baseline study

The primary responsibility of the designer is to design a building that is sustainable, and that is protective of the natural and culturally significant resources on the site. The challenge of the project is to generate a design that respond to the scale, form, time, space, order, and pattern of the existing context and preserve, enhance and make sustainable use of the bio-physical environment it is contained in.

The Burra Charter and the South-African Resources Act guide heritage as baseline criteria in the design development.

The Sustainable Building Assessment Tool (SBAT) will assist in decision-making regarding the sustainability of the building. The SBAT measures the performance of a building in relation to a number of social, environmental and economic issues.

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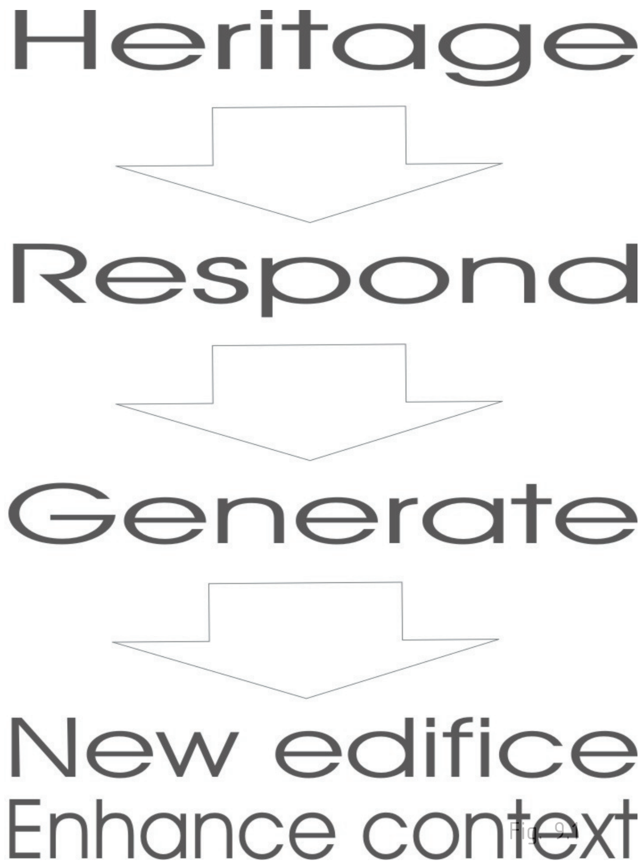

Fig 9.1

⌈09⌋⌈01⌋ HERITAGE AS BASELINE CRITERIA

⌈09⌋⌈01⌋⌈01⌋ INDUSTRIAL HERITAGE

"Our heritage celebrates our achievements and contributes to redressing past inequities. It educates, it deepens our understanding of society and encourages us to empathize with the experience of others. It facilitates healing and material and symbolic restitution and it promotes new and previously neglected research into our rich oral traditions and customs." (National Heritage Resources Act, 1999)

"The Industrial Revolution profoundly modified landscapes and life styles.
Industrial operations resulted in great achievements and grandiose constructions, testifying to the creative genius of humankind."
"Guardians of the past, they testify to the ordeals and exploits of those who worked in them. Industrial sites are important milestones in the history of humanity, marking humankind's dual power of destruction and creation that engenders both nuisances and progress. They embody the hope of a better life, and the ever-greater power over matter." (UNESCO, industrial heritage)

The vision is to create a special place of cultural significance that will draw on the sites industrial heritage. The aim is to embrace and enhance the existing structures and its context. The generation of new edifices and that of adaptive re-used structures must respond to the existing.

⌈09⌋⌈01⌋⌈02⌋ ADAPTIVE RE-USE

Refer to Urban design framework.

⌈09⌋⌈01⌋⌈03⌋ NEW WORK

Preserved existing structures will not only create a special place it will also have a significant influence on the generation of new edifices. New buildings must respond to heritage through manifestations of form, material properties, mass, positions of functions and urban plan form. This should be further explored in the design development.

The Extract form the Burra Charter 1999 below will guide the generation and design of the proposed Film Centre.

Article 22	New work	Application to the Gasworks site
22.1	New work such as additions to the place may be acceptable where it does not distort or obscure the cultural significance of the place, or detract from its interpretation and appreciation. New work may be sympathetic if its siting, bulk, form, scale, character, color, texture and material are similar to the existing fabric, but imitation should be avoided.	New work should compliment and enhance old edifices. This may be achieved through contrasting materials and articulation of details. The existing scale, form, space, order, materials and colors will be respected.
22.2	New work should be readily identifiable as such.	New work should not be direct copies of the existing.

Fig. 8.2_ view to retort building from site, indicating design requirements

Fig. 9.2

[09][01][04] **ORDER**
The design for the new film centre must be a response to the ordering principles on site. This include axis, symmetry, hierarchy, rhythm, datum and transformation The following statement by Ching should be considered throughout the design
Order without diversity can result in monotony or boredom; diversity without order produce chaos. A sense of unity with variety is the ideal. (Ching, F.D.K. 1996, 320)

[09[01][05] **SCALE AND FORM**
The following should be considered regarding the scale of new edifices

- The scale of new additions should respond and enhance the existing scale of the retort buildings, buildings should respect the scale by not towering above existing structures.
- Spaces around the retort buildings should be altered to relate to humans. Additions of landscaping features and new buildings should be placed in such a way to form enclosed humane spaces
- New buildings should be set back from retort buildings to preserve views to these buildings.
- The Grid and additive form of buildings and landscape features around the retort buildings should be considered in the design.
- The clustered special organization and the sharing of common trait/relationships between existing buildings must be maintained throughout the design to enhance the existing context.
- Again the design must respect the form of the historical buildings. Form should be assessed according to Solid and void spaces, envelopes, mass, density and interface.

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⌈09⌈02⌋ SBAT AS BASELINE CRITERIA

⌈09⌋⌈02⌋⌈01⌋ SOCAIL ISSUES

⌈09⌈02⌋⌈01⌋⌈01⌋ OCCUPANT COMFORT

Personal comfort is the most important user need to be satisfied. The following criteria are applicable for the design of the film centre, comprising of cinemas, a museum, offices, retail and residential facilities.

NATURAL VENTILATION

In favorable climates, natural ventilation can be used as an alternative to air conditioning plants, saving 10% - 30% of total energy consumption.

“Natural ventilation systems rely on pressure differences to move fresh air through buildings. Pressure differences can be caused by wind or the buoyancy effect created by temperature differences or differences in humidity. In either case, the amount of ventilation will depend critically on the size and placement of openings in the building. Gravity ventilation provides natural airflow in the absence of wind by making use of the difference in density between indoor and outdoor air.” (Nikken Sekkei, 2000, 32) An atrium is a good example of gravity ventilation.

The use of natural ventilation will be encouraged in as many areas as possible. Every space must be provided with an opening of at least 10 % of the floor area of that space.

In cases where natural ventilation is impossible (cinema auditoriums and AV rooms), mechanical ventilation systems should be provided. It is important to note in cinema auditoriums that when projector light sources are carbon arcs or xenon arcs which gives off ozone, ventilation must be provide a uniform volume of air at a low velocity to prevent uneven burning and hence changes in light intensity during projections.” (Tutt and Adler, 1998, 199)

Design recommendations for natural ventilation
The specific approach and design of natural ventilation systems will be based on the Film centre and the local climate. However, the amount of ventilation depends critically on the careful design of internal spaces, and the size and placement of openings in the building.

- Maximize wind-induced ventilation by siting the ridge of a building perpendicular to the summer winds.

- Buildings should be sited where summer wind obstructions are minimal. A windbreak of evergreen trees may also be useful to mitigate cold winter winds that tend to come predominantly from the south.
- Naturally ventilated buildings should be narrow. It is difficult to distribute fresh air to all portions of a very wide building using natural ventilation. The maximum width that one could expect to ventilate naturally is estimated at 13, 7 m.
- The effect of natural ventilation may be enhanced through the use of water. Water running over screens and sprayed onto hard surfaces can act as natural air conditioners
- Occupants should be able to regulate ventilation by opening and closing windows.
- Allow for adequate internal airflow. In addition to the primary consideration of airflow in and out of the building, airflow between the rooms of the building is important. When possible, interior doors should be designed to be open to encourage whole-building ventilation. If privacy is required, ventilation can be provided through high louvers or transoms.

ACOUSTICS

Auditorium acoustic conditions depends upon auditorium shape, acoustic absorption characteristics of the surface and qualities of reverberation resulting from them.
The following criteria should be considered regarding acoustics:

- Sound reflecting materials should be placed against all ceilings of cinema auditoriums. Whereas absorbing materials should be used against walls and floors.
- Mechanical noise due to overhead air-conditioning ducts should be minimized.
- All floors and ceilings in museum must be of absorbing materials, lowering noise levels caused by people generated sound.

VIEWS AND VIEWING CONDITIONS

Views:

The design of a new film centre has to respond to the existing context of the site. Since the Gasworks site is a culturally significant landmark, views from and to existing buildings, landscapes and structures need to be preserved.

Viewing conditions:

The size and position of the cinema screens must relate to the size and shape of the auditorium and the type of film used. The following table is a breakdown of approximate screen sizes relating to film type.

Film type	**Projection**	**Applications**	**Light source/ screen size**	**Aspect ratio**
16mm Silent type- perforations aloag both edges. Type with>Qund- perforations along one edge only leave room for either photographic or magnetic sound record	Either relatively light and readily portable, or heavy-duty for permanent installations	For educational, scientific, advertising, entertainment and TV purposes	Incandescent source permits screens up to 3 m x 2.2 m. Xenon or carbon arc. screens up to 6 m x 2.4 m. Power of source limited by amount of heat dissipated	1:1.135 (not readily changed)
35mm	Portable with incandescent light source, or heavy duty for permanent installations	'Standard' type for commercial cinemas; also for high quality lecture halls and TV	Incandescent-7 m x 5 m screen. Xenon or carbon arc. screen size proportional to power of light source; if very high, water cooled film gates provided	1:1,375

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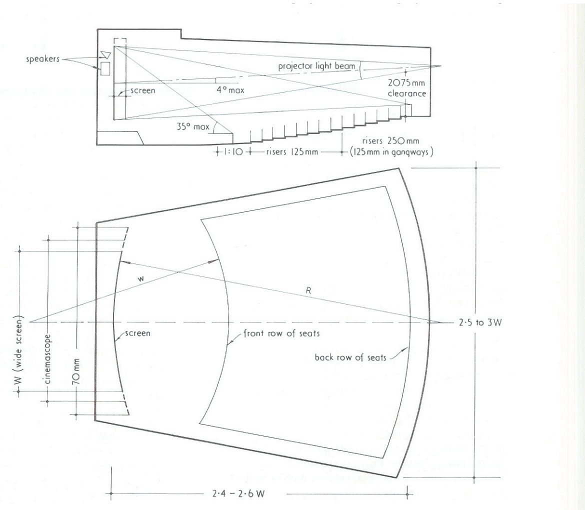

Fig. 8.3_ auditorium shape and offset from screen

Distance from screens:
Sightlines from the rearmost two or three seats should be drawn on a larger scale to check that the bottom of the screen is visible to all seats. At most the heads of the people in front should not obscure more than 12, 5 % of the total height of the screen.
When the screen is high, the front seats must be set back to preserve a sightline of 30 degrees to the top of the screen. (Tutt & Adler, 1998, 196)
In the instance where the screen is high, the viewer distance from the screen can be calculated by multiplying the screen height by a factor of 1, 43.
The projector distance can be calculated by multiplying the screen height by a factor of 8.
Viewing in exhibition spaces:
The normal vision without moving the head is a cone of 40 degrees. An object can therefore only be comfortably viewed as a whole from a distance of about double the objects diagonal. (Tutt & Adler, 1998, 289)
Showcases as usually viewed from close up.

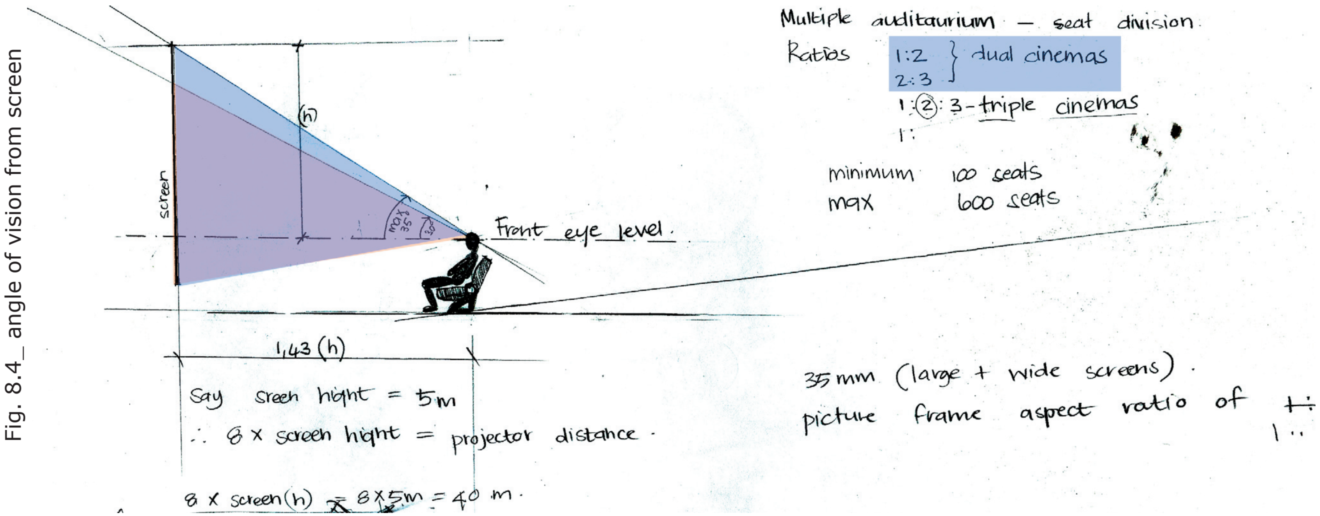

Fig. 8.4_ angle of vision from screen

[09][02][01][02] INCLUSIVE ENVIRONMENTS
The urban design framework should accommodate various kinds of users.
Redevelopment will make the site an inclusive environment catering for a diverse community, serving student of the various educational institutions, communities of Melville, Millpark, Aukland Park, Vrededorp and the CBD.

The following criteria should be considered.

- The retail, recreation and commercial facilities will be open to the public sector, and buildings will be designed to make all facilities accessible and secure.
- Public environments should be self contained, providing services such as banking and childcare
- All levels of public space should be made assessable to disabled persons, lift and ramps should be provided and must comply with SABS 0400.
- The change from public to private needs to be articulated to make the precinct more legible and secure. This may be achieved through the use of landscaping and façade articulation.

[09][02][01][03] PARTICIPATION AND CONTROL
Environmental control such as indoor climate, aesthetic qualities, ambience should be adaptable to user needs in retail, office and residential environments. Spaces must be able to transform into places of personalization.

User involvement in the museum area will involve the following.

- The users must be able to access and visit parts of the exhibit conveniently as it suite them. Users must be able to visit parts of the exhibit today and come back for the rest tomorrow.
- Users must be able to interact with the exhibitions. The idea is not to create elite museum spaces that can only be observed. The user must be able to comment and participate with a network of ideas that will be digitally accessible.
- Spaces must contribute to human interaction. Entrance lobbies, exhibits, restaurant seating, seating along paths, lift and stairways all are areas of potential interaction. (Refer to precedent study)

[09][02][01][04] EDUCATION HEALTH AND SAFETY

Education and awareness in South-African film is the main aim of the museum. Access to internet facilities, structural courses in film making, books and film and media technologies all form an integral part of the design for the film centre.

The museum should function as a place where directors and film experts can learn from new technologies, where the community becomes educated about film making and where users can participate in the film making process through comments and their visions for upcoming events.

The following design aspects should be employed to provide safe and secure environments.

- Fire regulations should comply with SABS 0400
- Spaces will be designed to have 24hour surveillance. Residences and offices must be placed strategically to overlook public spaces.
- The design should minimize unpredictable, unsecured alleyways. Visual linkages will contribute to a more secure environment.
- Adequate lighting should be provided along circulation routes and stairways. Dark spaces should be eliminated throughout the public square and along building facades.
- Places should be specifically allocated for smokers, complying with all smoking regulations.
- Since the site is a contaminated brown-field site, extensive attention should be paid to the decontamination process throughout the construction phase.

When it comes to potential redevelopment of the site, major problems associated with contamination are identifiable:

- For areas of residential development, exposure to contaminated soil can be hazardous to children exposed to it.
- Certain compounds may restrict re-vegetation of the site. This could have a consequent affect on the aesthetic appeal of the area
- Sulphates and salts may attack building materials, site services and cause corrosion of concrete foundations.

A method of decontamination may involve the following. Rather then excavating and replacing all the soil, topsoil should be replaced and buffered from the underlying contaminated soil with a damp proof course. Some areas can be treated with suspended timber floors that will buffer humans from contamination.

Fig. 9.3

Fig. 8.5_ warning sign indicating site contamination

[09][02][01] ENVIRONMENTAL ISSUES

[09][02][01][01] WATER

Johannesburg has abundant rainwater (… per year) which can be harvested and used as grey water of all kinds, thus saving valuable water resources.

"Wastewater can be used by toilet flushing or plant watering after preliminary treatment. Rainwater and pre-treated wastewater should be directed to a permeable ground surface to replenish urban groundwater. Residual pollutants in the pre-treated wastewater will be bio-degraded in the soil without further treatment, providing nutrients for plants." (Nikken Sekkei, 2000, 32)

The following should be considered:

- Rainwater should be harvested and stored in conservancy tanks for later use. Conservancy tanks should become aesthetic water features within the landscape.
- Surface discharge can be reduced by using pervious or absorbent surfaces that prevent erosion. Hard landscaping should be minimised and previous surfaces must be specified for car parking and paths.
- water needs to be channelled to the conservancy tanks, where impervious materials are used (roofs)
- Planting with low water requirement should be encouraged (indigenous species)
- The design should make use of efficient water devices like dual flush toilets, and aerated shower heads.

The table below gives international standards which have been recommended by international organizations

Type of vegetation	Water supply required	
Private gardens	Maximum average	350 kilo litres/hectare/day 225 kilo litres/hectare/day
Private gardens without grass	Average	170 kilo litres/hectare/day
Public parks	Average	60-140 kilo litres/hectare/day

⌈09⌋⌈02⌋⌈01⌋⌈02⌋ ENERGY

- The design should respond to the site's micro-climate.
- Buildings should be faced north for maximum sun infiltration.
- Shading devices should be designed to control sun angels during summer months.
- Building footprints should not be very deep. If this is not possible the buildings should take in light and ventilation at two sides.

- Natural lighting requires light paths that will carry the light to the heart of the building. Elements such as light shelves, top lights and light ducts are effective for carrying light into building interiors. (Nikken Sekkei, 2000, 32)

- Reduce the use of mechanical ventilation through the use of passive environmental control.
- A walkable urban environment should be encouraged, with facilities within walking distance.
- Gas should be used as a major energy source in the development. Lighting, cooking, streetlamps and urban lighting should all also make use of gas.

PASSIVE ENVIRONMENTAL CONTROL

Making Maximum Use of the Zero Energy Band

The range in which neither heating nor cooling are required is called the 'zero energy band', because no energy is consumed at all. Heating or cooling only becomes necessary when the room temperature starts to move beyond this temperature range. The same principle applies to lighting and ventilation. Indoor conditions can be maintained within these bands for a considerable portion of the year without consuming energy (figure). Insulation, sun screening and natural energy can be used to extend the use of the zero energy band for as long as possible. When daylight provides adequate lighting, the air is fresh enough, and the temperature is comfortable, no further energy expenditure is required. However, occupants and managers must find and establish the most suitable zero energy bands and avoid needless energy consumption within the band.
The width of the zero energy band is never uniform. In a room with a high ceiling it is quite adequate to maintain good conditions in an inhabited zone up to a height of around 1.8m from the floor, without trying to do so in the entire volume of the room. A wider zero energy band can be employed in unoccupied and ambient spaces than in occupied and personal spaces.(Nikken Sekkei, 2000, 33)

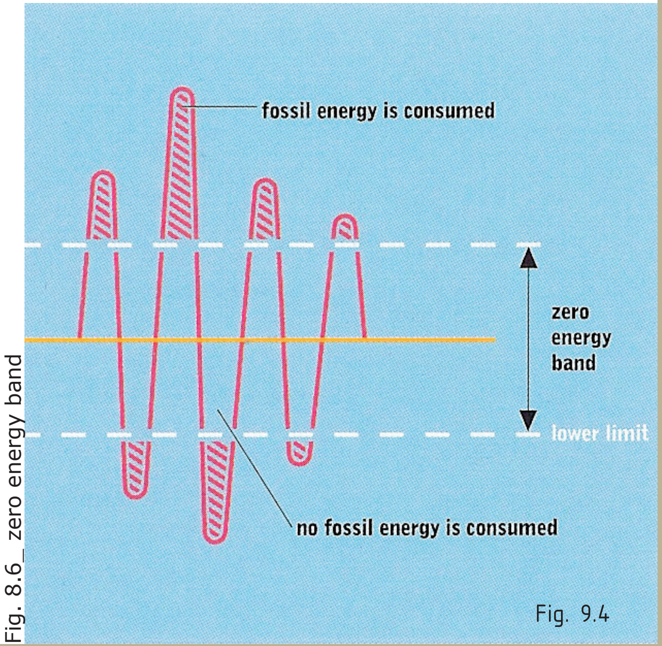

Fig. 8.6_ zero energy band

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⌈09⌋⌈02⌋⌈01⌋⌈03⌋ MATERIALS, COMPONENTS AND RE-USE

The Gasworks site is a contaminated Brownfield site with development potential. The new development should recognize the site's industrial past; giving it back to the community.

For a site to be completely healed it must once again become viable to the community. And it should expose or at least recognize its industrial past. The process is a culturally significant act, reconsidering the site's new use. (Dirt-metroloposis mag.)

The discourse focus on architectural reuse this includes:

- adaptive reuse,
- conservative disassembly,
- Reusing salvaged materials.

The following criteria are applicable regarding architectural re-use and waste management:

- Materials and detailing of new buildings must enhance that of the exising industrial buildings.
- Problems will arise where old and new are directly connected. The way of detail articulation and material choice of new additions will have a profound effect on the preservation of the existing.
- Old industrial buildings should be adapted to cater for new functions.
- Less energy will be used since demolitions of buildings are kept to a minimum.
- Re-using of salvaged materials should be encouraged in all new additions. The re-use of salvage materials will contribute to the industrial context. High-Tec might be contracted against withered materials.
- When large quantities of existing materials, components and buildings are re-used less new materials and components are required for future construction. This may include: steel girders, columns, concrete pile foundations, industrial lifts and conveyer belts, and machinery used in the gas refinery processes.
- The use of materials such as natural wood and stone, in place of those that consume large amounts of energy in their manufacture, is effective in reducing the environmental impact.
- Locally produced natural materials should be used wherever possible to avoid using excessive energy in their transportation.
- If the materials from a demolished building can be properly divided and collected separately, it becomes possible to recycle them. When separation of materials starts at the design stage, the potential for recycling buildings is enhanced, the design should provide for easy disassembly rather than destructive demolition wherever possible. (Nikken Sekkei, 2000, 34)

Materials are an important consideration for green buildings throughout their lifecycle. Optimum material choices must be made with consideration of the construction, use and eventual disposal of the building. (Nikken Sekkei, 2000, 34)

The following criteria are applicable for material choice.

- Use materials in their raw state.
- Choose materials with long term benefits of either low maintenance (raw concrete) or materials that can benefit the community by providing job opportunities (woven tapestries by local crafts people.)
- Choose materials according to the site's micro-climate and the buildings function (e.g. Materials with acoustic and thermal properties in the case of cinema design)
- Use salvage materials and building rubble as fill material.

⌈09⌋⌈03⌋⌈01⌋ ECONOMIC ISSUES

⌈09⌋⌈03⌋⌈01⌋⌈01⌋ LOCAL ECONOMY

The use of Local contractors, local building material and local manufactured components all contribute to a stronger local economy by sustaining the surrounding community. The use of local crafts people should be encouraged since if will provide a identity to the palce.
The urban redevelopment of the Gasworks should support local enterprises of art, culture and media. The film center will promote the South-African film industry locally and internationally.

⌈09⌋⌈03⌋⌈01⌋⌈02⌋ ADAPTABILITY AND FLEXIBILITY

Since the development encourages re-use, it automatically makes the development more financially viable.
New additions will be designed so that the Vertical dimension of spaces will encourage more versatile adaptation of use in future.
"…flexibility is ensured by generous floor-to-floor heights, double floors and equipment space above the false ceiling and on the roof and balconies." (Nikken Sekkei, 2000, 33)
Internal partitions will make spaces more transformable, both during operation of current and future use. People like change and flexibility of their environments to suit their needs.
In order for a building to accommodate change, it must have a functional value as well as a commodity value.
Buildings that offer an open arrangement of spaces and a flexible structural framework have the best potential for reuse. Building types organized with respect to their cellular structure allows for more flexibility in their future reuse
Circulation and service spaces must be planed not to restrict re-use. The most versatile option will be viable.

⌈09⌋⌈03⌋⌈01⌋⌈03⌋ ONGOING COSTS

The following criteria are applicable:

- Specification and material specification for low maintenance and or low cost maintenance is of high priority.
- Measures will be taken to limit requirement for cleaning. Hard wearing solid flooring (limited or no carpeting) specified. Windows must be designed to be easily accessible for cleaning.
- Measures should be taken to limit the requirement and costs of security. This should include mixed use development where buildings and spaces are overlooked by occupied neighboring buildings.
- A partnership will exist between tenants and occupants, treating the urban environment as a common property. A monthly fee will be charged for maintenance of the urban environment.

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