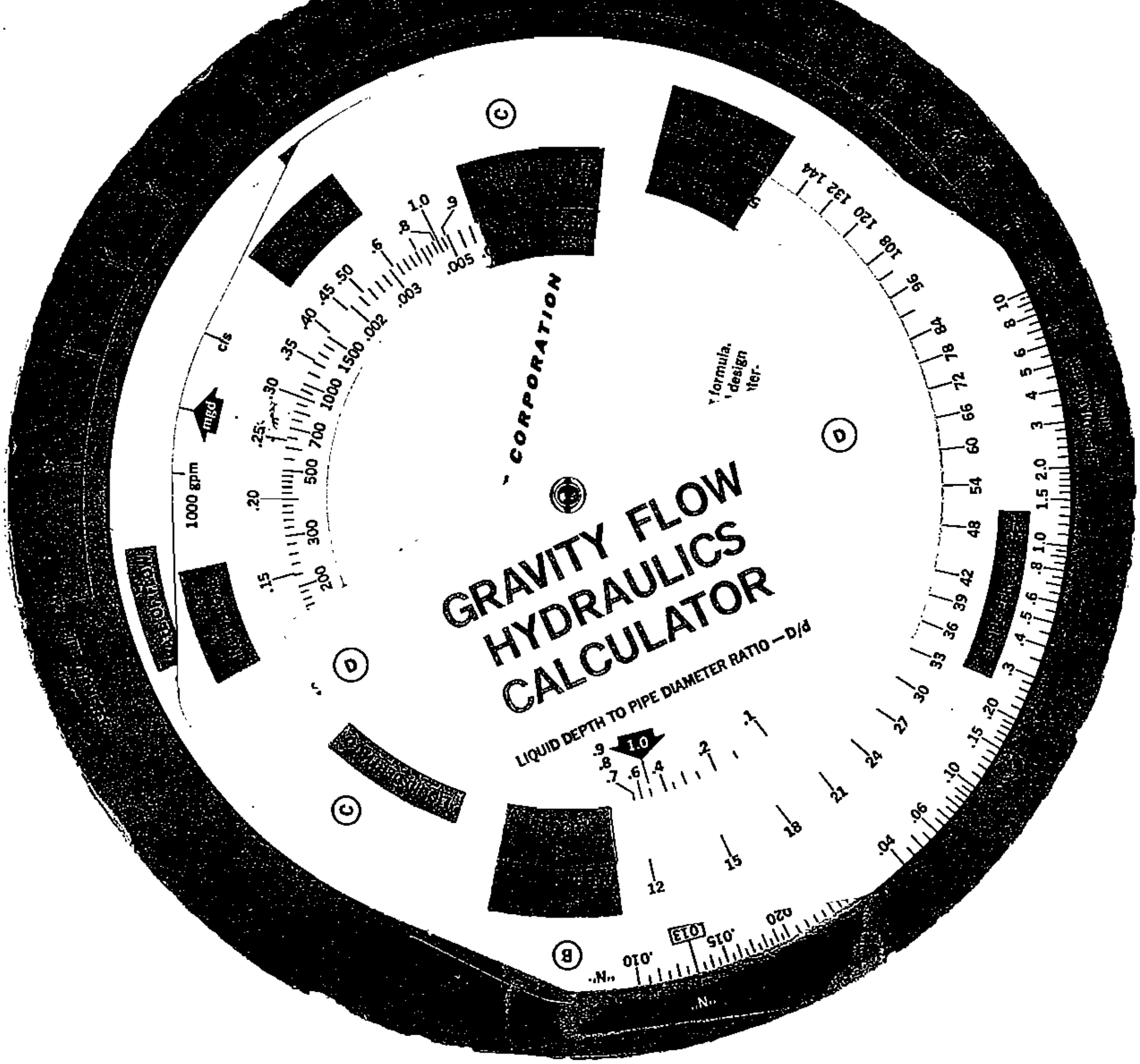
CONVERSION TABLES


GRAVITY FLOW
HYDRAULICS
CALCULATOR
LIQUID DEPTH TO PIPE DIAMETER RATIO — D/d
CORPORATION
1000 gpm
cfs
mgd

GRAVITY FLOW HYDRAULICS CALCULATOR

Based on Mannings Formula

$$Q = \frac{1.49\ AR^{2/3}S^{1/2}}{N}$$

UNKNOWN	UNITS OF MEASURE
Rate of Flow (Q)	Cubic Feet per Second (cfs) Million Gallons per Day (mgd) Thousand Gallons per Minute (gpm)
Roughness Coefficient (N)	N/A
Velocity (V)	Feet per Second (fps)
Diameter (D)	Inches
Slope (S)	Feet per Hundred Feet (%)

OPERATING INSTRUCTIONS

The Flow Rate Indicators, on Disc "C", coordinates with the Rate of Flow Scale on Disc "B", to indicate the rate of flow. Rate of flow is indicated in three different units of measure at the same time — million gallons per day (mgd), thousand gallons per minute (1000 gpm) and cubic feet per second (cfs).

The Velocity Scale, on Disc "B", coordinates with the Pipe Diameter, on Disc "C", to indicate velocities and pipe sizes required for the indicated rate of flow, pipe flowing full.

The "N" Indicator, on Disc "A", and the "N" value, on Disc "B", coordinate to indicate the Roughness Coefficient, "N".

The Slope Scale, on Disc "C", and Pipe Diameter, on Disc "A", coordinate to indicate slopes and corresponding pipe sizes required for the indicated rate of flow, pipe flowing full.

The Liquid Depth to Pipe Diameter Ratio, Disc "C", and the Partial Flow Rate, Disc "B", coordinate to indicate ratios of liquid depth to pipe diameter at various rates of flow when the pipe is flowing less than full. Since the Partial Flow Rate is referenced in mgd, all other values on this scale will also be in mgd.

The D/d ratio, Disc "D", and the Pipe Diameter, Disc "C", directly relate to the Velocity Scale, Disc "B", to indicate velocities, in pipes of selected size, corresponding to various ratios of liquid depth to pipe diameter determined for various rates of flow.

EXAMPLES

EXAMPLE 1: Convert 6.0 cfs to equivalent rates of flow expressed in mgd and in gpm.
SOLUTION: Set the cfs indicator to 6.0 on the Rate of Flow Scale. The mgd indicator and the 1000 gpm indicator point, respectively, to 3.9 and to 2.7 (2700 gpm), answers.

EXAMPLE 2: Determine the required diameter and slope for the discharge of 6.0 cfs through a pipe having a coefficient of roughness of 0.014 and flowing full at a velocity of 2.5 feet per second. Also determine the ratio of liquid depth to pipe diameter and the velocity when the rate of flow decreases to 0.75 mgd.
SOLUTION: Set the cfs indicator on 6.0 on the Rate of Flow Scale and the "N" scale with 0.014 opposite the "N" indicator. The required pipe diameter is 21", answer, found on the Slope Scale, opposite 2.5 on the Velocity Scale. The required slope, 0.16 feet per hundred, answer, is found on the Slope Scale, opposite 21" on Disc "C". When the rate of flow decreases to 0.75 mgd, the ratio of liquid depth to pipe diameter is 0.3, answer, found on Disc "C" opposite 21" on Disc "D". When the rate of flow decreases to 0.75 mgd, the velocity is 1.95 feet per second, answer, found on the Velocity Scale, opposite 0.3 on the Pipe Diameter Ratio Scale. Next, set the D/d value of 1.0 on Disc "D" opposite 21" on Disc "C". When the rate of flow decreases to 0.75 mgd, the velocity is 1.95 feet per second, answer, found on the Velocity Scale, opposite 0.3 on the D/d ratio on Disc "D".

EXAMPLE 3: For the discharge of 4.6 mgd, determine the required diameter of pipe whose slope is 0.20 feet per hundred and whose coefficient of roughness is 0.016. Also determine the velocities at this rate of flow and at 2.3 mgd.
SOLUTION: Set the mgd indicator to 4.6 on the Rate of Flow Scale and the "N" Scale with 0.016 opposite 0.20 on the Slope Scale, the diameter is indicated to be between 21" and 24". Therefore, the required diameter is 24", answer. Next, set the Slope Scale so that 0.20 is opposite 24" on Disc "A" and set the "N" scale again with 0.016 opposite the "N" Indicator. The Flow Rate Scale now indicates the pipe discharge capacity as 5.5 mgd. When the flow rates are 4.6 mgd and 2.3 mgd, the ratios of liquid depth to pipe diameter are 0.7 and 0.45, respectively, and the respective velocities are 2.95 and 2.5 feet per second, answers, determined by same procedure as in Example 2.

HYDRO CONDUIT CORPORATION

SANITARY LANDFILL SYNOPSIZER

WASTE GENERATION RATE LB PER PERSON PER DAY

22	71
33	106
44	141
55	177
66	212
77	247
88	283
99	318
110	353

Gates Engineering Company, Inc.

100 S. West St./Wilmington, DE 19899
(302) 656-9951

GACOFLEX™
Elastomers for Construction
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LENGTH

in → cm = 83.820

cm = 14.567 in

ft → = 12.497 m

m → = 147.64 ft

mi → = 78.858 km

km → = 32.933 mi

Metric Reader

AREA

in² → = 529.03 cm²

cm² → = 13.330 in²

ft² → = 8.3613 m²

m² → = 1011.8 ft²

PORTLAND CEMENT ASSOCIATION

An organization to improve and extend the uses of portland cement and concrete.

POUNDS CEMENT PER SQUARE YARD

PERCENT CEMENT BY VOLUME: 2.0 2.5 3.0 4 5 6 7 8 9 10 15

POUNDS CEMENT PER SQUARE YARD: 10 15 20 25 30 40 50 60 80 100

PAVEMENT THICKNESS: 4" 5" 6" 7" 8" 9" 10" 12"

1. Set percent cement by volume at arrow.
2. Read pounds of cement per sq. yd. at pavement thickness.

POUNDS CEMENT PER LINEAR FOOT

PERCENT CEMENT BY VOLUME: 25 20 15 10 9 8 7 6 5 4 3

PAVEMENT THICKNESS: 4" 5" 6" 7" 8" 9" 10" 12"

POUNDS CEMENT PER LINEAR FOOT: 9 10 15 20 25 30 40 50 60 80 100

SPREADER WIDTH: 3' 4' 5' 6' 7' 8' 10' 12'

1. Set pavement thickness under percent cement by volume.
2. Read pounds per linear foot over spreader width.

FORNEY LOAD • P.S.I. CONVERTER

FOR 6" x 12" CYLINDERS

FOR GAGE READINGS OF:

150-183500		184-217500		218-250000	
59500	2104	93500	3307	127500	4509
LBS.	P.S.I.	LBS.	P.S.I.	LBS.	P.S.I.

USE THIS SIDE FOR GAGE READINGS OF 150,000-250,000 LBS.

FORNEY TESTING MACHINES KNOWN THE WORLD OVER
FORNEY'S INCORPORATED

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Sverdrup & Parcel

ST. LOUIS, MISSOURI

DESIGN
PLANNING
CONSTRUCTION MANAGEMENT

LENGTH

METER X KILOMETER — LIGHT YEAR

KILOMETER	
39370	= Inch
3280.8	= Feet
1093.6	= Yard
198.84	= Rod
.62137	= Mile (statute)
.53959	= Mile (naut.)
1x10⁶	= Millimeter
1x10⁵	= Centimeter
1000	= Meter
1	= Kilometer
1.06x10⁻¹³	= Light Year

VOLUME

CUBIC YARD X CUBIC CM. — CUBIC METER

CUBIC CM.	
.06102	= Cubic Inch
3.53x10⁻⁵	= Cubic Feet
1.31x10⁻⁶	= Cubic Yard
1	= Cubic Cm
1x10⁻⁶	= Cubic Meter

Place unit to be converted at arrow and read conversion factor in window opposite desired unit.

DECIMAL EQUIVALENTS

1/64	.0156	23/64	.3594	45/64	.7031
1/32	.0312	3/8	.3750	23/32	.7188
3/64	.0469	25/64	.3906	47/64	.7344
1/16	.0625	13/32	.4062	3/4	.7500
5/64	.0781	27/64	.4219	49/64	.7656
3/32	.0938	7/16	.4375	25/32	.7812
7/64	.1094	29/64	.4531	51/64	.7969
1/8	.1250	15/32	.4688	13/16	.8125
9/64	.1406	31/64	.4844	53/64	.8281
5/32	.1562	1/2	.5000	27/32	.8438
11/64	.1719	33/64	.5156	55/64	.8594
3/16	.1875	17/32	.5312	7/8	.8750
13/64	.2031	35/64	.5469	57/64	.8906
7/32	.2188	9/16	.5625	29/32	.9062
15/64	.2344	37/64	.5781	59/64	.9219
1/4	.2500	19/32	.5938	15/16	.9375
17/64	.2656	39/64	.6094	61/64	.9531
9/32	.2812	5/8	.6250	31/32	.9688
19/64	.2969	41/64	.6406	63/64	.9844
5/16	.3125	21/32	.6562	1	1.0000
21/64	.3281	43/64	.6719		
11/32	.3438	11/16	.6875		

AREA

SQ. CENTIMETER X SQ. METER — SQ. KILOMETER

SQ. METER	
1550	= Sq. Inch
10.764	= Sq. Feet
1.1960	= Sq. Yard
.03954	= Sq. Rod
3.86x10⁻⁷	= Sq. Mile
10,000	= Sq. Centimeter
1	= Sq. Meter
1x10⁻⁶	= Sq. Kilometer
2.47x10⁻⁴	= Acre

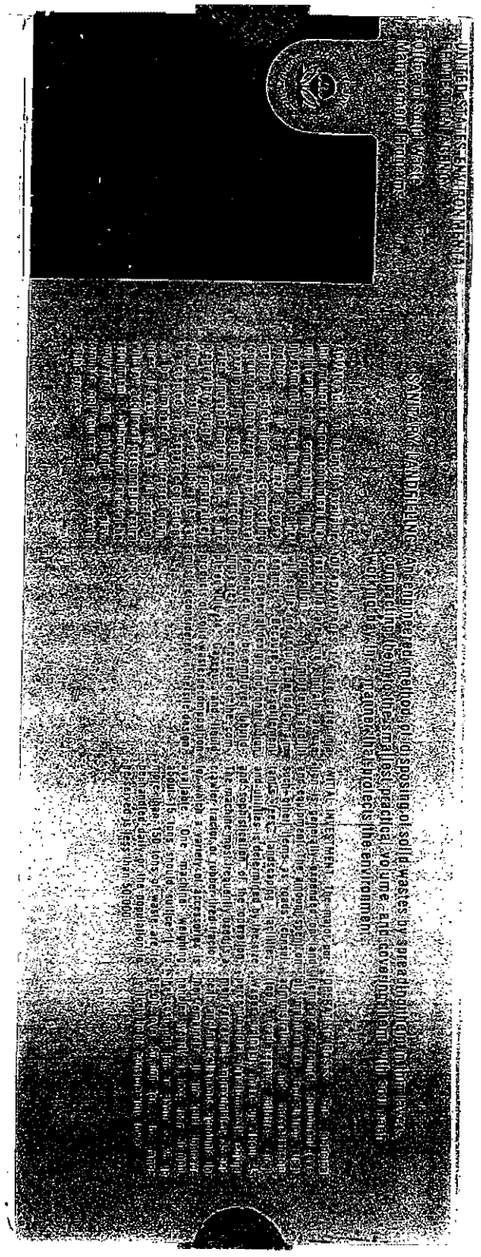
SPEED

KM per HR. X METERS per MIN. — CM per SEC.

METERS per MIN.	
.03728	= Miles per Hr.
.05468	= Feet per Sec.
1.04x10⁻⁵	= Miles per Sec.
.03238	= Knots
0.06	= KM per Hr.
1	= Meters per Min.
1.667	= CM per Sec.

C 1 2 3 4 5 6 7 8 9 1 C
D 1 2 3 4 5 6 7 8 9 1 D

INCHES 1 2 3 4 5 6 7



DECIMAL EQUIVALENTS

Fractions	Decimals	Millimeters	Fractions	Decimals	Millimeters
1/32	.03125	0.79375	17/32	.53125	13.49375
1/16	.0625	1.5875	9/16	.5625	14.2875
3/32	.09375	2.38125	19/32	.59375	15.08125
(1/8)	.125	3.175	(5/8)	.625	15.875
5/32	.15625	3.96875	21/32	.65625	16.66875
3/16	.1875	4.7625	11/16	.6875	17.4625
7/32	.21875	5.55625	23/32	.71875	18.25625
(1/4)	.250	6.350	(3/4)	.750	19.050
9/32	.28125	7.14375	25/32	.78125	19.84375
5/16	.3125	7.9375	13/16	.8125	20.6375
11/32	.34375	8.73125	27/32	.84375	21.43125
(3/8)	.375	9.525	(7/8)	.875	22.225
13/32	.40625	10.31875	29/32	.90625	23.01875
7/16	.4375	11.1125	15/16	.9375	23.8125
15/32	.46875	11.90625	31/32	.96875	24.60625
(1/2)	.500	12.700	(1)	1.000	25.400

VOLUME

in³	cm³		
39	639.10		
43	cm³ = 2.6240	in³	
47	ft³ ——▶ = 1.3309	m³	
51	m³ ——▶ = 1801.0	ft³	
55	gal ——▶ = 208.20	liters	
59	liters ——▶ = 15.586	gal	

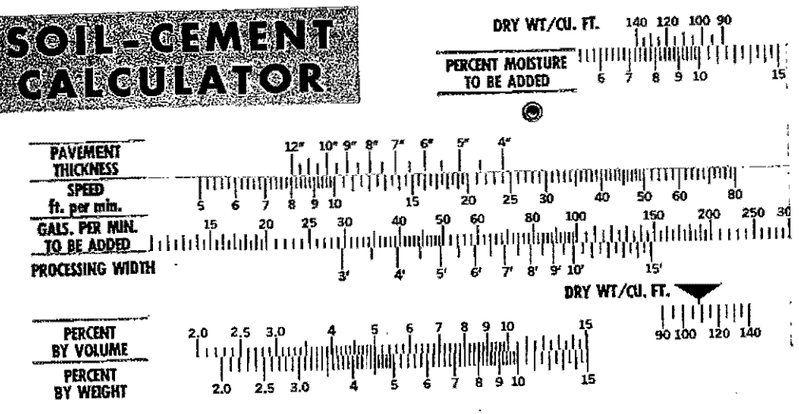
WEIGHT

70	oz ——▶ = 1984.5	g	
74	g ——▶ = 2.6103	oz	
78	lb ——▶ = 35.390	kg	
82	kg ——▶ = 180.78	lb	

METRIC PREFIXES

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10^{12}	tera	T	10^{-1}	deci	d
10^{9}	giga	G	10^{-2}	centi	c
10^{6}	mega	M	10^{-3}	milli	m
10^{3}	kilo	k	10^{-6}	micro	μ
10^{2}	hecto	h	10^{-9}	nano	n
10^{1}	deka	da	10^{-12}	pico	p

SOIL-CEMENT CALCULATOR



TO CALCULATE MOISTURE

1. Set percent of moisture to be added under dry weight per cubic foot.
2. Set speed under pavement thickness.
3. Read gallons per minute to be added over processing width.

PERCENTAGE OF CEMENT
Volume vs. Weight

1. Set dry weight at arrow.
2. Compare percent of cement by weight and by volume.

FORNEY'S

LOAD • P.S.I. CONVERTER

FOR 6" x 12" CYLINDERS

FOR GAGE READINGS OF:

50-83500	84-117500	118-150000
160500 LBS. | 5677 P.S.I.	194500 LBS. | 6879 P.S.I.	228500 LBS. | 8082 P.S.I.

USE THIS SIDE FOR GAGE READINGS OF 50,000-150,000 LBS.

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SEATTLE • ST. LOUIS • WASHINGTON, D.C.
BANGKOK • ROME • OSLO

CAPACITY — LIQUID MEASURE

CUBIC FEET	TABLE-SPOON	CUP	
	0.5		= Ounce
	0.125		= Gill
	0.0313		= Pint
X	0.016		= Quart
	.0034		= Gallon (U.S.)
	.0028		= Gallon (Imp.)
	14.786		= Milliliter
	0.015		= Liter
	0.902		= Cubic Inch
	.000522		= Cubic Feet
	1		= Tablespoon
	.0625		= Cup

WEIGHT

1 LB. AND	UNDER	
DRAM (apoth.)	OUNCE (avdp.)	POUND
	28350	= Milligram
	437.5	= Grain
	28.35	= Gram
X	16	= Dram (avdp.)
	7.292	= Dram (apoth.)
	1	= Ounce (avdp.)
	.0625	= Pound

FORMULAS

OHM'S LAW—DC CIRCUITS: $I = \frac{E}{R}$, $R = \frac{E}{I}$, $E = IR$, $P = EI$

where I = current in amperes, R = resistance in ohms, E = potential across R in volts, P = power in watts

OHM'S LAW—AC CIRCUITS: $I = \frac{E}{Z}$, $Z = \frac{E}{I}$, $E = IZ$, $P = EI \cos\theta$

where I = current in amperes, Z = impedance in ohms, E = potential across Z, P = power in watts, θ = phase angle in degrees

FREQUENCY FROM WAVELENGTH:

$f = \frac{3 \times 10^8}{\lambda}$ (Hz) $\qquad f = \frac{3 \times 10^4}{\lambda}$ (kHz)

λ = wavelength in meters $\qquad \lambda$ = wavelength in centimeters

WAVELENGTH FROM FREQUENCY:

$\lambda = \frac{3 \times 10^8}{f}$ (meters) $\qquad \lambda = \frac{3 \times 10^4}{f}$ (centimeters)

f = frequency in Hz $\qquad$ f = frequency in kHz

DECIBELS AND POWER, VOLTAGE, AND CURRENT RATIOS:

number of dB = $10 \log_{10} \frac{P_2}{P_1}$

number of dB = $20 \log_{10} \frac{V_2}{V_1} = 20 \log_{10} \frac{I_2}{I_1}$

TEMPERATURE CONVERSION

CAPACITY — DRY MEASURE

CUBIC FEET	CORD	BARREL	
	5582.9		= Pint
	3291.4		= Quart
	411.43		= Peck
X	102.86		= Bushel
	3625		= Liter
	128		= Cubic Feet
	1		= Cord
	31.22		= Barrel

WEIGHT

1 LB. AND	OVER	
METRIC TON	(SHORT) 100 WT.	SLUG
	100	= Pound
	45.36	= Kilogram
	.05	= Short Ton
	.0446	= Long Ton
	.0454	= Metric Ton
	1	= Short 100 wt.
X	3.108	= Slug