

BUILDEX
EDMONTON

MARCH 15 & 16, 2016
EDMONTON EXPO CENTRE, NORTHLANDS
www.buillexedmonton.com



W04: SUSTAINABLE AND AFFORDABLE: THE BUSINESS CASE FOR THE MOSAIC CENTRE AND IPD

Wednesday, March 16 8:30AM-10:30AM



Speakers:

Dennis Cuku, Co-Owner, The Mosaic Centre

Jennifer Hancock, Director of Innovation, Chandos Construction

EDMONTON'S PREMIER CONFERENCE & TRADESHOW FOR
CONSTRUCTION • PROPERTY MANAGEMENT • INTERIOR DESIGN • ARCHITECTURE • RENOVATION • REAL ESTATE



@BUILDEXSHOWS

Linked in

**IN EXCHANGE
FOR 120 MINUTES
OF YOUR TIME**

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WHAT**TO**EXPECT

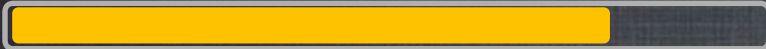
- * START WITH **WHY**
- * WHAT WE DELIVERED — **WHAT** IS THE MOSAIC CENTRE?
- * NET-ZERO RECIPE — THE **TECHNICAL** & NERDY
- * **HOW** WE DID IT — INTEGRATED PROJECT DELIVERY
- * **PROOF** IS IN THE PUDDING — HOW WE MEASURE UP
- * WHERE WE **FAILED** — CONTINUOUS IMPROVEMENT
- * QUESTION PERIOD



Something About ...

JENNIFER HANCOCK

LEARNER



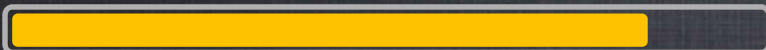
TEACHER



LEAN NINJA



SUSTAINABILITY CHAMPION

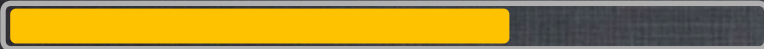


AGENT FOR CHANGE

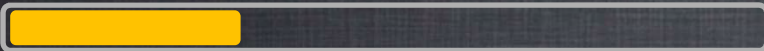


Something About ...
DENNISCUKU

NERD



ENGINEER



ENTREPRENEUR



VISIONARY



DISDAIN FOR STATUS QUO





2007:
START SMALL,
DREAM BIG

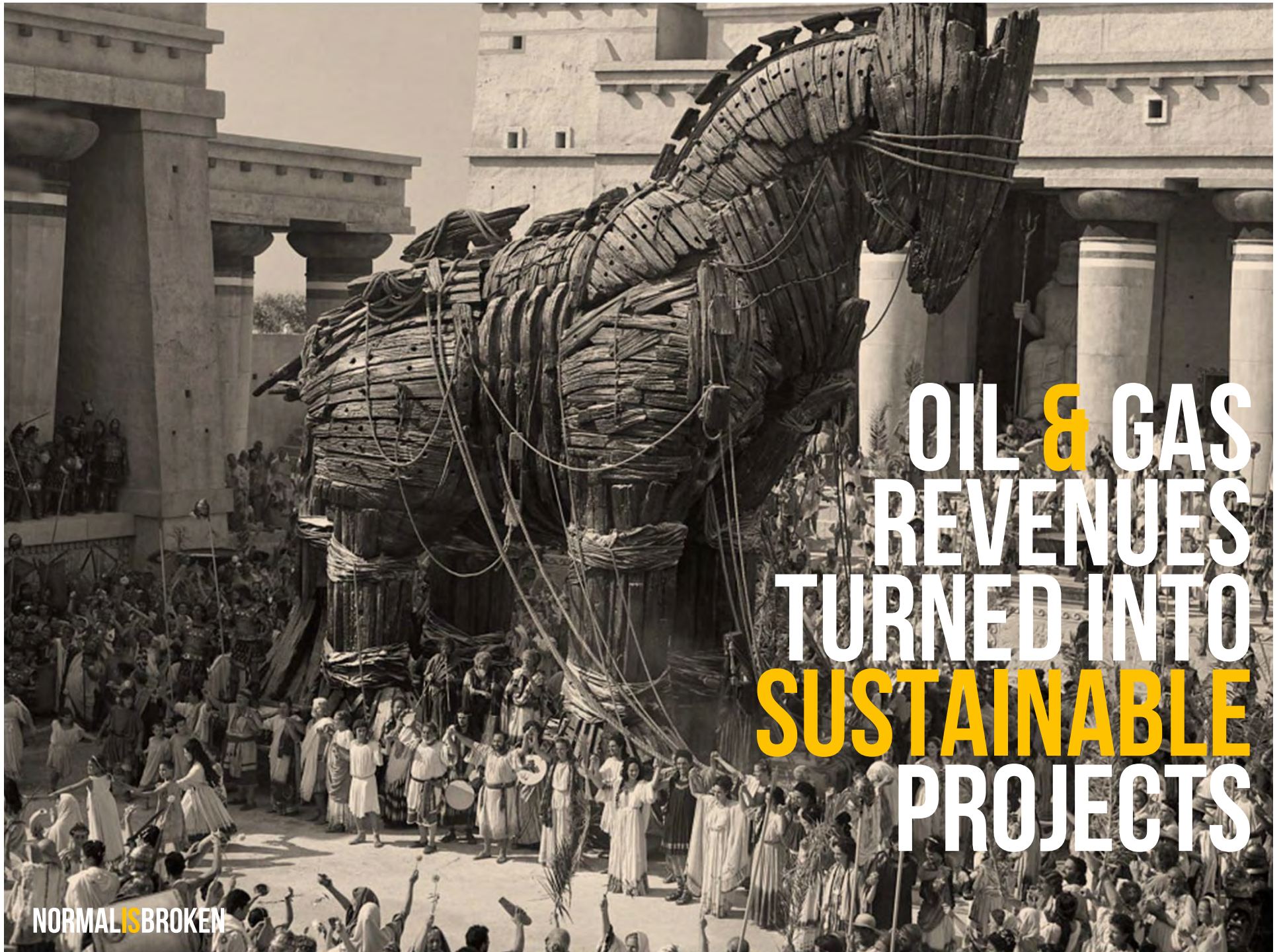
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WTF?
THAT'S NOT
GREEN!

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CAPITALISM NEED **NOT COME
AT THE EXPENSE OF HUMAN VALUES,
ENVIRONMENTAL SUSTAINABILITY
OR PERSONAL HAPPINESS**



OIL & GAS
REVENUES
TURNED INTO
SUSTAINABLE
PROJECTS

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2012: NEED MORE SPACE

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POORLY BUILT & UNHEALTHY BOXES

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PARKLAND NET-ZERO

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BEAUTIFUL



SUSTAINABLE

NORMAL **IS** **BROKEN**



A BETTER WAY “STREET CRED”

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NO NG LINE

SUSTAINABILITY

HEALTH

BEAUTY

PRAGMATIC

TEAMWORK

LEGACY

NET-ZERO

LIVING BUILDING

LEED PLATINUM



**WHAT OUR
PEERS THOUGHT
(& STILL THINK)**

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INNOVATION AVE.

FIRST
OF IT'S KIND
INSPIRING
MORE
TO FOLLOW

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JUST A BUILDING?



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GARDENS

SOLAR PV



COLLISION

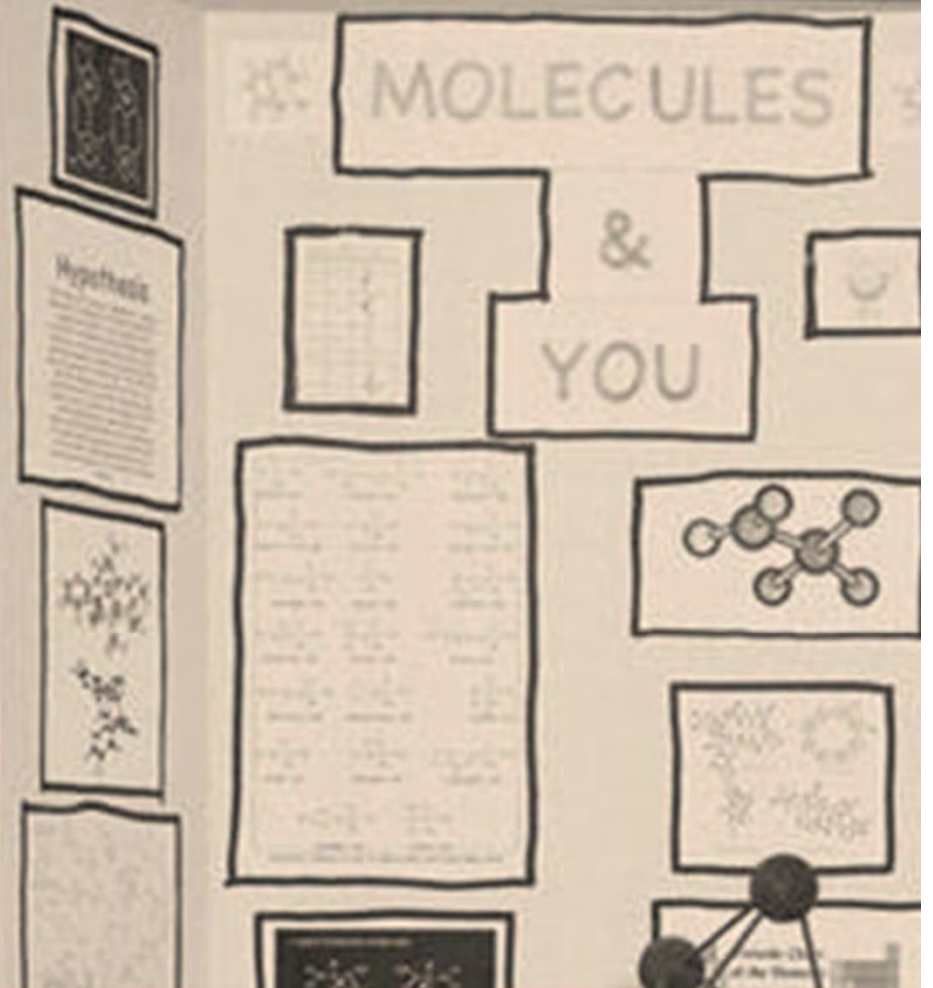
**COMMUNITY
SPACE**

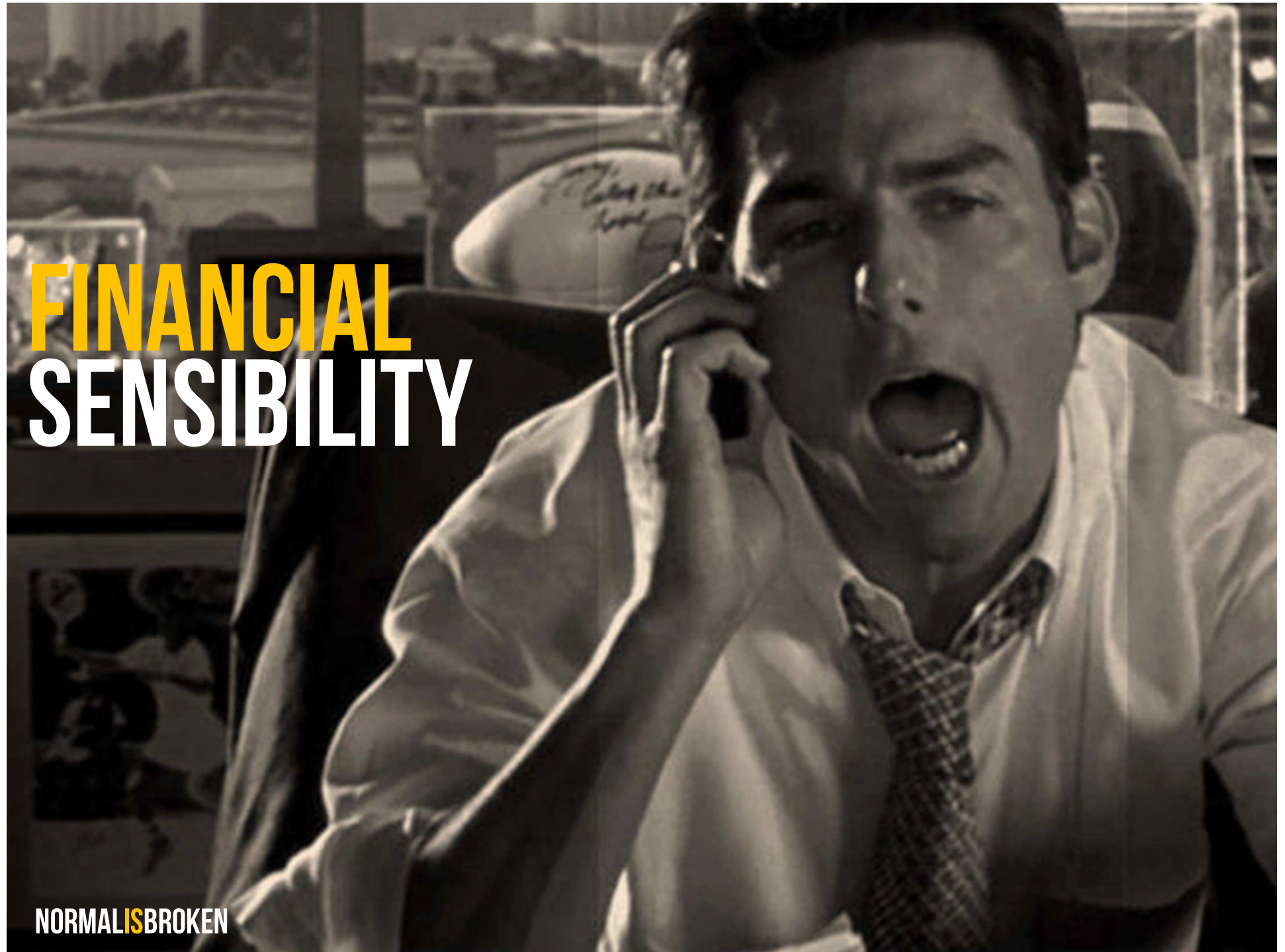
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Science Fair

NOT JUST A
SCIENCE PROJECT

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FINANCIAL SENSIBILITY

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YOU **NEVER**
FORGET
YOUR **FIRST**

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WHY DID WE DO IT?

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SEVEN GENERATIONS

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A photograph of a large, ancient tree trunk and its thick, spreading roots in a lush, sunlit forest. The background is a soft-focus green, suggesting a dense canopy of leaves. The lighting is warm and natural, highlighting the textures of the bark and the vibrant green of the foliage.

**DIFFERENT FEELING
OF BEING IN A
HEALTHY BUILDING ...**

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WITH FRESH AIR ...

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AND DAYLIGHT.

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NOW PROVE THAT TO A BANKER.

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QUICK GOAT MATH

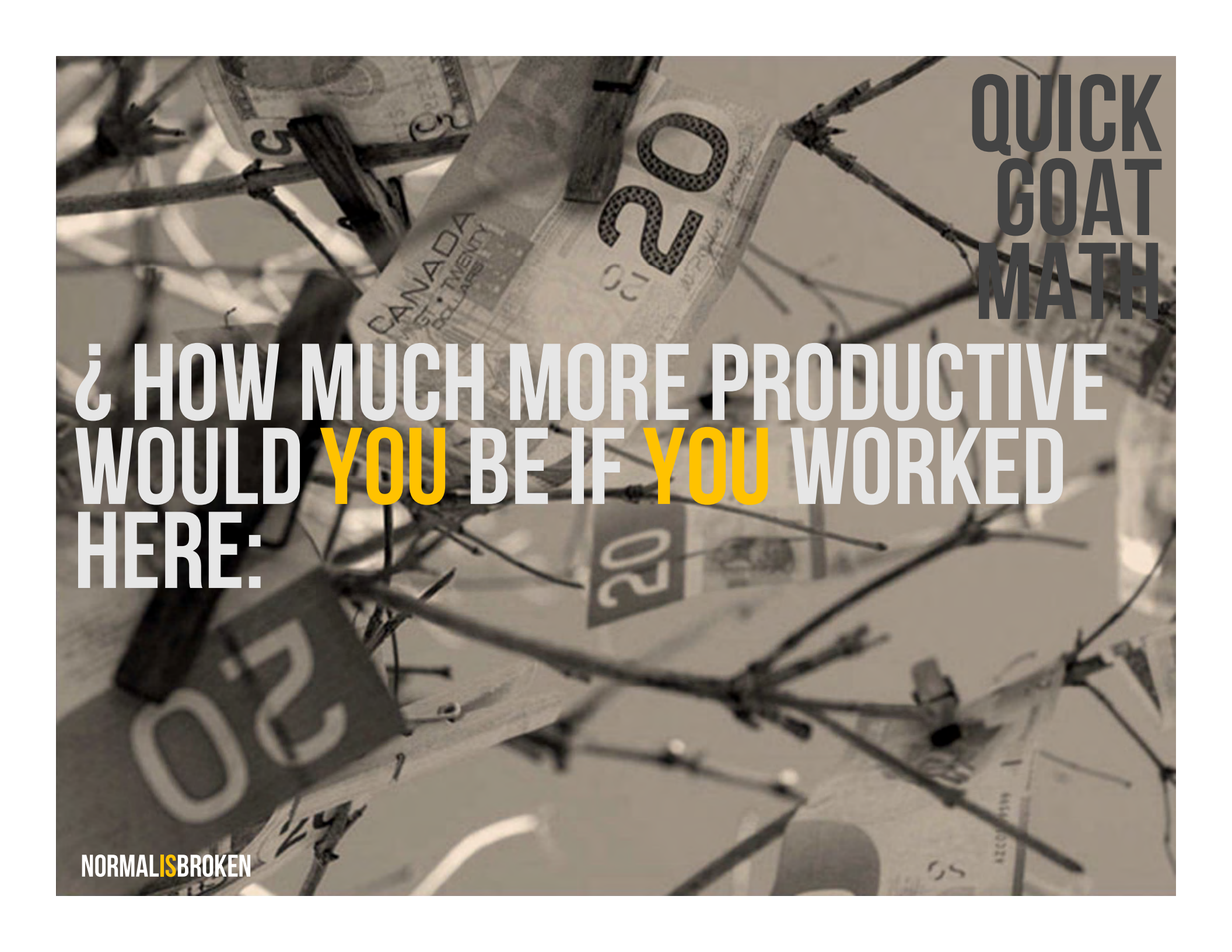
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**QUICK
GOAT
MATH**

RESEARCH EXERCISE ...

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QUICK
GOAT
MATH

¿ HOW MUCH MORE PRODUCTIVE
WOULD YOU BE IF YOU WORKED
HERE:

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BULLITT CENTER, SEATTLE

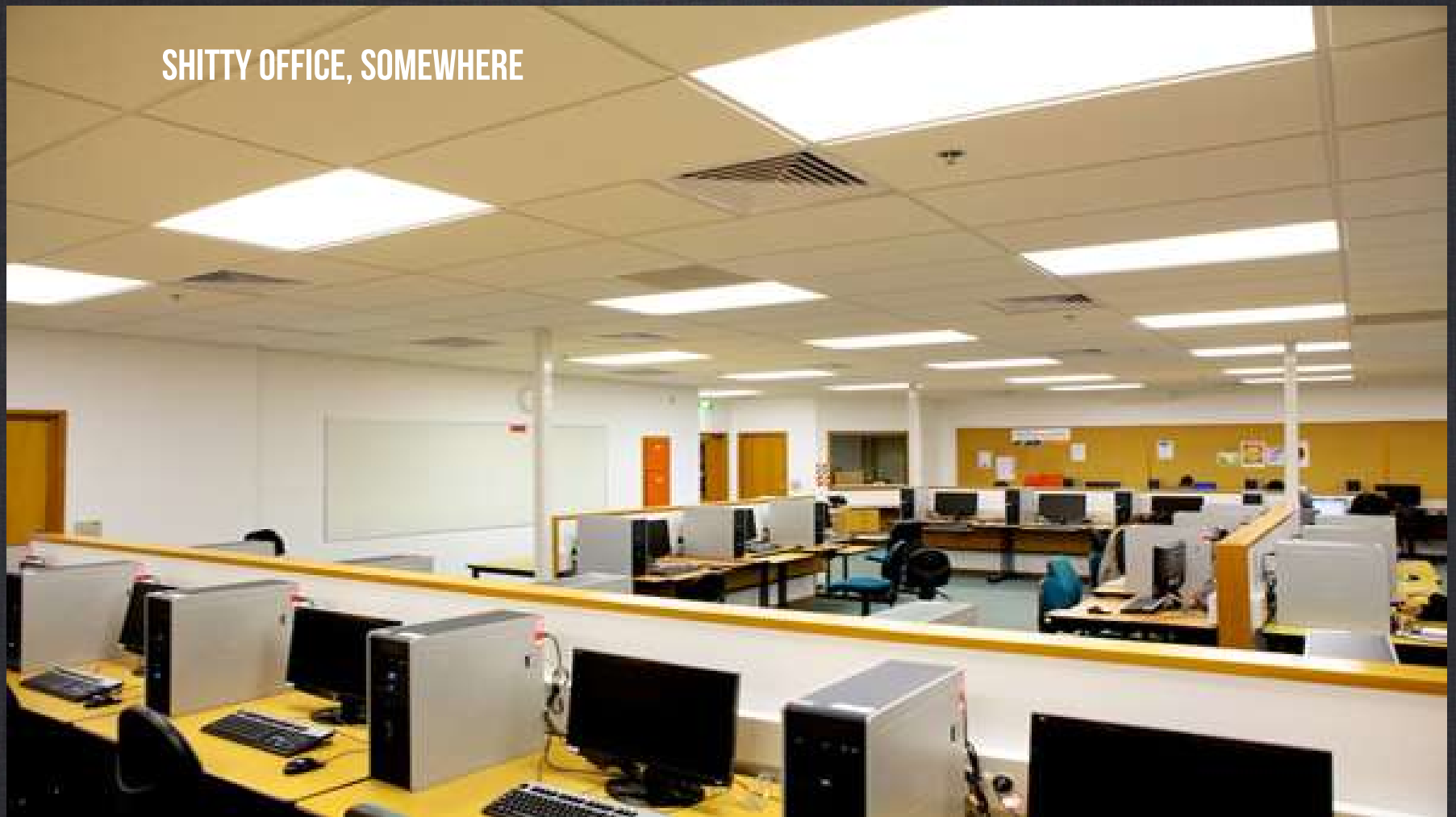


QUICK
GOAT
MATH

... VS. HERE:

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SHITTY OFFICE, SOMEWHERE



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QUICK GOAT MATH

HOW MUCH MORE PRODUCTIVE
WOULD YOU BE IF YOU WORKED
HERE:

25%

15%

10%

QUICK GOAT MATH

HOW MUCH MORE PRODUCTIVE
WOULD YOU BE IF YOU WORKED
HERE:

25%

15%

10%

QUICK GOAT MATH

HOW MUCH MORE PRODUCTIVE
WOULD YOU BE IF YOU WORKED
HERE:

25%

15%

~~10%~~

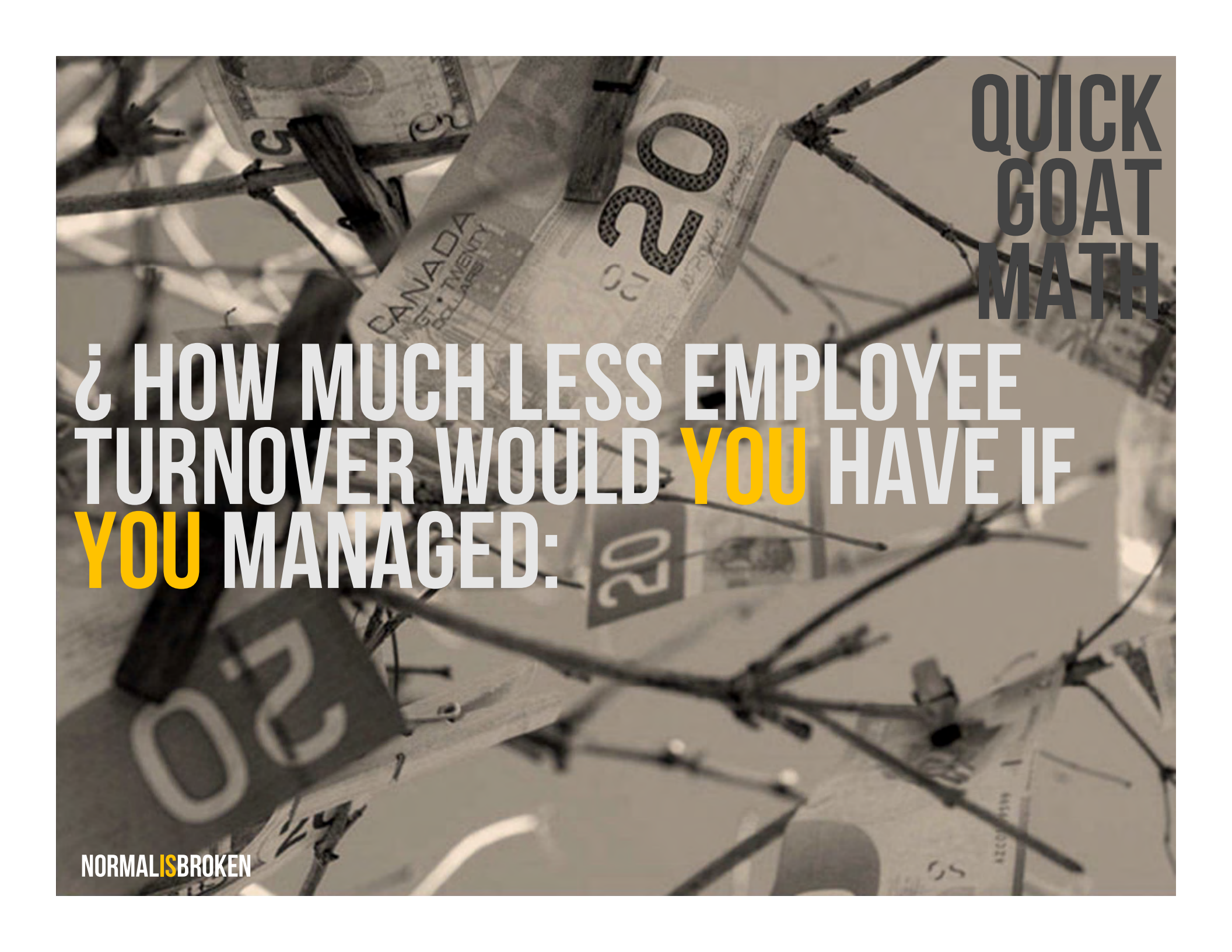
1%



QUICK GOAT MATH

130 AWESOME CO-WORKERS
\$150,000 REVENUE/EMPLOYEE

\$195,000 INCREASE PER YEAR



QUICK
GOAT
MATH

¿ HOW MUCH LESS EMPLOYEE
TURNOVER WOULD **YOU** HAVE IF
YOU MANAGED:

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BULLITT CENTER, SEATTLE



SHITTY OFFICE, SOMEWHERE

NORMAL**IS**BROKEN



QUICK GOAT MATH

¿ HOW MUCH LESS EMPLOYEE
TURNOVER WOULD YOU HAVE IF
YOU MANAGED:

25%

15%

10%

QUICK GOAT MATH

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10%

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QUICK GOAT MATH

¿ HOW MUCH LESS EMPLOYEE
TURNOVER WOULD YOU HAVE IF
YOU MANAGED:

~~25%~~

15%

10%

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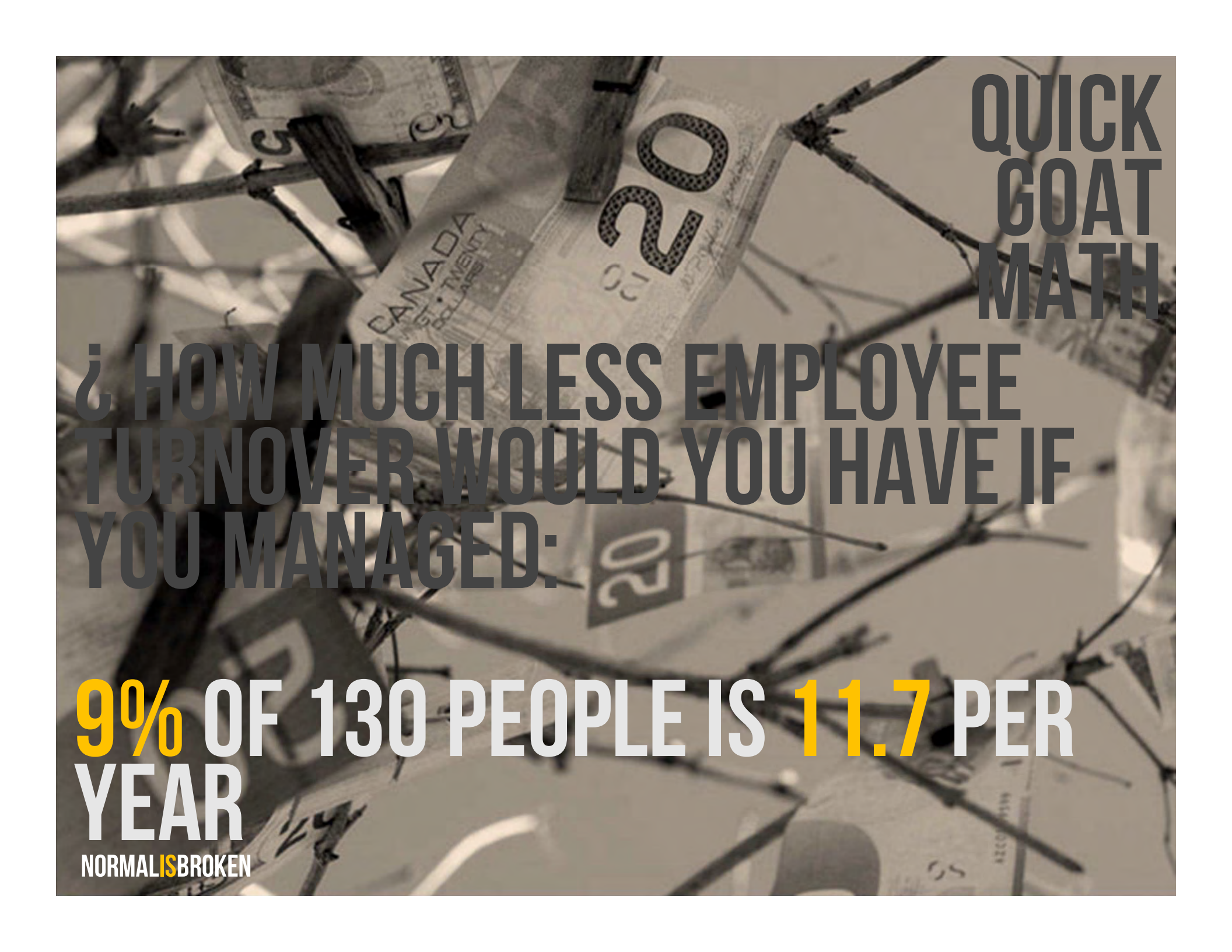


QUICK
GOAT
MATH

¿ HOW MUCH LESS EMPLOYEE
TURNOVER WOULD YOU HAVE IF
YOU MANAGED:

ALBERTA AVERAGE FOR
PROFESSIONALS IS AROUND **9%**

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QUICK GOAT MATH

¿ HOW MUCH LESS EMPLOYEE
TURNOVER WOULD YOU HAVE IF
YOU MANAGED:

9% OF 130 PEOPLE IS **11.7** PER
YEAR

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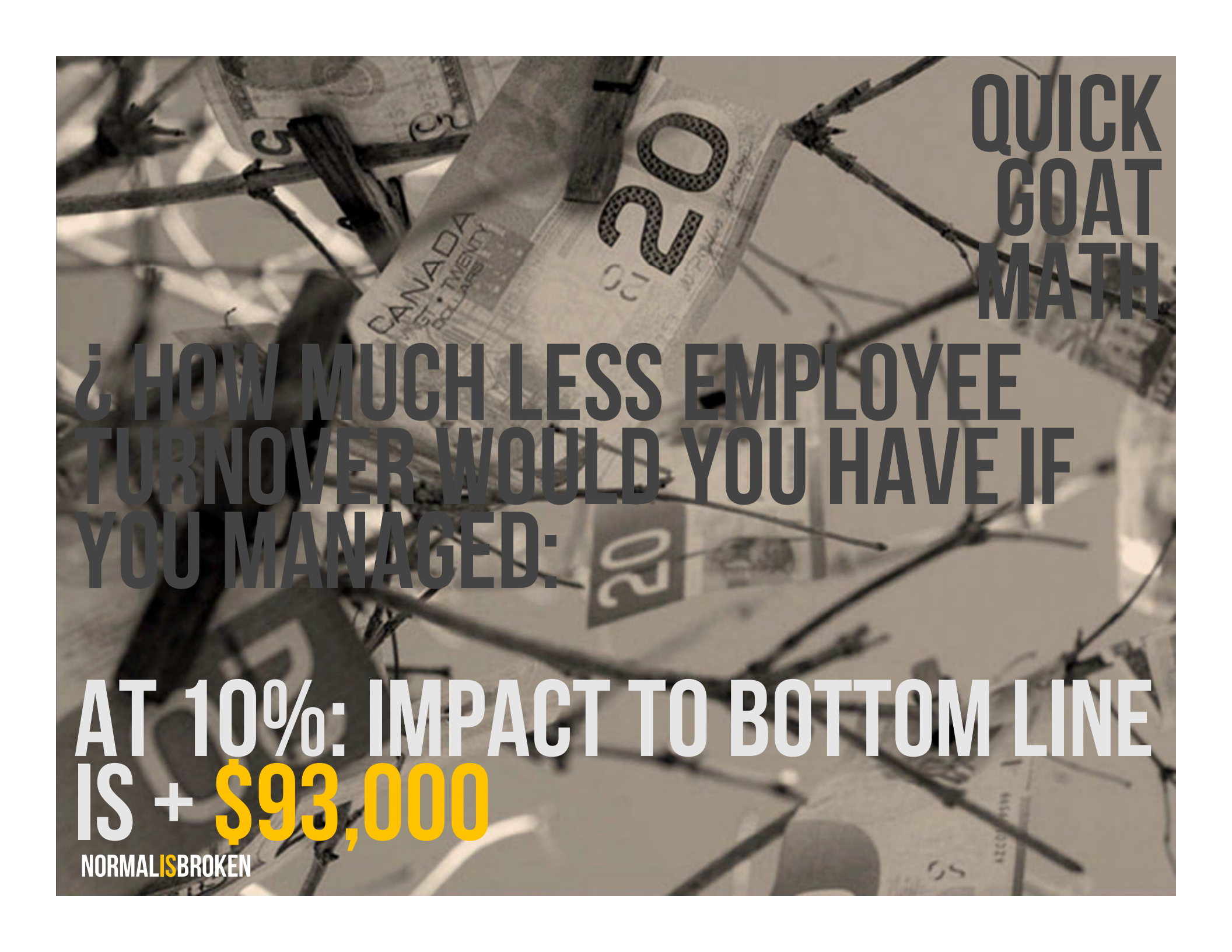


QUICK
GOAT
MATH

¿ HOW MUCH LESS EMPLOYEE
TURNOVER WOULD YOU HAVE IF
YOU MANAGED:

AVERAGE COST PER EMPLOYEE
TURNED OVER IS **\$80,000**

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QUICK GOAT MATH

¿ HOW MUCH LESS EMPLOYEE
TURNOVER WOULD YOU HAVE IF
YOU MANAGED:

AT 10%: IMPACT TO BOTTOM LINE
IS + \$93,000

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QUICK GOAT MATH

\$195,000 INCREASE PER YEAR IN
PRODUCTIVITY **(+1%)**

REDUCTION IN TURNOVER IS LOST
REVENUE EQUIVALENT OF
\$93,000 PER YEAR **(-10%)**



QUICK GOAT MATH

\$1,440,000 POSITIVE IMPACT TO
BOTTOM LINE ON 5 YEAR NPV

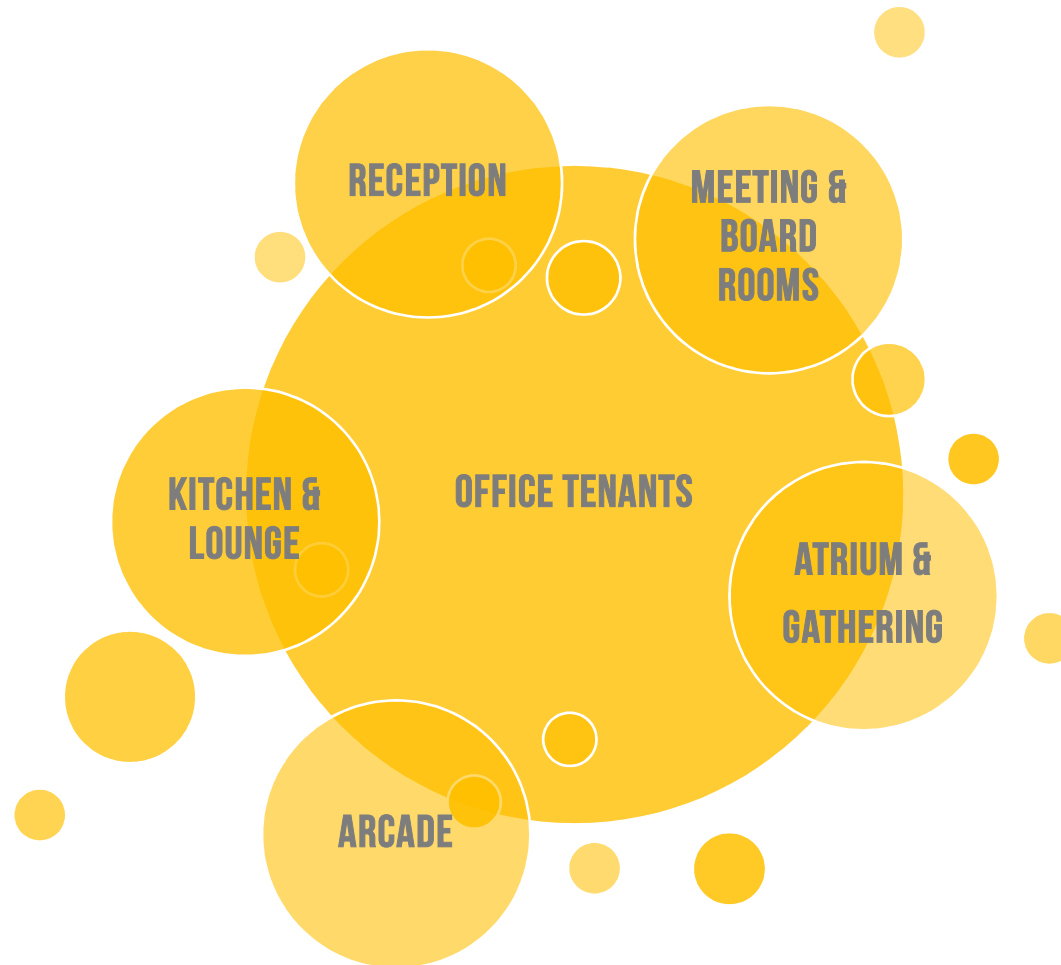
SHARED**E**ECONOMY



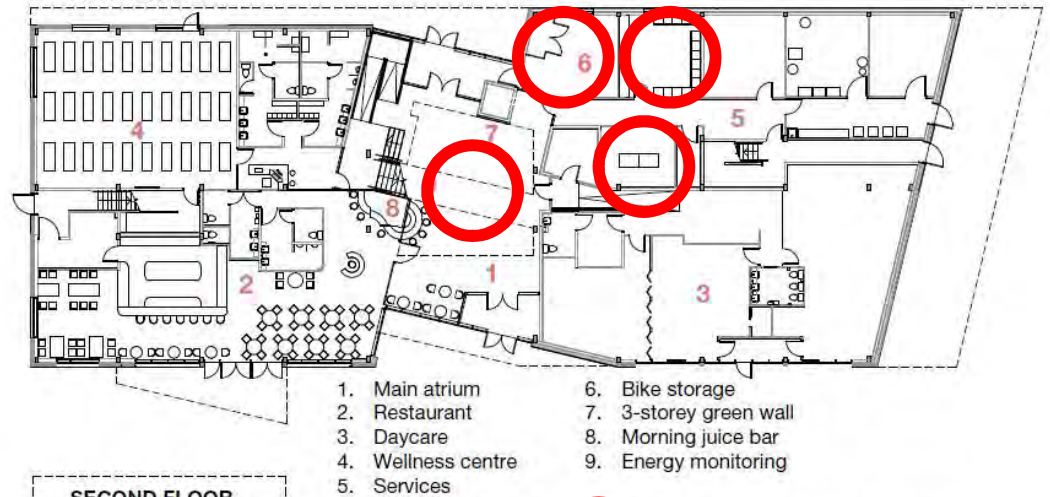
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Do you really need all those empty rooms?

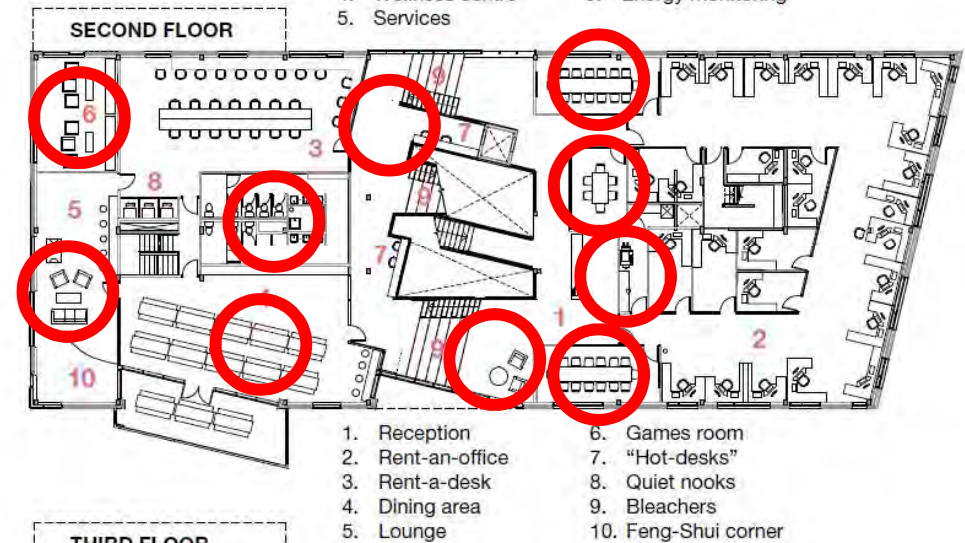
SHARED**ECONOMY**



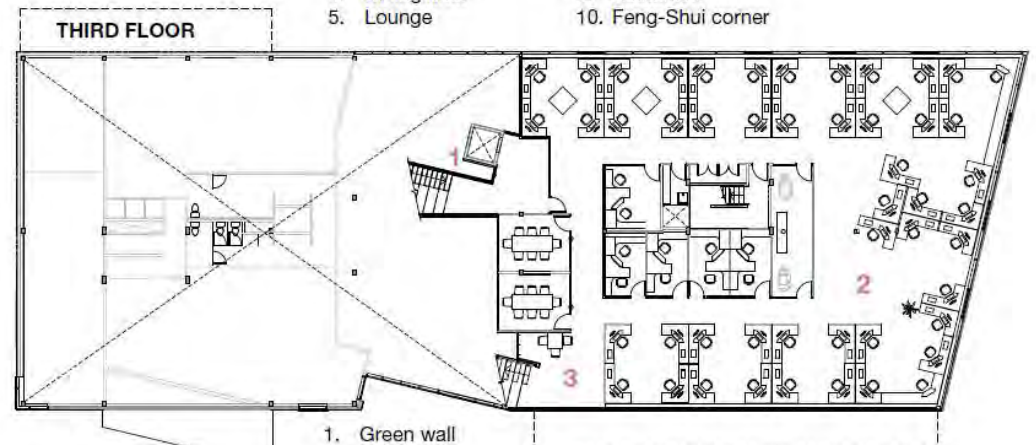
LEVEL 1



LEVEL 2/3



LEVEL 4/5



TRADITIONAL OFFICE:

- + KITCHENETTE
- + MEETING ROOM(S)
- + M/W WASHROOM
- + RECEPTIONIST
- + WAITING
- + HALLWAYS/SERVER/STORAGE

TRADITIONAL OFFICE:

- + KITCHENETTE
- + MEETING ROOM(S)
- + M/W WASHROOM
- + RECEPTIONIST
- + WAITING
- + HALLWAYS/SERVER/STORAGE

= 6 WORKERS (167/WORKER)

OFFICE @ MOSAIC:

TAKE ALL THAT OUT & SHARE IT!

+ COMMON GROSS UP (1.3)

OFFICE @ MOSAIC:

TAKE ALL THAT OUT & SHARE IT!

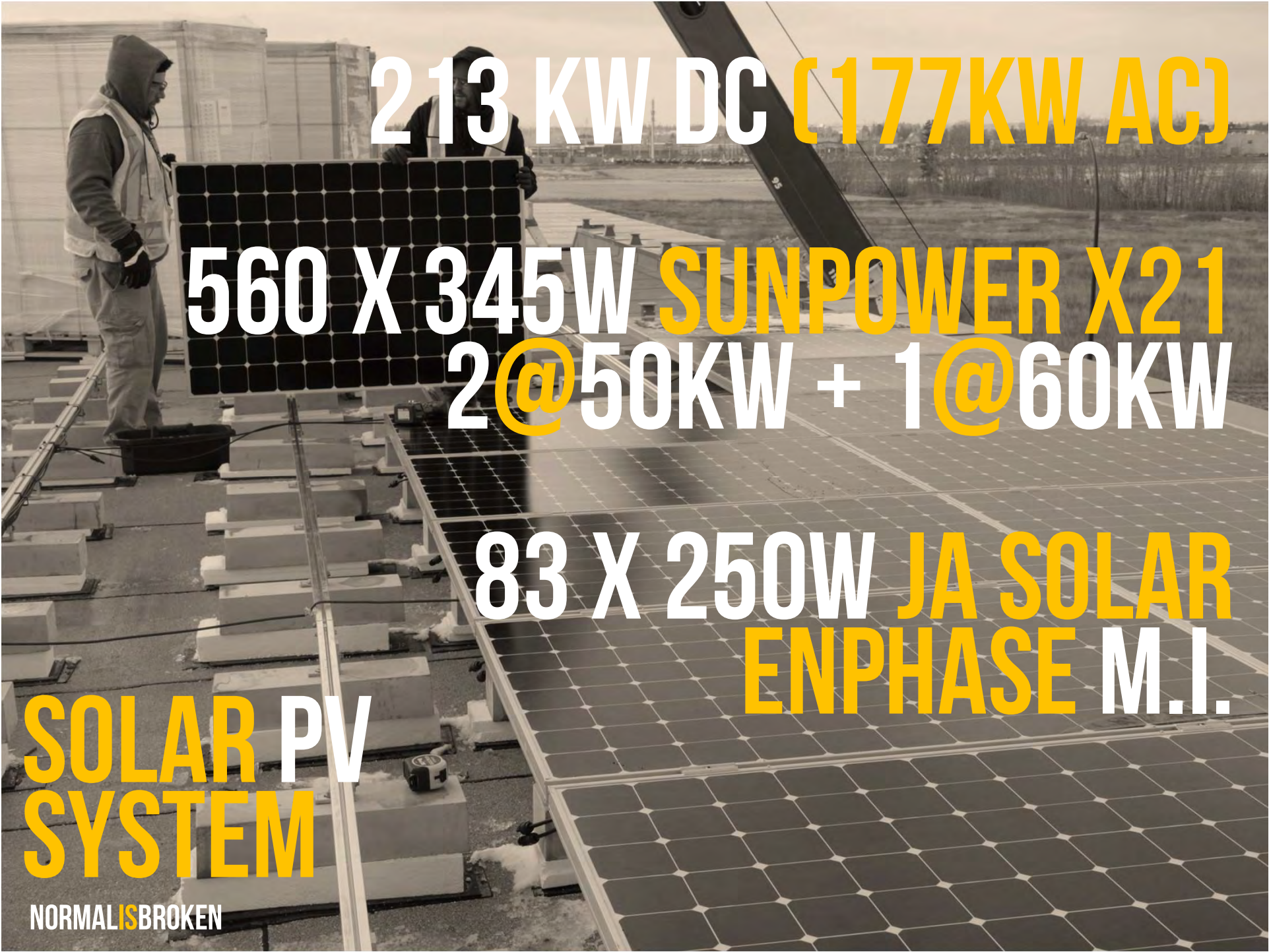
+ COMMON GROSS UP (1.3)

= 11 WORKERS (91/WORKER)

HEAD TO HEAD: TRADITIONAL

15% REDUCTION: COST/WORKER

- * NO TI'S REQUIRED**
- * COLLABORATION**
- * “PIXARED” SPACE**



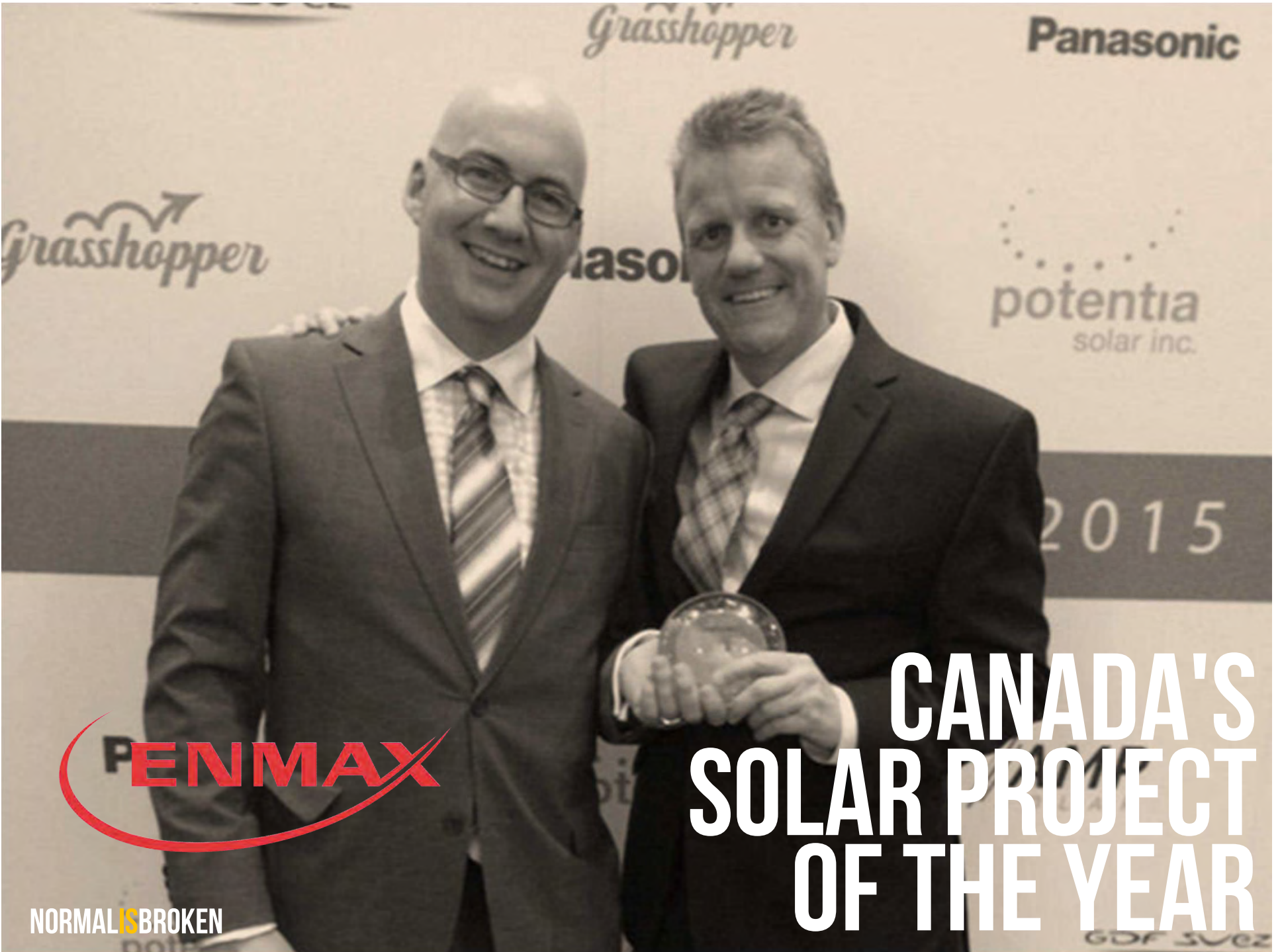
213 KW DC (177KW AC)

560 X 345W SUNPOWER X21
2 @ 50KW + 1 @ 60KW

83 X 250W JA SOLAR
ENPHASE M.I.

SOLAR PV
SYSTEM

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Grasshopper

Panasonic

Grasshopper

potentia
solar inc.

2015

ENMAX

**CANADA'S
SOLAR PROJECT
OF THE YEAR**

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**NET-ZERO READY
MAXIMIZED FRESH AIR
100% DAYLIT OFFICES
GREEN WALL
BIOPHELIA
OPENING WINDOWS
THERMAL MASS
DURABILITY
PUBLIC SPACES**



... SENSE OF PLACE

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MARKET RATE COMPARISON:

PROPERTY	NNN LEASE (\$/ft2)	OP COSTS (\$/ft2)	TOTAL (\$/ft2)
SOUTH EDMONTON 2016	\$19 - \$21	\$9 - \$11	\$28 - \$32
MOSAIC CENTRE	\$ 29	\$14.50	\$43.50

+30% HIGHER TOTAL LEASE RATE

100% LEASED*

OPERATING COST COMPARISON:

	STACEY (\$/sf)	PREMIUM (\$/sf)	ACTUAL or EST (\$)
ANNUAL OPERATING FEES			
1.0 Admin & Bank Charges		\$ -	\$ 750
2.0 Accounting		\$ -	\$ 2,500
3.0 Legal		\$ -	\$ 1,500
4.0 Reporting & packages		\$ -	\$ 1,200
5.0 Property Taxes		\$ -	\$ 116,964
6.0 Marketing & promotion		\$ -	\$ 3,000
7.0 Management Fees (5%)		\$ -	\$ 50,000
8.0 Insurance		\$ -	\$ 14,850
9.0 BMS		\$ -	\$ 3,500
UTILITIES			
10.0 Power (connection)		\$ -	\$ 23,424
11.0 Water		\$ -	\$ 6,000
12.0 Internet, Phone & Hotspots		\$ -	\$ 3,600
13.0 Telephone line for elevator		\$ -	\$ 1,044
14.0 Main phone line for building		\$ -	\$ 1,044
15.0 Elevator monitoring		\$ -	\$ 840
16.0 Security monitoring		\$ -	\$ 840
MAINTENANCE & REPAIRS			
17.0 Exterior maintenance	\$ 0.08	\$ 0.04	\$ 3,000
18.0 Exterior staining of cedar			\$ 1,800
19.0 Interior maintenance	\$ 0.08	\$ 0.04	\$ 3,600
20.0 Roof maintenance	\$ 0.02	\$ -	\$ 600
21.0 Green wall		\$ -	\$ 4,500
22.0 Doors locks and windows	\$ 0.02	\$ -	\$ 600
23.0 Plumbing	\$ 0.02	\$ -	\$ 600
24.0 Geothermal system	\$ 0.02	\$ -	\$ 600
25.0 HVAC system filters & maint	\$ 0.08	\$ -	\$ 2,400
26.0 Electrical	\$ 0.02	\$ -	\$ 600
27.0 Elevator service	\$ 0.05	\$ -	\$ 1,350
28.0 Fire protection	\$ 0.03	\$ -	\$ 900
29.0 Floor maintenance	\$ 0.10	\$ -	\$ 3,000
30.0 Signage	\$ 0.02	\$ -	\$ 600
LANDSCAPE			
31.0 Grounds and landscaping	\$ 0.10	\$ 0.05	\$ 4,500
32.0 Site litter and maintenance		\$ -	\$ -
33.0 Snow removal		\$ -	\$ 10,500
34.0 Parking lot	\$ 0.02	\$ -	\$ 600
JANITORIAL			
35.0 Cleaning common spaces (commercial)	\$ 0.36	\$ -	\$ 25,000
36.0 Janitorial supplies	\$ 0.13	\$ 0.07	\$ 5,850
37.0 Waste removal		\$ -	\$ 4,200
GREEN BUILDING PREMIUM			
38.0 Additional envelope upgrades & Solar PV lease		\$ -	\$ 90,072
TOTAL			\$ 308,456 (or) \$ 11.35 /s.f.

Do It Yourself Guide ...

DESIGN**INTENT**





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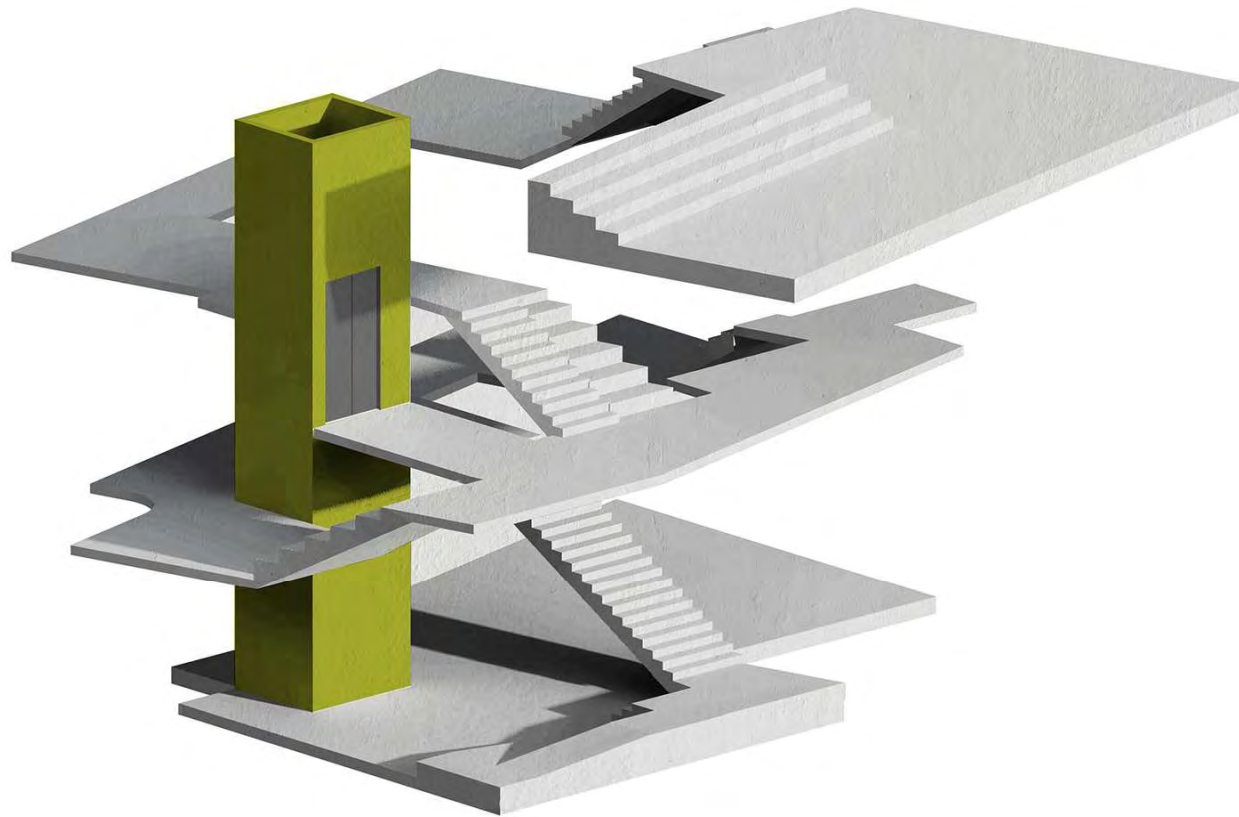


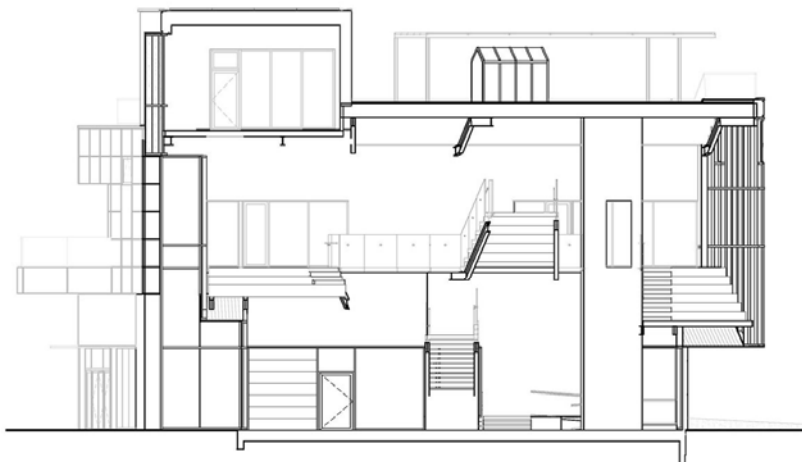
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COMPLEX BUT NOT
COMPLICATED

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CROSS SECTION
0 5 10 m





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WEST



EAST

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RENDER



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TODAY



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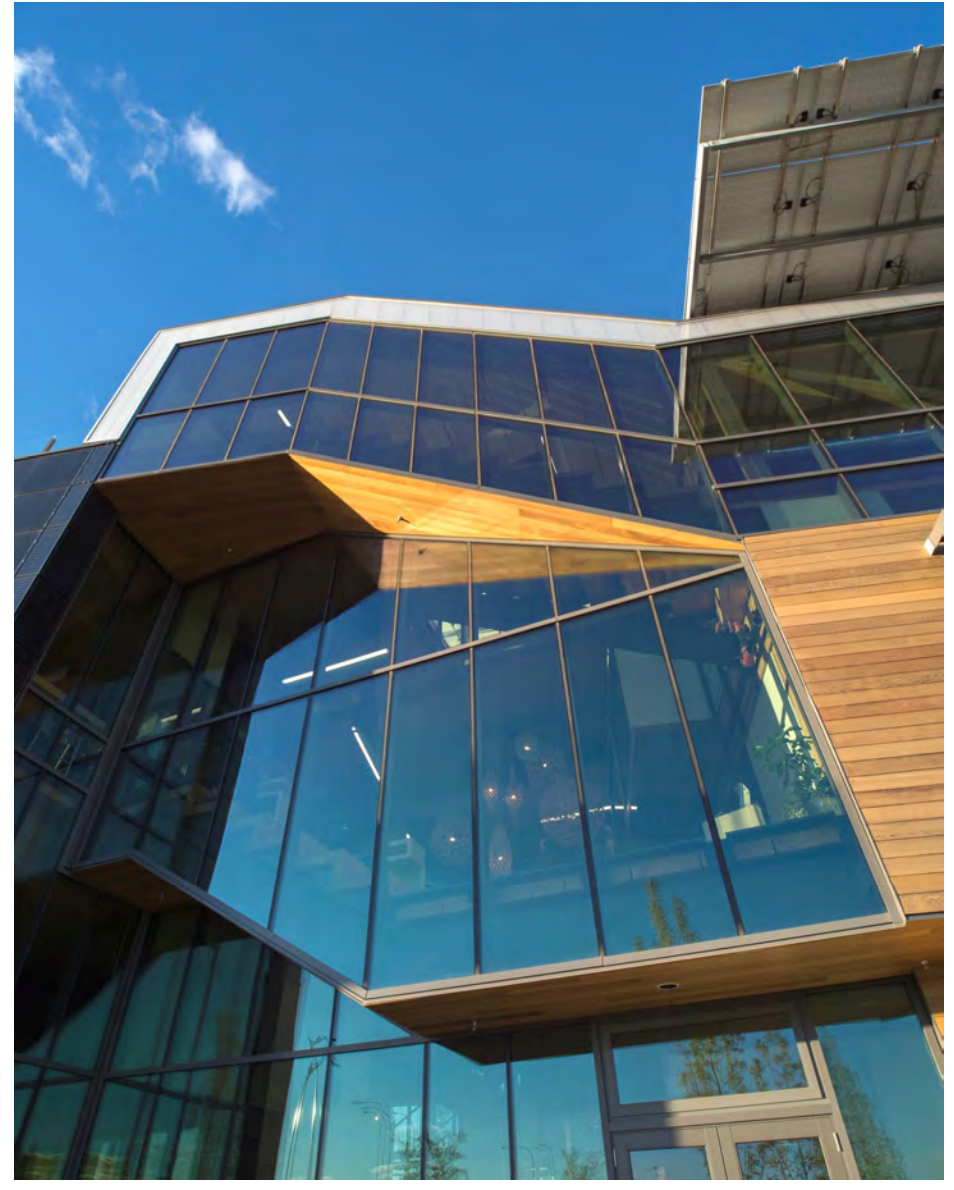
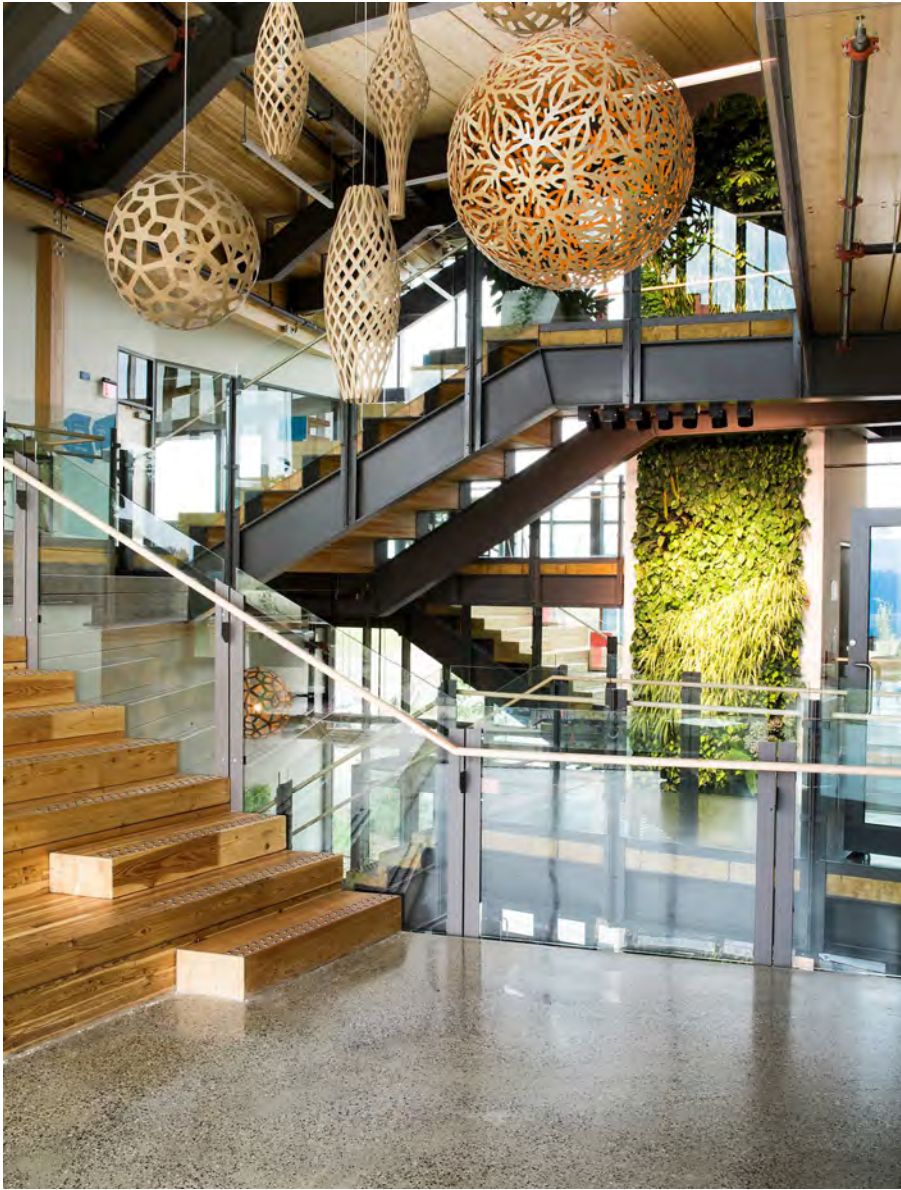
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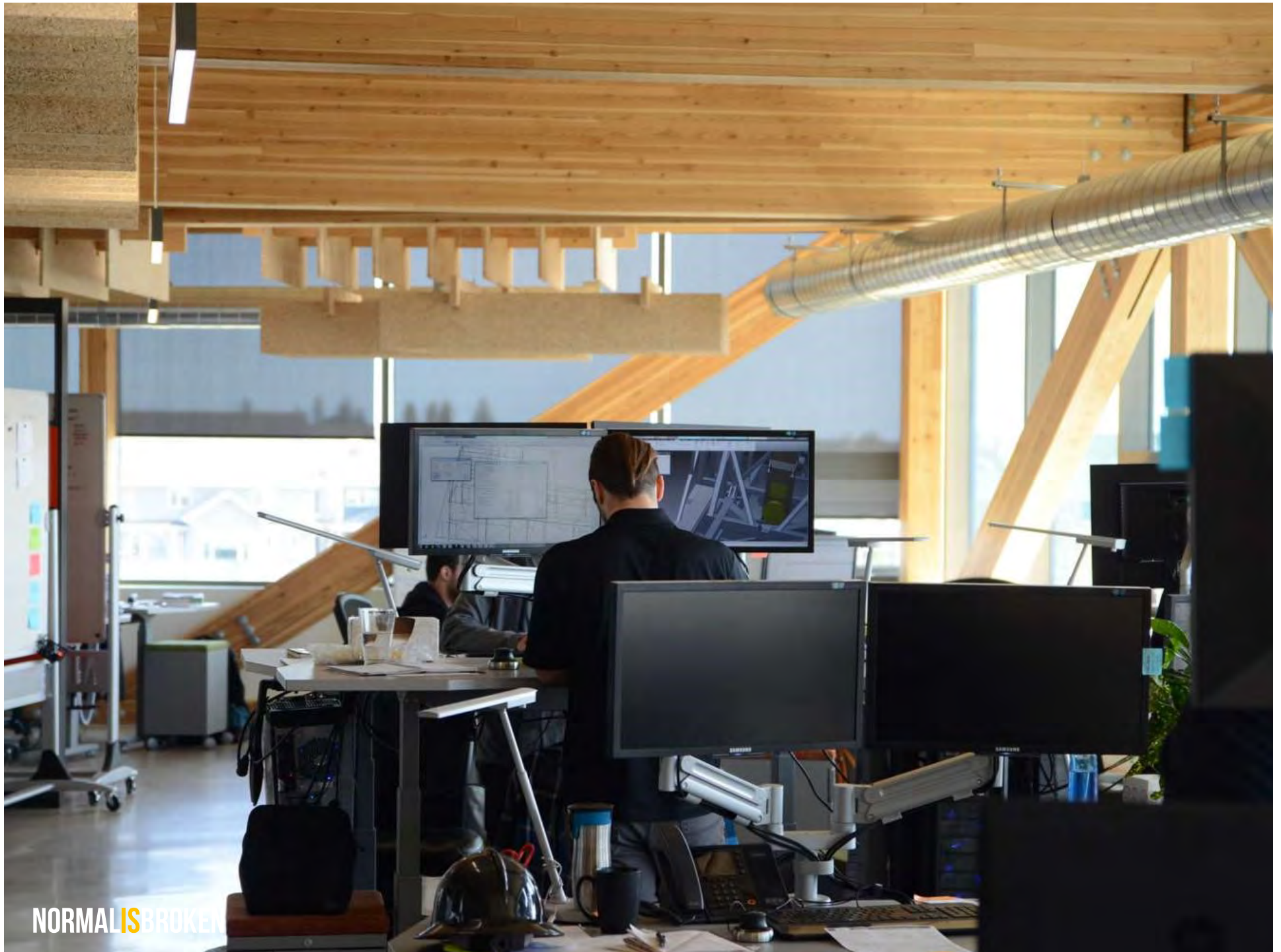
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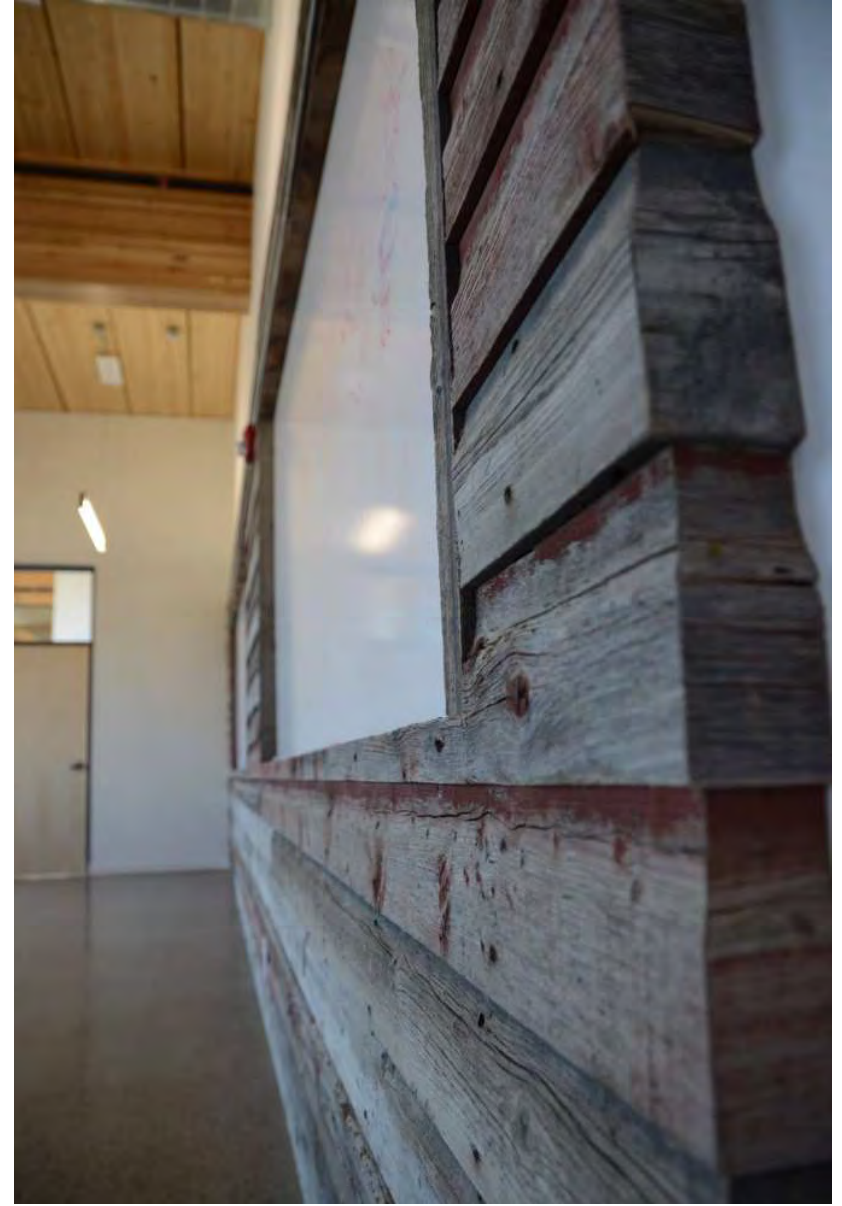
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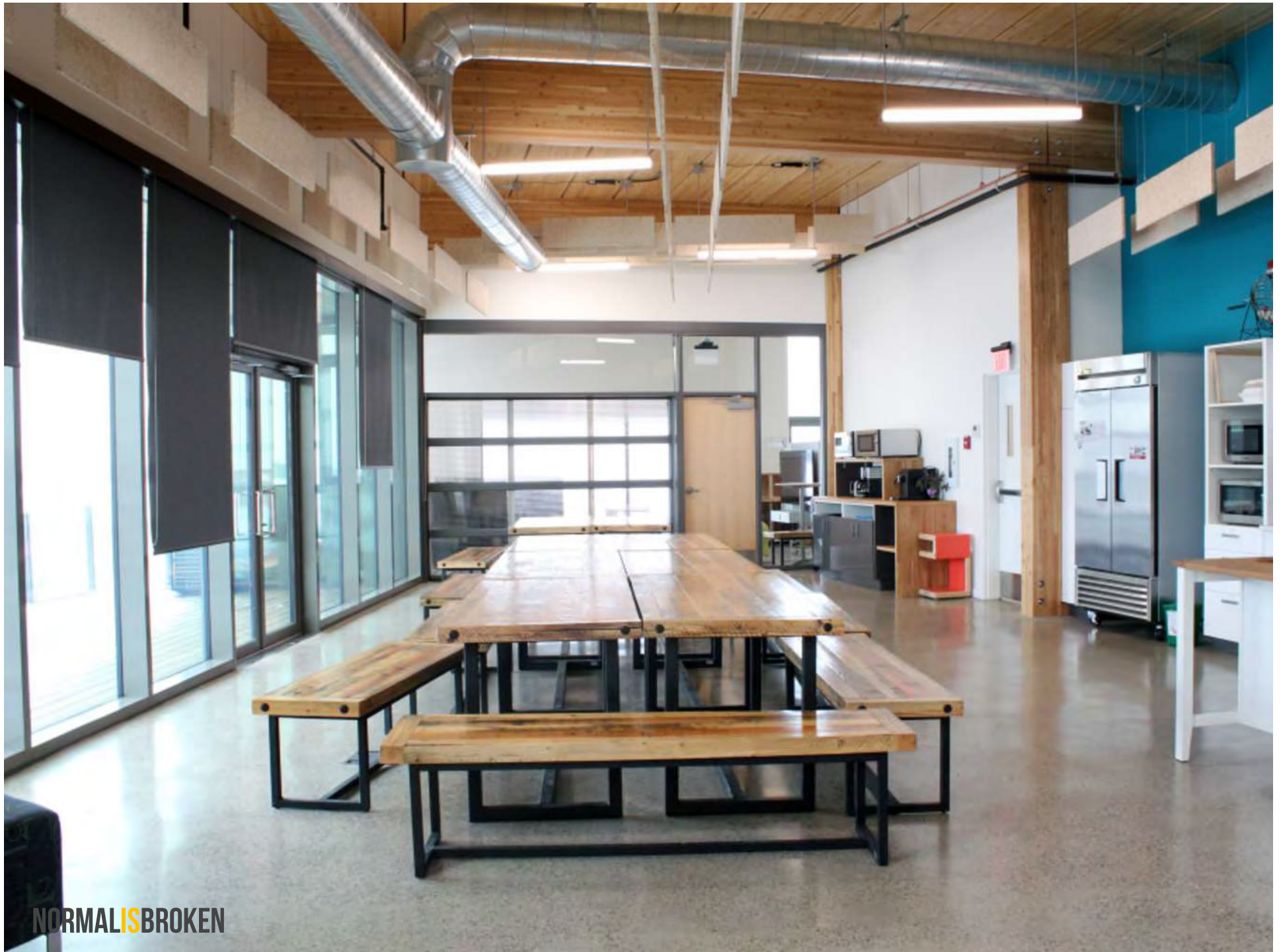
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SOLSTICE
ROOM

2-10

2



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OPERATION ABUNDANCE



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WHAT IS IT?

Beautiful. Sustainable. Affordable.

The Mosaic Centre is Alberta's first net-zero commercial building, and aims to be a model of sustainable construction to inspire others to build A Better Way.



WORK HERE

Work in the healthiest building in Edmonton. Join a community of like-minded entrepreneurs and businesses in our co-working space InterChange, which offers a variety of bright, beautiful and flexible work spaces.



RENT HERE

Whether you're planning a team meeting, conference, birthday party, wedding reception, anniversary celebration, or another type of special event, we have a variety of beautiful and fully-equipped rooms to host it.

HOW WE DID IT

The vision behind the Mosaic Centre was to prove that a sustainable building could be both beautiful and affordable.

In the vein of inspiring others to follow suit, we offer a variety of free resources to help get you started:

CONSTRUCTION

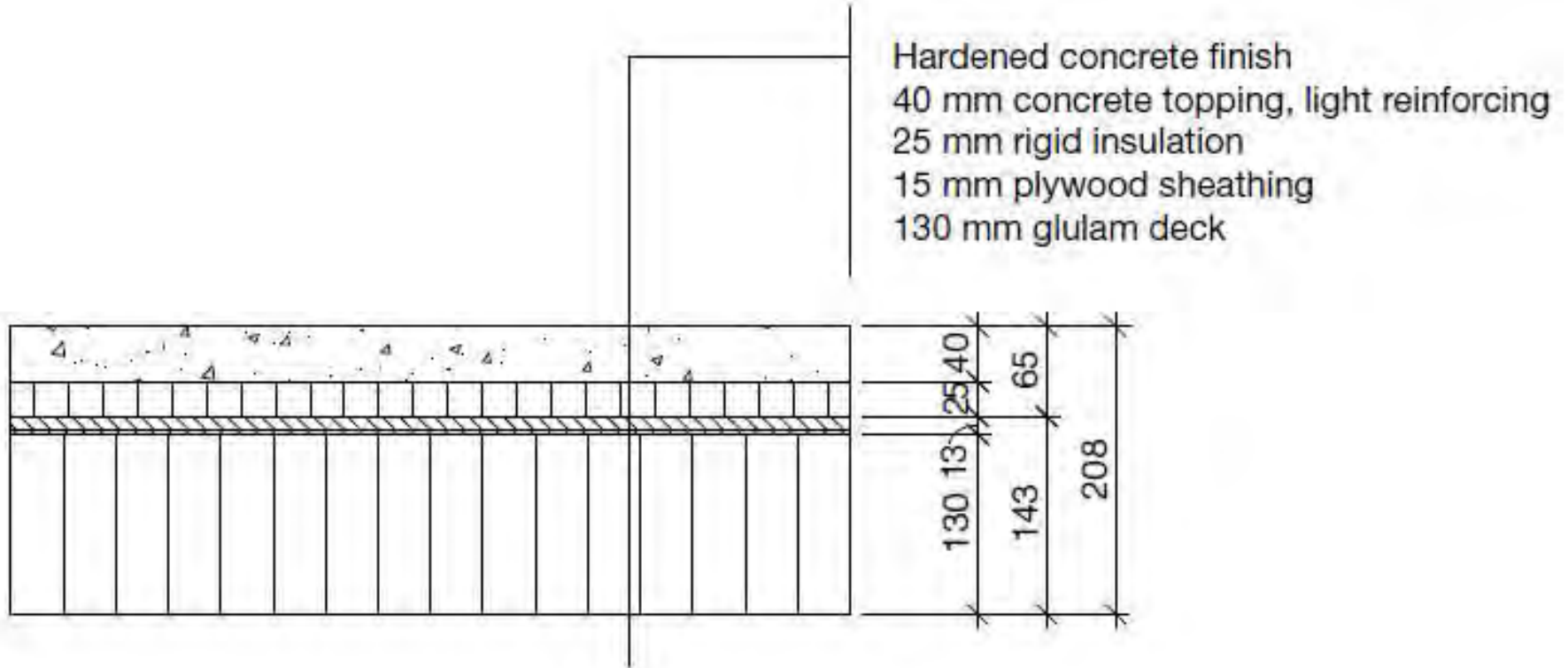
[Construction Drawings](#)
[Documentary Video](#)

INTEGRATED PROJECT DELIVERY (IPD)

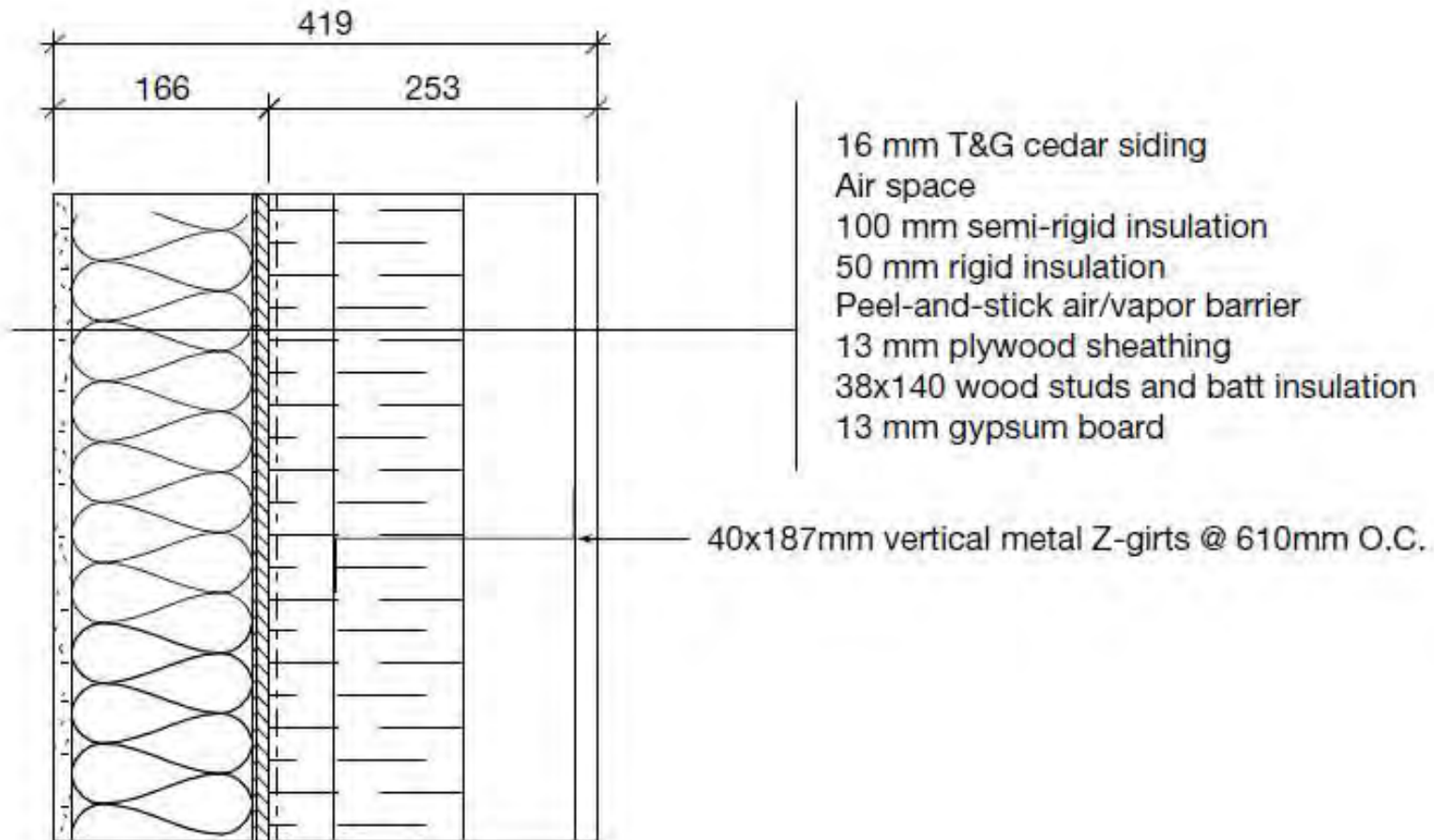
[Draft IPD Contracts](#)
[IPD Blog Posts](#)

THE TEAM

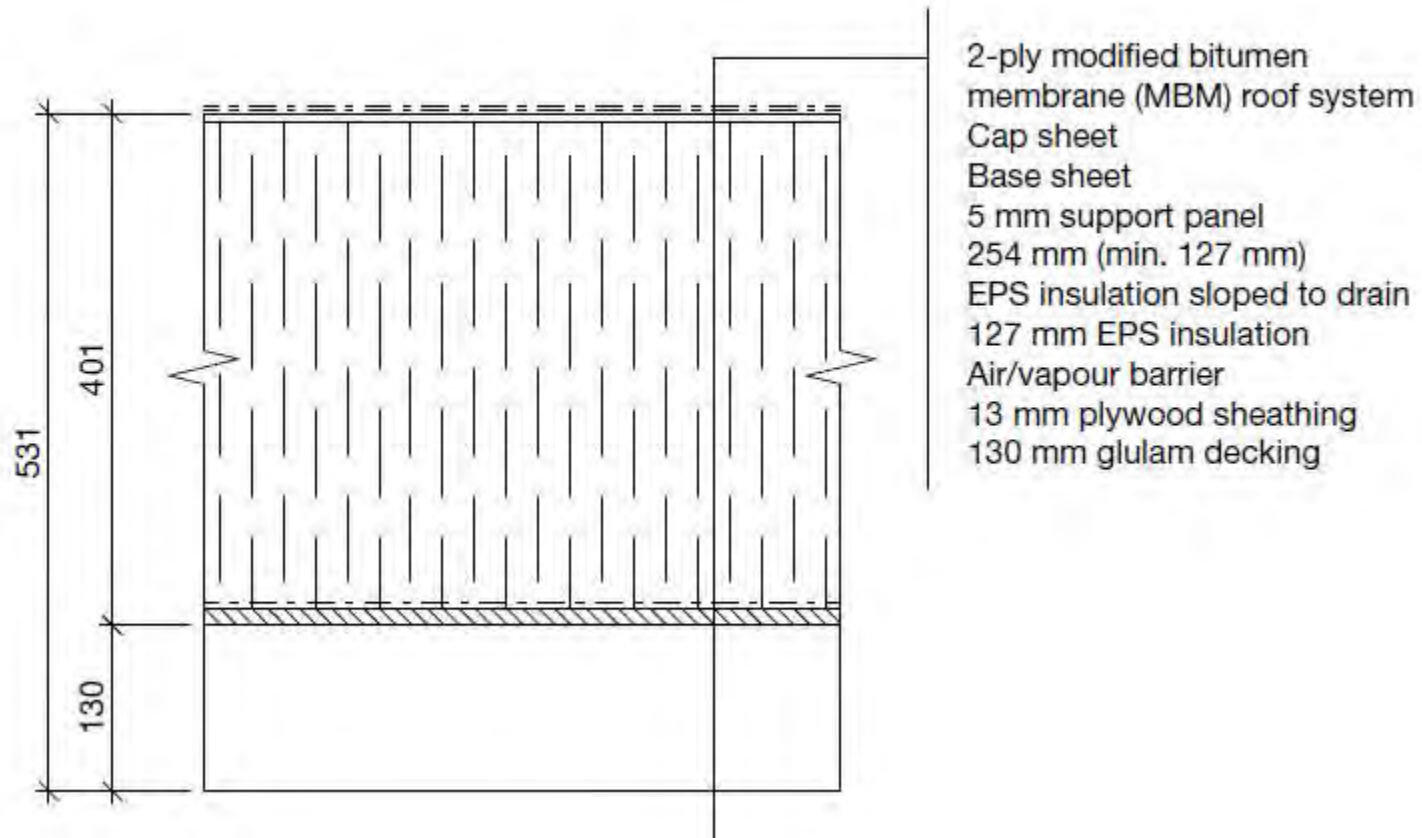
SUSPENDED FLOOR SECTION



TYPICAL WALL SECTION



TYPICAL ROOF SECTION



CONTRACTDOWNLOAD



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Follow Us



Access the Mosaic Centre IPD Contract



A large part of our success to date can be attributed to using an [Integrated Project Delivery](#) (IPD) approach. Throughout the building process, we've stayed true to our values of openness and transparency and, accordingly, we are excited to share the blueprint to the process – our IPD contract – in its entirety.

Are you interested in developing a similar building? Or are you thinking of approaching your next project with our IPD model? Tell us a little bit about yourself and we will automatically redirect you to a download page where you will be given **full access to the IPD contract**.

Our intent in collecting your contact information is not to sign you up for any email spam or mailing lists – that's not the way we roll. However, we would like the opportunity to hear where you're coming from and potentially connect with you in the future.

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PAYBACK CALCULATIONS

GEO COST	Feet of BH	Cost per Item	Cost	\$ / ft ²
Geo Field Cost	7360	\$ 16.60	\$ 122,176	
Cooling Tower Cost	\$ -		\$ -	
ERV	\$ -		\$ -	
Indoor Install Cost	\$ -	1	\$ -	\$ -

Multiplier

TOTAL COST	ft ²	\$/ft	Cost	
Geo Cost	30000	\$ 4.07	\$ 122,176	
Traditional Cost	30000	\$ 2.00	\$ 60,000	\$ 62,176

Boiler/Air-Cooled Chiller							
Year	Electrical Energy	Energy Cost	Gas Energy	Energy Cost	Maintenance Cost	Total Cost	Lifecycle Cost
	kWh	\$/kWh	GJ	\$/GJ	\$	\$	\$
0	0		0				\$ 60,000
1	38302	\$ 0.15	130	\$ 5	\$ 6,000	\$ 12,395	\$ 72,395
2	38302	\$ 0.16	130	\$ 5	\$ 6,180	\$ 12,831	\$ 85,226
3	38302	\$ 0.16	130	\$ 5	\$ 6,365	\$ 13,283	\$ 98,509
4	38302	\$ 0.17	130	\$ 6	\$ 6,556	\$ 13,750	\$ 112,259
5	38302	\$ 0.18	130	\$ 6	\$ 6,753	\$ 14,235	\$ 126,494
6	38302	\$ 0.18	130	\$ 6	\$ 6,956	\$ 14,737	\$ 141,230
7	38302	\$ 0.19	130	\$ 6	\$ 7,164	\$ 15,256	\$ 156,487
8	38302	\$ 0.20	130	\$ 7	\$ 7,379	\$ 15,795	\$ 172,282
9	38302	\$ 0.21	130	\$ 7	\$ 7,601	\$ 16,353	\$ 188,635
10	38302	\$ 0.21	130	\$ 7	\$ 7,829	\$ 16,931	\$ 205,566
11	38302	\$ 0.22	130	\$ 7	\$ 8,063	\$ 17,530	\$ 223,096
12	38302	\$ 0.23	130	\$ 8	\$ 8,305	\$ 18,151	\$ 241,247
13	38302	\$ 0.24	130	\$ 8	\$ 8,555	\$ 18,794	\$ 260,040
14	38302	\$ 0.25	130	\$ 8	\$ 8,811	\$ 19,460	\$ 279,500
15	38302	\$ 0.26	130	\$ 9	\$ 9,076	\$ 20,150	\$ 299,650
16	38302	\$ 0.27	130	\$ 9	\$ 9,348	\$ 20,865	\$ 320,516
17	38302	\$ 0.28	130	\$ 9	\$ 9,628	\$ 21,607	\$ 342,122
18	38302	\$ 0.29	130	\$ 10	\$ 9,917	\$ 22,374	\$ 364,497
19	38302	\$ 0.30	130	\$ 10	\$ 10,215	\$ 23,170	\$ 387,667
20	38302	\$ 0.32	130	\$ 11	\$ 10,521	\$ 23,995	\$ 411,662

Systems Description:

Boiler/Air-Cooled Chiller with VRV Distribution
Tempeff Dual Core Ventilation Unit

ENERGY INFLATION	% per year
Gas Inflation	4%
Electric Inflation	4%

Accelerated Capital Cost Allowance? **y**

ENERGY COST	Cost
Natural Gas Cost	\$ 5.00 per GJ
Electricity Cost	\$ 0.1500 per kWh

*Includes Delivery Charges

*Includes Delivery Charges

MAINTENANCE	ft ²	\$/ft	Cost
Geo Maint	30000	\$ 0.10	\$ 3,000
Traditional Maint	30000	\$ 0.20	\$ 6,000

Energy Usage		
Traditional	Geo	Energy Savings
74413 kWh	26874 kWh	64%

100% Geothermal										
Year	Electrical Energy kWh	Energy Cost \$/kWh	Gas Energy GJ	Energy Cost \$/GJ	Maintenance Cost \$	Total Cost \$	Lifecycle Cost \$	Savings \$	Cashflow Difference \$	ACC Credit \$
0	0		0				\$ 122,176		-\$ 62,176.00	
1	26874	\$ 0.15	0	\$ 5	\$ 3,000	\$ 7,031	\$ 129,207	\$ 5,364	-\$ 45,562	\$ 11,250
2	26874	\$ 0.16	0	\$ 5	\$ 3,090	\$ 7,282	\$ 136,489	\$ 5,549	-\$ 23,701	\$ 16,313
3	26874	\$ 0.16	0	\$ 5	\$ 3,183	\$ 7,543	\$ 144,032	\$ 5,740	-\$ 10,901	\$ 7,059
4	26874	\$ 0.17	0	\$ 6	\$ 3,278	\$ 7,813	\$ 151,845	\$ 5,938	-\$ 2,476	\$ 2,488
5	26874	\$ 0.18	0	\$ 6	\$ 3,377	\$ 8,092	\$ 159,937	\$ 6,142	-\$ 3,920	\$ 254
6	26874	\$ 0.18	0	\$ 6	\$ 3,478	\$ 8,382	\$ 168,319	\$ 6,354	-\$ 9,461	\$ 813
7	26874	\$ 0.19	0	\$ 6	\$ 3,582	\$ 8,683	\$ 177,002	\$ 6,574	-\$ 14,734	\$ 1,300
8	26874	\$ 0.20	0	\$ 7	\$ 3,690	\$ 8,994	\$ 185,996	\$ 6,801	-\$ 20,036	\$ 1,499
9	26874	\$ 0.21	0	\$ 7	\$ 3,800	\$ 9,317	\$ 195,314	\$ 7,036	-\$ 25,516	\$ 1,556
10	26874	\$ 0.21	0	\$ 7	\$ 3,914	\$ 9,652	\$ 204,965	\$ 7,279	-\$ 31,252	\$ 1,544
11	26874	\$ 0.22	0	\$ 7	\$ 4,032	\$ 9,999	\$ 214,964	\$ 7,531	-\$ 38,783	
12	26874	\$ 0.23	0	\$ 8	\$ 4,153	\$ 10,358	\$ 225,323	\$ 7,792	-\$ 46,576	
13	26874	\$ 0.24	0	\$ 8	\$ 4,277	\$ 10,731	\$ 236,054	\$ 8,062	-\$ 54,638	
14	26874	\$ 0.25	0	\$ 8	\$ 4,406	\$ 11,118	\$ 247,171	\$ 8,342	-\$ 62,980	
15	26874	\$ 0.26	0	\$ 9	\$ 4,538	\$ 11,518	\$ 258,690	\$ 8,632	-\$ 71,612	
16	26874	\$ 0.27	0	\$ 9	\$ 4,674	\$ 11,934	\$ 270,624	\$ 8,932	-\$ 80,544	
17	26874	\$ 0.28	0	\$ 9	\$ 4,814	\$ 12,364	\$ 282,988	\$ 9,242	-\$ 89,786	
18	26874	\$ 0.29	0	\$ 10	\$ 4,959	\$ 12,811	\$ 295,799	\$ 9,564	-\$ 99,350	
19	26874	\$ 0.30	0	\$ 10	\$ 5,107	\$ 13,274	\$ 309,072	\$ 9,897	-\$ 109,246	
20	26874	\$ 0.32	0	\$ 11	\$ 5,261	\$ 13,753	\$ 322,826	\$ 10,242	-\$ 119,488	

100% Geothermal with VRV Distribution
Tempeff Dual Core Ventilation Unit

Notes: - Increased structural and roof penetration costs from extra rooftop units with traditional system are not taken into account.

- Replacement cost of boiler/ACC system at year 18 is not included. Same goes for geo system since geo system wouldn't be replaced until after year 20 - (year 23 for Heat Pumps, 100+ years for boreholes)

- Maintenance cost estimates taken from ASHRAE. In this case they are very conservative as VRV distribution is the same- comparison is boreholes vs Boiler/ACC. boreholes basically require no Maintenance, but some cost has been included to be conservative.

- All other building components are identical for both cases (Lighting/Envelope/Equipment/Schedules etc..)

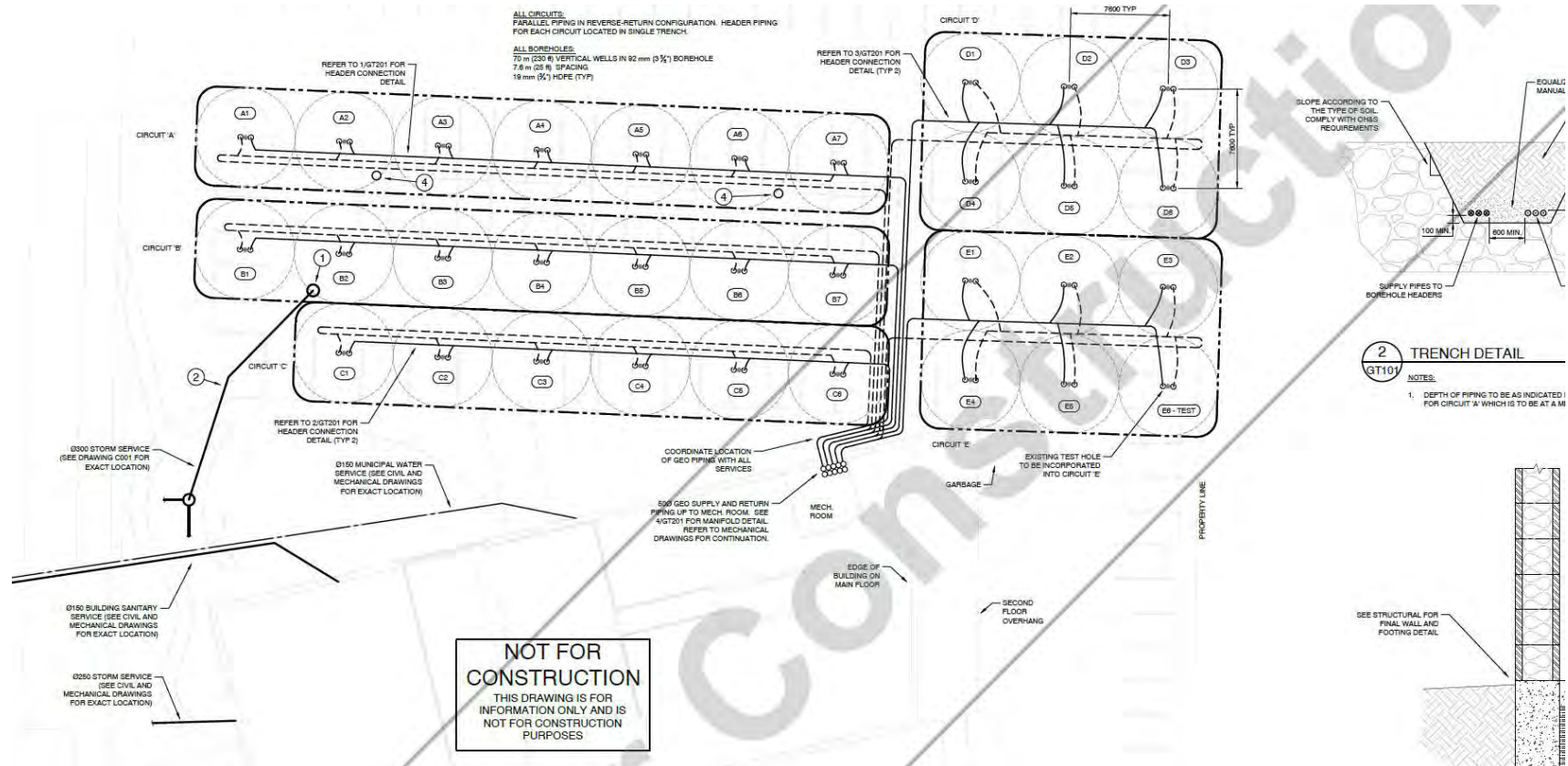
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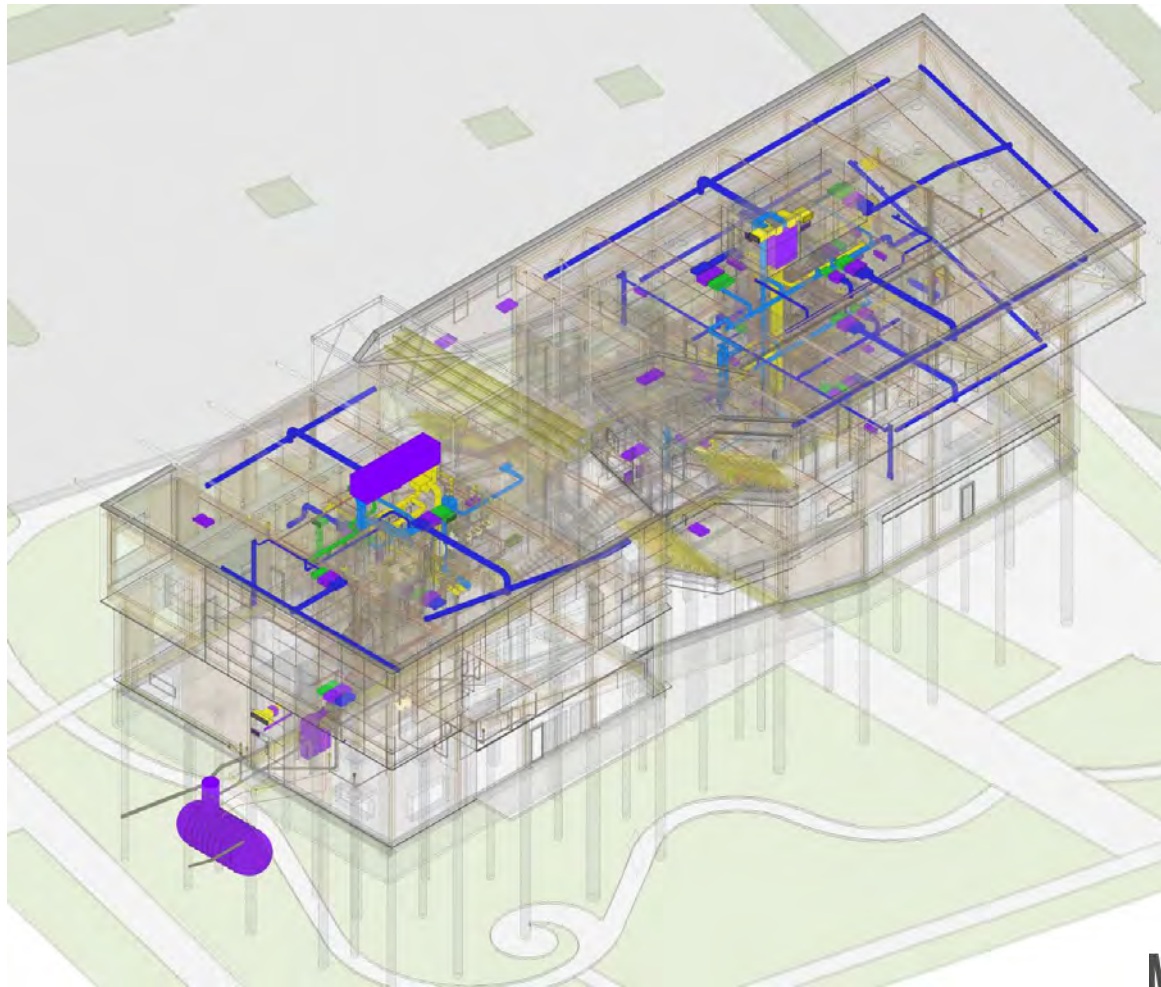
MODELLING DATA

Room	Room Name	Area (m²)	Heating Setpoint (°C)	Cooling Setpoint (°C)	Lighting Gains	Task Lighting	Schedule Start	Schedule End	Lighting Time On	Weekend (Default: No)	Max Occupancy (Realistic)	Equipment Loads	Special Equipment	Notes (Applies to Equipment)
Main Floor														
1	CS01 - Vestibule	9.4 m²	10.0 °C	-	5.0 W/m²		7 AM	6 PM	11 Hr	No	0			General Note: Heat gain from plug loads based on Ashrae - not always 100%
2	CS03 - Vestibule	13.4 m²	10.0 °C	-	5.0 W/m²		7 AM	6 PM	11 Hr	No	0			
3	CS02 - Atrium	127.0 m²	20.0 °C	23.0 °C	5.0 W/m²		7 AM	6 PM	11 Hr	No	0		2600 W	Elevator (2500W 0.5h) - no heat to space, LED TV (100W) 8h, Green wall not incl
4	RT01 - Restaurant	189.0 m²	21.0 °C	23.0 °C	10.0 W/m²		7 AM	10 PM	15 Hr	Yes	30		6480 W	Max Load - different schedules for each piece of equipment...too many to list
5	ES08 - Corridor	19.2 m²	20.0 °C	23.0 °C	10.4 W/m²		8 AM	5 PM	9 Hr	No	0			
6	WE01 - Multi Purpose	110.4 m²	20.0 °C	23.0 °C	5.0 W/m²		9 AM	2 PM	5 Hr	No	25		550 W	Computer (250W) 8h, plus sound system (300W) 4h
7	DC02 - Storage - Niche	10.5 m²	6.0 °C	-	5.0 W/m²				2 Hr	No	0			
8	RT01 - Child Care	216.0 m²	21.0 °C	23.0 °C	7.0 W/m²		7 AM	6 PM	11 Hr	No	30		2100 W	Computer (250W) 8hr, Fridge (250W) 30% 24h, Dishwasher (500W) 1.5h, Toys (1
9	SE01 - Corridor	35.0 m²	20.0 °C	23.0 °C	4.3 W/m²		8 AM	5 PM	9 Hr	No	0			
10	SE10 - Server	15.3 m²	20.0 °C	23.0 °C	3.7 W/m²				2 Hr	No	0		3000 W	24h
11	WE03 - Lockers - Washrooms	45.5 m²	20.0 °C	23.0 °C	7.1 W/m²				4 Hr	No	0			
12	WE03 - Reception	14.5 m²	20.0 °C	23.0 °C	5.4 W/m²		7 AM	6 PM	11 Hr	No	1	6.1 W/m²		
13	ES02 - Corridor	23.0 m²	20.0 °C	23.0 °C	4.3 W/m²		8 AM	5 PM	9 Hr	No	0			
14	SE08 - Recycle	20.7 m²	6.0 °C	-	5.7 W/m²				2 Hr	No	0			
15	SE07 - Electrical	20.2 m²	6.0 °C	-	4.2 W/m²				2 Hr	No	0		250 W	24h Estimates - Do we have these loads?
16	SE06 - Mechanical	24.0 m²	6.0 °C	-	4.7 W/m²				2 Hr	No	0		250 W	24h Estimates - Do we have these loads?
17	SE04-05 - Site Safety	49.0 m²	20.0 °C	23.0 °C	2.4 W/m²				2 Hr	No	0			
18	SE02 - Bike Storage	25.0 m²	6.0 °C	-	4.4 W/m²				2 Hr	No	0			
19	SE09 - Telecom	5.6 m²	6.0 °C	-	4.8 W/m²				2 Hr	No	0			
Floor 2														
20	2 - Atrium	135.0 m²	20.0 °C	23.0 °C	5.0 W/m²		7 AM	6 PM	11 Hr	No	0			
21	2 - BH - Stairs	14.8 m²	20.0 °C	23.0 °C	5.0 W/m²				5 Hr	No	0			
22	2 - BH01 - Reception	18.6 m²	20.0 °C	23.0 °C	5.4 W/m²		8 AM	6 PM	10 Hr	No	1	10.0 W/m²		Equipment loads taken from Dennis's sheet as well as ASHRAE data
23	2 - BH02-03 - Corridors	58.5 m²	20.0 °C	23.0 °C	6.5 W/m²		8 AM	5 PM	9 Hr	No	0			
24	2 - BH13 - Meeting Room	17.0 m²	20.0 °C	23.0 °C	10.3 W/m²				4 Hr	No	6		0 W	
25	2 - BH14 - Meeting Room	26.0 m²	20.0 °C	23.0 °C	10.3 W/m²				4 Hr	No	14		500 W	As per Dennis's sheet - 4-5h
26	2 - BH15-16 - Offices	35.8 m²	20.0 °C	23.0 °C		1.4 W/m²	8 AM	5 PM	9 Hr	No	4	10.0 W/m²		Equipment loads taken from Dennis's sheet as well as ASHRAE data
27	2 - BH17 - Office	20.0 m²	20.0 °C	23.0 °C		1.4 W/m²	8 AM	5 PM	9 Hr	No	2	10.0 W/m²		Equipment loads taken from Dennis's sheet as well as ASHRAE data
28	2 - BH18-19 - Office	52.9 m²	20.0 °C	23.0 °C		1.4 W/m²	8 AM	5 PM	9 Hr	No	5	10.0 W/m²		Equipment loads taken from Dennis's sheet as well as ASHRAE data
29	2 - BH20 - Office	18.9 m²	20.0 °C	23.0 °C		1.4 W/m²	8 AM	5 PM	9 Hr	No	2	10.0 W/m²		Equipment loads taken from Dennis's sheet as well as ASHRAE data
30	2 - BH21 - Office	27.1 m²	20.0 °C	23.0 °C		1.4 W/m²	8 AM	5 PM	9 Hr	No	3	10.0 W/m²		Equipment loads taken from Dennis's sheet as well as ASHRAE data
31	2 - BH22 - Meeting Room	26.0 m²	20.0 °C	23.0 °C	10.3 W/m²				4 Hr	No	14		100 W	LED TV -4-5h
32	2 - BH22-32 - Interior Offices	85.0 m²	20.0 °C	23.0 °C		1.4 W/m²	8 AM	5 PM	9 Hr	No	6	10.0 W/m²		Equipment loads taken from Dennis's sheet as well as ASHRAE data
33	2 - BH28 - Printer Room	8.1 m²	20.0 °C	23.0 °C	9.4 W/m²		8 AM	5 PM	9 Hr	No	0		1600 W	1000W + 600W printers - 20% for 10h (2h equiv.), standby at 3%
34	2 - SH01 - Dining Area	97.0 m²	20.0 °C	23.0 °C	4.7 W/m²				4 Hr	No	40		6950 W	Fridge (450W - 30% 24h), 3xMicrowave (1000W - 0.5h), 3x Coffee (1000W - 2h),
35	2 - SH05 - Lounge	64.9 m²	20.0 °C	23.0 °C	3.1 W/m²				4 Hr	No	15		400 W	2 TVs (100 W each - 1 hour) - assuming LED TV, Bar Fridge (200W - 30% 24h)
36	2 - SH06 - Games Room	32.7 m²	20.0 °C	23.0 °C	4.6 W/m²				5 Hr	No	6		600 W	2 Game consoles (200W each - 2 hours), 2 LED TVs (100W each - 2 hours)
37	2 - SH07 - Open Offices	114.9 m²	20.0 °C	23.0 °C	2.2 W/m²		8 AM	5 PM	9 Hr	No	14	10.0 W/m²		
38	2 - SH11 - W/C Jan Hall	40.0 m²	20.0 °C	23.0 °C	7.6 W/m²				4 Hr	No	0			
Floor 3														
39	3 - OC - Stairs	13.0 m²	20.0 °C	23.0 °C	5.0 W/m²				5 Hr	No	0			
40	3 - OC02-05 - Corridors	91.0 m²	20.0 °C	23.0 °C	7.1 W/m²		8 AM	5 PM	9 Hr	No	0			
41	3 - OC06-10 - Open Offices	115.0 m²	20.0 °C	23.0 °C		1.4 W/m²			6 Hr	No	18	6.1 W/m²		
42	3 - OC11 - Open Offices	20.0 m²	20.0 °C	23.0 °C		1.4 W/m²			6 Hr	No	3	6.1 W/m²		
43	3 - OC12-13 - Open Offices	63.0 m²	20.0 °C	23.0 °C		1.4 W/m²			6 Hr	No	9	6.1 W/m²		
44	3 - OC14 - Open Office	26.0 m²	20.0 °C	23.0 °C		1.4 W/m²			6 Hr	No	3	6.1 W/m²		
45	3 - OC15-17 - Open Offices	78.0 m²	20.0 °C	23.0 °C		1.4 W/m²			6 Hr	No	14	6.1 W/m²		
46	3 - OC18 - Hot Desks	23.0 m²	20.0 °C	23.0 °C		1.4 W/m²			6 Hr	No	2	6.1 W/m²		
47	3 - OC19 - Meeting Room	14.9 m²	20.0 °C	23.0 °C	7.4 W/m²				4 Hr	No	8		100 W	LED TV -4-5h
48	3 - OC20 - Meeting Room	14.9 m²	20.0 °C	23.0 °C	7.4 W/m²				4 Hr	No	8		100 W	LED TV -4-5h
49	3 - OC21-26 - Interior Offices	51.0 m²	20.0 °C	23.0 °C	3.2 W/m²	1.4 W/m²			6 Hr	No	10	6.1 W/m²		
50	3 - OC22 - Printer Room	19.3 m²	20.0 °C	23.0 °C	5.8 W/m²		8 AM	5 PM	9 Hr	No	0		900W	600W + 300W Printers - 20% for 10h (2h equiv.), standby at 3%
51	3 - SE13-14 - Storage	8.7 m²	6.0 °C	-	7.6 W/m²				2 Hr	No	0			
52	3 - Stairs to 4	18.0 m²	20.0 °C	23.0 °C	5.0 W/m²				5 Hr	No	0			

DETAIL DRAWINGS



BIMMODELS



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REALSTORIES



A Drink from the Fire Hose of Information

🕒 March 20, 2014 👤 Dennis Cuku, Building Owner 📁 Construction, Educate Me, Planning, Process, The Building

When the team agreed to capture stories and lessons learned from the Mosaic Centre project, I had no idea what we were committing to. A project of firsts in many respects; I underestimated the amount of learning required to position the team for success. The first net-zero commercial building in Alberta, the first LEED Platinum attempt for commercial north of Calgary, the first Living Building Challenge Petal Certification attempt in Alberta and the first IPD contract delivery for anyone on our team. We were creating design decision logic at an alarming rate, all the while attempting to record our “breadcrumbs”.

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[Read More](#)

SAIC CENTRE
VSCIOUS COMMUNITY AND COMMERCE

HUMAN EMOTION



COSTING CRISIS

POSTED BY SHAFRAAZ KABA, ARCHITECT, MANASC ISAAC ARCHITECTS

Estimating construction costs very early in the project is something of a hedge-your-bets game. At the schematic design phase, there is just enough information to show the design intent, but you can never fully reveal or outline the nuances of detail or quality you're after. Chandos did what they could with the sketch-up model and plans we had and came back with a number that initially appeared reasonable. Once we started to comb through, there were several things that seemed goofy. I could not believe the glulam wood structure would be more expensive than steel. It took a separate meeting directly with the glulam supplier, our structural engineer and Chandos to figure out we were looking at the wrong amount of building area; hence the estimated cost. There are other items that will be quite interesting to resolve over time. Dennis also suggested a cost-saving option for the level of finish on the concrete floors. It may turn out that it is plausible as possible, and left unpolished, sort of like our own office space. That could save \$100,000. Or perhaps concrete polishing will be another company that is under the Mosaic banner. We will see!



GOOD

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ACHIEVING SUCCESS TOGETHER

POSTED BY CLIFTON LOFTHAUG, PHOTOVOLTAIC POWER SYSTEM DESIGNER AND INSTALLER, GREAT CANADIAN SOLAR

When we were first brought in to this project, it didn't take long to notice that this was unlike any other enterprise we had been involved in. The walls between the various trades, engineers, architects and owners were nowhere to be found. If this project were a house, it would definitely be open concept.

By the end of the initial meetings, we had worked through problems we had encountered with past projects. The engineers (roofing, siding, electrical and structural) and contractors all had a clear understanding of how to make each other successful.

This was very different from a typical construction project. Usually, you are given a set of drawings, go to the site, eventually meet the other trades, hope no issues arise and try to stay out of each other's way.





UGLY

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Dennis Cuku

Entrepreneur | Business Development | Engineer @
Oil Country Engineering

[Edit post](#)

[View stats](#)

Settled Dust ... and a New Nickname

Mar 5, 2015

226 views

12 Likes

0 Comments



I've had some pretty strong feedback over the past weeks that I've been leaving some folks hanging with the drama that surrounded my last blog called [Hammer Time](#) – a post where I captured one of the darkest days for The Mosaic Centre

Do It Yourself Guide ...

NET-ZERO RECIPE

1. SITE SELECTION

2. PROGRAM REQUIREMENTS

3. BUILDING ORIENTATION



CONCEPT SKETCH

Do It Yourself Guide ...

NET-ZERO**RECIPE**

1. SITE SELECTION

2. PROGRAM REQUIREMENTS



CONCEPT SKETCH

3. BUILDING ORIENTATION

4. **BASELINE SCREENING**

5. **HVAC SYSTEM SCREENING**



“STARTING POINT” LOADS

6. **PRELIMINARY ENERGY MODEL**

Do It Yourself Guide ...

NET-ZERO**RECIPE**

1. SITE SELECTION
 2. PROGRAM REQUIREMENTS
 3. BUILDING ORIENTATION
 4. BASELINE SCREENING
 5. HVAC SYSTEM SCREENING
 6. PRELIMINARY ENERGY MODEL
 7. **OPTIMIZE ENVELOPE**
 8. **REDUCE BASE LOADS**
 9. **DETAIL ARCHITECTURE**
 10. **FINAL ENERGY MODEL**
- CONCEPT SKETCH
- “STARTING POINT” LOADS
- **SIZE PV SYSTEM**

Do It Yourself Guide ...

NET-ZERO**RECIPE**

1. **SITE SELECTION**

- ☐ SOLAR ACCESS
- ☐ WIND
- ☐ GEOTHERMAL

Do It Yourself Guide ...

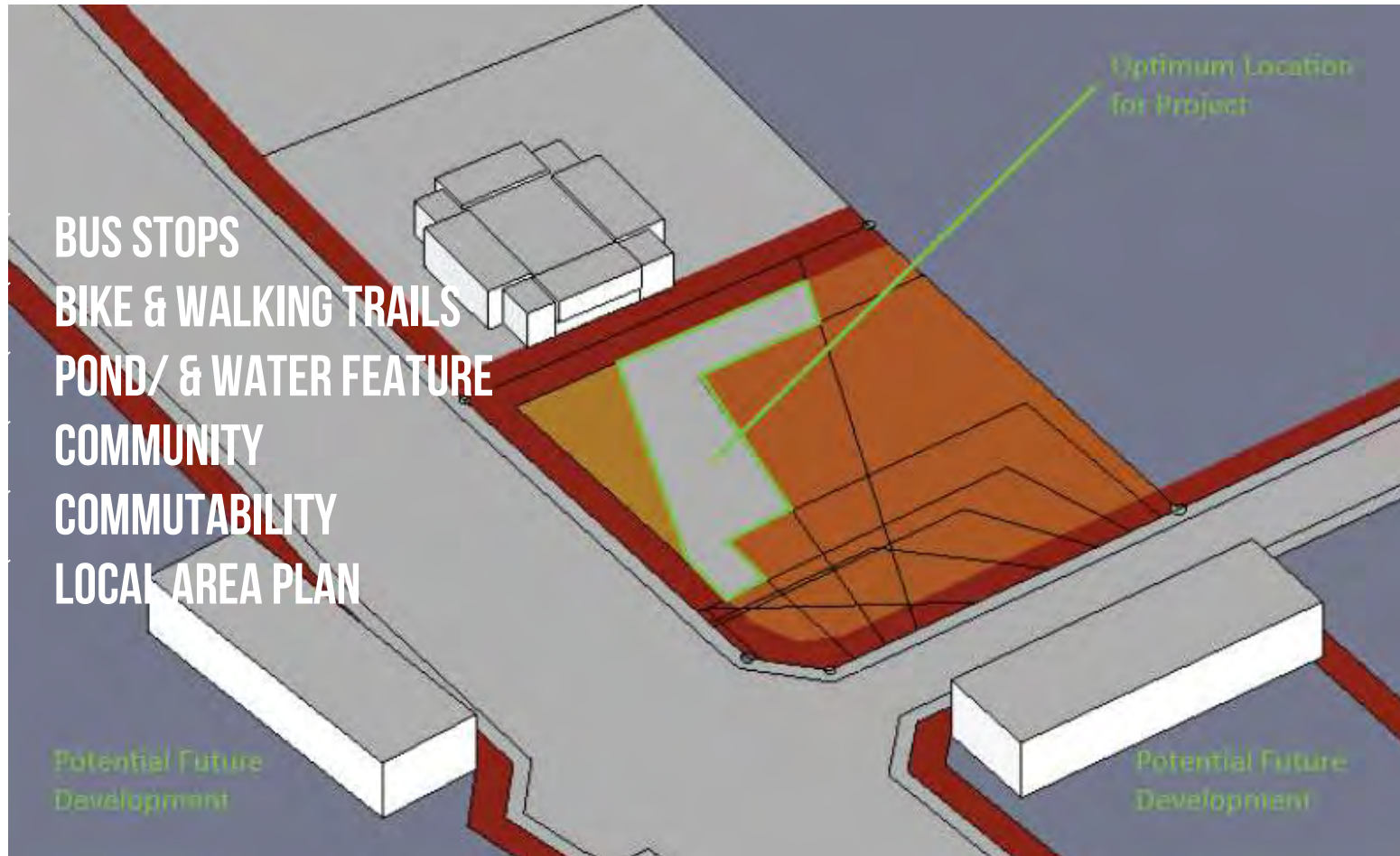
NET-ZERO**RECIPE**

- ✓ BUS STOPS
- ✓ BIKE & WALKING TRAILS
- ✓ POND/ & WATER FEATURE
- ✓ COMMUNITY
- ✓ COMMUTABILITY
- ✓ LOCAL AREA PLAN



Do It Yourself Guide ...

NET-ZERO RECIPE



Do It Yourself Guide ...

NET-ZERO**RECIPE**

2. PROGRAM REQUIREMENTS

- ☐ SPACE PLANNING
- ☐ OWNERS REQUIREMENTS
- ☐ PICTURES TO COMMUNICATE THE DREAM

- ✓ SHARED OFFICE & MEETING ROOMS + DAYCARE, RESTAURANT & FITNESS
- ✓ COLLISION SPACE + ATRIUM + GREEN WALL
- ✓ 200+ YEAR STRUCTURE
- ✓ INCREASED THERMAL COMFORT WINDOW
- ✓ LEED PLATINUM CERTIFICATION
- ✓ LIVING BUILDING PETAL CERTIFICATION
- ✓ NO PV IN PARKING LOT + ROOFTOP PATIO

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Do It Yourself Guide ...

NET-ZERO RECIPE

SUCCESS LOOKS LIKE THIS ...



FAST FORWARD

Two years from now when the media is scrambling to get interviews with the design team members of the newly-minted, highly-regarded Mosaic Centre, we will be able to say that **SUCCESS LOOKS LIKE THIS...**

- ✧ We have proven there is **A BETTER WAY** to do sustainable commercial construction ... **BY DESIGN**
- ✧ Our team processes and our final product are **INSPIRING** positive change in the commercial building industry in Canada;
 - What we have done is easily **REPEATABLE**
 - We have proven that sustainable construction can be **EFFECTIVE, BEAUTIFUL & AFFORDABLE**
 - We have advanced the base knowledge in the industry
- ✧ The design & construction team has **SHARED LESSONS** learned in a way that has **ADVANCED** the **KNOWLEDGE** of sustainable building practices in Canada
- ✧ Every member of the team is **PROUD** to have been a part of the experience. We **LEARNED**, we **COLLABORATED** and we had **FUN!**
- ✧ The occupants of the building have **HEALTHY, COMFORTABLE, TOTALLY COOL SPACES** that have resulted in higher **PRODUCTIVITY & PRIDE** in the place they work
- ✧ The Mosaic Centre owners are **THRILLED** to own one of the most **BEAUTIFUL, SUSTAINABLE, HIGH PERFORMANCE** yet **SIMPLE** buildings in Canada...completed **ON TIME & ON BUDGET**.

Do It Yourself Guide ...

NET-ZERO RECIPE

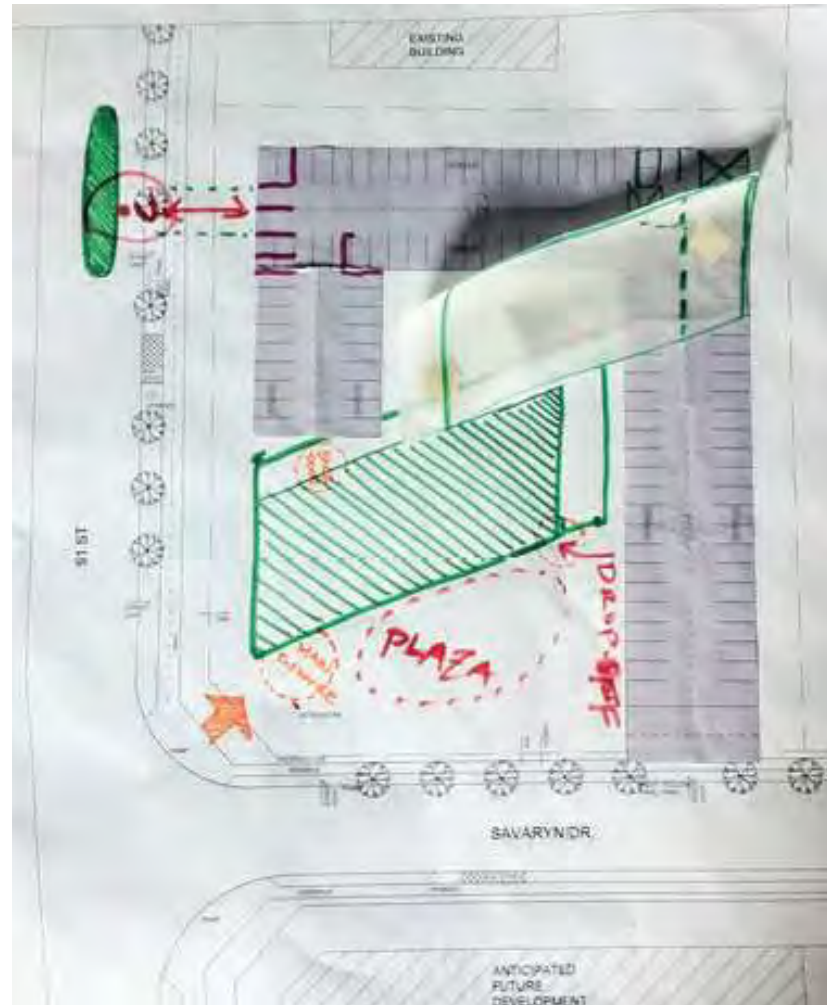
3. BUILDING ORIENTATION

- ☐ MAXIMIZE PASSIVE SOLAR & DAYLIGHTING
- ☐ AVOID NEARBY SHADING

- ✓ EAST-WEST ORIENTATION
- ✓ “HIDE” PARKING LOT AND HAVE LARGE PUBLIC PLAZA
- ✓ RESTAURANT & CHILDCARE ON STREET (SOUTH) SIDE
- ✓ MAXIMIZE PARKING (125+ STALLS)

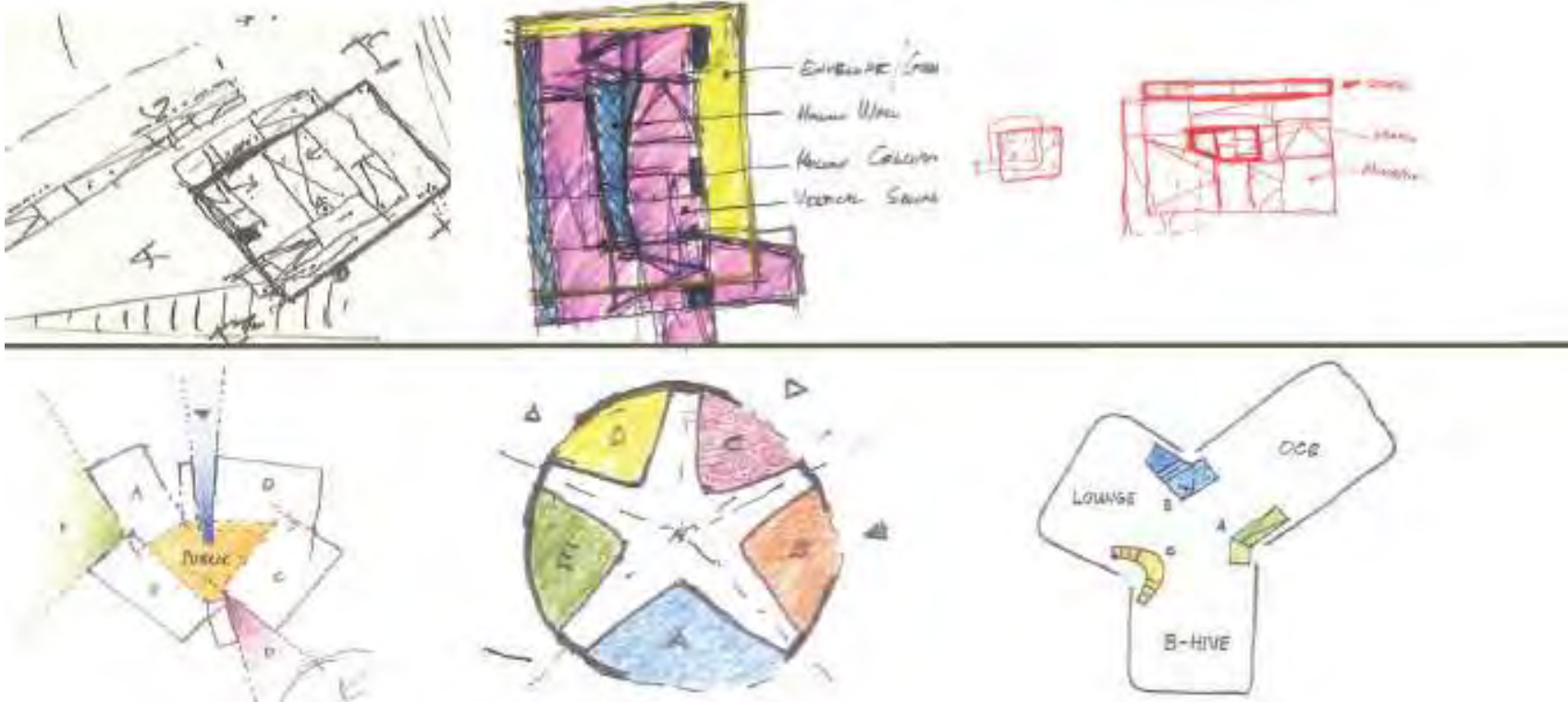
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4. BASELINE SCREENING

- ☐ STRATEGIES TO CONSIDER
- ☐ PRECEDENCE — USE EXISTING KNOWLEDGE BASE

- ✓ RECTANGULAR VS. SQUARE
- ✓ WIND FOR RENEWABLES — NO GO
- ✓ NET-ZERO H₂O TOO COSTLY
- ✓ PARKADE COST PROHIBITIVE
- ✓ GLAZING % STARTING POINT
- ✓ GLASS, WALL AND ROOF R-VALUES

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BULLITT CENTER — SEATTLE

Do It Yourself Guide ...

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STEPPE BUILDING — EDMONTON

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CIRS @ UBC — VANCOUVER

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NUOFFICE — MUNICH, GERMANY

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5. HVAC SYSTEM SCREENING

- ☐ HIGH COEFFICIENTS OF PERFORMANCE (COP'S)
- ☐ COST SENSITIVITY VS. PERFORMANCE VS. COST OF SOLAR
- ☐ MAINTENANCE OF SYSTEMS

- ✓ NO EXOTIC EQUIPMENT — ALL PROVEN TECHNOLOGIES
- ✓ 5 YEAR NPV APPROACH
- ✓ ENABLE NET ZERO
- ✓ MEET COMFORT LEVELS WITH HIGH THERMAL STABILITY

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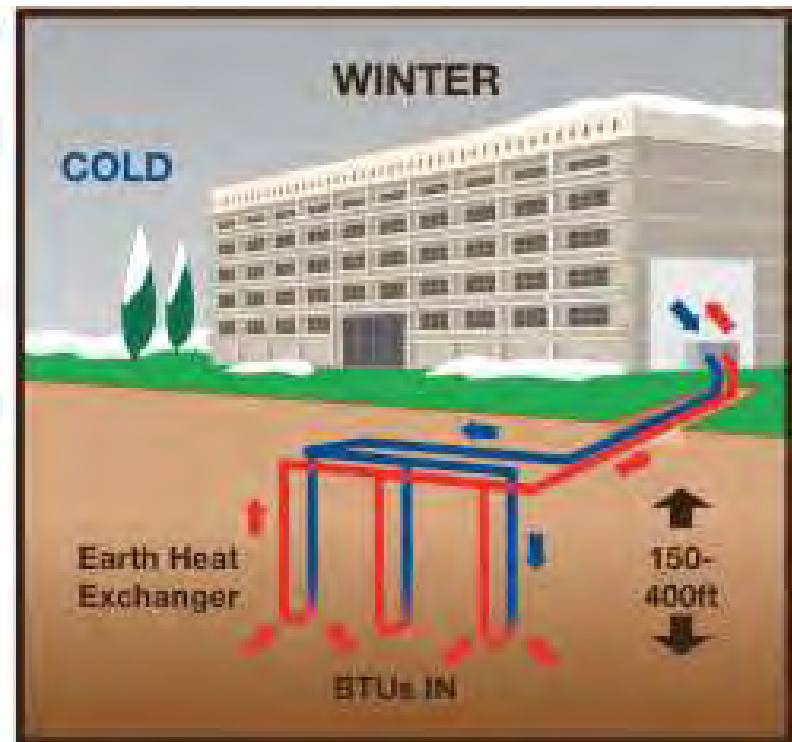
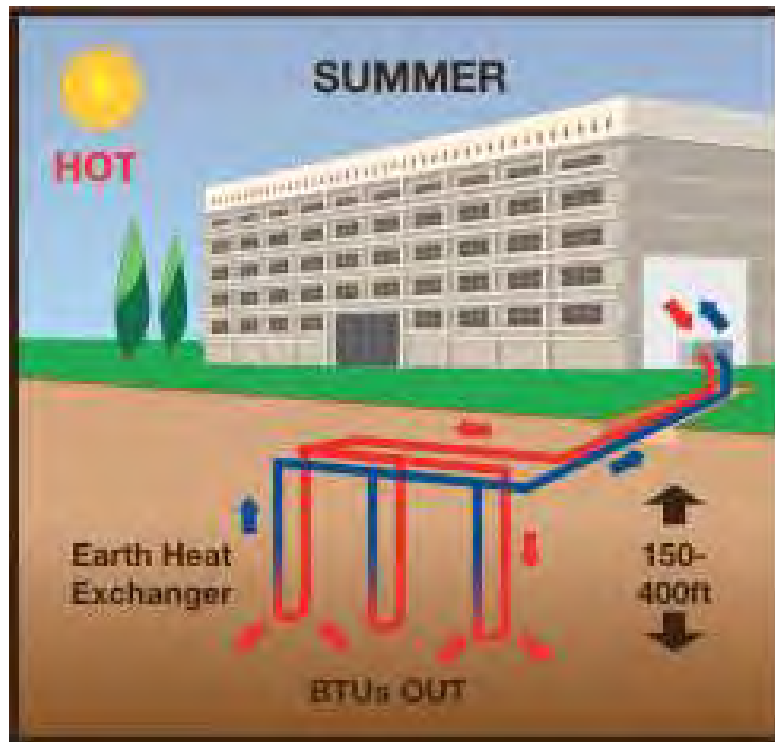
NET-ZERO RECIPE



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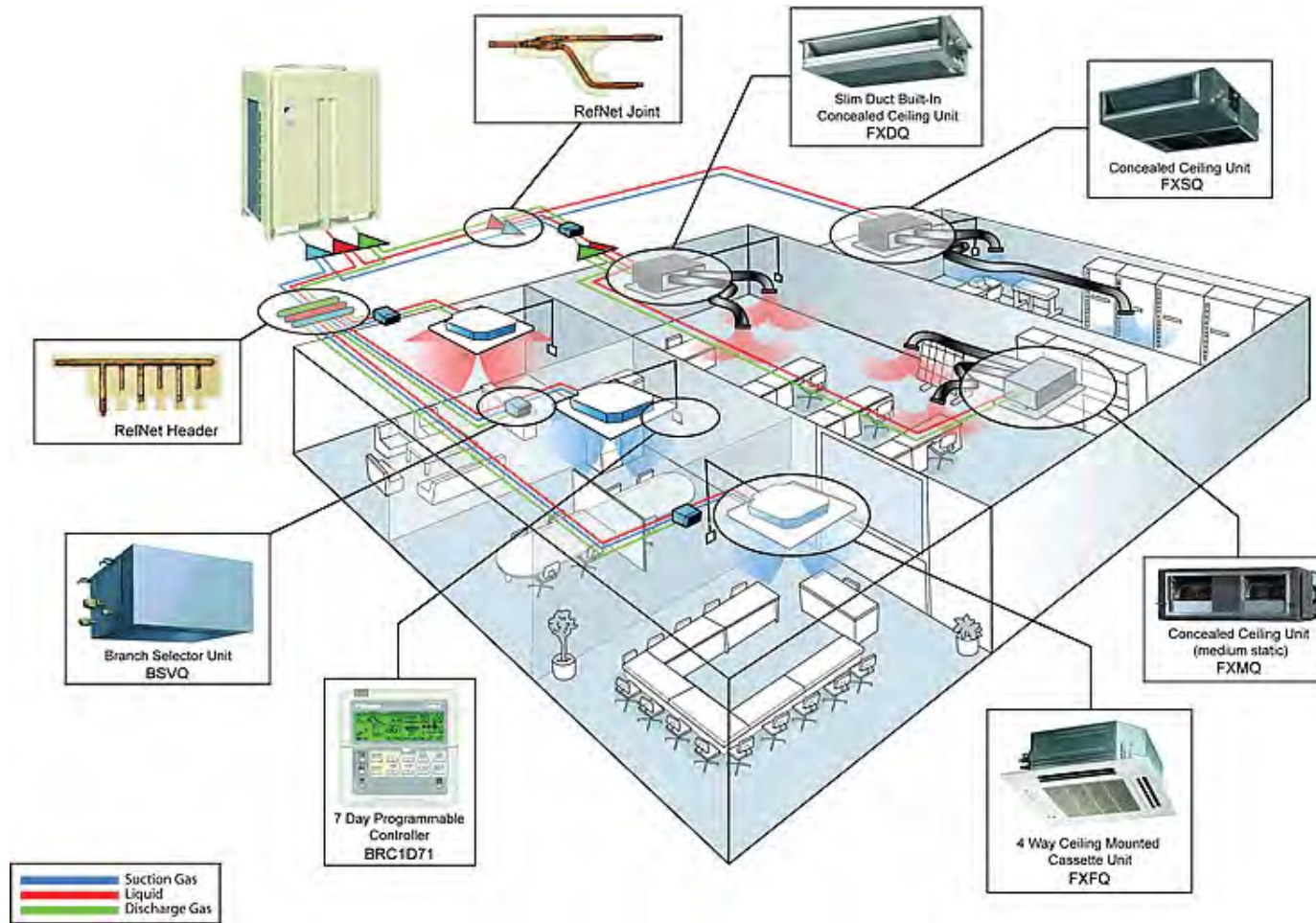
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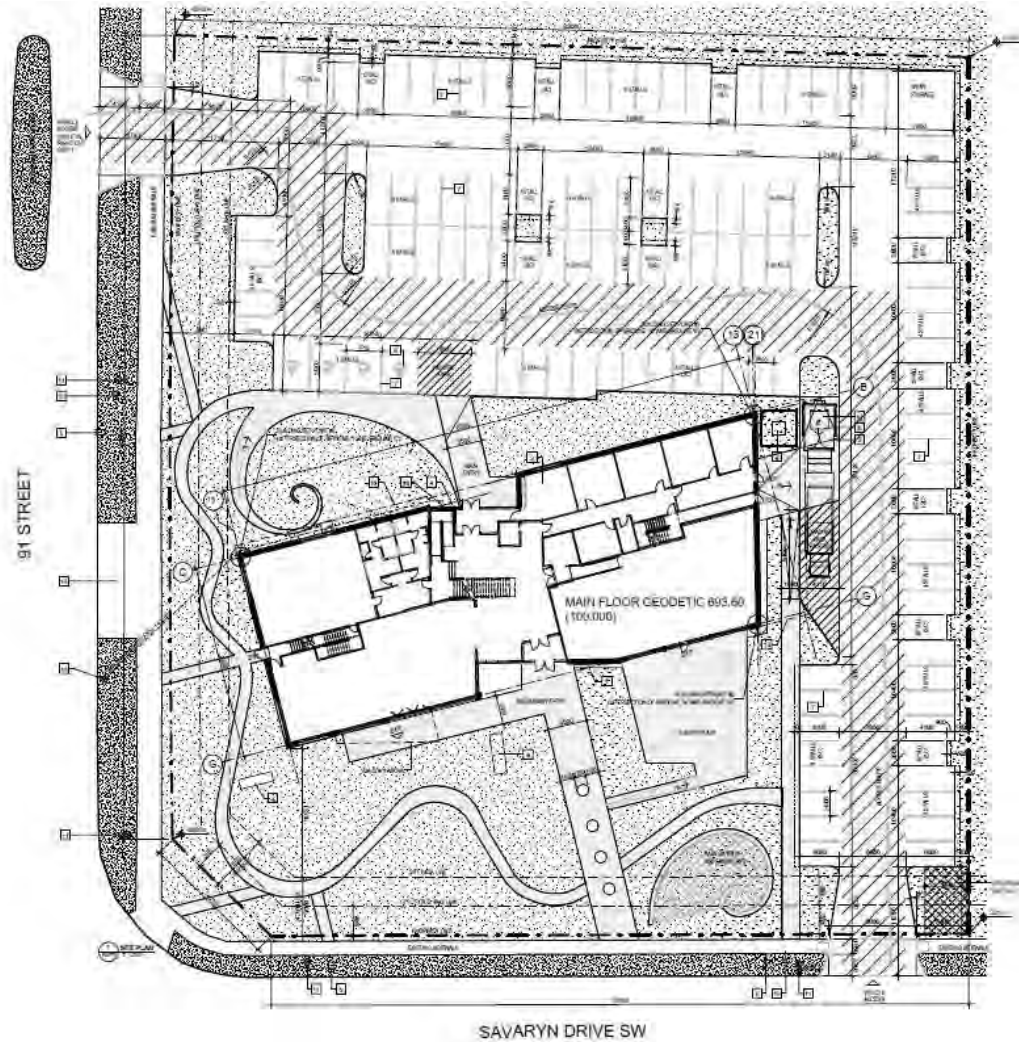
6. PRELIMINARY ENERGY MODEL

- ☐ TEST BUILDING SHAPE AND PROGRAM
- ☐ TEST DIFFERENT ENVELOPE/GLAZING COMBINATIONS
- ☐ DETERMINE STARTING POINT BUILDING LOADS

- ✓ SHITTY REVISION ZERO
- ✓ LEARN HOW THE BUILDING BEHAVES

Do It Yourself Guide...

NET-ZERO RECIPE



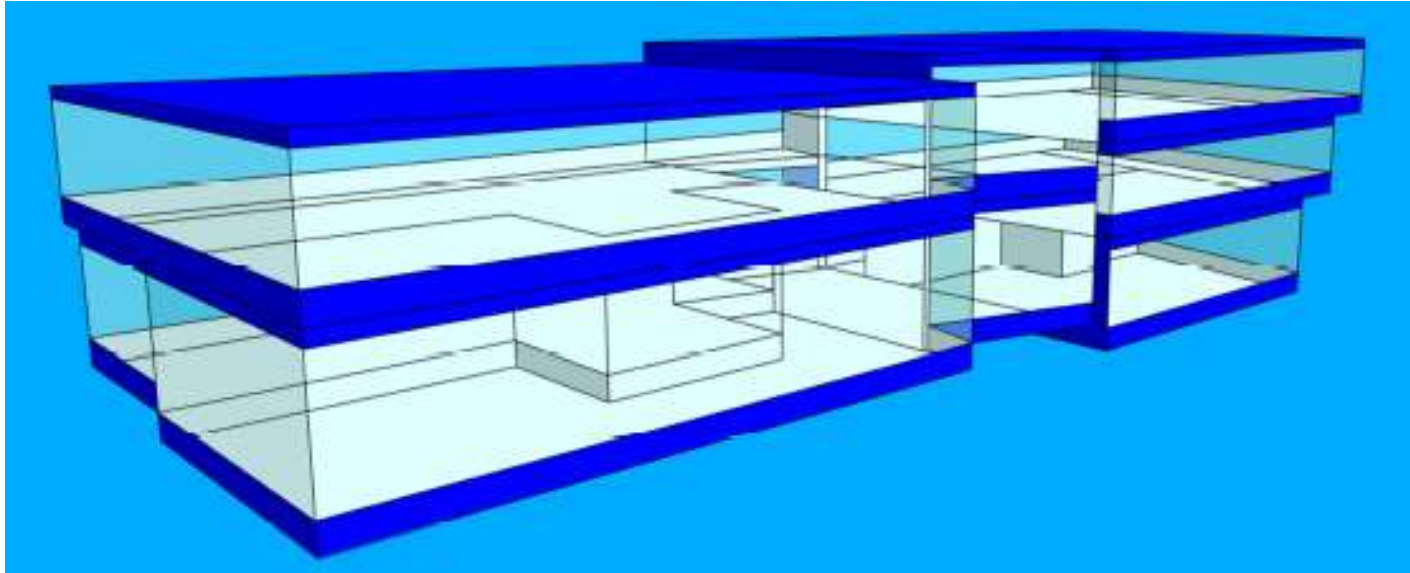
Do It Yourself Guide ...

NET-ZERO RECIPE

Glazing Design #	Size Description			Performance Description
	6m Storeys	5m Storeys	4m Storeys	
1	100% width 4.5m tall	100% width 3.5m tall	100% width 2.5m tall	Duxton R16, SHGC-0.37, Vt=0.54
2	100% width 4.5m tall	100% width 3.5m tall	100% width 2.5m tall	Duxton R20, SHGC-0.15, Vt=0.34
3	100% width 4.0m tall	100% width 3.0m tall	100% width 2.0m tall	Duxton R20, SHGC-0.15, Vt=0.34
4	100% width 3.5m tall	100% width 2.5m tall	100% width 1.5m tall	Duxton R20, SHGC-0.15, Vt=0.34
5	100% width 2.5m tall	100% width 1.5m tall	100% width 1.0m tall	Duxton R20, SHGC-0.15, Vt=0.34
6	100% width 2.5m tall	100% width 1.5m tall	100% width 1.0m tall	Duxton R16, SHGC-0.37, Vt=0.54
7	66% width 2.5m tall	66% width 1.5m tall	66% width 1.0m tall	Duxton R16, SHGC-0.37, Vt=0.54
8	100% width 2.5m tall	100% width 1.5m tall	100% width 1.0m tall	Duxton R8.3, SHGC-0.53, Vt=0.68
9	66% width 2.5m tall	66% width 1.5m tall	66% width 1.0m tall	Duxton R8.3, SHGC-0.53, Vt=0.68

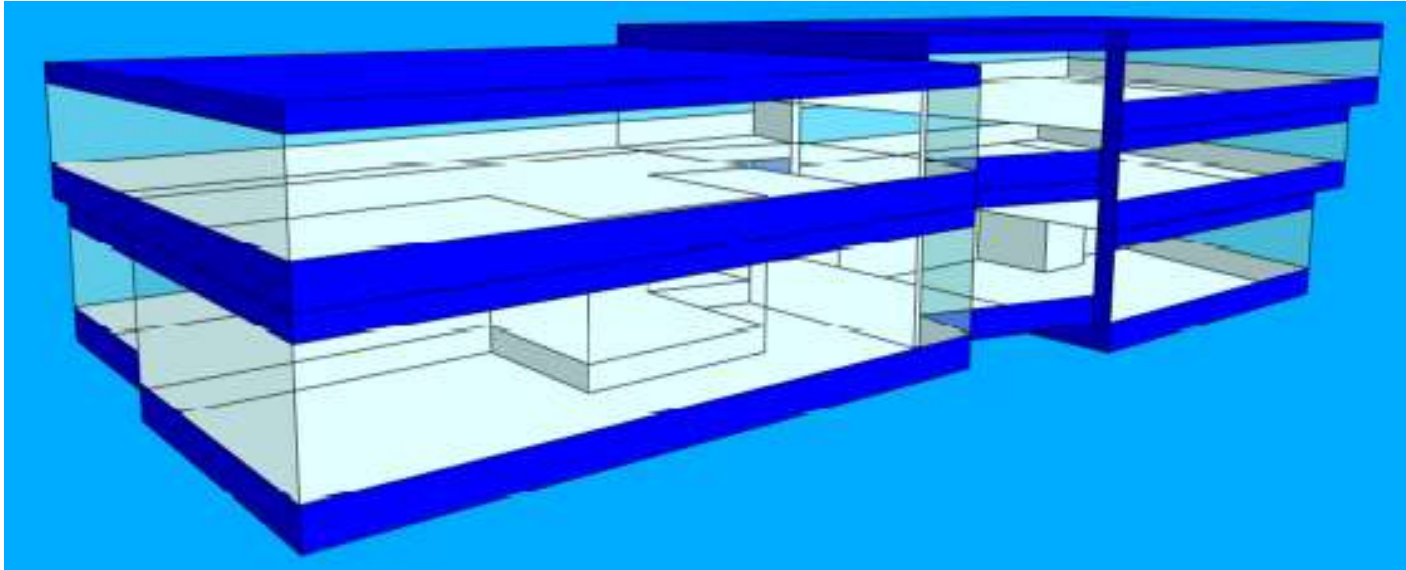
Do It Yourself Guide ...

NET-ZERO RECIPE



Do It Yourself Guide ...

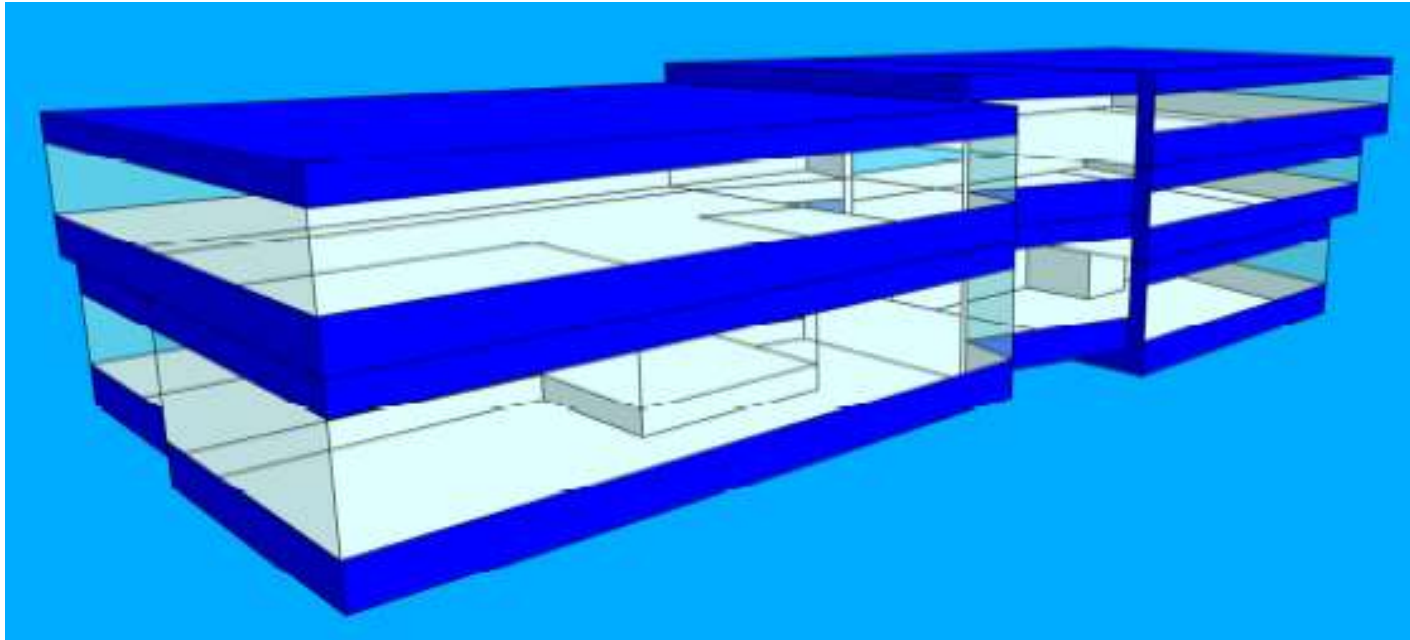
NET-ZERO RECIPE



NORMAL**IS**BROKEN

Do It Yourself Guide ...

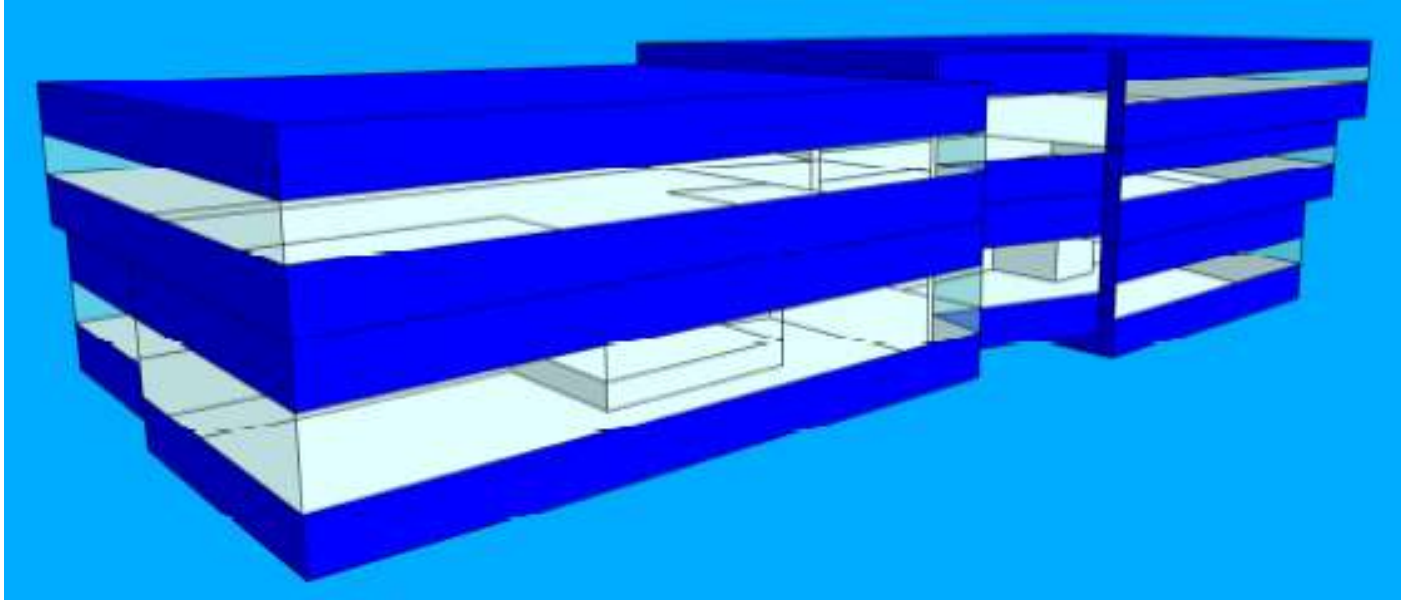
NET-ZERO RECIPE



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Do It Yourself Guide ...

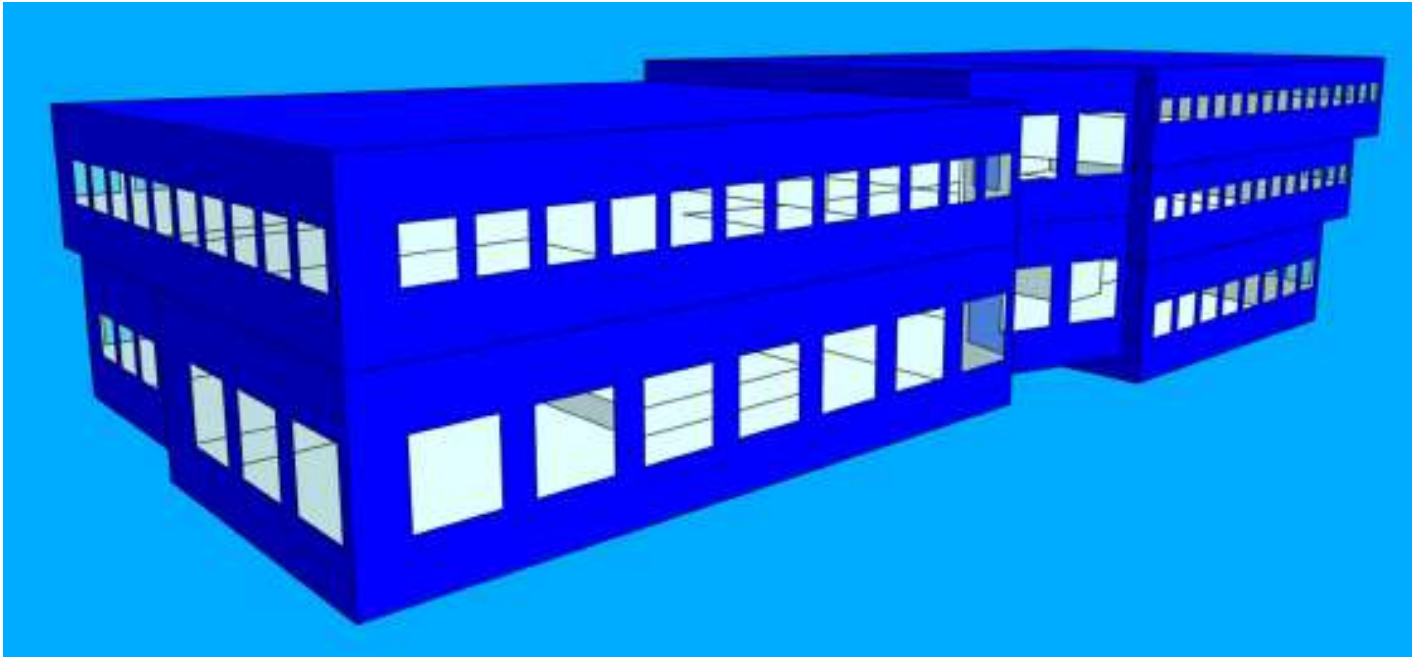
NET-ZERO RECIPE



NORMALISBROKEN

Do It Yourself Guide ...

NET-ZERO**RECIPE**

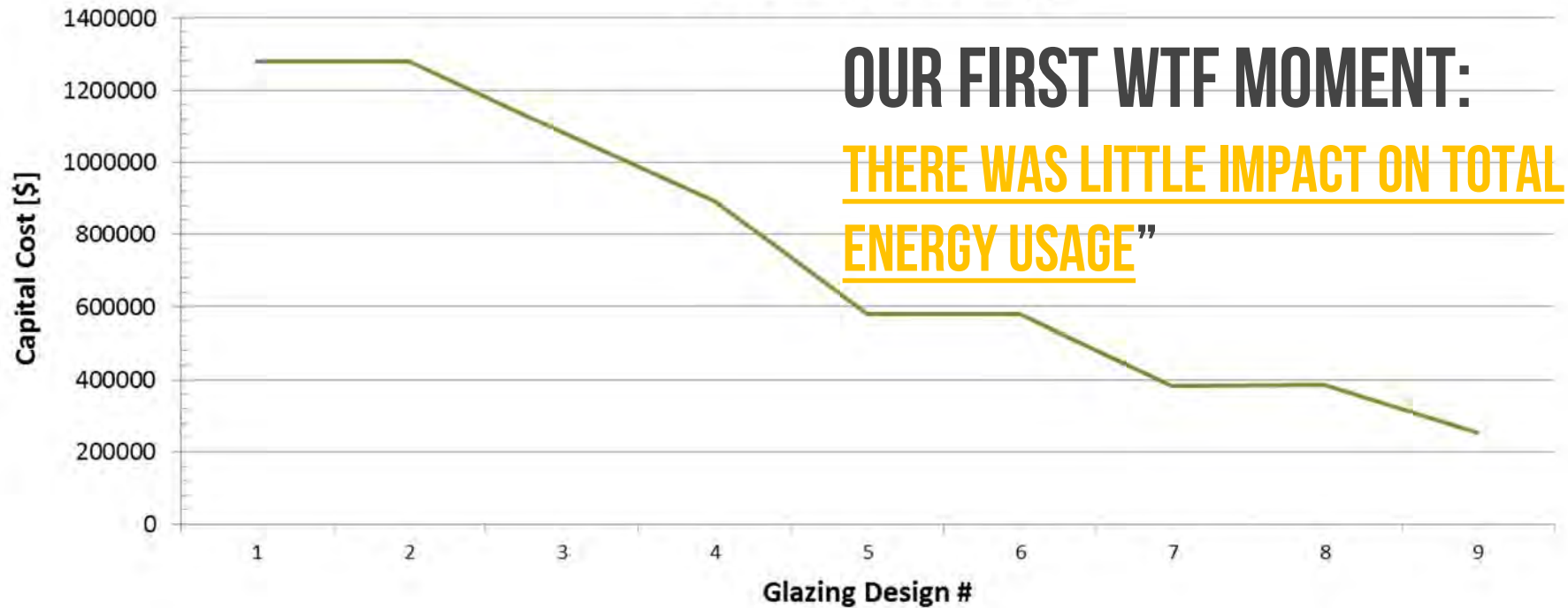


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Do It Yourself Guide ...

NET-ZERO RECIPE

C3 - Glazing Cost Range



Do It Yourself Guide ...

NET-ZERO**RECIPE**

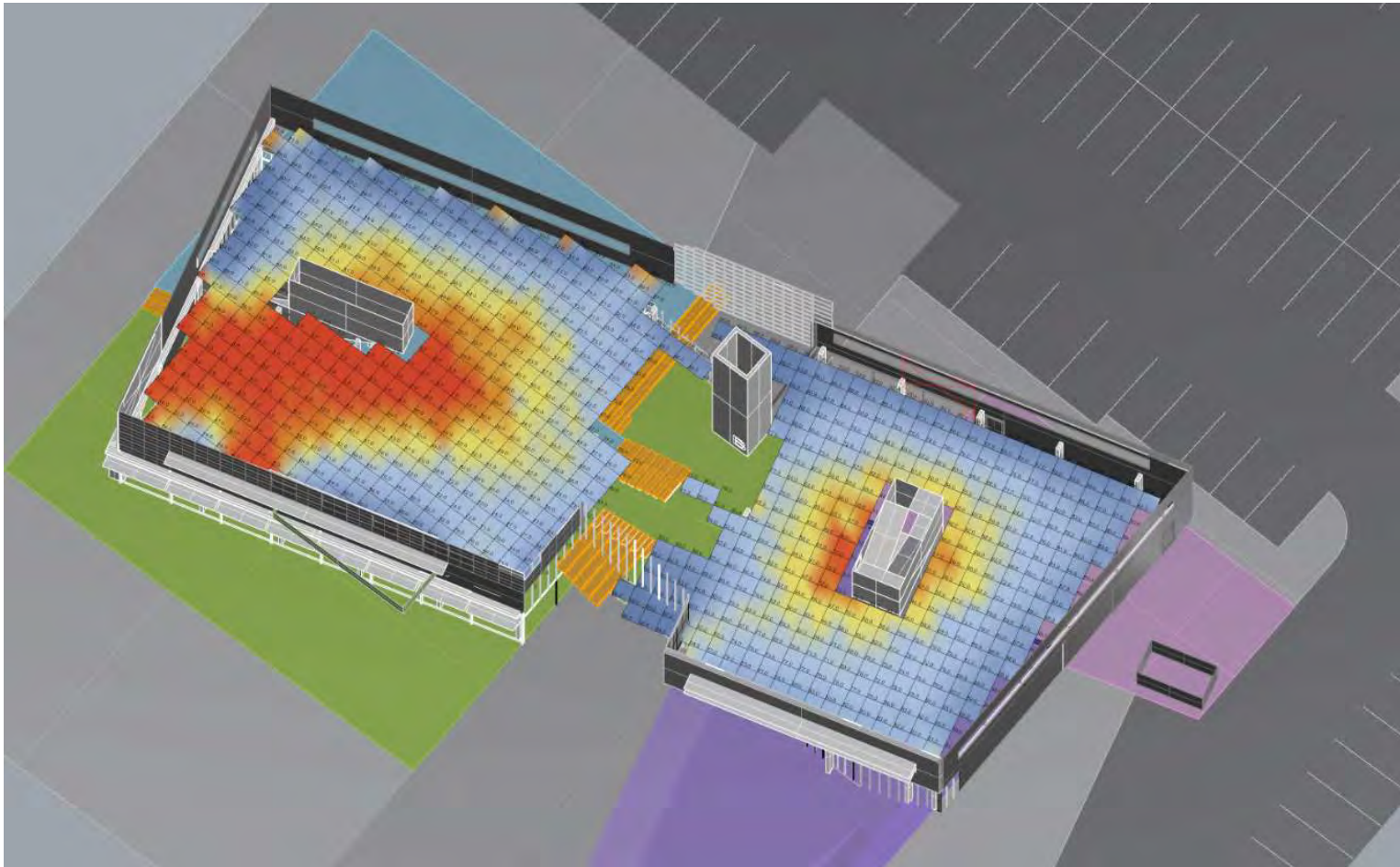
7. OPTIMIZE ENVELOPE

- ☐ DAYLIGHT STUDY
- ☐ WALL/ROOF CONSTRUCTION & R-VALUE [\$ VS. PERFORMANCE]
- ☐ GLAZING SIZE AND R-VALUE [\$ VS. PERFORMANCE]

- ✓ REMOVE BASE BUILDING LIGHTS
- ✓ OCCUPANCY & DAYLIGHT SENSORS
- ✓ AIR-TIGHTNESS
- ✓ ELIMINATE THERMAL BRIDGING

Do It Yourself Guide ...

NET-ZERO RECIPE

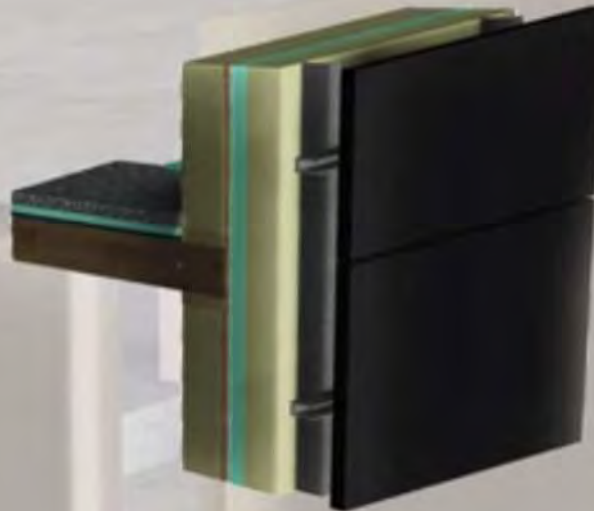


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Do It Yourself Guide ...

NET-ZERO RECIPE

**130 mm GLULAM DECK
13mm PLYWOOD SHEATING
2'x4' WOOD STUDS
13 mm PLYWOOD SHEATING
AIR/VAPOUR BARRIER
50mm RIGID INSULATION
'Z'-GIRT 610 O.C.
100mm SEMI-RIGID INSULATION
UNISTRUT MOUNTING SYSTEM
VERTICAL MOUNTED PV-PANELS
140mm BATT INSULATION
25mm RIGID INSULATION
40mm POLISHED CONCRETE**

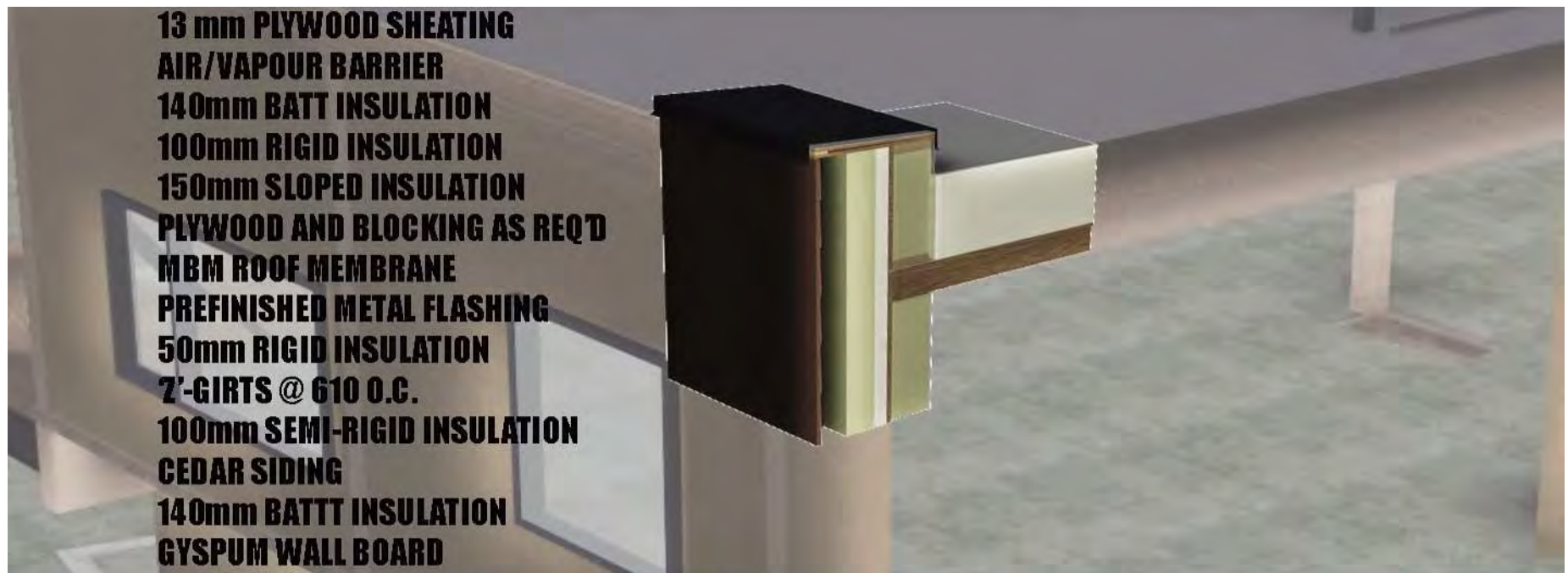


WALL SYSTEM

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NET-ZERO RECIPE



ROOF SYSTEM

Do It Yourself Guide ...

NET-ZERO RECIPE



GLAZING LAYOUT

Do It Yourself Guide ...

NET-ZERO RECIPE

8. REDUCE BASE LOADS

- ☐ COMPUTERS / PRINTERS / MISC. OFFICE
- ☐ LIGHTING
- ☐ MINIMIZE EQUIPMENT & LOADS
- ☐ USE TIMERS AND SENSORS

- ✓ LED MONITOR SWITCH OUT BEGAN IN 2014
- ✓ LOW-POWER CPU'S & LAPTOPS
- ✓ COFFEE MAKER & INSTANT HOT
- ✓ TASK LIGHTING
- ✓ AUDIO VISUAL

Do It Yourself Guide ...

NET-ZERO RECIPE



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Do It Yourself Guide ...

NET-ZERO**RECIPE**



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Do It Yourself Guide ...

NET-ZERO RECIPE



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Do It Yourself Guide ...

NET-ZERO RECIPE

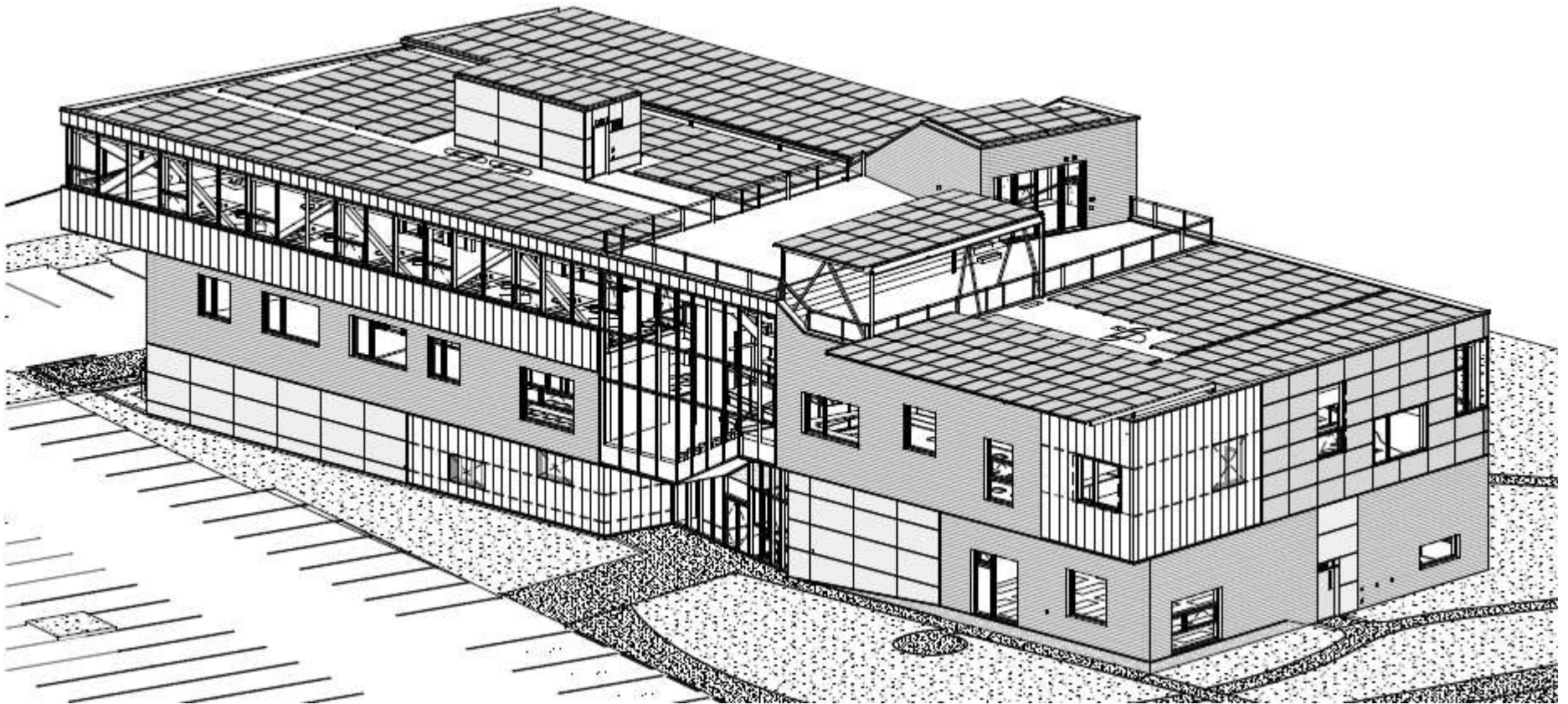
9. DETAIL ARCHITECTURE

- ☐ TURN THE SHOE BOX INTO A MASTERPIECE
- ☐ ASSESS EACH ARCHITECTURAL FEATURE

- ✓ BEAUTY + FUNCTIONALITY
- ✓ ENERGY LOSSES
- ✓ PRESERVE PROJECT DESIGN PHILOSOPHY
- ✓ LANDSCAPING

Do It Yourself Guide ...

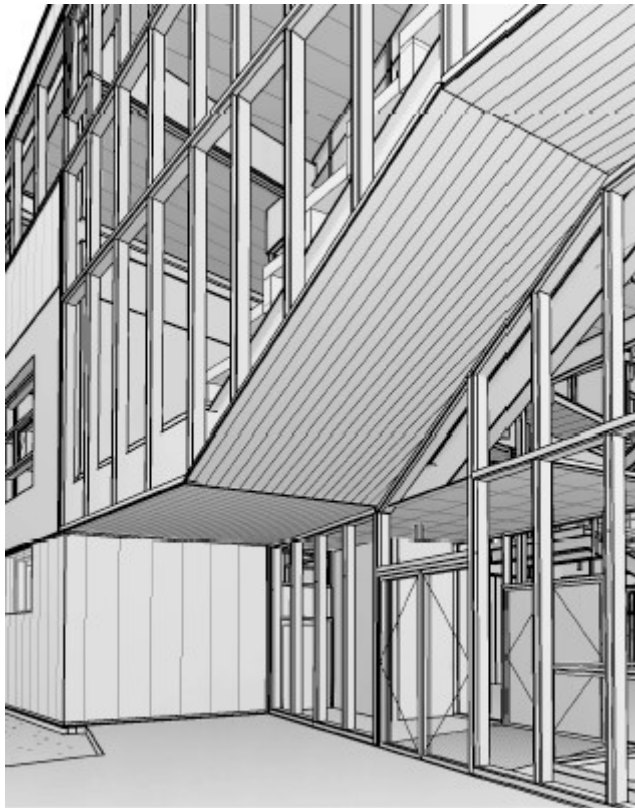
NET-ZERO**RECIPE**



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Do It Yourself Guide ...

NET-ZERO**RECIPE**



Do It Yourself Guide ...

NET-ZERO RECIPE

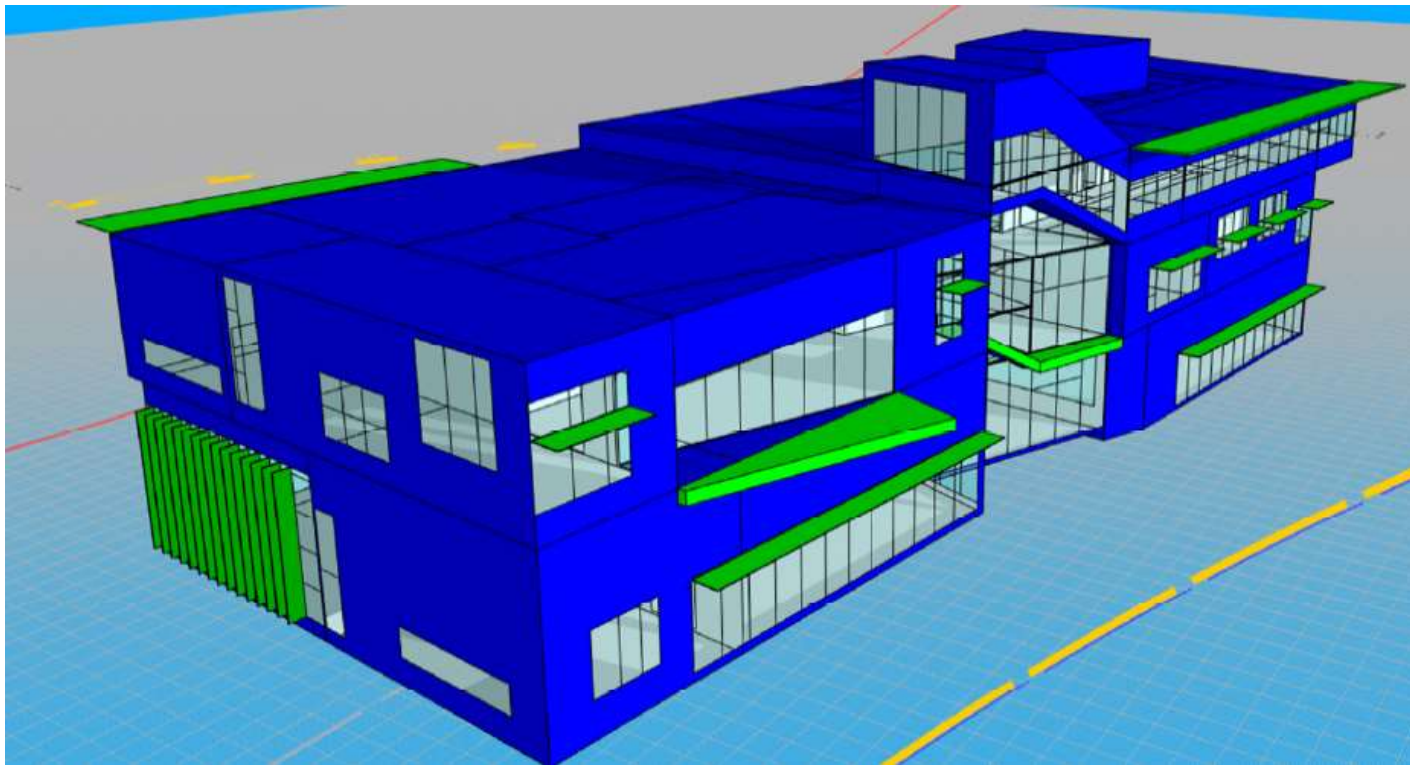
10. FINAL ENERGY MODEL

- ☐ BASELINE FOR PERFORMANCE
- ☐ INCLUDE ALL FEATURES AND THE LOSSES
- ☐ FINAL PROGRAM TIMES AND USAGE

- ✓ MONITOR EACH CIRCUIT
- ✓ EQUIPMENT AND ZONE USAGE DATA
- ✓ TEST AND MEASURE

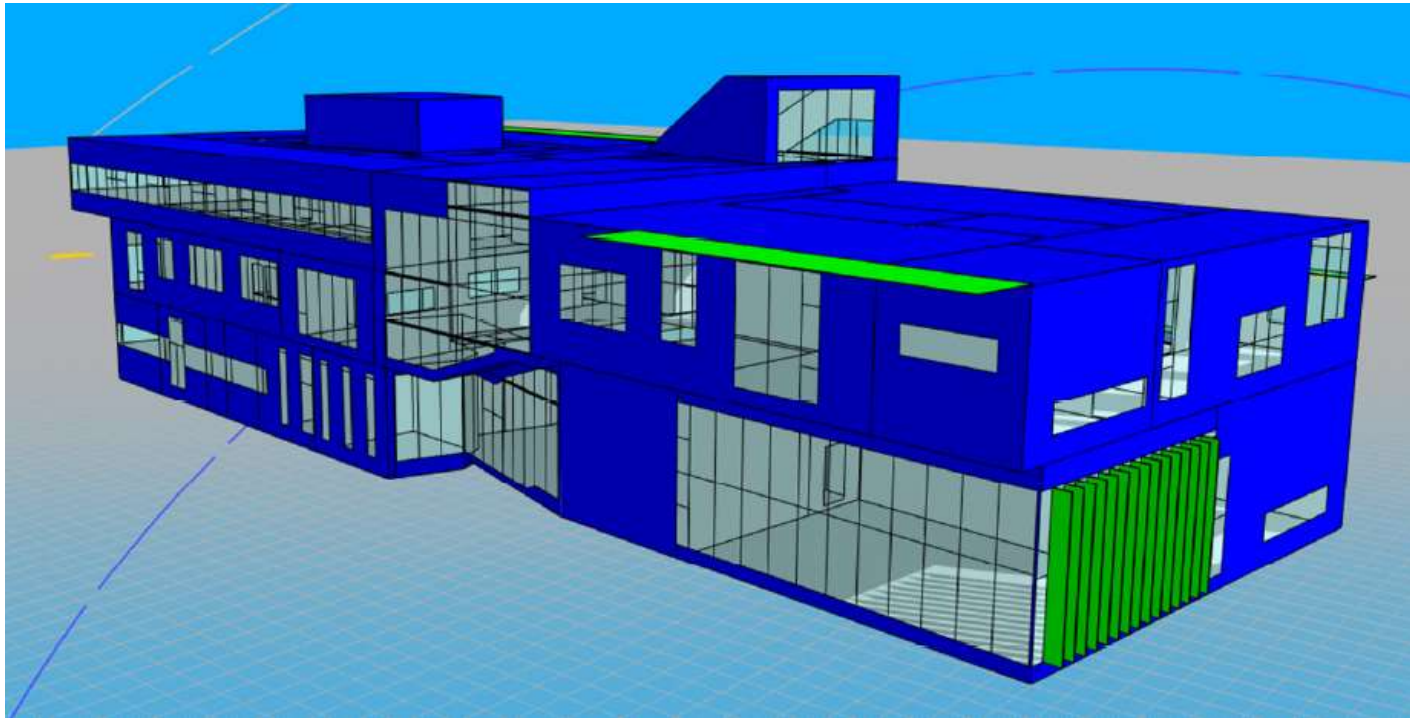
Do It Yourself Guide ...

NET-ZERO RECIPE



Do It Yourself Guide ...

NET-ZERO**RECIPE**



A **RECIPE** IS ONLY
AS **GOOD** AS THE
KITCHEN **STAFF**

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WHY IPD?

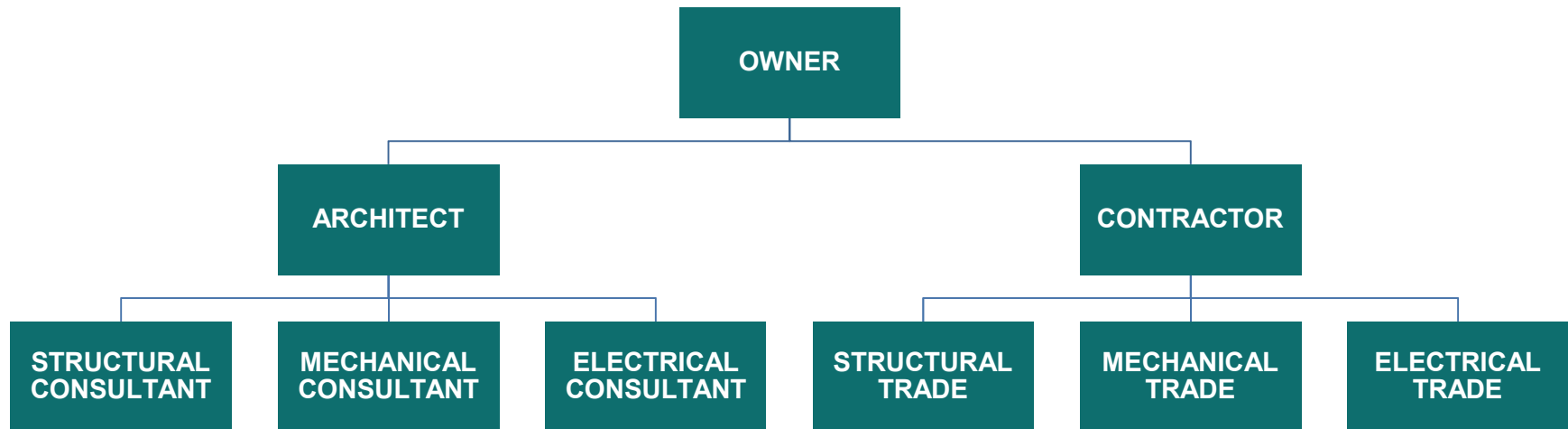


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Design. Bid. Build
Construction Management
Design Build
Integrated Project Delivery

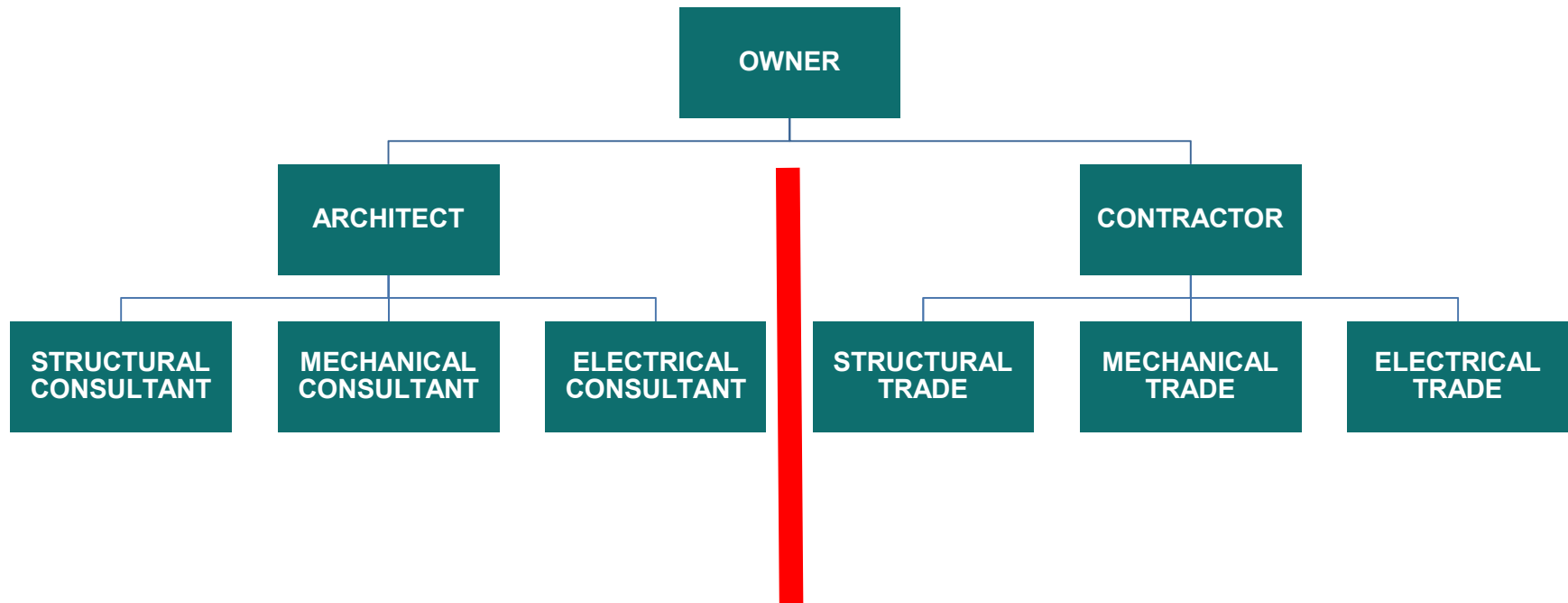
TRADITIONAL

SEE THINGS
DIFFERENTLY

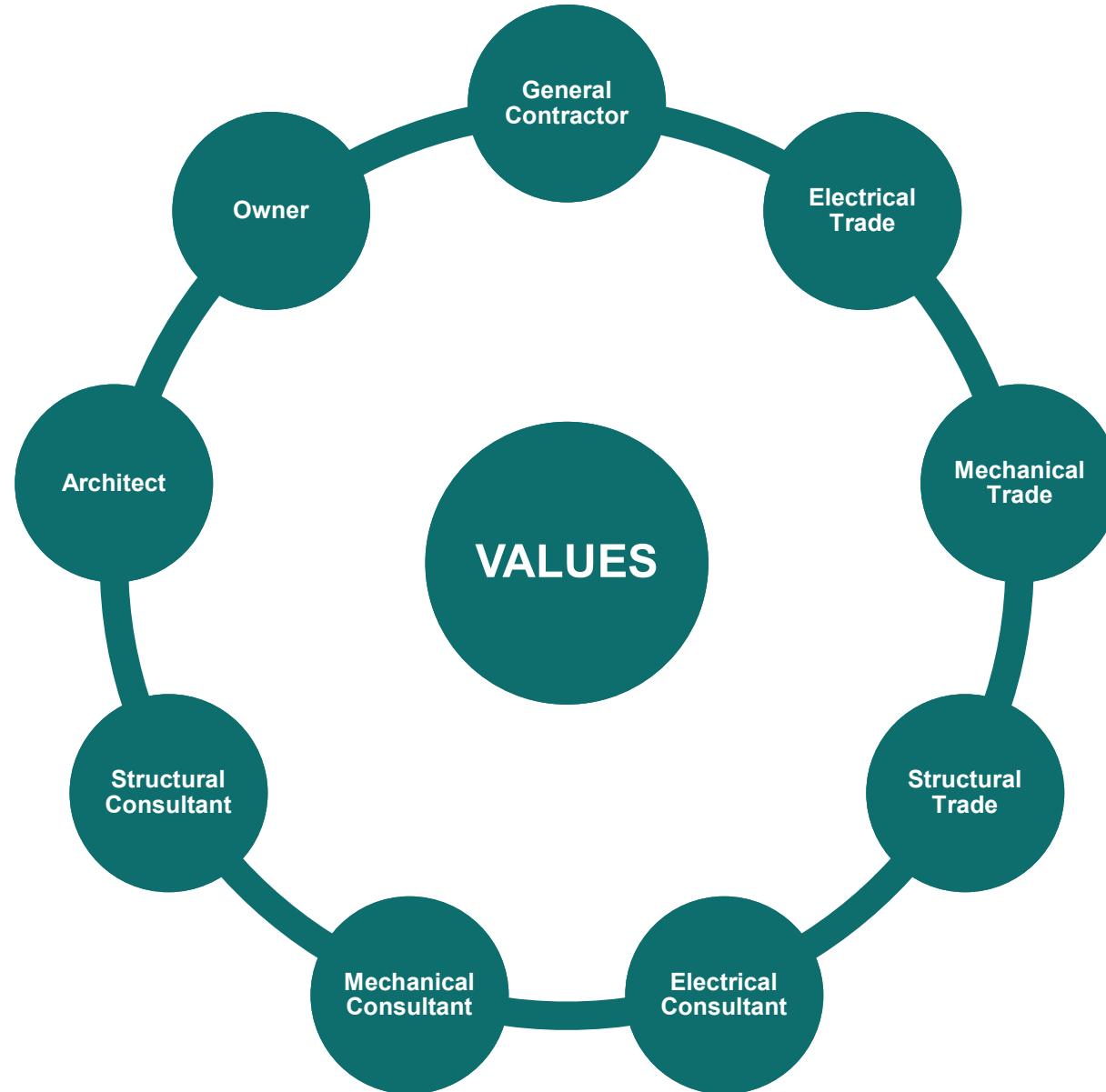


TRADITIONAL

SEE THINGS
DIFFERENTLY



IPD



SEE THINGS
DIFFERENTLY

IPD KEY FEATURES (AIA)

- Joint project control by owner and key designers and builders
- A multi-party agreement or equal interlocking agreements
- Limited liability among owner and key designers and builders. [\[1\]](#)[\[2\]](#)

THREE BIG DIFFERENCES

CONTRACT

- Risk Reward
- Cost Breakdown

TRADE PARTNERS

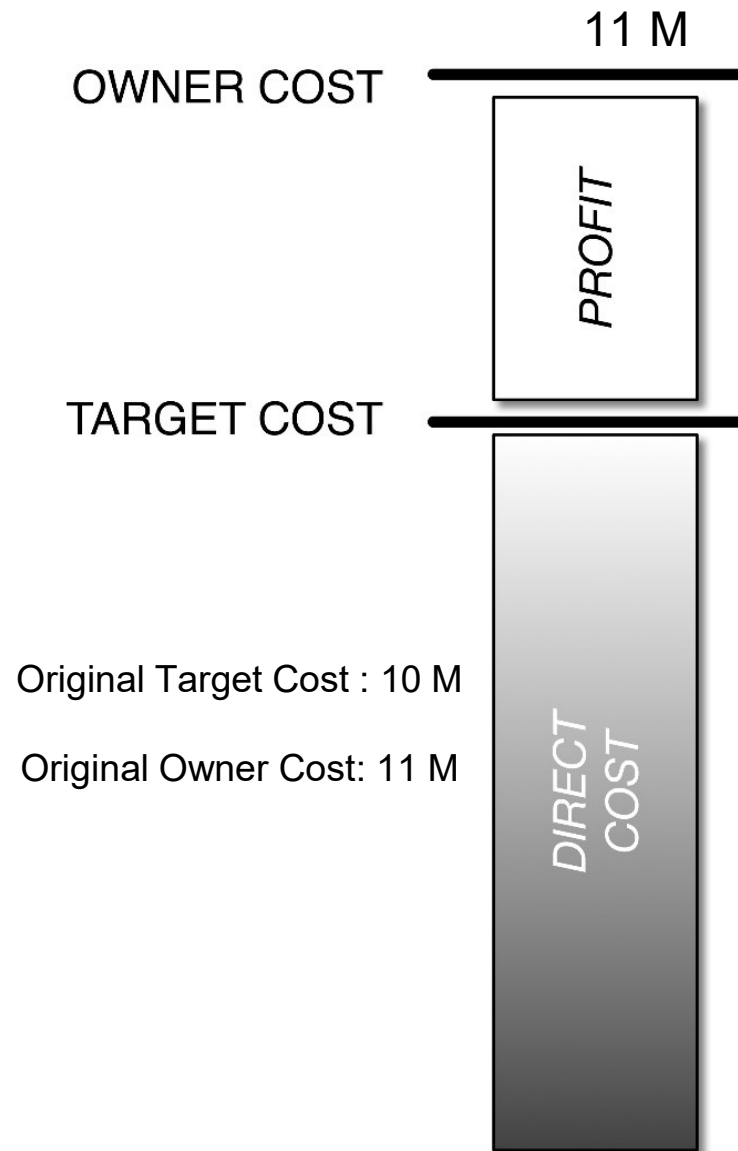
- Target Value Design
- Forecasting

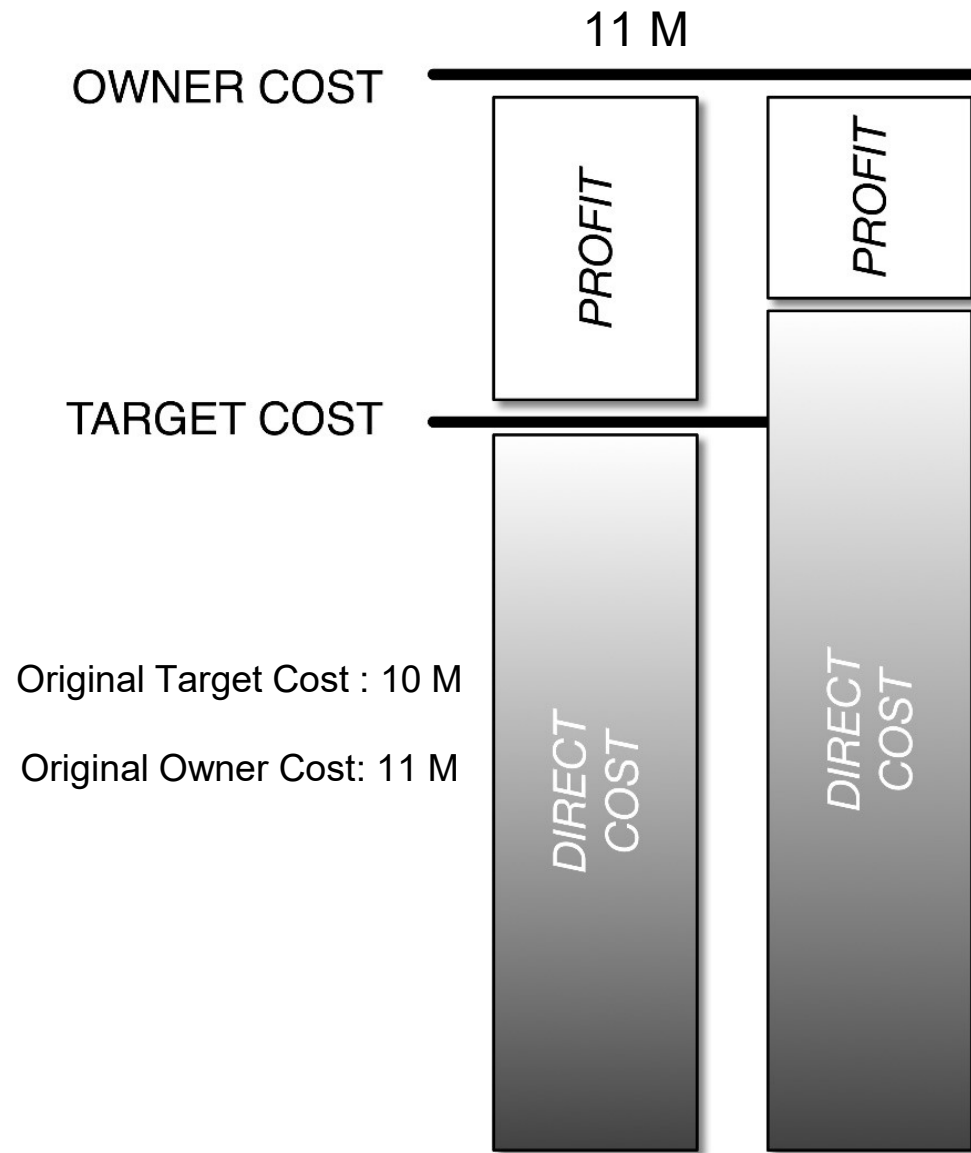
LEAN

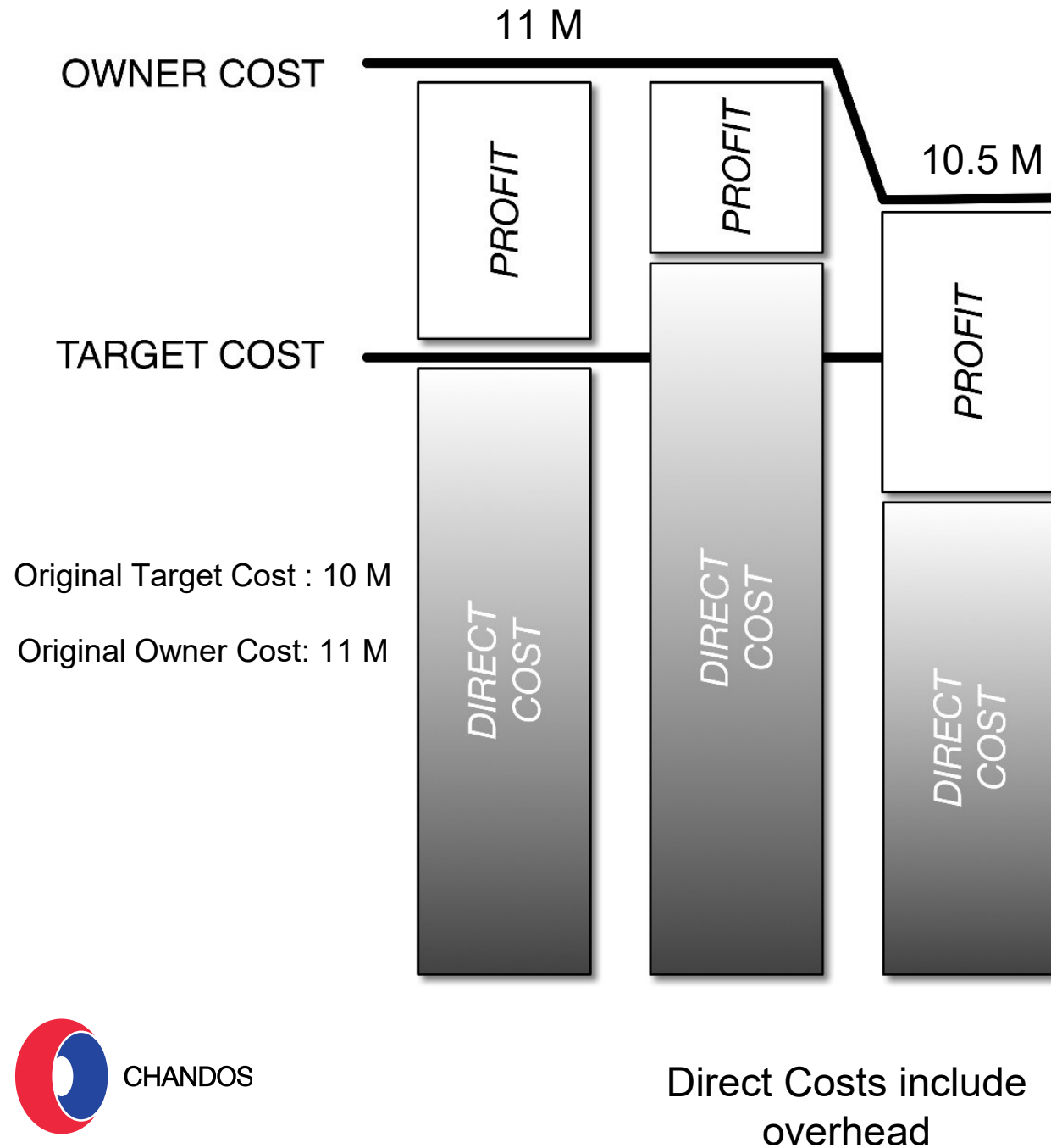
- Value Discovery
- Coordination

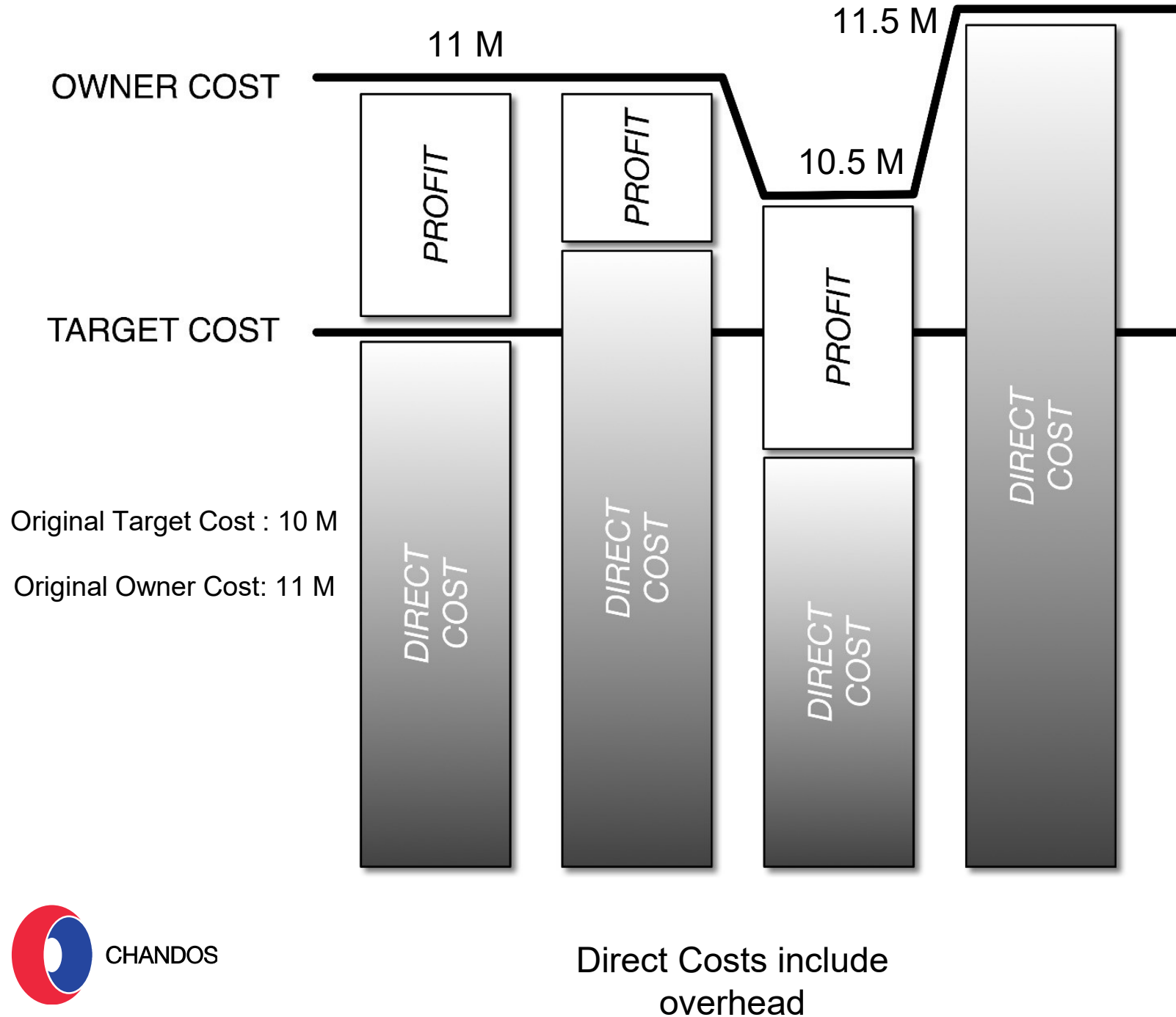
THE DEAL

- Building Cost: \$11 M
- Change Orders: 0-10%
- Total Building Cost: \$11M to 12 M









SEE THINGS
DIFFERENTLY

THREE BIG DIFFERENCES

CONTRACT

- Risk Reward
- Cost Breakdown

TRADE PARTNERS

- Target Value Design
- Forecasting

LEAN

- Value Discovery
- Coordination

Target Value Design Process

The process of establishing early financial targets for the project, and then designing to an associated detailed estimate rather than estimating a detailed design. Iterative in nature.

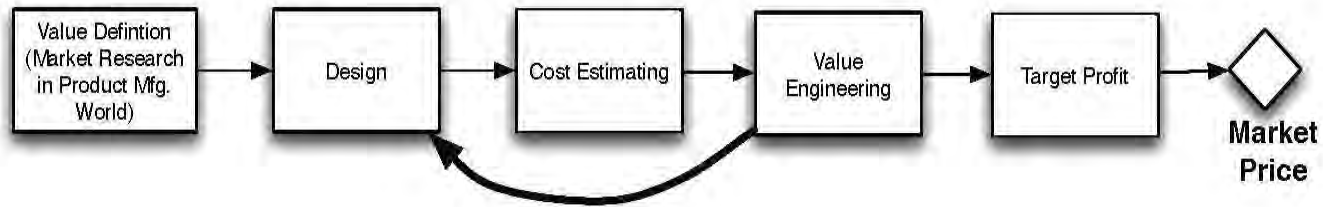
The estimator should be one of the key leaders during the target value design (TVD) stage

TARGET VALUE DESIGN

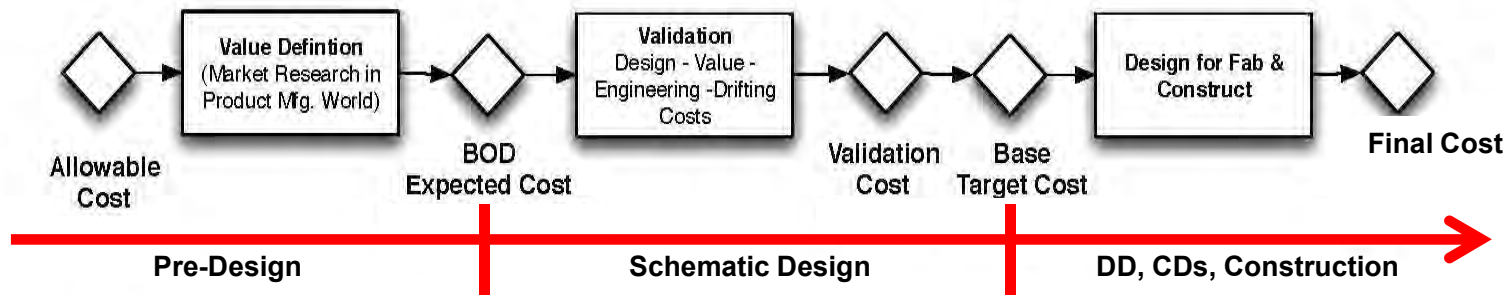
(from DPR Construction)

SEE THINGS
DIFFERENTLY

Traditional Cost Estimating



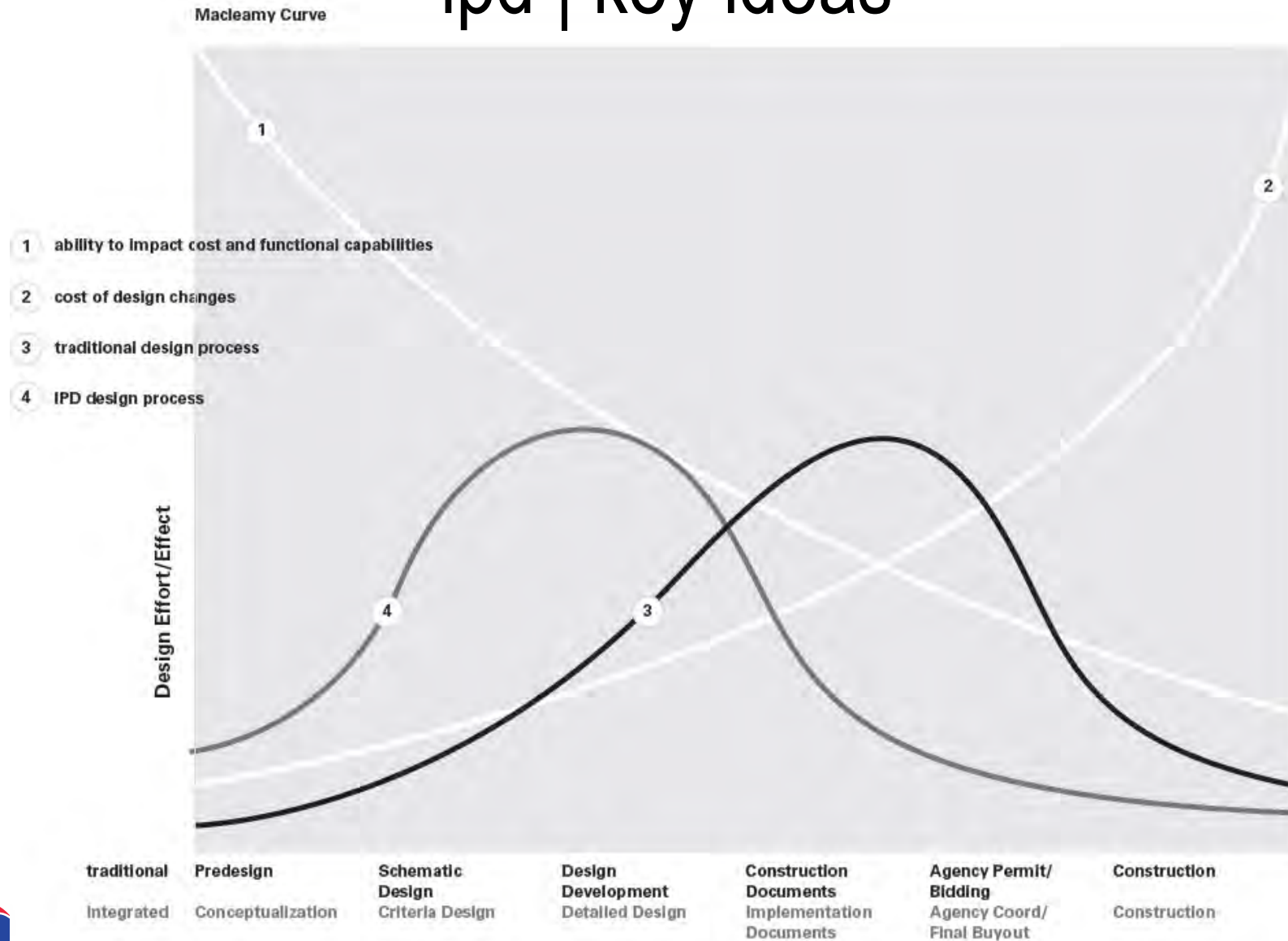
IPD Target Value Design



CHANDOS

ipd | key ideas

SEE THINGS
DIFFERENTLY



scan

THREE BIG DIFFERENCES

SEE THINGS
DIFFERENTLY

CONTRACT

- Risk Reward
- Cost Breakdown

TRADE PARTNERS

- Target Value Design
- Forecasting

LEAN

- Value Discovery
- Coordination

LEAN

SEE THINGS
DIFFERENTLY

Provide customer value, through streamlined processes, practicing continuous improvement

LEAN: VALUE ADD VERSUS NON-VALUE ADD

- Ask yourself 'What is the customer willing to pay for?'
- It is estimated that up to 90% of our work is non-value add



Defects

Efforts caused by rework, scrap, and incorrect information.



Overproduction

Production that is more than needed or before it is needed.



Waiting

Wasted time waiting for the next step in a process.



Non-Utilized Talent

Underutilizing people's talents, skills, & knowledge.



Transportation

Unnecessary movements of products & materials.



Inventory

Excess products and materials not being processed.



Motion

Unnecessary movements by people (e.g., walking).



Extra-Processing

More work or higher quality than is required by the customer.



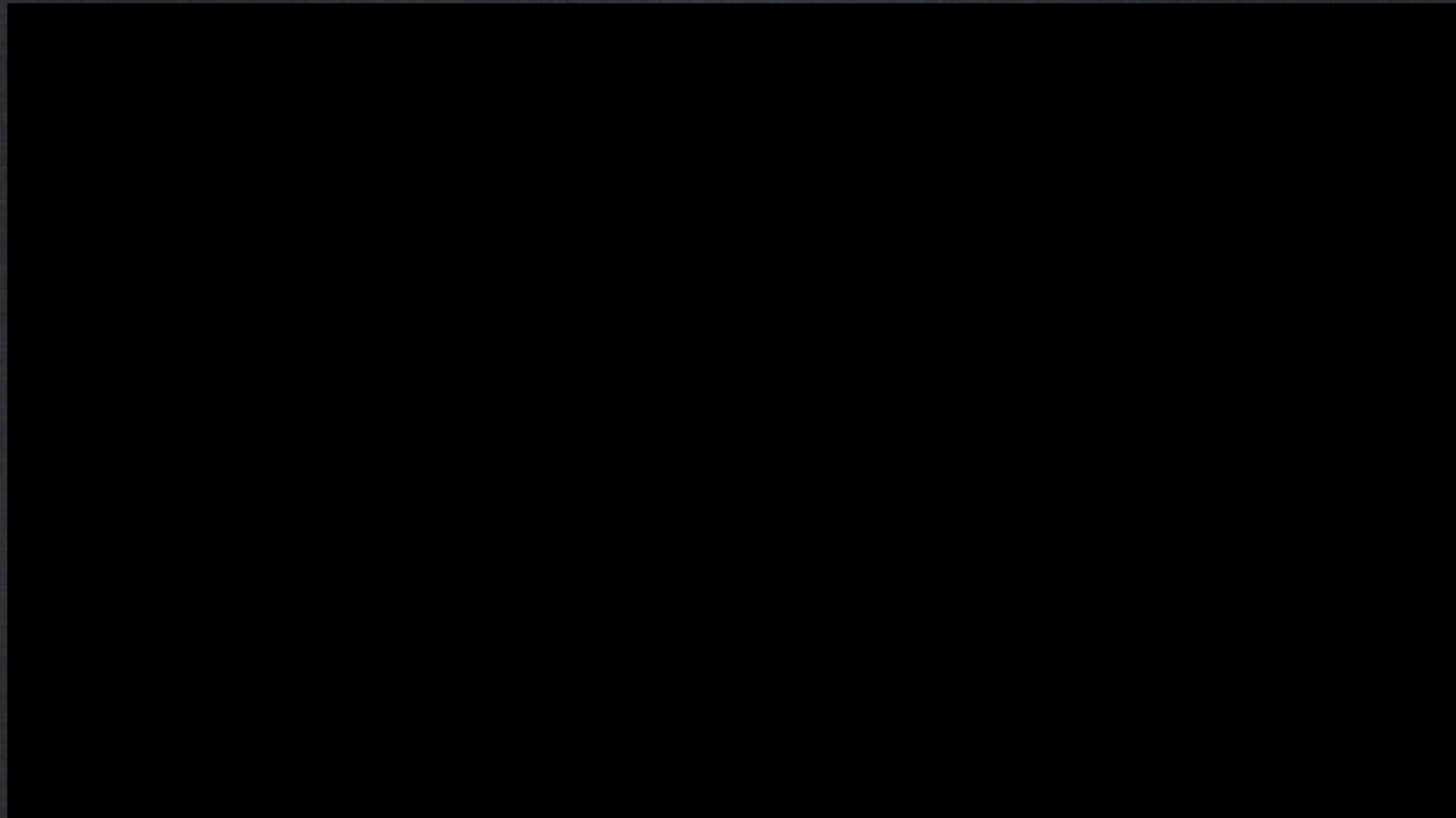
CHANDOS

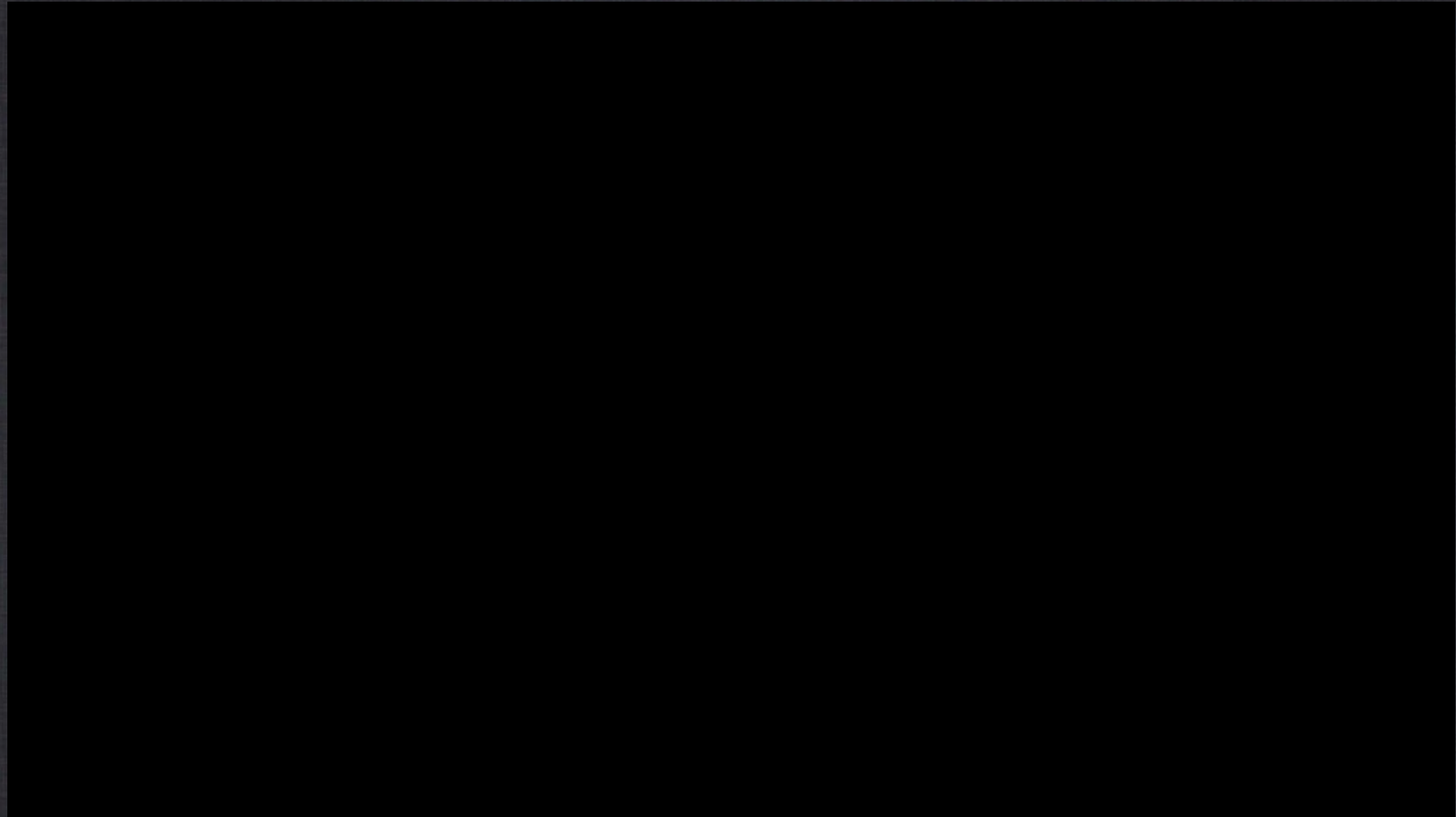


LEAN CULTURE

- Mosaic 2 Second Lean Videos

SEE THINGS
DIFFERENTLY





LAST PLANNER SYSTEM™

- Collaborative
- Commitment based
- Allows for early detection and removal of constraints
- Analyzes reasons why commitments were not met
- Gives trade foreman the authority to say no to a commitment when they can't do it

LAST PLANNER SYSTEM™

- Pull Schedule
- 6 Week Look Ahead
- Weekly Work plan w/ PPC
- Daily Stand-up Meetings

PPC

- Percent Planned Complete
- Typical construction PPC is 54%

DECISION MATRIX

SEE THINGS
DIFFERENTLY

MOSAIC CENTRE for CONSCIOUS COMMUNITY & COMMERCE VALUES MATRIX

Project values will be used to guide the team in decision making. Use this matrix on any major decision document that grades the decision on its affect (red, yellow, green) on the overall project values. Where there is a conflict between values, the document should discuss how the conflict will be resolved. If a decision doesn't affect a value, the team should question the necessity of the action.

ITEM UNDER CONSIDERATION

RE: INACTIVE (CUSTOM MADE) PV MODULES ON FACADE
IS OPTION A) BETTER THAN B) DUE TO AESTHETIC CONSISTENCY, DESPITE THE HIGHER COST ?

NOTES

OPTION A)
made of same material as the rest of facade PVs - \$19,200

OPTION B)
made of tempered glass and printed foil that imitates the rest of facade PVs - \$4.300 + ALU FRAMES (PRICE TBC)

NOTE: ALL PRICES ARE SUPPLY ONLY.

	AFFECT of DECISION			
	POS	NEU	NEG	N/A
SUSTAINABILITY				
BEAUTY	POS			
HEALTH		NEU		
PRAGMATIC		NEU		
TEAMWORK				
LEGACY				

DECISION MADE (+ ANY BACKUP)

DECIDED TO PROCEED WITH OPTION A)

What is Lean design?

SEE THINGS
DIFFERENTLY



CHANDOS

scan

SEE THINGS
DIFFERENTLY



CHANDOS

scan

SEE THINGS
DIFFERENTLY



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SEE THINGS
DIFFERENTLY

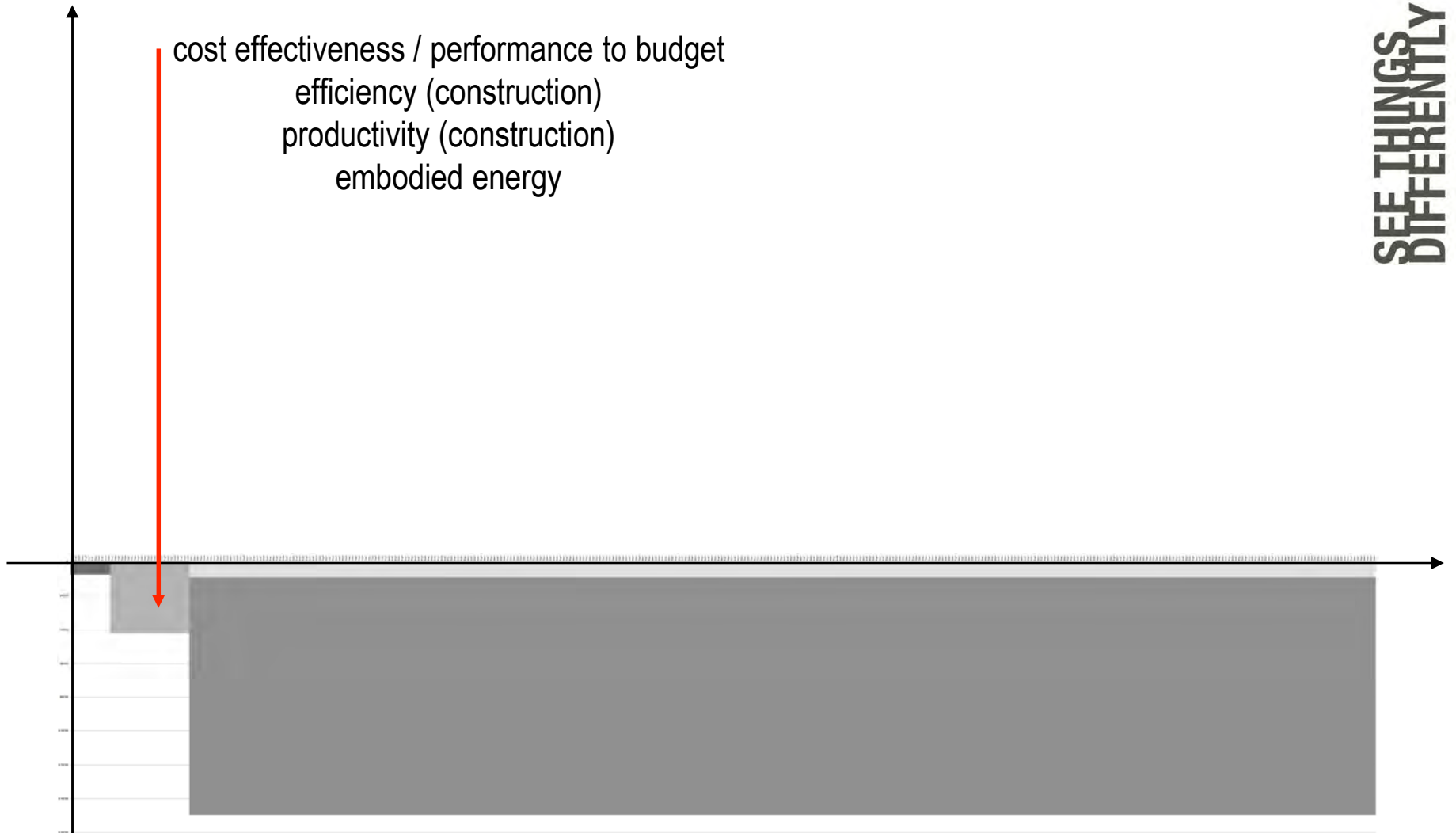


CHANDOS

scan

cost effectiveness / performance to budget
efficiency
productivity (construction)
environmental (sustainable) impact
embodied energy
energy use
maintenance costs
improved enterprise outcomes
worker satisfaction
productivity (users)
health
fit to use
flexibility
ROI
context / community
beauty

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CHANDOS

scan

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DIFFERENTLY

cost effectiveness / performance to budget
efficiency (construction)
productivity (construction)
embodied energy

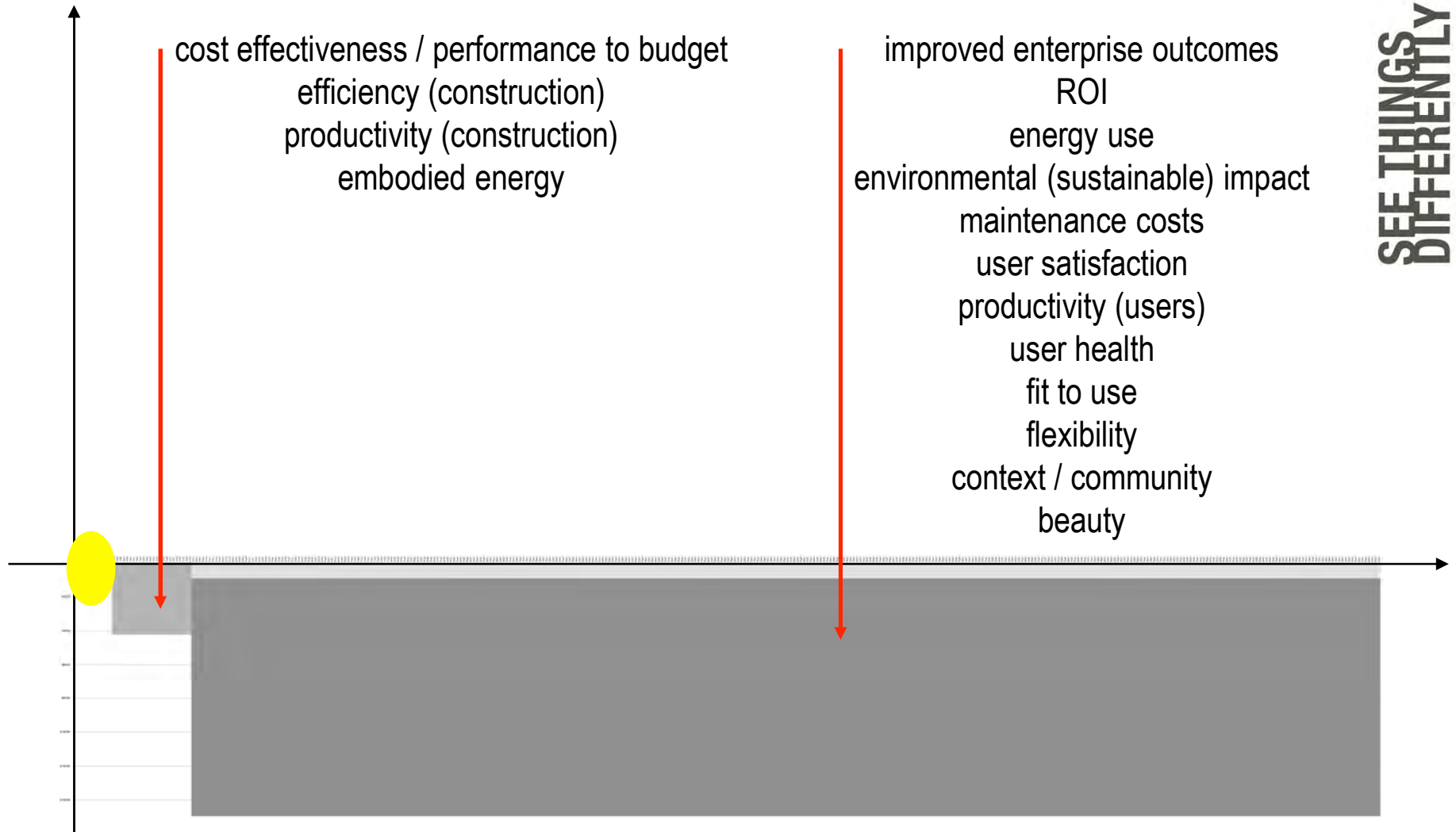
improved enterprise outcomes
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beauty



CHANDOS

scan

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DIFFERENTLY



CHANDOS

scan



CHANDOS

scan





CHANDOS

scan



SEE THINGS
DIFFERENTLY



CHANDOS

scan

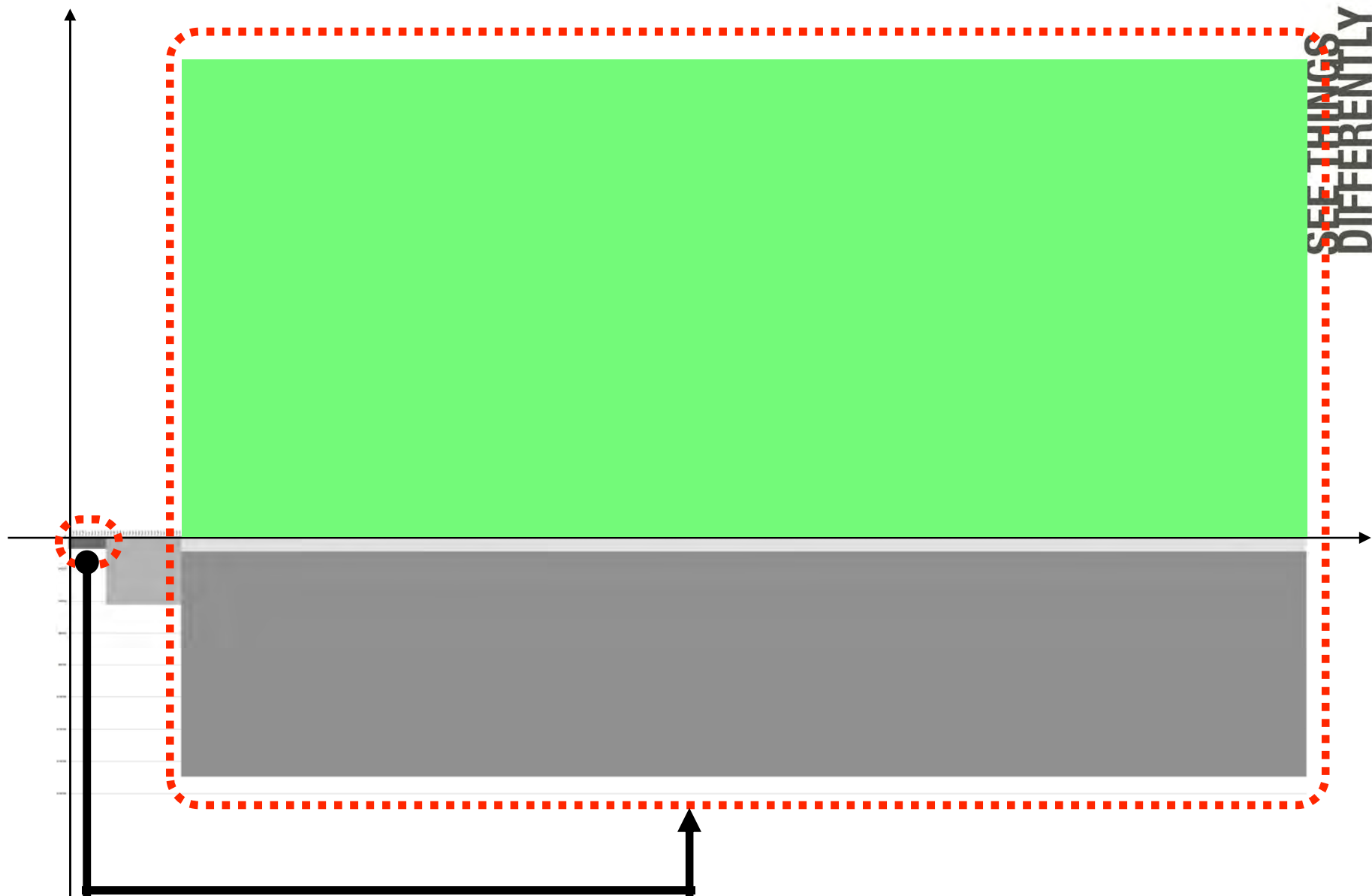


SEE THINGS
DIFFERENTLY



CHANDOS

scan





CHANDOS

scan

SEE THINGS
DIFFERENTLY

design
=
long term value for the
owner

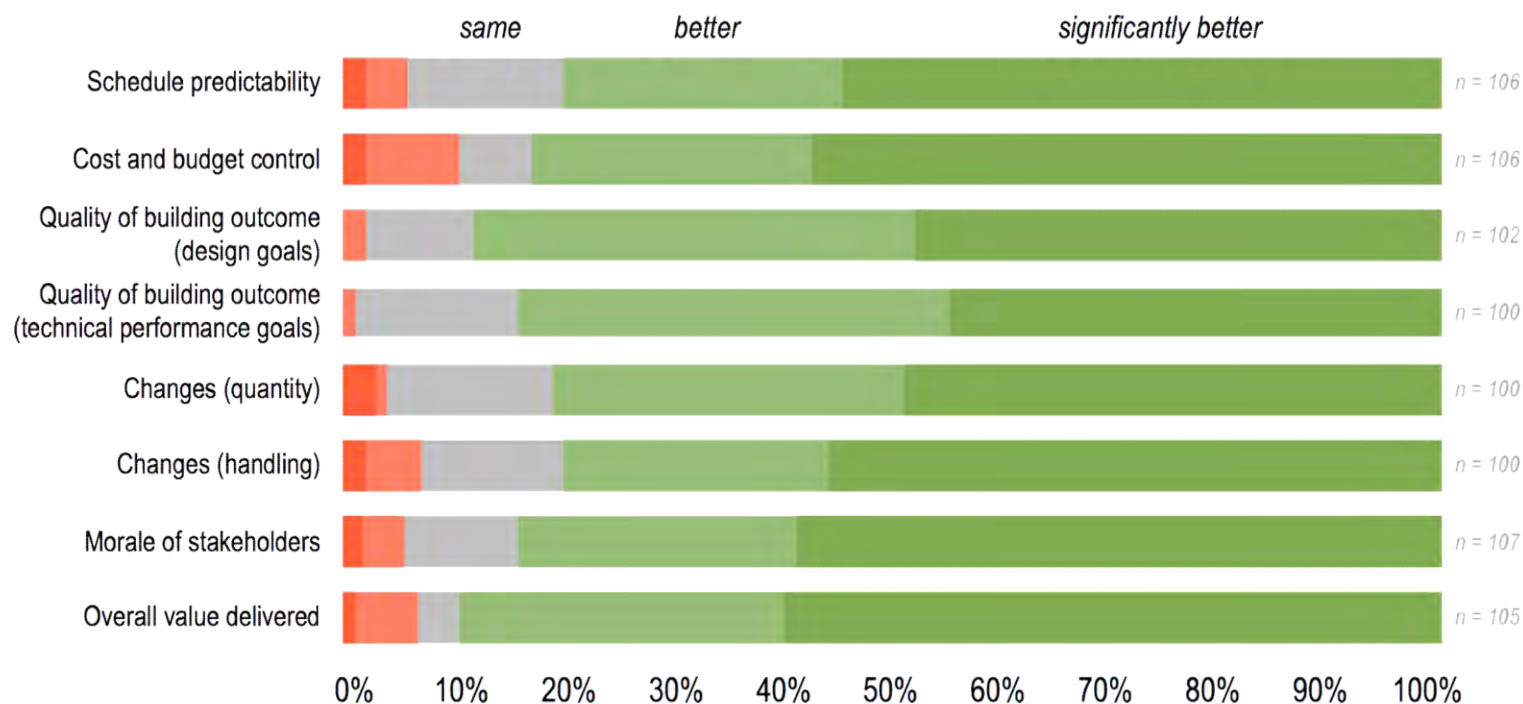
COMPONENT	% - SITE EXCLUDED			
	INDUSTRY	MOSAIC	COMPARABLE X	TRADITIONAL
SUBSTRUCTURE	4.4%	3.6%	8.2%	10.9%
SUPERSTRUCTURE	17.3%	22.4%	24.7%	15.5%
EXTERIOR ENCLOSURES	15.9%	20.2%	20.6%	19.1%
ROOFING	1.6%	2.8%	4.9%	2.4%
INTERIORS	20.5%	20.1%	8.1%	20.2%
CONVEYING	4.3%	1.4%	1.5%	2.9%
MECHANICAL	19.1%	17.0%	15.9%	18.4%
ELECTRICAL	16.9%	12.4%	16.1%	10.6%
SUBTOTAL	100.0%	100.0%	100.0%	100.0%
GENERAL CONDITIONS, FEES, OVERHEADS, PROFITS	25.0%	24.3%	22.0%	22.5%

MOSAIC VS PROJECT X

- Without net zero, Mosaic Centre is 12% less expensive
- With net-zero, Mosaic Centre is 2% less expensive

Lessons Learned

SEE THINGS
DIFFERENTLY



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM



CHANDOS

IT'S ABOUT...

- Early engagement of key participants; none of us is as smart as all of us.
- Shared values align interest.
- It all starts with culture. Get that right first, then start using tools like last planner and BIM.

FORECASTING

- Forecasting is critical to IPD success
 - Tracking burn rate of time and resources
 - Need to track both design and construction
 - Needs to be done monthly, at minimum
 - This is not easy!

CONTINUOUS ESTIMATING

- The estimate needs to be updated throughout design and construction
- Estimator needs to stay involved for longer

TARGET VALUE DESIGN

- Ensure there is adequate detail put into the validation study.
 - Ask yourself, ‘Can I go back to this document for clarity/answers later?’
- Is the team referencing the validation study during design and construction?

INFORMATION TRACKING

- Just because IPD is collaborative, does not mean the decision making, record keeping and changes should be done informally
- Clear processes should reflect value to the project and the team

CULTURE

- Establish a strong culture and maintain it
- Respect
- Accountability
- Trust

LEAN

- Just-In-Time delivery (JIT)
- 2 Second Lean
- Pull Planning was used but not to the rigour of Last Planner System

BIM

- We had a 3-D model but didn't use it on site for coordination
- We didn't use the model for pre-fabrication



iTRUST

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POSITIVE PEER PRESSURE



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“GREEN” **DENOMINATOR** **PROJECT CULTURE**

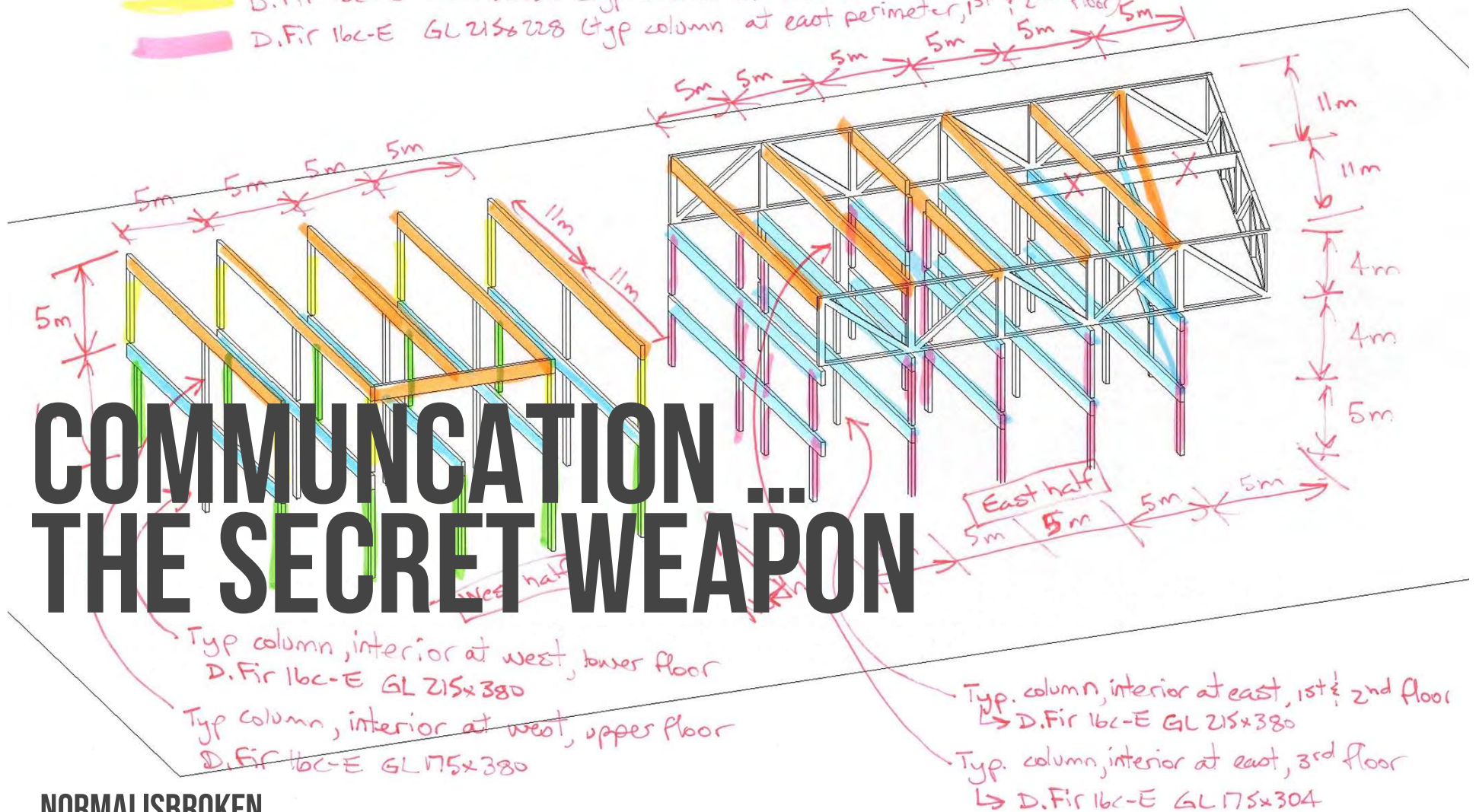
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BADASS PV CONTRACTOR

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- D.Fir 24f-E_x GL 215×608 (typ roof beam)
- D.Fir 24f-E GL 28×836 (typ floor beam)
- D.Fir 16c-E GL 215×190 (typ. column at west perimeter, lower)
- D.Fir 16c-E GL 175×152 (typ column at west perimeter, upper)
- D.Fir 16c-E GL 215×228 (typ column at east perimeter, 1st & 2nd floor)



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OWNER



ARCHITECT



CONSTRUCTION MANAGER



DESIGN

ARCHITECTURAL/ELECTRICAL



STRUCTURAL



MECHANICAL



LANDSCAPE



CIVIL



GEOTHERMAL/ ENERGY MODELING



ENERGY MODELING



LEED®/LBC



COMMISSIONING



CONSTRUCTION

GLULAM



STEEL



MECHANICAL



ELECTRICAL



GLAZING



CLADDING



ROOFING



SPRINKLERS



HVAC



REFRIGERATION/ CONTROLS



PV SYSTEMS



INTERIOR PARTITIONS/ ACOUSTICS



RED DEER SCHOOLS – NEXT GEN

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DIFFERENTLY





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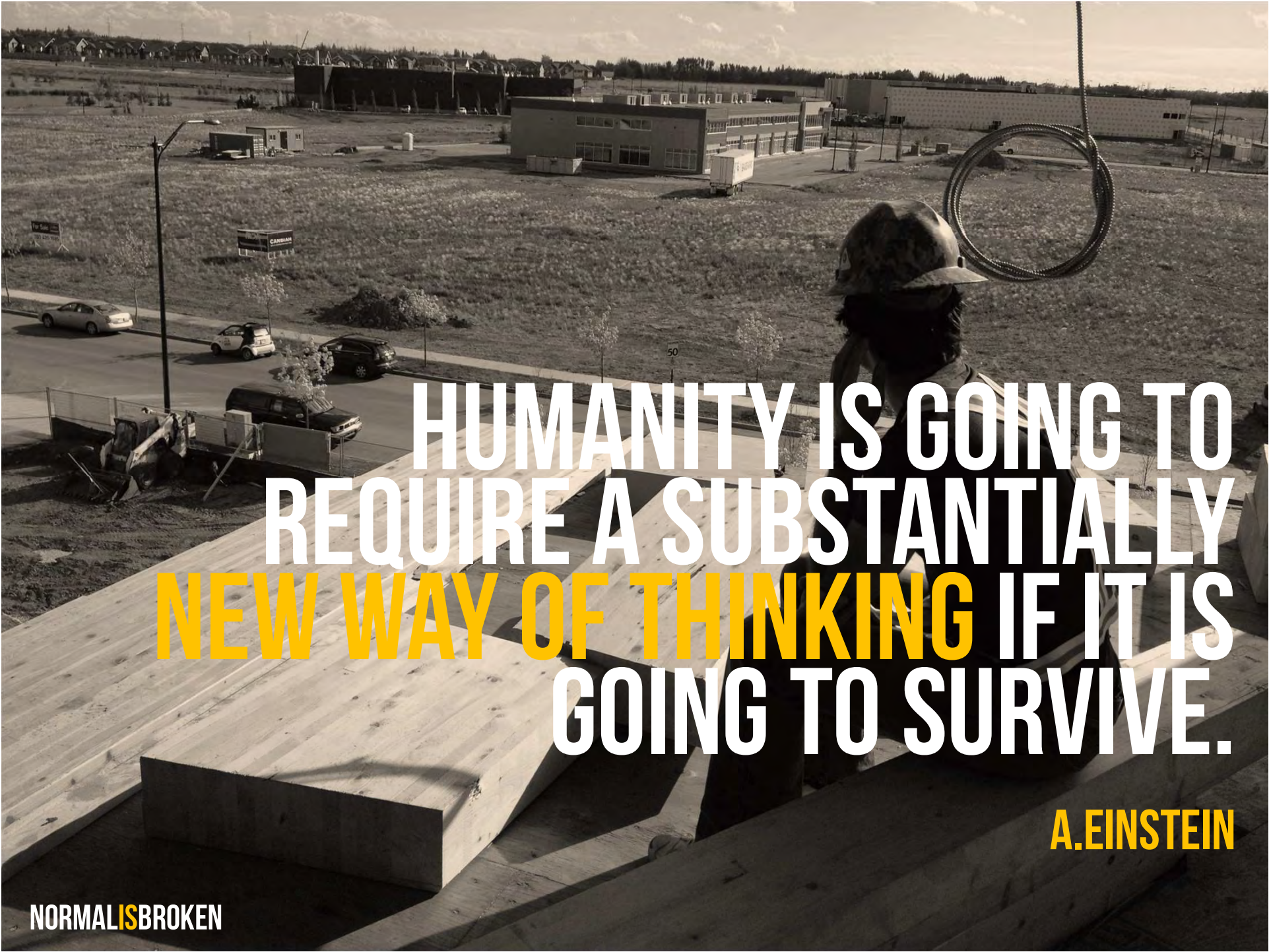


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**IT CAN
BE DONE**



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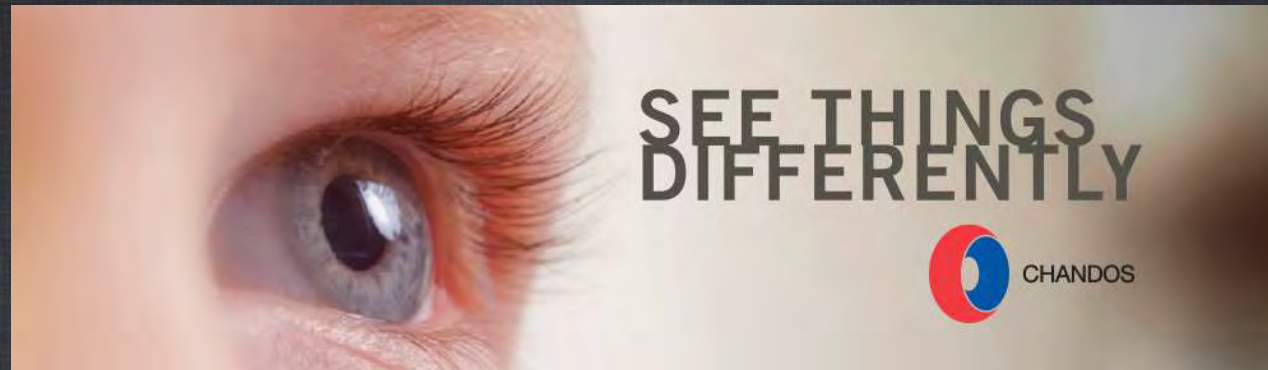
**HUMANITY IS GOING TO
REQUIRE A SUBSTANTIALLY
NEW WAY OF THINKING IF IT IS
GOING TO SURVIVE.**

A.EINSTEIN

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Get in touch

WAYMOREHERE

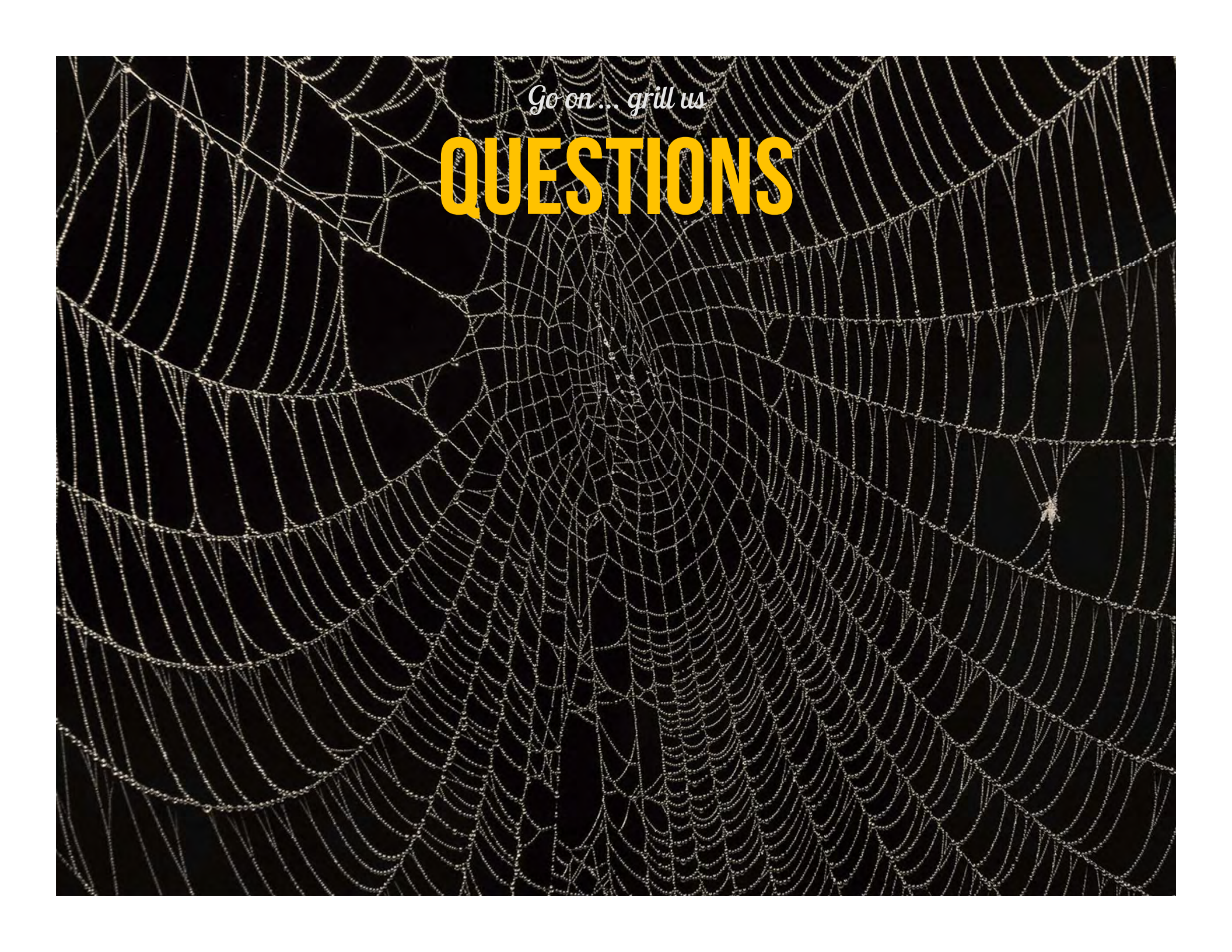


SOMETHING YOU HEARD TODAY COMPELLING YOU TO **THINK DIFFERENTLY**? WE'VE GONE AHEAD AND MADE ALL OF THE **LESSONS LEARNED** AND **INSIGHTS** OPEN-SOURCE AND HAVE SERVED THEM UP IN A VARIETY OF WAYS ... DEPENDING ON HOW YOU DIGEST YOUR INFORMATION. **GO ON ... DON'T BE SHY!**

WWW.THEMOSAICCENTRE.CA



OR, LEARN MORE ABOUT OIL COUNTRY ENGINEERING AND THEIR LEAN JOURNEY AT WWW.WCEM.CA



Go on... grill us

QUESTIONS