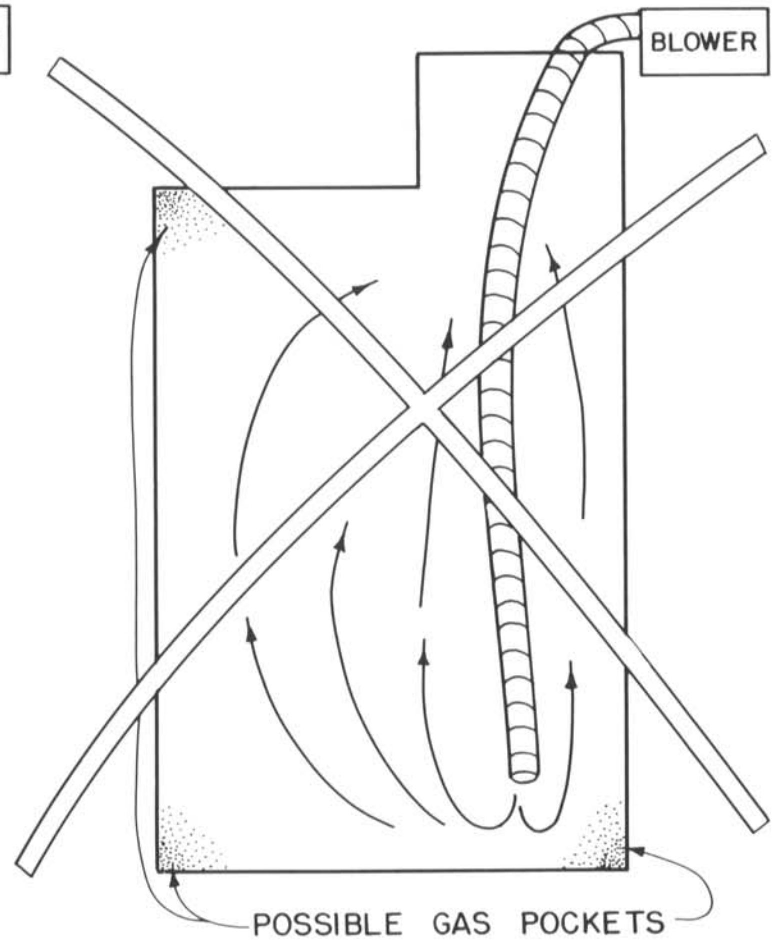
   One blower will be available in the tool checkout in the warehouse with proper leads for connection to truck battery.

4. To get the best circulation of air, the hose should be placed as near to the bottom of hole as possible with the end of hose at the opposite corner of entrance to vault. See drawing on the next page for the right and wrong methods of ventilation."

THIS
COMPLETE VENTILATION



NOT THIS
INCOMPLETE VENTILATION
CHIMNEY EFFECT



LOGGING TRACTORS FOR CANAL DEMOSSING 1/

Old timers in timber country will tell you there are some jobs rubber-tired logging tractors can do that a modern steel track type can't touch. Removing pondweeds and debris from Project canals is just such a job. The use of tractors with heavy metal tracks, made it necessary to place protection on paved roads near the canals to avoid damage to the pavement when crossing, but large rubber-tired logging tractors could cross the roads without any problem.

These tractors, also known as skidders, can move from one job to another under their own power.

A pair of the machines have been purchased by the Salt River Project for this work, and they have proven to be very successful for the job intended. Large discs are placed in the canal and chained to the skidders that are located on both sides of the canal, as shown in the photograph above (Photo P25-D-66664NA), the discs collect the pondweeds that are growing on the bottom.

However, it was reported that the track type tractors do not stay in the garage gathering rust. "In areas where the ground is sandy or muddy, rubber tires have been known to get bogged down; a track type tractor has no trouble completing the job."

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