Sustainable Architecture Prof. Avlokita Agrawal Department of Architecture and Planning Indian Institute of Technology, Roorkee

Lecture – 56 Whole Building Performance - VI

Good morning. Welcome to the last week of this course on Sustainable Architecture, where we are now discussing about the Whole Building Performance tool. And, in the previous lecture, we have seen how to create the geometry of a building a proposed building using design builder. So, here for whole building performance we are using 'Design Builder' with an 'Energy Plus' simulation engine.

So, we saw how to create the geometry, we took up a case of a very simple office building, a two floor office building, a rectangular building and we created the base case. So, before we come to this whole building performance simulation, we have to know what goes into the building.

So, we have to know the prescriptions as per ECBC or whatever relevant code, needs to be followed in the context of your building, it might be a building coming up in some other country. So, the code which, which is relevant there will need to be followed to create the base case. So, besides the geometry what is going to be the value of or the parameters for construction, what is going to be the parameter for opening setting and HVAC lighting all of that, has to be known through the relevant code.

So, we have already seen how to arrive at those prescriptive values. And, then in the introduction lecture to the building performance simulation, we have also discussed about the difference between the base case and proposed case. So, we very clearly saw that, what are the parameters which will remain same from base case to proposed case and what are the parameters which will be changed from base case to proposed case.

So, from today for this week we will be designing, we will be creating a proposed case. And we will be changing the values of those of that proposed case and the parameters, the relevant parameters.

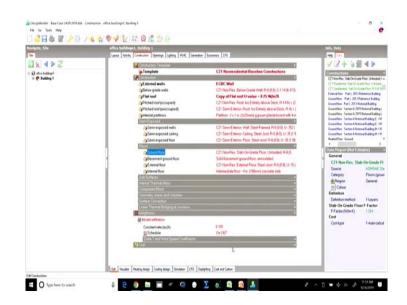
So, let us start with the building simulation for the proposed case and go ahead with that. Let us shift to the designer builders screen now.

(Refer Slide Time 02:38)



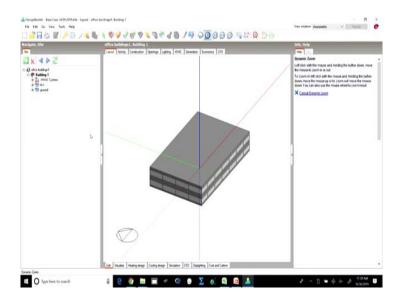
So, hopefully in the last week you would have already created a base case building for any building of your choice. So, just to quickly take a recap, we had created an entire building and then we simulated the building, the base case building, to achieve at the simulation results.

(Refer Slide Time 03:01)



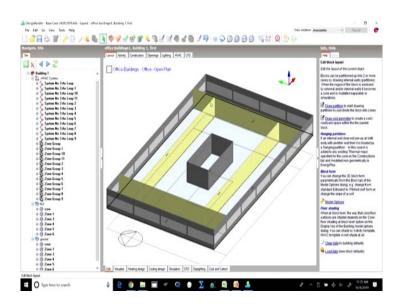
So, quickly giving you a recap of what all we modeled in the building.

(Refer Slide Time 03:10)



So, starting with a very simple rectangular commercial building an office building of two floors, ground plus first. We had modeled how the building is going to be depending upon it is core.

(Refer Slide Time 03:18)



Which was to be used as a toilet cum circulation and then there were perimeter zones. We had created the virtual partitions and then we assigned the activity template.

(Refer Slide Time 03:30)

	en buildings L. Heitling L. first		Jula, Italy
al la	nal Adore Canatustan Openings Lighting Holic CFD		
SAPX	Address Terrentee	(1)	Edit Activity Data
P builden I	A Temptote	Office Buildings - Office-Open Plan	PEats pass
1 To 160C Lythere	diam'r.	German	Lite this screen to edit the activity-relate
a 🖕 System No 3 As Long	Zone have	1-Conditioned .	data occupantly combit and equipment defaults for the current block
+ 🖕 System No 3 An Loop 1	Space condition category	1 Non-secolaritat +	termine to be servered
* 🖕 System Ris 3 An Loop 10	Zona muhahari		Activity menglate
8 ju Spatem No 3 Ar Loop 11	El include zone in thermal calculations		You can mana a generic selection funti- activity temptals but at the top of the
* System No 3 As Loop 2 * System No 3 As Loop 3		(16)	acreen. This leads data horn the axeed
the System No 3 As Long 4	Include zone in Fladiance deylighting calcula	hora	temptate into the currentbluck.
+ Sentem No 3 As Long 5	adminut this Setup	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Attentiabledy you can open the group header boses to access the data device
# 🖕 System No 3 An Loop 6	© ASHRAE 991 kgrmg category	Ohca - Open Plan	Occupance
# 🖕 System No 3 Az Loop 7	CASHEVAE 991 Roor definition	Poir 1	Set the number of people (per unit Score
# 🖕 System No 3 Az Loop 6	Cr. Contraction of the second s		areal and the occupancy times The
+ 5 Spring Ro 3 An Loop 9 + 2 Zone Group	El Occupied?		occupancy times are controlled to a
- 21 Zone Group 1		18.58	1:De fala
· 21 June Group 10	Floor area per person (w2/person)	ASHEAE 901 Occupancy - Ofice	Metabolic Tel the matabolic rate according to the
+ Z Zone Group 11	El Schedule	AGRENT RELOCODING ORCH	¹ level of activity within the space. The
8 2 Zone Group 2	Wetabolic	0 *	metabolic factor accounts for people of
+ 2 Zone Group 3	Cartery		varieus scas. Enter 1 30 for men 0 85 anorem 0 75 for children or one can up
+ T Zone Group 4	(control carbon (any ensurement)	-	avorrem, 0.75 for children, or you can up an average volue of Berra is a most of sco
= 21 Zone Group 5 = 21 Zone Group 5	Operational Generation and Reviews	•	Emissionanal control
· 21 / mar Group 1	a Cirtil		The heating and cooling subpoint
a 2 Zone Group B	Constanting Carton		Memperatures, mesimum kesh ar and
= 2 Jone Group 1	HEAVING DAYLON TANDANALANS		illuminance requirements are related to
10.44	Heating (CD	29.4	activity and are accessed by spaning the Environmental Control group header
+ 69 + 000	Heating set back (C)	130	Langement
* (j) Zana 1	Control Exposed Templembras		With Early gams detail the pains in the
* 03 Zune 3 * 03 Zune 4	Cooling (C)	31	space are separated and computers, of
= 00 Zone 3	Cooling set back (10)	27.0	egapment, miscellaneous, catering and process.
+ 02 Zone 8	Hantrig Camburt PMA' Salportha		poons
(pred	Control Constant PM/7 Congression		Chair data to building defaults.
* ()	Discourse of the second		Load Autority data New Template
# 05 Zone 1	Venigetic Separat Temperatures		AL
+ 69 Zone 3	Moreous Press Ar		B Lant Allicht data to new longtate
+ (2 Zone 4 + (2 Zone 5	Environment Martine Martine A		and the second se
+ 0/ 2mm 5 - 11 (m	Visualize Visiating design Conting design Simulation CFD Clink		

To all the zones which was taken as office buildings.

(Refer Slide Time 03:35)

	e buildings), Subling 1, first		Julia, Data
Les .	a Adonty Construction Openings Lighting HUNC CFD		THE CAY
2	Constantion Temphere		ノブキ と知ると
	Temptote	C21 November Intelline Constructions	A DECEMBER OF A
	a respect	Call Honer of His Contraction	Concludions
No Taylow II	Contraction water	ECEC WW	Content growthise Energy code standard Content growthise Energy code marked
Ro 3 Ao Long 1			Contract ground from State of the at Heart
No 2 An Long 10	afinition grade waits	CZ1 Non-Res. Balow-Grade Walt R-0.(0.0); C-1.14 (6-673)	Contend pound has Side of the of Lighter
No 3 Ar Long 11	Flat work	Copy of Platnoof Unitalian = 825 Wolv28.	Contend posed for State of the at Higher
3 Au Loop 2	Pitched intel (occupied)	CZ1 How Fies, Floot Ins Entrely above Deck, Fi-148c x (2)	Content goard floor Typical elements Have
An Loop 3	Fiched roof (waccupied)	C21 Seni-Extenso: Root Ins Extrely above Deck, R-4c i (Contract ground from Type of inference Light
An Loop 4	Colorenal partitions	Partition - 2 x 1 m (2x25mm) gyprum plasta-tootid with 4 m	Contract ground fixed Type of interests. Mad
ta Lang-S	Clim Copyred	Construction of the second	Control good feel Unevalued Insurent
3 An Loop 6 3 An Loop 7	California exposed wats	C21 Servit dence Walt Sheel Fritmed R-0.031 12 3521	Contend good free Unsubbid Lighting
An Loop B	Sam-orpored calling	C21 Sami-Entenix Ceding Steel-Just R-0.03() G-35(1.9	Control grant free Unevaluated Histories C21 Nan Res Und-On-Graite Files Unificated 1
		C21 Serve Henry Place Steel Asut Rid (20) 17-16 (19)	C1 Personal Matching and Party Orleage 7
	Serve exposed floor	C21 Servit Menor, Ploor, Sheek Jord Prid (20), CF 35 (198	
	CONTRACTOR OF THE OWNER		Dute Depart (Hat I ditable)
	Crowned Nova	C21 Nov-Fies, State-On-Grade Floor, Universited, FH-8 (8)	General
	Essenant ground floor	Solid besement ground floor, uninsulated	CZ1 Non-Flars, Slady-On-Gaudia F
8.0	Cremal locr	C21 Non-Flass, External Floor, Steak-Joint, R-6 (E-B), U-35 (
10.1	California Roor	Intermediate Rooi - 4 m (100mm) concrete sints	Source ADHIVED
	END DATE: N	Contraction in the second s	Category Pitters (grow
	Informat Thannesi Merry		Pregion General
			III Colour
	Charles and the bolt statements		Defeation
	Contract of the local division of the local		Defeitor method 1-Levers
	Linux Therma Bridging at Arctions		Slab-Ox-Grade Floor F-Factor
	Address in the second s		FFactor(Wheit) 1214
			Cest
	Nodel adilyation		CostApe 1-Auto-calo
	Constant value (ec;N)	0.000	congre i read cao
	(1) Schedula	On 247	
	Dates T and West Speak (Conflictents		
	Vi Curel		
	and the second se		10.4
			D
			1.50
	In a low part low part for the low low low	the start of the s	
- 14	Visualize Visitating design Costing design Seculation CFO D	Indepting Cost and Calture	

And, then we had defined the construction for this building.

(Refer Slide Time 03:42)

• effici	r buildinge L. Building L. First		Infin, Data
	A Advery Constructor Openings Lighting HUNC (CFD		140 (14)
541	Construction Tempteen		1 2 + 4x 4 >
ing t a	Temptate 1	C21 Howesidental Disative Constructions	Cunetractions
Hill Lyden:	Contraction .		Ball-out sight had construction up not
System No 3 As Long System No 3 As Long 1	Contract Londo	educ.mm -	Bull-out unde but construction these ex-
System No J As Long 1 System No J As Long 10	Gibelow grade waits	C21 Nov-Fes. Below-Grade Walt F-0 (0.0) C-114 (6.47))	Buil-out unde ind contractor life pie- buil-out unde hid constantion with to
System No 3 As Loop 11	Plat with	Copy of Plat soof U-value = 0.25 W/m28.	Contraved (Edite) (1991 Part)
System No 3 As Loop 2	Piched roof (occupied)	C21 Hov-Fres. Poot ins Entrely above Deck, R-148c x (2)	Cavity and #10x13000 Parts
System No 3 As Loop 3	Piched roof (wroccupied)	C21 Semi-Extence. Floot Ins Extraty above Deck, PI-Ici (Copy of C21 Non-Key, Walk 1944 Frame
System No 3 Az Long 4	cyliniamal perfitcies	Pattion 2 x 1 m (2x25mm) gypours plasterboard with 4 m	CET NamiPus, what Stand Francel # 131
System No 3 An Loop 5	Carls Capping		CT Revelote inid Sectional As
System No 3 An Loop 6 System No 3 An Loop 7	Serverposed wats	C21 Sero-Exterior Walt Shell-Framed Rid (8 0) 1921	CT Sampleton Wat Indeferred R. CT Sampleton Wat Traditional R.
System No 3 Au Loup B	Semi-exposed celling	CZ1 Semi-Extensor Ceding Steel-Joint R-6 (53) U-35(1.9	EDICWA
Santam No 3 As Long 9	Same exposed floor	C21 Servi Extensi: Place Steel Joint Rid (20) 17-35 (198	Fall that there are marked \$1
in Group	a same and particular accord	Carl party party index party party of the first	• • • • • • • • • • • • • • • • • • •
ne Group 1	Ground Roce	C21 Nov-Res. State-On-Grade Floor Universed IN-818 (S	Data Depart (Not Colorable)
na Group 10 na Group 11			General
mg 1	Becoment ground floor	Solid basement ground floor, semiculated	ECEC Well
*1	Colonial Roor	C21 Non-Fleis, External Floor, Sheet-Joint, Fr-6 (8-8) U-35 (Source ADHI
	ginternal floor	Intermediate floor - 4 m (188mm) concrete slids	Category Walls
5	S-Influtenes //		@Region Gener
eq 1	Internet Thannet Mens		Colour
imp /	4Ateratoy/		Defation
mpt mp1	Castrolly Areas and Volumes		
·•• '	Summer Constitution		Detrition method 11Lays
	Lineas Thermal Bridging at Aurotome		Loyers
	E Artymes		Number of leyers 4
	2 Model infilmation		Dutermost layer
	Constant value (Ac/A)	6.308	ity 875 m Shecco
	d3 Schedule	On 247	Thickness (m) 0.0150
	Code: T and West Spinal Coefficients	(H 1 4)	Endged? No
	Cont Cont		Layer 2
			in 0.625 in gypourn board
			Thickness (H) 0.0113
			Endged? No
- 10	Vaulae Indang Image Controp Image Serulation (CFD		Loger 3

So, we selected the ECBC Wall, where we had specified the U value.

(Refer Slide Time 03:47)

	ffice buildings L. Building L. First		1Mis. Data	
422	Land Amily Contruston Openings Lighting Hold (170		774 38	4.5
20 CT 10 CT	Construction Tringhom	C21 November Sector Projetory Constructions		48
Alley 1 A	Contraction of the local division		Conceptualities Copy of Full and United + 5.20	Sector Sector
1 Ipstem No 3 As Long	Construction of the second sec	ECEC WW	Chaine Par Pat he I me	
System No 3 An Loop 1	official provide walls	C211for/Fee Balow-Grade Wat Friddlin C1146-03	CT Rephend Rud In Lines	the states of the
🖕 System Ro 3 An Loop 10		Copy of Flat roof U-value = 8.25 Work28	(2) Same and And to Lat	
System No 3 Ar Loop 11	Piched mill (occupied)	C21 How Res. Poot ins Entrally above Deck. R-148cz (2	CT Service and Red in Eric	
System No 3 An Loop 7 System No 3 An Loop 3	Piched roof (shoccupied)	Q1 Servi Extensor Pract Ins Extensiv above Deck, Pi-4c i (Fid well. "Den dere cheparge Fid well. "Den aufort	an Stan Ma
C Series No 3 As Long 4	internal perfectors	p) Perfect with tweet survey in plaster back with 4 m.	For and Then exted as The	. Balance
System No 3 As Loop 5	Family Capital	different services and the service of the service o	Fid and Them aphal on 1 her	n scient or
System No 3 An Loop 6		C71 Second steeps Web Sheet Frended R-0.00 0.13 2021	Fid and Three aphil in Thre	
System No 3 As Loop 7	Serv exposed wals		Fid out. Zone date chippings	
System No 3 Ar Loop 8 System No 3 Ar Loop 9	Semi-separad celling	CZ1 Sami-Extensis: Casking, Steal-Joint Rid (20) 13-35 (1.9	Fid and first lighteeight radal	
2 Zine Group	Semi exposed floor	C21 Serv Extensor Floor, Sheek Joint Frid (23), U-35 (198	Fid and Energeinde standard	Harry
Z Zone Group 1	Pines		Data Depart Otal Editor	27730
Zime Group 10	Ground floor	C217kon/Res. Steb-On-Grade Floor, Universited (F-B (EIB)	General	star dente
Zi Zone Group 11	Construction of the second sec	Solid basement ground floor, uninsulated	Copy of Flat roat U v	and an other
2) Zone Group 2 2) Zone Group 3	Content for	C21 Non-Res, External Place, Deet-Juist, R-0 (8-8) U-35 (Despi
2 Zone Group 4	apinterwal floor	Intermediate Roor - 4 in (190mm) concrete sints	Celegy	Roth
Z Zone Group 5	That Dutester (17/2000		#Regon	General
Z Zone Group &	Informal Thurstal Mana		Colour	Carriere
Zine Group /	Addressly .		Defation	
Zi Zono Longo B Zi Zono Longo B	Geometry Areas and Volumes			1100
40 Zone Group 7	Sumo Convertion		Detailor method	Hayer
(Q ana	Lowar Thereas Bridging at Archiver		Layers	21000
(g Zmm 1	BACK/INVER	1	Number of layers	3
(j) Zune 3	2 Model infilmation		Outermost layer	
(2 Zono 4	Clanistant value (Ac,N)	0.308	cy Asphall	
(j) Zona 5 (i) Zona 5	d3 Schedule	On 247	Thickness (m)	10190
gried	Option T and Wind Speckel Conditionets		Endged?	No
(i) tas	4		Layer 2	
Ø Zone 1			y Fikreboard	
() Zone 3			Thickness (m)	20136
() Zone 4			Evdged7	No
() Zone 5 () Zone 5	Em Visualize Treating design Conting design Treatment CFO 0	and the second	Innermost Repar	

Then we also defined the flat roof, where also we defined the U value. Now, all these were created as per the prescriptive values suggested in ECBC.

(Refer Slide Time 04:05)

effice buildings L building L first Land Astric Constation Conveys (1999) Hith: (Infin. Data
Contraction of the second		12+444
Template	G21 Novembert at Encoding Constructions	Constructions
Correction		C21 Non-Res. Stdr.On-South Floor Uniterated 1 -
Contract with	ECECWW	C21 Paulana 100-D-Loab For Lineary
Colletow grade walls	C211Nov/Res. Balow-Grade Wall R-0(6/0); C-114(6-673)	CP1 Sandwared, Tod Contrado Final & 2010 Edward Rev. Part 1, 2011 Patronne Bulling
Fint which	Copy of Platnoof Urvalue = 8/25 W/m28.	Grand Rose Part 2011 Personal Rulling Grand Rose Part 2011 Reference Rulling
Piched roof (occupied)	C21 How Fies. Poot ins Entrely above Deck, Pr148cx (2)	Grand floor Fail (201) Noteend Building
Pitched roof (whoccupied)	C21 Semi-Extenso: Pool, Ins Extraty above Deck, Pi-tc i (Ground Roo Section 6 2015 Restand Buildings
Chinternal perfitions	Partition - 2 x 1 m (2x25min) gyprover plauterboard with 4 m	Ground Base: Sector-8,2015 Balance Building)
Setti Capsilet	CONTRACTOR OF THE OWNER	Ground Roam Sectors Elistence Robbing IE / M. Ground Roam Sectors Elistence Robbing IE / M.
Serverposed walls	C21 Serv-Extense Walt Sheel-Framed, H-0 (0.0), U-352 (Grand Ras Sector & National Robbing (H / W
Sami-separad celling	C21 Semi-Extensis: Centres, Steel-Joint R-0 (8-0) 13-35 (1-9	Ground Rose Sectors Etisterial Building (M / N
Semi-exposed floor	C21 SameExtensor Floor, Steat-Jonet R-0 (20), U-35 (198	Heated Floor Genard
FINAL		Costa Propert (Mart Editable)
Carband Roce	C21 Nov-Fies, Stab-On-Grade Pipor, Universited FH (8	General
Basement ground floor	Solid basement ground floor unificulated	C21 Non Flats, State On Grade (1)
Content and Astron	C21 Non-Fairs, External Floor, Sheah-Junit, R-0 (8-8), U-35 (Source AD-FAE the
Chinemal Rook	Intermediate Roor - 4 m (100mm) concrete sints	
Ever Evenues		Category Finors (growt
Internal Yearney's Marro		
4-April analy		Coleve
Galinaby Areas and Volumes		
Lange Constant		Detailon method 1-Layers Slab-Oa-Grade Floor F-Factor
Group Training Bodying of Archiver		Ffactor/Milerk) 1214
P Angle and		Cost
S Model infibration		Costype 1-Auto-calcul
Constant value (ec/h)	6.300	
Schedule .	On 247	
Control Transit Wood Experies (Constitute	· · · · ·	
Mi Casil		

Then we also had internal partitions, which were virtual in this case so they do not matter much and then the ground floor was taken as a default ground floor without insulation. So, the existing template was used here. We also took the constant rate of air changes per hour for modeling the infiltration, which was, which is on the basis of actual ASHRAE 62.2.

(Refer Slide Time 04:24)

	tice buildinget, building 1, first and Assay Constants Convey Lating Hull: (15)		Infa, Data
422	Council Temport	C21 Novilles Volcat Metaleonog - Atolian Social	✓ 2 + ≥x <
Publing 1 A	Constant Sectors Constant Sectors Constant Sectors Calence Sectors Calence Sectors	C21. Hon Her: Vencel Metal Issuing - All other: Cayloge ECBC Glacing feres 40% Vencel Glacing ASHRAE 301 Appli G	Citating C C1 Personal Int C C1 Sectored Int C C1 Sectored Int C C1 Sectored Int
 Spaten No 3 As Long 11 Spaten No 3 As Long 1 Spaten No 3 As Long 2 Spaten No 3 As Long 4 Spaten No 3 As Long 5 Spaten No 3 As Long 6 Spaten No 3 As Long 6 Spaten No 3 As Long 7 Spaten No 3 As Long 7 	Type Type Window to wait 15 Window to wait 15 Window teget (m) Sill height (m) Outside revealed depth (m)	3 Proteined Regist	C (2) Kontenent Toy C (2) Kontenent Toy
System No 7 As Loop 9 Source Group Zowe Group Zowe Group Zowe Group 10 Source Group 11 Source Group 11 Source Group 2	Foreign and Constants Finites and Constants Basing Autom Constant Heridans Finite Application Finite Application		Control Linear Games Son Control Contr
2 / an Eng 1 2 / an Eng 1	 Stoped Florer Mandows/Skylogen Loom Kremin 		Category AD Category Gan Colour Defention method
a € 2 Jone Group 9 10 Jon 4 (2) Jone 5 (2) Jone 1 5 (2) Jone 1 4 (2) Jone 1 4 (2) Jone 4 4 (2) Jone 4 4 (2) Jone 5			Detexture method 2-56 Celocatuted Values Total solar transmission 816 U-Value (Vdm24) 330 Apply enhanced suits. No.
⇒ (j) Zone 6. ∰ grind ≑ (j) zone			Cost Cost per even (CBP)er2) 100 Reducer Deylophing
+ (g) Zana 1 + (g) Zana 3 + (g) Zana 4 + (g) Zana 5 + (g) Zana 5 + (g) Zana 5	In Value Velating image [Costing image] Sociation (CFD		Diffusing No

Then, we also modeled the openings as per ECBC it is given that the WWR be maintained as 40 percent.

(Refer Slide Time 04:37)

	fice buildings L. Building L. First		Infe, Holp
	Land Astrony Construction Openings Lighting Hick CFD		
2	Course Tenerous		Edit Glazing Doors/Vents
	Qs Temptote	C21 Nov-Pers Vertical Metal Isoning - All other Skylight	Lite the screen to editive gracing door.
Cloime	Contrast Venetiana		vent and shading defaults for the current permeter back
lastem No 3 As Long	(Cleans top	ECBC Glaring ferrer	Glaring template
igotom No 3 Ao Loop 1	CLAUDA	40% VeAcel Glering ASHRAE 901 Apply G	Thu cast mate a genetic selection from 8
iputem No 3 Au Loopy 10	Department		glacing lengture kot at the log of the
ipstem No 3 Az Long 11 ipstem No 3 Az Long 2	Tipe	3 Protocol harph .	screen. This loads placing and frame construction data from the selected
prism No 3 An Long 3	Window to wall 1s	100	template web the surveid block. You can
m No 3 Au Loop 4	Window karupit (w)	152	also open the proop header times to access the data deects
No 3 An Loop 5	Window specing (m)	84	
to 3 An Loop G		B [Mondate spin reg (m)]	Glazing To expect the details of the currently
An Long 7 An Long 8	Sil height (m)	0.500	selected glaping type, click on the Glapin
Ar Loop 9	Outside reveni depth (m)		hips' icon. Alternatively double click the icon to view hidd the data in a dialog.
	1 Test and an		
e i 18	Artise Control Hundrey		Facade types There are a member of standard facade
	Fiee Apenture		hper
11 1	TO International		· tours - there is no placing
	· Second Reverblement Parkets		+ Continuous horizontal - glacing is
	1 Course		generaled en a continuous horizontal
up5			ship using sill height and window to wait %
4	Real Property lies and the second sec		Fired height - gracing is penersteat wit
mg / mg f			a fixed height of the specified all heigh
log 1			and width is calculated balled on the
			aindex to wait % This option uses Usindow to wait % but prantitizes
			errore to wait is out providents
			Prohenecheraft - stading is gererate
			song the sindle height data and the
			aindox to wait %. but the window
			height may be adjusted to achieve the respect advictments and the This option
			score window and all harged but
			prioritizes window to wait %
			· Fixed width and height - windows has
			fixed width and height. This option us autobia to wait % but provide as wind
			with and heght.
: · · ·	Cit Visualize Treating design Children CFD	Redaming Rest and the line	Parate States and a second states

So, we maintained a 40 percent and the windows will be uniformly distributed, which is what happened? Then, we selected, the fenestration, the glazing. And the values that we selected here, were the prescribed values as per ECBC for the composite climate.

(Refer Slide Time 04:57)

avigate, Sila	office buildings L. Building L. First Land Anny Constants. Opensys Latting H	uic (10	Infa, Help
A constraint of the const	Control Services Cont	Common Typica Olica - Open Pilas 1919/bits H 1999 A 1999 2 Johns Hanner 1 2 John	 I can under the second seco

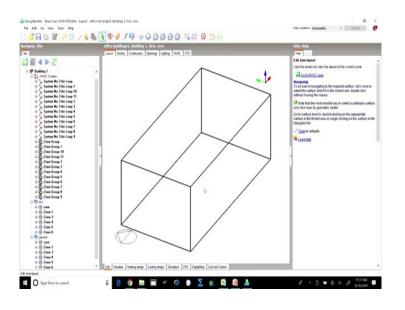
So, and then for lighting we took as 10.5 for the rest of the office, while for core we changed the schedule the power density the LPD was maintained as the same 10.5, which is what was what is prescribed in NBC and also ECBC, but the schedules they have been changed.

(Refer Slide Time 05:20)

	office buildings L. Building L. First, curv		Tota, Neta
	Land Actury Construitor Openings Lighting Hick	CFD	
2	Rent Add Tempore		WAC Data
	1) Template	Unitary Hant Coul	P Datalag HVAC datas
1 yelene	Text Rentwork of Version		Biter using Detailed HVAC the HVAC system is defenduate
ntem No 3 As Long-	PI On		components and the data on the HokC tab is used for
otom No 3 As Loop 1	Outside au defaultos method	Ables besch av (Sum per person + per menti	To access HEAC data doct on the HEAC Systeme navigat
ntem No 3 Ao Loop 10	Constant and Devote an endor	Construction of Construction of Construction	note
ntem No 3 Az Long 11	Manual North State	ASHRAE 8010ccupancy-Office	Detailed HVIIIC Activity Data
ntam No 3 Az Long 2 ntam No 3 Az Long 3	D Schedule	ACPEIVE TO LOCOPARCY - DRUE	The Defailed HinC Activity data model option set to "5 Smp HinC", so the data on the Hi/AC tab is used as follows
niam No 3 As Loop 4	The Discovery		
ntem No 3 As Long 5	Particip		Heating and Cooling design taloutations
ntem No 3 An Loop 6	Piterted .		 Heating, Cooking and DHW schedules, Natural ventilation and Temperature distribution data are used thir Temperature.
ntem No 3 As Long 7	Sizing Zona Edugment		
ntem No 3 Az Long B	State of Concession, State of		DHW with Detailed HVAC Hist water concernption data for this core comes from the
ntem No 3 As Long 9	Converse		Hist water concernption data for this pole comes fork the Actual tait. This pole is setteded to the "Zures served" tai-
ne Loup	11 Schedule	Http://gSPSB.default680-1886Max-Fe	Ti also culled
Group 1	- Chang	regular se anna can reac on the	
Group 18 Group 11			A Statembis 2 Art Loss 13
Group 7	Coolerd		Data shown with a green tackground is only used in
mp J	EffCooking system	Detsuit	Heating and/or Cooling design calculations and/s NOT used Simulations
-	Supply Air Condition		
	(Common Section 2017)		Citize to defaults
and the second second	() Schedule	Http://upipipib.ubetauk6.00 - 18.00 Mon - Pri	
1.00	B CONTRACTOR OF THE OWNER		
nip 8	CHW CHW		6 b
w1			
	20 On		
	Greene		
	[] Schedule	ASHRAE 101 Service Hot Water - Office	
	A later Vertigian		
	0.0		
	Allow Mark		
	One Temperature Destroyers		
	all of the second second second		
	1.000 March 1.000		
	I to Under Trend over Toute and Texture	International In	
4	* Control Visualize Heating design Conting design Simulation	Cr0 DeAgerg Collector	

And, then for HVAC we followed the ASHRAE prescription and we used system 3 and this is what we have.

(Refer Slide Time 05:28)



Now, the model was completed in every respect in all regards. And, then we went on to simulate; this case where the building is oriented towards north and we achieved the results.

Now, if we have to then calculate the average performance of the base case, then we rotate the building and create four different cases as I have mentioned earlier also by

rotating the building 90 degree. So, we rotate the building and simulate each of these four cases oriented in four different directions, for annual simulation 365 days hourly basis, 8760 hours specifically.

So, each building will be modeled for the entire duration of an year. And, an average we calculated to calculate the performance of the base case. This is the performance of our base case and we will use it later to compare, whether the proposed case is performing better than the base case or not.

Now, it is time to create the proposed case. So, while we have to create a proposed case we can just create another building in the same file, or we may just save the existing file, and copy it as a new file, and rename it and make all the necessary changes, whatever changes are desired. So, we now have the same file saved as proposed case. Let us quickly have a recap of what all needs to be changed; what is the difference between a base case and a proposed case? This building will look exactly the same, except for some minor changes.

So, let us quickly have a recap.

(Refer Slide Time 08:15)

	Inp	out Data	
 Building 			
201	Units	Base Case	Proposed Case
Site		9	
Location		New Delhi	New Delhi
Weather File		India - New Delhi - ISHRAE	India - New Delhi - ISHRAE
Building			
Building Type		Commercial Office	Commercial Office
Layout and Zones		As per Plan	As per Plan
Gross floor area	sq. m.	2000	2000
Total Conditioned floor area	sq. m.	1900	1900
Number of floors- above grade	number	2	2
Number of floors-below grade	number	0	0
Floor to floor height	m	3.5	3.5

So, if we look at the input data, the base case and the proposed case will have exactly the same site. So, the location which was taken in base case was New Delhi. And, the weather data file which is chosen is the 'New Delhi, India' ISHRAE file.

The same files will be used for the proposed case; they will remain exactly the same. Also the broad geometry of the building will remain the same where the building type, the layout of the building the zones, the gross floor area, the total conditioned area, total number of floors, below and above grade, and also the floor to floor height. So, since all these parameters have to remain the same, we copy it is easier for us to copy the base case as proposed case a new file and then go ahead with the changes.

(Refer Slide Time 09:10)

		t Data	
 Constructi 	ON <i>Units</i>	Base Case	Proposed Case
Site			
Roof- U value	W/sq. m. K	0.25	0.26
Wall- U value	W/sq. m. K	0.4	0.34
External Floor - U value	W/sq. m. K	1.26	0.319
Openings			
Uvalue	W/sq. m. K	3.300	2.2
SHGC		0.27	0.25
VII		0.561	0.781
Window wall ratio			
Ground floor	5	40	60
First floor		40	60
Shading		No	0.6 m Overhang
Netrando S-Sta	1. T. I.		1000 C C C C C C C C C C C C C C C C C C

Now, let us quickly look at the changes which we are proposing. So, the base case which we created, if you remember we had created the constructions, the construction typologies for walls, roofs, windows openings, everything as per ECBC prescription.

So, if we are looking at U value here. We created a U value roof with a U value of 0.25, which is as per ECBC; Wall with a U value of 0.4 and external floor with a U value of 1.26. Ground floor we took as default, which is what we will keep the same in proposed case as well. For openings we assumed the U value of 3.3 and SHGC of 0.27 and a window wall ratio of 40 percent, there were no shadings to be considered.

Now, in proposed case the changes that we are going to bring in. The proposed case we are going to assume that roof U value is 0.26, the wall U value is 0.34, and the external floor U value which is not the case here there is no external floor, which is being considered, but 0.319, wherever it is, ground floor remains the same. U value we will take as 2.2, which is improved SHGC as 0.25 and VLT as 0.781.

However, despite using the better glass we or to compensate, for the improvement in the glass, we are taking a new case, a proposal, where the window wall ratio will be increased from 40 percent to 60 percent. So, though this is a negative thing as per ECBC prescriptions for the climate of Delhi, window wall ratio approximately 40 percent is the best proposed one.

However, if we increase 60 percent increase the WWR to 60 percent, but also improve upon the type of glass. Let us see, what kind of differences in performance we see. Also, since base case had no shading, proposed case we will experiment with a shading of 0.6 meter, which is a horizontal overhang.

So, no fancy shading is being proposed here, but impact of shading will now be accounted for.

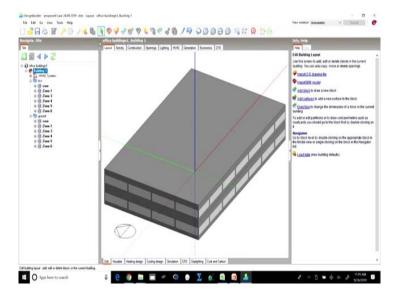
(Refer Slide Time 11:49)

	Inpu	ut Data	
 Lighting and 	HVAC		
Lighting			
Lighting Power Density (LPD)	W / sq. m.	10.5	7.6
Lighting Control	Yes/No	No	Yes
HVAC		6	
HVAC System Type		ASHRAE 90.1 App. G System 3 - PSZ - AC	VRF (Air-Cooled), Heat Recovery, DOA
Heating COP (seasonal)	W/W	0.8	25
Cooling COP (seasonal)	W/W	1.8	3
Miscellaneous		30	30

For lighting and HVAC initially we considered lighting power density of 10.5 Watt per square meter. Here, we will reduce it to 7.6 in the base case there were no lighting controls used while in proposed case we will be using the lighting controls.

So, for HVAC we used as per ASHRAE 90.1 appendix G, the system 3 prescription, while in this case proposed case, we are going to use variable refrigerant flow the VRF along with heat recovery. And, instead of the COP for heating and cooling as 0.8 and 1.8

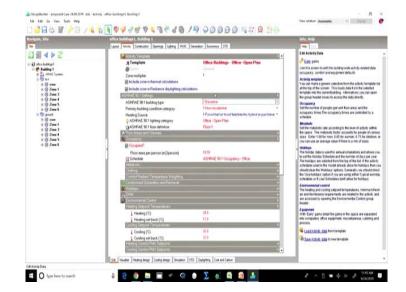
respectively, we will be using a higher coefficient of performance, the equipment power density we are going to keep the same.



(Refer Slide Time 12:44)

Now, you already know how to change this. Another thing, which is going to be kept as the same here, we are making changes in proposed case.

So, all other things have been brought directly as it is along with the activities.



(Refer Slide Time 12:51)

So, the activity is activity as well as the schedule is going to be remain retained as the same. There is no change that is going to be there also the heating set points and the cooling set points are going to remain the same. We cannot show the reduction in energy consumption by changing the set points. Whatever set points have to be taken in the base case will be the same as we will take in the proposed case.

(Refer Slide Time 13:23)

de, Silte	office buildings 1, Building 1		Infla, Data	
August and a second	Land Adney Constitution Openings Lighting HUAC	Generation Economics CFD	100	
	A Construction Tempton		V 2+ 4x 4>	
Also haddegal A haddegal 1 haddegal 1 milet 1 milet	Contract and Contr	C2) Neurosciented Disardes Cassiverson FCRC woll C3) transfere Below Gaster Wall (H-B)(h) (C1114 (H)) Casy of Hei and U value - 13 X Walk C3) transfere fault to forsky etters (Hot, H-H114 (H)) C3) Same Gaster, Birch H, Gfreise etters (Hot, H-H114 (H)) Parties - 1 et al. (Cheming gastary alteritheterate H in Factors - 1 et al. (Cheming	Control extension of the Control and a control of the Control and the Control	nen Lander Sen Later Statig 3, or 124 31,0 (24) 105 21,0 (24) 105 21,0 (24) 105
+ 0 2m+1 + 0 2m+1 + 0 2m+1	Convergent for Para Converting Converting Converting Converting Convergent Converge	Can Same Dation Anal. Search (High Kork) Hill Can Youn High Samo Anglas Proc Unavased Field (H) Can Same and ground factor annual and Can Young Learner Proc Sher Josef Pag (H) - Hill Hammadian Kori - Ka (Ultimol parcelar shar	4 The Deput Star Editable General Concerned Co	ADHIVE IN Wala Gammal T Layers
	Control of the Control of Control	1 88 Ga247	Nonber clayers Outcomestayer 27 975 m Sacco Thotness (n) Bolger? Layer 7 27 9455 m gypten bond Thotness (n) Bolger? Layer 3	4 8.0110 No 8.0110 No

(Refer Slide Time 13:33)

ets, Site	office buildings L. Building 1		Infe, Oata	
Constant of the local days	Land Amery Conductor Openings Lighting HUNC	Gerenation Economica (20	100 Int	
∭ ◀ ▶ 군	Construction Taxonalistic		V 2+ 4x 4 >	
shoe buildeard	Template	C21 Nonresidential Baseline Constructions	Number of Italiens 4	
P Building 1	Contractor		Outermost Inver	
11 Tel March System	and started walts	Copy of ECBC Wall	cy 175 m Sheco	
+ ja System No 3 An Loop	Officion grade walls	C211km-Res Balow-Grade Watt R-0.006 C114(8.878)	Thickness (m) 0.0190	
* System No 3 An Loop 1	OF lat roof	Copy of Elat mot U value = 8 25 W/m2K	Endged? No	
a System No 3 As Loop 11	Piched roof (scorpert)	C21 How Free Root Ins Entraty above Deck, R-148c+ (2	Lever 7	
+ C Sentem Nor 3 As Long 2	Fiched root beoccupied	C21 Servi Exterior Floot Ins Exterior above Deck, Fr-4c i 7	A 1825 m gypsum board	
+ System No 3 Ar Loop 3	California partitiona	Fanton -2 +1 m. (2x25mm) gypsum plasterboard with 4 m	Thickness (m) (10155	
+ 🖕 System No 3 As Loop 4	Service and a	A DESCRIPTION OF TAXABLE PARTY OF TAXABLE PARTY.	Endged? No	
* System No 3 An Loop 5 * System No 3 An Loop 5	Same exposed wats	(21 SameEnterior Wat Staniframed R-010 B (5 352)	Layer 3	
ii Spoten No 3 An Loop 7	Cam-expressed cashag	C21 Same-Enterior Calling Steal-Just R-9 (8.6) U- 35 (1.9	- Board insulation (Glass tiber board)	
a Spring No 3 As Loop 8	Servepored foor	C21 SameExtension Floor, Shear Joint, Proceeding, UP 25 (1 58	Thickness (w) 0.0101	
# Series No 3 Ar Loop 3	Convertined too	C21 Selections Pool Selection Regins (FISH	Bidged? No	
+ S Zone Group	A CONTRACTOR OF A CONTRACTOR OFTA CONTRACTOR O	Children and Children Barry Street Stre	Innermast Inver	
# 2 Zeer Group 1	Ground foor	C21 Non-Flas. State-On-Grade Floor Uniterated. FLID (E.B.		
1 21 Zone Group 10 1 21 Zone Group 11	 Basement ground floor 	Solid basevent ground foor uninulated	Theitman and 00111	
+ 2) Zone Group 7	External face	C21 Non-Flais, External Ploor Steet-Joint Fi-9 (8-8) U-35 (Dodged? No	
(Zonstone)	and the second s	Informazilatio Rozr - 4 in (100mm) concrete simili	Cross Section	
+ 23 Zone Group 4	SubSubstan	A STATEMENT OF A	Outranter	
+ 23 Zone Group 5	Internal Years intern		-	_
is Zi Zone Group 6	Component Elizab		William & The Verse	
in 25 Zone Group 7 in 25 Zone Group 8	Generally Areas and Visiones		11 Sime 21/2 is good lived	
· Z Zone Group 1	Europe Connection	2	Contract of the second second	
in the set	Linese Thermal Birdging at Jurchiste			
# (9 cm	Angle and		the second s	
10 03 Zone 1	Madal willings		and a second to be a second	
+ (ý Zone 3	Constant rate (ac/h)	8 300	Citize Starl robots (See South	
+ (i) Zone 4 + (i) Zone 5	(1) Schedule	On 24/7	Source Report International Inclusion	
+ 02 Zone 5	Dates T and West Speed Coefficients		and the second se	
ii D gaird	11 (21)		and the second se	
* 00		12	the second se	
+ (3) Zone 1			1170 FDI american	
+ () Zana 3	and the second sec		A Description of the American Street	-
+ (i) Zone 4 + (i) Zone 5	· La Vester Heatry despr [Codep despr Sestem]	and the second se	here safare	

So, let us look at construction. So, currently the wall which is being used is ECBC wall the template and the U value which we used was 0.4.

(Refer Slide Time 13:43)

日本国 / 10					
rigets, Sile	Laws Suface properties (trapp Collution) Call (the Discontinues	and surra [Contenation analysis]	Calculated Data		
Image: Constraint of the second sec	Constraints and transmission of (NoIO(4)) Restance and antice conference (NOIO(42)) Balance and antice conference (NOIO(42)) Restance and the stream's conference (NOIO(42)) Restanc	2701 5556 8720 22703 8 60 8 60 8 60 8 60 8 60 8 60 8 60 8 60	The second	 Leg (K) and (K) and <l< th=""><th>Additional States Wells General 14.system 4 001100 http: 14.system 15.system</th></l<>	Additional States Wells General 14.system 4 001100 http: 14.system 15.system
	Model data		Hite Carol Dt.	Barrittaden Ziner (†**)	

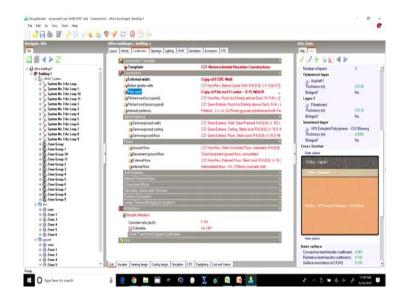
So, if we see the U value, which is being used is 0.4. Now, we have to create a copy of this. So, here we create a copy of ECBC wall, we have already seen it and we edit it.

(Refer Slide Time 14:10)

🗋 🥰 🖬 🦣 🕼 🦯 🥬 🧷	Constructions Holy Low Subscriptions have California Cal Hereinstein Contension andres Hol	
Image: Second	Loss (Description) Test (Description) Test (Description) None Capital (Description) Although (Description) Social Although (Description) Test and an although (Description) Social Capital Capital Social Cocial Social Social	A ≥ X ≤ Q > COSE Web Cose Web
	United by the second	No. Harve In generational Sen 0.000 No. No. No. No. No. No. No. No.

So, we have to set the U value. So, instead of 0.4 as per the input data which we are now using the U value will be changed to 0.34. So, here we change the value to 0.34 for the outside wall. And, we select this copy of ECBC wall, this new template that we have created here. So, if we check the new template, which has been created, which is for the proposed case is 0.34, which is definitely a better wall.

(Refer Slide Time 15:05)



Similarly, we will change the templates for each one of this the flat roof U value here was 0.25, while what we are proposing in the input data is 0.26.

So, we create a copy of the flat roof U value and we edit the values to set whatever values we want or we can also specify the layers. In case the layers are known, then the layers will be specified instead of the specific U values. So, we have already defined the external walls and the flat roof here and the construction has automatically been reflected in the respective blocks. So, if we go to the first floor and we see we have we already have the copy of ECBC wall with a U value of 0.4 and the copy of flat roof with a U value of 0.26.

So, if you look at it here, the U value of roof is the performance of the roof in the proposed case is lower than that of the base case. Marginally, but yes it is lower while the performance of the wall is proposed to be better than that of the base case. So, this is how we will change the construction.

This is automatically reflected in both the floors then we move on to openings. Now, the changes in openings are one we are changing the glass in the proposed building. So, we change it to this new glass which is being shown here, the properties which are being shown here.

(Refer Slide Time 16:59)

Marc Spream (7) Classing bytes	Fire: Vorkcel, Maria Bannay: All other: The set of the s
Alloyd Grandian C 21. 10 The Second	e first: Vorkick Marial Heaving: All advect http://www.all.com/p.All/2014/2014/2014/2014/2014/2014/2014/2014
Ang 1 Transmission Control (Samo Area) Control (Samo Area) Control (Investigation of the second se
Attic (same) Control by Control	Takang Kesen Unaye (15 Vie and U 1997) 20 (16 C 19) Kesel Ghanng ADHIVE 10 1 Appr G Unaye (15 Vie and U 1997) 20 (16 C 19) Unaye (15 Vie and U 1997) 20 (16 C 19) Unaye (15 C 2 and U 1997) 20 (16 C 19) Unaye (15 C 2 and U 1997) 20 (16 C 19) Unaye (15 C 2 and U 1997) 20 (16 C 19)
S calment best As Lange (B Aryani (B VA) Secondary 1 - Constrained (B VA)	Next Classing ASHIVE 10 1 Apps G to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 20, total 2 is to aper DSS and so Unity 2 is to appr to a to
Spatian Ris 7 Joint Lang 10 Types 1 Physics Spatian Ris 7 Joint Lang 10 Types 1 Physics Spatian Ris 7 Joint Lang 11 Types 1 Physics Spatian Ris 7 Joint Lang 11 Types 1 Physics Spatian Ris 7 Joint Lang 12 Webber to self Vig 1 Bit Spatian Ris 7 Joint Lang 1 Webber toget paip [4] 1 Sit Spatian Ris 7 Joint Lang 5 Webber toget paip [4] 1 Sit	Independent of the second seco
k prime the 2 Au Leng 11 Type 2 Folders k prime the 3 Au Leng 2 Weddew to well % eff 32 k prime the 3 Au Leng 4 Weddew to well % eff 32 k prime the 3 Au Leng 4 Weddew to prime 1 Au k prime the 3 Au Leng 4 Weddew spacing (m) 1 49	 Statight Statight 01:55 all sole 01:851 (2005) 2:77 Sciulage 01:55 all sole 01:864 (3:65) Soles 2:14
System No. 3 An Lamp 2 Window to well % 41 30 System No. 3 An Lamp 3 Window to well % 150 System No. 3 An Lamp 4 Window to well % 150 System No. 3 An Lamp 4 Window to well % 150	Triviage (0), 53 of your 1/10 (44) (14), 14 (24)
Spatian No 3 An Long 4 Vision Respire (k) 500	The state of the
we file 3 As Long 5 Window spacing (m) 5.00	
	Triplater (D. 55. of and 3.0.8.8.1 (D. 5. 666, 8.08 Studiet (D. 55. of and 3.0.8.8.1 (D. 5. 666, 8.09
	Inside (3.5) of and (-DB1) White Ord
mp 7 Outside revenil depth (m) 0.000	Sought US-TE of and U-D-REFE BID THEN DISA
Finisher and Chicklery Country Country	TRANS IN AS A REAL PROPERTY AND A REAL PROPERTY AND A REAL PROPERTY.
Lee 1 Easter	Data Report Otort Editable)
Auflahe Öcenhul Mindows	General
Pres Agentus	CODC Glaring lanes
Internet Workswe Engeld Root Worksweit Flaukigen	Source ASIEVE
a here and a more course of the	Category AD/FAE
R	@Feyon General
Nu.	Color
	Definition method
	Definition method 2-Simple
	Colculated Values
	Total solar transmission (SHGC) 8.278
	UphteenweiGe 150 Urblie (Weiz 40 2300
	Apply enhanced surface coefficient. No Cost
	Cost per avea (CBP Inc) 110,000
	Padiance Devlighting
	Diffusing Ha
	A CONTRACT AND A CONTRACT

So, instead of using an ECBC glazing fenestration, let us edit the properties; create a copy and edit.

(Refer Slide Time 17:11)

evigets. Site	Edit glazing - Copy of ECBC Glazing lanes			Outa	
3448	Claring Lawn Cat		Hally		
Arr. Index June 2 P address P address	Company New Corport Server Server Compose Comp	ADHING \$11202 ADHING \$1202 General 25mpte 8275 836 3390	Next (Long Online) Contragramp U-real (Strate of generations) (DeC) of events transmission. And (Long and Strategiese of events transmission. Strategiese of the strategiese of events that the manufactures are then a strategiese of events of events of the strategiese transmission. The strategiese of the strategiese transmission of per-requestion is used at the strategiese the strategiese of events of the strategiese transmission. The strategiese of the strategiese transmission of the strategiese of the strategiese the strategiese of the strategiese of the strategiese the strategiese of the strategiese of the strategiese of the strategiese the strategiese of the strategiese of	12 Sectors from the sector of the formula of the sector of	A denied 11 19 19 19 19 19 de noie 11 19 19 19 20 de noie 11 19 19 19 19 20 de noie 11 19 19 19 19 20 de noie 11 19 19 19 19 19 20 de noie 11 19 19 19 19 19 19 19 19 19 19 19 19
	Mayded dealer		Hits Cavel DK	at aut per area (GEF3m2) adience DayligMing	100.000
	Model dem		Heb Canal OK	dung	No

So, instead of 0.27 the solar transmission has been proposed to be 0.25, U value to be 2.2 and VLT to be 0.78. So, the U value goes to be 2.2, which is possible to be created here and the light transmission becomes 0.781 and the SHGC goes to be 0.25. Now, this these values that I have created here might appear to be hypothetical values.

However, when in real scenario when we enter the values for the proposed cases we might actually be selecting a glazing system, which is already available in the market.

rte, Sila	office buildings 1. Building 1 Land Amay Constants Desrey Lighting Hill		Infa, Onta	
1422	Land Abrills Construction Computer Capting Ho	C Grader Towards [05 2]	12+384	
and the second	Qa Template	CZ1, Non-Firs, Vertical, Metal learning - All other,	and the second sec	K
the buildings I	Commit Westbare	Contract of the second second second	Discore (Contraction Bod Day)	tetter for is
IT TA MADE Symmetry	(7 Glazing type	Copy of ECBC Glazing lenes	Dirited Elec Per Cale	
System No 3 As Long System No 3 As Long 1	Clayout	40% Vestical Glazing ASHRAE 90.1 Apps G	Distail (In: Par Cale Of Distail (In: Par Cale	
n 🖕 System No 3 As Loop 10	Dimensions	20 1808 B	Divited Speec Sel Ck 1	Iron 7 Iron Rep. 4a
* System No 3 As Loop 11 * System No 3 As Loop 2	Type	2 Preferred Aurght	Dist Left Speet Set Cit	
in System No 3 As Loop 3	Wedge to wall %	150	Divited Specified Child	
+ 🖕 System No 3 Au Long-4	Window height (w) Window specing (w)	3.00	CO COULD DOUBLE DOUBLE DO	Server, " . Jonal Marg
* System No 3 An Loop 5 * System No 3 An Loop 5	Sill hardet ged	0.60	Distail Spec Set Ce I Distail Spec Set Ce I	
+ System No 3 As Loop /	Outside revent depth bnj	6.000	Doilui Special Tar	
* 🖕 System No 3 As Loop 0	Frame and Duidary		🖉 DMiLeE Specified Tex	
* Salam No 3 An Loop 3 * 23 Zone Group	States	<u>/</u>	Die Raf B in Tax Konne Elliche Ekspenset (2001 Efferhalte)	Classifier -
in 2 Zone Group 1	Antine Science Windows		General	(
in Zij Zone Group 10 in Zij Zone Group 11	< First Apartum		Obline Special Chile	and them does
in 2) Zone Group 7	Elizard Fast Windows/Exutories	1	Source	EnergyPhysic
+ 2 Zoon Group)			Category	Double
+ 21 Zone Group 4	C Carta		@Rapon	General
· Z Zone Group 6			Colour	
+ 2 Zone Ermp /			Definition method	
in 2) Zone Group B in 2) Zone Group 1			Defention method	1-Manerical Tary
10 hr			Layers	and a starter
1 purd			Number layers Outermost pane	1
	1		Pane type	Gananci Loff
	1		Pielayer	No
	1		Window gas 1	
	1		g Wedow gas type	ARGON 13M
	1		Innermost pane	
	1		[Pane type	Generic CLE
			Flip Hyer	No
	Em Visuatur Visuatur Design Couling design Seculator		Outside Surface	

(Refer Slide Time 18:19)

So, suppose we have to select a double glazing system. So, a lot of these different types of double glazings, the templates are already available here. We can select any one of them and we can check for their values.

(Refer Slide Time 18:31)

Sile	office buildings L. Building L Land Actual Communic Courses Capture Hill	and the second	Infe. Deta	
4 6 2		C Genetar Borrano (00 E		
	Charles Template	C71 Non-Flats, Vertical, Matel Iteming - All other	A DOLLAR DE MARCHANE	
building-1	Que Tampiote	C21, Non-Test, Vencal, Metar Maning "An educt	General	
uliding 1 Millio Symmetry	Coloring type	Copy of ECIIC Glazing lenes	Oblice Spec Set Chilem/13e	
Sentem No 3 As Long	di most	40% Vestical Glaring ASHIVE 10.1 Apps G	Scace	EnergyPhys
🖕 System No 3 An Loop 1	Station	the vessel carried scattered at 1 white a	Category	Double
🖕 System No 3 As Long 10	Type	Preferred larget	#Pegon	General
System No 3 Ar Loop 11 System No 3 Ar Loop 2	Window to wait 1;	41.00	Colour	
Santan No 3 Au Long 3	Wedge to wait is	150	Definition method	
📡 System No 3 As Loop 4	Window specing (m)	1.61	Defection method	1-Material he
System No 3 As Loop 5	Sil height and	140	Layors	2
System No 3 As Loop 6 System No 3 As Loop 7	Outside reveni depti ini	1 801	Number leyers	£
Santan No 3 As Loop 8	Finne and Contenant		Outermost pane	2
System No 3 As Loop 9	Stading		Pana type	Generic Lot
Zone Group	Authore Control Ministers	7	Pipinyer Wester pas 1	No
To Zone Group 1 To Zone Group 10	res Apetine			ABCON 13
2 Zone Group 11	Contract Constant		" P Window gas type Innermost pane	MULTIN
2 Zone Group 2	 Depart Hoot windows/Daylights 		Para type	Genere CLB
(Zone Group)	Com.	-	El Paris type El pristar	No.
2 Zone Group 4	Figure	-	Outsafe Sarlece	rep
2 Zone Group 8	- 1. D. L. 199	//	Fis convective heat leaster coeffici.	Also 1
2 Zone Ecoup /			Inside Surface	100
Zana Group B			Fix convective heat transfer coeffici.	10.
E Zone Group 1			Colculated Values	100
good			Total solar transmission (\$460)	0.015
			Direct tolar kanamission	0340
			Light transmission	1082
			U-value (ISO 18292/ EH 673) (M/m.	1 337
			U-Value (M(In24)	1337
			Apply enhanced surface coefficent	No
			Cest	
			Cost per area (GBP/tm2)	180.000
			Badiance Daylighting Diffusing	No

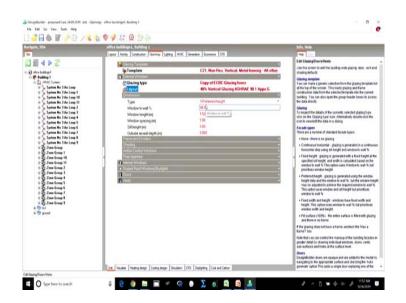
So, in case we have a glass type in mind a type of double glazing which we already have in mind and also their values, we can directly select this glazing type and use it here. However, in case we are going for a specific configuration where we are selecting two different types of glasses and getting them assembled, specifically for the project for the proposed project, there we might have these values U values SHGC and VLT, which may be entered and a new type of glazing system may be created.

ute, Sila	office buildings 1, Building 1 Laved Actualy Constants Oceanya Califord Hill	C Courses (Courses) (C)	Inflo, Data	
# 4 ≥ 2	Claring Templots	1	V 2+ 5 1 4 >	
Har hadge → And → An	Prepare Prepare Characy type Characy type	C/1 Rio file: Voltad Web lessing - Al affet Cipy of CRC Control files IBY Veptoria Giorna (ADRIME B) Ages 6 17 febreral length IB 18 19 19 19 19 19 19 19 19 19 19 19	Terrer version of the second s	r adələş adələş adələş

(Refer Slide Time 19:18)

Now, in layout we already have used a 40 percent vertical glazing as per ASHRAE. If, we see here we do not have a different say 60 percent vertical glazing in ASHRAE the template.

(Refer Slide Time 19:29)



So, we keep the template as the same where it is uniformly distributed on all the sides the preferred heights and spacing's are already given. Instead of 40 percent window to wall ratio, we will just change it to 60 percent window to wall ratio and update it; let us quickly check the difference it brings.

So, we can see that the spacing between the windows has reduced, if you compare it with that of the base case, you can see that the windows have been changed and the overall window to wall ratio the window area has been substantially increased. So, we stop here for today's lecture. And we will continue to create our proposed case and make the changes in the base case as per the proposal and continue with the same lecture in the tomorrow's class.

Thank you for being with us today, see you again tomorrow.