



Building Type/Use Office and Hall  
 Country Japan  
 Client Toyota Motor Corporation  
 Architect NIKKEN SEKKEI  
 Occupation 2005.02

## Building Performance

- Distance from public transport stop in **about 500m**.
- Predicted or actual km traveled per year to and from the building by all occupants whose primary mode of transport is a motor car; **2,000,000km**
- Predicted or actual kWh/m2 per year primary operating energy for all operating end uses; **1,398 MJ/m2 per year**
- Predicted or actual Kg/m2 per year eCO2 for all operating end uses; **19.8Kg-C/m2 per year eCO2**
- Predicted or actual L/m2 per year of potable water consumption;
- Predicted or actual indoor CO2 concentrations in ppm for typical occupancies under normal operating conditions; **600 ~ 800ppm**
- Percent of construction cost spent within the greater urban area; **about 90 ~ 100%**
- Other performance information of interest that is not included above or in the performance assessment result; **Life cycle CO2 emission is 28kg-C/ m<sup>2</sup> per year and the reduction rate of it is 31%.**

## Architectural Features

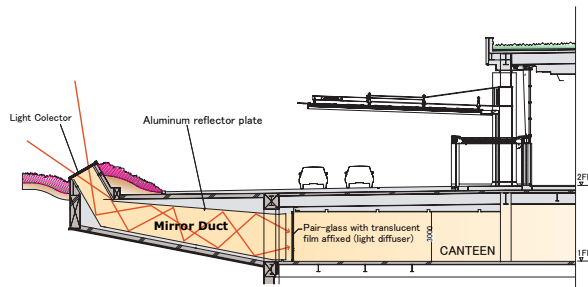
As the headquarters of a company which leads the way in environment-oriented efforts, this sustainable building attains the world's top level of environmental performance.

### "Creation of Communication"

The typical floors have office space in two wings, and the staircases are situated in an atrium, dubbed the "vertical village", between the offices and the elevators. This atrium space stimulates communication among the staff and it exploits an efficient chimney effect, serving as a natural ventilation system.

### "Mirror duct for natural light"

Natural light for the underground staff canteen is captured through openings above ground, carried through high efficient light ducts, and delivered from the side, marking a bright and clean dining space.



### "Double-grazing with advanced active control systems"

Three advanced technologies for reducing heat loads, utilizing natural light and natural wind, have been employed to realize environmental design that is in harmony with the building.

1. air-barrier system
2. gradual blind
3. automatic ventilation damper

- Heating degree-days and cooling degree-days; 2004/170 (18C/24C)
- Gross area above ground ;64,700m2
- Gross area including below-ground area; 60,700m2
- Number of stories; -1,+15
- Estimated typical population; 1,000persons

## Green Head Office



Roof Planting on the Toyota-Hall



Site Plan

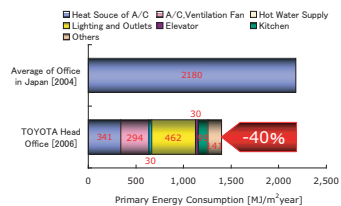


Promnade with a plenty of greenery

## Highlight of Assessment Results

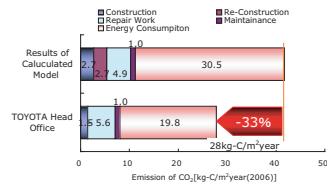
### "Primary energy Consumption"

Primary energy consumption is 1,398MJ/m2year and it is reduced to 36% than ordinary office building in Japan.

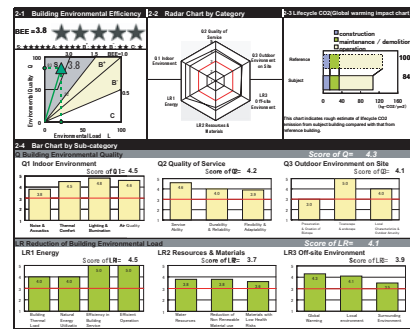


### "Life cycle eCO2"

To achieve numerical target (LCCO2=38kg-C/m2year) set up at the beginning of master planning, it is designed the various energy-saving system using the advanced technology.



### "Assessment result by CASBEE-EB"



(CASBEE-EB 2007 Edition)

## Creation of Communications

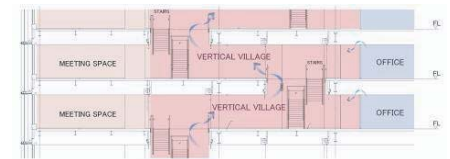


Vertical Village



Vertical Village

The typical floors have office space in two wings and the staircases are situated in an atrium, dubbed the "vertical village", between the offices and the elevators. This atrium space stimulates communication among the staff.



## Structural technology for higher levels of safety

"Seismically isolated structure"

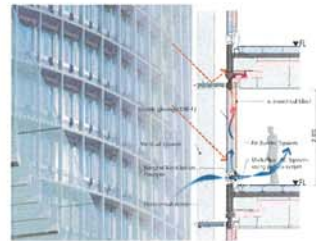
All buildings in Japan must be designed to withstand earthquake forces. Aseismic capability has been upgraded through seismically isolated structure to realize high level of safety.



## Advanced System on Perimeter

Three advanced technologies for reducing heat loads, utilizing natural light and natural wind, have been employed to realize environmental design that is in harmony with the building.

1. Air-Barrier System
2. Blind with Gradual Slats
3. Automatic Ventilation Damper



Double-glazed external wall system



Solar shade :louvers



Blind with gradual slats

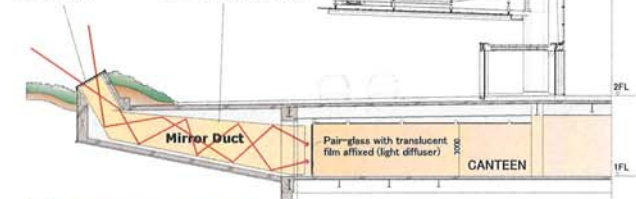
## Sunlight to the underground canteen



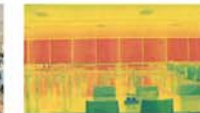
Light Collector



Aluminium reflector plate

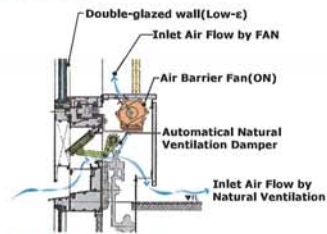


The underground canteen

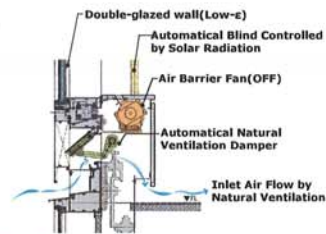


Luminance distribution of Light Diffuser

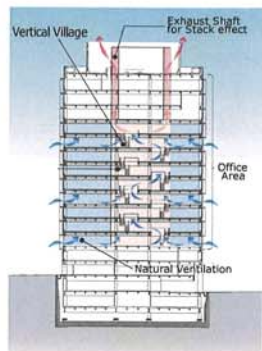
## Natural ventilation system driven stack effects



When Solar radiation > set-point

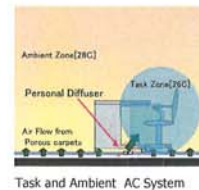
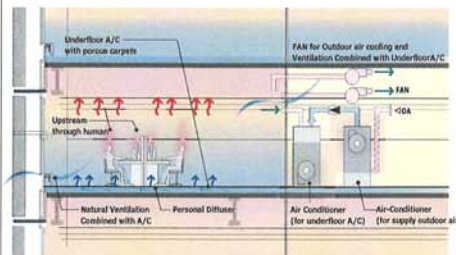


When Solar radiation < set-point  
Natural Ventilation in the intermitted season

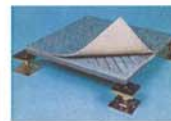


About Chimney effect

## Underfloor A/C system using porous carpet



Task and Ambient AC System



Porous carpet



Personal diffuser

## Design Approach for Maintenance



3-dimensional CAD



After Completion of Works

"The development of design approach for maintenance."

We also develop a design approach for maintenance of air-conditioning and electric systems to realize a long-life building.

