

Appendix F



estimating formulas

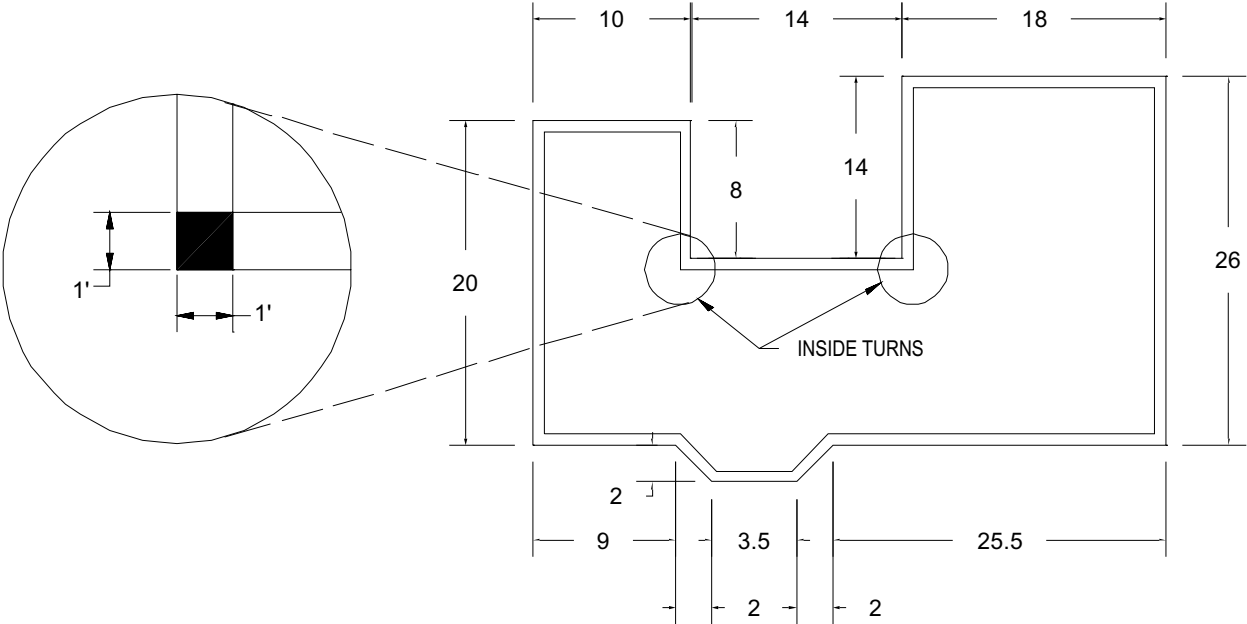
ESTIMATING/INFORMATION GATHERING

Estimating is a simple task with Arxx™. In order to complete an estimate of materials required for a typical Arxx project, you will need to gather the following information from the plans for the building.

Lineal Footage of Wall

Begin by adding the length of all walls that will be built with Arxx. It is typically easier to look at each floor separately when calculating lineal footage. After the lineal footage is calculated, return to the plans and count the total number of inside turns. For each inside turn, add two lineal feet. This is to accommodate for the two lineal feet of material that are not dimensioned on most plans. (Refer to Figure F.1.)

FIGURE F.1 – OVERLAP OF DIMENSIONS



In the above example, the total lineal footage would be:

$$10 + 8 + 14 + 14 + 18 + 26 + 25.5 + 3 + 3.5 + 3 + 9 + 20 = 154$$

$$154 + (2 \times 2) = 158$$



90° Turns

While still looking at the floor plan, determine how many times the wall turns 90° (inside and outside together). You will use this number to determine how many 90° corner forms are required.

Again referring to Figure F.1, there are eight (8) 90° turns.

Variable Degree Turns

From the floor plan, determine how many times the wall turns other than 90° (inside and outside together). You will use this number to determine how many adjustable corner forms are required.

Again referring Figure F.1, there are four (4) variable degree turns.

Number of Courses

Next, you will need to determine the number of courses of forms required. From the section drawings, you can determine the height of the wall section that is being estimated. With this dimension, turn to the coursing chart later in this chapter to determine the most economical combination of full courses of forms and height adjusters.

When determining course layout, keep in mind such things as floor elevations and height of openings within the wall, as these can help to determine where height adjusters should be placed, or whether it would be better to add another course of forms to make floor installation simpler. Now is the time to build the project on paper before you get to the site.

Area of Openings

Next, you will determine the total square footage of openings. Using the window and door schedules (if provided) is the easiest way to determine the total area of openings. However, you will sometimes need to go through the floor plans looking at each opening to determine its dimensions and calculate its area.

Buck Saver™

While gathering the data for total area of openings in the wall, make note of the head and jamb dimensions of each opening. These will be used to determine the quantity of Buck Saver required on-site. It should be noted that the Buck Saver is available to fit the 6 1/4" forms. It can easily be modified for use with the 8" forms also.

Masonry Veneer

Looking at the plans, you should be able to determine if the project will require support for masonry veneer. If so, does it require a tapered top form, or an extended brick ledge form? Now determine how many lineal feet of tapered top or extended brick ledge forms will be required.

Waterproofing and Parging

If the area being estimated will be partially below grade (i.e. a basement or crawlspace), it will be necessary to provide waterproofing and other coatings materials to the outside of the wall. Calculate the average height of backfill around the building.

Armed with the information collected above, flip to the next page and use this information to calculate the forms and other materials required for your project.

Reinforcing Steel

To determine reinforcing steel requirements, you need to determine an average length of reinforcing steel required for each form unit to be placed. When determining this average per form, be sure to account for horizontal and vertical reinforcing separately since the horizontal and vertical rebar are often different sizes. Typically, it is easier to account for stirrups (for both lintels and extended brick ledge), opening reinforcing, and lintel rebar separately from the normal wall reinforcing.

Blok Lok®

Using the lineal footage of wall and the number of courses of Blok Lok® to be used, you can determine the required Blok Lok quantity. Remember that Blok Lok should be used in every fourth or fifth course starting with the second course.

Concrete

Concrete quantities are determined using the dimensions of the concrete wall to be cast. The lineal footage of wall, height of wall, thickness of wall, and total SF of openings are the critical pieces of information that must be captured from the plans.

Labor

Arxx™ strives to collect accurate data with respect to man-hour labor rates. In order to ensure that any such data can be applied accurately, there must be some knowledge applied with respect to such elements as the following:

- › Expected weather conditions (winter vs. summer)
- › SF of openings versus Gross SF of wall
- › Available access on-site
- › Crew size and experience level, etc.

To this end, Arxx has developed a tool called the Arxx Guide to Estimating Man-Hour Rates. The guide is re-printed later in this chapter.

ESTIMATING/FORMULAS

PRODUCT	FORMULA
Standards	$\frac{LF^1 - \text{Footage of } 90^\circ \text{ Turns} - \text{Footage of Adj. Turns}}{4} \times \# \text{ of Courses of Standards}$
90° Corners	$\# \text{ of } 90^\circ \text{ Turns} \times \# \text{ of Courses}$
Fixed 45° Corners	$\frac{\# \text{ of } 45^\circ \text{ Turns} \times \# \text{ of Courses}}{2}$
Adjustable Corners	$\# \text{ of Adjustable Turns} \times \# \text{ of Courses}$
Extended Brick Ledge	$\frac{LF \text{ of EBL}}{4} + 1 \text{ Unit/Turn}$
Tapered Top	$\frac{LF \text{ of TT} - \text{Footage of } 90^\circ \text{ Turns} - \text{Footage of Adj. Turns}}{4}$
Height Adjuster (Feet)	$LF \times 2 \text{ sides} \times \# \text{ of Courses of Height Adjusters}$
Feet of Blok Lok®	$LF \times \# \text{ of Courses of Blok Lok}^\circ$
Filament Tape (Rolls)	$\frac{\text{Total } \# \text{ of Forms}}{50}$
Feet of Buck Saver™	$\text{Jamb Height} \times 2 + \text{Head}$
Rolls of Arxx™ Waterproofing ²	$\frac{\text{Area to Be Covered}}{235}$
Bags of PrepCoat B2000 ²	$\frac{\text{Area to Be Covered}}{75}$
Rolls of Fiber Mesh ²	$\frac{\text{Area to Be Covered}}{475}$
Feet of Rebar	$\text{Total } \# \text{ of Form Units} \times \text{Est'd Footage of Rebar per Form Unit}$
Feet of EBL Rebar	$\# \text{ of EBL Forms} \times 14' \text{ of } \#4 (10M)$
Sets of Alignment System	$\frac{LF}{6} + \text{Allowance for Corners}$

CONCRETE FORM	IMPERIAL (YD ³)	METRIC (M ³)
4"	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.334}{27}$	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.334}{35.315}$
6"	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.522}{27}$	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.522}{35.315}$
8"	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.667}{27}$	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.667}{35.315}$
10"	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.84}{27}$	$\frac{(\text{GSF of Wall} - \text{SF of Openings}) \times 0.667}{35.315}$
ADD FOR EBL	$\text{Linear feet of EBL} \times 0.0066 \text{ yd}^3$	$\text{Linear feet of EBL} \times 0.005 \text{ m}^3$

¹ Add 2' 0" to total linear footage for every inside 90° turn.

² One standard form unit = 5.58 sf of wall area
One adjustable form unit = 4.19 sf of wall area

COURSING CHART

# OF COURSES	TOTAL HEIGHT	ADD 1 HT. ADJUSTER (3 3/8")	ADD 2 HT. ADJUSTERS (6 3/4")	ADD 3 HT. ADJUSTERS (10 1/8")
1	16 3/4"	n/a	n/a	n/a
2	33 1/2"	36 7/8"	n/a	n/a
3	50 1/4"	53 5/8"	57"	n/a
4	67"	70 3/8"	73 3/4"	77 1/8"
5	83 3/4"	87 1/8"	90 1/2"	93 7/8"
6	100 1/2"	103 7/8"	107 1/4"	110 5/8"
7	117 1/4"	120 5/8"	124"	127 3/8"
8	134"	137 3/8"	140 3/4"	144 1/8"
9	150 3/4"	154 1/8"	157 1/2"	160 7/8"
10	167 1/2"	170 7/8"	174 1/4"	177 5/8"
11	184 1/4"	187 5/8"	191"	194 3/8"
12	201"	204 3/8"	207 3/4"	211 1/8"
13	217 3/4"	221 1/8"	224 1/2"	227 7/8"
14	234 1/2"	237 7/8"	241 1/4"	244 5/8"
15	251 1/4"	254 5/8"	258"	261 3/8"
16	268"	271 3/8"	274 3/4"	278 1/8"
17	284 3/4"	288 1/8"	291 1/2"	294 7/8"
18	301 1/2"	304 7/8"	308 1/4"	311 5/8"
19	318 1/4"	321 5/8"	325"	328 3/8"
20	335"	338 3/8"	341 3/4"	345 1/8"
21	351 3/4"	355 1/8"	358 1/2"	361 7/8"
22	368 1/2"	371 7/8"	375 1/4"	378 5/8"
23	385 1/4"	388 5/8"	392"	395 3/8"
24	402"	405 3/8"	408 3/4"	412 1/8"
25	418 3/4"	422 1/8"	425 1/2"	428 7/8"



WHEN ORDERING, PLEASE KEEP IN MIND THE QUANTITIES IN WHICH ARXX™ WALLSYSTEM FORMS ARE BUNDLED FOR SHIPPING.



WHEN PERFORMING ESTIMATES, PLEASE CONTACT YOUR LOCAL ARXX WALLSYSTEM DISTRIBUTOR FOR MOST RECENT PRICING AND AVAILABILITY.

GUIDE TO ESTIMATING MAN-HOUR RATES

Instructions

In each of the 20 categories on the next page, circle one of the three choices that most closely matches your building. Add up the points from each category into a grand total. This is your building's rating. Apply the building rating to determine your estimated man-hours per gross square foot of wall surface, (mh/gsf). To calculate the total Arxx™ man-hours for your building, simply multiply the man-hour rate by the gross square feet of wall surface in your building (do not deduct for openings). This is an approximate calculation. Contractors are to utilize their best judgment in applying lighter or heavier point ratings. This guide is based on historical job reports and covers all phases of the Arxx work, including unloading and handling forms, stacking forms, fabricating/installing bucks, fabricating/installing reinforcing steel, handling/installing BMAS, installing embedded metal connections, placing/consolidating concrete, stripping BMAS, and final clean-up. Good contractors will track their mh/gsf and create their own historical database to improve their accuracy in future estimates.

❖ The top twelve categories have heavier point ratings than the bottom eight categories.

POINT SYSTEM	WEATHER CONDITIONS	#90 CORNERS/COURSE TOTAL FORMS/COURSE	ADJ. CORNERS/COURSE TOTAL FORMS/COURSE	TYPICAL # OF COURSES/STORY	# OF POINTS	MAN-HOUR RATE CHART	
1	mild	0-16%	0	1-7		BUILDING RATE	MAN-HOUR RATE MH/GSF
3	rain/snow	17-24%	1-16%	8-10		20	0.03
5	severe hot/cold	25% +	17% +	11 +		21-24	0.04
						25-28	0.05
						29-32	0.06
						33-36	0.07
						37-38	0.08
						39-40	0.09
						41-42	0.10
						43-44	0.11
						45-47	0.12
						48-50	0.13
						51-55	0.14
						56-61	0.15
						62-67	0.16
						68-73	0.17
						74-79	0.18
						80-82	0.19
						83-84	0.20

POINT SYSTEM	SF OF OPENINGS GSF OF WALL SURFACE	SF OF RADIUS WALL GSF OF WALL SURFACE	AVERAGE LINTEL HAS	ARXX™ CREW EXPERIENCE LEVEL	# OF POINTS
1	0 - 7%	0	no stirrups	high	
3	8 - 20%	1 - 10%	C stirrups	medium	
5	21% +	11% +	rectangular cage stirrups	low, unless job is 2000+ forms	

POINT SYSTEM	SITE ACCESS AND GROUND CONDITIONS	WINDOW AND DOOR HORIZONTAL RIP CUTS	# OF TEES OR PILASTERS/STORY	EMBEDMENTS	# OF POINTS
1	ideal	no rip cuts	0	few & simple	
2	fair	up to 4" rip cuts	1 - 4	many/complex	
5	poor	4" rips at top & bottom	5 +	many & complex	

POINT SYSTEM	COURSES OF HEIGHT ADJUSTERS	COURSES OF BRICK LEDGE PER STORY	LF REINFORCING PER STANDARD FORM	# OF STORIES INCL. BASEMENT	# OF POINTS
1	0	0	0 - 9	1	
2	1	1	10 - 14	2	
3	2 +	2 +	15 +	3 +	

POINT SYSTEM	CREW SIZE	BOTTOM COURSE ON A:	CONCRETE PLACEMENT	DIMENSIONS ARE ARXX™-FRIENDLY	# OF POINTS
1	1 - 4	slab	boom pump	8" increments	
2	5 - 10	strip footer	chute	non 8" increments	
3	11 +	piles	crane & bucket or line pump	many wall lengths less than 3'	
TOTAL					

GUIDE TO ESTIMATING MAN-HOUR RATES

PROJECT EXAMPLE

POINT SYSTEM	WEATHER CONDITIONS	#90 CORNERS/COURSE TOTAL FORMS/COURSE	ADJ. CORNERS/COURSE TOTAL FORMS/COURSE	TYPICAL # OF COURSES/STORY	# OF POINTS	MAN-HOUR RATE CHART	
POINT SYSTEM	SF OF OPENINGS GSF OF WALL SURFACE	SF OF RADIUS WALL GSF OF WALL SURFACE	AVERAGE LINTEL HAS	ARXX™ CREW EXPERIENCE LEVEL	# OF POINTS	BUILDING RATE	MAN-HOUR RATE MH/GSF
1	☛ mild	0-16%	☛ 0	☛ 1-7	3	20	0.03
3	rain/snow	☛ 17-24%	1-16%	8-10	3	21-24	0.04
5	severe hot/cold	25% +	17% +	11 +	0	25-28	0.05
						29-32	0.06
						33-36	0.07 ☛
1	0 - 7%	☛ 0	no stirrups	high	1	37-38	0.08
3	☛ 8 - 20%	1 - 10%	☛ C stirrups	☛ medium	9	39-40	0.09
5	21% +	11% +	rectangular cage stirrups	low, unless job is 2000+ forms	0	41-42	0.10
						43-44	0.11
						45-47	0.12
						48-50	0.13
						51-55	0.14
						56-61	0.15
						62-67	0.16
						68-73	0.17
						74-79	0.18
						80-82	0.19
						83-84	0.20
POINT SYSTEM	SITE ACCESS AND GROUND CONDITIONS	WINDOW AND DOOR HORIZONTAL RIP CUTS	# OF TEES OR PILASTERS/STORY	EMBEDMENTS	# OF POINTS		
1	☛ ideal	no rip cuts	☛ 0	few & simple	2		
2	fair	up to 4" rip cuts	1 - 4	☛ many/complex	2		
5	poor	☛ 4" rips at top & bottom	5 +	many & complex	5		
POINT SYSTEM	COURSES OF HEIGHT ADJUSTERS	COURSES OF BRICK LEDGE PER STORY	LF REINFORCING PER STANDARD FORM	# OF STORIES INCL. BASEMENT	# OF POINTS		
1	0	☛ 0	☛ 0 - 9	☛ 1	3		
2	☛ 1	1	10 - 14	2	2		
3	2 +	2 +	15 +	3 +	0		
POINT SYSTEM	CREW SIZE	BOTTOM COURSE ON A:	CONCRETE PLACEMENT	DIMENSIONS ARE ARXX™-FRIENDLY	# OF POINTS		
1	1 - 4	☛ slab	☛ boom pump	8" increments	2		
2	☛ 5 - 10	strip footer	chute	☛ non 8" increments	4		
3	11 +	piles	crane & bucket or line pump	many wall lengths less than 3'	0		
TOTAL					36		

☛ Estimated Project Man-Hour Rate is 0.07 mh/gsf

Perform any necessary calculations here



Appendix G



glossary

GLOSSARY

Following are several terms used in this manual, and the common understanding of their meaning.

90° corner form unit

means a section of Arxx™ wall form that creates a 90° corner

a

AAMA

American Architectural Manufacturers Association

ACI

American Concrete Institute

adjustable corner form unit

a section of Arxx wall form that can swing to adjust to a wide range of corners

adjustable pole

the diagonal pole that incorporates a turnbuckle used to plumb the Arxx wall prior to and immediately after concrete placement

advanced house

the equivalent of an R2000 home

air barrier

the elements of the building envelope that provide a continuous effective barrier to the movement of air through the building envelope

allowable bearing pressure

the maximum pressure that may safely be applied to the soil or rock by the foundation

allowable load

the maximum load that may be safely applied to the foundation

ASHRAE

American Society of Heating, Refrigeration and Air-Conditioning Engineers

ASTM

American Society for Testing and Materials

authority having jurisdiction

the governmental body responsible for the enforcement of any part of the codes or regulations mentioned in this manual

b

basement

a story of a building located below the first story

bearing surface

the contact surface between the foundation and a floor joist, beam, open web steel joist or hollow core slab

box section

see channel

buck

the frame, normally wood used to hold the concrete in the forms at window and door openings

C

CAN

National Standard of Canada designation. The number following the CAN designation represents the agency under whose auspices the standard is issued.

CAN1 designates CGA

CAN2 designates CGSB

CAN3 designates CSA

CAN4 designates ULC

CGSB

Canadian General Standards Board

chalk line

string line

channel

the vertical steel box section of the BMAS

consolidation

the manipulation of concrete to remove air bubbles to avoid honey-combing and voids which can allow leakage

course

a horizontal row of Arxx form units

curing

hydration; the chemical reaction that occurs as concrete loses its water

d

dampproofing

a product or the application of a product designed to inhibit the passage of water

dead load

the weight of all permanent structural and non-structural components of a building

e

end cap

a section of Arxx wall form used to impede the flow of concrete past the end of the form unit

EPS

Expanded Polystyrene

extended brick ledge form unit

a section of Arxx wall form used to create a shelf to support the application of brick veneer

exterior cladding

those components of a building that are exposed to the outdoor environment and are intended to provide exterior protection, i.e. from weather

f

fiber mesh

the fiberglass material used in conjunction with parging to control cracking due to shrinkage and settling

fire resistance rating (FRR)

the time in hours or fraction thereof that a material or assembly of materials will withstand the presence of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria.

firewall

a type of fire separation of non-combustible construction which subdivides a building or separates adjoining buildings to resist the spread of fire and which has a fire resistance rating and structural stability under fire conditions

flame spread rating

an index or classification indicating the extent of spread of flame on the surface of a material or an assembly under specified conditions of test

footing

the wider portion of the foundation found at the bottom of the foundation wall, also referred to as a footer

form unit

generic term referring to an Arxx Insulated Concrete Wall Form, and consisting of two panels of EPS connected with four to six black plastic webs

foundation

a system through which the loads from a building are transferred to supporting soil or rock

g

grade

the average level of proposed or finished ground adjoining a building at all exterior walls

grade beam

a below-grade wall that is reinforced so that it will perform as a beam to support the loading conditions imposed by the building



h

hard coat

a finish material normally applied to the exterior with a trowel to provide a weather resistant coating that is aesthetically pleasing

HUD

US Department of Housing and Urban Development

l

lintel

the section of wall directly over an opening designed to transfer the loads to the sides of the opening

live load

the load other than dead load to be assumed in the design of the structural members of a building

load

a supported weight or mass

loadbearing

as applied to a building element, subjected to or designed to carry loads in addition to its own dead load

m

moist cure

hydration in the presence of water or moisture

n

nipple

the diamond shaped protrusion on the top of the form

NWWDA

National Wood Window and Door Association

p

parging

an acrylic based, cementitious coating designed for use on EPS

party wall

a wall jointly owned and jointly used by two parties under easement agreement, and erected at or upon a line separating two parcels of land

pile

a slender deep foundation made of materials such as wood, steel or concrete, or a combination thereof

point load

a load that is concentrated over a small area

pour rate

the speed at which concrete can be placed into a wall given a certain temperature

r

R2000

the program of residential construction originating in Ontario, Canada, designed to reduce the amount of energy required to operate a residential structure. Other provinces and states operate similar programs under other names

regulation

the governmental rules governing the design or use of a material or its installation

RO

Rough Opening, see RSO

rock

that portion of the earth's crust which is consolidated, coherent and relatively hard

RSO

Rough Stud Opening; dimension supplied by the window/door manufacturer referencing the outside dimensions of the unit

s

scaffold bracket

the shelf angle designed to support the scaffold planks

shrinkage

the dimensional change of concrete due to hydration

socket

the receptacle into which the nipple fits, found on the bottom of the form unit

soil

that portion of the earth's crust which is fragmentary, or such that some individual particles of a dried sample may be readily separated by agitation in water

sound transmission class (STC)

the classification rating of the quantity of airborne sound which is inhibited from traveling through a material or assembly

standard

the minimum quality to which a material must be manufactured

standard form unit

a straight section of Arxx™ wall form

step footing

a footing that incorporates multiple elevations in order to compensate for sloping site conditions

stirrup

a section of reinforcing steel bent and shaped to strengthen a section of concrete wall

t

tapered top form unit

a section of Arxx wall form similar to the standard form unit used to create a wider bearing surface at the top of the wall

tee-wall

the intersection between two walls that are perpendicular to each other

thermal bridge

an area through which heat energy can be transmitted through a wall assembly

u

UL

Underwriters Laboratories

ULC

Underwriters Laboratories of Canada

v

vapor barrier

the element of the building envelope that is installed to control the diffusion of water vapor through the building envelope

w

waterproofing

a product or the application of a product designed to prohibit the passage of water through its surface

web

the black plastic strap that functions as a form tie and furring strip

