

ATTACHMENT 1

**International best practice buildings: some of the buildings visited
by the Mission**

Pier 1

The Embarcadero
San Francisco, California

Pier One is a seismically retrofitted, rehabilitated and re-adapted development, carefully transforming a dilapidated, historic 1930s shed into a safe, technologically advanced office building. A public-private partnership between AMB Corp and the Port of San Francisco, it has added more than one acre of public space to the waterfront.

The building gives expansive views of the Bay and new access to the water's edge. An additional 4,645-square-meter interior area was created without violating height and heritage restrictions by floating a new partial mezzanine which is set six ft (1.8 m) in from the exterior walls, allowing light to penetrate the building width. This increased the leasable area by 50% while retaining high levels of energy efficiency. The building takes advantage of the outdoor temperature and prevailing winds for cooling and fresh air.

Another advanced technology is the design and installation of a closed-loop heat pump, using the Bay water as a giant heat sink. This system was cheaper to install (\$2.3 million, rather than the \$2.5 m a conventional system would have cost), and to operate (a 35 % saving on annual energy costs). The system allowed the designers to circumvent the need for compressors on the roof or at grade, either of which would have violated historic preservation guidelines. The heat pump system is used in conjunction with radiant-floor heating pipes embedded in the concrete floors, using gas-fired boilers as an auxiliary heat source.

SMWM also spearheaded community outreach and navigated the arduous approval process to secure a listing for Pier 1 on the National Register of Historic Places, which entitled the development to approximately \$8 million in Federal tax credits.

The project has not officially been rated under the LEED™ Green Building Rating System, although an informal evaluation was done under version 1 that indicated it qualifies for a rating of 31 credits. Mechanical engineers estimate that the building is at least 20-30% more efficient than if it had been engineered to meet the requirements of California's Title 24, 1998 Standards.

Architect: SMWM (Simon Martin-Vegue Winkelstein Moris)
151,000 sq. ft. of rentable space
Cost: \$42 Million dollars (includes shell and core + TI)
Construction: 1998 -2001

San Francisco Public Library

100 Larkin Street
San Francisco, California

The design exhibits two exterior faces: one mirroring the materials and formality of the neighbouring Beaux-Arts building; the other a contemporary response to the adjoining commercial district. Internally, a grand staircase and five-storey, skylit atrium connects the library's many components with accommodation for both group and individual scholarship.

Natural ventilation and low-emission materials achieve an unparalleled level of air quality. In particular, emission test data was required of all products, including adhesives and paints. The air quality and natural light achieved helped win support for the project from librarians who had been working in poorly ventilated, dark, underground spaces in the old library and were threatening industrial action if the new building did not improve their work environment.

The cost of the building was US\$142 million.

Aspect Communications

Corporate Headquarters
San Jose, California

An urbane courtyard links community with nature in a building that celebrates the California climate by merging indoors and outdoors. A vibrant sun-filled garden courtyard framed by the expansion wings and connecting bridge offers a magical setting that balances intimacy and openness. It also suggests an expansive interpretation of the region's mission cloisters. The offices' high floor-to-ceiling dimensions give shape to dramatic, flexible loft-like spaces that connect people to the outdoors.

Employee amenities, ecologically intelligent materials, and the Silicon Valley's first underfloor air distribution system broadly promote the occupants' health and well-being. The air feels fresher because convective airflows vent warm air, dust and toxins up and away from people, while operable windows offer individual control over natural ventilation. Narrow office floors place workers close to natural light, supplemented by exterior light shelves both shade excessive sunlight, while reflecting it into the space indirectly. 'Low emissivity glass' provides insulation to reduce the load on mechanical systems, without compromising natural light.

Recyclable concrete in exterior walls eliminate the need for fiberglass reinforcement. Compartmentalisation of the building into 'firebreaks' eliminated the need for toxic fireproof coatings. All carpets are recyclable. The building does not reuse water, but stormwater ponds can be converted to wetlands in the future and piping is in place to connect to a stormwater recycling regional scheme should that be implemented.

The building courtyard receives direct sun throughout the day and its orientation registers the passage of the day as different building faces are illuminated. The courtyard also frames a view of the mountains and is an active public space with common spaces such as cafes and auditoriums along the ground floor.

110,000 square feet
Architect: William McDonough and Partners

The Dearborn Centre (BankOne)

131 South Dearborn Street
Chicago

BankOne is a commercial building development that includes energy efficient design and technologies solely for commercial gain. The design creates highly efficient floorplates – virtually column free space – providing unlimited flexibility in space planning. The building is supplied with electrical service from two separate and redundant substations, virtually eliminating the possibility of a power failure. Designed for the utmost in employee comfort, flexibility, and energy savings, the building incorporates cutting edge technology in its under-floor air, cable, and wire management systems.

A 14” pressurised raised floor delivers high quality conditioned air to every workstation and private office, adjustable by each individual user for personal control of his or her environment. This system results in reduced energy usage, superior air quality and temperature control, better ventilation, and more comfortable and productive workers. Floor to ceiling vision glass opens up the space and brings an abundance of natural light deep into the space.

9’6” to 10’ ceiling heights with floor to ceiling glass allows maximum daylight. Combined with indirect pendant lighting this increases comfort, while lowering energy use.

BankOne is marketed primarily as a building of high comfort and amenity, with the energy savings a secondary bonus.

David L Lawrence Convention Centre (Pittsburgh Exhibition Centre)

1000 Penn Avenue
Pittsburgh, Pennsylvania

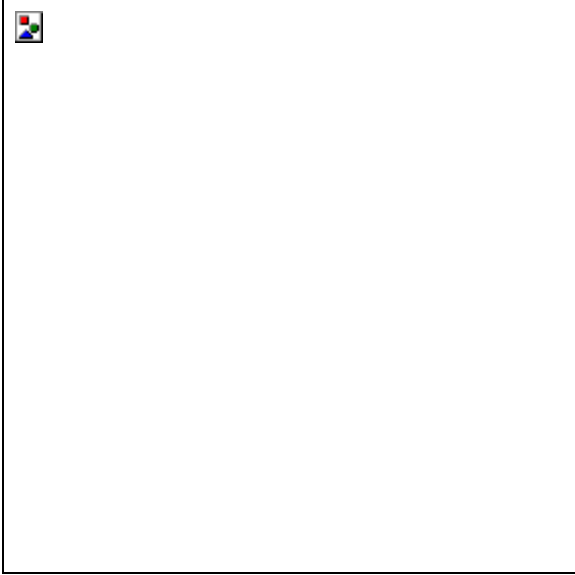
Located on one of Pittsburgh's rivers, the David L. Lawrence Convention Centre is the world's first certified green convention centre. The shape of the roof encourages natural cross-ventilation, taking advantage of the convection currents to draw fresh air from the river.

Natural ventilation in the exhibition hall, which can also lit entirely by natural light from skylights and windows, saves significant energy because the building systems often do not have to be switched on during exhibit change-over. The exhibition hall also uses a low-temperature air-supply system that reduces the volume of air to be delivered, minimising ductwork and energy consumption. Displacement ventilation is used throughout the facility to minimise the volume of air to be cooled.

Compared to conventional construction, the building uses 35% less energy, saving over US\$500,000 per year. Recycled water is used for toilet flushing and plant irrigation, reducing potable water use by over half. 98% of the water from the demolition of the old convention centre was recycled and most of the interior materials contain no volatile organic compounds.

Architect: Rafael Vinoly
Area: 1.5 million sq ft
Cost: US\$385 million, with projected payback of 10 years





Swiss Re Building

65 Leadenhall Street
London, UK

This 41-storey tower is a stunning addition to the London skyline. The environmental performance of the building was a key contributor to its approval in an otherwise height restricted area.

The building has been commissioned by one of the world's largest reinsurance companies, Swiss Re, which has adopted environmental sustainability as a key corporate value, recognising the impact of environmental issues on the insurance industry. The building, scheduled for completion in 2004 includes offices for Swiss Re staff and other tenants, retail areas, and a public plaza.

A series of rotating, radiating floors are linked by spiralling light wells that contain greenery to provide visual breaks and pressure differentials that assist natural ventilation. Fresh air is drawn in at each floor through slots in the cladding, and exhaust air is vented to the outside or recycled to provide heat to the building. Advanced modeling of the building heat and air flows predict that air-conditioning will not be required for most of the year. This will dramatically reduce energy consumption and the required scale of the mechanical plant, providing further cost savings.

Architect: Foster and Partners
Engineers: Arup

Plantation House

London, UK

The project involved the refurbishment of the 32,500 m² (350,000 sq ft.) of multi-tenanted space to competitive commercial standards. Great care was taken to respect the existing details and proportions of this listed building, but at the same time introduce new high-performance materials for energy efficiency. The result is a fresh dialogue with the Neo-Classical original building.

A complete overhaul of the internal public environment also created a bright, friendly atmosphere. For example, to resolve the confusing circulation of the existing building, emphasis was placed on the lifts by establishing an individual colour code for each group. These colours have been taken up by the building's internal signage to create a comprehensive orientation system.

ING Group HQ

Amsterdam, Netherlands

Client brief:

- a building to embody the core values of transparency, innovation and sustainability
- large conference spaces
- flexibility – staff on flexible hours don't require permanent offices, but rather 'booked' workstations
- adaptability – the building must last 100 years, so it must be receptive to change

The architect sought to express:

- social responsibility with low energy consumption design
- urban context – a prime city gateway on 30m x 140m site, with low density landscape on one side while on the others sides – future high-density, large-scale, mixed-use development. Thus architect sought an icon with human scale

Building description:

- Outer skin creates a striking physical shape. Inside is an 'amorphous' building for people and plants.
- Glass façade is a 'double skin' – exterior is 12mm glass, interior is insulating double glass; the cavity space is central to the building's climate control, designed so that in 800 hours out of annual 2000 hours, the majority of the building is naturally ventilated.
- Both open spaces and rooms can be 'disconnected' from air conditioned system for local natural ventilation, when other parts of the building need air conditioning.
- The outer skin of the northern facade is sealed for noise control against traffic,
- Glass tints, anti-sun coatings and internal sun blinds control seasonal heat and light flows.
- Atrium garden (tropical, with palm trees), foyer garden and roof gardens create a pleasant working environment.
- ESD expressed in low energy and material used (rationalised use of aluminium to last a long time).
- An aquifer below ground provides heat storage for a water-based radiant cooling/heating system delivered through ceiling panels. The glazed perimeter has additional displacement heating at floor level.
- The board room double skin is different from the rest of the building; the cavity is used for mechanically assisted cooling and heating system.
- Narrow width and use of glass helped meet Holland's building regulations which specify minimum daylight levels for all workspaces.
- Design tools used: advanced tools used for air conditioning, fire and acoustic computations/modelling
- Key public spaces such as the Theatre and the Restaurant face west to capture evening sun and panoramic views.

Construction: 1998-2002

Architect: Roberto Meyer of Meyer en Van Schooten,

Cost: twice conventional building

Office space: approx 20,000m²

ABN/AMRO Building

Gustav Mahlerlaan 10, 1082 PP
Amsterdam, The Netherlands

The ABN-AMRO Bank World Headquarters provided an opportunity for PEI COBB FREED + PARTNERS to use its most recent research on curtain-wall technology. The facade incorporates ventilated cavity windows and automated blinds, and the building's heat-recovery system and light fixtures automatically adjust for changing light and occupancy levels, reducing energy consumption. The complex includes two office towers, a courtyard building with a dealing room for 600 dealers, an auditorium for 225, a congress hall for 400, and a 20-room meeting centre. Motorised louvred skylights are similar to the Louvre in Paris and East Gallery in Washington.

However, there have been problems with the building operation. The building has been hotter in summer than outside temperature. As a result, motorized windows have been shut fast and natural ventilation features have been closed off as it has been too difficult to balance air conditioning.

Other facts

- Flat screen VDV's used throughout
- Natural timber used throughout.
- Displacement ventilation floor to dealing room – ½ metre raised floor
- Skylights over the dealing room provide natural light
- Roof planting and outdoor areas provide breakout spaces
- Bicycle parking shelter adjacent to station
- Windows need to be cleaned once a week due to pollution from freeway alongside 700 positions in dealing room
- 4,000 staff
- 90,000m² gross
- Building completed September 1999
- Located 15 minutes from the center of Amsterdam AMBRO principle – global connectivity particularly Amsterdam / London
- Vast bandwidth provided. Video, voice and data extensive.
- Fountain at entrance blows water over visitors in high wind
- Adjacent lake not used for cooling
- No stormwater initiatives included

CommerzBank Building

Kaiserplatz, Germany

At 53 storeys, the Commerzbank is the world's first ecological office tower and the tallest in Europe to date. Every office is daylight and has openable windows. This allows occupants to control their own environment, reducing energy use to half those of conventional office towers.

The building is divided into 4-storey office sections, each with a winter garden; the sections are organized spirally in relation to one another. In each unit, the office space occupies 2 sides of the triangular floor plan, the winter garden occupies the third side. The support structure, circulation areas and ancillary rooms are located in the corners of the triangle. In the centre of the building is a full-height atrium, divided into 12-storey sections. The gardens become the focus for village-like office clusters. They bring daylight and fresh air into the central atrium, which acts as a natural ventilation chimney up the building for the inward-facing offices.

For most of the year the building is naturally ventilated as thermal buoyancy and general wind conditions create the necessary low and high pressure that promote air flow. To naturally ventilate the offices facing outwards there is a double-skin façade, with opening windows in the inner skin. Insulating glass is used, and placed in the cavity are adjustable louvers to protect against glare and direct sunlight.

Louvred shutters in the façade can be closed when temperatures drop, so that the cavity can become an insulating cushion of air. The winter gardens form buffer; they help cross-ventilate the whole building. South gardens have Mediterranean landscape planting; west and east gardens have North American.

In summer, when the windows in the winter garden are open, the outside air enters and either rises or sinks in the atrium stretching over several storeys – depending on the ambient temperature and pressure conditions in the winter garden. This cross ventilation enables the office spaces facing the atria and the winter gardens to be naturally ventilated. When the weather is colder, the glazings remain largely closed, and the winter gardens then act as climate buffer zones, by turning the solar radiation into heat and creating a temperate environment. In summer the ventilated thermal mass of the concrete floors, subject to night time cooling, balances the heat produced in the offices during the day.

Cooling to central office areas is via chilled ceilings. Garden areas have infloor heating. In Germany, regulations require a view and light to all workspaces.

The tower rises from the centre of a city block alongside the original Commerzbank building. Through restoration of the perimeter structures, the traditional small scale of this block has been respected. A public galleria with restaurants, cafes and spaces for social and cultural events forms a popular new route cutting across the site.

Date completed: May 1997

121,000m² (total complex); 85,000m² (tower only)

Cost \$600m euro (including interior), \$300m euro (building only)

Post Tower Building

Bonn
Germany

'Breathing in the wind' with a panoramic view of the Rhine valley best describes the building airflow. The airflow-optimized floor plan of the 41 storey tower comprises two semi-elliptical towers. Regardless of the season or the exterior temperature, the facade of the building distributes supply air, the corridors are exhaust air collectors and the skygarden zones act as an air extraction chimney.

Consequently, neither vertical supply air nor extractor shafts are required to ventilate the normal offices along the outer facade. Furthermore, due to the ventilation units and the exhaust air collection, an entire floor that would otherwise have been needed for the technical equipment, could now be used as office space.

The two towers are connected by a 7.4 m wide 'joint', which extends to the top of the building and contains the feature glass elevators and bridges. Comfort for the 2000 occupants is optimised by automated shading technology, daylight and artificial light regulation and air-conditioning.

The outer skin of the building tenuates wind pressure via adjustable shutters. Sun shades and openable windows in all rooms then regulate natural light and ventilation. Water from the Rhine River is used for concrete slab cooling. Four internal skygardens provide exceptional views and internal courtyards that also allow indirect heat recovery from adjacent offices.

Date completed: 2000-2002
Office space: 29,000 sq m
Staff: 2000