

Design of healthy interior environments

[Environment](#), [Ecology](#)



Part 1: Introduction

What is IAQ about? IAQ stands for Indoor Air Quality, which is a term to depict the distinctive feature of an indoor infinite and concern of the major wellness, safety, and public assistance about the design of the infinite.

Why Indoor Air Quality Is of Import?

Most of our life, we spend the most clip inside an edifice. Harmonizing to GREENGUARD “ Indoor Air is 2 to 5 Times More Contaminated Than Outdoor Air” [1]

As when we are inside an edifice, we are exposing to environmental pollutants when taking a breathing indoor air. [1]

What Affect Indoor Air Quality?

There is some chief facet that causes a hapless indoor air quality such as:

- Chemicals
- Mold
- Particulates
- Poor Ventilation

Inside the procedure of planing an infinite, we need to admonish the procedure of fabrication and building. Where in this instance the stuff may incorporate and let go of some sums volatile organic compounds (VOCs).

VOCs can be harmful when the chemicals are exposed to human beings. [2]

VOC's normally found in merchandise such as Furniture, Paint, Drywall, Bedding, Paint strippers, Adhesives/glues, Solvents, Upholstery, and other fabrics, Carpet, Cleaning merchandises, Copy machine toners, Office supplies, Electronic equipment, Dry-cleaned vesture, Building stuff. [3]

Formaldehyde, Decane, Butoxyethanol, Isopentane, Limonene, Styrene, Xylenes, Perchloroethylene, Methylene, Chloride, Toluene, Vinyl chloride is some of the common VOCs in places, offices, and schools. [3]

What is GREENGUARD Certified Program?

“ GREENGUARD Certification is recognized and referenced in legion edifice plans, criteria, and specifications around the universe. Merchandises with GREENGUARD Certification or GREENGUARD GoldCertification can lend to the accomplishment of points in established green edifice evaluation systems, satisfy codification or regulation standards, and run into indoor air quality specific RFP requirements.” [4]

Mention:

1. hypertext transfer protocol: //www. greenguard. org/en/CertificationPrograms. aspx
2. Gesimondo & Postell, 2011, Materiality and Interior Construction, Wiley P6-8
3. hypertext transfer protocol: //www. greenguard. org/en/indoorAirQuality/iaq_chemicals. aspx

4. hypertext transfer protocol: //www. greenguard.

org/en/CertificationPrograms. aspx

Part 2a: Public Space – Neil Pitt Edifice Hotel Lobby

The hotel anteroom takes topographic point at bing Neil Pitt edifice located on Brisbane Street.

	Length (m)	Height (m)	Surface Area (m ²)
Entire Wall and Column	60. 30m	4. 2m	253. 26m ²
New Built Wall	19. 05m	4. 2m	80. 01m ²
Display Wall	5. 40m	4. 2m	22. 68m ²
Partition	8. 80m	1. 2m	10. 56m ²
Window	15.	4. 2m	64.

, Glass Door	4m		68m ²
Entire	-	-	431. 19m ²

Surface Area of Wall(High Impact IAQ)

Floor and Ceiling Area(High Impact on IAQ)

$$\text{Floor Area} = 16.05\text{m} \times 18.2\text{m} = 292.11\text{m}^2$$

$$\text{Ceiling Area} = \text{Floor Area} - \text{Void Area}$$

$$= 292.11\text{m}^2 - (4.28\text{m} \times 12.196\text{m})$$

$$= 239.85\text{m}^2$$

Volume of the Space (High Impact on IAQ)

$$= 18.2\text{m} (L) \times 16.05\text{m} (W) \times 4.2\text{m} (H)$$

$$= 1226.86\text{m}^3$$

From the above computation, the surface country of the wall has the largest proportion of surface in the country. After subtraction out the divider and window portion, the wall has a country of 333.27m². Therefore, the choice of stuff for this will be most of the import as it affects most IAQ of that country.

Floor country that consists of 292. 11m² will be the 2nd largest surface within the country. And ceiling will be the last, consists of 239. 85m²

The entire volume of this hotel anteroom is around 1226. 86m³. For a public infinite like hotel anteroom that is in immense volume, there will be more fondness in airing and humidness of the infinite.

Objects:	Measur e:	Material
Counter	1	Wood, Laminate
Plant	14	Wood
Table	7	Wood, Glass
Lighting	28	Steel, Glass, Plastic
Sofa	4	Wood, Leather
Chair	18	Steel,

		Leather
Air Conditionin g	4	Steel, Plastic
Others	-	-
(Low Impact on IAQ)		(Medium Impact on IAQ)

Objects and Material in the Space

Age of Material(Medium Impact on IAQ)

For Neil Pitt edifice, most stuff of the edifice is old and some might necessitate holding retreatment or renovation on the big stuff. There will be some impact to look on such as the lumber saving (may utilize toxic merchandise), bing brick and block (may happen natural radiation), metal (where some repainting demand to be done), and some old adhesives or sealers might incorporate some dissolvers. [5]

Mention:

1. hypertext transfer protocol: //www. uq. edu. au/ohs/pdfs/pol-indoorair.pdf

Part 2b: Private Space – Holyman House Double Bedroom

The dual sleeping room is located at Holyman House in Brisbane Street. This hotel room merely a little sleeping room with a dual bed plus a cabinet filled with fabric hanging, a Television cabinet, and besides workspaces.

	Length (m)	Height (m)	Surface Area (m ²)
Wall	15.05m	3.76m	56.69m ²
Window	2.38m	1.45m	3.45m ²
Entire Wall - Window	-	-	53.24m ²

Surface Area of Wall(High Impact IAQ)

Floor and Ceiling Area(High Impact on IAQ)

$$= 4.44\text{m} \times 3.083\text{m} - 1.471\text{m} \times 0.996\text{m}$$

$$= 13.69\text{m}^2 - 1.47\text{m}^2$$

$$= 12.27\text{m}^2 \text{ (both floor and ceiling)}$$

Volume of the Space(High Impact on IAQ)

$$= [2.969\text{m} \times 3.083\text{m} + 2.087\text{m} \times 1.471\text{m}] \times 4.2\text{m}$$

$$= 45.96\text{m}^3$$

For this sleeping room, the wall beside occupied the most surface country with the entire wall size of 53.24m^2 . The Floor and ceiling occupied the 2nd with 12.27m^2 each.

As for the room volume, this room has a little volume of 45.96m^3 .

Comparison with the public infinite Hotel Lobby, this smaller infinite IAQ will better as got direct entree to the window which provides natural airing.

Objects and Material in the Space

Objects:	Measure:	Material
Bed	1	Wood, Fabric
Cabinet	3	Laminate
Lighting	6	Steel, Glass
Chair	1	Steel,

		Leather
Television	1	Steel, Glass, Plastic
Others	-	-
(Low Impact on IAQ)		(Medium Impact on IAQ)

Age of Material(Medium Impact on IAQ)

Similar to Neil Pitt edifice, Holyman house most stuff is old and some might necessitate holding retreatment or renovation on the big stuff.

Part 2c: Extra Factor

1. Ventilation

Ventilation is a procedure where air altering through a gap in the infinite. Hausladen & Tichelmann reference in their book that: “ Natural airing is an agency of accomplishing a direct exchange between internal and external air through Windows or dedicated airing louvers or flaps.” [6] For the Hotel Lobby country, the natural airing is non every bit good as the infinite is a deficiency of opening such as a window. It merely has a chief door entryway. Therefore for the anteroom country, mechanical airing will be needed.

Holyman house sleeping room airing is better where they have their own window and the size of the window is suited for the volume of the room.

Figure 1 [7]

1. Humidity

Humidity is the measure of H₂O vapor in the ambiance. In cold topographic points illustration when winter, the humidness is low and for Tasmania, the temperature is cold, hence humidness is easier to command. To forestall grew of the cast, humidness must non over the per centum of 70 %. Several ways can command humidness inside a room such as airing, temperature control, and dehumidification. [8]

1. External Air

There is some common facet between external air and natural airing. As being reference above, Hotel lobby country is harder to acquire external air due to the location and deficiency of gaps that exposes the infinite to the outside air.

Mention:

1. Hausladen & Tichelmann, 2010, Interiors Construction Manual: Integrated planning, Finishes, and Fittingout, Technical Services, DETAIL, Birkhauser P174-175
2. Hausladen & Tichelmann, 2010, Interiors Construction Manual: Integrated planning, Finishes, and Fittingout, Technical Services, DETAIL, Birkhauser P174-175

3. Godish, Thad, c1989, Indoorair pollutioncontrol. Chelsea, Mich. : Lewis Publishers P167-168

Part 3: Indoor Air Quality Strategy

As the undertaking is taken portion at the old edifice, get downing by analyzing the factor of the bing edifice. From the edifice, the chief nucleus stuff will be brickwork and concrete.

Brickwork effects on Indoor Air Quality

- They may happen some natural radiation.
- But this radiation merely to be found low in the scope of merchandise.

Concrete

- Concrete besides may incorporate natural radiation

Timber

- Preservation of lumber might incorporate toxic merchandise.

As these three chief stuff will be found in the bing edifice which still need to maintain and can't be replaced, I will travel to the following measure of aiming the care plan and remotion facet. The ground of this scheme is because the care of the hotel is non-easy when clean up, moreover this spread hotel is located individually. For the remotion facet is consider after a few old ages, the hotel might travel through for new redevelopment, repackaging the hotel. Using this, the stuff will be analyzed to fit the scheme that traveling to be using.

The three primary surface stuff will be floor, wall, and ceiling.

Material Selection - Floor

Ceramic floor tiles : Portland cement-based will not breathe any VOCs and/or the growing of harmful allergens.

Rug : will be the host for dust mites and mold spores. VOCs found to be emitted from the solvents, latex backing or the adhesives used in the merchandise installing.

Cork : may incorporate vinyl and methanol

Linoleum : natural stuff, but some systems contain off-gassing. Some people may sensitivity with the linseed oil.

Rubber flooring : disinfectant, but minimum off-gassing opportunities.

Vinyl flooring : stuff that is component beginnings of VOCs.

Wood flooring : maintenance such as varnishes, discolorations will give off big sums of VOCs. [9]

Stone flooring : hard composition, the broad scope of coatings. Example of rock: Granite, Marble, Travertine. [10]

Mention:

1. Gesimondo & Postell, 2011, Materiality and Interior Construction, Wiley P54-55
2. Gesimondo & Postell, 2011, Materiality and Interior Construction, Wiley P149-151

Material Selection - Ceiling

Acoustic Ceiling tiles : hold wet control or wet balance. Some low denseness mineral fiber ceiling can absorb wet and humidness. Largely Low or no VOCs. Recyclable, renewable stuff. Easy care.

Ceramic tile : fireproof, similar to floor ceramic tiles, doesn't commit VOCs. Low care, odorless.

Concrete Ceiling : non see as green stuff, can be recycled. Care may necessitate sealer that might incorporate VOCs. Pressure might do cleft.

Gypsum Board: lasting and can organize different forms. Susceptible to H2O and wet harm and cause growth of cast.

Metallic element Ceiling : Durable.

Plaster Ceiling : non wholly environmentally sustainable. However, they will non breathe VOCs. Absorbs wet. May cleft after some time. Excessive wet can damage it. [11]

Mention:

1. Gesimondo & Postell, 2011, Materiality and Interior Construction, Wiley P294-320

Material Selection - Wall

Bead Board : meets the standards of GREENGUARD about the chemical emanations. Contain PVC that is the beginning of VOCs. Durable and easy to keep.

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Brick Masonry: low care and lasting . Good for reuse and recycle. Some brick might be porous such as painting brick.

Cement fibreboard : strong and immune to fire, insect, and decay. But receive discoloration and will bit. No care required, wet fabric rub for cleansing.

Ceramic tiles : similar to floor and ceiling ceramic tile. Easy to keep and lasting.

Concrete : similar to the concrete ceiling.

Glass/ Glazing : transparent, translucent, or opaque stuff. High fire resistance. The installation has a sequence for panel parts.

Gypsum drywall: similar to the gypsum ceiling. [12]

Mention:

1. Gesimondo & Postell, 2011, Materiality and Interior Construction, Wiley P203-283

Part 4: Solution to Make a Better Indoor Air Quality

1. Shocking for Hotel Lobby

For the Hotel Lobby, after going through some list of stuff, rock type shocking which this suite my scheme demand of easy care and remotion facet.

Rock flooring is easy to keep and did non incorporate of VOCs in the installing of remotion.

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There is a disadvantage where rock shocking pricing is rather high compared to other flooring.

The stuff is alone because of its nature signifiers of texture.

Travertine Stone Floor [13]

1. Shocking for Hotel Rooms

For the suites, the rug will be used although it is harder to clean. The rug supplier that to take will be their stuff is a free emanation of VOCs and eco-friendly carpet pad.

This is because rug care is a lower compared to wood flooring, merely cleaning portion will be harder.

Carpet besides can do the room experience warmer comparison to the rock flooring that being taken to utilize at the hotel anteroom.

Nylon Rugs [14]

Mention:

1. hypertext transfer protocol: //www. ecostonefloors. com. au/
2. hypertext transfer protocol: //www. ec-group. com. au/ ? view= featured

1. Ceiling for both Hotel Lobby and Rooms

Acoustic Ceiling tiles have been choosing to be the ceiling stuff because of the non-VOCs. It is besides easy to keep and clean. Other than that, the

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acoustic ceiling supplies some acoustic demand for the infinite which is an excess benefit other than the indoor air quality.

Acoustic Ceiling [15]

1. Wall for both Hotel Lobby and Rooms

Brick masonry wall will be used for the lasting and easy care scheme. The covering of the wall will be plastered and painted with GREENGUARD certified pigment.

There will besides some glass wall at the hotel anteroom to supply natural sunshine into the infinite.

Mention:

1. hypertext transfer protocol: //www. gyprock. com. au/

Part 5: Mention List

Books:

1. Hausladen & Tichelmann, 2010, Interiors Construction Manual: Integrated planning, Finishes, and Fittingout, Technical Services, DETAIL, Birkhauser
2. Gesimondo & Postell, 2011, Materiality and Interior Construction, Wiley
3. Godish, Thad, c1989, Indoor airpollutioncontrol. Chelsea, Mich. : Lewis Publishers
4. Bearg, David W., c1993, Indoor air quality, and HVAC systems. Boca Raton, Fla. : Lewis Publishers
5. Conran, T., 2009, Eco House Book, Conran Octopus

6. Susan, M., 2012, Sustainable Design for Interior Environments, Bloomsbury Acad & Prof

Web site:

1. hypertext transfer protocol: //www. aerias. org/hospitality
2. hypertext transfer protocol: //www. isiaq. org/
3. hypertext transfer protocol: //www. greenguard. org/en/CertificationPrograms. aspx
4. hypertext transfer protocol: //www. ecostonefloors. com. au/
5. hypertext transfer protocol: //www. ec-group. com. au/ ? view= featured
6. hypertext transfer protocol: //www. gyprock. com. au/