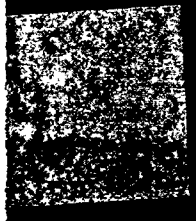
PLAINTIFF'S EXHIBIT
JMMC-322

TRANSITE® PERFORATED UNDERDRAIN PIPE



For subsurface drainage systems designed to serve:

ABUTMENTS
AIRPORTS
BASEBALL FIELDS
BUILDING FOUNDATIONS
CEMETERIES
EMBANKMENTS
FARM LANDS
FLOOD CONTROL PROJECTS
GOLF COURSES
HIGHWAYS
PARKING AREAS
PARKS
PLAYGROUNDS
POWER STATIONS
RACE TRACKS
ROADWAYS & STREETS
RETAINING WALLS
DAMS
DIKES
RIDGES
RAILROADS, ETC.
SHOPPING AREAS
STADIUMS

MATERIAL

The basic ingredients of Transite are (1) asbestos fibers (2) portland cement and (3) silica—three minerals that are "at home" in the ground. These ingredients form a dense uniform pipe structure with the asbestos fibers acting as a reinforcing agent in much the same manner as steel rods are used to reinforce concrete. Because of its great strength and toughness, Transite needs less wall thickness than many materials used in drainage service, making it lightweight, easy to handle and able to withstand normal abuse.

PIPE SIZES, STANDARD LENGTHS AND WEIGHTS

Pipe Size (In.)	Standard Length	Wt. Pipe* Lbs. Per Ft.	Plastic Coupling Approx. Wt., Lbs.
4	10'	3.6	.19
6	10'	7.5	.26
8	10'	12.9	.51
10	13'	14.8	.82
12	13'	20.0	1.54

(*without coupling)
(Unperforated Pipe also available for outfall lines. Sizes, lengths and weights same as perforated pipe)

CRUSHING STRENGTH

PIPE SIZE (Inches)	TOTAL APPLIED LOAD* LBS. PER LINEAL FT.	PIPE LENGTH (Feet)
4	1,000	10'
6	1,100	10'
8	1,300	10'
10	1,400	13'
12	1,500	13'

*ASTM 3-Edge Bearing Method

CORROSION RESISTANCE

Transite resists corrosion inside, outside, all-the-way-through. Transite is immune to rust and to chemical, galvanic and electrolytic types of corrosion. Numerous installations for mine drainage, in cinder fills and for salt water disposal lines are further evidence of Transite's high stability, maintained hydraulic efficiency and long, economical performance. They document why Transite is considered the most corrosion-resistant pipe in general use. This degree of corrosion resistance is achieved through autoclaving—the process used to cure Transite Pipe.

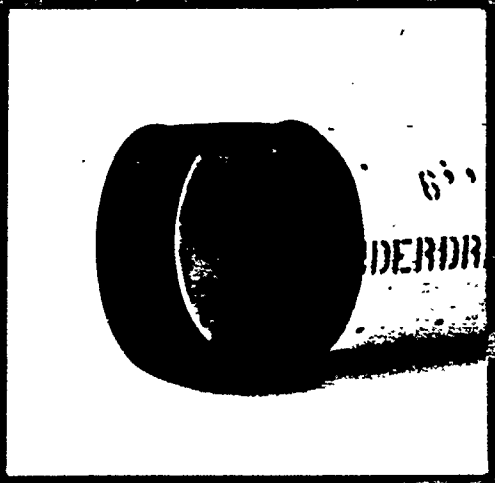


This photo shows an actual demonstration of Transite's capabilities as a subsurface drainage pipe.

ASSEMBLY OF JOINT



1.

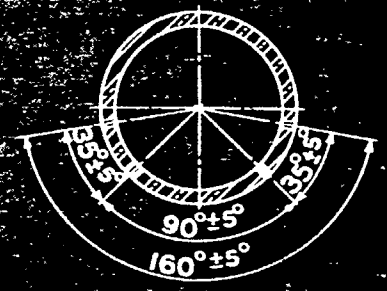


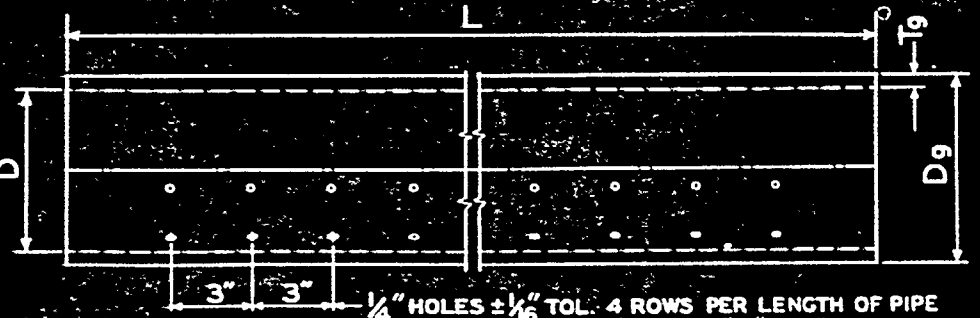
2.



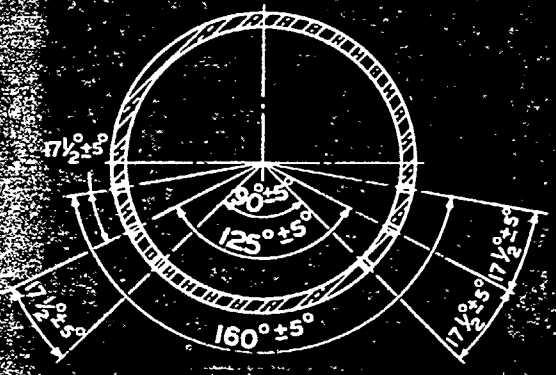
3.

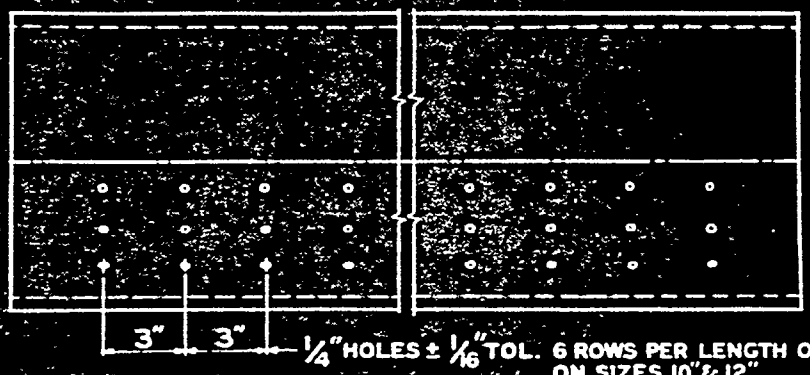
DIMENSIONAL DATA – PRODUCT



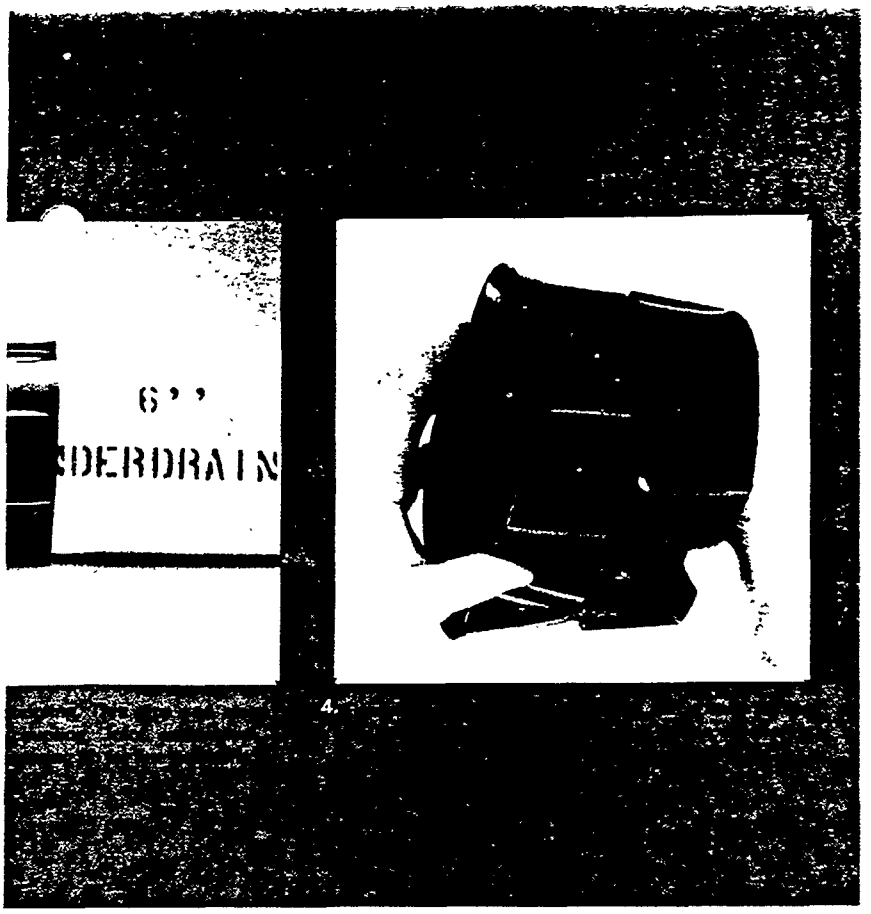


¼" HOLES ± 1/16" TOL. 4 ROWS PER LENGTH OF PIPE ON SIZES 4", 6" & 8"

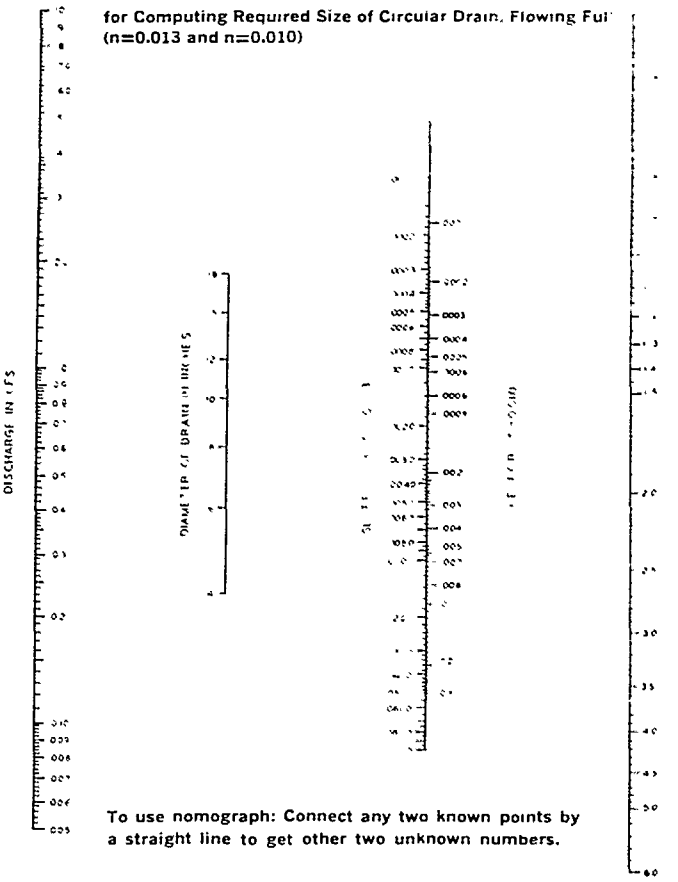


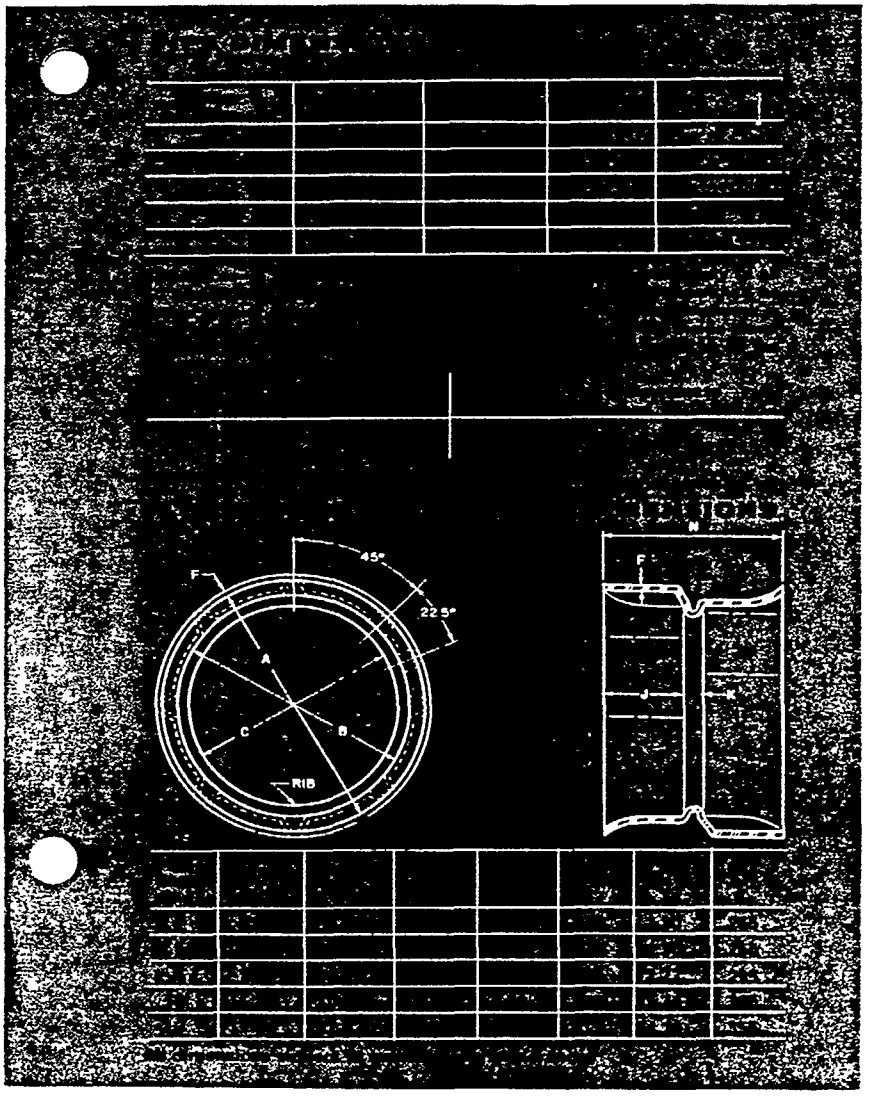


¼" HOLES ± 1/16" TOL. 6 ROWS PER LENGTH OF PIPE ON SIZES 10" & 12"



NOMOGRAPH





FILTER MATERIALS

Expressed in its simplest form, the requirements of a filter medium for subdrains are (1) the filter material should not wash through the drain pipe openings (2) the grain sizes and gradations should permit the easy flow of water from the drainage field to the drain pipe and yet (3) eliminate the infiltration of the fine particles of the base soil into the filter medium which might result in clogging the filter or washing through it into the drain pipe openings.

Studies have been made to determine the filter medium requirements to prevent infiltration of fines and filter media into underdrain pipes. One of the well known and accepted studies is that conducted by the U. S. Waterways Experiment Station at Vicksburg, Miss. Conclusions reached were:

"a. A fine material will not wash through a filter material if the 15 per cent size of the filter material is less than five times as large as the 85 per cent size of the fine base material.

b. In addition to meeting the above size specification, the grain size curves for filter and base materials should be approximately parallel in order to minimize washing of the fine base material into the filter material.

c. Filter materials should be packed densely in order to reduce the possibility of any change in the graduation due to movement of the fines.

d. A filter material is no more likely to fail when flow is in an upward direction than otherwise, unless the seepage pressure becomes sufficient to cause flotation or a 'quick' condition of the filter.

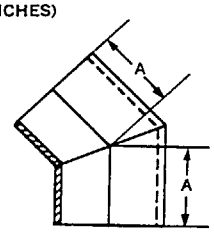
e. A well-graded filter material is less susceptible to running through the drain pipe openings than a uniform material of the same average size. However, even a filter material having a wide range of graduation cannot be used successfully over a drain pipe having large openings, since enough fine particles to cause serious clogging will move out of the well-graded material into the pipe."

Material approximately the same size and grade as concrete sand (AASHO Spec.) can be used as a filter medium and is, in fact recommended by many authorities.

FITTINGS AVAILABLE

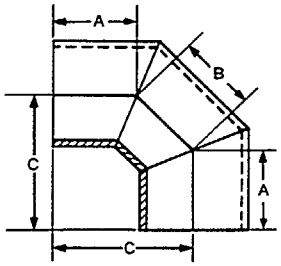
(ALL DIMENSIONS IN INCHES)

45° ELBOW



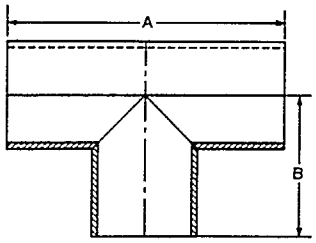
SIZE	4	6	8	10	12
A	4.5	5.0	6.0	7.5	8.5
Wt. lbs	2.7	6.3	12.9	18.6	28.4

90° ELBOW



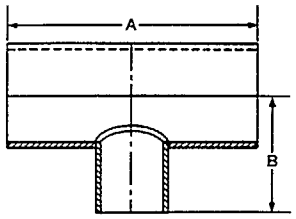
SIZE	4	6	8	10	12
A	4.5	5.0	6.0	7.5	8.5
B	4.25	4.95	5.66	6.38	7.78
C	7.5	8.5	10.0	12.0	14.0
Wt. lbs.	3.9	9.4	19.0	26.4	41.5

TEE



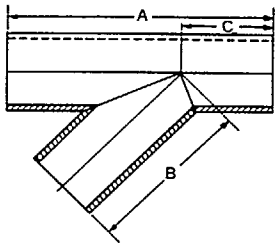
SIZE	4	6	8	10	12
A	12.0	14.0	17.0	21.0	24.0
B	6.0	7.0	8.5	10.5	12.0
Wt. lbs.	4.6	11.0	22.4	32.1	49.3

REDUCING TEE



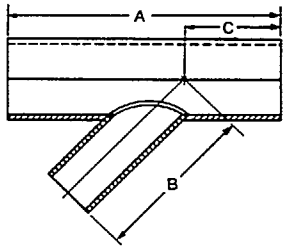
SIZE	6 x 4	8 x 6	10 x 6	10 x 8	12 x 8	12 x 10
A	14.0	17.0	21.0	21.0	24.0	24.0
B	7.0	8.0	9.0	9.5	10.5	11.5
Wt. lbs.	9.1	20.3	25.8	31.3	44.6	46.6

45° WYE



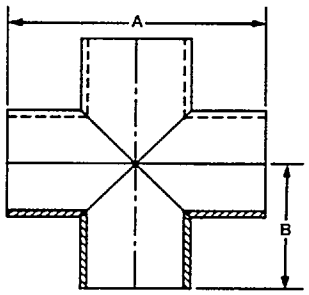
SIZE	4	6	8	10	12
A	14.0	17.0	21.0	25.0	31.0
B	9.0	12.0	15.0	18.0	22.0
C	5.0	5.0	6.0	7.0	9.0
Wt. lbs.	5.9	15.2	31.7	43.5	73.4

45° REDUCING WYE



SIZE	6 x 4	8 x 6	10 x 6	10 x 8	12 x 8	12 x 10
A	17.0	21.0	25.0	25.0	31.0	31.0
B	10.5	13.5	14.5	16.5	18.0	20.0
C	5.0	6.0	7.0	7.0	9.0	9.0
Wt. lbs.	11.9	25.8	33.9	38.6	59.0	62.1

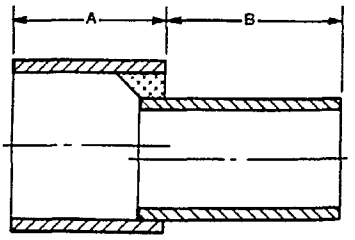
CROSS



SIZE	4 x 4	6 x 6	8 x 8	10 x 10	12 x 12
A	12.0	14.0	17.0	21.0	24.0
B	6.0	7.0	8.5	10.5	12.0
Wt. lbs.	5.7	13.3	26.6	38.2	58.3

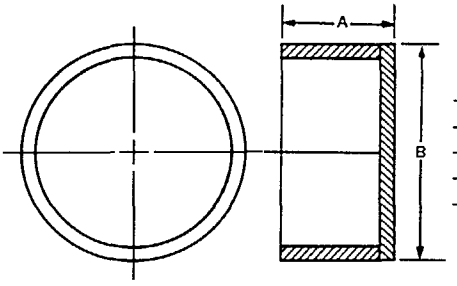
FITTINGS AVAILABLE continued

INCREASER



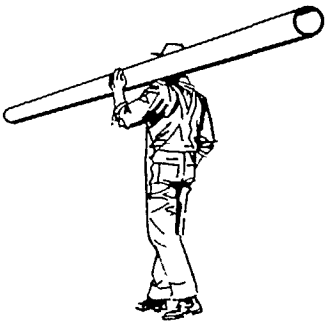
SIZE	4 x 6	6 x 8	8 x 10	10 x 12
A	8.0	8.0	8.5	13.0
B	4.0	4.0	4.5	4.5
Wt. lbs.	10.1	14.5	21.6	35.9

END CAP



SIZE	4	6	8	10	12
A	2.25	2.25	2.75	2.75	3.25
B	5.99	8.23	10.54	12.43	14.65
Wt. lbs.	1.4	2.3	4.3	5.5	7.6

INSTALLATION



When installing Transite Underdrain Pipe, standard and accepted practices of trenching and bedding apply. Transite helps simplify and speed up installation. One man can handle Transite's long lengths in the popular sizes. They are that light. This light weight also contributes to reduce costs in on-job hauling, stringing out, lowering into trench and in assembly.

Transite Underdrain Pipe is easy to cut. The Wheeler "Snap type" cutter illustrated here requires no stand or clamp. One man, with one motion, pushes handles together—Transite snaps off cleanly.



Note: Other means of cutting include hand cutting by a bow saw with a blade such as Disston #45, or Swedish steel, and a hack saw with blades such as molybdenum, and Disston high speed steel #10/HI2460.

The services of our Field Representatives are offered without cost to you—only upon request, and solely at our discretion for such period of time as we deem necessary. Our representatives will give initial instructions as covered in our installation guides. This service is offered on the condition that Johns-Manville shall not be deemed to have approved or in any manner to have assumed responsibility for the engineering design of the job, supervision, inspection or quality of the workmanship employed in the installation of the pipe or pipe materials.

RECOGNIZED STANDARDS COVERING TRANSITE UNDERDRAIN

AASHO M 189-60

ASTM C-508-67 (Type II)

SS-P-00340 Interim Federal Specification (As Amended)

F.A.A. Supplement No. 2 to June 1959 Edition of Standard Specifications for Construction of Airports.

Nation-wide Acceptance Through State Highway Specifications

REFERENCE MATERIAL AVAILABLE FROM JOHNS-MANVILLE

- J-M Material Specification DS-927
- J-M TR-324A (handbook for engineers)

[illegible] SPECIFICATION

MATERIALS: Transite Underdrain Pipe and fittings shall be composed of asbestos fiber, cement and silica and shall be free of organic substances . . . shall be autoclave cured to produce 1% or less uncombined Calcium Hydroxide in the finished products. Couplings shall be made of virgin polyethylene plastic or other approved flexible material.

DIMENSIONS AND STRENGTHS:

SIZE	Standard Lengths*	Tolerances on Diameter**	Rows of ¼" Perforations on 3" Centers	Crushing Strength***
[illegible]	[illegible]	[illegible]	4	1000
[illegible]	[illegible]	[illegible]	[illegible]	1100
[illegible]	[illegible]	[illegible]	[illegible]	1300
10"	[illegible]	[illegible]	6	1400
[illegible]	[illegible]	[illegible]	6	1500

* Up to 15% of footage may be shipped in random lengths over 7' long.

** Diameters measured at pipe ends.

*** ASTM 3-Edge Bearing Method.

JOINTS: One sleeve type plastic coupling shall be furnished with each length of pipe to facilitate joining and aligning the pipe ends without the use of sealing compounds.

FITTINGS: Tees, wyes, reducing tees and wyes, increasers, crosses and end caps shall be made of the same material as the pipe.

WARRANTY—Johns-Manville warrants that our products are manufactured in accordance with the applicable material specifications and are free from defects using our specifications as a standard. The limit of our liability for failure of any of our products to meet the foregoing warranty or for breach of any other warranty, express or implied, shall be to supply an equivalent amount of products for any materials returned to us within 6 months of shipment and found to be defective by us. *Due to the widely varying conditions under which our products are used or installed, we offer no warranty, express or implied, as to their length of service life or suitability for any particular purpose.* In no event shall we be liable for incidental or consequential damages. No person is authorized to bind us for any further warranty obligation beyond that stated in this paragraph.

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