

Metric System Conversion Factors
Bert McCarty

Area Equivalents

1 acre	=	43,560 ft ²	=	4840 yd ²	=	0.4047 hectares (ha)	=	160 rods ²	=	4047 m ²	=	0.0016 mi ²
1 ha	=	10,000 m ²	=	100 are	=	2.471 acres	=	107,639 ft ²				
1 yd ²	=	9 ft ²	=	0.836 m ²				1 yd ³	=	27 ft ³	=	0.765 m ³
1 ft ²	=	144 in ²	=	929.03 cm ²	=	0.09290 m ²		1 m ²	=	10,000 cm ²		
1 ft ³	=	1728 in ³	=	0.037 yd ³	=	0.02832 m ³	=	28,320 cm ³				
1 acre-inch	=	102.8 m ³	=	27,154 gal	=	3630 ft ³						

Liquid Equivalents

1 gal	=	4 qt	=	8 pt	=	16 cups	=	128 fl oz	=	8.337 lb		1 barrel	=	42 gal		
	=	231 in ³	=	256 tbsp	=	0.134 ft ³	=	3.785 L	=	3785 ml						
1 qt	=	0.9463 L	=	2 pt	=	4 cups	=	32 fl oz	=	64 tbsp	=	57.75 in ³	=	946.4 ml		
1 L	=	2.113 pt	=	1000 ml	=	1.057 qt	=	33.8 fl oz	=	0.26 gal	=	0.0001m ²	=	1,000 cm ³		
1 pt	=	16 fl oz	=	2 cups	=	473.2 ml	=	32 tbsp	=	0.125 gal	=	0.5 qt				
1 cup	=	8 fl oz	=	0.5 pt	=	16 tbsp	=	236.6 ml		1 tbsp	=	14.8 ml	=	3 tsp	=	0.5 fl oz
1 floz	=	29.57 ml	=	2 tbsp	=	6 tsp	=	0.0313 qt		1 tsp	=	4.93 ml	=	0.1667 floz	=	80 drops
1 ft ³ of water	=	7.5 gal	=	62.4 lb	=	28.3 L		1 ml	=	1 cm ³	=	0.034 floz	=	0.002 pts		

Pressure Equivalents

1 mmHg	=	133.32 Pa	=	0.133 kPa	=	133,333 mPa										
1Pa	=	10 ⁻³ kPa	=	10 ⁻⁶ mPa												
1 PSI	=	6.9 kPa	=	2.31 ft head												
1mPa	=	10 ³ kPa	=	10 ⁶ Pa	=	10 bar	=	10.2 kg cm ⁻²	=	100 N cm ⁻²						
1 atm	=	760 mmHg	=	29.92 in Hg	=	1.013 x 10 ⁵ Pa	=	1.013 bar	=	14.69 psi	=	33.89 ft water				
1kPa	=	0.001mPa	=	10 cm H ₂ O	=	10 mbar	=	0.01 bar	=	1J kg ⁻¹	=	0.0099 atm	=	0.145 psi		

Temperature Equivalents

°C	=	(°F-32)	x	5/9
°F	=	(°Cx9/5)	+	32

Length Equivalents

km	=	0.621 statute mile	=	1,000 m	=	100,000 cm	=	3,281 ft	=	39,370 in
m	=	3.28 ft	=	39.4 in	=	100 cm	=	1.094 yd	=	1,000 mm
cm	=	0.3937 in	=	0.01 m	=	0.03281 ft				
in	=	2.54 cm	=	25.4 mm	=	0.0254 m	=	0.08333 ft		
ft	=	0.3048 m	=	30.48 cm	=	12 in				
yd	=	0.9144 m	=	3 ft	=	91.44 cm				
statute mile	=	1,760 yd	=	5,280 ft	=	1.61 km	=	1609 m		

Mixture Ratios

1 mg g ⁻¹	=	1000 ppm	=	1 fl oz gal ⁻¹		7490 ppm	=	1 gpm	=	0.134 ft ³ min ⁻¹	=	0.06308 L sec ⁻¹
1 floz 100 gal ⁻¹	=	75 ppm	=	1 qt 100 gal ⁻¹		2 tbsp gal ⁻¹	=	1 ft ³ min ⁻¹	=	448.83 gal hr ⁻¹	=	7.481 gal min ⁻¹
1 pt 100 gal ⁻¹	=	1 tsp gal ⁻¹				1 ft ³ sec ⁻¹	=	448.83 gal min ⁻¹				

Flow

Weight Equivalents

1 ton (US)	=	2,000 lb	=	0.907 metric tons	=	907.2 kg	1 metric ton	=	10^6 g	=	1,000 kg	=	2,205 lb	
1 lb	=	16 oz	=	453.6 g	=	0.4536 kg			1 oz (wt)	=	28.35 g	=	0.0625 lb	
1 g	=	1,000 mg	=	0.0353 oz	=	0.001 kg	=	0.002205 lb	1 mg	=	0.001 g			
1 kg	=	1,000 g	=	35.3 oz	=	2.205 lbs			1 μ g	=	10^{-6} g	=	0.001 mg	
ng	=	10^{-9} g	=	0.001 micrograms (μ g)					picogram	=	10^{-12} g			
1% (v/v)	=	1.28 fl oz gal ⁻¹	=	$\frac{1}{100}$ gal 100 gal ⁻¹	=	10,000 ppm	=	10 g L^{-1}	=	$\frac{1 \text{ g}}{100 \text{ ml}}$	=	1.33 oz (wt) gal ⁻¹	=	8.34 lb 100 gal ⁻¹
1 ppm	=	0.0001%	=	1 mg kg^{-1}	=	1 mg L^{-1}	=	$1 \mu\text{g g}^{-1}$	=	$1 \mu\text{l L}^{-1}$	=	$1 \mu\text{g ml}^{-1}$		
	=	$\frac{0.379 \text{ g}}{100 \text{ gal}^{-1}}$	=	$8.34 \times 10^{-6} \text{ lb gal}^{-1}$	=	$0.013 \text{ fl oz } 100 \text{ gal}^{-1}$			10 ppm	=	0.001%	=	10 mg L^{-1}	
100 ppm	=	0.01%	=	100 mg L^{-1}			1,000 ppm	=	1 mg g^{-1}	=	0.1%	=	$1,000 \text{ mg L}^{-1}$	
1 ppb	=	$1 \mu\text{g kg}^{-1}$	=	$1 \mu\text{g L}^{-1}$	=	1 ng ml^{-1}	=	$1 \text{ ng } 1,000,000,000^{-1}$			1 ppt	=	$1 \text{ picogram g}^{-1}$	

Approximate Weight of Dry Soil

Type	Bulk Density	Weight		
	g cm^{-3}	lb ft^{-3}	kg m^{-2}	lbs acre^{-1} (6-in deep)
sand	1.6	100 (or 2700 lb yd ⁻³)	1,623	2,143,000
loam	1.3 to 1.55	80-95	1,299-1,542	1,714,000
clay or silt	1.0 to 1.30	65-80	1,055-1,299	1,286,000
muck	0.65	40	649	860,000
peat (compact)	0.325	20	325	430,000
Sand weights (tons):	=	yd ³	x	1.3
Gravel weights (tons):	=	ft ³	x	110
	-0.5- to 1-in diameter gravel	=		2,700 lb/ton
	-0.25- to 0.375-in diameter gravel	=		3,000 lb/ton

Approximate Organic Materials for 6-inch depth per 1,000 ft² (weight variance in materials may occur).

Organic Material Volume in Mix	Approximate thickness applied to soil surfaces		Organic Material Needed		
	%	in	cm	yd ³ 1,000 ft ⁻²	m ³ 100 m ⁻²
5		0.33	0.84	1.0	0.83
10		0.67	1.70	2.0	1.70
15		1.00	2.54	3.0	2.48
20		1.33	3.38	4.0	3.30
25		1.67	4.24	5.0	4.16
30		2.00	5.08	6.0	4.95

Example: If 10% organic materials is incorporated into the top 6-inches of a 1,000 ft² area, the organic material is applied to a depth of 0.67-in and 2.0 yd³ will be needed (1.7 cm and 1.7 m³ 100 m²).

Peat Moss Coverage

Depth (inches)	Coverage (sq.ft.)	
	5.6 ft ³ Bale (compressed) covers	4.0 ft ³ Bale (compressed) covers
0.25	480	346
0.50	240	173
1.00	120	86
2.00	60	43
3.00	40	29
4.00	30	22
6.00	20	14

Conversions for determining turfgrass irrigation needs

1 acre-inch	=	27,154 gal	=	43,560 in ³	=	3,630 ft ³
1 inch 1,000 ft ⁻¹	=	620 gal	=	83 ft ³		
1 gallon	=	0.134 ft ³	=	8.34 lb		
1 million gallon	=	3.07 acre-feet				
7½ gallons	=	1 ft ³	=	231 in ³		
1 acre-foot	=	325,851 gal	=	43,560 ft ³		
1 pound of water	=	0.1199 gal				
Precipitation rate (in/hr)	=	$\frac{\text{gpm} \times 96.3}{\text{area (ft}^2\text{)}}$				

Water and Soil Calculations

1 mmhos cm ⁻¹	=	1,000 µmhos cm ⁻¹	=	1 dS m ⁻¹	=	0.1 S m ⁻¹	=	1mS cm ⁻¹	=	10 meq L ⁻¹
1 meq L ⁻¹	=	1 mmol L ⁻¹	=	1mol m ⁻³						
1 meq 100g ⁻¹	=	1mmol 100g ⁻¹	=	cmol kg ⁻¹						
Electrical conductivity (mmhos cm ⁻¹ or dS m ⁻¹)	x	640	=	Total dissolved salts (mg L ⁻¹ or ppm)						
Total dissolved salts (mg L ⁻¹ or ppm)	x	0.0016	=	Electrical conductivity (mmhos cm ⁻¹ or ds m ⁻¹)						

Energy

1 calorie (cal)	=	4.184 Joule (J)
Joule (J)	=	1 kg m ² s ⁻²
1 kcal	=	4.184 kJ

Slopes

10%	=	6E	=	10:1	33%	=	18E	=	3:1
18%	=	10E	=	6:1	50%	=	26E	=	2:1
25%	=	14E	=	4:1	100%	=	45E	=	1:1

Decimal and Millimeter Length Equivalents

Fraction (inch)	Decimals (inch)	Millimeters
1	1.00	25.4
15/16	0.9375	23.812
7/8	0.875	22.225
13/16	0.8125	20.638
¾	0.75	19.05
11/16	0.6875	17.462
5/8	0.625	15.875
9/16	0.5625	14.288
½	0.5	12.70
7/16	0.4375	11.112
3/8	0.3750	9.525
11/32	0.34375	8.731
5/16	0.3125	7.938
9/32	0.28125	7.144
¼	0.25	6.350
15/64	0.234375	5.953
7/32	0.21875	5.556
13/64	0.203125	5.159
1/5	0.200	5.08
3/16	0.1875	4.762
23/128	0.1797	4.564
11/64	0.171875	4.366
1/6	0.167	4.242
21/128	0.1641	4.168
5/32	0.15625	3.969
1/7	0.143	3.633
19/128	0.1484	3.769
9/64	0.140625	3.572
[0.1250	3.175
7/64	0.109375	2.778
1/10	0.100	2.540
3/32	0.09375	2.381
5/64	0.078125	1.984
1/16	0.0625	1.588
3/64	0.046875	1.191
1/32	0.03125	0.794
1/64	0.015625	0.397

Surface Area Impacted and Topdressing Sand Needed to Fill Aerification Holes.

Spacing in	Tine Diameter		Holes ft ⁻² no.	Surface Area Impacted %	Dry Sand to Fill Holes 3-in Depth	
	in	mm			~ft ³ 1,000 ft ⁻²	~lb 1,000 ft ⁻²
1.0 x 1.0	0.250	6.350	144	4.91	12.3	1227
	0.375	9.525	144	11.04	27.6	2761
	0.500	12.700	144	19.63	49.1	4909
	0.625	15.875	144	30.68	76.7	7670
	0.750	19.050	144	44.16	110.4	11040
	1.000	25.400	144	78.50	196.4	19640
1.0 x 2.0	0.250	6.350	72	2.45	6.1	614
	0.375	9.525	72	5.52	13.8	1381
	0.500	12.700	72	9.82	24.5	2454
	0.625	15.875	72	15.34	38.4	3855
	0.750	19.050	72	22.09	55.2	5520
	1.000	25.400	72	39.27	98.2	9820
1.5 x 1.5	0.250	6.350	64	2.18	5.5	550
	0.375	9.525	64	4.91	12.3	1230
	0.500	12.700	64	8.72	21.8	2180
	0.625	15.875	64	13.63	34.1	3410
	0.750	19.050	64	19.63	49.1	4910
	1.000	25.400	64	34.89	87.3	8730
2.0 x 2.0	0.250	6.350	36	1.23	3.1	307
	0.375	9.525	36	2.76	6.9	690
	0.500	12.700	36	4.91	12.3	1227
	0.625	15.875	36	7.67	19.2	1917
	0.750	19.050	36	11.04	27.6	2760
	1.000	25.400	36	19.63	49.1	4910
7.0 x 7.0 (drill & fill)	0.750	19.050	2.94	0.90	2.3	230
	1.000	25.400	2.94	1.60	4.0	400

Metric Conversion

To Convert	Multiply by	To Obtain
Acres (a)	0.4047	hectare (ha)
Acres	43,560	sq. feet (ft ²)
Acres	0.00405	sq. kilometer (km ²)
Acres	4047	sq. meter (m ²)
Acres	4840	sq. yards (yd ²)
Acre-feet	325,851	sq. feet (ft ²)
Acre-feet	43560	cu. feet (ft ³)
Acre-feet	1233.5	cu. meter (m ³)
Acre-inch	102.8	m ³
Bar	14.5	lb/in ²
Bar	1019.7	g/cm ³
Bar	29.53	inches Hg @ 0°C
Bar	75	cm Hg @ 0°C
Bar	0.001	J/kg
Bar	100	kPa
Bushels - dry	0.03524	m ²
Bushels	1.245	ft ³
Calorie (cal)	4.184	Joules (J)
Centimeters (cm)	0.03281	feet (ft)
cm	0.3937	inches (in)
cm	0.1094	yards (yd)
cm	0.01	meters (m)
cm	10	millimeters (mm)
cm/sec = cm sec ⁻¹ = cm per sec	1.9685	ft/min
cm/sec	0.0223694	miles per hour (MPH)
cm ² (square centimeters)	0.001076	ft ²
cm ²	0.1550	in ²
cm ²	0.01	sq. decimeter
cm ³ (cubic centimeters)	0.0610237	in ³
cm ³	0.0338	fl oz
cm ³	0.001057	qt ³
cm ³	0.001	cu. decimeter
Cup	8	fl oz
Cup	236.6	cm ³
Feet (ft)	30.48	cm
ft	0.3048	m
ft	305	mm
ft ² (square feet)	929	cm ²
ft ²	0.0929	m ²
ft ²	9.294 x 10 ⁻⁶	hectares (ha)
ft ²	144	in ²
ft ³ (cubic feet)	0.0283	m ³

Metric Conversion

To Convert	Multiply by	To Obtain
ft ³	7.4805	gallons
ft ³	1728	cubic inches (in ³)
ft ³	0.037	cubic yards (yd ³)
ft ³	28.32	liters (L)
ft ³ /1,000 ft ²	0.030463	m ³ /100 m ²
Feet per minute	0.01136	mph
Feet head of water	0.433	psi
Foot candle	10.764	lux
Gallons (gal)	3.785	liters
Gal	3785	ml
Gal	128	ounces (liquid)
Gal	0.13368	ft ³
Gal	231	in ³
Gal per acre (gpa)	9.354	L/ha
gpa	0.09354	L/100 m ²
gpa	2.938	oz/1,000 ft ² (liquid)
Gal/1,000 ft ²	4.0746	L/100 m ²
Gal/minute	2.228 x 10 ⁻³	ft ³ /second
Gal/min	0.06309	L/sec
Gal/min	0.227125	m ³ /hr
Grams (g)	0.002205	lb
Gram	0.035274	oz
g/cm ³	0.036127	lb/in ³
g/cm ³	62.428	lb/ft ³
g/ft ²	96	lb/acre
g/ha	0.000893	lbs/acre
g/ha	0.014275	oz/acre
g/kg	0.10	percent (%)
g/liter	1000	PPM
g/liter	10	%
g/liter	0.00834595	lb/gal
g/liter	0.13351	oz/gal
g/m ²	0.00020481	lb/ft ²
g/m ²	0.20481	lb/1,000 ft ²
Hectares (ha)	2.471	Acres
Ha	107,639	ft ²
Ha	107.64	1,000 ft ²
horsepower (electrical or mechanical)	746	watts
hp	550	ft-lbs/sec
hp	33,000	ft-lbs/min
hp	1.014	metric horsepower
hp	33,000	ft lbs/min

Metric Conversion

To Convert	Multiply by	To Obtain
Inches (in)	2.540	cm
Inches	0.0254	m
Inches	25.40	ml
Inches of mercury	3.4	kilopascals (kPa)
in/ft	0.083	mm/mm
in ²	6.4516	cm ²
in ³	16.3871	cm ³
in ³	0.55411	fl oz
in ³	0.01732	qt
Joules per kilograms (J/kg)	1	kPa
kilo Pascal (kPa)	1	J/kg
kPa	1	0.01 bar
kPa	0.01	bar
Kilograms (kg)	2.2046	lb
kg/hectare	0.892	lb/acre
kg/ha	0.02048	lb/1,000 ft ²
kg/100 m ²	2.048	lbs/1,000 ft ²
kg/L	8.3454	lb/gal
Kilometers (Km)	100,000	cm
Kilometers	3281	ft
Kilometers	1000	m
Kilometers	0.6214	miles
Kilometers	1094	yd
Km/h	0.62137	mph
Km/h	54.6807	ft/min
Kilopascals (kPa)	0.145	lbs/in ² (psi)
kPa	1	0.01 bar
kPa	1	J/kg
Liters (L)	0.2642	gallons
L	33.814	fl.oz.
L	2.113	pt
L	1.057	qt
L	0.035315	ft ³
L/m ²	3.2808	ft ³ /1,000 ft ²
L/100 m ²	0.2454	gal/1,000 ft ²
L/100 m ²	1.9634	pt/1,000 ft ²
Liters/hectare	0.107	gal/A
L/ha	0.0025	gal/1,000 ft ²
L/ha	0.314	oz/1,000 ft ²
L/ha	0.855	pt/A
L/min	15.85	gal/hr
Meters (m)	3.281	ft

Metric Conversion

To Convert	Multiply by	To Obtain
Meters	39.37	in
Meters	1.094	yd
Meters	100	cm
Meters	0.001	km
Meters	1000	mm
Meters/sec	2.2369	mph
M ² (square meters)	10.764	ft ²
M ²	1,550	in ²
M ²	1.196	yd ²
M ³ (cubic meters)	35.3147	ft ³
M ³	1.30795	yd ³
M ³	1,000	L
M ³ /ha	14.29	ft ³ /acre
M ³ /ha	0.0122	yd ³ /1,000 ft ²
M ³ /ha	0.328	ft ³ /1,000 ft ²
mil	0.001	in
mil	0.0254	mm
Miles (nautical)	1.1508	miles (statute)
Miles (nautical)	6,076	ft
Miles (statute)	160,900	cm
Miles	5280	ft
Miles	1.609	km
Miles	1760	yards
Miles per hour (mph)	1.467	ft/sec
mph	88	ft/mine
mph	1.61	km/hr
mph	0.447	m/sec
mg/kg	1	parts per million (ppm)
Milliequivalents per liter (meq/L)	1	millimoles per liter (mmol/L)
Milliequivalents per 100 g (meq/100g)	Eq. wt. x 10	parts per million (ppm)
Millimhos per centimeter (mmhos/cm)	1	decisiemens per meter (dS/m)
mmhos/cm	1,000	micromhos per centimeter (μmhos/cm)
Milliliters (ml)	0.0338	oz (fluid)
ml	0.0002642	gal
ml/m ²	3.14	oz/1,000 ft ²
ml/l	0.12793	oz/gal
ml/10,000 L	0.0128	fl oz/1,000 gal
Millimeters (mm)	0.03937	in
1 mm Hg @ 0 C	0.13332	kPa
1 mm Hg	133333.3	mPa
Ounces (fluid) (oz)	0.02957	L
Ounces (fluid)	29.573	ml

Metric Conversion

To Convert	Multiply by	To Obtain
Ounces (fluid)	0.03125	qt.
Oz (fluid)/gal	7.81	ml/L
Ounces (fluid)/acre	0.0731	L/ha
Ounces (fluid)/acre	73.1	ml/ha
Ounces (fluid)/1,000 ft ²	3.18	L/ha
oz (weight)	28.35	g
oz (weight)	0.0625	lb
oz (weight)/acre	0.07	kg/ha
oz (weight)/acre	70	g/ha
oz (weight)/1,000 ft ²	3.05	kg/ha
oz (weight)/ft ²	305.15	g/m ²
oz (weight)/gal	7.5	g/L
oz (weight)/1,000 ft ²	0.305	g/m ²
Percent (%)	10	g/kg
Pint (liquid) (pt)	0.473	liter
pt/A	1.1692	L/ha
pt/A	0.3673	oz/1,000 ft ²
pt/1,000 ft ²	0.50932	L/100 m ²
Parts per million (ppm)	2.719	lb ai/acre foot of water
PPM	2.0	lbs/acre slice 7-in. deep
PPM	2.25	kg/ha slice 7-in. deep
PPM	0.001	g/L
PPM	8.34	lb/million gal
PPM	1	mg/kg
PPM	0.013	oz/100 gal of water
PPM	0.3295	gal/acre-foot of water
PPM	8.2897	lbs/million gal of water
Pounds (lb)	0.4536	kilograms (kg)
lb	453.6	g
lb/acre	1,120	g/ha
lb /acre	1.12	kg/ha
lb /acre	1.0413	g/100 ft ²
lb / acre	0.02296	lb/1,000 ft ²
lb /acre	0.112	g/m ²
lb /acre-foot	0.3682	g/m ³
lb /acre-foot	0.0003682	kg/m ³
lb / ft ²	4883	g/m ²
lb /ft ³	16.23	kg/m ³
lb /1,000 ft ²	4.88	g/m ²
lb /1,000 ft ²	48.83	kg/ha
lb /1,000 ft ²	43.5597	lb/A
lb /1,000 ft ²	488	g/100 m ²

Metric Conversion

To Convert	Multiply by	To Obtain
lb /1,000 ft ²	0.4883	kg/100 m ²
lb /1,000 ft ²	0.91	lbs/100 yd ²
lb /1,000 ft ²	1.1	lbs/1,000 ft ²
lb /yd ³	0.0005937	g/cm ³
lb /yd ³	594	g/m ³
lb /yd ³	0.5932	kg/m ³
lb /gallon	0.12	kg/liter
lb /1,000 gal	0.12	g/1,000 L
pounds per square inch (PSI)	6.89	kilopascals (kPa)
PSI	0.06895	bar
PSI	0.068046	atmosphere (atm)
PSI	2.31	feet head of water
Quarts (qt)	0.9463	L
Quarts	946	ml
Qt/A	2.3385	L/ha
Qt/A	0.7346	oz/1,000 ft ²
Qt/100 gal	2.5	ml/L

Metric Conversion

To Convert	Multiply by	To Obtain
meq K ⁺ /100 g soil	780	lb K ⁺ per acre furrow slice
meq Na ⁺ /100 g soil	460	lb Na ⁺ per acre furrow slice
meq Mg ⁺² /100 g soil	109	lb Mg ⁺² per acre furrow slice
meq Fe ⁺³ /100 g soil	372	lb Fe ⁺³ per acre furrow slice
meq Zn ⁺² /100 g soil	654	lb Zn ⁺² per acre furrow slice
meq H ⁺ /100 g soil	20	lb H ⁺ per acre furrow slice
meq Al ⁺³ /100 g soil	180	lb Al ⁺³ per acre furrow slice
meq Ca ⁺² /100 g soil	9.2	lb Ca ⁺² per 1,000 ft ² furrow slice
meq K ⁺ /100 g soil	18	lb K ⁺ per 1,000 ft ² furrow slice
meq Na ⁺ /100 g soil	10.6	lb Na ⁺ per 1,000 ft ² furrow slice
meq Mg ⁺² /100 g soil	2.5	lb Mg ⁺² per 1,000 ft ² furrow slice
meq Fe ⁺³ /100 g soil	8.5	lb Fe ⁺³ per 1,000 ft ² furrow slice
meq Zn ⁺² /100 g soil	15	lb Zn ⁺² per 1,000 ft ² furrow slice
meq H ⁺ /100 g soil	0.46	lb H ⁺ per 1,000 ft ² furrow slice
meq Al ⁺³ /100 g soil	4.1	lbs Al ⁺³ per 1,000 ft ² furrow slice