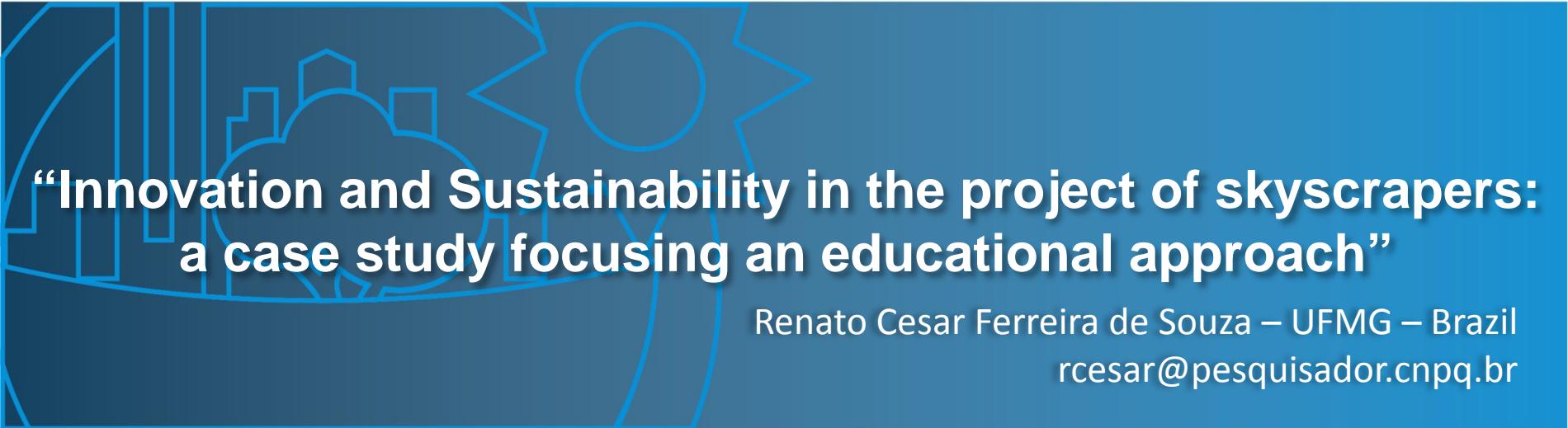


4th International Workshop - Advances in Cleaner Production

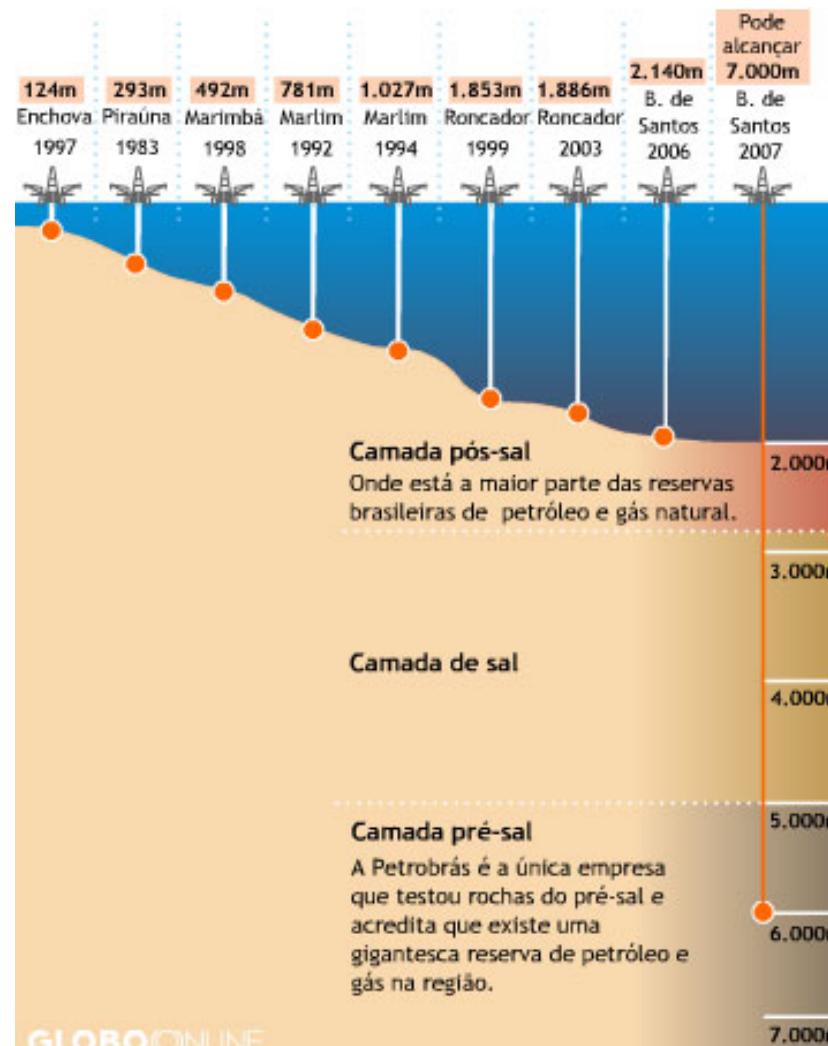
São Paulo - Brazil - 22nd to 24th, May - 2013



“Innovation and Sustainability in the project of skyscrapers: a case study focusing an educational approach”

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The very start of a dream?





Minas Gerais County council (2003-2010)





County Council





S6, S6A, S6B





Arround the Council





Arround the Council



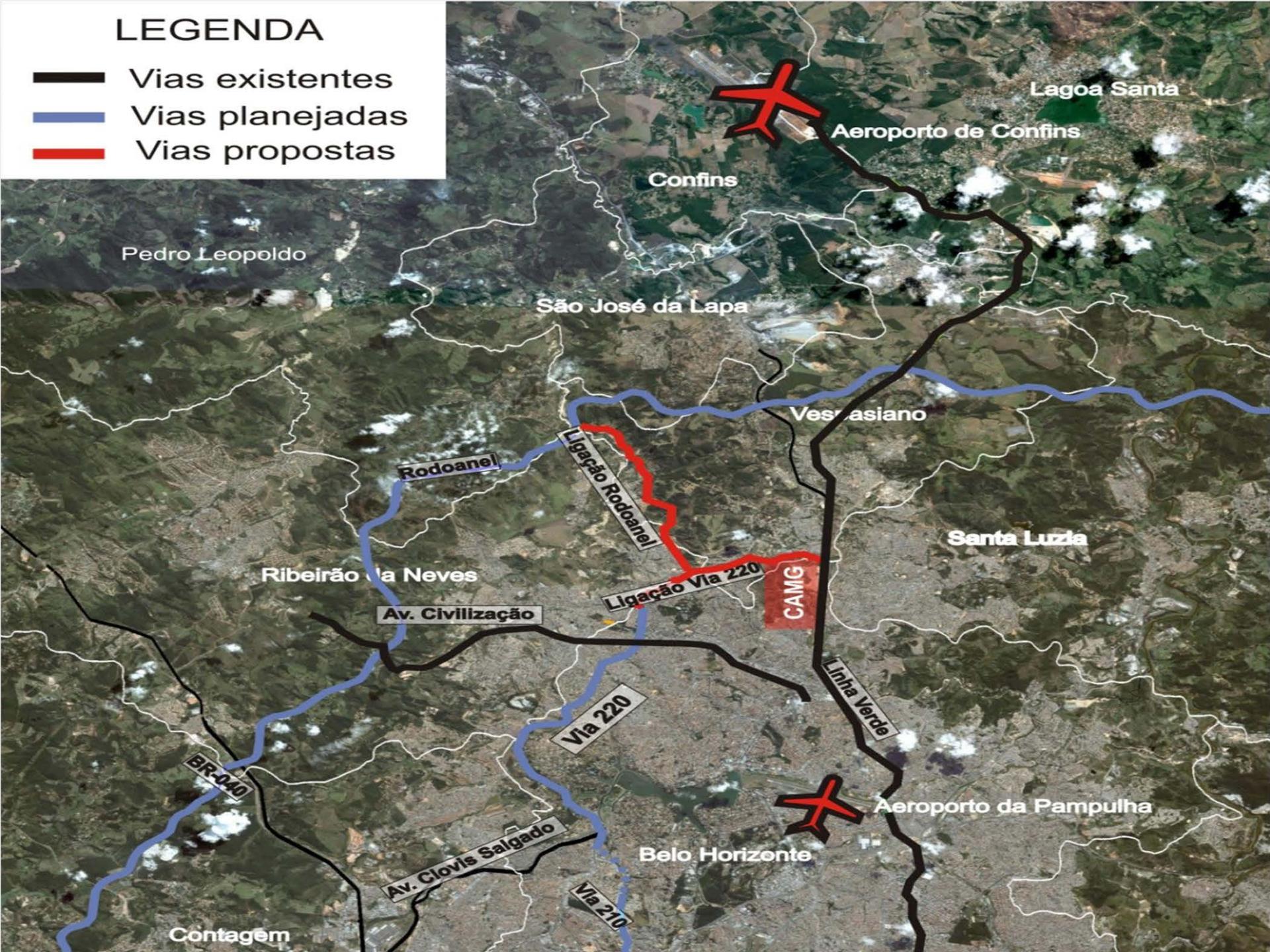
BOULEVARD - VIA PARQUE

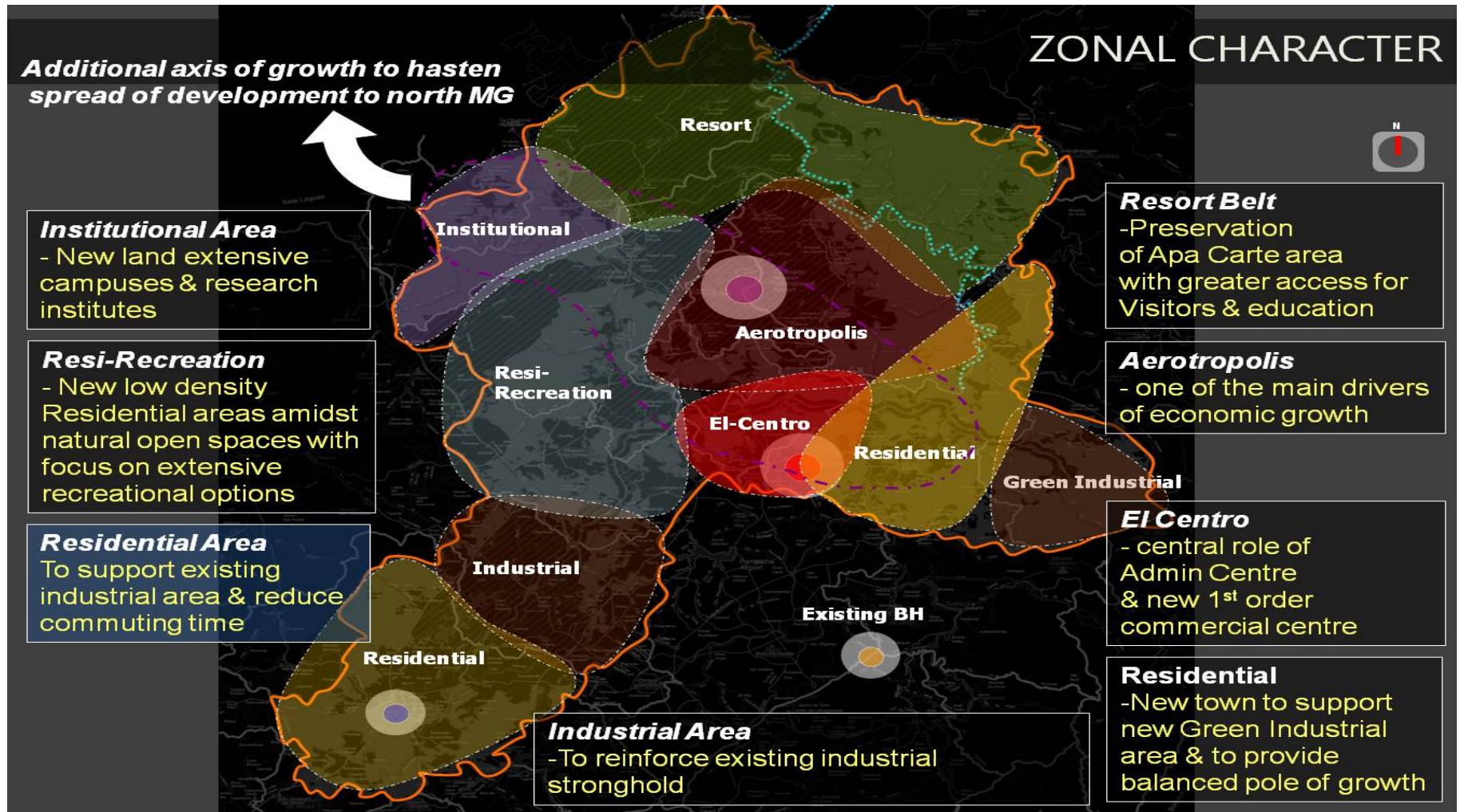
Arround the Council: the site



LEGENDA

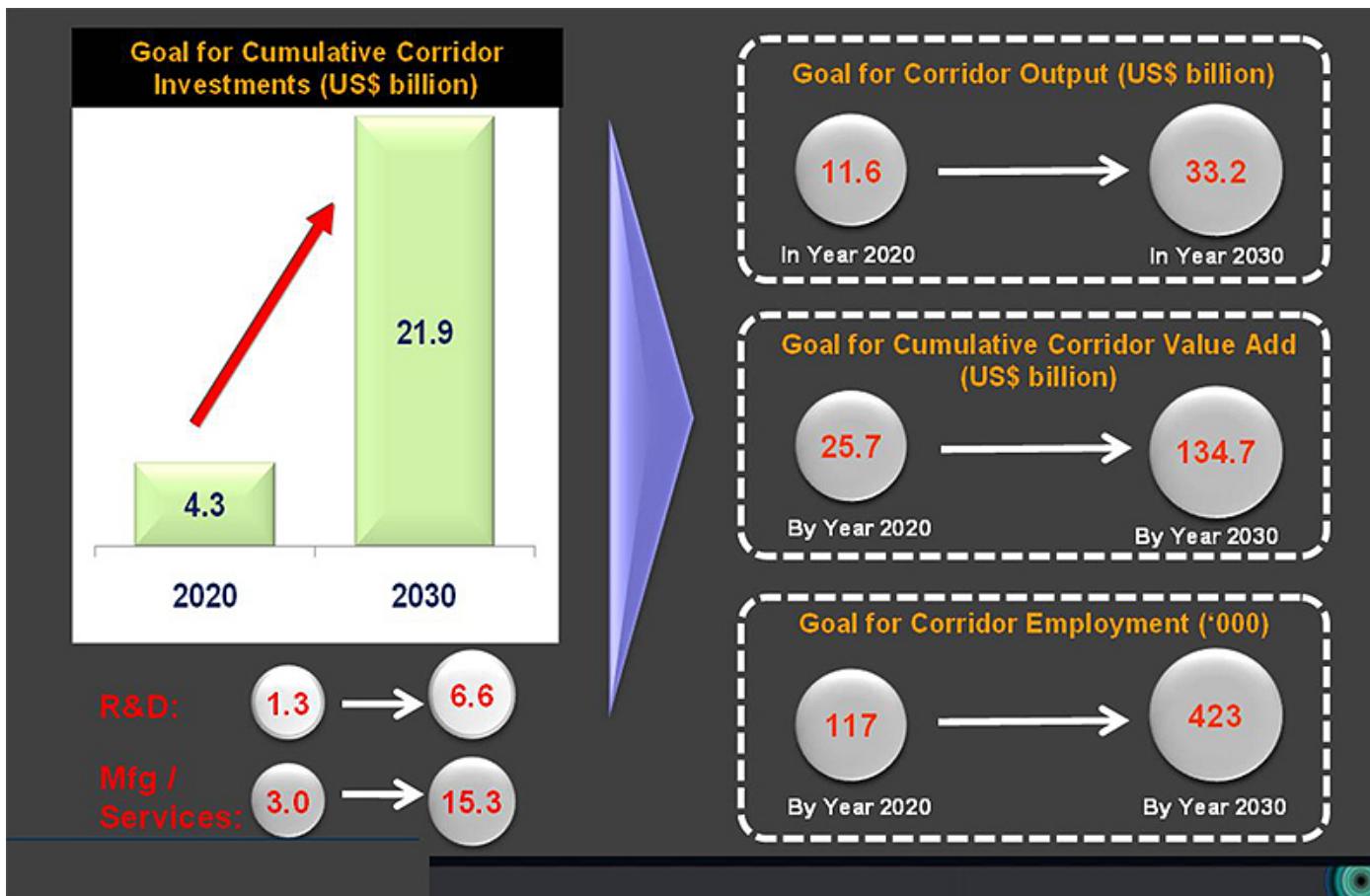
- Vias existentes
- Vias planejadas
- Vias propostas







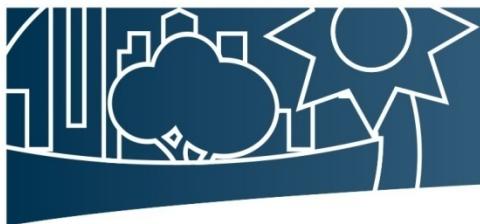
Economic and monetary goals to Minas





- *Is this System the cause of the material progress that came from preto?*
- **NO!**
- *it comes from an exponential and continuous advance in the productive technology;*

There is an apparent mega-source of hidrocarbonet to base all the economic and social system.



A New Way to think Global Systems of managing resources extraction:

Resource Based Economy (Jacques Fresco 1970).

- Production: strategic preservation; safety; efficiency.
- Distribution: Strategic proximity; accessibility .



The Problem and the Method

Our problem was using the early stages of design of skyscrapers to reach principles to project a guidance in order to achieve cleaner and sustainable buildings. That would demand a research of new technologies, even some announced by the specialized media but not ready to use yet. In doing so, it was expected that this process would reveal the main difficulties that the students would have.

Case Studies



Urban Farming Research Centre

how to grow life?

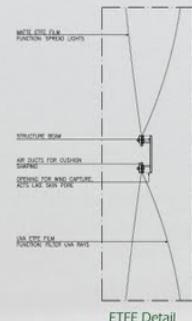


Due to our current technology today we can build skyscrapers. Since immemorial times, as Babylon era, we can see human's desire of farming and gardening vertically. Adding up to this, nowadays we seek for technological support to built environmental friendly towers and sustainable buildings that create synergic influences within their environment.

Beyond sustainability, in this project we were concerned of a research process that include the building itself as an experiment to cultivate hydroponics. It is justified considering the massive amount of potable

light

The building is covered with an ETFE (Ethylene tetrafluoroethylene) two sided cushion. It helps to correct the two main problems with exterior lighting which are glare and UVA rays. The exterior film filters the UVA rays, and the inner spreads the light. Thus the growth environment will be perfect for plants.



water demanded by any traditional agriculture and a giant size of lands used to cultivate. If we not pay attention on those bigger farms, we will devastate ours forests in the behalf of an expansion of agricultural areas. A lot are being spent in order to get this buildings sustainability. But this one is not to turn other buildings more sustainable, it is to turn life more sustainable. We see food as something that has almost no impact on the planet, but the truth is that agriculture uses lots of natural resources. A good percentage of all potable water is used for agriculture, and we

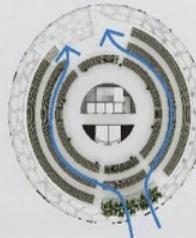
may also say that lots of forests are being devastated. Here in Brazil, the bounds of the Amazon rainforest are being pushed by big farmers. All the technology used in this building is developed and ready to use. That means that the project is not a prognosis of a technological state in the future. Three concerns were explored in the architectural solutions: all spatial elements were planned to permit plants to grown better, with light, temperature and water.

temperature

In Brazil the main problem with greenhouses is the indoor temperature, too high for most of plants. So the ventilation is one of the main problems. We have to make it run cool most of the time.

In the project, there is a big atrium faced NE-NW, witch is the sun path in the South Hemisphere. That warms the air and make it go upwards, sucking it on the other big opening SE-SW. Therefore it cools perfectly the interior.

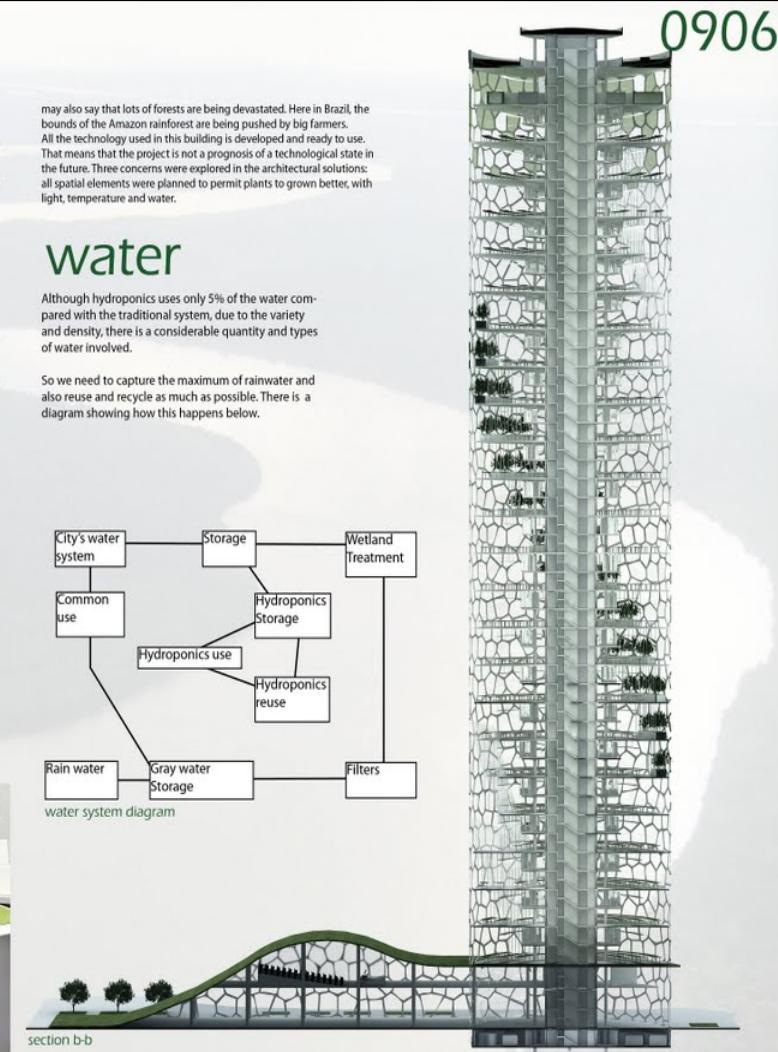
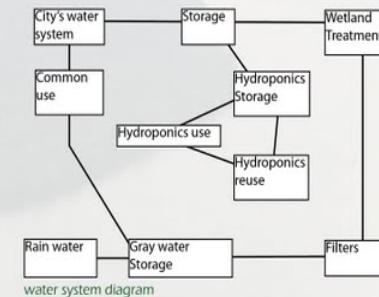
Also there are little openings in etfe-structure interface, that acts like skin pores, capturing wind from every side of the building.



water

Although hydroponics uses only 5% of the water compared with the traditional system, due to the variety and density, there is a considerable quantity and types of water involved.

So we need to capture the maximum of rainwater and also reuse and recycle as much as possible. There is a diagram showing how this happens below.



0906

The first building will serve as a prototype.

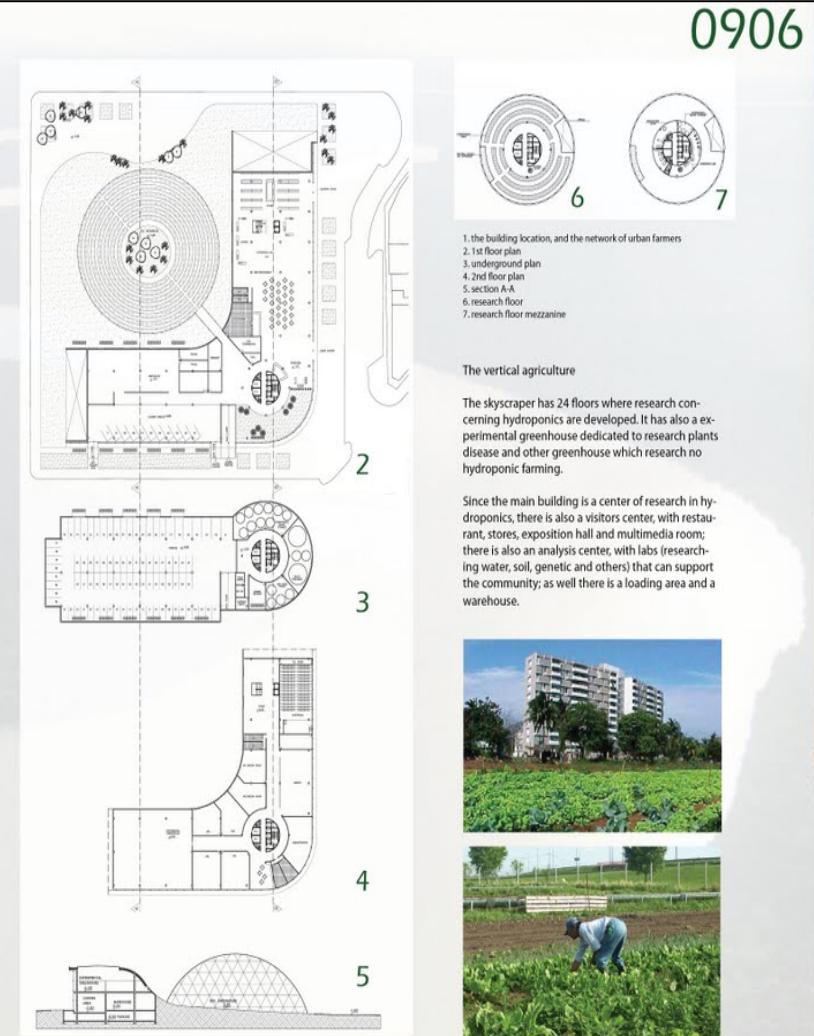
urban farming research center



Nowadays, to feed the world's population of 6.8 billion people, it's needed an equivalent area of entire South America. According to some studies, yet by 2050, with 9 billion people, we may need an area equivalent to Brazil. So, there is a clear necessity to look for new developments of agriculture.

This proposal do not have intention to present a skyscraper that explores maximum deployment of resources in smallest areas, but it constitutes a first essay where skyscrapers like that could pop in the skyline of the city.

In the sense this skyscraper should be a powerful tool to local city farmers, who will make their all experiments and will find the best conditions to produce vegetables and ease their labor. In the midst of many objectives, the building aims to be a center of a local network of urban farmers since its site is in front of a central market of Belo Horizonte city.

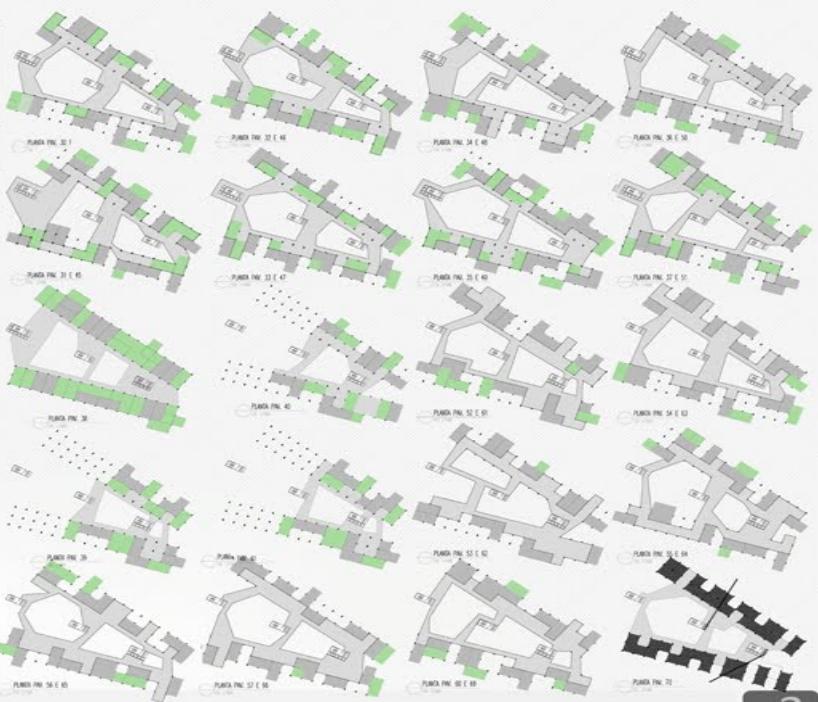
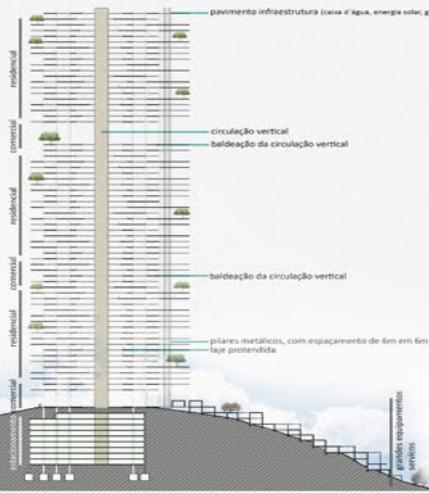
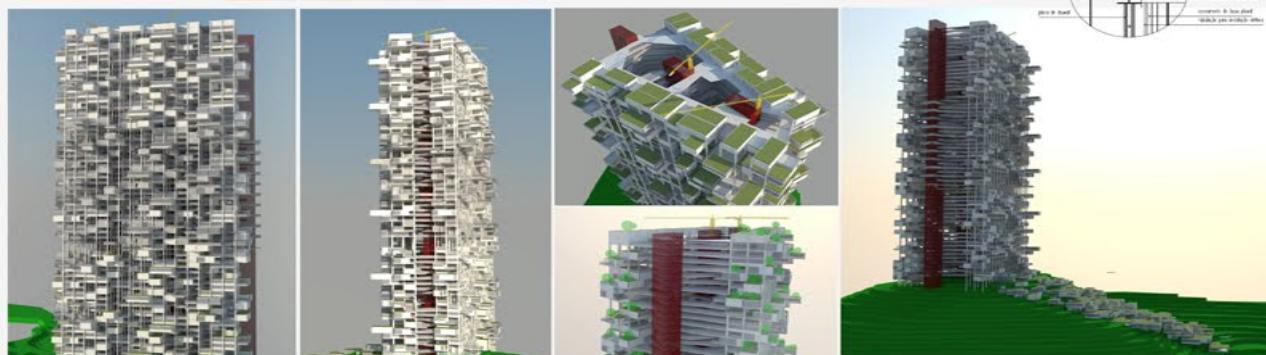


Vertical Allotment





Vertical Allotment



Vertical Aerotropolis

Edifício Aerotrópolis

EM 2006 APÓS UM GRANDE ACIDENTE AÉREO, UMA CRÍSE DO SISTEMA AERONÁUTICO TOMOU CORAÇO DO BRASIL, O QUE CAUSOU MUITOS VÔOS ATRASADOS, DESVIOS, CANCELAMENTOS, E, TAMBÉM, DIFERENTES SERVIÇOS AERONÁUTICOS. A CRISE DE 2006 AINDA É CONSIDERADA A MAIOR DA HISTÓRIA DO SISTEMA ESTACIONÁRIO AÉREO NO BRASIL, DEVIDO AO ALTO PINTORÍSTICO NA INDÚSTRIA AERONÁUTICA QUE SE LOCALIZA NO MUNDO PELA SEU CRESCIMENTO E PROGRESSO. ANTES, HAVIA UM GRANDE FUTURO NA DESENVOLVIMENTO DA AVIAÇÃO.

EM MEIO A ESTE ÁREA, A QUARTA MAIOR CIDADE DO BRASIL – BELO HORIZONTE – SE MOSTRA EXTREMAMENTE FRÁIL NESTE SETOR, UMA vez que DESDE 2006, A CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO PESTA, SE INCREVENDO INAPTA PARA ATENDER A DEMANDA ATUAL E PRINCIPALMENTE A JUTADA TRABALHADORES DA AVIAÇÃO BRASILEIRA. NO A LOCALIZAÇÃO MAIS QUAIS A ATUAL AEROPORTO DE BELO HORIZONTE ESTÁ IMPLANTADA, PRATICAMENTE SEM POSSIBILIDADE DE EXPANSÃO, SAINDO DA CUSTA DE MANUTENÇÃO SOBRE A QUDA, SE EXPEDIA UM NOVO DESAFIO INOVADOR, DEVIDO A IMPLEMENTAÇÃO DA CÓDIGO ADMINISTRATIVO (IMAN) GRANDES NOVOS DESAFIOS, QUE PODERIA LEVAR A UMA NOVA SITUAÇÃO DE URBANIZAÇÃO HISPONTE E PRECÁRIA.

A LONGO PRAZO, PODERIA ESBOZAR UM DESCREVIMENTO INTENSO DE OCUPAÇÃO DOS ARREDORES INIMIGOS DO CENTRO ADMINISTRATIVO DE BELO HORIZONTE, ESPECIFICAMENTE, OS INCLUSIVÉS, PROJETOS DE LAMAS, VETOS, E, TAMBÉM, A CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO, PARA CONSTRUIR ESTA SE FORMAMOS RADIOSA, CONFIURA-TE, E, TAMBÉM, A CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO, E, TAMBÉM, A CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO, QUE ATÉ A TERRA HORIZONTE E ARRIBOS, O QUE PODERIA TORNAR MAIS FÁCIL ESTA POSSÍVEL REVOLUÇÃO DA CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO, DAS EXPANSÕES E DAS ARRIBOS. ESTA SEUSCIDA, PORTANTO, UMA RELAÇÃO DE CONFLITO ENTRE DIFÍCIL URBANO E AEROPORTO.

NESSA CONTEXTUAL, VAISSA BORA O EDIFÍCIO AEROTRÓPOLIS, UMA CONSTRUÇÃO QUE SE CONFUNDE COM A PRÉPIA CIDADE PRA SUA ESCALA, E, TAMBÉM, A CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO, BEM COMO INVERSA, UMA NOVA MÍNIMA DE SE PENSAR, MIGRAR, EQUIPAMENTOS EM COLEGIOS RELATIVAMENTE COMPACTAS.

ISSO SE FEZ POSSÍVEL GRAVADO DE UMA EDIÇÃO QUE QUASEAPLICA CONCEPÇÕES DE UMA CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO E DESCREVIMENTO URBANO PARA A ÁREA AÉREA DESERTICADA, GERANDO E ORGANIZANDO UM NOVO NUCLEO DE CRESCIMENTO COMO UMA NOVA PESQUISA, QUE SE FORMA A FORMA PLANA DO AEROPORTO E NA SUA ESTUFAÇÃO EM SI.

Edifício Aerotrópolis é uma forma diferente para o crescimento da área estacionária aérea, uma vez que forma um solo em preta de um quartel da área de um aeroponto, gerando de um terminal e uma estrutura de apoio, que se converte em um centro de desenvolvimento para um novo patamar, sem a necessidade da expansão da estrutura existente, que é a estrutura de apoio, que é a estrutura de apoio para o desenvolvimento urbano da aérea, que consequentemente consegue a decorrer com a implementação das estruturas de apoio, que é a estrutura de apoio para os serviços, mas áreas de serviços relacionados ao sistema aeronáutico, tais como escritórios de companias aéreas, aéreos de manutenção, hospitais, escolas, universidades, entre outros, que é a estrutura de apoio, bem como residências, comércio e serviços, além da implementação de parques e outros equipamentos, podendo, contemplando uma estrutura de apoio para o crescimento da aérea.

O NOVO AEROPORTO, CONSIDERANDO UMA PROPRIEDADE FUTURÍSTICA, PERMITINDO, PORTANTO, UMA RELAÇÃO CLÍSE X AEROPORTO MUITO RICA, NA QUAIS O DOCUMENTO NÃO OCUPA O SÓLO UMBRA, COM GRANDE DIVERSIDADE DE SERVIÇOS, MAS TAMBÉM, DE UMA CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO, QUE É A CUSTA DE MANUTENÇÃO DO SISTEMA ESTACIONÁRIO AÉREO, TRAZ UMA NOÇÃO ÓPTICA À BÁSIA DE ESTABELECER UM ARRANHA-CÉU NUM LOCAL COM ESPAÇO AÉREO MOVIMENTADO.



AEROPORTO ATUAL X EDIFÍCIO AEROTRÓPOLIS

Ocupação do Solo e Presença do Concreto



Capacidade de Aviões Estacionados



Distância ao Centro de Belo Horizonte



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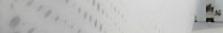
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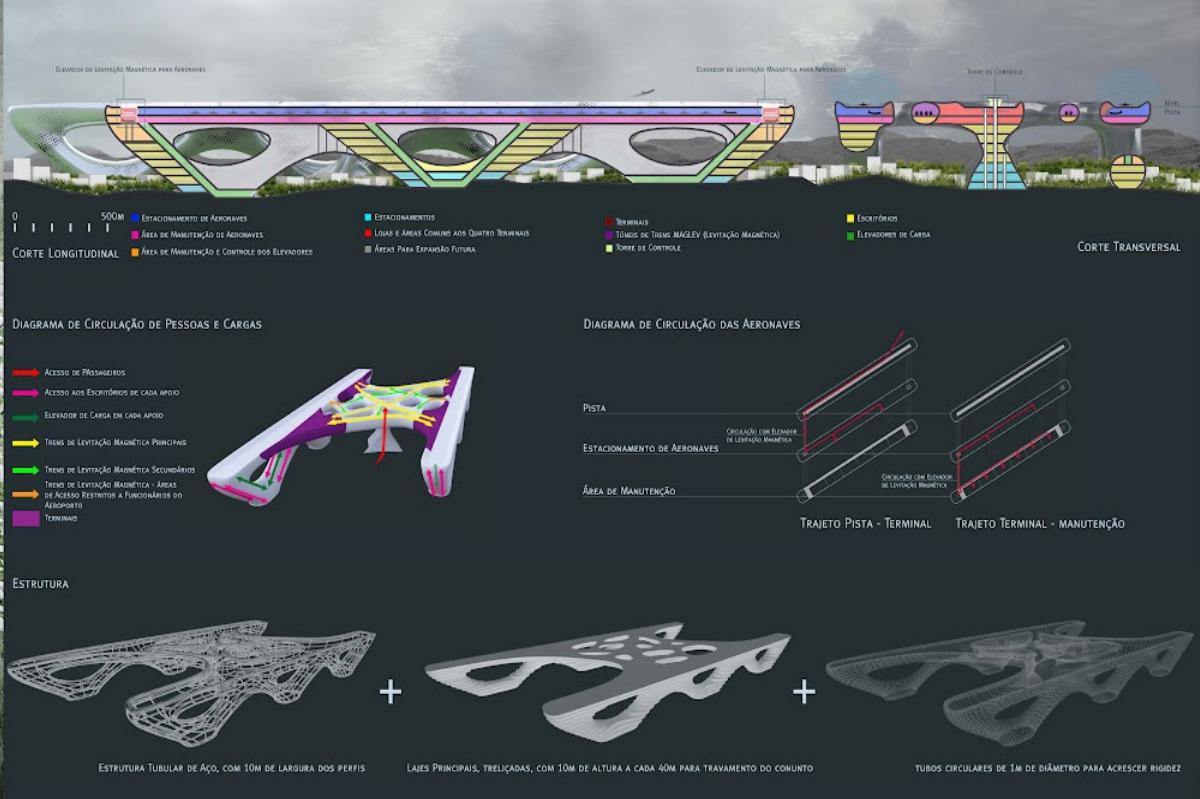


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Distância ao Centro de Belo Horizonte

Vertical Aerotropolis



Conclusions



INERTIAL FORCE ACTING IN THE IMAGINATION...

Less than 30% of the skyscraper s projects coped satisfactorily with the challenges introduced in the three levels, during 3 years: the economic background, the challenges in the use of new and sometimes not clearly defined technologies and the ability to go further traditional programs to the buildings.



So, working in small groups, students identified what they already knew, and how and where to get the access to new information. It was what happened mainly in the decisions of structural and other material they chosen. Aeronautic course and the Centre of Technology of Minas Gerais offered them supportive lessons in class as to give them appropriate power of decisions.



PBL as a mean?

The fact that only two months were taken to students to produce the projects does not mean a limitation, since the schematics drafts were quite expressive and quickly to create, exposing ideas.

Thank you.



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