Building Quantity Estimation from CAD Drawings

ENSOFT has recently released their new software **Build-Quant** for easy & quick estimation of quantities involved in building construction. **Build-Quant** reads an **Architectural Plan Drawing** prepared in **AutoCAD** directly. Providing additional information about Doors, Windows and Flooring types it work out the quantities of Brickwork, Plaster, Flooring without entering dimensions in L-B-D format. **Build-Quant** also reads a **RCC Plan Drawing** prepared in **AutoCAD**. Providing additional information of **Design Schedules** for Beams, Slabs, Columns and Footings it will workout quantities of Concrete and Reinforcement Steel (with diameter wise breakup) for each floor.

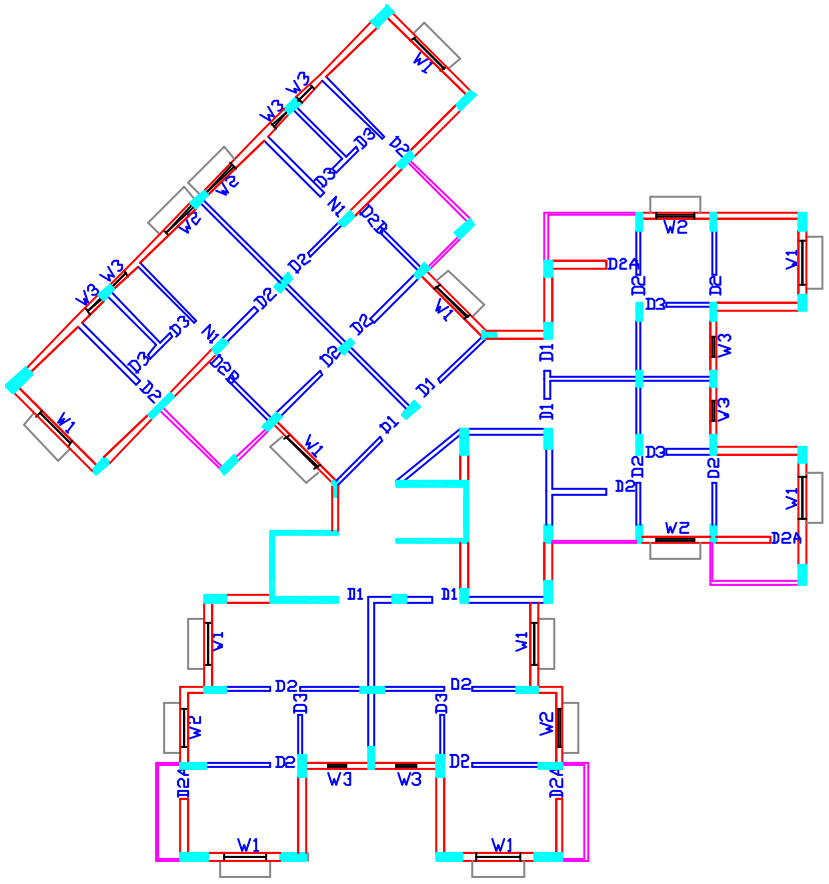
The main objective of **Build-Quant** Software is to workout the quantities directly from the working drawings. The conventional L-B-D format input is also available for the items whose information can not be easily read from the drawings. The software is a handy tool for quick estimation of quantities for tender works and also for the detail checking of contractor's bills.

If any of the dimensions taken at site or written in the measurement sheet for working out quantities are by mistake incorrect, it becomes difficult to locate the mistake later. Since this software is reading the working drawings dirctly, it will prove to be very useful tool for cross checking the bill of quantities at office level.

About Input Drawings

Since **Build-Quant** reads the drawings prepared in AutoCAD, few norms are required to be followed while preparing these drawings. Wall lines in **Architectural Plan** are drawn with basic **LINE** command. Separate layers are used for different types of walls and plasters. Door & Window marking text (D1, D2 etc.) is put close to the wall lines and their sizes are given in a schedule. These actually are not any special norms, but usually followed by most of the Architects. A sample Architectural plan is shown below.

Original Architectural Plan



Additional Details in Schedule Form

SCHEDULE OF WALLS

Wall Type	Thick mt	Height mt	Wall Line Layer	Description
L1	0.230	2.55	W-200	230mm Thk
L2	0.150	2.55	W-100	150mm Thk
L3	0.100	1.00	R-100	100mm Thk

SCHEDULE OF PLASTERS

Plaster Type	Thick mt	Height mt	Plaster Line Layer	Description
P1	0.015	2.9	P-15	Plaster 15
P2	0.020	3.0	P-20	Plaster 20
P3	0.020	1.0	P-25	Plaster 25
P4	0.012	0.0	CEILING-PL	Plaster 12

SCHEDULE OF DOORS

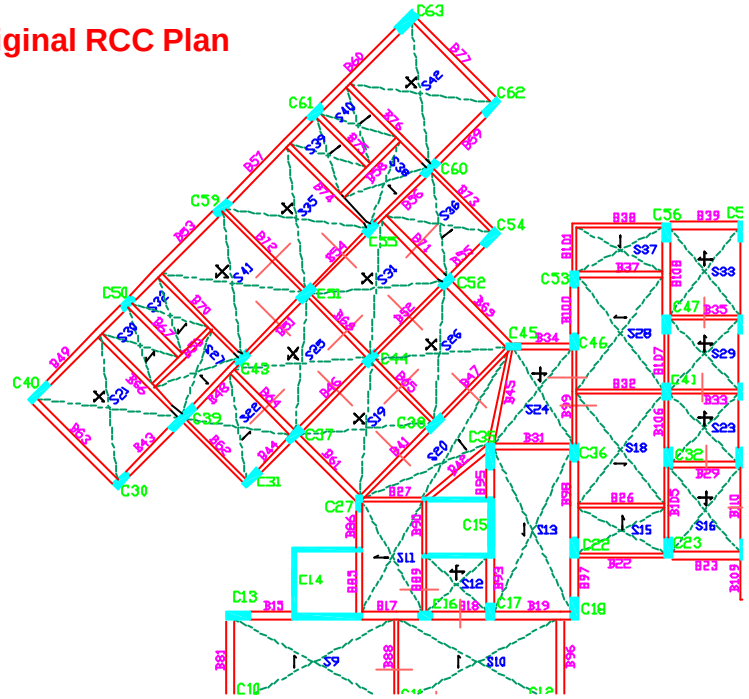
Door Type	Width mt	Height mt	Description
D1	1.200	2.100	Teak Wood
D2A	1.000	2.100	Flush Door
N1	1.000	2.100	Opening

SCHEDULE OF WINDOWS

Window Type	Width mt	Height mt	Description
W1	1.500	1.200	Aluminum
W2	1.200	1.200	Aluminum
W3	0.600	0.600	ToiletWin.

Beams in **RCC Plan** are also drawn as double lines with **LINE** command. Beam marking Text (B1, B2 etc.) is drawn near to these beam lines. Cross lines are drawn between slab corners to mark the extent of slabs. Slab Spanning and Slab marking Text is drawn near to the intersections of these cross lines. Column numbers are also put with **TEXT** command. Only the Column text is read and not the shape. A typical RCC plan is shown below.

Original RCC Plan



RCC Details in Schedule Form

BEAM DETAILS :

1. Beam Sizes
2. Bottom Straight/ Curtailed Bars
3. Top Anchor / Support Bars
4. Stirrup Reinforcement details

SLAB DETAILS :

1. Slab Thickness
2. Main Span Reinforcement details
3. Other Span Reinforcement details

COLUMN DETAILS :

1. Column Shape
2. Column Size
3. Main Reinforcement details
4. Link Reinforcement details

FOOTING DETAILS :

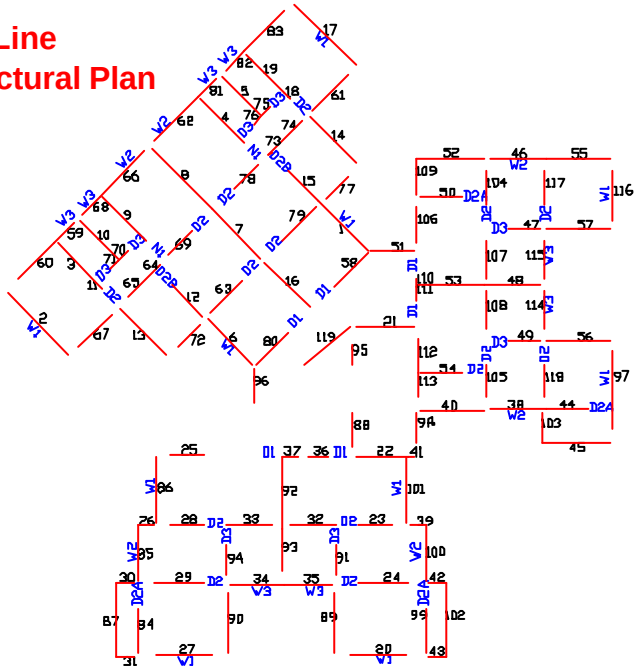
1. Footing Type
2. Footing Size
3. PCC Size
4. Footing Depth
5. Reinforcement details

Reinforcement details for beams, slabs, columns and footings are entered in **Schedule** Form, with in-built editor. To make your job easy, the editor also shows typical sketches alongside. That' All About INPUT!

How Program Works?

From the input you feed, **Build-Quant** starts its Herculean task of working out Quantities. Firstly it reads the Wall Lines from Architectural Drawing. From the User specified range of minimum and maximum wall thickness, it converts the double line drawing into single line. Of course each single line is drawn exactly at centers of walls. **Build-Quant** then meticulously numbers these wall lines serially and calculates their lengths. It now deducts the door / window areas from wall quantities and prints them in report. Similarly the Plaster quantities are worked out and added in the report. Thus the program works out the quantities, without user being required to enter the dimension in conventional **L-B-D format**. Program works out the quantities of different types of floorings, as well as skirting and dado areas. A schematic single line plan is shown aside.

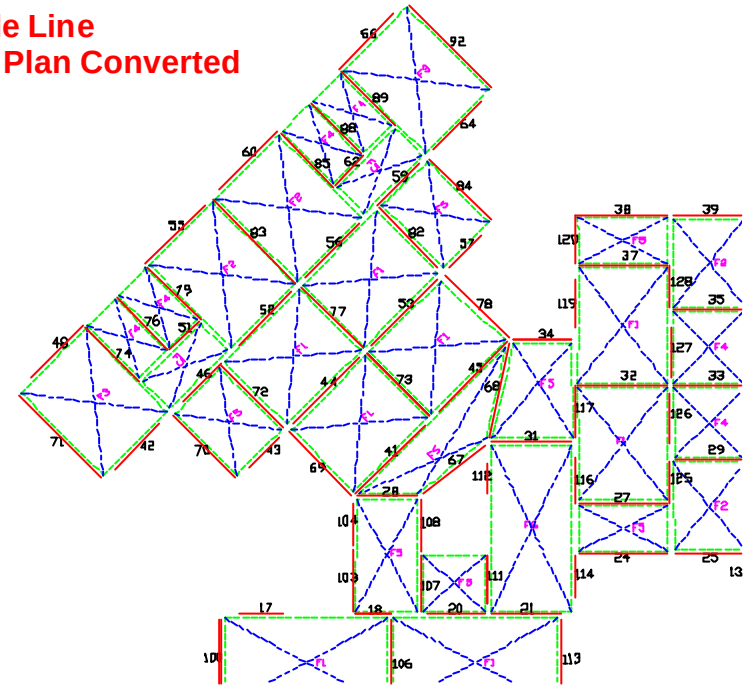
Single Line Architectural Plan



- Single Lines are drawn wherever walls are detected in Original Architectural drawing.
- Single Lines are numbered serially as Wall Sr.Nos.
- Wall data can be checked easily by viewing this drawing.
- Wall Quantities are calculated by program without user entering dimensions in L-B-D format.

Similar to the walls the double lines of Beams are converted to single lines and each line is given a serial number. Beam numbers written on the drawing are read. Length of single line is the length of beam. Beam size and number of bars are read from schedule. Thus beam Concrete and Steel quantities are worked out.
Slab area is calculated automatically from end points of cross lines. Design schedule gives information about thickness and reinforcement details. The concrete and steel of slabs is also worked out. Column and Footing quantities are calculated from the schedules directly.

Single Line
RCC Plan Converted



- Single Lines (Full Lines) are drawn wherever beams are detected in Original RCC drawing.
- Dotted boundary lines are drawn around the slab periphery.
- RCC layout can be checked easily by viewing this drawing.
- Concrete and Steel Quantities are worked out by program without user entering the length of bars.

Finally program gives the diameter wise break-up of steel quantity. In the final Summary it not only gives the floor wise quantities, but also works out the cumulative quantities for the entire project.

TYPICAL FLOOR ARCHITECTURAL QUANTITIES

WALL DATA

Line Sr.No	Wall Type	Length mt	Height mt	TotalWall Area mt2	Deduct for Openings mt2	Net Wall Area mt2	List of Openings
1	L3	0.735	1.000	0.74	0.00	0.74	
2	L1	2.280	2.550	5.81	3.90	1.91	W1 D2
3	L1	2.280	2.550	5.81	1.80	4.01	W1

PLASTER DATA

Line Sr.No	Plaster Type	Length mt	Height mt	Plaster Area mt2	Deduct for Openings mt2	Net Plaster Area mt2	List of Openings
1	P2	1.850	3.000	5.55	0.00	5.55	
2	P2	2.687	3.000	8.06	1.80	6.26	W1
3	P1	2.706	2.900	7.85	0.00	7.85	

TYPICAL FLOOR RCC QUANTITIES

BEAM CONCRETE QUANTITIES

Beam. Name	Beam SrNo	Group No.	Clear Length mt	Beam Width mt	Beam Depth mt	Concrete Volme mt3
B1	1	1	0.735	0.230	0.500	0.08
B2	2	1	2.280	0.230	0.450	0.24
B3	3	1	2.280	0.230	0.450	0.24

SLAB CONCRETE QUANTITIES

Slab Name	Slab SrNo	Group No.	Slab Thick mt	Slab Clear Area mt2	Slab Concrete Volume mt3	Slab Perimeter mt	Slab Sides mt			
S1	1	1	0.100	1.82	0.18	6.820	0.660	2.750	0.660	2.750
S2	2	1	0.120	9.33	1.12	12.341	3.521	2.590	3.520	2.710
S3	3	1	0.120	9.47	1.14	12.420	3.520	2.710	3.520	2.670

BEAM REINFORCEMENT QUANTITIES

Beam	BotStr. Bars			BotBent Bars			Left Supp. Bars			Right Supp.Bars			Anchor Bars			SideFaceBars			Total
Name	No	Dia	BarLt	No	Dia	BarLt	No	Dia	BarLen	No	Dia	BarLen	No	Dia	BarLt	No	Dia	BarL	kg
B1	2	12	1.637	1	10	1.580	2	16+ 1 12	0.485	2	16+ 1 12	0.485	2	16+ 1 12	1.938	0	0	0.0	15.64
B2	2	12	3.182	1	10	4.186	2	10	1.505	3	12+ 3 12	1.505	2	8	2.312	0	0	0.0	11.92
B3	2	12	3.182	1	10	4.186	2	10	1.505	3	12+ 3 12	1.505	2	8	2.312	0	0	0.0	11.92

BEAM STIRRUP QUANTITIES

Beam	Left Side Stirrups						Rest (Central) Stirrups						Right Side Stirrups						
Name	Dia mm	Spc mt	Legs	Dist mt	StpLt mt	No	Wt kg	Dia mm	Spc mt	Legs	Dist mt	StpLt mt	No	Wt kg	Dia mm	Spc mt	Legs	Dist mt	StpLt mt	No	Wt kg	Total kg
B1	8	0.100	2	0.184	1.266	3	1.50	8	0.130	2	0.367	1.266	4	2.00	8	0.100	2	0.184	1.266	3	1.50	5.00
B2	6	0.130	2	0.570	1.342	6	1.79	6	0.150	2	0.140	1.342	9	2.68	6	0.130	2	0.570	1.342	6	1.79	6.26
B3	6	0.130	2	0.570	1.342	6	1.79	6	0.150	2	0.140	1.342	9	2.68	6	0.130	2	0.570	1.342	6	1.79	6.26

PROJECT SUMMARY : Architectural Quantities

TYPE-WISE WALL QUANTITIES (From Level 1 To Level 4)

Sr. No.	Wall Type	Double Line Layer Name	Wall Area mt2	Rate Rs.	Amount Rs.	Description
1	L1	W-200	606.02	1000.00	606024.83	Wall 230mm Thk
2	L2	W-100	533.76	1250.00	667197.67	Wall 150mm Thk
3	L3	R-100	176.00	2250.00	396010.93	RCCWall 100mmThk
		Total	1315.79		1669233.43	

FLOOR-WISE WALL QUANTITIES

Level	Floor Code	L1	L2	L3	Total Area
1	PL	194.57	181.37	21.57	397.51
2	Typ	193.84	176.19	21.57	391.60
3	Typ	193.84	176.19	21.57	391.60
4	RF	23.78	0.00	111.30	135.08
		606.02	533.76	176.00	1315.79 mt2

TYPE-WISE PLASTER QUANTITIES (From Level 1 To Level 4)

Sr. No.	Plaster Type	PlasterLine Layer Name	Plaster Area mt2	Rate Rs.	Amount Rs.	Description
1	P1	P-15	2653.81	80.00	212305.08	Plaster 15
2	P2	P-20	1061.39	100.00	106139.01	Plaster 20
3	P3	P-25	452.54	100.00	45253.51	Plaster 20
4	P4	CEILING-PL	803.93	100.00	80393.32	Plaster 12
		Total	4971.67		444090.92	

FLOOR-WISE PLASTER QUANTITIES

Level	Floor Code	P1	P2	P3	P4	Total Area
1	PL	858.58	353.34	56.22	0.00	1268.14
2	Typ	858.11	354.03	56.22	267.98	1536.34
3	Typ	858.11	354.03	56.22	267.98	1536.34
4	RF	79.01	0.00	283.86	267.98	630.85
		2653.81	1061.39	452.54	803.93	4971.67 mt2

TYPE-WISE DOOR QUANTITIES (From Level 1 To Level 4)

Sr. No.	Door Type	Door Layer	Door Areamt2	No.Of Doors	Total Door Area mt2	Rate Rs.	Amount Rs.	Description
1	D1	D-W	2.52	17	45.36	1500.00	68040.00	Teak Wood Door
2	D2	D-W	2.10	62	132.30	1500.00	198450.00	Flush Door
3	D3	D-W	1.78	23	42.84	1500.00	64260.00	Flush Door
4	N1	D-W	2.10	6	12.60	1500.00	18900.00	OPENING
		Total	233.10				349650.00	

TYPE-WISE WINDOW QUANTITIES (From Level 1 To Level 4)

Sr. No.	Window Type	Window Name	Window Area mt2	No.Of Windows	TotalWindow Area mt2	Rate Rs.	Amt Rs.	Description
1	W1	D-W	1.80	30	54.00	1500.00	81000.00	Aluminum
2	W2	D-W	1.44	18	25.92	1500.00	38880.00	Aluminum
3	W3	D-W	0.36	24	8.64	1000.00	8640.00	ToiletWin
				Total	88.56		128520.00	

TYPE-WISE FLOORING QUANTITIES (From Level 1 To Level 4)

Sr. No.	Flooring Type	Flooring Area mt2	Rate Rs.	Amount Rs.	Description
1	F1	267.98	550.00	147389.00	Stilt PCC
2	F2	284.34	600.00	170604.00	Marble
3	F3	195.77	450.00	88096.50	Kottah
4	F4	55.86	400.00	22272.00	Ceramic
5	F5	267.98	450.00	120591.00	China Mossaic
	Total	1071.91		548952.50	

FLOOR-WISE FLOORING QUANTITIES

Level	Floor Code	F1	F2	F3	F4	F6	Total Area
1	PL	267.98	0.00	0.00	0.00	0.00	267.98
2	Typ	0.00	142.16	97.88	27.93	0.00	267.98
3	Typ	0.00	142.16	97.88	27.93	0.00	267.98
4	RF	0.00	0.00	0.00	0.00	267.98	267.98
		267.98	284.34	195.76	55.86	267.98	1071.91mt2

TYPE-WISE SKIRTING QUANTITIES (From Level 1 To Level 4)

Sr. No.	Skirting Type	Skirting Area mt2	Rate Rs.	Amount Rs.	Description
1	F1	0.00	0.00	0.00	Stilt PCC
2	F2	56.10	300.00	16830.59	Marble
3	F3	53.57	300.00	16069.22	Kottah
4	F4	145.27	300.00	43580.83	Ceramic
5	F5	63.91	300.00	19173.71	China Mossaic
	Total	318.85		95654.36	

PROJECT SUMMARY : RCC Quantities

BEAM & SLAB CONCRETE QUANTITES

Level No.	Floor Code	Beam M20 mt3	Slab M20 mt3	Total M20 mt3	Amount Rs.
1	PL	25.51	0.00	25.51	51021.15
2	Typ	20.20	28.21	48.41	96818.62
3	Typ	20.20	28.21	48.41	96818.62
4	RF	20.20	28.21	48.41	96818.62
		86.12	84.62	170.74	341477.01

TOTAL BEAM & SLAB STEEL QUANTITES

Level No.	Floor Code	6	8	10	12	16	Total Wt. Kg.	Amt Rs.
1	PL	0.00	1173.68	410.56	1199.63	0.00	2783.87	55729.25
2	Typ	411.76	1984.90	222.57	1268.62	309.15	4197.02	75509.10
3	Typ	411.76	1984.90	222.57	1268.62	309.15	4197.02	75509.10
4	RF	411.76	1867.78	222.57	1268.62	309.15	4079.89	73400.84
		1235.29	7011.27	1078.28	5005.49	927.46	15257.79	280148.30

COLUMN CONCRETE QUANTITIES

From Level	Floor No. Code	To Level	Floor No. Code	FormWork mt2	M20 Concrete mt3	Amt Rs.
0	Footing	1	PL	122.26	10.13	16205.82
1	PL	2	Typ	308.52	25.48	40770.72
2	Typ	3	Typ	304.92	25.07	40108.32
3	Typ	4	RF	302.52	24.79	39666.72
				1038.22	85.47	136751.58

COLUMN STEEL QUANTITIES

From Level	Floor No.	To Level	Floor 6 Code	8	10	16	20	TotalWt. Kg.	Amt Rs.
0	Footing	1	PL	250.49	242.14	57.21	1952.84	371.70	2874.38	52370.99
1	PL	2	Typ	460.69	437.51	84.10	2631.30	301.46	3915.06	72708.34
2	Typ	3	Typ	460.69	415.40	84.10	2815.95	0.00	3776.14	76741.92
3	Typ	4	RF	460.69	414.30	84.10	2815.95	0.00	3775.05	76722.27
				1632.57	1509.35	309.50	10216.05	673.16	14340.63	278543.52

FOOTING QUANTITIES

Footing	FormWork mt2	PCC Concrete mt3	M20 Concrete mt3	M20 Amount Rs.
	95.06	19.76	51.03	91861.69

FOOTING STEEL QUANTITIES

Footing	10	12	Total Wt. Kg.	Amount Rs.
	1625.37	140.08	1765.45	32507.44

ABSTRACT OF COST

Level No.: 1 Floor : PL Stilt

Walls	:	469810.46
Plasters	:	109642.19
Floorings	:	107191.10
Skirtings	:	0.00
Doors	:	116550.00
Windows	:	42840.00
Concretes	:	159088.66
Steels	:	140607.68
Floor Total	: Rs.	1145730.09

Level No.: 2 Floor : Typ 1st Floor

Walls	:	462604.60
Plasters	:	136471.85
Floorings	:	165093.93
Skirtings	:	38240.32
Doors	:	116550.00
Windows	:	42840.00
Concretes	:	137589.34
Steels	:	148217.44
Floor Total	: Rs.	1247607.48

Level No.: 3 Floor : Typ 2nd Floor

Walls	:	462604.60
Plasters	:	136471.85
Floorings	:	165093.93
Skirtings	:	38240.32
Doors	:	116550.00
Windows	:	42840.00
Concretes	:	136926.94
Steels	:	152251.02
Floor Total	: Rs.	1250978.65

Level No.: 4 Floor : RF Roof

Walls	:	274213.77
Plasters	:	61505.04
Floorings	:	120589.98
Skirtings	:	19173.71
Doors	:	0.00
Windows	:	0.00
Concretes	:	136485.34
Steels	:	150123.11
Floor Total	: Rs.	762090.95

GRAND TOTAL PROJECT COST (RS.) : 4406407.17

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