

Cut/Fill Stakes - 4' Level

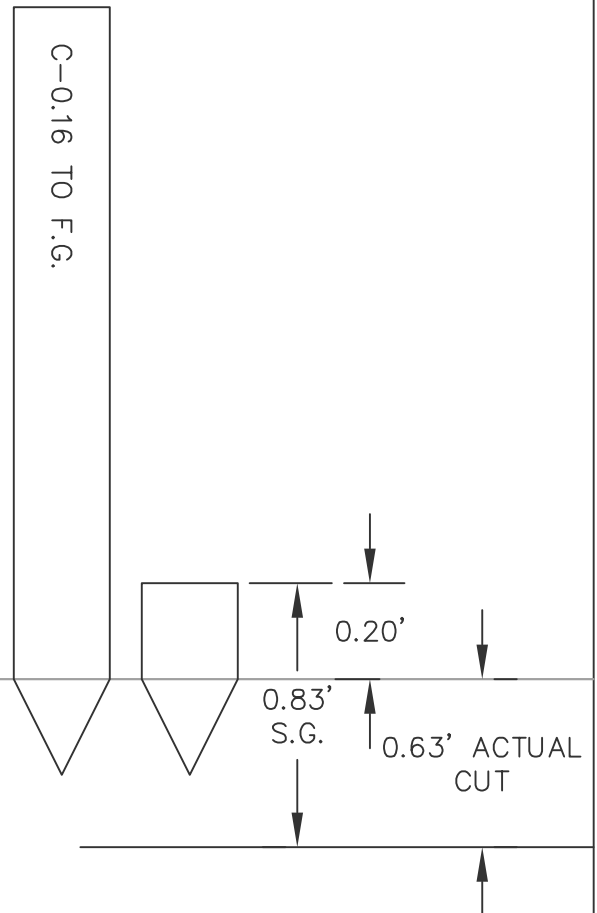
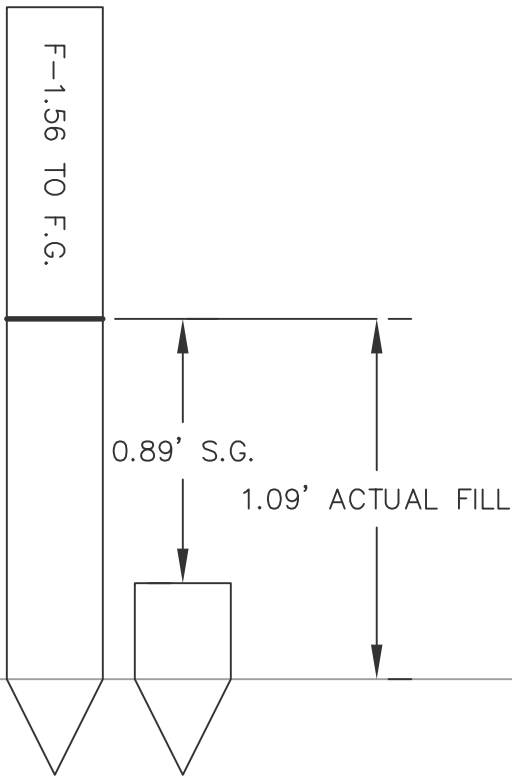
SECTION + CUT = TOTAL CUT
 SECTION - FILL = POSITIVE # = CUT
 SECTION - FILL = NEGATIVE # = FILL

FILL STAKE EXAMPLE

SECTION - 4" CONC & 4" SAND = 8" = 0.67'
 FILL OF 1.56' TO F.G. (TOP OF CONCRETE)
 $0.67' - 1.56 = -0.89 = F-0.89$
 MEASURE UP FROM THE TOP OF THE HUB
 0.89', MARK THE LATH WITH A BLACK LINE.
 USING THE 4' LEVEL, PLACE THE BOTTOM OF
 THE LEVEL ON THE BLACK LINE AND MEASURE
 DOWN TO THE GROUND, THIS IS YOUR
 ACTUAL FILL - F-1.09

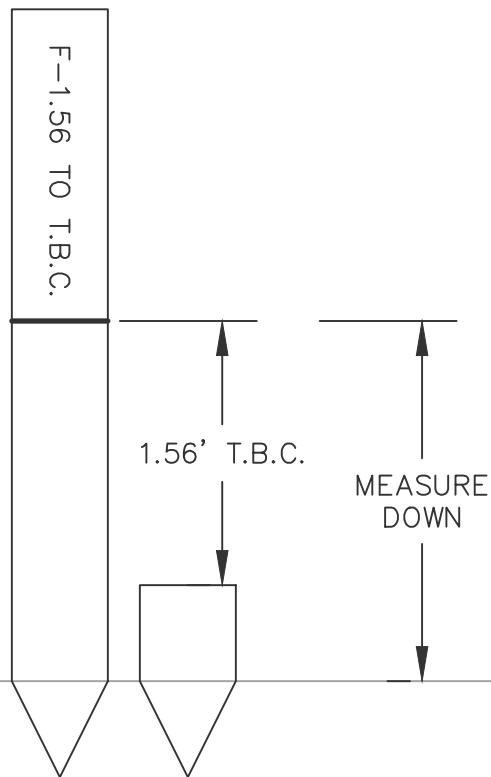
CUT STAKE EXAMPLE

SECTION - 4" CONC & 4" SAND = 8" = 0.67'
 CUT OF 0.16' TO F.G. (TOP OF CONCRETE)
 $0.67' + 0.16' = +0.83 = C-0.83$
 PLACE THE LEVEL ON THE HUB AND MEASURE
 THE DISTANCE TO THE GROUND.
 $0.83' - 0.20' = \text{ACTUAL CUT} = C-0.63'$



Curb Stakes - 4' Level

FILL STAKE EXAMPLE
GENERALLY, CURB STAKES SHOULD ALL BE FILLS
FILL OF 1.56' TO T.B.C. (TOP BACK CURB)
MEASURE UP FROM THE HUB 1.56' AND DRAW
A BLACK LINE DENOTING T.B.C. FIND OUT WHAT
CURB DIMENSIONS ARE INCLUDING GRAVEL IF NEEDED.
PLACE THE TOP OF YOUR LEVEL ON THE BLACK LINE
AND MEASURE DOWN TO THE GROUND. IF YOUR TOTAL
SECTION SHOULD HAVE BEEN 1.42' AND YOU MEASURE
1.52', ITS A FILL OF 0.10'. IF YOU MEASURE 1.12, ITS
A CUT OF 0.30'. KEEP MEASURING UNTIL YOU MEASURE
THE 1.42 OR WHATEVER YOUR SECTION IS.



Stake Reading with Section - Grade Rod

Stake #	Stake Info	Section Thickness	ROD READING ON HUB(RR)	RR+CUT RR-FILL = FG RR	FG RR + Section = SG RR	$\frac{SG\ RR -}{GROUND\ RR} =$ (-) = Fill (+) = Cut
Example	F-1.56 To FG	4" Concrete 4" Sand	5.06	(5.06-1.56) 3.50	(3.50+0.67) 4.17	(4.17-5.25) F-1.08 SG
1	C-0.16 To FG	4" Concrete 4" Sand				
2	F-1.56 To FG	4" Concrete 4" Sand				
3	C-0.34 To FG	4" Concrete 4" Sand				
4	F-1.08 To FG	4" Concrete 4" Sand				
5	C-0.67 To FG	6" Concrete 6" Sand				
6	F-0.96 To FG	6" Concrete 6" Sand				
7	C-1.43 To FG	6" Concrete 6" Sand				
8	F-0.56 To FG	6" Concrete 6" Sand				
9	C-1.21 To FG	Curb & Gutter 13 1/2" Section				
10	F-0.85 To FG	Curb & Gutter 13 1/2" Section				
11	C-0.01 To FG	Curb & Gutter 13 1/2" Section				
12	F-2.02 To FG	Curb & Gutter 13 1/2" Section				
13	C-0.85 To FG	Roadway 25 1/2" Section				
14	F-1.11 To FG	Roadway 25 1/2" Section				
15	C-2.44 To FG	Roadway 25 1/2" Section				
16	F-0.24 To FG	Roadway 25 1/2" Section				

Stake Reading with Section - Grade Rod

Stake #	Stake Info	Section Thickness	ROD READING ON HUB(RR)	RR+CUT RR-FILL = FG RR	FG RR + Section = SG RR	$\frac{SG\ RR -}{GROUND\ RR} =$ (-) = Fill (+) = Cut
Example	F-1.56 To FG	4" Concrete 4" Sand	5.06	(5.06-1.56) 3.50	(3.50+0.67) 4.17	(4.17-5.25) F-1.08 SG
1	C-0.16 To FG	4" Concrete 4" Sand				
2	F-1.56 To FG	4" Concrete 4" Sand				
3	C-0.34 To FG	4" Concrete 4" Sand				
4	F-1.08 To FG	4" Concrete 4" Sand				
5	C-0.67 To FG	6" Concrete 6" Sand				
6	F-0.96 To FG	6" Concrete 6" Sand				
7	C-1.43 To FG	6" Concrete 6" Sand				
8	F-0.56 To FG	6" Concrete 6" Sand				
9	C-1.21 To FG	Curb & Gutter 13 1/2" Section				
10	F-0.85 To FG	Curb & Gutter 13 1/2" Section				
11	C-0.01 To FG	Curb & Gutter 13 1/2" Section				
12	F-2.02 To FG	Curb & Gutter 13 1/2" Section				
13	C-0.85 To FG	Roadway 25 1/2" Section				
14	F-1.11 To FG	Roadway 25 1/2" Section				
15	C-2.44 To FG	Roadway 25 1/2" Section				
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Stake Reading with Section - Grade Rod

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Example	F-1.56 To FG	4" Concrete 4" Sand	5.06	(5.06-1.56) 3.50	(3.50+0.67) 4.17	(4.17-5.25) F-1.08 SG
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9	C-1.21 To FG	Curb & Gutter 13 1/2" Section				
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13	C-0.85 To FG	Roadway 25 1/2" Section				
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Stake Reading with Section - Grade Rod

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1	To FG					
2	To FG					
3	To FG					
4	To FG					
5	To FG					
6	To FG					
7	To FG					
8	To FG					
9	To FG					
10	To FG					
11	To FG					
12	To FG					
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10	To FG					
11	To FG					
12	To FG					
13	To FG					
14	To FG					
15	To FG					
16	To FG					

Stake Reading with Section - Lenker Rod

Stake #	Stake Info	Section Thickness	ROD READING ON HUB(RR)	RR-CUT RR+FILL = FG RR	FG RR - Section = SG RR	GROUND RR - SG RR = (-) = Fill (+) = Cut
Example	F-1.56 To FG	4" Concrete 4" Sand	5.06	(5.06+1.56) 6.62	(6.62-0.67) 5.95	(4.87-5.95) F-1.08 SG
1	C-0.16 To FG	4" Concrete 4" Sand				
2	F-1.56 To FG	4" Concrete 4" Sand				
3	C-0.34 To FG	4" Concrete 4" Sand				
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10	F-0.85 To FG	Curb & Gutter 13 1/2" Section				
11	C-0.01 To FG	Curb & Gutter 13 1/2" Section				
12	F-2.02 To FG	Roadway 25 1/2" Section				
13	C-0.85 To FG	Roadway 25 1/2" Section				
14	F-1.11 To FG	Roadway 25 1/2" Section				
15	C-2.44 To FG	Roadway 25 1/2" Section				
16	F-0.24 To FG	Roadway 25 1/2" Section				

Stake Reading with Section - Lenker Rod

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Stake Reading with Section - Lenker Rod

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Stake Reading with Section - Lenker Rod

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2	To FG					
3	To FG					
4	To FG					
5	To FG					
6	To FG					
7	To FG					
8	To FG					
9	To FG					
10	To FG					
11	To FG					
12	To FG					
13	To FG					
14	To FG					
15	To FG					
16	To FG					

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3	To FG					
4	To FG					
5	To FG					
6	To FG					
7	To FG					
8	To FG					
9	To FG					
10	To FG					
11	To FG					
12	To FG					
13	To FG					
14	To FG					
15	To FG					
16	To FG					

Level Looping Exercise - Building C
Grade Rod

BM/TP	BS	HI	FS	Assigned EL	Actual EL	Description
BM-980.32					BM-980.32	Stake #1
						Stake #2
						Stake #3
						Stake #4
						Stake #5
						Stake #6
						Stake #7
						Stake #8
						Stake #9
TP						Stake #10
						Stake #9
						Stake #8
						Stake #7
						Stake #6
						Stake #5
						Stake #4
						Stake #3
						Stake #2
BM-980.32					BM-980.32	Stake #1

Level Looping Exercise - Building C Grade Rod

BM/TP	BS	HI	FS	Assigned EL	Actual EL	Description
BM-980.32					BM-980.32	Stake #1
						Stake #2
						Stake #3
						Stake #4
						Stake #5
						Stake #6
						Stake #7
						Stake #8
						Stake #9
TP						Stake #10
						Stake #9
						Stake #8
						Stake #7
						Stake #6
						Stake #5
						Stake #4
						Stake #3
						Stake #2
BM-980.32					BM-980.32	Stake #1

Level Looping Exercise - Building C

Grade Rod

BM/TP	BS	HI	FS	Assigned EL	Actual EL	Description
BM-980.32					BM-980.32	Stake #1
						Stake #2
						Stake #3
						Stake #4
						Stake #5
						Stake #6
						Stake #7
						Stake #8
						Stake #9
TP						Stake #10
						Stake #9
						Stake #8
						Stake #7
						Stake #6
						Stake #5
						Stake #4
						Stake #3
						Stake #2
BM-980.32					BM-980.32	Stake #1

Level Looping Exercise - Building C
Lenker Rod

BM/TP	BS	HI	FS	Assigned EL	Actual EL	Description
BM-980.32					BM-980.32	Stake #1
						Stake #2
						Stake #3
						Stake #4
						Stake #5
						Stake #6
						Stake #7
						Stake #8
						Stake #9
TP						Stake #10
						Stake #9
						Stake #8
						Stake #7
						Stake #6
						Stake #5
						Stake #4
						Stake #3
						Stake #2
BM-980.32					BM-980.32	Stake #1

Level Looping Exercise - Building C Lenker Rod

BM/TP	BS	HI	FS	Assigned EL	Actual EL	Description
BM-980.32					BM-980.32	Stake #1
						Stake #2
						Stake #3
						Stake #4
						Stake #5
						Stake #6
						Stake #7
						Stake #8
						Stake #9
TP						Stake #10
						Stake #9
						Stake #8
						Stake #7
						Stake #6
						Stake #5
						Stake #4
						Stake #3
						Stake #2
BM-980.32					BM-980.32	Stake #1

Level Looping Exercise - Building C Lenker Rod

BM/TP	BS	HI	FS	Assigned EL	Actual EL	Description
BM-980.32					BM-980.32	Stake #1
						Stake #2
						Stake #3
						Stake #4
						Stake #5
						Stake #6
						Stake #7
						Stake #8
						Stake #9
TP						Stake #10
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						Stake #8
						Stake #7
						Stake #6
						Stake #5
						Stake #4
						Stake #3
						Stake #2
BM-980.32					BM-980.32	Stake #1

Straight Grade - 2 Elev/RR & Dist Grade Rod

BM	BS RR	HI	FS RR	Elevation	Distance	
BM-980.32	3.24	983.56				
			LP 9.87	973.69	132.50	
			HP 6.54	977.02		
Highest RR - Lowest RR			3.33	$3.33/132.50 = \text{FT/FT} = 0.02513 \text{ FT/FT}$		
Want it staked in 4 equal Segments				$132.50 / 4 = D = 33.125$		
DIST (D) X		FT/FT =	RISE	LP RR - Rise =	FG RR	Section - 4" Bit + 8" CL - 5 FG RR + Section = SG RR
(DX1)	33.125	0.02513	0.83	9.87 - 0.83	9.04	$9.04 + 1.00 = 10.04$
(DX2)	66.25	0.02513	1.66	9.87 - 1.66	8.21	$8.21 + 1.00 = 9.21$
(DX3)	99.375	0.02513	2.50	9.87 - 2.50	7.37	$7.37 + 1.00 = 8.37$
(DX4)	132.50	0.02513	3.33	9.87 - 3.33	6.54	$6.54 + 1.00 = 7.54$

BM	BS RR	HI	FS RR	Elevation	Distance	
			LP			
			HP			
Highest RR - Lowest RR						
Want it staked in 4 equal Segments						
DIST (D) X		FT/FT =	RISE	LP RR - Rise =	FG RR	Section - 4" Bit + 8" CL - 5 FG RR + Section = SG RR
(DX1)						
(DX2)						
(DX3)						
(DX4)						

Try Some Random Distances

Straight Grade - 2 Elev/RR & Dist Grade Rod

BM	BS RR	HI	FS RR	Elevation	Distance	
BM-980.32	3.24	983.56				
			LP 9.87	973.69	132.50	
			HP 6.54	977.02		
Highest RR - Lowest RR			3.33	$3.33/132.50 = \text{FT/FT} = 0.02513 \text{ FT/FT}$		
Want it staked in 4 equal Segments				$132.50 / 4 = D = 33.125$		
DIST (D) X		FT/FT =	RISE	LP RR-Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)	33.125	0.02513	0.83	9.87-0.83	9.04	$9.04 + 1.00 = 10.04$
(DX2)	66.25	0.02513	1.66	9.87-1.66	8.21	$8.21 + 1.00 = 9.21$
(DX3)	99.375	0.02513	2.50	9.87-2.50	7.37	$7.37 + 1.00 = 8.37$
(DX4)	132.50	0.02513	3.33	9.87-3.33	6.54	$6.54 + 1.00 = 7.54$

BM	BS RR	HI	FS RR	Elevation	Distance	
			LP			
			HP			
Highest RR - Lowest RR						
Want it staked in 4 equal Segments						
DIST (D) X		FT/FT =	RISE	LP RR-Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)						
(DX2)						
(DX3)						
(DX4)						

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Straight Grade - 2 Elev/RR & Dist Grade Rod

BM	BS RR	HI	FS RR	Elevation	Distance	
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			LP 9.87	973.69	132.50	
			HP 6.54	977.02		
Highest RR - Lowest RR			3.33	$3.33/132.50 = \text{FT/FT} = 0.02513 \text{ FT/FT}$		
Want it staked in 4 equal Segments				$132.50 / 4 = D = 33.125$		
DIST (D) X		FT/FT =	RISE	LP RR - Rise =	FG RR	Section - 4" Bit + 8" CL - 5 FG RR + Section = SG RR
(DX1)	33.125	0.02513	0.83	9.87 - 0.83	9.04	$9.04 + 1.00 = 10.04$
(DX2)	66.25	0.02513	1.66	9.87 - 1.66	8.21	$8.21 + 1.00 = 9.21$
(DX3)	99.375	0.02513	2.50	9.87 - 2.50	7.37	$7.37 + 1.00 = 8.37$
(DX4)	132.50	0.02513	3.33	9.87 - 3.33	6.54	$6.54 + 1.00 = 7.54$

BM	BS RR	HI	FS RR	Elevation	Distance	
			LP			
			HP			
Highest RR - Lowest RR						
Want it staked in 4 equal Segments						
DIST (D) X		FT/FT =	RISE	LP RR - Rise =	FG RR	Section - 4" Bit + 8" CL - 5 FG RR + Section = SG RR
(DX1)						
(DX2)						
(DX3)						
(DX4)						

Try Some Random Distances

Straight Grade - 2 Elev/RR & Dist Lenker Rod

BM	BS RR	HI	FS RR	Elevation	Distance	
BM-980.32		0.32				
			LP 3.69	973.69	132.50	
			HP 7.02	977.02		
Highest RR - Lowest RR			3.33	3.33/132.50=FT/FT=0.02513 FT/FT		
Want it staked in 4 equal Segments				132.50 / 4 = D = 33.125		
DIST (D) X		FT/FT =	RISE	LP RR+Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR - Section =SG RR
(DX1)	33.125	0.02513	0.83	3.69+0.83	4.52	4.52 - 1.00 = 3.52
(DX2)	66.25	0.02513	1.66	3.69+1.66	5.35	5.35 - 1.00 = 4.35
(DX3)	99.375	0.02513	2.50	3.69+2.50	6.19	6.19 - 1.00 = 5.19
(DX4)	132.50	0.02513	3.33	3.69+3.33	7.02	7.02 - 1.00 = 6.02

BM	BS RR	HI	FS RR	Elevation	Distance	
			LP			
			HP			
Highest RR - Lowest RR						
Want it staked in 4 equal Segments						
DIST (D) X		FT/FT =	RISE	LP RR+Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR - Section =SG RR
(DX1)						
(DX2)						
(DX3)						
(DX4)						

Try Some Random Distances

Straight Grade - 2 Elev/RR & Dist Lenker Rod

BM	BS RR	HI	FS RR	Elevation	Distance	
BM-980.32		0.32				
			LP 3.69	973.69	132.50	
			HP 7.02	977.02		
Highest RR - Lowest RR			3.33	3.33/132.50=FT/FT=0.02513 FT/FT		
Want it staked in 4 equal Segments				132.50 / 4 = D = 33.125		
DIST (D) X		FT/FT =	RISE	LP RR+Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR - Section =SG RR
(DX1)	33.125	0.02513	0.83	3.69+0.83	4.52	4.52 - 1.00 = 3.52
(DX2)	66.25	0.02513	1.66	3.69+1.66	5.35	5.35 - 1.00 = 4.35
(DX3)	99.375	0.02513	2.50	3.69+2.50	6.19	6.19 - 1.00 = 5.19
(DX4)	132.50	0.02513	3.33	3.69+3.33	7.02	7.02 - 1.00 = 6.02

BM	BS RR	HI	FS RR	Elevation	Distance	
			LP			
			HP			
Highest RR - Lowest RR						
Want it staked in 4 equal Segments						
DIST (D) X		FT/FT =	RISE	LP RR+Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR - Section =SG RR
(DX1)						
(DX2)						
(DX3)						
(DX4)						

Try Some Random Distances

Straight Grade - 2 Elev/RR & Dist Lenker Rod

BM	BS RR	HI	FS RR	Elevation	Distance	
BM-980.32		0.32				
			LP 3.69	973.69	132.50	
			HP 7.02	977.02		
Highest RR - Lowest RR			3.33	3.33/132.50=FT/FT=0.02513 FT/FT		
Want it staked in 4 equal Segments				132.50 / 4 = D = 33.125		
DIST (D) X		FT/FT =	RISE	LP RR+Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR - Section =SG RR
(DX1)	33.125	0.02513	0.83	3.69+0.83	4.52	4.52 - 1.00 = 3.52
(DX2)	66.25	0.02513	1.66	3.69+1.66	5.35	5.35 - 1.00 = 4.35
(DX3)	99.375	0.02513	2.50	3.69+2.50	6.19	6.19 - 1.00 = 5.19
(DX4)	132.50	0.02513	3.33	3.69+3.33	7.02	7.02 - 1.00 = 6.02

BM	BS RR	HI	FS RR	Elevation	Distance	
			LP			
			HP			
Highest RR - Lowest RR						
Want it staked in 4 equal Segments						
DIST (D) X		FT/FT =	RISE	LP RR+Rise =	FG RR	Section-4"Bit + 8"CL-5 FG RR - Section =SG RR
(DX1)						
(DX2)						
(DX3)						
(DX4)						

Try Some Random Distances

Straight Grade - 1 Elev/RR, Dist & Rise/Fall Grade Rod

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32	3.24	983.56					
			9.87	973.69	20.00	+2.00%	
Want Rise/Fall in Feet per Foot				$+2.00\% / 100 = \text{FT/FT} = +0.02$			
Want it staked in 4 equal Segments				$20.00 / 4 = D = 5.00$			
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR-Rise RR+Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)	5	+0.02		+0.10	9.87-0.10	9.77	9.77 + 1.00 = 10.77
(DX2)	10	+0.02		+0.20	9.87-0.20	9.67	9.67 + 1.00 = 10.67
(DX3)	15	+0.02		+0.30	9.87-0.30	9.57	9.57 + 1.00 = 10.57
(DX4)	20	+0.02		+0.40	9.87-0.40	9.47	9.47 + 1.00 = 10.47

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32							
Want Rise/Fall in Feet per Foot							
Want it staked in 4 equal Segments							
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR-Rise RR+Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)							
(DX2)							
(DX3)							
(DX4)							

Try Some Random Distances

Straight Grade - 1 Elev/RR, Dist & Rise/Fall Grade Rod

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32	3.24	983.56					
			9.87	973.69	20.00	+2.00%	
Want Rise/Fall in Feet per Foot				$+2.00\% / 100 = \text{FT/FT} = +0.02$			
Want it staked in 4 equal Segments				$20.00 / 4 = D = 5.00$			
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR-Rise RR+Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)	5	+0.02		+0.10	9.87-0.10	9.77	9.77 + 1.00 = 10.77
(DX2)	10	+0.02		+0.20	9.87-0.20	9.67	9.67 + 1.00 = 10.67
(DX3)	15	+0.02		+0.30	9.87-0.30	9.57	9.57 + 1.00 = 10.57
(DX4)	20	+0.02		+0.40	9.87-0.40	9.47	9.47 + 1.00 = 10.47

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32							
Want Rise/Fall in Feet per Foot							
Want it staked in 4 equal Segments							
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR-Rise RR+Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)							
(DX2)							
(DX3)							
(DX4)							

Try Some Random Distances

Straight Grade - 1 Elev/RR, Dist & Rise/Fall Grade Rod

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32	3.24	983.56					
			9.87	973.69	20.00	+2.00%	
Want Rise/Fall in Feet per Foot				$+2.00\% / 100 = \text{FT/FT} = +0.02$			
Want it staked in 4 equal Segments				$20.00 / 4 = D = 5.00$			
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR-Rise RR+Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)	5	+0.02		+0.10	9.87-0.10	9.77	9.77 + 1.00 = 10.77
(DX2)	10	+0.02		+0.20	9.87-0.20	9.67	9.67 + 1.00 = 10.67
(DX3)	15	+0.02		+0.30	9.87-0.30	9.57	9.57 + 1.00 = 10.57
(DX4)	20	+0.02		+0.40	9.87-0.40	9.47	9.47 + 1.00 = 10.47

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32							
Want Rise/Fall in Feet per Foot							
Want it staked in 4 equal Segments							
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR-Rise RR+Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR + Section =SG RR
(DX1)							
(DX2)							
(DX3)							
(DX4)							

Try Some Random Distances

Straight Grade - 1 Elev/RR, Dist & Rise/Fall Lenker Rod

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32		0.32					
			3.69	973.69	20.00	+2.00%	
Want Rise/Fall in Feet per Foot				$+2.00\% / 100 = \text{FT/FT} = +0.02$			
Want it staked in 4 equal Segments				$20.00 / 4 = D = 5.00$			
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR+Rise RR-Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR - Section = SG RR
(DX1)	5	+0.02		+0.10	3.69+0.10	3.79	3.79 - 1.00 = 2.79
(DX2)	10	+0.02		+0.20	3.69+0.20	3.89	3.89 - 1.00 = 2.89
(DX3)	15	+0.02		+0.30	3.69+0.30	3.99	3.99 - 1.00 = 2.99
(DX4)	20	+0.02		+0.40	3.69+0.40	4.09	4.09 - 1.00 = 3.09

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32							
Want Rise/Fall in Feet per Foot							
Want it staked in 4 equal Segments							
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR+Rise RR-Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR - Section = SG RR
(DX1)							
(DX2)							
(DX3)							
(DX4)							

Try Some Random Distances

Straight Grade - 1 Elev/RR, Dist & Rise/Fall Lenker Rod

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32		0.32					
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Want Rise/Fall in Feet per Foot				$+2.00\% / 100 = \text{FT/FT} = +0.02$			
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DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR+Rise RR-Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR - Section = SG RR
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(DX3)	15	+0.02		+0.30	3.69+0.30	3.99	3.99 - 1.00 = 2.99
(DX4)	20	+0.02		+0.40	3.69+0.40	4.09	4.09 - 1.00 = 3.09

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32							
Want Rise/Fall in Feet per Foot							
Want it staked in 4 equal Segments							
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR+Rise RR-Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR - Section = SG RR
(DX1)							
(DX2)							
(DX3)							
(DX4)							

Try Some Random Distances

Straight Grade - 1 Elev/RR, Dist & Rise/Fall Lenker Rod

BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
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			3.69	973.69	20.00	+2.00%	
Want Rise/Fall in Feet per Foot				$+2.00\% / 100 = \text{FT/FT} = +0.02$			
Want it staked in 4 equal Segments				$20.00 / 4 = D = 5.00$			
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR+Rise RR-Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR - Section = SG RR
(DX1)	5	+0.02		+0.10	3.69+0.10	3.79	3.79 - 1.00 = 2.79
(DX2)	10	+0.02		+0.20	3.69+0.20	3.89	3.89 - 1.00 = 2.89
(DX3)	15	+0.02		+0.30	3.69+0.30	3.99	3.99 - 1.00 = 2.99
(DX4)	20	+0.02		+0.40	3.69+0.40	4.09	4.09 - 1.00 = 3.09

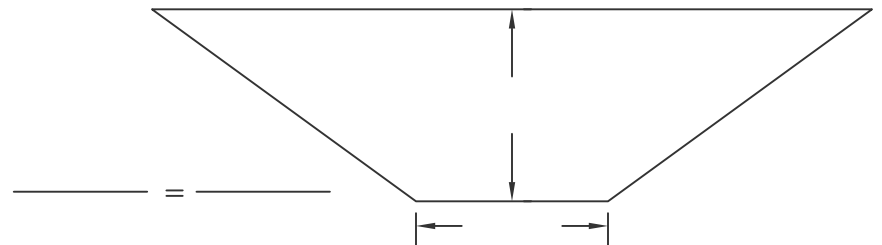
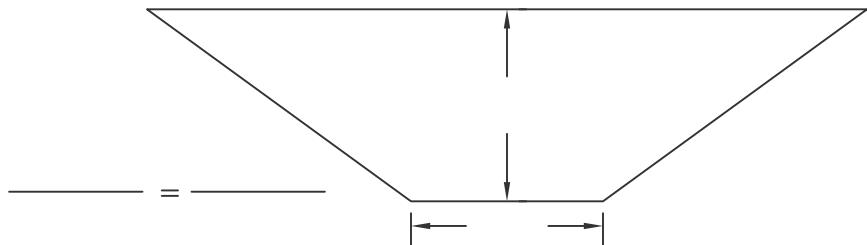
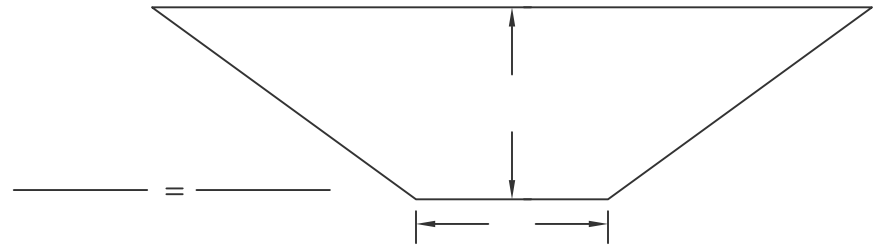
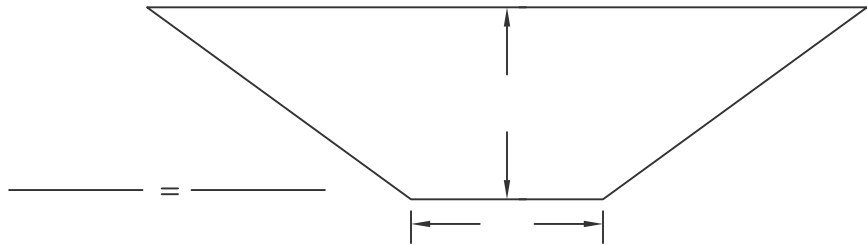
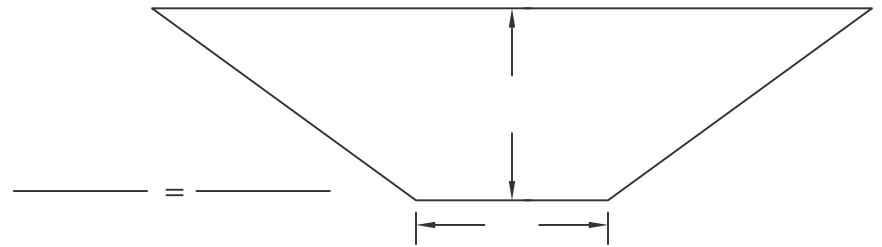
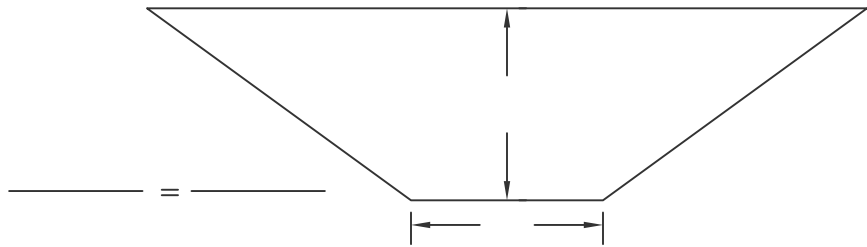
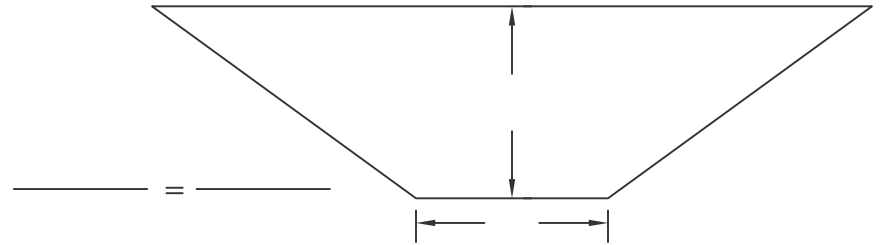
BM	BS RR	HI	FS RR	Elevation	Distance	Rise (+) Fall (-)	
BM-980.32							
Want Rise/Fall in Feet per Foot							
Want it staked in 4 equal Segments							
DIST (D)	X	FT/FT	=	+ = Rise - = Fall	RR+Rise RR-Fall	= FG RR	Section-4"Bit + 8"CL-5 FG RR - Section = SG RR
(DX1)							
(DX2)							
(DX3)							
(DX4)							

Try Some Random Distances

Total Trench Exercise

$$\begin{aligned} \text{SOLVING FOR RISE} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{X \text{ (RISE)}}{14' \text{ (RUN)}} \\ &= 14 \times 1 = 14 / 4 = X = 3.5' \end{aligned}$$

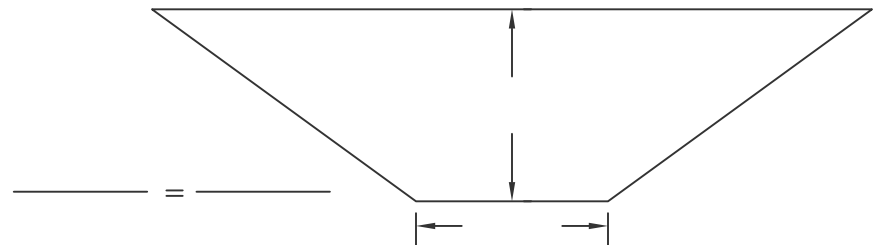
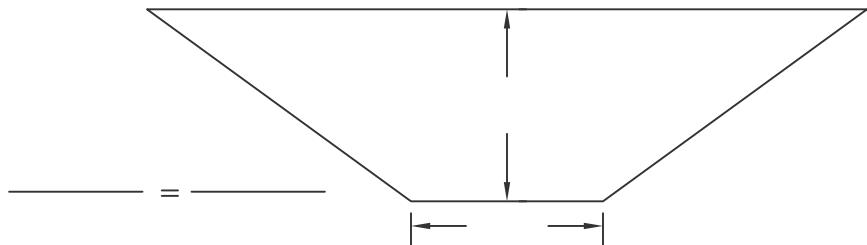
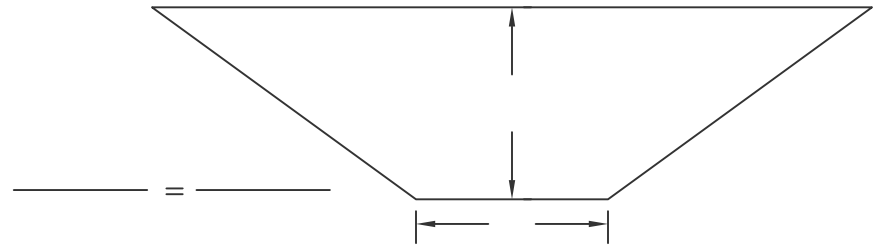
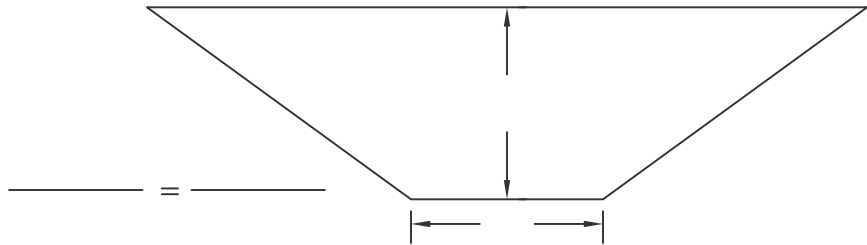
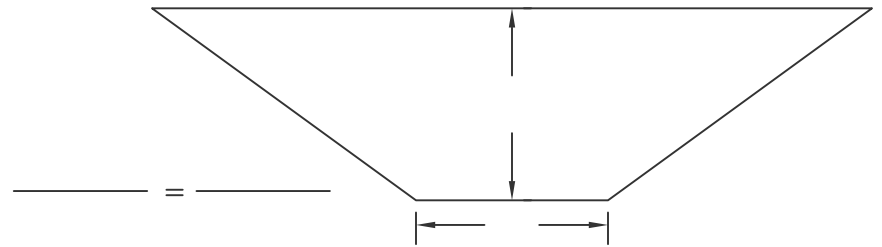
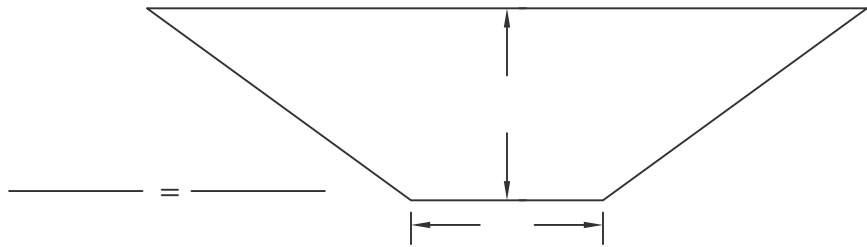
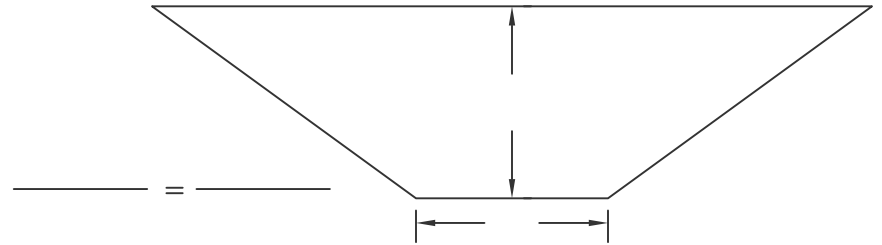
$$\begin{aligned} \text{SOLVING FOR RUN} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{5' \text{ (RISE)}}{X \text{ (RUN)}} \\ &= 5 \times 4 = 20 / 1 = X = 20' \\ 20 \times 2 \text{ (Sides)} &= + \text{Ditch Bottom} = \text{Total Trench} \end{aligned}$$



Total Trench Exercise

$$\begin{aligned} \text{SOLVING FOR RISE} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{X \text{ (RISE)}}{14' \text{ (RUN)}} \\ &= 14 \times 1 = 14 / 4 = X = 3.5' \end{aligned}$$

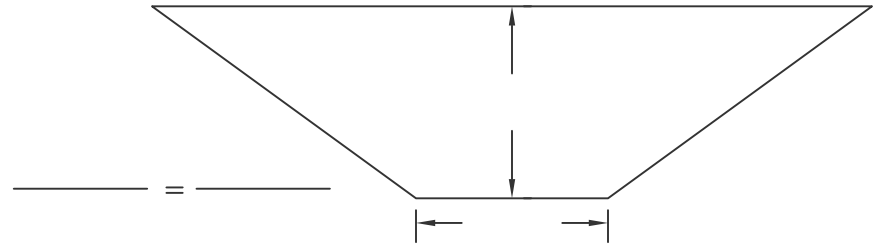
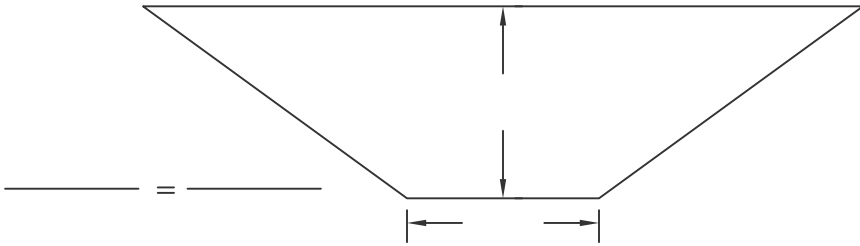
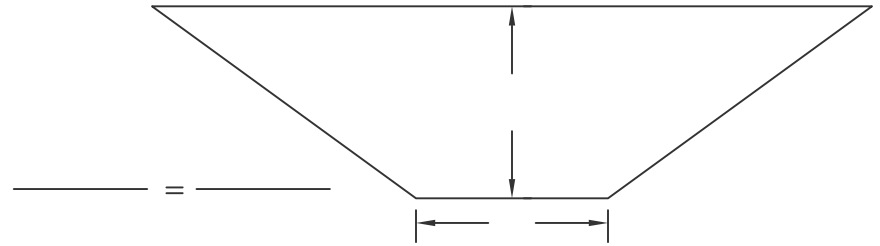
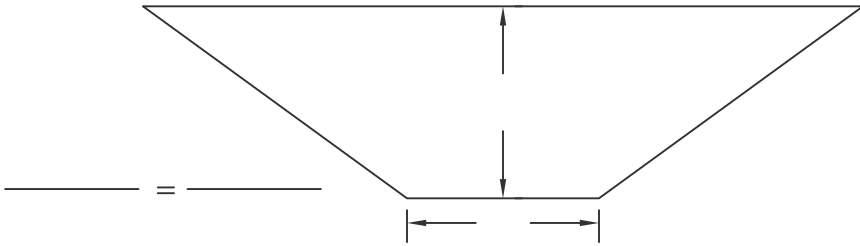
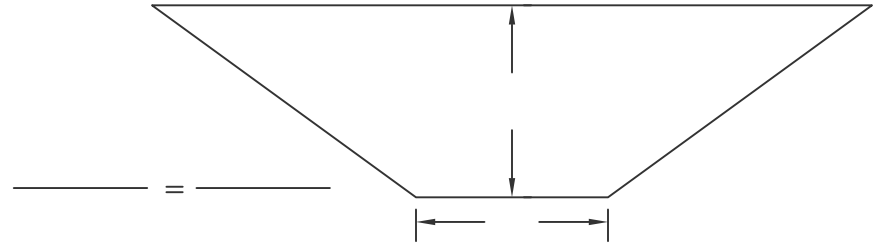
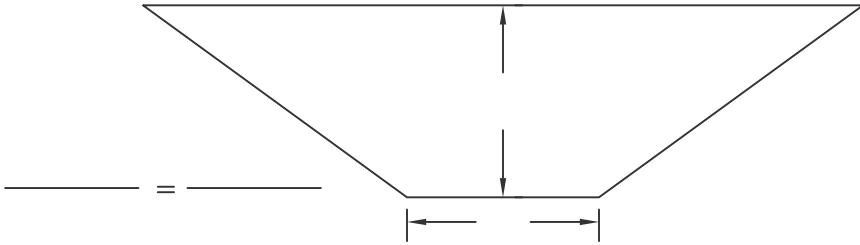
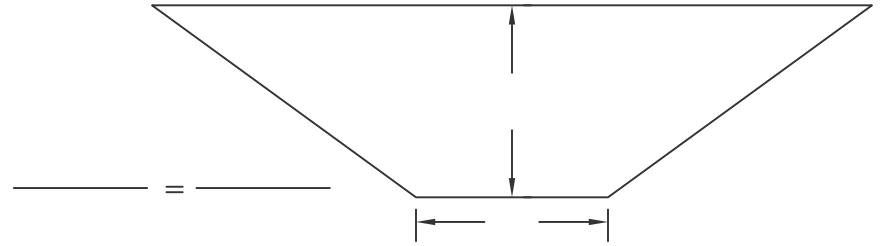
$$\begin{aligned} \text{SOLVING FOR RUN} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{5' \text{ (RISE)}}{X \text{ (RUN)}} \\ &= 5 \times 4 = 20 / 1 = X = 20' \\ 20 \times 2 \text{ (Sides)} &= + \text{Ditch Bottom} = \text{Total Trench} \end{aligned}$$



Total Trench Exercise

$$\begin{aligned} \text{SOLVING FOR RISE} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{X \text{ (RISE)}}{14' \text{ (RUN)}} \\ &= 14 \times 1 = 14 / 4 = X = 3.5' \end{aligned}$$

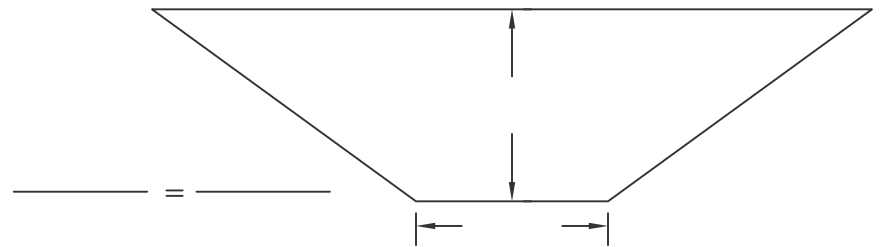
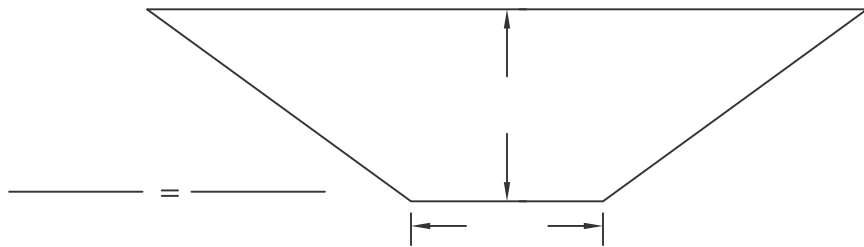
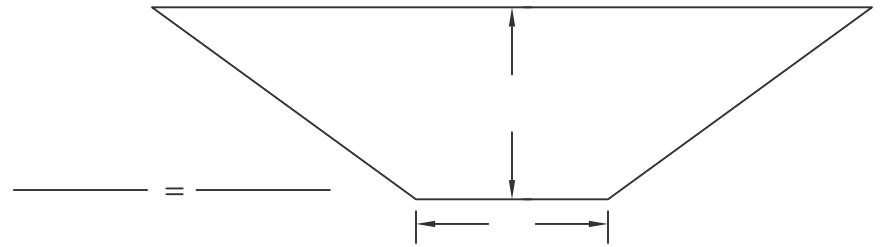
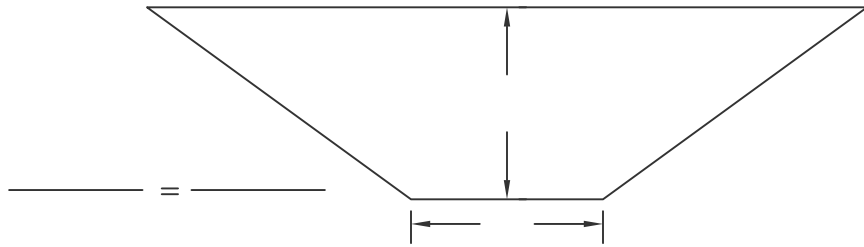
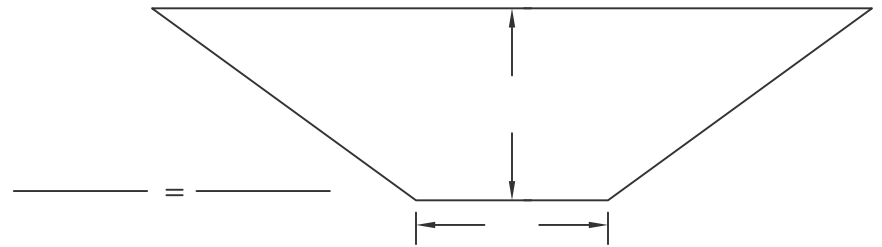
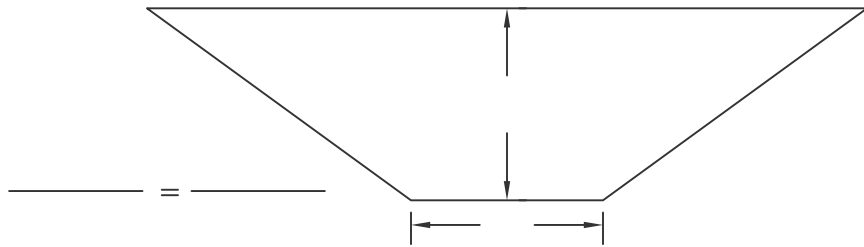
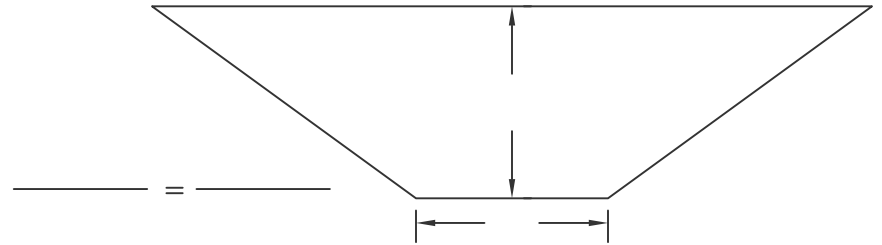
$$\begin{aligned} \text{SOLVING FOR RUN} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{5' \text{ (RISE)}}{X \text{ (RUN)}} \\ &= 5 \times 4 = 20 / 1 = X = 20' \\ 20 \times 2 \text{ (Sides)} &= + \text{Ditch Bottom} = \text{Total Trench} \end{aligned}$$



Total Trench Exercise

$$\begin{aligned} \text{SOLVING FOR RISE} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{X \text{ (RISE)}}{14' \text{ (RUN)}} \\ &= 14 \times 1 = 14 / 4 = X = 3.5' \end{aligned}$$

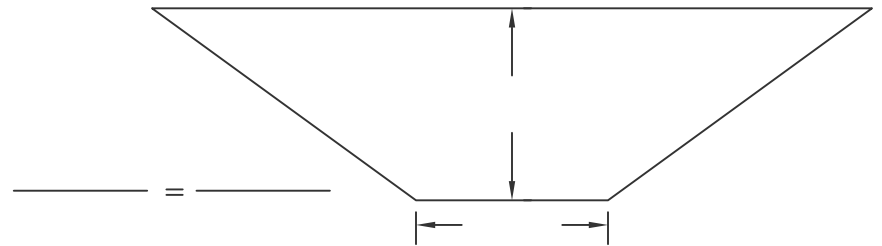
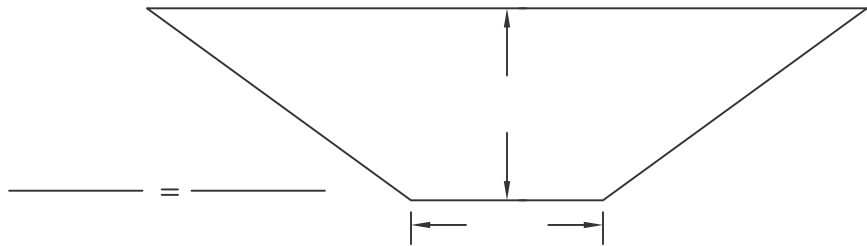
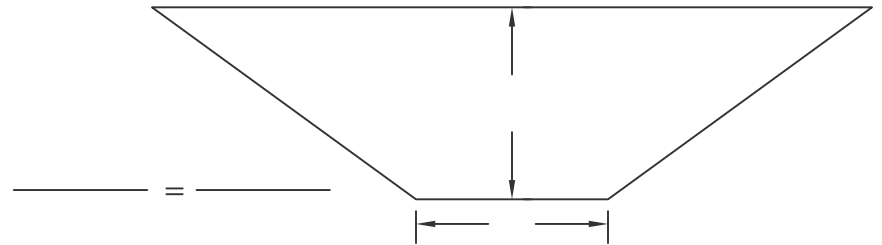
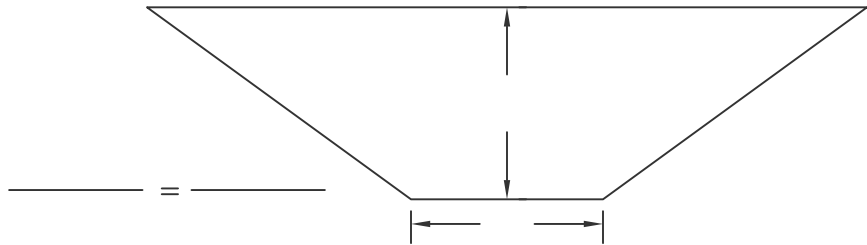
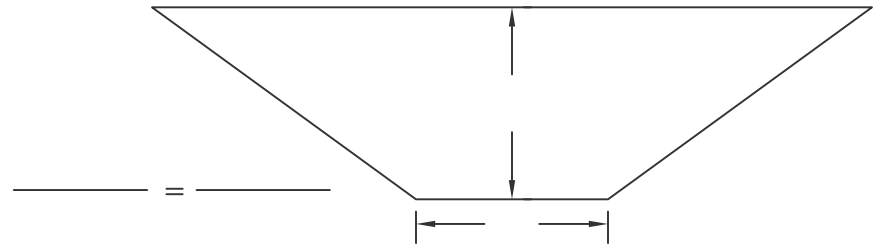
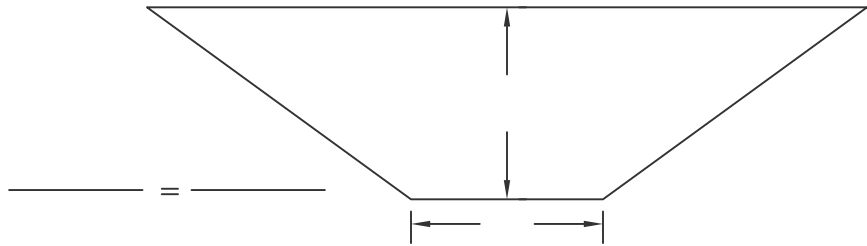
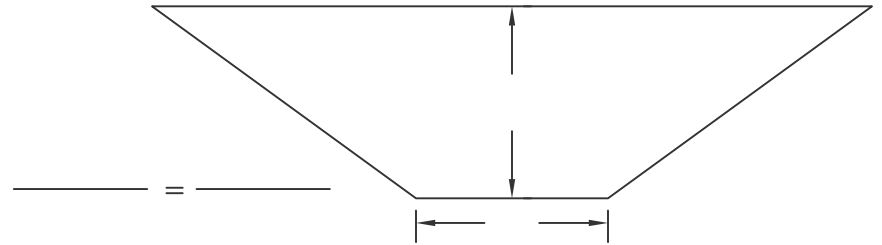
$$\begin{aligned} \text{SOLVING FOR RUN} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{5' \text{ (RISE)}}{X \text{ (RUN)}} \\ &= 5 \times 4 = 20 / 1 = X = 20' \\ 20 \times 2 \text{ (Sides)} &= + \text{Ditch Bottom} = \text{Total Trench} \end{aligned}$$



Total Trench Exercise

$$\begin{aligned} \text{SOLVING FOR RISE} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{X \text{ (RISE)}}{14' \text{ (RUN)}} \\ &= 14 \times 1 = 14 / 4 = X = 3.5' \end{aligned}$$

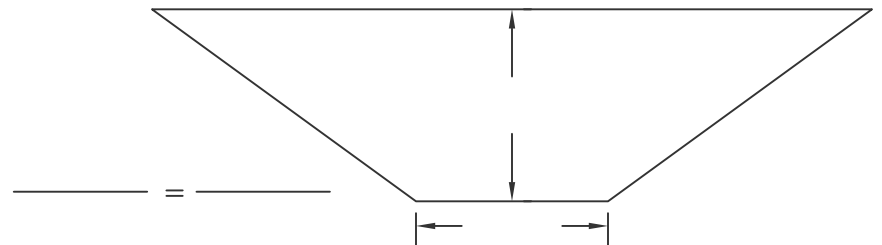
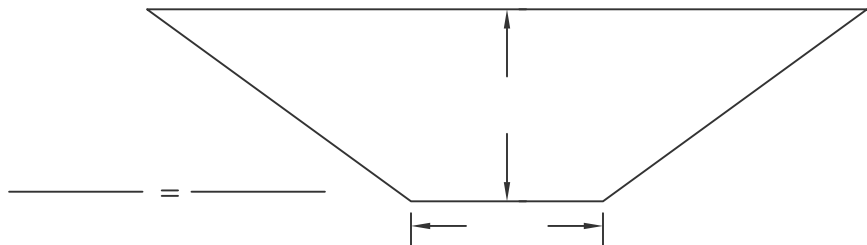
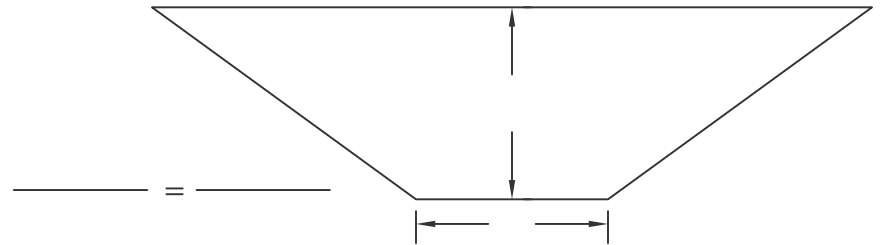
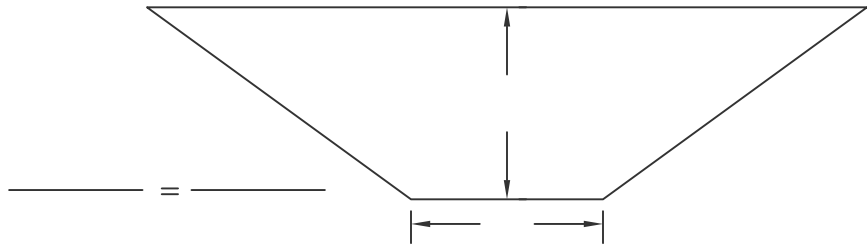
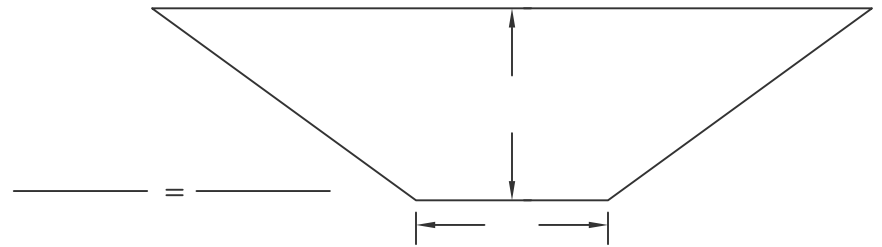
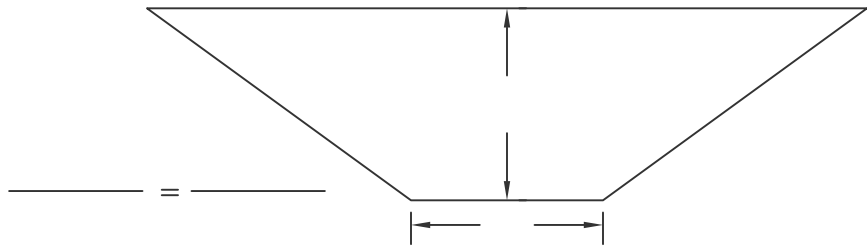
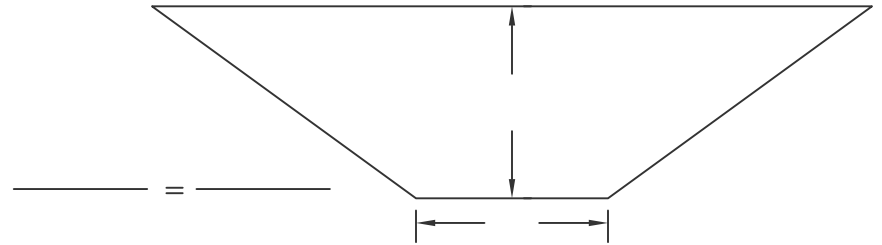
$$\begin{aligned} \text{SOLVING FOR RUN} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{5' \text{ (RISE)}}{X \text{ (RUN)}} \\ &= 5 \times 4 = 20 / 1 = X = 20' \\ 20 \times 2 \text{ (Sides)} &= + \text{Ditch Bottom} = \text{Total Trench} \end{aligned}$$



Total Trench Exercise

$$\begin{aligned} \text{SOLVING FOR RISE} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{X \text{ (RISE)}}{14' \text{ (RUN)}} \\ &= 14 \times 1 = 14 / 4 = X = 3.5' \end{aligned}$$

$$\begin{aligned} \text{SOLVING FOR RUN} &= \frac{1' \text{ (RISE)}}{4' \text{ (RUN)}} = \frac{5' \text{ (RISE)}}{X \text{ (RUN)}} \\ &= 5 \times 4 = 20 / 1 = X = 20' \\ 20 \times 2 \text{ (Sides)} &= + \text{Ditch Bottom} = \text{Total Trench} \end{aligned}$$



TYPICAL SECTION EXERCISES

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

#4
Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

#4
Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____

TYPICAL SECTION EXERCISES

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

#6
Rise/Fall _____

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#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

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Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____

TYPICAL SECTION EXERCISES

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Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

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#1
Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

TYPICAL SECTION EXERCISES

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#5

#6

#1
Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

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Rise/Fall _____

#6
Rise/Fall _____

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

#4
Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____

TYPICAL SECTION EXERCISES

The top diagram shows a cross-section profile with points #1 through #6. The profile starts at point #1, goes down to #2, then down to #3, then down to #4, then up to #5, and finally up to #6. Below the profile is a list of six 'Rise/Fall' questions, each with a blank line for the answer.

#1
#2
#3
#4
#5
#6

Rise/Fall _____
Rise/Fall _____
Rise/Fall _____
Rise/Fall _____
Rise/Fall _____
Rise/Fall _____

The bottom diagram shows a cross-section profile with points #1 through #6. The profile starts at point #1, goes down to #2, then down to #3, then down to #4, then up to #5, and finally up to #6. Below the profile is a list of six 'Rise/Fall' questions, each with a blank line for the answer.

#1
#2
#3
#4
#5
#6

Rise/Fall _____
Rise/Fall _____
Rise/Fall _____
Rise/Fall _____
Rise/Fall _____
Rise/Fall _____

TYPICAL SECTION EXERCISES

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

#4
Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

#4
Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____

TYPICAL SECTION EXERCISES

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

#4
Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____

#1

#2

#3

#4

#5

#6

#1
Rise/Fall _____

#2
Rise/Fall _____

#3
Rise/Fall _____

#4
Rise/Fall _____

#5
Rise/Fall _____

#6
Rise/Fall _____