

0012



United States Department of the Interior
OFFICE OF SURFACE MINING
Reclamation and Enforcement
BROOKS TOWERS
1020 15TH STREET
DENVER, COLORADO 80202

*Orig mine file
cc file
J. Smith*

*ACT/007/004
#3*

AUG 31 1984

RECEIVED

SEP 4 1984

**DIVISION OF OIL
GAS & MINING**

MEMORANDUM

TO: Dave Maxwell, Project Leader
Price River Coal Company, Utah

THRU: *Ron Singh* a/s
Ron Singh, Chief, Hydrology Support Branch

FROM: *Don Minges*
Don Minges, Hydrologist, Hydrology Support Branch

SUBJECT: Field trip to Price River Coal Company (PRCC) to view sediment control structures and consult on U.S. Fish and Wildlife Service (USFWS) streamflow depletion estimate, August 22, 1984

Modifications to existing Hardscrabble Canyon sedimentation control structures were inspected as well as the newly constructed pond 009. Concerns expressed by the State relative to the modified slotted culvert installations across the haul road can be laid to rest since these installations will work as designed. The State's concern centered around the much smaller sheet inflow areas of the culverts. However, road crowning and banking will result in most sheet flow entering the road ditches thereby minimizing the volume of water to be intercepted by the slotted surface drains. With respect to culvert capacities, these are sufficient to route ditch flows to the respective ponds.

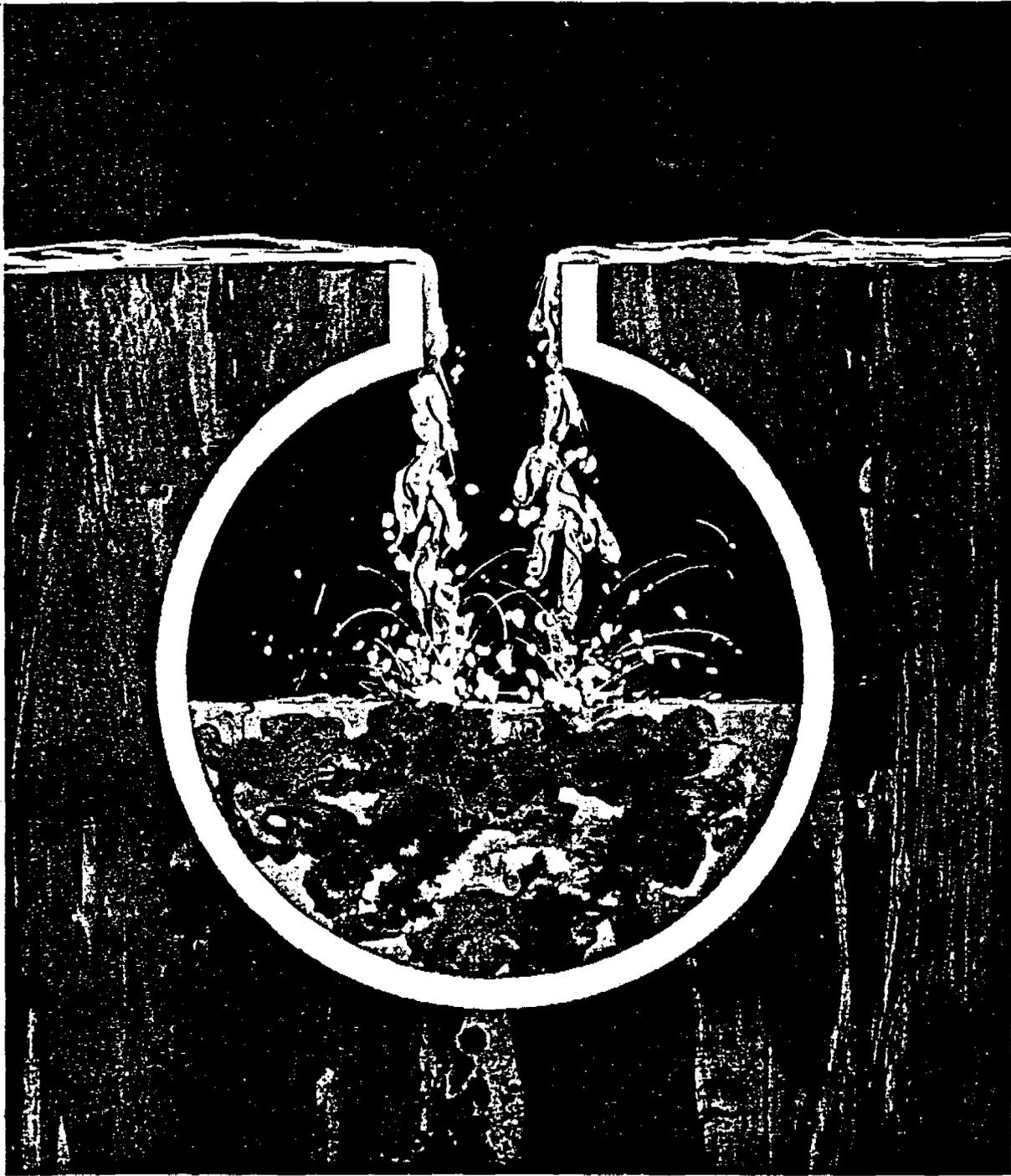
Drop-inlet spillway installations appeared adequate with the outflow from the most downstream spillway (pond 009) protected with adequate riprap. However, all other pond inflow and discharge points are inadequately protected from erosion. It was suggested to the company that a section of culvert be used at the pond 009 entrance to control headcutting of this very steep inflow point. Similar steep inflow points exist at all up-valley ponds but because they have been in place over a period of time, the inflow channels have stabilized somewhat.

Because the ponds work in series, the possibility of discharges exceeding regulatory requirement leaving the permit area appears reasonably remote. The danger appears to be from potential lessening of design capacities, especially with respect to the new pond 009, from sediment accumulation resulting from both headcutting and bank sloughing. This is something that should be checked during inspections and corrected by excavating to re-establish pond capacity where necessary.

The final approach used to arrive at net streamflow depletion for the mine appears to be the correct method. The average of actual diversions over a four-year period from 1980 to 1983 (43 acre-feet per year depletion) gives a reasonable estimate especially considering the range of annual coal productions included in that period. Most USFWS Windy Gap Process estimates are based on a summation of many individual item estimates of indirect losses. In this situation, however, the estimate is based on actual direct losses (diversions) from streamflow .

cc: Walter Swain - OSM
Bob Hagen - OSM, Albuquerque
Susan Linner - UDOGM
Sandy Pruitt - UDOGM
Dianne Nielson - UDOGM

ARMCO SLOTTED DRAINS



The early collection and removal of surface water on roadways promotes safe travel and deters hydroplaning. In the past, conventional drainage systems have called for construction of a combination of dikes and catch basins to intercept and dispose of rainwater that would normally flow in sheets across highways, parking lots, airport runways and other paved areas. Armco Slotted Drain was developed as an improvement in this water removal process.

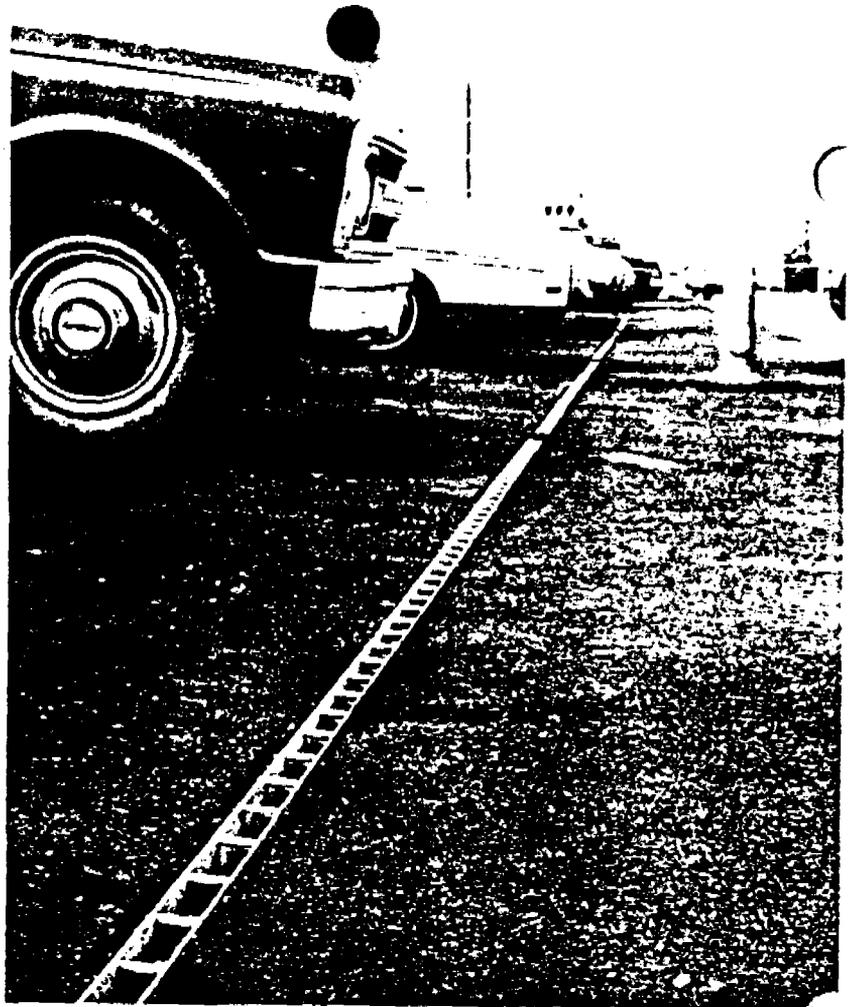
Advantages of Armco Slotted Drain

The basic material in the fabrication of Armco Slotted Drain is Armco Welded-Seam HEL-COR Pipe. This means you're working with the strongest corrugated steel pipe available. The welded seam affords a virtually watertight pipe and straight, uniform pieces.

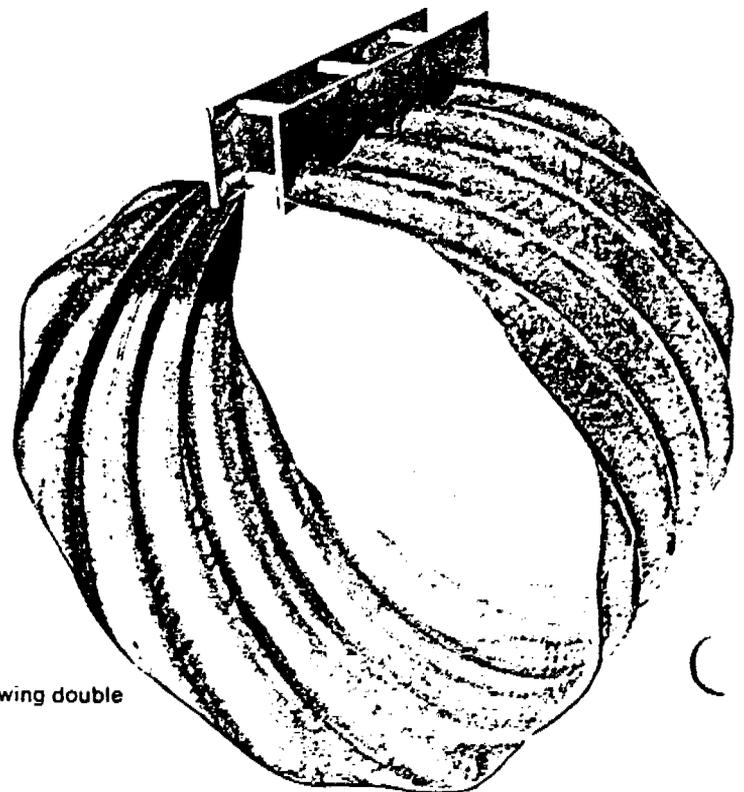
This welded HEL-COR is cut along the longitudinal axis and reinforced with a grate to form a 11 $\frac{1}{16}$ -inch-wide slot opening. As a result, the drain can pick up sheet flow without the use of berms or dikes, eliminating a previously hazardous obstacle in highway medians.

Besides creating a hazard to high-speed vehicles traveling near the median area, the dikes frequently catch and trap dirt and litter. Much of this is not washed into the catch basins in wet weather. Since Armco Slotted Drain intercepts surface sheet flow it thereby minimizes an ice hazard, precludes a ponding effect, and reduces the chances of clogging by runoff-carried debris. This elimination of ponding also applies to parking lots, airport runways and other paved areas.

The grate slot of Armco Slotted Drain is fillet welded at the crest and valleys of every third corrugation of the pipe, thus eliminating bolted construction and providing stronger, straighter installations. It provides a continuous ring to develop maximum ring compression of the pipe wall, and it may be installed flush with the pavement for the most economical installation.



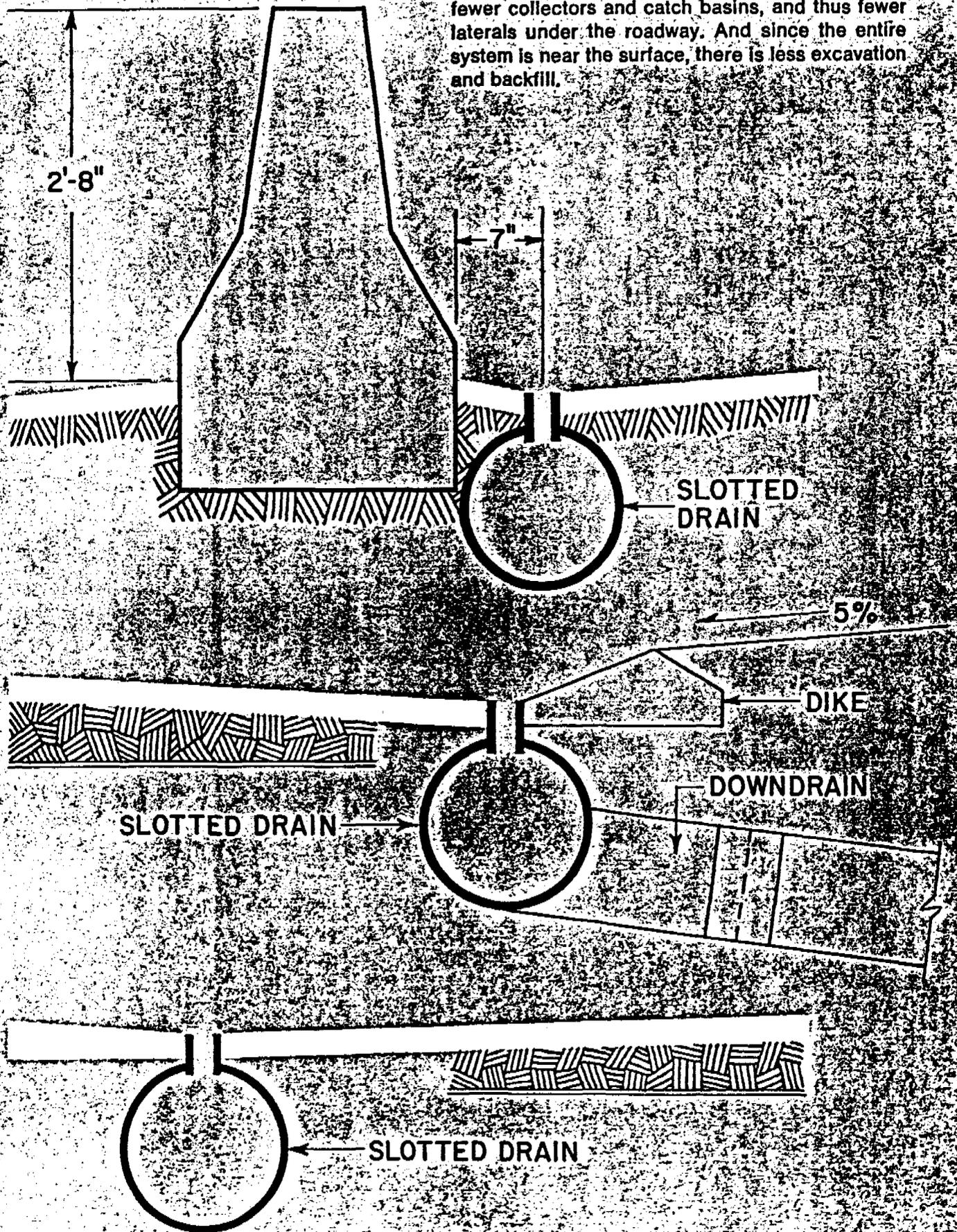
Slotted drain efficiently disposes of runoff in parking lots.



Cross-section detail showing double bar grate.

Installation

One of the inherent economies of Armco Slotted Drain is ease of installation. The 18-inch-diameter Slotted Drain can carry much more water than can be collected by a dike and basin system. This means fewer collectors and catch basins, and thus fewer laterals under the roadway. And since the entire system is near the surface, there is less excavation and backfill.



Hydraulics and Loadings for Slotted Drain

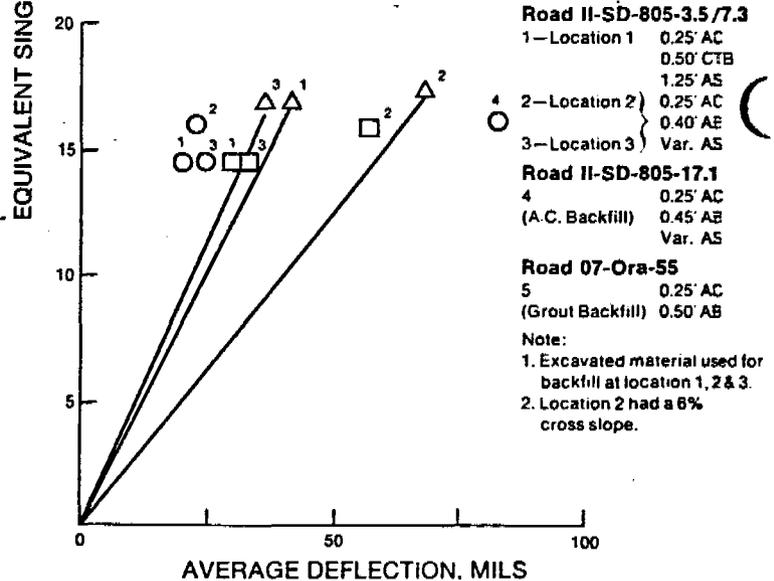
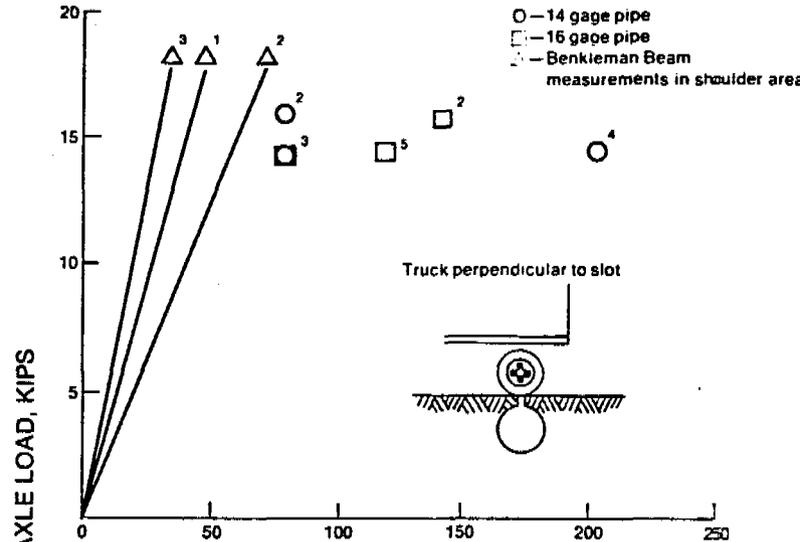
The principal applications of Armco Slotted Drains are: continuous inlets in medians; shoulders; parking lots; other areas where sheet flow is intercepted. In such applications, simple weir formulas can be used to check inlet capacities. As a practical matter, the standard grate top of Slotted Drain has, through experience, been designed to handle any normal sheet flow from urban freeway pavement lanes.

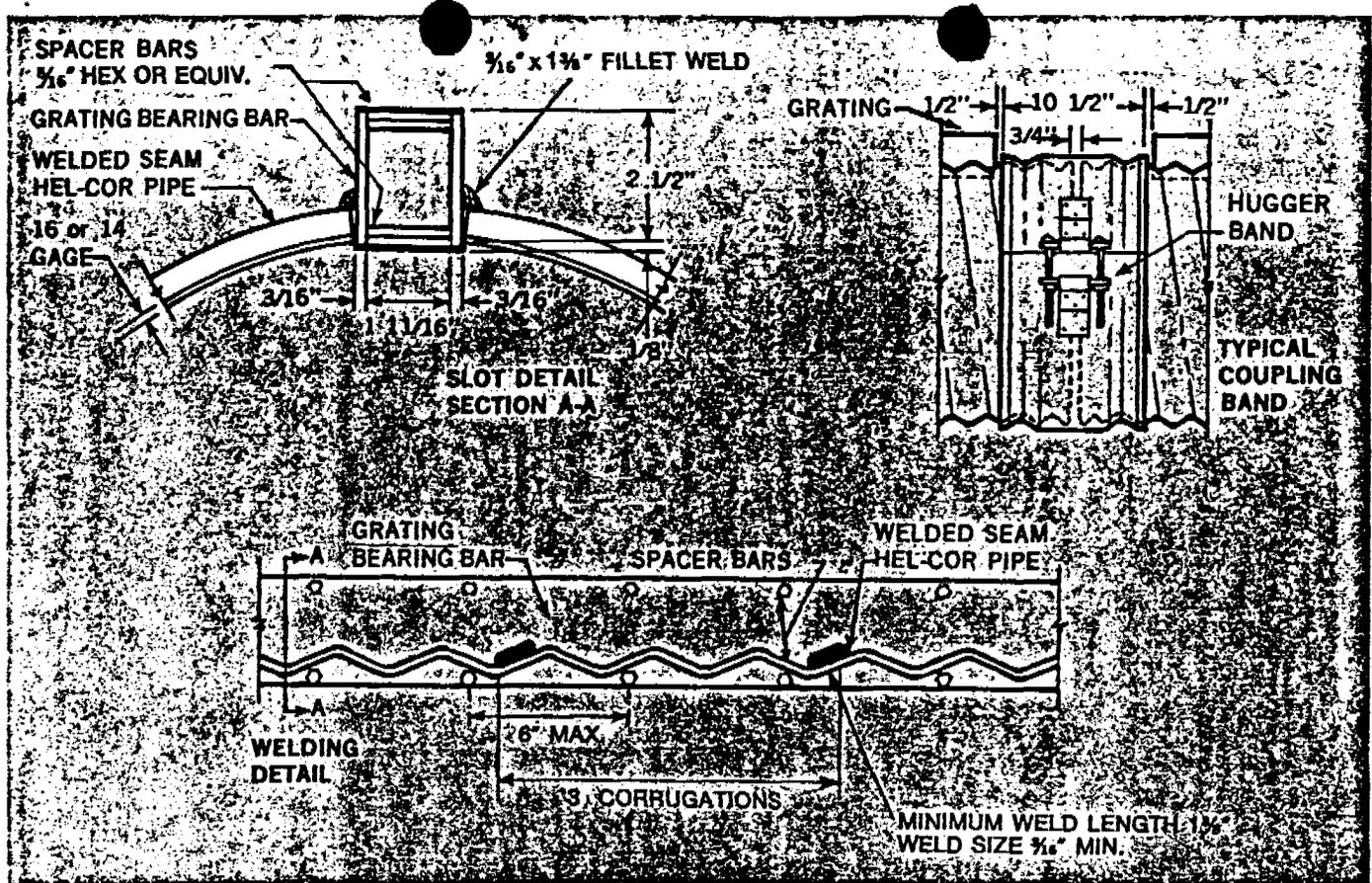
However, there are special cases in which Slotted Drain is used in place of a conventional drop inlet to pick up channel flow. For these instances, California has found that the slot behaves as an orifice when flow is deeper than 2½ inches, and as a weir when flow is less than 2½ inches. Details of the hydraulic calculations for this special application are available on request. For rough approximations, a generally accepted rule is: 40 feet of 18-inch Slotted Drain will collect as much water as two 36-inch square drop inlets.

REFERENCE: Nordlin, E. F., Stoker, J. R., and Page, B. G., "Slotted Corrugated Metal Pipe Drains." State of California, Department of Public Works, Division of Highways, Materials and Research Department Research Report 636453, August, 1971.

Key for Load Table Symbols:
 AC—Asphaltic Concrete
 AS—Aggregate Subbase
 AB—Aggregate Base
 CTB—Cement Treated Base

LOAD-DEFLECTION RELATIONSHIPS





Specifications

The Slotted Drain is made from Armco Welded-Seam HEL-COR Pipe with HUGGER Joints and meets the applicable portions of AASHO Designation: M-36.

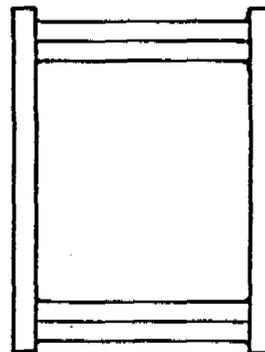
Grate assemblies are made from structural steel suitably welded to form the open slot and are hot-dip galvanized to meet the provisions of ASTM Designation: A-123.

Normal pipe sizes are from 12-inch through 36-inch diameters, and in 16 gage through 14 gage.

Backfill

Good backfill is important on all corrugated steel pipe installations but it is even more important on Slotted CSP structures since they are so close to the road surface. In order for a Slotted CSP structure to withstand concentrated wheel loads, it must have excellent backfill.

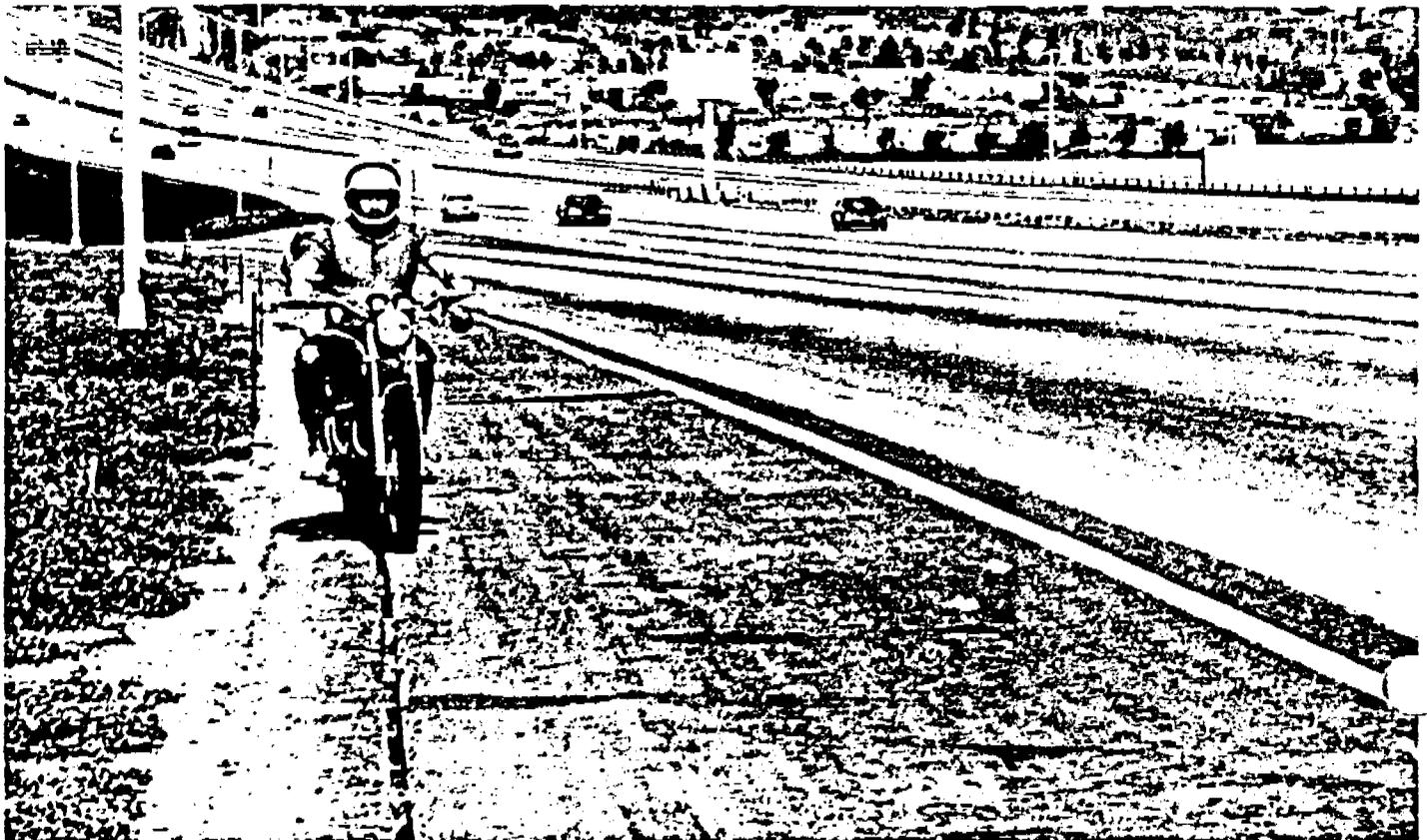
In some circumstances it may be economical to use relatively expensive backfill materials such as lean grout. An example of this would be a very narrow trench without sufficient room to allow practical compaction procedures.

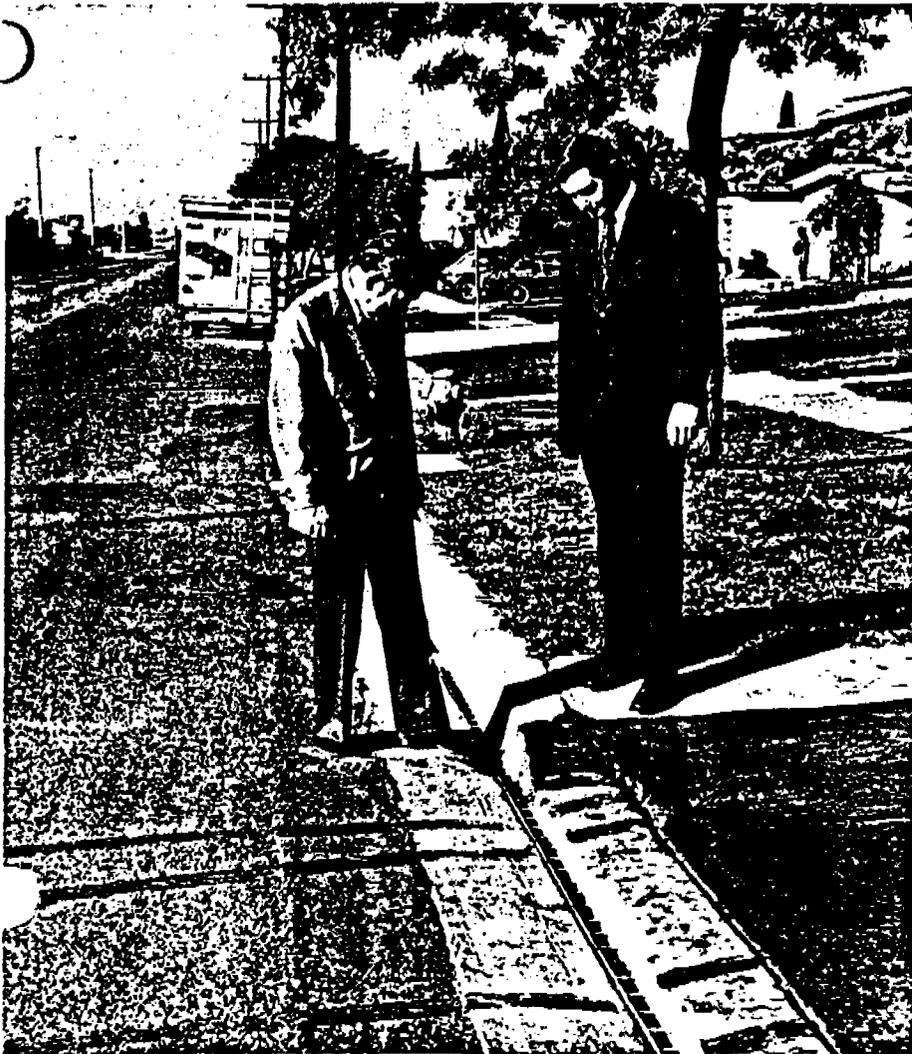
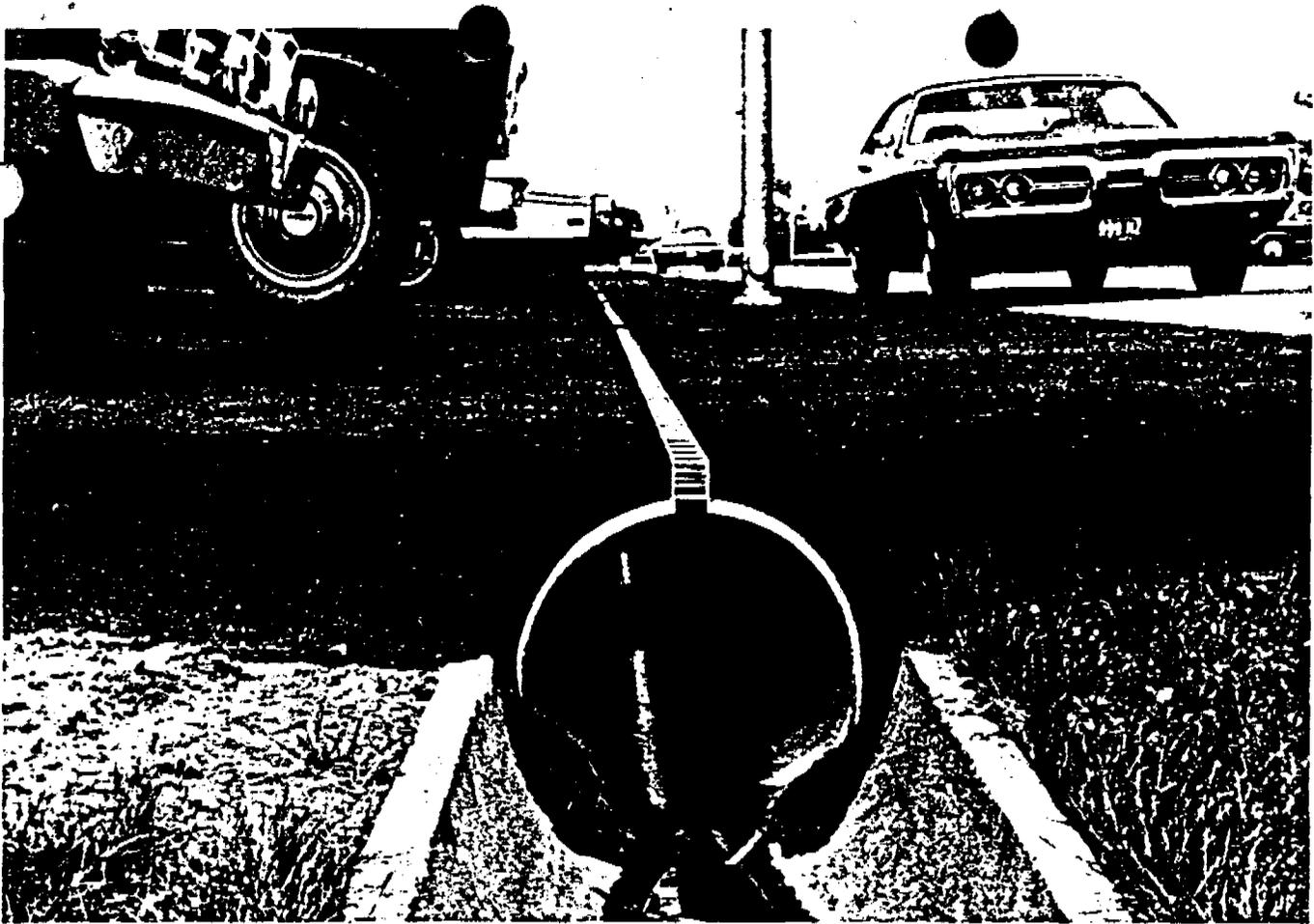


Armco Slotted Drain is simple to install. A strip of tape on the grating serves to prevent backfill material entering the pipe as installation proceeds.



Armco Slotted Drain, with its double bar grating, eliminates safety hazards for two-wheeled traffic.





Armco Slotted Drains can be used in a variety of applications. They serve in parking lots and residential areas as well as highway installations.

CHECK THESE IMPORTANT

Drainage and Construction Aids:

ARMCO ASBESTOS-BONDED PIPE

for sewers, culverts and drains where corrosive conditions are severe.

ARMCO BIN-TYPE RETAINING WALLS

for unstable slopes, limited rights-of-way, shore and bank protection.

ARMCO BRIDGE PLANK

for reflooring bridges and for new bridge construction.

ARMCO END SECTIONS

a modern end finish for culverts or sewer outfalls, either pipe or pipe-arch structures.

ARMCO FLEX-BEAM GUARDRAIL

a safety device for highways, bridges, parking lots and dead-end streets.

ARMCO HEL-COR PIPE AND PIPE-ARCH

for use under airports, railways and highways as culverts, drains, sewers, conduits.

ARMCO LINER PLATES

for new openings or relining existing tunnels and shafts.

ARMCO MULTI-PLATE PIPE, ARCH AND PIPE-ARCH

for large culverts, drains and conduits.

ARMCO PAVED-INVERT PIPE

for culverts and sewers subject to severe erosion.

ARMCO PERFORATED PIPE

for subdrainage under airports, highways, railways, playgrounds and athletic fields.

ARMCO SMOOTH-FLO SEWER PIPE

for top flow capacity plus proved strength of corrugated steel design.

ARMCO STEEL BUILDINGS

for offices, shops, utility buildings and other structures.

ARMCO STEEL SHEETING

for trenches, cofferdams, foundations, shore protection.

ARMCO TRUSS PIPE

for small-diameter sanitary sewers.

ARMCO WATER CONTROL GATES

for irrigation and drainage, sewer outfalls, flood control, land reclamation, water and sewage treatment plants.

Armco, the Armco Triangle, ASBESTOS-BONDED, FLEX-BEAM, HEL-COR, MULTI-PLATE, PAVED-INVERT, SMOOTH-FLO and TRUSS PIPE ® trademarks of Armco Steel Corporation, Middletown, Ohio
HUGGER Joint trademark of Armco Steel Corporation

Armco Steel Corporation, Metal Products Division,
Box 800, Middletown, Ohio. Regional Offices in Fol-
lowing Cities: Baltimore, MD • Topeka, KS • South
Bend, IN • Lafayette, CA • Sales Offices in Wash-
ington, D. C., and Other Principal Cities. In Canada:
Armco Canada Ltd., Guelph, Ontario.

