

## **Notice to Our Readers**

The market forecasts supplied by Torto Wheaton Research in Part Two of the report *Commercial Office Real Estate Markets* rely on 3<sup>rd</sup> quarter 1999 data. The forecasts reflect the average lease rates for Class 'B' buildings in the specific metropolitan area. The metropolitan area includes the Commercial Business Districts (CBD) and the closer in suburbs.

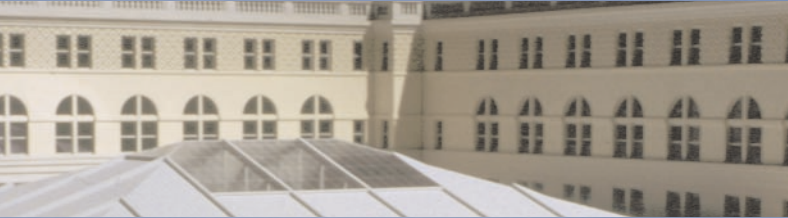
# Real Property in the New Millennium



October 2000

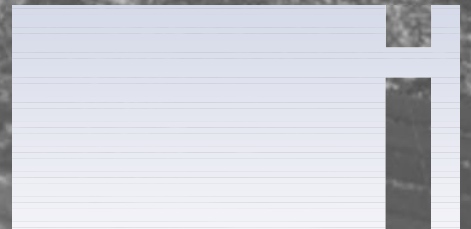


# Real Property in the New Millennium



U.S. General Services Administration  
Office of Governmentwide Policy  
**Office of Real Property**

October 2000



# Foreword

**T**HE OFFICE OF GOVERNMENTWIDE POLICY is pleased to issue the report *Real Property in the New Millennium*. The report reflects our organization's promise to provide our Federal customers with information and data to assist them in delivering world class products and services to their employees, stakeholders, and the American public. The millennium report also carries out the General Services Administration's (GSA) strategic goal to position the agency to predict, prepare and provide for the future by identifying workplace-related trends in the public and private sectors.

The report is divided into two parts. The first part discusses what experts from the public and private sectors are saying about the future of office buildings and the workplace.

The second and final part of the report summarizes the forecasts for the top 10 growing U.S. commercial office realty markets over the next 10 years. In addition, we identify the 10 largest U.S. office markets, and provide an overview on how they will change in the future. Federal real property managers will know the location of these markets and benefit through improved planning and budgeting for new Federal buildings, renovations to existing buildings and negotiations for leased office space.

I would like to recognize David Bibb, whose Office of Real Property undertook this research effort. With the guidance of Marjorie Lomax from the Evaluation and Outreach Division, and under the leadership of team leader Ron Whitley, the project team of Catherine Blanton, Dennis Goldstein, Carol Moore and Doris Reinhart (Chesapeake Consulting, Inc.), with contributions by Chris Coneeney, Andrea Wohlfeld Kuhn and Richard Ornburn produced this collection of information and data on changes that will impact the office buildings and new workplace of the future. I would also like to thank the GSA Office of Communications, in particular David L. Alexander of the Creative Services Division, for preparing the design of this publication.

Additionally, we would like to recognize the contributions from those experts and professionals in the public and private sectors that gave time from their busy and demanding schedules to provide input for this report. Without your dedication and participation, this project would not have been possible.



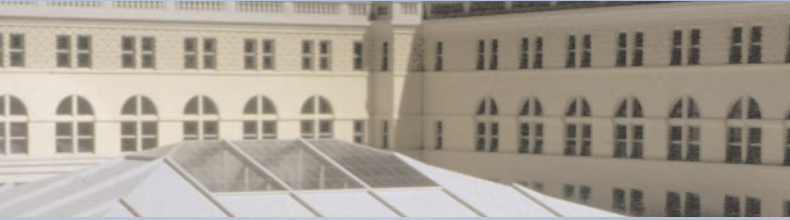
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# Executive Summary

## **T**HE GENERAL SERVICES ADMINISTRATION,

Office of Governmentwide Policy, Office of Real Property, recognizes the value of future real property changes to Federal real property managers in making wise decisions. This report identifies changes and trends that will affect the way office buildings and the workspace are designed, constructed, managed and staffed in the next 10 years. The report contains two parts.

Part One reflects information and data gathered from executives in Federal, State and local governments, and global experts from various professional disciplines such as real property management, realty investments, human resources and information technology, as well as futurists, academia, economists, and fast track organizations. Based on their input, the following trends will significantly change the office and workplace in the next 10 years:

- **E-commerce will provide efficiencies in real estate.** The use of e-commerce will offer benefits to real estate executives in the areas of purchasing, communications, realty transactions and project management. Benefits of saving time and money are available by using the Internet.

Facility managers will be able to deliver tenant services at lower costs and on time using on-line vendors for building products and materials. The need to allocate resources to house and track part inventories or to dispose of obsolete supplies and equipment will gradually disappear.

Communications through the

Internet will improve the flow and timeliness of information and data to facility managers and customers. Problems with building equipment and systems can be detected faster and corrective action initiated. This information can also be disseminated to others as preventive measures.

Marketing on-line will allow global audiences to interact and tour office properties for sale or for lease on a twenty-four hours a day, seven days a week basis (24/7). Services that close realty deals will also be available on-line, such as inspections, searches, equity financing and others.

Project management will also benefit from e-commerce. Delays and costs in transmitting designs, plans, and approvals will disappear. Results show that using the Internet can save one to three percent of the total project cost.

- **Workforce will determine office locations and transportation needs.** The competition for knowledgeable workers and pressures from employees for good transportation networks will necessitate organizations locating near population centers and providing technology for work anywhere/anytime. The knowledge labor force prefers locations near downtown areas because of more after hours events and better mass transit.
- **The workplace must be healthy, productive, flexible and friendly.** The future workplace will support new office designs and ergonomic furniture to improve employee productivity and reduce computer type



repetitive injuries. Employees will also be able to customize their workspace with color, texture and design configuration options. In addition, buildings will support robust technologies that provide higher-speed connectivity to transfer information and data to employees, customers, and stakeholders. Furthermore, the workspace will include features that dampen acoustical levels to compensate for surrounding noise.

Buildings and workspace will use green products and technology to conserve energy, eliminate waste and reduce indoor pollution. The workplace will also provide natural lighting to promote worker efficiency and lower energy consumption. In addition, employees will be able to adjust lighting levels and, on a limited basis, space temperatures to enhance occupant comfort.

However, many employees will prefer alternative office environments (AOE) outside the traditional office. Workers want the flexibility of AOE's, including telework centers, drop in centers, port sites, satellite offices and at-home locations. These environments are drivers that balance employees' work and personal lives, improve worker productivity and lower environmental pollution by reducing congestion and commuting times.

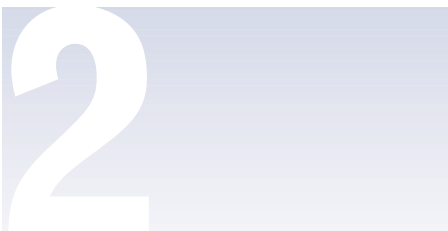
- **Sustainable and green designs will influence offices of the future.** The influence of government regulations, local community involvement and customer demands will drive offices to be designed,

constructed, and operated using environmentally friendly processes, products and materials. Future buildings will incorporate new architectural designs; promote recycling of land, water, and building materials; generate their own electricity; and provide healthy indoor environments.

The workplace will also offer more amenities that support employee quality of life. Amenities such as banking centers, ATMs, exercise centers, daycare, and retailers will locate within the office building. Organizations will also subsidize elder care for employee family members and service networks to provide home (maid, and repair) services while the worker is at the job.

- **Changes in the workplace will have little impact on the aggregate demand for office real estate.** In the Federal government, there will be small reductions in office space requirements resulting from downsizing the workforce, not in the way employees work. Agencies will continue their efforts to privatize (contract out) certain functions, and to eliminate programs that are no longer of strategic importance to carrying out their missions.

In the commercial sector, there appears to be little discernable impact on the demand for office space. Even with major increases in employees using alternative office environments, office space will grow, albeit at a slower rate than in the late 1990's. The level of construction momentum built up in the 1990's should continue



and is expected to meet customers' demands for new space in the next 10 years.

In Part Two, the project team provides a model that identifies the top ten realty markets that will experience growth in commercial office space in the next 10 years.

Historical real estate market data from Torto Wheaton Research is coupled with factors and considerations such as absorption rates, office completions and others for the following cities. Cities are listed alphabetically to facilitate the ease of navigating the information.

## Top Ten Growing Markets

- Atlanta, GA
- Boston, MA
- New York, NY (Manhattan area)
- Orlando, FL
- Phoenix, AZ
- San Diego, CA
- San Francisco, CA
- San Jose, CA
- Seattle, WA
- Washington, DC

In addition, we relied on the same market research organization and identified the ten largest realty markets in the U.S., and briefly discuss how the markets will change in the next 10 years. The cities are also listed alphabetically.

## Ten Largest Markets

- Atlanta, GA
- Boston, MA
- Chicago, IL
- Dallas, TX
- Houston, TX
- Los Angeles, CA
- New York, NY (Manhattan area)
- Philadelphia, PA
- San Francisco, CA
- Washington, DC

# Introduction

## **N**EW MILLENNIUM OFFICES OF THE TWENTY-FIRST

**CENTURY** will offer greater flexibility in design and function, be energy efficient and technologically advanced, use building materials that are healthy and sustainable, and promote maximum worker productivity. In addition to places of work, these office buildings will become living and dynamic centers for activities such as childcare services, places for meeting people, physical fitness spas, electronic banking facilities, retail shopping, and havens for relaxation to meet the demands and high standards of the office worker of the future. Furthermore, these newer office structures will emit lower levels of carbon dioxide into the atmosphere, use water and energy resources more efficiently, and rely on recycled building materials to construct and renovate the building and other related projects.

Federal real property executives and professionals need to be knowledgeable of issues such as potential changes in public and private sector office buildings and workspace, levels of growth forecasted in office markets, and other kinds of related information and data that influence changes in future office buildings and workspace.

To facilitate this, the General Services Administration (GSA), Office of Governmentwide Policy, Office of Real Property, has produced this report on *Real Property in the New Millennium*. The report is divided into two parts.

Part One, Office Buildings and the New Workplace, identifies the changes from the traditional office

of the past to the new millennium office building and workspace of the future. We report on what the global experts and executives had to say about the evolution of office real property in the next 10 years.

Part Two, Commercial Office Real Estate Markets, identifies and analyzes the growth of the top 10 private sector office markets in the U.S. for years 1999 through 2009. Using trend data provided by Torto Wheaton Research, we report on the office space square footage and potential vacancy percents that may exist, the levels of employment growth, the variation in rental rates and demand for new office construction. This forecast only extends through 2009 since there are no other research organizations that provide market forecasts that extend beyond that year. In addition, we identify the 10 largest U.S. real estate markets for commercial office space and provide an overview of how the markets will change in the next 10 years.

There are five appendixes provided at the end of the report. Appendix A, Discussions on Predictions Outlined in Part One, provides further detail and expands on the summarized findings as addressed in Part One. Appendix B is a prediction matrix for those interviewed entitled, Respondent and Predictions Matrix. Appendix C, Econometric Model, describes the model and defines the model's variables. Appendix D, Exhibits for Top 10 Growing U.S. Commercial Realty Markets and National Forecast, provides forecasts for those 10 markets that will have the largest growth in commercial office realty in the foreseeable future. Appendix E lists the References/Resources and Supplemental Reading Materials.

# PART ONE: Office Buildings and the New Workplace

## **T**HE EVALUATION AND OUTREACH DIVISION,

with the assistance of a contractor, Chesapeake Consulting, Inc., of Alexandria, VA, prepared this report. In this part of the report, we conducted collaborative discussions and telephone interviews with public and private sector managers, professionals, and experts. Thirty-eight experts from public and private organizations (25 percent Government, 75 percent private sector) provided their unique insights on potential changes that would occur in office buildings and in the workplace of the future.

Eight subject categories have been identified using the information collected during the collaborative session with our respondents.

### *Physical Environment*

#### *Office Location*

#### *Workforce*

#### *Support Services*

#### *Organizational Operations*

#### *Technology*

#### *Real Estate Considerations*

#### *Regulatory Impacts*

Each category contains a brief overview on various predictions that may affect the future of office realty. For those readers who want to read more about certain predictions, we have included a complete discussion with details and examples in Appendix A.

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## A. Physical Environment

### A-1. Use of sustainable design/materials

Sustainability/greening concepts in future office buildings will be driven by customer demands for buildings that are friendly to the environment and governmental regulations requiring environmental compliance with new laws. The future trend for constructing buildings and building components is to use environmentally benign materials and processes. Materials or components in offices will be recycled after their useful life.

### A-2. Interior Office Environment

#### • *Flexible furniture*

The office furniture of the future will offer total flexibility to the

organization and its employees. Workspace facilities will easily be dismantled and reconstructed to accommodate temporary or long-term purposes.

#### • *Natural light*

Future offices and the workspace will maximize the use of natural lighting, which is an essential component to enhance the productivity of employees. New office designs of the future will emphasize locating smaller private offices at the center core of the building, thereby allowing more natural light to penetrate into the interior workspace. The same designs will also provide open atriums and skylights that supply additional sunlight into the cores of office buildings.

- **Ergonomic furniture**

Ergonomic furniture designs will increase productivity and promote employee health in the workplace of the future.

- **Private teaming space**

Space for teaming will be enclosed and provide a quiet environment.

- **Personal control over the workspace**

Workers want more control over their workspace environment and freedom of choice - true self-management that is the ultimate individual freedom. Employees will want the ability to control the heating, cooling and lighting, and to enjoy some privacy within their workstations.

- **Energy conservation measures**

Efforts to save energy in office buildings and the workplace will continue to play an important role in the future. Facility managers will use direct digital controls to reduce energy use. New lighting designs in buildings will reduce energy costs and improve worker productivity.

- **Plug and play systems**

The use of plug and play systems by organizations will expand and provide the complete boxing of electrical, telecommunication and information technologies service hookups.

- **Open space**

Offices of the future will support open space configurations that promote interaction among fellow workers and promote better access to natural lighting.

- **Acoustical performance**

Open space designs will require

acoustical engineering to be effective in reducing noise levels.

- **Workspace customization**

The future workspace may no longer embrace the concept of one-size fits all. Employees may have the opportunity to customize their workspace by changing workstation textures, colors, type of seating, height of partitions, numbers and type of cabinets, and placement of task lighting.

### A-3. Facilities

- **New buildings**

While sustainability concepts are gaining increased support, many existing office buildings are not good candidates for upgrades. Customers expect offices that improve worker productivity and satisfaction. They want offices that provide access to natural light, have efficient and clean electric power, provide fiber optic cable throughout the building structure, have a good site location, offer efficient transportation networks, provide more parking and operate on a 24-hour/7 days a week (24/7) basis.

- **Retrofitted buildings**

Conversely, advocates for retrofitting existing buildings point out that many costs incurred in constructing a new building have already been paid, such as site preparation, building design, roads, and infrastructure. Historic preservation and adaptive reuse further sustainability concepts.

- **Leased facilities**

There is a trend toward short term leasing of 3 to 5 years. Changes in the way people work, where the workforce is located, right sizing and downsizing, reorganizations,

mergers, global competition, global workforce, product marketing and product distribution as well as other evolutions in organizations demand flexibility.

- **Building design**

Hierarchical floor plates that historically placed executive offices on the penthouse floor and private offices near windows will slowly disappear, in order to reflect the new, flatter organizational structure. New office buildings will efficiently bring together employees from every organizational stratum to promote synergy and better collaboration.

- **Disposable offices**

The "disposable office" is a fully functional and furnished office space that can be leased by the hour, the day, the week, the month or the year. The office includes telephone, high speed Internet access and, if required, administrative support. This space can be easily vacated as warranted. Organizations in the future will use a disposable office arrangement when costs do not justify the need for everyday workplaces. This novel idea will enable organizations to satisfy short-term space requirements.

#### A-4. Building Security

At the government and private sector level, managers will acquire and install new security technologies. These technologies include:

- **Biometrics**

These devices will be used to read tenant fingerprints, eye scans, and voice imprints, replacing the typical proximity reader for controlling building access.

- **Digital video**

Improved imaging will improve

security surveillance. Digital pictures can also be e-mailed to other security officials in the building or to management executives in other parts of the world.

- **Greater bandwidths**

Greater bandwidths will provide facility managers with real-time remote audio capability that enables them to hear what is occurring at a specific location within the building.

- **Internet**

Facility executives at remote sites will be able to control security at buildings. Information like occupancy reports, the status of building lock-ups, and other security data can be downloaded, reviewed, and processed through the Internet (*Vergetis Lundin, B.L., p. 97*).

- **Radio Frequency Identification (RFID) Devices**

RFID technology will be used to document the movement of real property assets within the building. Installing antenna readers inside interior doorways, or hand held readers at door exits allow RFID technology to effectively control the location of material and equipment, identify who has it, and when it left the organization.

- **Security surveys**

The security survey can identify the type of threats against the building and the probability of those threats occurring. Using survey results, managers can identify and implement appropriate security counter measures.

- **Smart cards**

Similar to proximity cards that provide building access, smart cards will also control access to personnel



computers, monitor time of computer use, daily attendance, and track assets that move through the building. Furthermore, the smart

card's memory provides personal and security information on the employee in the event of an emergency situation.

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## B. Office Location

- **Traditional settings**

Organizations will locate their future offices near population centers that support a knowledgeable workforce. These offices may be located in downtown areas, near airports, or in suburban locations. Organizations will consolidate buildings and functions as an integral part of their location strategy. The need for good transportation networks will play a larger role in formulating the organization's location strategy for the future.

- **Alternative office environments (AOE)**

The demand for non-traditional office settings will expand in the future. These AOE's may include: telework centers, drop in centers, port sites, and satellite offices, and home offices. For more information on AOE's, see GSA's publication on *Office Space Use Review, Current Practices and Emerging Trends*, September 1997.

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## C. Workforce

### C-1. Diversity

- **Age**

A diverse age population will staff future organizations. The "baby boomers" (born between 1946 and 1964) will prefer office environments that promote and maintain employee empowerment and teaming. This generation exhibits very strong loyalty to their employers.

Generation X (born between 1965 and 1977) will prefer to manage results, not time. Assignments by X managers to employees require little or no oversight unless specifically requested. This group, like the boomers, is interested in

teaming. The Xers want on-site support services such as childcare and opportunities to continue their education. This group of workers is more at ease with flexible working arrangements like AOE's.

Generation Y (born between 1978 and 1994) will be oriented toward teaming. This generation, having grown up with computers, sees them as basic essentials in the workplace. (*Zemke, Raines & Filipczak*).

- **Physically challenged**

Once viewed by many organizations as too costly to hire, the disabled workforce is now, and will increasingly be in demand by organizations.

- **Retirees**

Shortages among the knowledgeable workforce will encourage organizations of the future to hire retired workers and increase the age of retirement for existing workers. Organizations must prepare themselves to offer older workers the same amenities that appeal to younger workers, like part-time work, flexible work arrangements, flexible hours, transit subsidies, plus certain amenities that are specifically targeted to the aging population such as on-site medical clinics, elderly care, and retreat or meditation rooms.

## C-2. Availability

The future will see a decline in available/qualified workers. In particular, experts believe that Federal agencies will experience more difficulty in filling career positions than in the private sector.

The following factors will contribute to this decline:

- **Global competition**

International competition will make it difficult for non-global realty companies to attract and retain employees because of the employee's desire to live elsewhere and enjoy new experiences in other parts of the world.

- **Abundance of investment capital**

New employees will be more adventurous and lean toward changing careers as investment capital in new and emerging technologies open up new, more lucrative job markets. Employees will function more as "free agents." Their loyalty is to their knowledge, expertise and skill sets - what they bring to a project, not necessarily to the organization itself.

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## D. Support Services

- **Workplace amenities**

More organizations will offer new amenities to attract and retain future employees. The demand for employees to have childcare services, fitness centers, banking centers, ATMs, exercise areas, cafeterias, day care, drug and mini-mart stores and dry cleaning establishments will result in these becoming common services in most office buildings.

- **Elder care**

Elder care is an emerging practice whereby the organization subsidizes employee expenses to provide daily care to aging family members.

- **Employee service networks**

Organizations will contract with bonded service providers and offer employees maid service, car repair, and home repair, leaving more time for the employee to spend with family and to participate in other activities.



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## E. Organizational Operations

- **Global expansion**

Organizations will operate in a global economy where everyone is tied together through satellite communications and the Internet. Most organizations have operations around the globe and will continue to expand these.

- **Less centralized authority**

The benefits of moving the decision making process closer to the customers will continue to decrease the need for centralized authority in organizations. Flatter organizations and downsizing of middle management is moving decision making down to the "rank and file" line workers. Innovation of better and more powerful information technology is responsible for moving more employees out of the traditional office settings to AOE's. This movement away from the traditional office will also decentralize decision-making.

- **Outsourcing**

The future will see a gradual decrease in the use of in-house employees that provide

maintenance, janitorial, security, and landscape services. Organizations that are concerned over maintaining and supporting high-level security requirements and demand proficiency testing are probably best served by an in-house security operation.

Organizations will form more strategic partnerships with outsourced vendors to provide design services, facilities management, furniture and other services.

Another new idea that is gaining press is the "all in" service model, which will enable organizational employees to obtain everything they need to accomplish their work from a single source. This one-stop shopping service will provide everything that the customer needs, such as food services, travel arrangements, records management, shipping and receiving, fleet management, building services, moves/relocations, furniture, telecommunications, utilities maintenance, reprographics, lease management, and even building demolition (*Westfall, S.L.*).

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## F. Technology

The demand of an expanding information age will require that a building's infrastructure have proper design and construction to support the customers' latest technology. The future workplace will support robust technology that provides connectivity to employees, custom-

ers, and stakeholders. To meet these expectations, office buildings of the twenty-first century will incorporate many new technologies.

- **Data cabling**

The use of expanded, high-speed cabling configurations will support

evolving communication infrastructures. These technologies will include: the ability to carry digital subscriber line (DSL) for digital telephone service, e-mail and direct access to Internet, higher speed copper wiring, and fiber-optic cable to support high-bandwidths.

- **Internet**

The power of the Internet and bandwidth will provide greater productivity and a working environment that is capable of responding to change. With the proliferation of 24/7 communication services, most workers will be able to work from anywhere in the world at anytime and on any day. The use of e-commerce will provide benefits in the areas of purchasing, communications, real estate transactions, and project management (*Piper, J., p. 36*).

- **Intelligent buildings**

Devices such as sensors in floors, walls, and ceilings electronically will feed instantaneous information and data for quick analysis on the building and workspace conditions. These data will provide the ability to

monitor security, lighting, fire and safety systems, energy management, power transmission, and environmental control (*Caloz, J.W., p. 53*).

- **Power systems**

The high-tech office buildings and workspaces will require more efficient and reliable power systems to support growth in information technology. Most problems will be corrected using the proper sizing of wiring and effective electrical grounding within the building. Office buildings will also have backup power infrastructures to support LAN based computer operations and provide for life safety support in areas like security systems, fire alarms, CCTV and others.

- **Wireless devices**

The implementation of wireless technology will ensure complete flexibility in the design and construction of the future office building and workspace. The demand for hardwire in the next five years and definitely in the next 10 years to support intra-office information technology and communications will disappear.

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## G. Real Estate Considerations

### G-1. Demand

There is disagreement on the level of demand for corporate office space in the future. Most experts believe that the corporate demand for office space will continue into the foreseeable future. However, there remains uncertainty about how much the demand will be and how long it will last.

However, other experts see the office market in a gradual decline. These experts suggest that vacancy rates that have remained in the single digits during the late 1990's have bottomed out and will begin to rise in the new millennium. These same experts also believe that the economic boom of the mid to late 1990's is cooling down and will slow the rate of space absorption (*PriceWaterhouseCoopers, 1999*).



## G-2. Financing mechanisms

- **Public/private partnerships**

The use of public/private partnerships are offering State and local governments funding to gradually replace aging facilities with newer and more productive units in the future. Through enacted legislation, more governments will have the authority to use private capital to construct buildings that will revert to government ownership at the close of a specified outlease period. Depending on the terms and conditions of the agreement, the government's contribution to the partnership will change.

- **Wall Street financing**

Growth of the financial markets will influence acquisition of real estate capital. Many large investment houses will use real estate to balance their stock portfolios, reflecting investors' desires for greater consistency in investment yields with reduced volatility.

- **Office construction financing**

The competition for cash to construct office buildings will also intensify in the future as lenders become more cautious. This will continue to drive returns on real estate investments downward, make developers more cautious about over-building, and increase financing costs for new construction.

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## H. Regulatory Impacts

- **Deregulation of utilities**

Under a deregulated environment, consumers will have a choice of who provides their building service utilities.

- **Greening**

An increasing awareness of limited resources, pressure from consumers, and a new sense that sustainability is fiscally sound will create international government-wide initiatives to promote greener working environments. These may include energy conservation, increased use of alternative work environments, development of sustainable buildings, and alternative transportation initiatives.

- **Telecommunications**

Telecommunication providers are demanding Federal legislation that would provide free and unlimited access to install and provide telecommunication services directly to customers. Conversely, owners, developers, and managers want to provide their occupants with telecommunication services through license agreements that they negotiate with the telecommunication providers. This issue will be resolved through the interaction of market forces.

- **Transportation**

Several regulatory initiatives will increase the collaborative efforts of Federal, State, local governments and the private sector to achieve the common goal of reducing air pollution and traffic congestion.



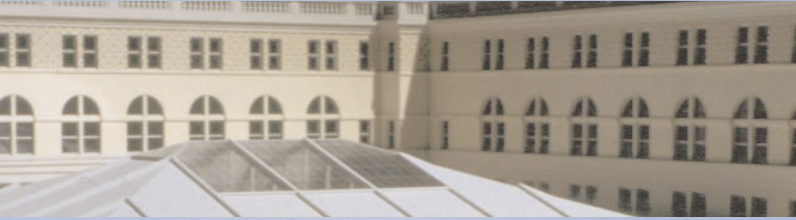
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We would like to express our appreciation to the following organizations in the public and private sectors that assisted us in preparing Part One of the *Real Property in the New Millennium* Report:

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- Shell International (Netherlands)
- State of Alaska
- State of Pennsylvania
- Steelcase, Inc.
- Sun Microsystems, Inc.
- The Design Alliance
- Trammel Crow, Inc.
- University of California- Berkley
- University of Georgia
- Workplace Change Enablers





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# PART TWO: Commercial Office Real Estate Markets

**I**N PART ONE, WE ADDRESSED FUTURE CHANGES to office buildings and the workplace. We looked at how the future workspace will be energy efficient and productive, will accommodate the needs of customers, will be non-toxic to the environment, and will incorporate new designs and technology. In Part Two of the report, we look at the changes that will occur in selected office real estate markets across the Nation. This is presented in two sections. Section A, Top Ten Growing Markets, presents a forecast through 2009 for 10 U.S. cities that will achieve the largest level of market growth in the area of commercial office real estate. Section B, Ten Largest Markets, identifies the 10 U.S. cities that have the largest real estate markets in commercial office space, and briefly

discusses how the markets will change in the foreseeable future. All statistics provided in this portion of the report are provided through a professional research organization and other experts, and do not represent the official views of the U.S. Government.

Federal managers should know where these real estate markets are for those cities where governments have buildings. The various market forecasts provide important information on future charges in commercial office buildings. This information can enhance the accuracy of planning and budgeting for renovations to Federal buildings. It also has the potential for use with the new tools in GSA's proposed Federal Property and Administrative Services Act amendments, disposals, and negotiations for leased space.

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## A: Top Ten Growing Markets

### Methodology

The 10-year forecasts for the realty markets that will experience the largest market growth use a consensus approach. Forecasts rely on historic real estate market data like geographical area, projected market growth, investment potential and technology leaders.

Six organizations were identified as potential suppliers of realty market forecasts. These organizations include:

- ***Torto Wheaton Research***
- ***Milken Institute***
- ***Entrepreneur Magazine***
- ***PricewaterhouseCoopers***
- ***Landauer Associates***
- ***Dun and Bradstreet***

### Selection criteria

Comparing market forecasts (excluding Dun and Bradstreet), using the selection criteria below, the team identified the 10 realty markets that will exhibit the largest growth during the 10-year period. Dun and Bradstreet was excluded because it consists of a one-time study tracking the migration of businesses and jobs between states.

- ***Projected market growth***
- ***Supply-demand for office space***
- ***Vacancy and rental rates***
- ***Top technology locations***
- ***Investment potential***
- ***Multifaceted environments***

### The Model

The Torto Wheaton econometric model was used to forecast the future demand for commercial office space and change in rental rates. The major variables in the model are office square footage, absorption rates (national market only), rental rates, vacancy rates, employment levels and new office construction (completions). Appendix C discusses the model in greater detail and defines each model variable. Appendix D provides real estate market forecasts for the top 10 growing U.S. cities and the national forecast.

Two different sets of data from the model provide the statistics. The data used to develop the national forecast rely on 54 major U.S. markets and cover the time period from 1999 through 2009. These data consist of historical trend information. The top 10 U.S. cities

use a subset of the 54 markets and reflect the projections for these growing markets.

Torto Wheaton's renowned reputation as a leader in preparing real estate market forecasts for various types of commercial property, plus their ability to provide forecasts that cover more than five years, was the basis for selecting their published research for the purpose of this report. Many of the remaining organizations that publish real estate market forecasts do not speak to office buildings but focus on retail, residential or technology facilities. Additionally, these same organizations limit their forecasts to less than five years.

Torto Wheaton Research has received international recognition as a premier provider of commercial real estate forecasts, analyses, and research. Their proprietary property-level database enables them to forecast and analyze supply and demand trends in commercial real estate. Torto Wheaton Research covers 54 U.S. markets, including 72 metropolitan statistical areas, and 24 international markets. Founded in 1982, Torto Wheaton is backed by CB Richard Ellis, the world's leading global real estate services company.

### National Forecast

The model forecasts that there will be a slowdown in the growth rate for office employment. It also indicates that the construction of new office buildings will gradually decline as we move forward into the twenty-first century. Even so, the major realty markets will continue to increase the stock of office space to satisfy customer demands, albeit at a slower pace. Despite the slowdown in job growth, and in new

office construction activity, office rents should continue to increase slowly over the 10-year period.

Consumer spending and business investment should remain robust. The strong economy will support above average rates of absorption for office space that will gradually decline during the period. This in turn will slow down the increase in the national market vacancy rate.

The National forecast is presented in Exhibit 1 in Appendix D and summarized as follows:

- Projected job growth should decrease from a 3.9 percent growth rate in 1999 to a low of 1.8 percent in 2000 and increase slightly to 2.0 percent by 2009.
- Growth in rental rates will remain positive and increase slowly. Rates will remain mostly flat in comparison to the increases that occurred in the 1990's. The spillover effects of a healthy office real estate market of the late 1990's will continue to increase rental rates even as newer constructed buildings come on line.
- Vacancy rates should continue to increase as absorption of office space slows, and new projects come online. However, the real estate market for office space should remain tight until 2001, with the vacancy rate below 12 percent. Over the long term, vacancy rates are expected to stabilize in the range of 13 to 14 percent.
- New office construction will continue to be strong through 2002 with an average completion rate of approximately 80,000,000 rentable square feet (rsf) coming on line per year.
- Net absorption should continue to increase from a low of 41 percent of completions in 1999, or 35.6 million rsf, to 96 percent in 2009, or 49.9 million rsf.

### Top Ten Commercial Markets

Listed below are the top 10 growing realty markets in the U.S., followed by discussions on changes to office realty in the new millennium. The markets are listed alphabetically to improve navigation of the information.

- **Atlanta, GA**
- **Boston, MA**
- **New York, NY (Manhattan area)**
- **Orlando, FL**
- **Phoenix, AZ**
- **San Diego, CA**
- **San Francisco, CA**
- **San Jose, CA**
- **Seattle, WA**
- **Washington, DC**





## Atlanta, GA Forecast

*(includes the areas of Metropolitan Atlanta, Buckhead and North Fulton)*

Atlanta continues to be a focal point for business development. Atlanta benefits from the migration of businesses from the northeast to the south and southwest. It also serves as a major transportation hub, which attracts new businesses.

The Atlanta forecast is presented in Exhibit 2 in Appendix D and is summarized as follows:

- The rate of employment growth was high in 1999, at 6.2 percent. Thereafter, employment growth should be relatively flat, averaging a 3.0 percent rate of growth annually.
- Even though new construction will continue steadily throughout the forecast period, the strong economy and demand for office space will result in increasing rental and absorption rates. The rental rates will steadily increase from \$19.05 per rsf in 1999 to \$23.22 per rsf in 2009.

- Vacancy rates will increase between 1999 and 2001. Thereafter the rates will remain fairly stable, averaging around 12.5 percent.
- The new construction explosion began in 1997, when the number of new office completions increased from 1,472,000 rsf to 5,693,000 rsf. This rate of new construction should continue through the forecast period, decreasing only slightly by 2009, with 4,140,000 rsf of office space coming on line.



Atlanta Federal Center  
Atlanta, GA

## Boston, MA Forecast

*(includes the areas of Boston NECMA (New England County Metropolitan Area), Suffolk County and Essex, Norfolk, Middlesex, Worcester, Plymouth and Bristol counties in Massachusetts, plus the counties of Hillsborough, Rockingham and Strafford in New Hampshire. The major cities included in the NECMA are Boston, Cambridge, Lynn, Waltham and Gloucester)*

Boston continues to serve as a center for high tech and innovation. Its proximity to educational institutions like Harvard University and MIT has shored up its market position. A strong economy in the area contributed to the high demand for new office space in the late 1990's, which should continue into the new millennium.

The Boston forecast is presented in Exhibit 3 in Appendix D and is summarized as follows:

- Projected job growth should steadily decrease over the 10-year study period, which will contribute to the increase in vacancy rates.
- The strong economy and increasing demand for office space and rental rates will remain high even though new construction will come on line and vacancy rates are rising slightly.
- The vacancy rates will increase through 2005.
- The high rate of new office construction will continue between 1999 and 2003 with annual increases of 13.8 percent, 19.5 percent and 8.0 percent respectively. Thereafter, the new construction rate will gradually decline.

## New York, NY Forecast

*(includes the areas of midtown north and south, midtown and downtown)*

The Manhattan office market represents the largest office market in the U.S., comprising over 355 million rsf of competitive office space. The City has been experiencing a dynamic economy as a result of the success of Wall Street. Rising corporate profits have led to steady job growth, which in turn has tightened the office market. The Metropolitan area has experienced cuts in government payrolls; however, job growth in the private sector has been very strong.

New York continues to develop its presence in the new media and entertainment industries at a rapid rate while information technology firms have expanded in the area. The city's economy will soften over the next 10 years. Employment growth will slow to around 0.6 percent by 2006.

The vacancy rate for the Manhattan office market has been quite low in the late 1990's, averaging around 5.4 percent. The steady infusion of new construction has helped to keep the vacancy rate fairly stable. The

average lease rate in this market continues to increase.

The New York forecast is presented in Exhibit 4 in Appendix D and is summarized as follows:

- Job growth will remain fairly flat over the forecast period with almost no growth projected for the last six years of the forecast period.
- Average rental rates will continue to increase through 2002 when the city will experience a negative absorption rate. The rents will peak at \$44.48 per rsf, decreasing to \$34.95 per rsf in 2009.
- Shrinking vacancy rates will lead to a moderate increase in new office development over the next 4 to 5 years.
- The City will experience a negative absorption rate from 2002 through 2004; however, significant increases in new construction will help meet the demand for office space.



*U.S. Courthouse  
at Foley Square  
New York, NY*



*U.S. Courthouse  
Boston, MA*

## Orlando, FL Forecast

*(includes the areas of Orlando, Lake Mary, Heathrow and Maitland Center)*

There has been a general shift in the 1990's toward the south and southwest, contributing significantly to the economy in the Orlando area. This trend should continue into the new millennium as the Orlando technology market continues to receive support due to its close proximity to the National Aeronautics and Space Administration Space Center.

The Orlando forecast is presented in Exhibit 5 in Appendix D and is summarized as follows:

- Going forward into the new millennium, the rate of growth will remain fairly constant at an average rate of 2.9 percent.
- The rental rates will decrease to \$18.14 per rsf in 2004 as vacancy rates increase. Thereafter, the opposite will occur as rental rates increase to \$20.48 per rsf in 2009 and vacancy rates decrease.
- Vacancy rates will increase as new construction comes on the market, peaking at 19.7 percent in 2002. As new office construction slows, vacancy rates will gradually decrease to somewhere around 12.1 percent in 2009.

- Orlando experienced a surge in new office construction between 1998 and 1999. However, new construction will begin to slow down in 2001 with significant decreases forecasted through 2009. New construction will reach a high of 2,776,000 rsf in 2001 to drop to a low of 202,000 rsf in 2006, with a gradual rebound through 2009.



*"Government Plaza"  
Orlando, FL  
(Federal, state and local facilities)*

## Phoenix, AZ Forecast

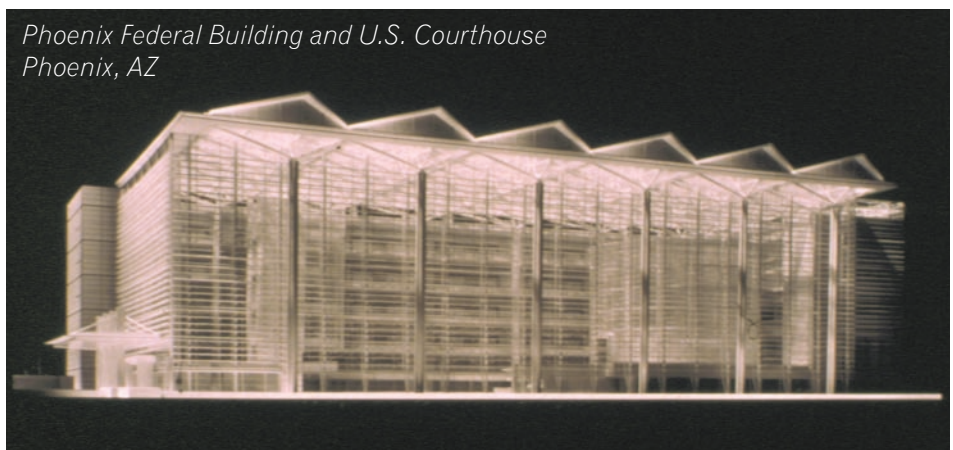
*(includes the areas of Phoenix, Sun City, Glendale, Squaw Peak, Paradise Valley, Camelback Corridor, Scottsdale, Tempe, Mesa, Superstition Corridor, Chandler/Gilbert, Deer Valley, Litchfield Park and Tolleson)*

Phoenix represents another growth city that enjoys the migration of business to the south and southwest. Phoenix has experienced a surge in new office construction since the late 1990's, which should continue into the new millennium. Employment growth continues, which has contributed to an increase in the rental rates.

The Phoenix forecast is presented in Exhibit 6 in Appendix D and is summarized as follows:

- Employment growth rates will increase between 1999 and 2000, from 1.9 percent to 4.3 percent. Thereafter, the growth rate will remain fairly constant.

- Rental rates should continue to increase in spite of the new construction coming on line, due to strong employment growth and absorption rates. Forecasts show that rates will climb to \$26.84 in year 2009, representing a 34 percent increase over 1999 levels.
- The vacancy rate will remain flat at an average rate of 13.9 percent throughout the 10-year period.
- New construction should continue at a high rate through 2003. Thereafter, the new construction rate will slightly decrease through 2009 to 2,852,000 rsf.



*Phoenix Federal Building and U.S. Courthouse  
Phoenix, AZ*

## San Diego, CA Forecast

*(includes the areas of San Diego, Governor Park, Mission Valley, Scripps Ranch, Miramar, La Jolla, Kearny Mesa, North Beach Cities, Escondido, Carlsbad, Sorrento Valley, Rancho Bernardo, Poway/Rancho Pen, San Marcos/Vista, Torrey Pines, Sorrento Mesa, Temecula, Oceanside, Mission Gorge and Del Mar Heights)*

San Diego, like San Jose and San Francisco, has experienced significant growth and economic prosperity as a result of the developing technology influence. High tech industries such as Qualcomm have located in San Diego, which has attracted other high tech and related businesses to the area. San Diego should continue to experience high demand for office space into the new millennium.

The San Diego forecast is presented in Exhibit 7 in Appendix D and summarized as follows:

- Projected job growth will increase, from 2.9 percent in 1999 to 3.6 percent in 2001. The growth rate will decrease slightly through 2009 to 3.0 percent.
- The strong economy and demand for office space will continue to push up rental rates even with new construction coming on-line.
- The vacancy rate will remain flat, between 1999 and 2003, at an average rate of 9.2 percent,

increasing slightly to 10.8 percent by 2009. This increase reflects the growth in new construction throughout this period.

- There has been a boom in new office construction in San Diego since 1998. A steady stream of new office construction should continue through 2009.



*Ronald Reagan Federal Building and U.S. Courthouse  
Santa Ana, CA*

## San Francisco, CA Forecast

*(includes the areas of San Francisco, Yerba Buena, Mission Bay, China Basin and Potrero Hill)*

San Francisco enjoys some of the economic prosperity associated with the growing technology industry in nearby Silicon Valley. It also ranks as one of the top five regional areas for investment banking. This healthy economic environment coupled with a significant increase in new office construction has made San Francisco a desirable location for new and expanding businesses.

San Francisco led the office market with the largest rent increases in the late 1990's. However, future rental rates will decline due to the increasing levels of completions and climb in vacancy rates.

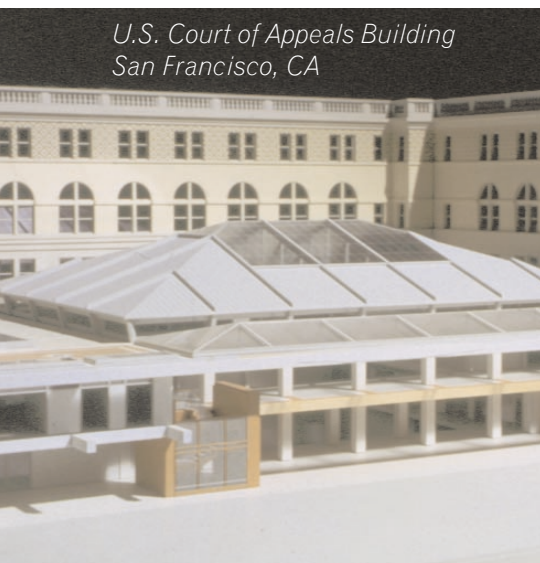
The San Francisco forecast is presented in Exhibit 8 in Appendix D and summarized as follows:

- The amount of office space in San Francisco should increase from

71,453,000 rsf in 1999 to 98,083,000 rsf in 2009, an increase of 37 percent.

- Rental rates will continue to fluctuate, reaching a high of \$38.19 per rsf in 1999, to a low of \$29.65 per rsf in 2006, with a slight rebound to \$33.85 per rsf in 2009. In the future, rental rates will begin to decline as new construction comes on line and employment growth slows.
- The vacancy rate for this market was very low in 1997 and 1998; 3.3 percent and 4.2 percent respectively. This low vacancy rate reflects the decrease in new construction between 1991 and 1996. However, as new construction comes on line in 1999 through 2003, vacancy rates will increase from 8.4 percent in 1999 to 15 percent in 2004 with a slow decline to 9.8 percent in 2009.

*U.S. Court of Appeals Building  
San Francisco, CA*



## San Jose, CA Forecast

*(includes the areas of San Jose, Silicon Valley, Militas, Los Gatos, Saratoga, Cupertino, Santa Clara, Sunnyvale, Mountain View, Los Altos and Palo Alto)*

The San Jose area has become a center for high technology companies, similar to Silicon Valley. Many of the major technology firms are located in this area, including Netscape, 3Com, Intel and Cisco Systems. It ranks among the top areas in technology production. As a result, the economic environment for this area remains robust and the demand for office space continues to climb. Until 1998, there was very little new construction, resulting in a significant increase in rental rates.

The San Jose forecast is presented in Exhibit 9 in Appendix D and is summarized as follows:

- Projected job growth should remain fairly flat, at an average of 2.0 percent, after decreasing from 3.2 percent in 1999.
- Rental rates will decrease from a high of \$29.35 per rsf in 2001 to \$25.58 per rsf in 2006 with a slight rebound to \$26.77 per rsf in 2009.
- Vacancy rates should increase as a result of lower rates of employment growth and increased construction activity.
- New office construction will remain strong through 2004. Thereafter, new construction should steadily decrease.

## Seattle, WA Forecast

*(includes the areas of Metropolitan Seattle extending from Pioneer Square to the northern shore of the Lake Washington Ship Canal; the Northend which extends north of the ship canal to the Snohomish County Line; Tacoma/Ederal Way, comprising Pierce County; the Eastside, comprising all of King County directly east of Lake Washington, plus that portion of Bothell extending into Snohomish County; and Snohomish County)*

The Seattle area has become a high-tech mecca. The entire job market has shifted from reliance on manufacturing industries like Boeing, to information technology, notably Microsoft. As a result of this shift, the demand for office space in the 1990's will remain strong. The strength of the economy has supported moderate vacancy rates, but the rates will rise significantly as new space is brought into the market. New construction increased 253 percent between 1996 and 1997, and in 1998, it was up by 371 percent.

However, the increased levels of construction activity will slow down. In fact, the rate of new construction should begin to decline in 2001 and continue through 2009.

The Seattle forecast is presented in Exhibit 10 in Appendix D and summarized as follows:

- The strong job growth experienced in the late 1990's will decline to basically no growth in 2000 and then hedge upward to 2 percent by 2001, to approximately 3 percent in 2009.
- Growth in rental rates will remain fairly stable over the forecast period, averaging about \$22.00 per rsf.
- The vacancy rate will increase to approximately 16.0 percent in 2001 and decrease to 12.3 percent in 2009. The increase in rates parallels the construction of new office buildings during the 1998 through 2000 time period.
- New office construction will begin to slow down over the next 10 years, from 5,676 completions in 1999 to 1,310 completions in 2009, or a decrease of approximately 77 percent.



## Washington, DC Forecast

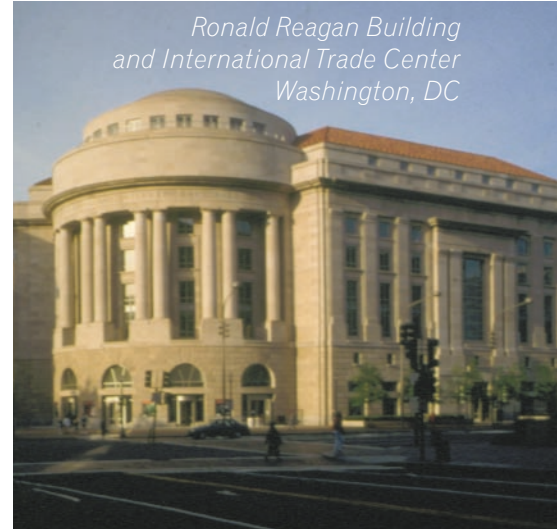
*(includes the areas of Washington, DC, Fairfax, Loudoun, Stafford, Prince William, Montgomery, Prince George's, Calvert, Charles and Fredrick counties)*

The DC office market, one of the largest in the U.S., has a total inventory of approximately 225 million square feet of competitive office space. The downtown Washington, DC office market continues to demonstrate good growth and should continue its growth well into the new millennium. New construction continues to climb, and vacancy rates are also moving upward.

While there has been some negative job growth in the Washington area due primarily to Federal downsizing, predictions are that job growth should be strong due to the private sector moving into the area. Employment should increase from 731,000 office jobs in 1999 to 915,000 in 2009, or a 25 percent gain in jobs. A key ingredient of the job growth and demand for office space in the metropolitan Washington area comes from emerging computer-based and biotech businesses developing in the suburban areas.

The Washington forecast is presented in Exhibit 11 in Appendix D and is summarized as follows:

- Rental rates will continue to increase over the next 4 years from an average of \$25.92 per rsf in 1999 to \$29.60 per rsf in 2002. After that time, rates will start to fall and have a slight rebound in 2009.
- The vacancy rates will rise to around 14.9 percent in 2004, and gradually slide, reaching a low point of 8.9 percent in 2009 as high-tech industries absorbed new building completions. The increase in vacancy rates appears to be associated with large inventories of new space coming on line during the early 2000's.
- New office completions will peak in 2002 with 14,544,000 rsf coming on-line. In 2009, the number of office completions will decrease to 1,185,000 rsf, or a decrease of 92 percent.



*Ronald Reagan Building  
and International Trade Center  
Washington, DC*



*U.S. Courthouse  
Seattle, WA*

## Section B: Ten Largest Markets

Relying on similar information provided by Torto Wheaton Research, the team identified the 10 largest office real estate markets in the U.S. Selections are based on the total rentable square feet (rsf) of

commercial office space in the city. Furthermore, we have provided a brief overview on selected cities and what changes can be expected in real estate in the next 10 years.

### Ten Largest Commercial Markets

The city markets that are italicized below are not part of the brief overview in this section of the report, but have been addressed beforehand in Part Two, Section A. The markets are listed alphabetically to facilitate the ease of navigation through the information.

- **Atlanta, GA**
- **Boston, MA**
- **Chicago, IL**
- **Dallas, TX**
- *Houston, TX*
- *Los Angeles, CA*
- *New York, NY (Manhattan area)*
- *Philadelphia, PA*
- *San Francisco, CA*
- *Washington, DC*

### Chicago, IL Forecast

*(includes the area of Metropolitan Chicago)*

New construction in the Chicago area will remain moderate. Only two buildings totaling 754,000 rentable square feet (rsf) are scheduled for delivery in year 2000, and two additional buildings totaling 1,700,000 rsf are scheduled for year 2001. This moderate level in activity is expected to drive vacancy rates downward in the future as office space is gradually absorbed.

The vacancy rate has been steadily decreasing due to the strong demand and delayed occupancies. The net absorption for the first part of 2000 exceeded one million rsf of office space.

Rental rates have been increasing only moderately. The continued lack of quality office space should cause rates to increase in the future. Current office rental rates range from \$20.00 to \$25.00 per rsf.



Chicago Federal Center  
Chicago, IL

## Dallas, TX Forecast

*(includes the areas of Metropolitan Dallas, Las Colinas, Richardson, Plano and Turtle Creek)*

The Dallas economy is expected to show steady improvement in economic conditions with an unemployment rate below the national level. The demand for office space should remain constant in spite of a shrinking employment base.

Construction activity for office space has been steadily decreasing. In year 2000, approximately 2,415,491 rsf of office space was under construction as compared with approximately 10,000,000 rsf during the comparable period in 1999. This can be attributed to the large vacancy rate that exists in the region.

The vacancy rate has remained relatively unchanged at 18 percent.

The Dallas Central Business District continues to experience the highest vacancy rate at 28 percent, which is attributed to corporate relocations into the suburbs to newer office buildings. However, the absorption rate is expected to remain strong in the future.

The rental rates continue to decrease. The average rental

rate for all classes of buildings is approximately \$20.00 per rsf.

*A. Maceo Smith Federal Building, Dallas, TX*



## Houston, TX Forecast

*(includes the areas of Metropolitan Houston, S. Montgomery County, NASA/Clear Lake and E. Fort Bend County)*

The Houston economy, which is primarily dependent upon gas and oil exploration and sales, is benefiting from the fact that crude oil prices reached a nine-year high in early 2000. This improvement in economic conditions is expected to have a positive impact on the demand for office space in the future.

Houston experienced a large volume of new office construction in 1999. As a result, new office construction in the near future is expected to be significantly less, with developers waiting for long-term, committed tenants before commencing further construction.

The citywide vacancy rate has been steadily increasing to 12.5 percent in the first quarter of 2000. The net absorption rate has also been low. The relatively cautious approach to new construction will give the market a chance to fill existing vacant space. The projection is for demand to increase, especially in the downtown office buildings where there is more quality space.

The office rental rates are projected to remain high. Houston's office rental rates, which historically correlate with oil prices, have rebounded with the spike in crude oil prices.

*Alliance Tower Federal Building Houston, TX*





## Los Angeles, CA Forecast

*(includes the areas of Metropolitan Los Angeles, San Fernando Valley, San Gabriel Valley, South Bay and Ventura)*

Over the last 5 years, the Los Angeles economy has experienced strong growth resulting in the creation of 301,000 new jobs. The employment growth rate in Los Angeles is projected to increase 1.42 percent between 2001 and 2005. This represents a significant growth in employment over the previous five years. As a result of the positive economic climate and employment growth, the demand for office space is projected to continue to experience strong growth.

Over the last two years, construction consistently ranged between two to three million square feet. West Los Angeles and the San Fernando Valley are the most active sub-markets, accounting for 88 percent of the first quarter, year 2000, total rsf under construction.

The vacancy rate has been steadily decreasing, reaching an 18-year low in 2000, of 11.3 percent. The net absorption was 2,180,508 rsf, the

largest gain in 10 years. This strong absorption rate is projected to continue.

New office buildings combined with tighter vacancies continue to pressure lease rates up and rejuvenated the market for quality office space. Average lease rates are approximately \$22.00 per rsf.

## Philadelphia, PA Forecast

*(includes the areas of Metropolitan Philadelphia, Bala Cynwyd, Delaware County, Fort Washington, King of Prussia, Plymouth Meeting, Blue Bell, Upper Main Line, Camden County, NJ, Suburban New Castle County, DE)*

Construction activity is taking place mostly in the Delaware and Philadelphia suburban markets. Approximately 2.3 million rsf are under construction and due to be delivered in year 2000, and 8.3 million rsf are scheduled for 2001. It is expected that the tight Delaware office market will relax a bit when these new office buildings are completed.



*U.S. Custom House  
Philadelphia, PA*

The overall vacancy rate has been decreasing as new office buildings come on line. The absorption rate is expected to remain strong in the future, especially in the Philadelphia suburban market where most of the new construction is taking place. Rental rates continue to increase for the metropolitan office market and average about \$23.00 per rsf.



*Roybal Center and Federal Building  
Los Angeles, CA*

## Next Steps

1. We plan to conduct a second review within the next two or three years, to identify how the predictions and forecasts compiled in this publication benefited the Federal real property community. Specifically, the team wants to look at the type of changes that are being implemented in buildings and the workspace, and to learn why some were chosen over others as well as the benefits derived.
2. The team plans to provide information and data, as it becomes available, through GSA's Office of Real Property's Polycysite Newsletters on what the public and private sectors are doing to enhance the quality and productivity of office buildings and the workspace. The sharing of this material will strengthen management's interest in pursuing quality workspace initiatives, provide real time input on workplace changes, and help others by learning from those that have confronted successes as well as setbacks.

# Appendix A: Discussions on Predictions Outlined in Part One

**T**HIS APPENDIX EXPANDS ON AND DISCUSSES IN GREATER DETAIL those predictions outlined in Part One

regarding what can be expected in future office buildings and the workplace.

## A. Physical Environment

### A-1. Use of sustainable design/materials

To effectively implement a sustainable strategy, there are a number of factors that must be recognized and addressed, as outlined in the *GSA Real Property Sustainable Development Guide*. In the future, materials or components in offices will be recycled after their useful life.

Approximately two billion people now work in buildings. This number is expected to climb as high as eight billion in the next 50 years. The Department of Energy forecasts that by the year 2010, another 38 million buildings will be constructed worldwide that will further impact a fragile and out of balance ecological system (*Roodman & Lenssen, p. 5*).

Buildings use approximately one-sixth of the world's fresh water supplies, one-quarter of the wood harvested and two-fifths of the material and energy reserves (*Roodman & Lenssen, p. 5*). The impact that modern buildings have on people and the environment is better understood in table A.

**Table A: Impact of Building Materials**

<i>Problem</i>	<i>Buildings' Share of Problem</i>	<i>Effects</i>
Use of Virgin Materials	40% of raw stone, gravel, and sand; comparable share of other processed materials such as steel.	Landscape destruction, toxic runoff from mines and tailings, deforestation, air and water pollution from processing.
Use of Virgin Wood	25% for construction.	Deforestation, flooding, siltation, biological and cultural diversity losses.
Use of Energy Resources	40% of total energy use.	Local air pollution, acid rain, damming of rivers, nuclear waste, risk of global warming.
Use of Water	16% of total water withdrawals.	Water pollution; competes with agriculture and eco-systems for water.
Production of Waste	Comparable in industrial countries to municipal solid waste generation.	Landfill problems, such as leaching of heavy metals and water pollution.
Unhealthy Indoor Air	Poor air quality in 30% of new and renovated buildings.	Higher incidence of sickness, lost productivity in \$10 of billions annually.

Source: Worldwatch Institute

Consumer attitudes and pressures from the local communities are driving the demand for sustainable designs in future buildings. Customers and government clients will soon insist that organizations that they do business with are environmentally responsible. Since the release of data demonstrating that buildings are a major air polluter

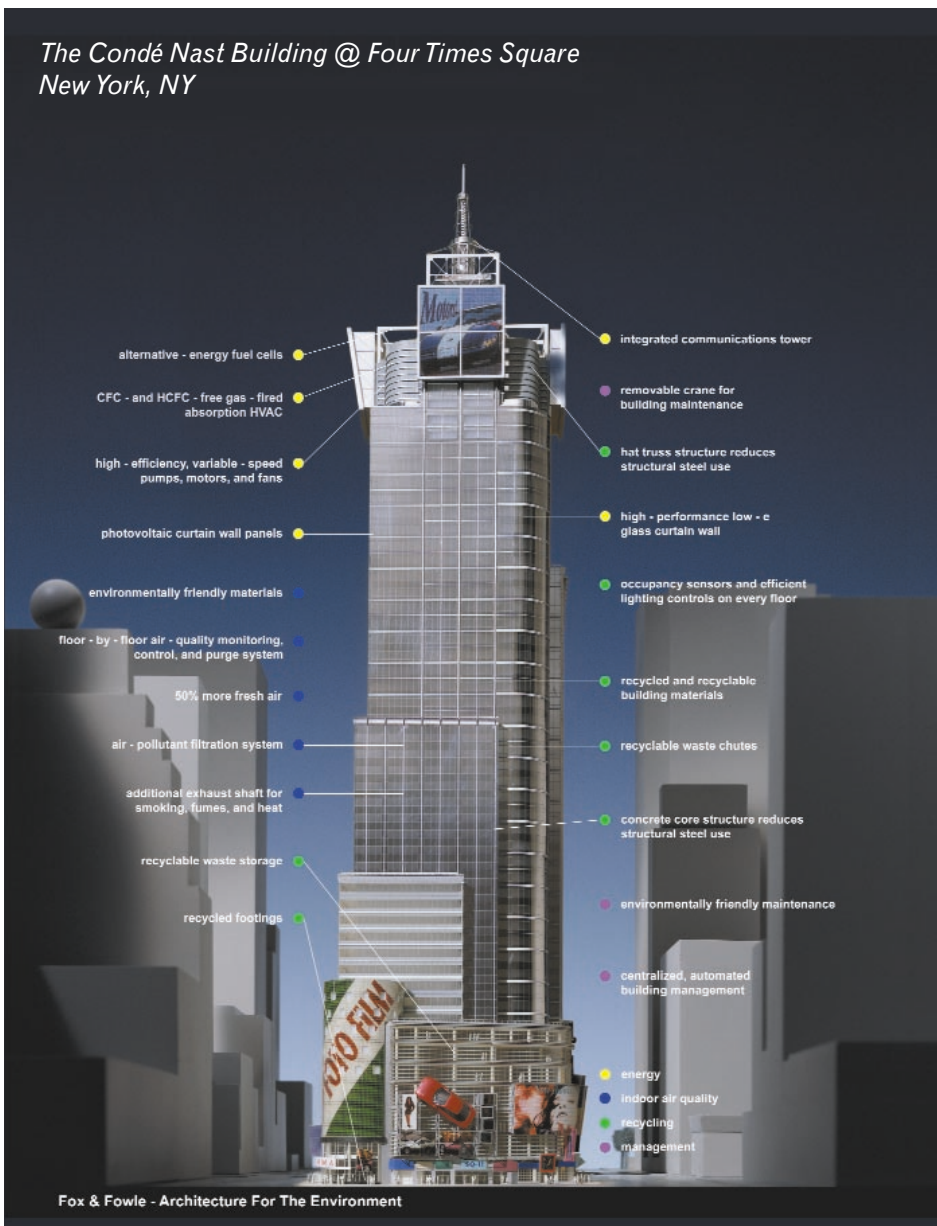
(49 percent of sulfur dioxide emissions, 25 percent of nitrous oxide emissions, 10 percent of particulate emissions, and one-third of carbon dioxide emissions), the interest in constructing environmentally friendly buildings has increased.

The following are examples of a sustainable approach to developing office buildings.

In the Netherlands, new buildings integrate natural shapes, make extensive use of green plants and promote environments that are pleasant and healthy. The new Dutch buildings must also adhere to laws, similar to those in Germany, which specifies the distance that the employees' workspace must be from a natural light source.

Here in the U.S., the Condé Nast Building at Four Times Square in New York City uses rainwater runoff for toilet flushing and environmental (chiller) cooling. The floors are covered with recyclable carpet, have photovoltaic systems (solid-state semiconductor devices) that provide some part of the building's electrical energy requirements, and use recyclable concrete and steel materials in construction.

The Pennsylvania Department of Environmental Protection's "green" office building in Ebensburg, Cambria County, Pennsylvania, is constructed on a brownfield site (an abandoned, idled, or under-used industrial and commercial facility where expansion or redevelopment is complicated by real or perceived environmental contamination). The building is constructed with recycled and virgin materials that limited the environmental impact based on waste reduction and energy required



for fabrication. The lobby floor is 70 percent recycled post-industrial and post-consumer glass. The building is constructed using non-VOC-emitting paint, recycled asphalt, recycled structural steel, recycled carpet, mechanically fastened roofing membrane to minimize adhesive use, and wood products harvested from certified sustainable forests.

## A-2. Interior Office Environment

### • Flexible furniture

Most of our experts see office furniture as providing unlimited flexibility. The furniture found in tomorrow's offices will be mobile, with wheels. Tables, files, partitions, and chairs will provide easy adjustments, allowing customers to constantly reconfigure their furniture. This will satisfy task requirements such as teaming, provide additional privacy, and promote organizational changes, such as reorganizations and realignments.

### • Natural light

In recent years, the benefits of natural lighting have been the subject of research among experts. For example, studies of 2,000 school students in California revealed that scores on math exams were 20 to 26 percent higher for students that received instruction in rooms with daylight exposures. In the same study, it was discovered that when commercial store products were displayed in a daylight setting that sales increased by a whopping 40 percent (*Pacific Gas and Electric Study*). The ING Bank in the Netherlands and Lockheed in Sunnyvale, CA also reported that



the level of worker productivity increased by 15 percent, and absenteeism was 15 percent lower among employees in natural light settings.

Medical researchers have also identified that exposure to sunlight maximizes the human brain's production of serotonin. The brain

needs an appropriate amount of this chemical to keep a person alert and lively. Employees that lack adequate production of this chemical become lethargic, sleepy and less productive.

Another consideration is that unlike natural lighting, artificial lighting consumes non-renewable sources of energy, and contributes to warming within the building envelope, thus requiring the installation of larger heating ventilation and air-conditioning (HVAC) systems to dissipate the excess heat. HVAC systems are a main contributor to increased levels of carbon dioxide that promote global warming.

- **Ergonomic furniture**

The work surface of the employee's desk will include computer monitors that install below the desk surface to reduce eyestrain and glare. The computer keyboards and mouse trays will also offer features that reduce repetitive strain injuries like carpal tunnel syndrome. There are desktops that change in height at the touch of a button, and bookshelves that rotate to provide easier access to reference materials (*Government Executive*, p. 59).

- **Private teaming space**

Teaming space should be located in an area that does not disturb fellow office employees. Collaboration among team members requires territorial space. Teams need space to call their own and for centralizing team information and history. Employees will also benefit from the discipline-specific interaction, learning and reinforcement that transpires.

- **Personal control over the workspace**

In a recent 1999 survey conducted by

the Building Owners and Managers Association (BOMA) and the Urban Land Institute (ULI) entitled, "What Office Tenants Want," the net results clearly show that most tenants want control over their space temperature and personal office environment (*Skylines Magazine*, p. 1).

The changeover to allow employees greater freedom in controlling their workspace will be gradual but progressive as we move into the new millennium. The drivers of this change in operations will be demands by current and new employees for a healthier and more productive workspace and a reduction in costs.

- **Energy conservation measures**

The demand by customers and communities to be socially accountable to eliminate energy waste and the pollution it causes, and the focus on stakeholders to reduce building operating costs will provide an incentive to facility managers to make their buildings more energy efficient in the future.

Devices such as direct digital controls help maintain the proper balance between fresh and recycled air, thus reducing the amount of outside air that is heated and humidified in the winter or cooled and dehumidified in the summer.

Other technologies used by owners and managers to improve the efficiency of heating ventilation and air-conditioning (HVAC) systems include displacement ventilation and desiccant air systems. Displacement air allows air at ground level vents to heat up naturally as it rises, reducing heating costs (*Respond, K.M.*, p. 28). A desiccant air system dehumidifies air prior to its

distribution through the HVAC system. This allows cool air to flow without an increase in humidity.

New lighting designs in buildings will also reduce energy costs and improve worker productivity. Tomorrow's energy savings will be achieved in part by the design and installation of lighting that gives even greater energy savings and ensures that the system is ideally suited to the employee's work tasks.

- **Plug and play systems**

These systems offer organizations added flexibility to change space interiors to meet their unique needs. This is accomplished by using a combination of raised flooring and boxes that contain electrical, telecommunication and information technologies service hookups. Another benefit of this overall system is that the raised flooring can be used to transmit airflow to the employees' desks, providing employees with the ability to control ventilation and temperatures within their space.

- **Open space**

The open office environment will comprise a mixture of cubicles. Most will be used for employee workspaces, some for group meeting areas, a few for large conference rooms, others for small private areas requiring quiet and a few private offices. The open architecture will also allow moves to be accomplished more quickly and economically.

Some open offices will have boulevards. The free flowing walkthrough between workspaces will support informal learning and provide a place where people can

interact socially with others using the boulevard or with those sitting at their workstations. A survey by the Center for Workforce Development revealed that as much as 70 percent of employee knowledge is gained through informal learning (*Bencivenga, D., p. 4*).

- **Acoustical performance**

Employees who have difficulty in concentrating, or require a confidential environment may find it uncomfortable to adjust to open office space configurations that have not effectively mitigated the background noise. The noise reduction designs and materials used in buildings of today are unable to meet the rigorous requirements of the new open workspace designs of tomorrow. New office furniture systems will include better sound absorbing materials, wall finishes that reduce the deflection of sound waves, and sound-masking technology to electronically control noise levels in the employees' personal space.

- **Workspace customization**

Employees will have the opportunity to customize their workstations. Basically, a set price will cover a workstation, including employee selection of different options such as colors, material textures, seating, task lighting, etc.

### A-3. Facilities

- **New buildings**

Many buildings in the public and private sector are dated and have old technology that needs upgrading. Experts agree that many office buildings of today are incapable of meeting the demands and challenges of the future.

Some experts suggest that, in some cases, it may be more cost effective to construct new office buildings. However, sustainability considerations are going to preclude widespread reliance upon demolition/replacement.

Reasons for building new may include the high costs to abate hazardous substances in existing structures, a building which is no longer a viable economic asset, the need for additional building space, the opportunity to promote innovative building designs and technologies, the need for greater revenue, and the requirement to service unique customers.

- **24/7 Operations**

In the future, organizations will move operations to a 24-hour/7 days a week (24/7) basis. Demands to remain competitive coupled with keeping pace with the Internet will gradually increase the demand for workforce planning to cover a 24-hour a day period. At the same time, many organizations are beginning to consider the negative social, physical and psychological impact on employees of being constantly "at work," either physically or virtually.

- **Retrofitted buildings**

Retrofitted buildings do not require the payment of premiums to satisfy new building codes and can often be renovated sustainably. The processing and disposal of construction waste is minimized. There is also the benefit of having advantageous site locations and building heights that may no longer exist because of new zoning requirements.

- **Leased Facilities**

The dynamic and uncertain environment of tomorrow will encourage more organizations to rely on short-term leases. Organizations recognize that to remain competitive in an environment that is undergoing constant change internally as well as externally requires agility. This flexibility must be timely, cost effective, targeted, and successful, or an organization may lose its competitive posture. Even though shorter-term leases will be more expensive, the costs of missed opportunities in the new millennium are incalculable in comparison.

- **Building design**

Reductions in middle managers and flatter organizations are compressing the building structure. The hierarchical designs of the last 100 years will not meet the new business leader management style of the future. Future leadership wants the capability to adapt quickly to new services and products to remain competitive.

- **Disposable offices**

Organizations in the future will have the option of using a disposable office (fully functional office space that can be rented by the hour, the day, the week, the month and the year) arrangement when the need to construct/lease everyday workplaces becomes impractical. Organizations can benefit by pilot testing different office environments in the disposable office at a fraction of the cost than if they had to reconfigure their existing offices. There is also less disruption to rank and file employees if the pilot proves unsuccessful. Organizations will

use disposable offices for operations that do not justify high overhead costs. Costs to construct, build-out and furnish conventional office space are eliminated. Organizations that consist primarily of small sales staffs or several consultants are ideal candidates for the disposable office (*Arenas, J. P., p. 30*).

#### **A-4. Building Security**

The offices and the workspace of the future will be safe. At the government and private sector level, incidents of mass destruction such as those against the Alfred P. Murrah Federal Building in Oklahoma City and the World Trade Building in New York City, have energized facility managers to acquire and install new security technologies. Other similar incidents of office building and workplace crime have led realty managers to develop security survey models that detect threats against office buildings and their occupants. According to the Workplace Violence Research Institute, violence in the workplace costs employers approximately \$36 billion dollars each year from losses in work stoppages, tarnished reputations, lower morale, and lawsuits alleging negligence (*Mosher, D., p. 24*).

The security challenges of the twenty-first century will not be easy. Demands by corporate executives to cut expenses, expectations by customers to have comfortable and flexible buildings and workspace, and potential lawsuits, will continue to pressure managers to look for new and innovative technologies to mitigate crime. Provided below are security technologies that can improve occupant and building security.

- **Biometrics**

These devices will replace the typical proximity reader for controlling who enters and leaves the building.

- **Digital video**

Digital pictures enable building security to have global monitoring and reporting.

- **Greater Bandwidth**

Greater bandwidths will provide the facility manager with faster information to improve decision making before dispatching security personnel.

- **Internet**

Sophisticated Internet browsers can provide managers with the information and data required to monitor and make decisions regarding building security.

- **Radio Frequency Identification (RFID) Devices**

Statistics indicate that in-house employee thefts are 15 times greater than external thefts, and that 75 percent of them go unnoticed by management (*Vergetis Lundin, B.L., p. 89*). RFID technology can help control thieves. It is especially effective when two or more departments share equipment, and in verifying the movement of supplies and equipment leaving warehousing facilities.

- **Security surveys**

Security surveys focus on the location of the building, building tenants, access and egress required by building tenants, existing security systems, crime statistics for the area, building construction type, hours worked by the tenants, and number



and types of outside deliveries.

- **Smart cards**

The use of these devices will control ingress and egress to buildings and the workspace. These cards incorporate electronic technology by

using an embedded chip that provides security officials with a great deal of information on the card user. Information such as the employee's picture, personal statistics and emergency information/data can be embedded in the chip.

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## B. Office Location

- **Traditional settings**

Experts believe that there will be a shortage of labor over the next 20 years. Many organizations are now adopting a location strategy to go where the knowledge workforce is. The shortage and fierce competition for the limited supply of knowledge workers is pressuring organizations to move to areas that were once considered unacceptable.

Sociologists believe that knowledge workers will locate closer to the center cities. Since this group is mostly comprised of young people, either single or married with no children, the inner cities offer them more activities, and provide cultural learning. These workers also benefit from attending higher learning educational institutions within or near the city and the flexibility of mass transit systems that offer freedom of movement within the city. In addition, the close proximity of their work to the inner city provides these individuals with more free time for other activities.

In addition, the need for good transportation networks will play a large role in formulating the organization's future location strategy. Organizations will favor locations where employees can benefit from area mass transit

systems. The traffic gridlock that plagues the nation's cities and highways is stealing productive time away from workers, making it more difficult to attract new and retain existing workers, and compromising the quality of our air and environment, while costing the nation billions in new roads and road repairs. In addition, some experts believe that organizations will favor locations that are close to airports and other forms of commercial transportation to provide better services to their customers. Regardless of the reasoning, owners, developers and facility managers must be smart about where they locate future offices and the workspace to assure improved quality of life for workers and the adjacent community.

Furthermore, organizations will consolidate buildings and functions as an integral part of their location strategy. Improvements in organizational efficiency and reductions in overhead costs are the rationale for most consolidations. For example, the demands of rightsizing, downsizing, mergers, and lower facility operating costs are primary drivers for consolidating building operations. Building consolidations will also benefit the organization by freeing up capital for

other core mission requirements, promoting mobility initiatives for workers, eliminating redundancy in staff resources, and promoting organizational efficiency by having fellow organizations located in the same building.

- **Alternative office environments (AOE)**

The workforce of the future wants more choice, flexibility and freedom from the traditional office environment. The alternative office environment (AOE) will satisfy these demands and offer workers more free time and reduced commuting times. AOE's such as telework centers, drop in centers, port sites and satellite offices are excellent solutions (options) for employees who desire to work closer to home or for employees who prefer to work away from the office until local traffic conditions are favorable enough to allow them to reach their assigned workplace. To reduce the

overhead costs associated with these generic facilities, many organizations are building or leasing space in lower cost areas normally found around the perimeter of the city.

The work-at-home strategy is similar to AOE's because it is away from the traditional office, and yet different since it does not require the organization to construct or lease independent space. Employees are encouraged to establish office workspace in their personal residences. Most organizations supply the computer equipment and software, printer, faxes, LAN, phone, Internet access, and furniture. Some organizations also pay for long distance service, and a few will even pay for electrical usage provided the service is separately metered from the main home. For more information see GSA's publication on *Office Space Use Review, Current Practices and Emerging Trends*, September 1997.

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## C. Workforce

### C-1. Diversity

- **Age**

Future organizations will get support from three generations of workers. Approximately 77 million baby boomers (between the ages of 40 to 57) occupy most of the influential positions within organizations and companies.

In comparison, there are approximately 45 million Generation Xers (between the ages of 23 and 34) in the workforce. This group is commonly referred to as the knowledge workforce.

Generation Y represents approximately 72 million people. This is the future workforce. This generation is more ethnically diverse and interested in protecting the environment; therefore, it is important for facility professionals to consider this when designing and constructing office buildings and the workspace of the future (*Zemke, Raines & Filipczak*).

- **Physically challenged**

The future office and workspace will be accessible and friendlier to the physically challenged in the areas of

physical, visual (sight and hearing) and mental impairment. Facility managers are eliminating physical barriers at the workspace that challenge the general public and employees.

The *Americans with Disabilities Act* (ADA), signed into law on July 26, 1990, prohibits discrimination based on disability in employment, programs and services provided in Federal State and local governments, and products and services provided by the private sector through commercial facilities. ADA requires that organizations make a good faith effort to eliminate any barriers within reason. The Act does not apply to commercial enterprises such as manufacturing plants and corporate offices that do not routinely invite the general public into organizational facilities.

It makes good business sense to eliminate physical barriers. Experts estimate that approximately 54 million individuals in the U.S. are physically challenged in one way or another. These same individuals have disposable incomes that total about \$175 billion. There are a growing number of physically challenged customers and employees that many organizations can reach out to simply by improving access to the building or by providing better navigational assistance within the building. These specially challenged citizens will not patronize or inquire about career opportunities within organizations that are not sensitive to their special needs.

The facility manager will need a thorough knowledge of ADA, and is strongly cautioned to make sure that the requirements of ADA are fully assessed prior to finalizing plans to construct, renovate, modernize or

alter any office and workspace. Application of the Americans Disabilities Act Accessibility Guidelines (ADAAG) is an essential part of conducting this assessment. The guidelines provide an architectural blueprint of requirements that satisfy the purpose and intent of the ADA.

- **Retirees**

Shortages among the knowledge workforce will encourage organizations of the future to hire retired workers and increase the age of retirement for existing workers. Organizations must prepare themselves to offer older workers the same amenities that appeal to younger workers, like part-time work, flexible work arrangements, flexible hours and transit subsidies, plus certain amenities that are specifically targeted to the aging population such as on-site medical clinics, elderly care, and retreat or meditation rooms.

## **C-2. Availability**

According to experts, the greatest challenge for facility executives in the twenty-first century is to keep and retain key personnel. A study conducted by McKinsey and Company indicates that the supply of qualified real estate professionals will decline by 15 percent over the next 15 years, while the demand for these professionals will increase by approximately 25 percent over the same period (*Grossman, R. J.*).

- **Global competition**

Global competition will contribute to the shortage of qualified personnel in the new millennium. The expansion of the Internet and the availability of low-cost, high-tech electronic communication devices

and infrastructures makes it possible for employees to work internationally.

- **Abundance of investment capital**

The abundance of investment capital will also make it difficult to hire qualified realty professionals. The number of individuals that no longer desire the trappings of the traditional corporate career ladder positions is increasing. This group's members often favors establishing or joining new technology start-ups, fueled by record level prices for technology stocks.

- **Productive workplace**

Organizations that do not provide workers with an efficient and productive workplace will also experience a difficult time in filling career vacancies. A survey conducted by the American Society of Interior Designers suggests that 41 percent of job applicants see the office environment as a key consideration in choosing for whom to work (*Gorman, M. T., p. 21*). To further illustrate this point, Table B shows the importance of the workplace to hiring and retaining employees.

**Table B: Workplace Importance to Employees**

**89%**

***of Facility executives view the workplace as an asset to recruit and retain employees***

**57%**

***of Facility executives have their facility accessible to mass transit systems***

**11%**

***of Facility executives say that an employee has quit within the past two-years over dissatisfaction with the workplace.***

Source: Reel Grobman & Associates

Most organizations are beginning to take action to attract employees in all fields, including the area of facility management. For example, some organizations are creating "assistant to" jobs to backfill executive level positions. Other organizations are increasing the ranks of the physically challenged. Organizations such as Booz, Allen and Hamilton; Microsoft; Ford Motor; Honeywell and others are aggressively seeking disabled employees. For example, Microsoft

has instituted a program, "Able to Work," that is a consortium of 22 businesses that are actively seeking ways to hire the best and brightest of the disabled workforce. The National Disability Council reports that organization's requests for physically challenged workers has grown by 50 percent (*Williams, J., p. 66*).

Some organizations are also turning to the Internet for assistance to hire workers. Use of the Internet to canvass potential workers has

jumped to 64 percent of all those firms surveyed in 1997 compared to 38 percent just two years ago. The Internet allows organizations to attract a larger cross-section of employees to fill the increasing demand for professionals.

The Federal Government will also face a shortage of qualified professionals in the future. In fact, experts believe that Federal agencies will experience more difficulty in filling career positions than the private sector. College graduates and professionals looking for careers are less inclined to work for the government than the private sector. The era of downsizing, and the perceptions of scandals and government inefficiency have undermined the effectiveness of

agencies to attract the best and brightest for job vacancies. (*Light, P., p. 17*).

The intense competition with the private sector for highly qualified workers also places the government sector at a disadvantage in hiring the best and brightest. Even though Federal agency personnel organizations are being replaced by more flexible change-oriented systems, private sector employment practices can surpass these by offering signing bonuses, higher starting salaries, better opportunities for growth and learning, and a flexible personnel system that rewards innovation, creativity and performance through frequent promotions (*Light, P., p. 17*).

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## D. Support Services

- **Workplace amenities**

Providing employee amenities at the workplace will continue to expand in the future, as these are viewed as "quality of life." Organizations recognize that offering amenities is a small expense in comparison to the extraordinary benefits received, such as improved employee productivity, better morale among workers and a positive image with customers and the community.

- **Elder care**

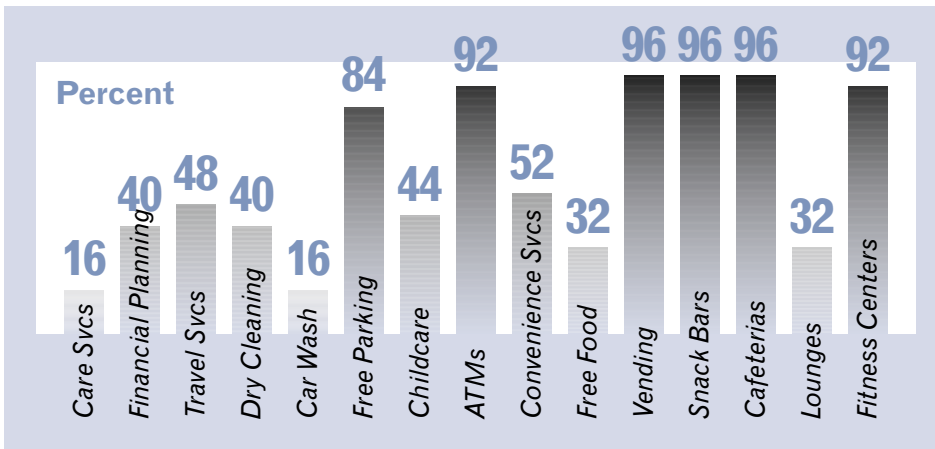
One area that will receive more attention in the future is elder care.

Good health and advances in medical technology are helping family members to live longer lives. As a result, a growing number of workers have long-term commitments to care for aging family members.

Organizations of the future that expect to attract and retain workers will offer elder care as a part of their employee benefits package.

Chart A displays the types of amenities that facility managers from selected Fortune 500 Companies are offering to employees at the workplace and the frequency of offering.

Chart A: Amenities in the Workplace



Source: 1999 Survey of Workplace Productivity Consortium members

Sample: N=25 (selected Fortune 500 Companies)

- **Employee service networks**

In the future, organizations will arrange for services such as employee home repairs and home

cleaning. The company benefits by having a focused, less agitated and more productive worker. Equally, the employee benefits by having more time for family and other activities.

## E. Organizational Operations

- **Global expansion**

No longer are organizations looking at buildings and space at the local or even national level. Organizations are now multi-national with property, staffing and products located throughout the world. Global operations are now even more complicated and complex than ever. Facility managers must recognize and comply with regulations and statutes concerning housing employees, address unique cultural diversity issues, and provide effective security measures.

- **Corporate Infrastructure Resource (CIR) Management**

It is important that future real estate organizations have the correct infrastructures in place to service their customers. The correct CIR strategy will ensure that the organization is equipped to become a successful global competitor. Too much CIR can hurt an organization by reducing its competitiveness, and too little can be detrimental to the support of the core/mission requirements. For more information on CIR, go to IDRC's website: [www.sitenet.com/idrcnet](http://www.sitenet.com/idrcnet).

The concept of CIR refers to:

- Management integration of non-core functions (Human Resources, Information Technology and Corporate Real Estate) to add value and reduce costs in organizations.
- A new approach to create and sustain capabilities for creating business plans of the organization.
- New process and organization models that align and integrate the management of workspace to increase productivity and lower costs.

Reasons for implementing CIR include:

- Quicker response to satisfying organizational needs
- Lower product and service costs
- Improved use of limited resources
- Enhanced levels in services delivered
- Better quality in products and services
- Ability to attract and retain best and brightest employees

#### • **Work outsourced**

The transfer from inhouse to outsourced service providers will continue, but slowly. Of course, there will be some organizations that continue to retain their facility operations in-house. Those that remain inhouse believe that they derive benefits of lower operating costs, higher productivity, more timely delivery of services, greater flexibility to implement future changes, and a corporate image of support for employees, customers and the local community.

The focus on containment of costs in facility operations has become the primary driver of many organizations to use outsource providers.

Organizations no longer want to carry overhead staffing costs when services can be accessed only on an as needed basis, especially when the results are better than your own staff can provide.

The "all in" service is being used by organizations like General Motors, Dupont, Citicorp, Lucent Technologies, Bristol-Myers Squibb, and several others who have adopted and implemented this organizational model (*Westfall, S. L.*). The all in service approach is one-stop shopping for those employees' needs connected with work.

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## F. Technology

#### • **Data cabling**

According to Mr. Daren Hornig, cofounder and executive vice president of On-site Access, a provider of telecommunication services in the New York area, "Every building will need to be rewired in

the next five years." (*Miller, C., p 18*).

If building owners expect to retain quality clients, offices must be compatible with available technology. For example, telecommunication cable infrastructures in buildings will carry

digital subscriber line (DSL) for digital telephone service, e-mail and direct access to the Internet. Using DSL's eliminates delays found in dial-up systems and provides higher transmission speeds than modems. DSL's will enhance tenant access to desktop video, data conferencing and other interactive multimedia applications.

In addition, new and retrofitted buildings of the future will benefit from higher speed copper wiring, such as the Category 6 and 7 next generation cabling, and fiber-optic cabling. This next generation cabling can support gigabyte applications in information technology. The fiber-optic cable will support high-bandwidth such as broadband technology. This technology will enable realty professionals to download more information, provide faster loading of data and information and generate better images, including virtual ones over the Internet.

Even though the new generation of cabling will increase building owner costs, it is probably not a prudent move to invest in less expensive technologies, especially if the owner and facility manager is serious about maximizing the use of the building(s) and getting the most value from the investment. (*Peri, F., p 24*). Most telecommunication providers believe that building owners can recover their initial investment in high-speed broadband telecommunication services within a year.

- **Internet**

Since the early 1990's when the Internet gained popularity with businesses, it has changed the way workers interact with office buildings and the workplace. The

Internet has enabled most managers and workers to free themselves from the traditional confines and restrictions of the traditional office building. No longer do employees require an assigned office, nor do they have to work prescribed hours. The workers' productivity and quality of life is improved since they are not sitting in traffic congestion and do not have to take chances during bad weather conditions. Workers also have the opportunity to spend more quality time with family, friends, and other activities. The Internet is also an electronic source of global information and data used to perform various analyses and research projects efficiently.

Another example where Internet technology is changing the way real property is operated and managed is seen in the area of e-commerce. Specifically, there are four activities that will see the benefits of e-commerce: purchasing, communications, real estate transactions and project management (*Piper, J., p. 36*).

**Purchasing** goods and services using e-commerce will reduce procurement costs. So called spot purchases that require purchase orders will be virtually eliminated and replaced by on-line credit card purchases. On-line purchases eliminate the costs and delays of processing paperwork for the purchase order. On-line procurement also provides real time availability and pricing data on the products and services offered. In addition, because on-line orders are normally acquired over shorter procurement cycles and reach suppliers with large inventories, facility managers do not need large inventories of spare parts. This has two major benefits. First, the





amount of expensive space to house inventories is reduced, and the cost to maintain and track inventory is practically eliminated. Secondly, facility managers no longer need to discard outdated supplies and materials. They are able to take advantage of the latest in innovation and design in equipment parts and spares.

**Communications** through the Internet will improve the timeliness and accuracy in the flow of information and data on-line. Facility managers using e-mail can keep in continuous contact with their customers. Progress reports, orders for repairs and work schedules can be electronically transmitted across town or the world in a matter of seconds. E-commerce can also provide customers with advance warnings of potential problems so that the information can be used to fix the same problem at other sites the customer occupies.

**Real estate transactions** are gradually replacing conventional ways of marketing office properties and space. In just 6 years, customer use of the Internet has climbed to over 300 million since 1993, and is expected to reach 600 million in 2004 and 1 billion worldwide by the year 2010 (*Inman*). The continued growth in the number of realty transactions performed on-line is attributed to customers' demand for cost effective, efficient, and real time information and data. The proliferation of inexpensive and efficient personal computers and data transfer technology in businesses and homes has made it easy for the global community to access information at any time, and any place. For example, in the area of real estate, the power of the

Internet provides customers with details on building floorplates/ floorplans, photos of the property, on-line tours of the inside and outside of the property, maps on where the property is located, site plans and elevations, demographics on the surrounding area, financial information on property acquisition cost, purchase price, leasing information, rent, taxes, utilities, a contact person and contact information, and any other pertinent information. The availability of Internet technology is also increasing customer demand for integrated on-line realty services. Through strategic alliances and Internet partnerships, Internet realty providers will offer a complete line of realty services on line. Services like advertising and selling of large and small property portfolios will be combined with services such as life insurance, property inspections, mortgage services, equity analysis, title searches, and other realty closing services. Combining these and other realty services for certified repairs, remodeling specialists, and suppliers of realty materials and equipment is significantly reducing the time and resources that would be required if the customers had to conduct their own search and secure these services themselves.

**Project management** will benefit from e-commerce. Many costly delays in construction projects are in transmitting documents and related changes, and obtaining approvals. Using the Internet for this purpose is timely and cheap. Documents can be viewed and approved on-line by numerous individuals at the same time, whether across the street or on the other side of the world. Results suggest that average savings of 1 to

3 percent of the total project cost can be obtained (*Piper, J., p. 36*).

- **Intelligent buildings**

The intelligent/smart approach and interoperability will be the standard for office buildings and workspace design in the new millennium. These buildings will provide occupants with working environments that sustain competitiveness in today's global markets.

Topping the list of intelligent building items are six components: security, lighting, fire and safety systems, energy management, power transmission, and environmental control (*Caloz, J.W., p. 53*). The integrated design approach will meet the challenges of flexible work environments that vary working conditions while controlling energy costs and being good stewards of the earth's environment. This is successfully accomplished by having building systems work together seamlessly rather than independently. For example, systems like raised flooring, flexible lighting, and plug and play options promote synergy in creating cost effective and adaptable systems that respond immediately to an increasing environment of organizational change.

Smart building systems will not rely on proprietary software or a single vendor's products. This benefit releases the buyer from having to transact business with a single vendor that supplies those specific goods and services. The flexibility minimizes the financial burden on the buyer since there is no need to buy a complete replacement system if one or several components go bad, or if the vendor is no longer in business.

- **Power systems**

Not having an efficient, flexible and reliable power arrangement in the building can cause the customers' workplace to experience recurring problems such as equipment downtime, systems failures, lost data, or corrupt data. It is believed that as much as 45 percent of data loss and data corruption is attributed to inefficient power systems.

In addition, it is imperative that before customers install new technology and systems that they notify the facility manager. Using this information, the facility manager can retrofit existing buildings and design new buildings that provide power configurations that will support the demand and change in customer electronics.

Power backups are also becoming commonplace in more buildings as the demand for more sophisticated telecommunication networks and dollars invested in those networks increase.

- **Wireless devices**

Space limitations on where the workspace is located will disappear and workers will enjoy more freedom. In addition, the expense, time, mess, and loss of worker productivity to restring cable through the workspace will no longer be a problem for either the facility manager or tenant.

A drawback to using wireless devices is the limitation on the distance within a building that the technology can efficiently operate. Development of new buildings will have to be done with an awareness of the metals used in construction. Many metals that are not shielded

can bounce a wireless signal, and a distorted line of sight within a

building can interrupt the signal.

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## G. Real Estate Considerations

### G-1. Demand

Many areas across the nation continue to experience a shortage of office space. Some predictions suggest that office construction will drop down to more of an "acceptable" growth ranging from 2 to 3 percent per quarter. There also appears to be a consensus that the incredible gains that were experienced in 1997 and 1998 of 4.0 percent and 4.3 percent respectively in the growth of new office properties will not carry forward into the future (*Salimando, J., p. 54*).

### G-2. Financing mechanisms

- **Public/private partnerships accepted**

The benefits of the public/private

partnership arrangements are many. New government office buildings are constructed with no increase in annual budgets, private sector expertise is available to design and construct the buildings and the government is able to respond to customer demands for better space, support improvements in worker productivity, lower energy costs and reduce environmental pollution.

- **Office construction**

The practice of financing at 95 to 100 percent of real property value is over. Instead, the developer will be required to fund at least 50 percent of the cost of office construction up front, and be able to guarantee leasing and completion of the project (*Outlook, p. 14*).

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## H. Regulatory Impacts

- **Deregulation of utilities**

The deregulation of electric utilities will present a new opportunity, yet challenge the real estate community in the new millennium. Consumers will now have a choice of who provides their utilities.

In 1999, 24 states already have legislation that deregulates the energy market. By 2004, it is estimated that more than half of the U.S. population will be able to

choose their energy providers (*Tagliafeere, L., p. 39*).

There are cost savings to be found in energy deregulation; however, the facility manager faces new responsibilities that previously fell to the state regulating commissions. The facility manager should be a knowledgeable shopper when comparing various services. The facility manager should also perform an energy audit to gain a full understanding of the energy

requirements of the facility. This will allow him or her to better match the facility power requirements with the energy provider.

Aggregating the power requirements of several buildings in a particular area or a campus setting is another option that facility managers will use to reduce their future energy costs. If an organization can combine facilities having a lower power load factor with those with a higher load, they can reduce the overall energy costs for the group of facilities. For example, in the State of Pennsylvania, GSA was able to realize \$5 million in cost avoidance by awarding aggregated power contracts for 27 federal activities (*Tagliafeere, L. p. 64*).

#### • **Greening**

The Federal Government is aggressively promoting greener working environments for the future. In response to the President's Executive Order 13123, *Greening the Government through Efficient Energy Management*, Federal agencies will reduce the emissions of greenhouse gases in their building inventories by 30 percent in 2010 when compared to the 1990's baseline.

The General Services Administration (GSA) is sponsoring the "Planet GSA" program. The program encourages Federal agencies to build, buy, drive, manage and save green. GSA is accomplishing this by providing agencies with space, products, vehicles, services, policies and technology that provides and supports the greening of the planet. Accomplishments in this area include:

- Reducing paper use
- Offering Energy Star® office products to agencies

- Offering reformulated chemical products
- Recycling office waste
- Using office supplies made from recycled materials
- Utilizing "green" techniques to construct and modernize buildings
- Disposing of buildings using sustainable principles
- Offering alternative-fuel vehicles to agencies
- Teleworking
- Saving energy
- New leasing procedures

At the State level, for example, the Governor of Pennsylvania established the "Governor's Green Government Council" to facilitate the incorporation and deployment of greening across agency jurisdictions. The government will construct its future office buildings using green technology.

International governments will also actively promote greener workplaces in the future. For example, the Dutch government has the National Environmental Policy Plan. The plan improves energy efficiency in new and renovated buildings, and increases the use and recycling of construction and demolition waste.

#### • **National Energy Policy**

As a part of Executive Order 13123, Federal agencies will reduce energy use by 30 percent in government buildings by year 2005 and 35 percent by year 2010. Federal agencies will focus on the installation of efficient lighting systems, as well as boilers and cooling systems; improving building insulation; and expanding

the use of renewable energy technologies.

Renewable sources of energy, such as wind, sun, biomass, and geothermal, will also present new opportunities to owners and facility managers of office buildings to reduce future energy costs and preserve the environment. By 2010, the Federal government wants to see 7.5 percent of electricity generated through renewable energy sources.

The Department of Energy (DOE) and the Environmental Protection Agency (EPA) have implemented their "Energy Star®" program, which encourages building owners and facility managers to improve energy efficiency and reduce waste. The program identifies appliances, lighting and office equipment that meet certain energy efficiency guidelines. Recently DOE and EPA expanded the program to recognize roofing products that exceed solar

reflectance levels without compromising either quality or performance.

DOE has funded a \$1 million research project for the Air Conditioning and Refrigeration Technology Institute (*Raiford, R., p. 45*). The project is responsible for developing high-energy efficient systems and services for new and retrofitted buildings. The Institute's research will focus on the design of flexible HVAC distribution systems and a review of building simulation and design tools.

- **Transportation**

Experts believe that highway traffic congestion from single-occupancy vehicles could increase by over 61 percent in the next 20 years, costing the economy approximately \$39 billion annually.

The collaborative efforts of Federal, State and local governments and the

private sector will continue to work toward the common goal of reducing air pollution and eliminating traffic congestion attributed to employees that commute to work in their vehicles. Efforts by the Federal Government to accomplish this goal are found in the *Federal Employees Clean Air Incentives Act* and the *Transportation Equity Act for the 21st Century (TEA 21)*, discussed below.

In 1993, the Congress passed the *Federal Employees Clean Air Incentives Act* to improve air quality and to reduce traffic congestion. Passage of this Act authorized Federal Agencies to establish programs that encourage employees to commute to work by means other than single-occupancy vehicles.

Another piece of landmark legislation that encourages employees to commute to work using public transportation is

TEA-21. This legislation was signed in 1998, and amends the Internal Revenue Service Code 26 USC 132(f) by allowing public and private sector employers to provide tax-free transportation fringe benefits in addition to present employee compensation, or in lieu of compensation. TEA-21 also provides a "parking cash-out program" where employees can either cash out their employer-sponsored parking, or receive tax-free transit or vanpool compensation of up to \$65 per month (as of October 1, 2000).

On April 21, 2000, the President signed an Executive Order, *Greening the Government through Federal Fleet and Transportation Efficiency*. The order directs Federal agencies to reduce their annual petroleum consumption by 20 percent by the year 2005. Using alternative fuel vehicles and re-refined motor oils will be instrumental in meeting this goal.

# Appendix B: Respondent and Predictions Matrix

**THE OFFICE OF REAL PROPERTY, EVALUATION AND OUTREACH DIVISION**, with the assistance of a Contractor, Chesapeake Consulting, Inc., of Alexandria, Virginia, prepared this report. Through our combined efforts, we spoke to 38 experts from the public and private sector, performed a literature search to identify the latest information and data on office buildings and new workspace of the future, searched virtual (Internet) and actual communication links, and canvassed ideas from senior level management, colleagues and other diverse resources. The following matrix shows the predictions that were made by the respondents and the frequency of being selected.

Predictions	Respondents	Architectural firm	Commercial property provider (#1)	Commercial property provider (#2)	Commercial property provider (#3)	Commercial property provider (#4)	Commercial property provider (#5)	Consulting group (#1)
<b>A Physical Environment</b>								
A-1 Use of sustainable design/materials				■		■		
<b>A-2 Interior Office Environment</b>								
Flexible furniture								■
Natural light		■			■			■
Ergonomic furniture								■
Private teaming space								
Personal control over workspace								
Energy conservation measures		■						
Plug and play systems								
Open space								
Acoustical performance								
Workspace customization								■
<b>A-3 Facilities</b>								
New/retrofitted buildings								
Twenty-four seven operations (rolled into new bldgs)								
Leased facilities								■
Building design		■						
Disposable offices								
<b>A-4 Building Security</b>								
<b>B Office Location</b>								
Site selections			■		■			
Transportation strategies (rolled into site selections)		■						
Building consolidations (rolled into site selections)		■				■		
Alternative office environments		■	■	■	■		■	■
<b>C Workforce</b>								
<b>C-1 Diversity</b>								
Age					■		■	
Physically challenged								■
Retirees				■	■	■		
<b>C-2 Availability</b>								■
Global competition								
<b>D Support Services</b>								
Workplace amenities								
Employee service networks					■			■
<b>E Organizational Operations</b>								
Less centralize authority		■						■
Outsourcing								
CIR management								
<b>F Technology</b>								
Integrated new technologies into bldg designs				■				■
E-Commerce (rolled into new technologies)								
<b>G Real Estate Considerations</b>								
<b>G-1 Demand</b>								
<b>G-2 Financing mechanisms</b>								
Public/private partnerships			■	■	■			■
Wall Street financing								
Office construction financing						■		
<b>H Regulatory Impacts</b>								
Greening		■	■				■	

Respondent Group	Government service organization (#1)	Government service organization (#2)	Government service organization (#3)	Government service organization (#4)	Government service organization (#5)	Government service organization (#6)	Government service organization (#7)	Government service organization (#8)	Government service organization (#9)	International organization (#1)	International organization (#2)	Manufacturer of building controls	Manufacturer/designer of communication technology	Manufacturer of electronic equipment	Manufacturer of electrical and equipment controls	Manufacturer of facility controls	Manufacturer of information technology	Networking company	REIT company	Service organization	University (#1)	University (#2)	University (#3)	University (#4)	University (#5)
Consulting group (#2)																									
Consulting group (#3)																									
Designer/ manufacturer of office furniture																									
Electronic banking institution																									
Futurist (#1)																									
Futurist (#2)																									
Government service organization (#1)																									
Government service organization (#2)																									
Government service organization (#3)																									
Government service organization (#4)																									
Government service organization (#5)																									
Government service organization (#6)																									
Government service organization (#7)																									
Government service organization (#8)																									
Government service organization (#9)																									
International organization (#1)																									
International organization (#2)																									
Manufacturer of building controls																									
Manufacturer/designer of communication technology																									
Manufacturer of electronic equipment																									
Manufacturer of electrical and equipment controls																									
Manufacturer of facility controls																									
Manufacturer of information technology																									
Networking company																									
REIT company																									
Service organization																									
University (#1)																									
University (#2)																									
University (#3)																									
University (#4)																									
University (#5)																									





# Appendix C: Torto Wheaton Econometric Model

**T**HE FOLLOWING DEFINITIONS ARE PROVIDED for the variables in the econometric model.

**Office Space:** The office building represents an average facility in that the coefficient for age and class are weighted averages. The national forecast includes only office buildings within the continental U.S. The building square footage is expressed in rentable square feet (rsf).

**Office Employment:** The demand for office space comes from employment statistics within certain sectors of the economy. The majority of jobs housed in office space are from the finance, insurance, real estate and service sectors of the economy. Service will continue to be the fastest growing sector over the next decade, increasing approximately 29 percent. Within the service sector, the fastest growth should be in computer-related companies and information technology.

**Office Completions:** The office or space completions reflect the square footage of actual office space completed or new space under construction scheduled for completion during a specific period. The inventory of completed space includes office buildings that exceed 20,000 or 30,000 rsf.

**Vacancy Rates:** The vacancy rate comes from vacant square feet divided by the building square feet. The rates cover mostly competitively rented buildings in the 54 metropolitan areas. The vacancy numbers are based on 20-year old historic data provided by the Building Owners and Managers Association (BOMA) and an international realty company.

In the model, the key relationship is between vacancy rates and rent changes. The structural rate of



vacancy describes the vacancy-rent linkage. This represents the vacancy level where rents are in equilibrium. For example, vacancy rates that go above this level will cause rental rates to fall.

**Absorption Rates:** The absorption rate represents the net change in total competitively leased square feet from one period to the next. It is not gross absorption, or a measure of total leasing activity, which is more a measure of tenant turnover or mobility rather than market demand. Absorption, as used in this model, reflects the change in space demanded when such space is available.

In the model, competitive absorption (net) represents the amount of new space brought into a market over a period of time minus the change in vacant space over the same period.

The econometric model also incorporates an accounting equation and a number of behavioral or statistical relationships. The predominant factors that impact the demand for office space include the economy, office employment, rental rates and availability. For example:

- The office employment in relation to the amount of total occupied space strongly affects the absorption rate.
- As the price of space declines and consumption increases, absorption per office employee is higher in slack markets.
- Absorption can be constrained in tight markets by an inadequate supply of space, resulting in an underestimation of the true demand for office space.

- The expectations regarding the rate of economic growth affect the demand for space per employee.

Moreover, on the supply side, there is a correlation between completions of new competitive space and market conditions, including vacancy rates, rents, space absorption and overall economic growth. Interest rates and other financial market conditions do not appear to impact the level of building activity.

The forecasts produced by the model utilize the following process:

- The employment forecasts and projected changes in the employment structure derive the future of office employment.
- Given the current stock of office space (both competitive and single tenant), together with future office employment and current vacancy rates, the equation is able to forecast total market absorption.
- A competitive completion minus net absorption produces changes in vacant space, from which new vacancy rates are determined for competitive space.
- Market surveys of office space reveal the completions of competitive space over the first forecast year. Beyond that, data on vacancy rates, net absorption and employment growth provides predictions on future competitive completions.
- The historical movements and the relationship between vacancy rates and office rents provide the basis for the future value of vacancy and office rents.

# Appendix D: Exhibits for Top 10 Growing U.S. Commercial Realty Markets And National Forecast

## Exhibit 1

### National Forecast, Office Real Estate

1999 - 2009

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)	Net Absorption (RSF x 1,000)
1999	2,401,772	11,154	3.9	\$23.02	10.6	86,781	35,602
2000	2,502,956	11,353	1.8	\$24.17	11.6	101,185	66,460
2001	2,600,207	11,620	2.3	\$24.93	12.4	97,251	63,788
2002	2,694,704	11,875	2.2	\$25.38	13.2	94,497	62,883
2003	2,784,599	12,128	2.2	\$25.60	13.8	89,895	61,236
2004	2,867,988	12,386	2.1	\$25.69	14.2	83,389	60,350
2005	2,943,967	12,651	2.2	\$25.73	14.4	75,979	59,577
2006	3,012,632	12,917	2.1	\$25.80	14.4	68,665	58,398
2007	3,074,771	13,184	2.0	\$25.94	14.3	62,139	56,859
2008	3,131,562	13,448	2.0	\$26.18	14.1	56,792	54,905
2009	3,182,353	13,717	2.0	\$26.26	14.1	51,810	49,856

Source: Torto Wheaton Research

## Exhibit 2

### Atlanta, GA Forecast, Office Real Estate

1999 - 2009

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	111,572	497	6.2%	\$19.05	9.9	6,428
2000	118,292	507	2.2%	\$20.42	10.9	6,720
2001	124,924	524	3.2%	\$20.84	12.3	6,632
2002	131,054	540	3.0%	\$20.96	12.9	6,131
2003	136,462	556	3.0%	\$21.13	12.9	5,408
2004	141,443	573	3.0%	\$21.34	12.9	4,981
2005	146,151	590	3.0%	\$21.57	12.8	4,707
2006	150,629	608	3.0%	\$21.84	12.7	4,478
2007	154,921	627	3.2%	\$22.20	12.4	4,292
2008	159,098	647	3.2%	\$22.66	12.1	4,177
2009	163,238	667	3.1%	\$23.22	11.7	4,140

Source: Torto Wheaton Research

**Exhibit 3**

**Boston, MA Forecast, Office Real Estate**

**1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	138,701	656	3.6%	\$24.01	7.4	4,134
2000	143,405	668	1.8%	\$24.58	9.1	4,704
2001	149,026	682	2.1%	\$24.72	11	5,622
2002	155,099	696	1.9%	\$24.47	12.7	6,072
2003	160,928	708	1.8%	\$23.92	13.9	5,829
2004	166,070	720	1.6%	\$23.24	14.5	5,142
2005	170,250	731	1.6%	\$22.59	14.4	4,180
2006	173,396	742	1.6%	\$22.12	13.9	3,146
2007	175,632	753	1.5%	\$21.91	13.1	2,236
2008	177,209	764	1.4%	\$22.00	12.2	1,576
2009	178,428	776	1.6%	\$22.39	11.4	1,220

Source: Torto Wheaton Research

**Exhibit 4**

**New York, NY Forecast, Office Real Estate**

**1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	353,878	1,161	3.3%	\$35.48	5.0	1,627
2000	357,252	1,169	0.6%	\$39.91	4.5	3,374
2001	364,692	1,183	1.2%	\$43.14	6.2	7,440
2002	372,314	1,196	1.1%	\$44.48	8.9	7,621
2003	380,159	1,207	1.0%	\$43.24	11.9	7,845
2004	386,960	1,217	0.7%	\$39.96	13.6	6,800
2005	391,832	1,225	0.7%	\$36.25	14.6	4,873
2006	394,446	1,233	0.6%	\$33.66	14.6	2,613
2007	395,562	1,240	0.6%	\$32.42	13.9	1,117
2008	396,008	1,247	0.6%	\$32.92	12.7	446
2009	396,452	1,254	0.6%	\$34.95	11.7	445

Source: Torto Wheaton Research



**Exhibit 5****Orlando, FL Forecast, Office Real Estate****1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	24,049	188	6.0%	\$19.16	11.7	3,072
2000	26,825	193	2.7%	\$19.14	16.9	2,776
2001	29,089	198	2.6%	\$18.89	19.4	2,265
2002	30,640	203	2.7%	\$18.57	19.7	1,550
2003	31,585	209	2.8%	\$18.28	19.2	946
2004	32,081	215	2.8%	\$18.14	18.0	496
2005	32,325	221	2.9%	\$18.23	16.2	244
2006	32,527	228	3.0%	\$18.57	14.4	202
2007	32,858	235	3.0%	\$19.11	13.0	331
2008	33,407	242	3.1%	\$19.78	12.3	549
2009	34,177	250	3.1%	\$20.48	12.1	770

Source: Torto Wheaton Research

**Exhibit 6****Phoenix, AZ Forecast, Office Real Estate****1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	52,006	335	1.9%	\$19.99	14.9	4,679
2000	55,345	349	4.3%	\$21.12	14.2	3,339
2001	58,927	365	4.4%	\$21.96	13.5	3,582
2002	62,420	380	4.1%	\$22.72	13.8	3,493
2003	65,983	396	4.0%	\$23.37	14.3	3,562
2004	69,371	412	4.0%	\$23.92	14.3	3,389
2005	72,638	429	4.3%	\$24.45	14.0	3,267
2006	75,787	447	4.0%	\$24.98	13.8	3,149
2007	78,809	466	4.1%	\$25.55	13.6	3,021
2008	81,727	485	4.1%	\$26.16	13.2	2,918
2009	84,578	505	4.3%	\$26.84	12.8	2,852

Source: Torto Wheaton Research

**Exhibit 7**

**San Diego, CA Forecast, Office Real Estate**

**1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	43,806	236	2.9%	\$20.79	9.6	1,892
2000	45,769	243	3.1%	\$21.99	8.6	1,964
2001	48,086	252	3.6%	\$22.89	8.8	2,317
2002	50,445	260	3.5%	\$23.81	9.2	2,358
2003	52,785	269	3.4%	\$24.61	9.6	2,340
2004	55,149	278	3.3%	\$25.31	9.9	2,364
2005	57,500	287	3.2%	\$25.93	10.2	2,351
2006	59,814	296	3.1%	\$26.49	10.4	2,314
2007	62,079	304	2.9%	\$27.00	10.5	2,265
2008	64,290	313	2.8%	\$27.47	10.7	2,210
2009	66,441	322	3.0%	\$27.96	10.8	2,151

Source: Torto Wheaton Research

**Exhibit 8**

**San Francisco, CA Forecast, Office Real Estate**

**1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	71,453	324	2.1%	\$38.19	8.4	2,252
2000	73,478	328	1.4%	\$37.79	11.5	2,024
2001	75,603	335	2.0%	\$35.92	13.0	2,125
2002	78,787	341	2.0%	\$34.18	13.8	3,184
2003	83,052	348	1.9%	\$32.67	14.8	4,265
2004	87,049	354	1.8%	\$31.08	15.0	3,996
2005	90,182	361	1.8%	\$29.88	14.0	3,134
2006	92,608	367	1.7%	\$29.65	12.5	2,426
2007	94,649	373	1.5%	\$30.51	11.0	2,040
2008	96,454	378	1.4%	\$32.08	10.2	1,805
2009	98,083	384	1.6%	\$33.85	9.8	1,628

Source: Torto Wheaton Research

**Exhibit 9****San Jose, CA Forecast, Office Real Estate****1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	34,157	239	3.2%	\$28.44	5.9	1,454
2000	37,320	244	2.2%	\$29.21	10.1	3,163
2001	41,434	250	2.6%	\$29.35	15.9	4,114
2002	45,060	256	2.1%	\$28.15	18.1	3,626
2003	48,189	261	2.2%	\$26.94	18.0	3,129
2004	50,748	266	2.0%	\$26.16	17.1	2,559
2005	52,675	272	2.0%	\$25.71	16.0	1,928
2006	54,094	277	2.0%	\$25.58	14.9	1,418
2007	55,166	282	1.8%	\$25.74	13.9	1,071
2008	56,020	287	1.8%	\$26.16	13.1	854
2009	56,761	293	2.0%	\$26.77	12.5	741

Source: Torto Wheaton Research

**Exhibit 10****Seattle, WA Forecast, Office Real Estate****1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	64,063	269	4.1%	\$22.33	10.1%	5,676
2000	69,828	272	0.9%	\$22.91	16.2%	5,765
2001	74,511	277	2.0%	\$22.54	16.1%	4,683
2002	78,131	283	2.1%	\$22.22	12.6%	3,621
2003	81,291	289	2.2%	\$22.18	12.3%	3,160
2004	83,894	296	2.6%	\$21.94	14.8%	2,604
2005	86,211	305	3.0%	\$21.48	15.8%	2,316
2006	88,399	315	3.0%	\$21.22	14.3%	2,188
2007	90,286	324	3.0%	\$21.38	12.6%	1,887
2008	91,783	333	2.9%	\$21.80	12.1%	1,497
2009	93,093	342	2.7%	\$22.31	12.3%	1,310

Source: Torto Wheaton Research





**Exhibit 11**

**Washington, DC Forecast, Office Real Estate**

**1999 - 2009**

Year	Rentable Sq. Ft. (1,000)	Employment (1,000)	Employment Growth(%)	Rental Rates (\$/RSF)	Vacancy Rate (%)	New Office Completions (RSF x 1,000)
1999	224,781	731	4.5	\$25.92	7.0	8,216
2000	235,880	743	1.7	\$28.39	9.2	11,099
2001	249,363	761	2.5	\$29.51	11.6	13,483
2002	263,907	779	2.3	\$29.60	13.5	14,544
2003	277,844	795	2.1	\$28.83	14.7	13,936
2004	289,730	813	2.3	\$27.57	14.9	11,886
2005	298,719	832	2.2	\$26.29	14.4	8,989
2006	304,670	852	2.3	\$25.36	13.2	5,951
2007	308,063	872	2.4	\$25.07	11.7	3,392
2008	309,802	894	2.4	\$25.56	10.2	1,739
2009	310,986	915	2.4	\$26.79	8.9	1,185

Source: Torto Wheaton Research

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## Supplemental Reading Materials

**Molitor, Graham. "Trends and Forecasts for the New Millennium." *The Futurist*; August-September 1998.**

Mr. Molitor has identified 65 specific trends that provide insight on what the twenty-first millennium might look like.

**McKinley and Conway. "The Super Century Arrives." *The Futurist*, March 1998.**

The authors predict massive construction projects for the next decade, including intelligent highways, huge island airports, and "super metros." New projects early in the century will focus on solving water problems and finding alternative fuels, particularly to address greenhouse warming. To address the problem of high urban land costs and urban sprawl/congestion, designers will plan for facilities to move more below ground; thus leaving more surface areas for parks and recreation.

**McKinley and Conway. "The Great Cities of the Future." *The Futurist*, June-July 1999.**

The author predicts that citizens will seek to enjoy the benefits of big cities without actually living in them. Thus, in an effort to attract and retain workers, companies will look for sites that have the following attributes:

- A metro center with urban services, a convention center, international airport, research and medical centers, universities, a domed stadium, and museums.
- A satellite area with business parks and office areas offering functional and aesthetic features.

- A "hinterland" that will provide quiet, protected residential areas served by schools and shopping, law enforcement, and utility services.
- A location close to the ocean or lakes with pleasant year-round climate.
- Proximity to high-speed rapid-transit systems.

The author concludes that Atlanta, Georgia and Denver, Colorado are the two U.S. cities that best meet the above criteria.

**Author unknown. "United States: Aren't Cities Great?" *The Economist*, August 14, 1999.**

The report discusses the results of a study by the Brookings Institution and Fannie Mae Foundation on 26 cities. It found that all 26 cities expect downtown growth in the next 10 years. These cities are keeping their current residents and are enticing suburban residents to move back; thus addressing the problem of urban sprawl. Young professionals are having children later, allowing them to stay in the city longer. Empty nesters are also rediscovering the appeal of the urban life, spurred by the reduction in crime rates. Cities will have a comparative advantage over other areas since they are a hub of culture, the arts, good dining, sports, and entertainment.

**Nassar, Haya. "West, South Are Building More Population Muscle." *USA Today*, December 31, 1998.**

The article analyzes census data and estimates from the Election Data Services, Inc. The analysis shows that Arizona, California, Nevada, Florida, Texas, Montana, and

Georgia will be the fastest growing areas in the twenty-first century.

**Becker, Franklin, and Steele, Fritz. "Workplace by Design: Mapping the High-Performance Workspace." 1995.**

The authors provide examples from Levi Strauss, Chrysler Corporation, Steelcase, and others. The argument is made that space is a tool for achieving business goals, not a drain on profits. They maintain that executives, human resource specialists, and design consultants must collaborate to create spaces that can generate increased levels of teamwork and cross-functional collaboration—all of which results in greater productivity.

**Author unknown. "Workplaces of the Future." *Workforce*, August 1999.**

The publication discusses what companies want in a productive work environment. The workplace should be technologically advanced yet warm and inviting, promote colorful and almost playful facilities, and provide interactive connectivity with the outside world. In addition, the following trends were identified:

- The "pack-them-in" mentality will give way to a more spacious human environment to attract and retain workers.
- The concept of "green" buildings will greatly expand, resulting in buildings that have better air quality, building materials that do not emit gas, and facilities that have greater access to natural light for all employees.
- Ceiling heights will be raised as the popularity of converting industrial/ warehouse buildings into office space increases.
- Square footage per office space will shrink to accommodate more space for shared amenities (cafeterias, fitness centers, etc.)
- Customization will be the standard in workplace planning. Thus, one size no longer fits all.

**Author unknown. "The Best Places to Live in America," *Fortune*, 1999.**

The article provides some interesting insight on where U.S. job growth will take place in the twenty-first century. The five cities with the largest job growth rate are Las Vegas, NV; Punta Gorda, FL; Austin, TX; Provo, UT; and Fayetteville, AR. The 10 most important factors in deciding where to live are (1) clean water, (2) low crime, (3) clean air, (4) good public schools, (5) low property taxes, (6) low cost of living, (7) home appreciation, (8) strong local government, (9) strong state government, and (10) low sales taxes.

**Author unknown. "Employees More Interested in Office Design than HR Thinks," *Facilities Design & Management*, July 1999.**

The article concludes that the design of a workplace is a deciding factor for employees who are considering working at a company, according to research sponsored by the American Society of Interior Designers. The study showed that physical workplace is tied with benefits as the second most important factor influencing their decisions to accept or leave jobs (the first is compensation). The most important elements of the workplace to workers were a visually appealing facility, new or ergonomic furniture, and up-to-date technology.

**Nussbaum, N., "Blueprints for Business," *Business Week*, November 1997.**

The article provides highlights of innovations by U.S. businesses that won building architecture awards for solving business problems, particularly with respect to reducing costs and improving worker morale. Included were discussions on "flexible spaces" (at 3Com, Microsystems, etc.) to bring about "fortuitous encounters" between disparate groups that led to new ideas or products. In addition, there was an overview on the Herman Miller, Inc. building referred to as SQA (for simple, quick, and affordable). The building has few walls, provides many amenities and offers office space that has windows that permit sunshine and "green" views.

**Author unknown. "Office Designers Show That They Practice What They Preach," *Management Today*, April 1998.**

The office design company, DEGW, redesigned its own offices in London, resulting in the accommodation of 27 percent more employees in the building. They found that certain employees were out of the workspace over 40 percent of the workweek and had no real requirement for an assigned office. They concluded that it was better to occupy space on an as needed basis ("hoteling"). The company integrated cordless and mobile technologies (including a wireless local area network) which enable employees to freely move around the different office zones. In addition to increasing headcount by 27 percent, the company states that the redesign has created an environment that promotes collaborative teamwork.

**Lehman-Smith, D., and Mcleish, J., "Corporate Clients Want Workplaces that Streamline Processes and Retrain Employees," *Architectural Record*, September 1999.**

The authors argue that companies demand new offices and facilities with designs focused on critical workplace issues such as workflow, corporate culture, productivity, and worker attraction and retention. The article submits that many architectural firms do not recognize that interiors increasingly drive the design process. As a result, interior architects are now taking a significant role on the design team.

**Zelinsky, M., "New Workplaces for New Workstyles;" McGraw-Hill, 1998.**

The book discusses alternative office strategies and the process of creating alternative workplace environments. The publication also provides case studies and examples of cost-benefit analysis; a client questionnaire on needs for alternative workplaces, and templates for telecommuting policy and agreements.

**Author unknown, "By 2010, We May Face Another Energy Crisis That Architects Can Help Solve," *Architectural Record*, February 1999.**

The article discusses that experts are predicting another energy crisis in the near future, thus, designers must plan for employment of new energy-saving technologies since buildings account for 40 percent of energy use in the U.S. Specifically discussed are photovoltaic (PV) cells, which generate electricity by harvesting sunlight. A most promising prototype was the Solar-

Powered Glass Pavilion recently showcased at the Cooper-Hewitt National Design Museum in New York City. The structure featured multiple PV modules and clear glass panels that generated enough electricity to power its ventilation system and all lighting.

**Blatterman, J., "The Future: News to Move People Around Really Big Buildings,"** *Architectural Record*, February 1997.

The author states that the twenty-first century design, security, and life-safety concerns are prompting a review of transportation within large or mega-buildings. This is of particular importance in view of the aging population (older employees and customers will have greater difficulty descending the large number of stairs from higher stories).

The article also discusses new types of elevators. For example, a Japanese manufacturer is developing an elevator using magnetic levitation to correct for minute deviations in elevator guide rails, preventing the physical discomfort associated with vibrations and eliminating all sensation of speed in the elevator car itself. Otis Elevator is developing the sideways elevator, called Odyssey.

**Templin, N., "Windows that Open Are the Latest Office Amenity,"** *Wall Street Journal*, August 26, 1998.

The article discusses the Gap, Inc., buildings in San Bruno, California. The roof of the administration building has a field of native grasses and wild-flowers planted on its surface that undulates like the surrounding green hills. Additionally, the cooling system pumps cool night air under the floor slabs.

The article goes on to discuss that "operable windows" are coming back into favor in an effort to address employee morale. The article notes that in Europe, fresh air and natural light for workers are often required in local ordinances.

**Author unknown, "Gardens in Healthcare Facilities,"** *Architecture*, January 1997.

The author discusses the results of 18 specific facilities that have built gardens and plazas in and around their buildings. The findings show that people expressed that they felt more rejuvenated, that the environment enabled them to think more clearly, or that it generated a sense of spiritual well being.

**Lindsey, Gail. A., "Green Building Challenge,"** *Architecture*, February 1999.

The article discussed the goals, process, and early results of the efforts of the International Framework Committee (IFC), a group of international building industry professionals from 14 countries, including the US, Canada, the UK, France, Germany, and Japan. The goals of the IFC are to reduce global warming and to increase market demand for green buildings. Members of the IFC are conducting case studies in their countries to determine the critical elements and objective measures for effectiveness of green buildings. This would result in the Green Building Assessment Tool (GBTool) which would address questions like:

- Does a building perform to a specified level of energy consumption?
- What is the recommended level of air quality?



- What is the amount and content of the solid waste produced by construction?
- What percentage of materials should contain recycled content?

Further information can be obtained through the web-site:  
www.greenbuildings.ca.

**Author unknown, "Seeking State's First Green Building Certification," *BioCycle*; June 1999.**

The author describes the efforts of two companies (Paric Corp. and Hellmuth, Obata and Kassabaun, Inc.) to obtain Missouri's first green building certification under the standards established by the U.S. Green Building Council. The Nidus Center for Scientific Enterprise is a 41,000 square foot building that consists of materials such as recycled aluminum window frames and steel support beams made partly with salvaged material. High-efficiency energy systems are also included in the structure and they consume 40-60 percent less in non-renewal resources.

The building's metal roof channels rainwater into six corrugated metal silos. The interior will include a landscaped atrium under a pyramidal skylight. One face of the atrium will consist of large stones with plants to filter toxins from the air. The company's labs will have sloped ceilings of clear and tinted glass to allow in natural light to promote morale and further reduce energy costs.

**Howard Associates, "Green Building: A Primer for Builders, Consumers and Realtors," *Building Environmental Science and Technology*, 1999.**

The publication predicts that in the next 10-20 years, there will be an accelerated movement to address the environmental problems of global climate change, enlargement of the ozone "hole," topsoil depletion, erosion, and ground water contamination. Thus, there will be much increased emphasis on the preservation of natural resources. The primer suggests that building specifications of the future need to include language such as:

"The contractor shall:

- Employ recycled, renewable, and previously used but structurally sound building materials wherever feasible;
- Minimize waste, spillage, pilferage, spoilage, and misuse of building materials;
- Maximize energy and water use efficiency by exceeding local energy standards in the building code for site planning, thermal insulation, and mechanical systems;
- Reduce indoor levels of radon gas and formaldehyde emissions; and
- Provide consumer operating and maintenance information for best performance in this project through careful planning, specification, job site management, and labor supervision."

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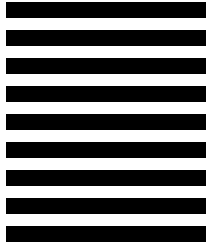
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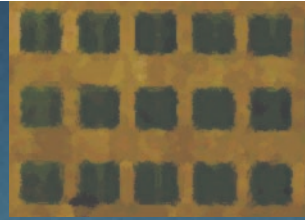
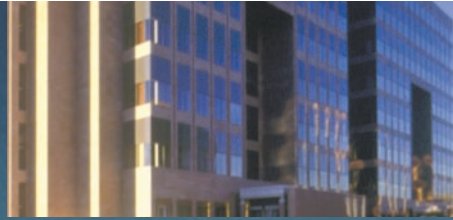
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