TAKING CONTROL OF RUN OFF WITH BUILDING GEOMETRY AND DETAILS

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INTRODUCTION

Background –

•Buildings up until 1800's under influence of **glamorous religious purpose** or **to express power**

•**Auguste Perret, French architect** proposed on simple building façades

(Hood, 2010)

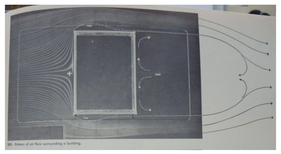
(Hood, 2010)

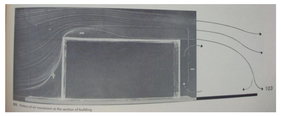
Terminologies & Effects –

Wind flow field around a building carries rain drops with it. When there is an **interruption** on the building façade, these rain drops are **deposited** onto the surface.

Depending on the substrate, **runoff** does not happen until the surface material has reached its ability of absorbance. Wind can carry water, but water can carry dirt, dust, air pollutants etc. These can then be left on the façade textures.

Runoff can create several different effects on building facades, including: **Staining**, **Wetting**, **Weathering**, **Dirt Accumulation**, **Dirt Washing** and **White Washing**.





(Olgyay, 1992)

These effects can vary differently depending on how the façade is related to the wind driven rain. Façade on the **windward side** would have more visible stains and or wetting patterns than the **leeward side**.

PURPOSE OF PHOTO ANALYSIS

•Stain patterns on building facades are **not** random
•Visualization, evidence to see the causing factors behind them: **Wind directions**, **Wind forces**, **Rain water**

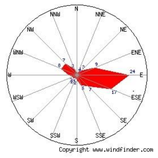
•Highly Ornamented Buildings >> Simple Plane Designs
•Windward Directions/ Wind Flow Field >> Raindrops/ Wetting >> Wetting & Staining Patterns

CLIMATIC EFFECT RESULTING IN WIND DRIVEN RAIN

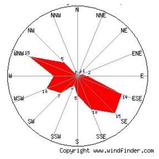
CHARACTISTICS OF VANCOUVER CLIMATE –

•Temperate
•Oceanic
•Average 166 days with measurable precipitation per year
•Pineapple Express weather pattern often brings warm rainstorms in winter
•Wind driven rain generally can be assumed to be from the SSE

Data taken for **January** from 2007 to 2010



Data taken for **July** from 2007 to 2010



Data taken from 2007 to 2010

(Wind Calculator)

VISUALIZING WIND FLOW FIELD WITH PHOTO CATEGORIES

Terrain Category -

A: Large city centers with buildings averaging over 70' in height.

B: Urban and suburban areas.

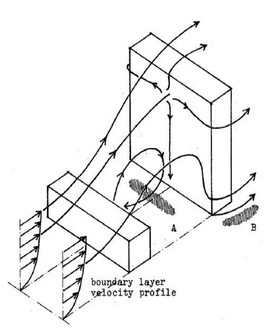
C: Open terrain.

D: Flat, unobstructed areas exposed to wind flowing over water.

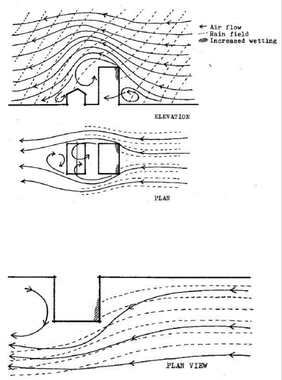
(Gerrity, 2009)

Facing Direction -

North, East, South, West



(Robinson & Baker, 1975)



CATEGORIZED PHOTOS AS EVIDENCE TO SEE WIND FORCE

The pictures have been categorized into 5 categories; **Channelling and Masking**, relating to some of the good practices, **Wetting**, **White Washing**, **Staining and Dirt Accumulation**, and **Weathering**, where the first three reveals the wetting negative aspect and the latter two, drying.

Channelling and Masking

Wetting

White Washing

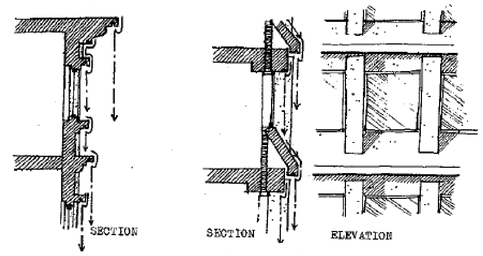
Staining & Dirt Deposition

Weathering

RECOMMENDATIONS & CONCLUSION

Recommendations:

•**Masking façade with darker colors** where runoff is expected
•**Deflector flashing** to redirect water
•**Vertical channels** where horizontal & vertical elements meet (eg. Windows)
•**Overhangs** over projecting components (eg. Frames) to interrupt wind flow
•**Drip edges**



(Robinson & Baker, 1975)

RESOURCES

Canavan, H. D. (2008, 12 4). *WO 2008/14600 - Initial Publication with ISR (A1 49/2008).* Retrieved from World Intellectual Property Organization: http://www.wipo.int/pctdb/en/wo.jsp?WO=2008146000&IA=GB2008001829&DISPLAY=DOCS

El-Shimi, M., White, R., & Fazio, P. (1980). Influence of facade geometry on weathering. *Canadian Journal of Civil Engineering* , *7*, 597-613.

Robinson, G., & Baker, M. C. (1975). *Wind-Driven Rain and Buildings.* Ottawa: National Research Council of Canada Division of Building Research.

Smith, P. F. (2005). Architecture in a Climate of Change Second edition. In P. F. Smith, *Architecture in a Climate of Change Second edition* (pp. 115-117). Oxford, United Kingdom: Architectural Press.

Yeang, K. (2006). *ECODESIGN A Manual for Ecological Design.* London, UK: Wiley-Academy.

Wikipedia. (2007, October). Retrieved May 2, 2010, from Climate of Vancouver: http://en.wikipedia.org/wiki/Climate_of_Vancouver

Hood, J. *Flicker* (2010). Retrieved May 4, 2010, from Flickr: http://www.flickr.com/photos/entheos_fog/4531704905/sizes/o/

Weldon, R. (2007, September). *ASHI REPORTER.* Retrieved May 4, 2010, from Commercial Inspection Tips: The Building Envelope — How Does it Stack Up?: http://www.ashireporter.org/articles/articles.aspx?id=1253

Wind Calculator. (n.d.). Retrieved May 6, 2010, from Metal Era: http://www.metalera.com/CalcWind.aspx?id=2098

Gerrity, M. (2009, August 7). *Vacation & Leisur Real Estate*. Retrieved May 6, 2010, from Real Estate Channel: http://www.realestatechannel.com/assets_c/2009/08/MGM-city-center-Construction-site-thumb-630x418.jpg

Olgyay, V. (1992). *Design with Climate: Bioclimate Approach to Architectural Regionalism.* John Wiley & Sons Inc.

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