Variables, Formulae, and Constant Values

VARIABLES

**ADOBELAB:** the total number of person hours for adobe labor (calculated)

**BACKPN:** the number of wall posts for the back wall (calculated)

**BIGWOOD:** the total weight of BIG beams in kilograms (calculated)

**BUILD:** the cost in person-hours for construction (calculated)

**CLOSING:** the total weight of closing materials for the roof in kilograms (calculated)

**CUTTING:** the number of person-hours for cutting wood (calculated)

**DIGGING:** the number of person-hours for digging adobe (calculated)

**ELONG:** maximum entry length in meters (field maps)

**ENTRYPN:** the number of wall posts for the entry walls (calculated)

**EWIDE:** maximum entry width in meters (field maps)

**FACTOR:** correction factor that subtracts the volume of wall posts or rocks from the volume of wall adobe (assigned based on architectural style)

**FADOBE:** total amount of adobe on the floor in cubic meters (calculated)

**FRONTPN:** the number of wall posts for the front wall (calculated)

**IPAREA:** interior posthole area in square meters (field maps)

**IPWOOD:** the total weight of raised floor features in kilograms (calculated)

**MIDWOOD:** the total weight of secondary beams in kilograms (calculated)

**MIXING:** the number of person-hours for mixing adobe (calculated)

**PBEAM:**  the number of primary beams in the roof (assigned based on the number of roof supports)

**PDBACK:** the wall post density per meter for the back wall (field maps)

**PDENTRY:** the wall post density per meter for the entry wall (field maps)

**PDFRONT:** the wall post density per meter for the front wall (field maps)

**PDSIDE:** the wall post density per meter for the side walls (field maps)

**PERIMETER:** the total perimeter of the structure in meters (calculated)

**PLLENGTH:** length of floor plaster in meters (field maps)

**PLTHICK:** thickness of floor plaster in cm (field notes)

**PLWIDTH:** width of floor plaster in cm (field maps)

**PROLONG:** the projected total length of the floor in meters (field maps)

**PROWIDE:** the projected total width of the floor in meters (field maps)

**RADOBE:** amount of adobe in the roof in cubic meters (calculated)

**RAREA:** roof area in square meters (calculated)

**RELADOBE:** adobe cost per square meter (calculated)

**RELCOST:** relative cost of building in person-hours per square meter (calculated)

**RELWOOD:** wood cost per square meter (calculated)

**SIDEPN:** the number of wall posts for the two side walls (calculated)

**SIZE:** floor size in square meters (calculated)

**SMALLWOOD:** the total weight of wall posts in kilograms (calculated)

**SUPPNUM:** the number of roof support posts (field maps)

**TOTADOBE:** total amount of adobe in the structure in cubic meters (calculated)

**TOTALPN:** the total number of wall posts in the structure (calculated)

**TOTLAB:** the total number of person-hours for construction (calculated)

**TOTWOOD:** the total weight of all the wood used in the structure in kilograms (calculated)

**TRANSPORT:** the number of person-hours for transporting wood (calculated)

**WADOBE:** the total amount of adobe in the walls in cubic meters (calculated)

**WALLAREA:** the total area of the walls (calculated)

**WCLOSE:** the total weight of closing materials for the walls in kilograms (calculated)

**WFACTOR:** height of the wall covered by closing materials (assigned based on architectural style)

**WOODLAB:** the number of person-hours for cutting and transporting wood (calculated)

**WOODPCT:** percentage of the total labor devoted to wood costs (calculated)

**WWIDE:** average wall width in cm (field notes)

FORMULAE

**Constants:**

Wall height = 1.8 m

Rate of adobe mixing and application (for calculating MIXING) = .05 cubic meters/person-hour

Thickness of covering of adobe on roof (for calculating RADOBE) = .05 m

Volume of a wall post that is 1.8 m long and 20 cm in diameter = .0565 cubic meters

Weight of each BIG beam (ROOFSUPP and PBEAM) = 50 kg

Cutting rate of wood and closing materials = 50 kg / person-hour

Weight of secondary beams = 15 kg

Weight of wall posts = 10 kg

Weight of roof and wall closing material per square meter = 29 kg (based on 25-30 cm thickness)

Excavation of the house pit = .52 cubic meters/ person-hour (for calculating digging)

Transport rate of wood and closing materials = 96 kg / person-hour for a 0.5 km distance

Building Rate = 2.5 person hours**/**square meter

SUMMARY FORMULAE

**TOTLAB** = WOODLAB + ADOBELAB + BUILD

**RELCOST** = TOTLAB/ (PROLONG x PROWIDE)

**SIZE** = PROLONG x PROWIDE

**RELADOBE** = ADOBELAB/SIZE

**RELWOOD** = WOODLAB/SIZE

**WOODPCT** = WOODLAB/TOTLAB

ADOBE LABOR FORMULAE

**ADOBELAB** = MIXING + DIGGING

**MIXING** =TOTADOBE / .05

**DIGGING** = TOTADOBE/ .52 (Post-reinforced and Massive-walled adobe)

**DIGGING** = (PROLONG x PROWIDE x .50)/ .52 (Deep, adobe-lined and Deep, post-supported)

**DIGGING** = (PROLONG x PROWIDE x .30)/ .52 (all other pithouses)

**TOTADOBE** =WADOBE + RADOBE+ FADOBE

**WADOBE** =[(PERIMETER x WWIDE x 1.8)/ 100] – FACTOR

**FACTOR** =TOTALPN x .0565 (Post-reinforced)

**FACTOR** = (PERIMETER x WWIDE x 1.8)/300 (Massive-walled adobe)

**FACTOR** = 0 (all pithouse styles)

**PERIMETER** =(PROLONG x 2) + (PROWIDE x 2) – EWIDE + (ELONG x 2)

**RADOBE** = RAREA x .05

**RAREA** =[PROLONG + (2 x WWIDE/100)] x [PROWIDE + (2 x WWIDE/100)]

**FADOBE** =PLLENGTH x PLWIDTH x PLTHICK/100

WOOD LABOR FORMULAE

**WOODLAB** = CUTTING + TRANSPORT

**CUTTING** = TOTWOOD/ 50

**TRANSPORT** = TOTWOOD / 96

**TOTWOOD** = BIGWOOD + MIDWOOD + SMALLWOOD + CLOSING + IPWOOD **+** WCLOSE

**BIGWOOD** =(SUPPNUM + PBEAM) x 50

**MIDWOOD** =[(PROLONG x PROWIDE) + 8] x 15

**SMALLWOOD** = TOTALPN x 10

**TOTALPN** =BACKPN + FRONTPN + SIDEPN + ENTRYPN

**BACKPN** =PDBACK x PROLONG

**FRONTPN** = PDFRONT x (PROLONG – EWIDE)

**SIDEPN** =2 x PDSIDE x PROWIDE

**ENTRYPN** =2 x PDENTRY x ELONG

**CLOSING** = RAREA x 29

**IPWOOD** = IPAREA x 29

**WCLOSE** =PERIMETER x WFACTOR x 29

**WFACTOR** = 1.8 (Type S-1; S-2)

**WFACTOR** = 1.3 (Deep, adobe-lined; Deep, post-supported)

**WFACTOR** = 1.5 (Rock-lined; Narrow-walled adobe)

**WFACTOR** = 0 (Post-reinforced; Massive-walled adobe)

BUILDING COSTS FORMULAE

**BUILD** = (RAREA+ WALLAREA+ IPAREA) x 2.5

**WALLAREA** = PERIMETER x 1.8