NETWORK / NEIGHBORHOOD Building Telecom City

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Submitted to the Department of Architecture in partial fulfillment of the requirements of the degree of Master of Architecture at the Massachusetts Institute of Technology, May 2000.

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ABSTRACT

The coupling of virtual interfaces and physical places is integral in realizing the full potential of information technologies upon the planning of communities. To date, the urban model of development most associated with digital networks is single-use, low-density sprawl, as exemplified in California's Silicon Valley. However, this thesis proposes that a more traditional urban form can better complement and parallel the efficiencies afforded by information technologies. Mixed-uses, higher densities, and walkable main streets for synchronous face-to-face interaction coupled with service alleys for asynchronous delivery systems can support the information-based, 24-hour lifestyles desired by networked communities. While the notion of overlaying network technologies onto neighborhoods is new, the best physical frameworks that can house these wired communities may indeed be based on traditional urban patterns.

Traditional urbanism is especially appropriate to sustain the processes of a fully wired and integrated community. First, as information technologies collapse space and time requirements for activities, so does the denser, mixed-use neighborhood. Secondly, mixed-use block configurations more naturally accommodate today's increasingly blurred distinctions between living and working, another phenomena nurtured by the advent of information technologies. At the same time, by virtue of its finer-grained , more concentrated and livable fabric, mixed-use blocks can foster a more vibrant street life and greater opportunities for the social networking that is so critical to the entrepreneurial, mobile workers of today's agglomerative dot-com economies. Third, the physical patterns of street fronts and service alley spaces provide a simple but effective framework in which to house coordinated, synchronous interactions and around-the-clock asynchronous activities, a distinction that becomes increasingly significant to users of on-line environments. Recognition of these benefits offered by traditional urbanism can be pointed to in the recent emergence of cyber-districts such as New York's Silicon Alley in New York and San Francisco's South of Market Area.

The thesis first considers how services and spaces in the community may be mapped out across virtual and physical dimensions, correlating what gets clustered and what gets dispersed as online services are mapped onto a neighborhood masterplan. The distinction between asynchronous and synchronous modes of services is used to both develop the urban masterplan and to suggest specific ways that conventional architectural models might better adapt to the networked neighborhood plan. The value of these integrated services and spaces is demonstrated in the context of scenario mapping between three different households: an elderly couple in an assisted living complex, a working class family with home business needs, and young telecommuting professionals in more urban mixed use units.

The thesis explores these issues in a re-design of Massachusetts' Telecom City project. Telecom City is a regional redevelopment initiative co-ventured by the cities of Malden, Everett and Medford. The project planners' goal is to convert 200 acres of underutilized and blighted land along the Malden River into a state-of-the-art telecommunications research and development office park. In contrast, the thesis will propose a more locally integrated neighborhood network, more along the lines of the new urban cyber-districts, that will ultimately add unique value to and create greater synergies with its surrounding towns.

Thesis Supervisor: Ellen Dunham-Jones
Title: Associate Professor of Architecture

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URBAN FORMS AND HIGH-TECHNOLOGY DEVELOPMENTS

HIGH TECHNOLOGY DEVELOPMENTS: OFFICE PARKS AND CYBER-DISTRICTS

The Establishment of Office Parks and the Emergence of Cyber-Districts

At the regional scale in Massachusetts, there are two distinct models of development that are housing the state's high technology communities. Each targets different agglomerations of industries and exhibit stark contrasts in formal expression.

The first type, the Research & Development Office Park represents an older development pattern and one that served earlier high-technology companies in electronics over the past several decades. In Massachusetts, these low-density, single-use sprawl developments have evolved to become the state's high-tech strongholds on research and product development in a range of high technology industries. The most prominent cluster of high technology office parks in the state can be found off Route 128, a 65-mile highway surrounding Boston and Cambridge. Supported by a network of academia, industry and government, Route 128 spawned successful industry giants such as Digital Equipment Corporation, Raytheon, and Lotus Development.

The federal government, more so than in California has provided a greater role in the Route 128 expansion. By the

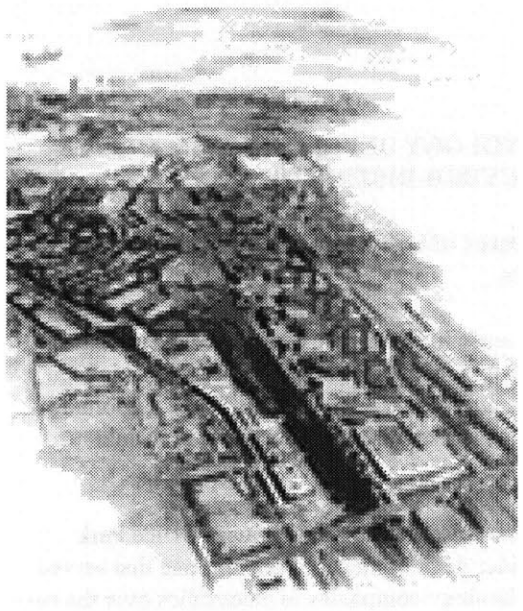

Figure 1. Rendering of office park scheme for Telecom City

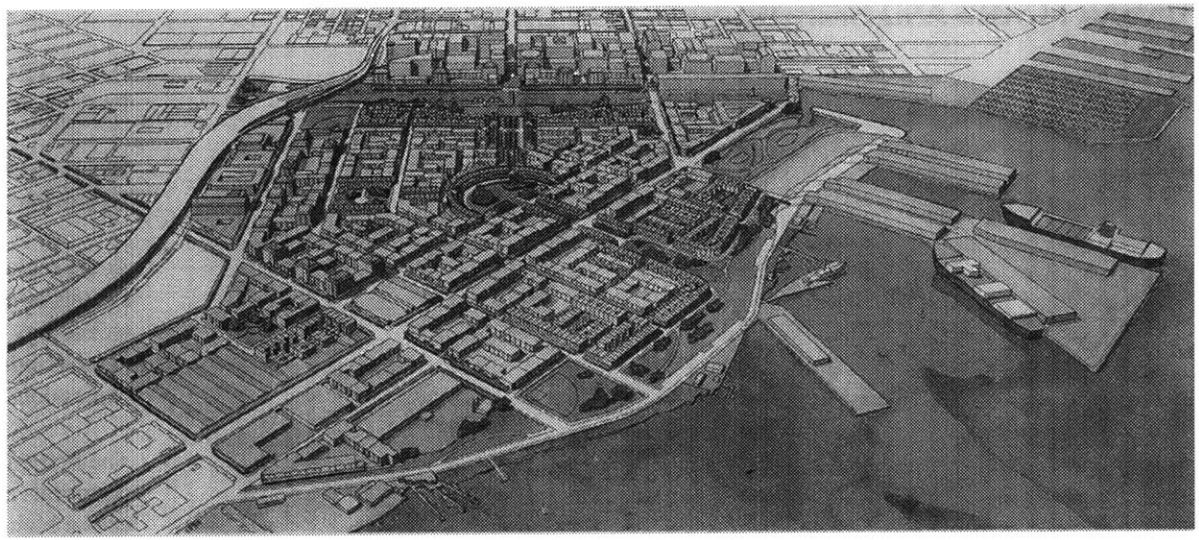

Figure 2. Rendering of cyber-district redevelopment scheme near San Francisco's South of Market Area.

late 1990's, Massachusetts was one of the top five states in terms of federal research resources granted (Rosegrant and Lampe 1992). Throughout Route 128's early history, military defense technology, space travel and computers evolved into dominant industries out of this close relationship between technology companies and government. The Department of Defense alone funded over 60% of federal research and development spending in the state. Other major federal agencies that provided universities and firms with millions of research dollars include the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and the Department of Energy (DOE). As a result, a whole agglomeration of government-backed industries has emerged, ranging from biotechnology, computers, and artificial intelligence.

In addition to its government-influenced industrial focus, Route 128 differs from Silicon Valley with respect to its culture and social organization. In contrast to Silicon Valley's reliance on risk-taking and partnerships is eastern Massachusetts' emphasis upon convention, decorum, and self-reliance (Mackun 1999). Furthermore, compared to the network of office parks in California's Silicon Valley, the firms around metropolitan Boston are more spread out around metropolitan Boston lessening the probability of interaction, while communication between companies and their surrounding towns is even less prevalent. Many large companies such as DEC have almost no ties to the towns in which they were located.

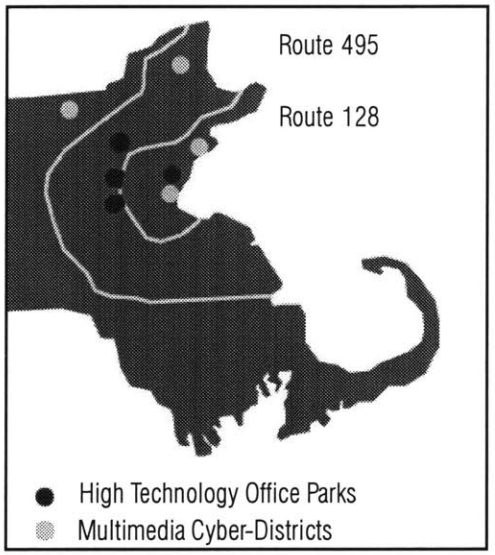

Figure 3. Diagram showing regional network of office parks and cyber-districts in Massachusetts.

The Multimedia Cyber-District represents the latest trend of development in the network economy. According to the Massachusetts Software Council, Internet and interactive companies is the fastest growing segment of the state's software industry, accounting for 282 companies that employ close to 12,000 people (McCabe, 2000). In light of the recent boom in Internet and multimedia industries, cities throughout the state are now clamoring to jumpstart and grow cyber-districts of their own. Departing from the hierarchical corporate structures of Route 128, Massachusetts's emerging cyber-districts look to the organic, spontaneous patterns of development and social interaction bred in New York's Silicon Alley and San Francisco's South of Market Area. From a regional perspective, the early stage companies that are nurtured in these cyber-districts also play an increasingly vital role in the state's high technology economy as large corporations are increasingly relying on outsourced research and product development. In contrast to the office park complexes of the past, today's cyber-districts often act as entrepreneurial incubators, offering cheaper rents, high bandwidth and flexible working conditions for early-stage ventures.

The availability of inexpensive office space can be perceived as the greatest draw in these cyber-districts. Coupled with federal and state grants, the low cost of rehabilitating old mill buildings and warehouses allow developments to offer more loft space at cheaper rents. In contrast to the $28 per square foot rent typical of the more established office parks in Burlington, Lexington and Cambridge, cyber-district rents range from a comparatively lean $4-$10 per square foot. (McCabe, 2000). In Lynn, tax credits and local incentives attract young multimedia companies into the city's newly designated cyber-district, a six-block area of the city's downtown area. In Fort Point Channel's loft district, 20 Internet businesses now occupy renovated warehouse buildings along Boston's industrial waterfront. Haverhill and Lowell are yet more examples of provincial towns aiming to restructure local economies around high-technology industries. Along with the cheaper rates and robust bandwidth access, the host city usually offers a packaged range of amenities related to living and working in the cyber-district: fully furnished offices, 24-

hour security, full kitchen and bathing facilities, shared reception and conference rooms, and administrative support services and most importantly, access to a dedicated high-bandwidth infrastructure, usually a T1 Internet connection coupled with a low-cost service provider. Office rent time cycles are also broken down into finer grained modules to allow for greater customization and flexibility in working arrangements. So spaces are not only available on a full time basis but also on an hourly, daily or weekly basis.

Spatial and Socio-Economic Implications between Office Parks and Cyber-Districts

The two office development types discussed above also bear distinct spatial and urban implications. While the office park sprawl model engenders a sharp division between living and working conditions, the cyber-district promises to restore a more tenable urban framework that brings together mixed uses and meshes living and working closer together. First, cyber-districts are usually situated within central location in a city and enjoy extensive accessibility to pedestrian-oriented nodes of transportation. Furthermore, cyber-districts usually attempt to collapse the distances between residential, recreational and workspaces to promote a mixed urban environment that lessens dependence upon the automobile commute. Furthermore, the intermingling of uses in a compacted area also is conducive to housing the social networking that is so critical in today's entrepreneurial age of dot.coms and startups.

In contrast to the office park model, cyber-districts are fashioned in a much more organic and interactive manner, often created within older, abandoned quarters and industrial lots. The major challenge of most cyber-districts is to transform the image of a once derelict environment into a vibrant architectural setting that attracts and sustains the creative processes of interactive industries. As a result, the architectural quality plays a greater role in the success of a cyber-district than a conventional office park.

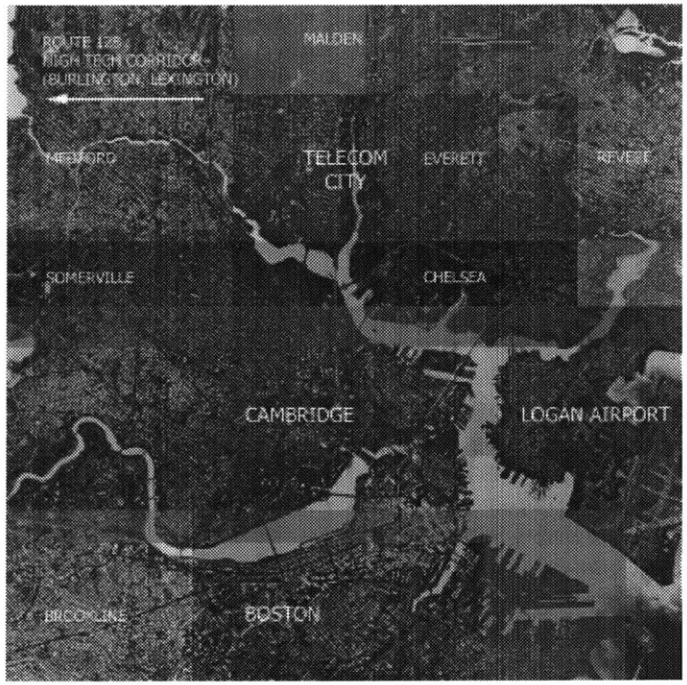

Figure 4. Diagram map of Telecom City and surrounding neighborhoods.

TELECOM CITY: CONTEXT AND INDUSTRIAL HISTORY

TeleCom City is a regional technology development initiative co-ventured by the three cities of Malden, Medford and Everett. The goal is to convert 200 acres of underutilized and blighted land along the Malden River into a high-end telecommunications research and development park. Telecom City will strive to forge a consortium of area universities, federal and state government agencies and private companies to restructure an abandoned manufacturing-based economy into a new global technology-based economy.

THE SURROUNDING NEIGHBORHOODS

The physical context that surrounds Telecom City area is decidedly urban, with population density almost nine times as high as the statewide average. Of the only seven communities in Massachusetts that have population densities over 10,000, two of them are in the Telecom City project area. The host communities are house over 147,000 in high residential densities. Malden boasts a population of around 54,000 and a density of about 10,600 residents per square mile. Everett is home to about 35,701 with a density of 10,500 residents per square mile. And Medford, at a population of about 57,000 still possesses a relatively high residential density at over 7000 residents per square mile (Nangle Consulting Associates, 1997, Table 1.0).

PHYSICAL CHARACTERISTICS

Located five miles north of Boston, the project area totals around 207 acres along side the Malden River. The Telecom City project falls within all three host communities boundaries in the following amounts: Everett at 58% with 120 acres, Malden at 22% with 45 acres and Medford at 20% with 42 acres. (Nangle Consulting Associates, 1997, p.5). The site is bounded on the east by the underutilized Boston & Maine Railroad. To the west lies the Orange and Purple commuter rail lines of the MBTA. To the north is Medford Street and to the south, Route 16 or Revere Beach Parkway.

ECONOMIC HISTORY AND BACKGROUND

Although the first settlement within the community could be traced back to the founding of Mysticide in 1633, the Malden River along which it was situated was largely left underutilized due to its marshy bank conditions. By the mid 19th century, the river and the surrounding towns represented an important regional hub for the then burgeoning energy and chemical industries. By then, the river came to be valued as an important transportation corridor and correspondingly as a site for developing manufacturing plants. The development of the Boston & Maine railroad accelerated the region's industrial development as the riverside towns now became connected into the greater continental rail network.

However, the site's most dramatic transformation took place in 1845. Between 1845-1848, Otis Tufts orchestrated the dredging of the river to create a deeper canal. And in 1874, the Commonwealth of Massachusetts enacted legislation that essentially allowed the reengineering of the once meandering river into a straightened and deeper canal that would be more suitable for barge transport.

A wharf was then constructed on the river to unload coal and lumber products near the north end of the river. This phase of expanded manufacturing led to a significant increase in surrounding population densities and
spawned a burgeoning network of coal storage yards, lumber companies, leather tanning, coal gasification, metal finishing plants and textile mills through the early 20th century.

By the 1920's, breakthroughs in transportation networks rendered the river as an economically unviable transportation route. As a result, the tri-city area experienced a steep decline in manufacturing activity and jobs.
Even the last of the chemical companies, which were evolved from the site's earlier tanning plants, had been shut down recently in the face of increasingly strict environmen-

tal regulations. The wasteland left behind was little more than a scattered settlement of abandoned structures and low-end converted uses. Over 70% of the Telecom City site is vacant or used parking and open storage.

After the 19th century though, the river and the surrounding industries that grew around it were largely cut off from the neighboring communities; with no public access to the river.

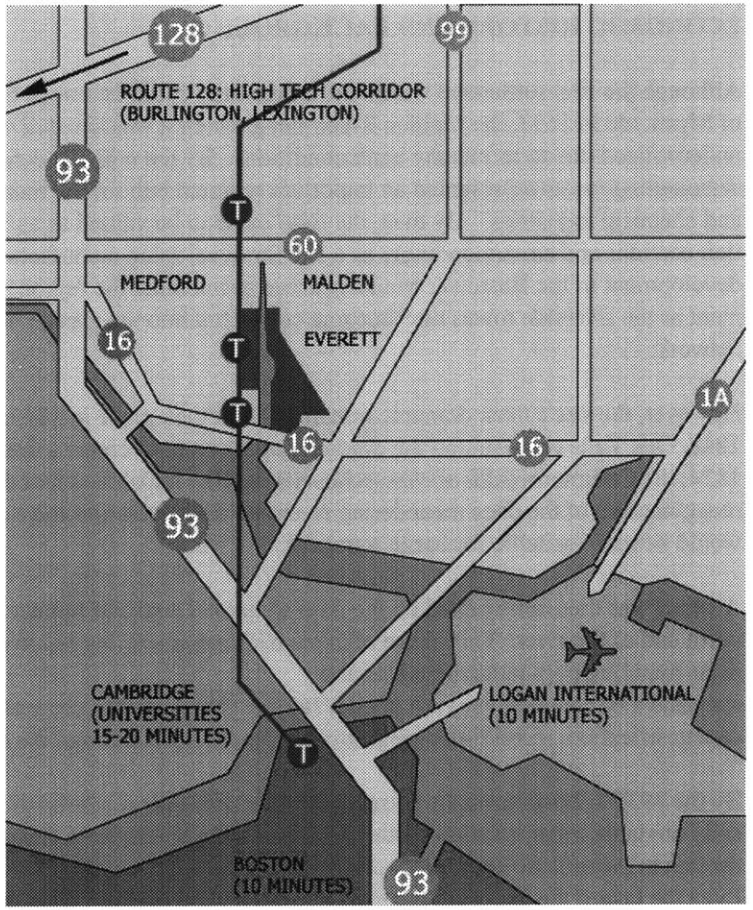

Figure 5. Telecom City's regional transportation connections.

TELECOM CITY: PROJECT STRUCTURE

RESTRUCTURING THE REGION FROM MANUFACTURING-BASED ECONOMIES TO HIGH TECHNOLOGY-BASED ECONOMIES

The project planners look to Telecom City as a catalyst that will position the state and three host communities for new regional and international investment, along with new employment and educational opportunities. It is an aggressive campaign that seeks to carve out a niche in the telecommunications industry, which is projected to garner $3 trillion per year within the next ten years (Nangle Consulting Associates, 1997, p.4). Geographically, the site occupies a strategic location, being alongside regional networks of highway and subways as well as proximity to Logan Airport.

Project-related Institutions are slated at the outset of the development, with each focusing on a core set of services. The development will be guided around a set of Anchor Institutions, public-private partnerships that will bolster a network of connections between academic and corporate sectors.

The Telecom City Anchor Institutions include:
1. **Applied Research Institute**: a consortium of regional universities and corporations engaged in disseminating technical knowledge and also involved in the patenting and licensing of innovative ideas.
2. **Lifelong Skills Center**: Telecom City's vocational training program, involving distance learning options.
3. **Product Commercialization Center**: a small association of incubator business, startups and spinoff companies; now at 100% occupancy.
4. **Advanced Manufacturing Center**: a consortium of regional universities focused on product innovation and product development.
5. **Strategic Business Services Center**: a network of professional support services including strategic marketing, legal services, finance and management consulting.

Telecom City aims to bring in local branches of multi-national companies; startup companies, university labs, federal lab projects, think tanks, business service firms as well as conference and exhibition firms.

GOVERNMENT SUPPORT AND FINANCIAL STRUCTURE

Most of the physical development costs of the project site are undertaken through substantial commitments of federal, state, and local financing. The state investment will total $17.8 million in grants for on-site infrastructure, $44 million in repayable loans for land assembly and preparation, $15 million in grants for initiation of on-site industry activities. The most significant cost is represented by the $54 million required for regional transporation corridor improvements that will serve Telecom City. In addition, $250 million in other investments comprise the private sector contributions to the project's development (Nangle Consulting Associates, 1997, p.12).

How does the state plan to gain a return on this massive investment? According to studies conducted during the master-planning phase, a substantial return is expected primarily from payroll taxes from job creation. Planning consultants estimate Telecom City's 7500 new jobs to quintuple the region's tax base from $1.1 million to $6 million (Nangle Consulting Associates, 1997, p.59).

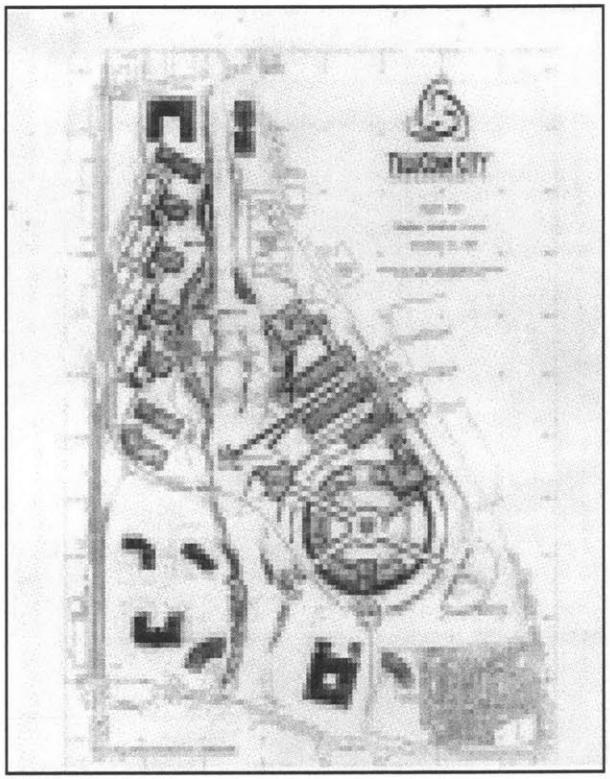

Figure 6. Site plan of existing office park scheme.

TELECOM CITY: THE EXISTING OFFICE PARK PROPOSAL

CURRENT ZONING CONDITIONS

The site is currently zoned in the following manner: the portions that lie in the Malden and Everett borders are slated for Industrial, while the Medford area is delineated for future office use as illustrated in the recently erected 650,000 square feet Wellington Place office complex nearby.

EXISTING PROPOSAL: THE OFFICE PARK PROGRAM

In its current form, Telecom City proposes the construction of approximately 2 million square feet of new office, research and development labs, and light manufacturing facilities. An additional 300,000 square feet will be dedicated to housing the Anchor Institutions. Furthermore, there is a minor component, 200,000 square feet, which will be slated for retail and residential uses, mostly along the Everett border. Finally, parking is estimated at a 1-to-1 ratio.

According to the Planning Guidelines, Telecom City's Masterplan priorities can be classified along three categories: the first set of priorities relate to the cleanup and preparation of the site for development. The second tier of priorities concerns the economic development of the area into a telecommunications industry hub. And the final set of goals relate to the development of public spaces and infrastructure aimed at servicing not only Telecom City itself but the surrounding neighborhoods at large.

EXISTING PROPOSAL: MASTERPLAN PRIORITIES (Nangle Consulting Associates, 1997, p.42-45)

Environmental Cleanup:

1. To remove structurally substandard buildings within and eliminate blighting influences on the project area, including vacant parcels, buildings, and the abandoned General Electric manufacturing plant in Everett); initiate acquisition and demolition of abandoned, contaminated structures.
2. To prepare land for redevelopment, eliminating obsolete street layouts to create new vehicle, bicycle and pedestrian circulation patterns.
3. Rehabilitate the Malden river.

Economic Development Plan:

4. To provide for development of telecommunications research & development along with manufacturing activities, including career and educational opportunities to local residents.
5. To establish a regional center for telecommunications, vocational and continuing education. Develop a consortium of state and private universities community colleges, vocational technical schools, and providers of distance-learning providers
6. To create new economic activities in tri-city area, which should be supported by a network of services such as small-scale retail shops, recreational options, and rental housing.

Public Spaces and Infrastructure Upgrading:

7. Provide public open space and recreation; "edge properties" might be converted to serve as a green buffer between Telecom City and the adjacent neighborhoods in Everett (p44 of clipped pamphlet).
8. Link project area to host communities through the Bike to the Sea trail network, converted from the Boston & Maine railroad onsite.
9. Explore provision of alternative transportation options, such as shuttle buses from nearby MBTA Wellington Station.
10. Improve transportation infrastructures in Wellington Circle and parts of Revere Beach Parkway.

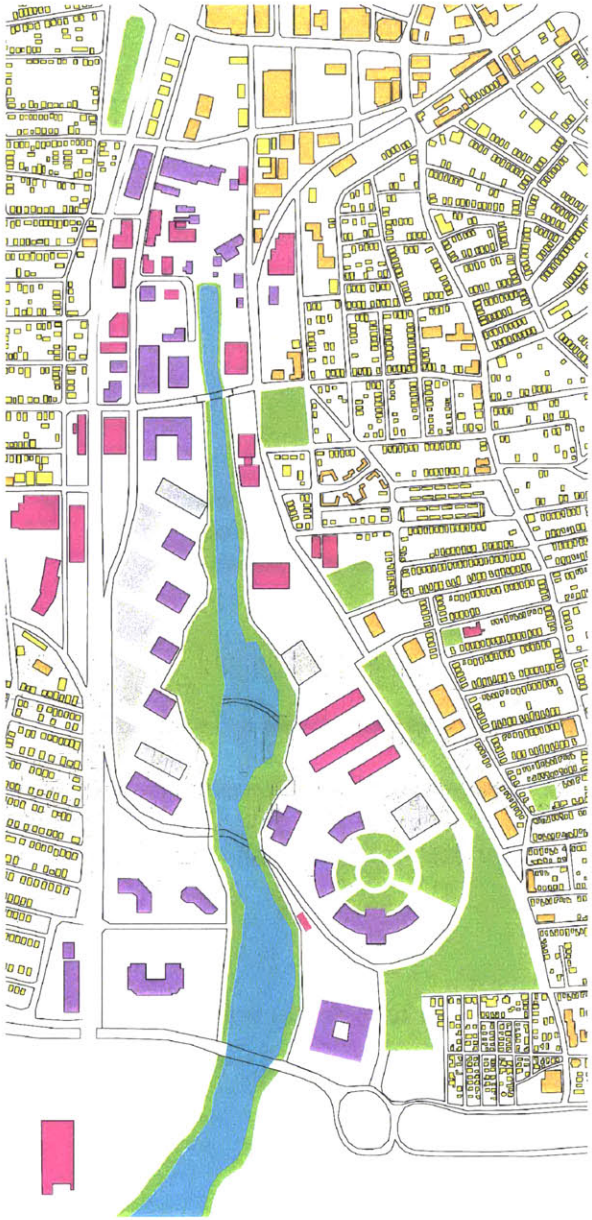

Figure 7. Program masterplan of existing office park scheme.

EVALUATION OF EXISTING PROPOSAL

Although the masterplan's statement of the project goals seem reasonable enough, the proposed means run contradictory to the priorities just mentioned.

The greatest weakness in the project's masterplan lies in the development's proposed connections with the surrounding host communities. Most of the gestures to establish local connections with the host communities seem suspect, especially in the initial gestures of the physical planning. For example, the green space planning is tellingly envisioned as a "green buffer" between the project site and Everett (Nangle Consulting Associates, 1997, p. 44). Clearly the greatest risk the project encounters is not the displacement of local jobs, which is probably inevitable, but the lack of synergy and connection with the project's host communities. The isolated character of the Telecom City office park reveals itself mostly through the arbitrary physical framework proposed thus far by the project planners. Essentially, the Telecom City Park gives little back to the host communities beyond a bike trail network and a green space buffer lining the Everett-Telecom City border.

TELECOM CITY: THE RE-DESIGNED CYBER-DISTRICT PROPOSAL

RECONSIDERATION OF PROGRAM AND PREMISE OF TELECOM CITY

At this point, the thesis exploration reconsidered the underpinnings and rationale of the Telecom City project. In several ways, the Telecom City represents much greater potential to synergize with its local surroundings while being developed as a high-technology industry center. Although much thinking has gone into Telecom City's role as a networked development on a regional and perhaps global scale, the thesis calls for a reconsideration of its framework and processes as a local network. Given that most of Telecom City's surroundings are characterized by demographic profiles usually marginalized in the network economy, the thesis will reconsider how Telecom City can be more effectively integrated within the neighborhood context and how the surrounding communities can tap into the resources of a project like Telecom City.

First, in reconsidering the programmatic requirements for Telecom City, an assumption was made that the development should target and can eventually achieve a much higher density than the one proposed in the office park scheme. Most of the readjusted program figures for Telecom City have been drawn from mixed-use, mid to high density neighborhood developments.

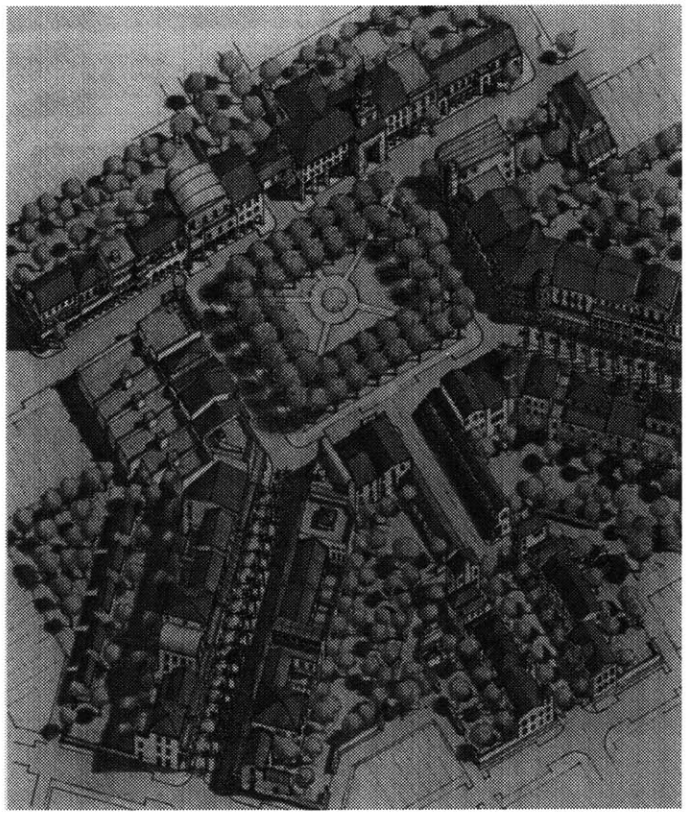

Figure 8. Axonometric rendering of traditional town center.

The guidelines shown directly below illustrates a sample urban village model and its development configurations (Duersken, 1996):

Section 601: Village Model
"Villages shall contain a minimum of five different lot types selected from the following list of permitted lots. The lot mix is expressed as a percentage of total permitted lots."

Overall Size:	100-200 acres
Open Space:	20%-30% of total acreage
Residential Lots:	
Townhouse Lots	15% maximum
Traditional Lots	65% maximum
Neighborhood Lots	65% maximum
Estate Lots	20% maximum
Conservancy Lots	3 lots maximum
Village Apartment Lots	2.5% maximum
Commercial/Mixed Use Lots:	
Village Main Street Lots	5% maximum
Institutional Lots:	
Small Institutional Lots	1% maximum

Total Size			
Total Acreage			**200**
acres			
FAR Ratio			**2.5 to 3**
1. Public Spaces			
Open/Green Space (30% of total acreage)	60	acres	**2.6M sf**

2. Institutional

The thesis has also redeveloped the institutional and industrial focus of the Telecom City project as well. Rather than just targeting the telecommunications industry in a broad and overarching manner, the thesis proposes that the development add a new target strategy towards a more tightly related group of industries. The redesign of Telecom City into a neighborhood-scale cyber-district typology suggests that it would be more effective in attracting multimedia, Internet and creative technology companies.

Types of companies Telecom City's New Media District could attract include:
Web Design and Hosting: visioning and construction of web sites and WWW hosting services.
Research/Content Development: sound and time-based studio focusing on research, interface design, user-feedback, sound and music, digital storyboarding.
Multimedia / Web Design: cross-platform multimedia design, web design, music/audio production.
Web Design and Development: full service web design and development including design, art direction and full service web development, information management, HTML and JavaScript.
Digital Audio Production: full service recording; original music, sound design, music libraries and talent for all media.
Original Audio/Voice-overs: creates original audio and multi-lingual voice-overs for the Internet and other New Media applications.

The Anchor Institutions could be adapted to reflect this additional industry target with research consortiums on new media applications and small business association networks that may sustain relationships between various ventures and early-stage companies.

4. Work Places		**800,000 sf**
Office (software developers, multimedia companies)		300,000 sf
Research Development (streaming media and software research)		300,000 sf
Light Manufacturing (wireless multimedia devices)		200,000 sf
	Subtotal	**4.0M sf (92 acres)**

5. Residential

From precedent models, Telecom could expect to attract **1000 new families**.
Residential densities were estimated from precedent New Urbanist developments: Kentlands (350 acres, 1600 dwellings, 5000 new people, 1M office, 1.2M retail), Laguna West (1000+ acres, 3,330 units, 10000 new people)

5a. 200 Single Family, Dense	8 net units/acre (1/5445 sf)	1 M sf
5b. 400 Townhouses, Walk-up Apartments	12 net units/acre (1/3630 sf)	1.4 M sf
5c. 400 Mid-rise Apartments (5-8 stories)	18 net units/acre (1/2420 sf)	1 M sf
5d. 400 Assisted Living Complexes	18 net units/acre	1 M sf
	Subtotal	**4.4M sf**
Parking	(1-to-1 ratio)	**500,000 sf**

Anchor Institutions **300,000 sf**

1. **Community-at-Large Training Center** (distance learning resources complete with publicly accessible teleconferencing classrooms and dedicated physical classrooms).
2. **New Media Business Network**: (a locally affiliated network of small businesses, early-stage ventures in the incubation or pre-financing stage)
3. **New Media Laboratory** (an MIT Media Lab Branch that acts as a regional scale organization exchanging technical knowledge related to new media and Internet infrastructure developments)
4. **Business Development Consulting** (Outsourced professional support services in finance, legal and management consulting).

2a. Educational
2b. Healthcare
3. Retail, Entertainment (3% of total acreage) 6 acres **300,000 sf**

Although not immediately related to the project's economic development prerogatives, institutional development in education and healthcare can add unique value to Telecom City's host communities, given the sizable population of families with children and elderly residents. Finally, a modest infusion of retail and entertainment places are necessary to provide viable recreational options within the neighborhood.

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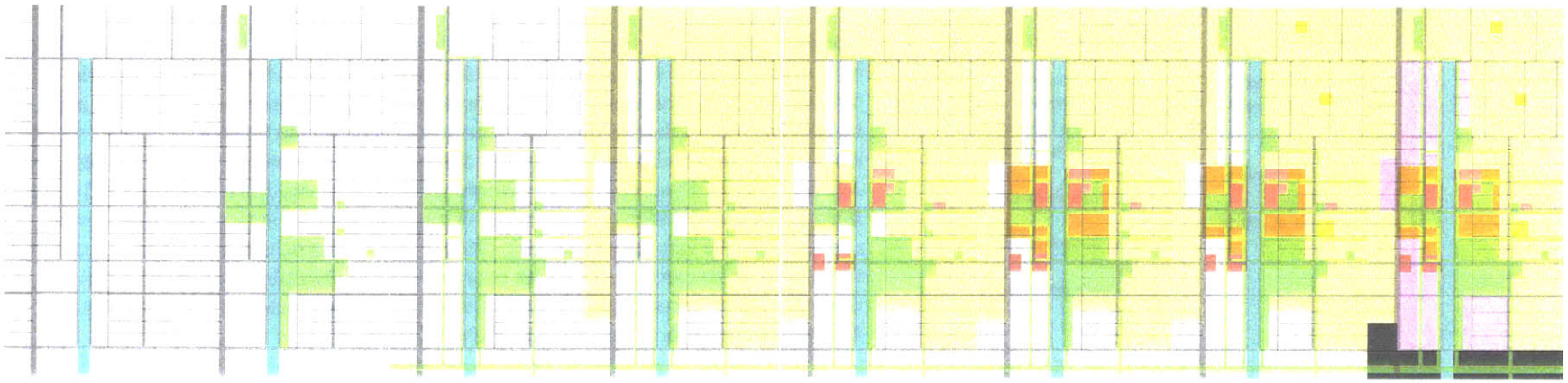

Figure 9. Cyberdistrict sequence of development diagrams.

	Synchronous	Asynchronous
Physical	Meeting spaces Immediate feedback High transportation costs High space costs Requires coordination of availability Requires full attention	Storage/dispensing facilities Limited by storage, playback capability No immediate feedback No reduction in transportation costs No reduction in space costs No need to coordinate availability May allow some division of attention
Virtual	Transmission/receiving spaces Limited by bandwidth, interface capabilities Retains immediate feedback Reduces transportation costs Reduces space costs Requires coordination of availability May allow some division of attention	Virtual spaces Limited by storage, bandwidth, interface capabilities No immediate feedback Reduces transportation costs Reduces space costs No need to coordinate availability Allows greatest opportunity to multitask

Figure 10. Tradeoffs between physical/virtual presence and synchronous/ asynchronous activities.

MAPPING THE NETWORK / NEIGHBORHOOD: PHYSICAL/VIRTUAL AND SYNCHRONOUS/ASYNCHRONOUS

The first step in planning the distribution of spaces and services in the network neighborhood was to reconsider them along new dimensions. In the City of Bits hypothesis, William Mitchell describes the delineation of spaces and services in the network neighborhood along two dimensions: that of presence, either in the Physical or Virtual realm, and that of interactivity, in Synchronous or Asynchronous interactions (Schon, Sanyal and Mitchell, 1999). Synchronous interactions refer to those enacted in real-time and those that require coordination of availability; in other words, they are necessarily two-way exchanges at the very least (Mitchell, 1995, p.15-17). Asynchronous interactions refer to those that can be carried out without coordination of availability. Mitchell further describes the constraints and opportunities afforded along these two dimensions in the following chart (Schon, Sanyal and Mitchell, 1999).

This framework was immediately useful in speculating how the network neighborhood in Telecom City could utilize information technologies to complement and in some cases, streamline and substitute the traditional physical facilities of a neighborhood. The services and spaces of the neighborhood were broken down into the following categories:

Public Spaces
Residential (Domestic Services)
Institutional
Education
Healthcare
Retailing
Entertainment
Office / Research & Development
Industrial (Storage)

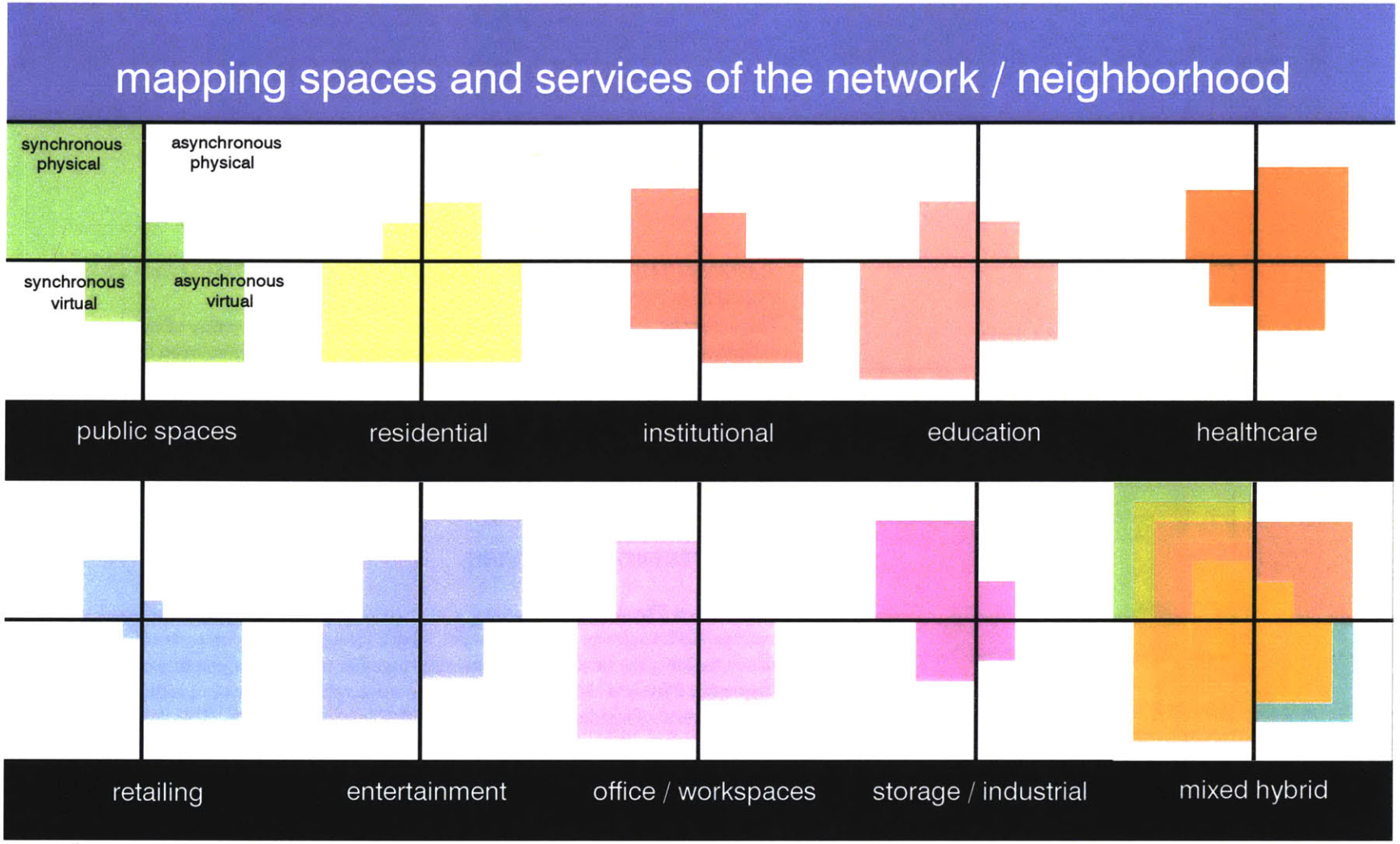

Figure 11. Matrix of services and spaces mapped out along physical/virtual and synchronous/asynchronous dimensions.

The diagram below speculates on how each particular function within a network neighborhood can be enacted across physical/virtual realms and across synchronous and asynchronous modes of activities. For example, the diagram speculates that face-to-face (physical), synchronous public spaces, in the form of playgrounds, public squares, and gardens, will remain the most important configuration for sustaining public activity. However, in the lower right corner, virtual, asynchronous modes of delivering public spaces, such as online news postings, bulletin boards and community-based intranets will emerge as a strong complement to the neighborhood's physical public spaces.

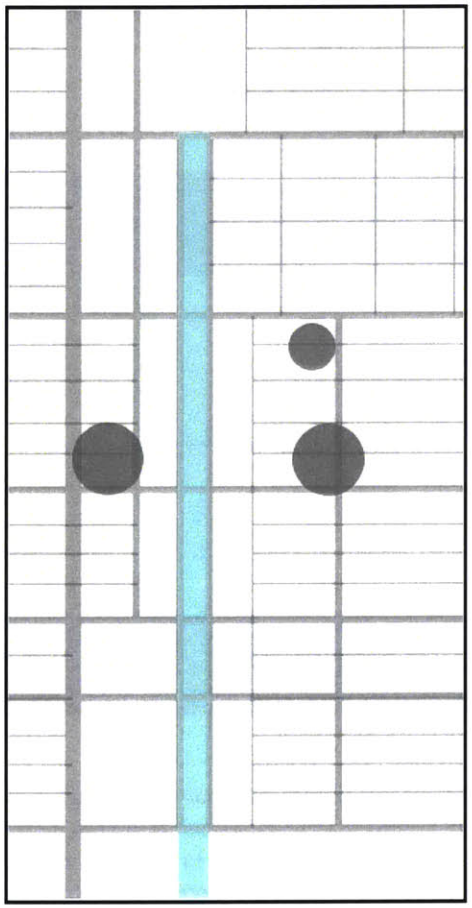

Figure 12. Linkages Infrastructure Diagram.

MAPPING THE NETWORK / NEIGHBORHOOD: CENTRALIZED AND DISPERSED ACTIVITIES

The following set of masterplan diagrams illustrates how the overlay of cyber-networks and physical infrastructures can be positioned and distributed in relation to each other. The effects of network technologies in most cases exhibits a clustering of services in strategically placed hubs but also engenders the presence of dispersed and locally distributed nodes. For the sake of clarification, the following set of diagrams delineate between physical and virtual spaces. The orthogonal shapes of the diagram correspond to the physical portions of the masterplan whereas the circular shapes represent virtual-based components, such as portals and access nodes.

LINKAGES INFRASTRUCTURE

Centralized Physical: The regional scale network of highways lies to the south of the site and the MBTA subway line to the west. Major through streets run east-west across the site connecting the three host communities together through the juncture of Telecom City.
Dispersed Physical: More importantly, the masterplan proposes to continue the finer-grained fabric of residential roads through the Telecom City site. This smaller scale of road networks will set the physical framework for much of the plan's locally distributed and decentralized activities. Greater porosity in the roads network will allow for more locally distributed deliveries and transactions. Due to the smaller scale of roads, alternative modes of transportation will be essential in conducting delivery transaction. For example, rather than large vans or trucks conducting deliveries, carrier bicycles or mopeds could be utilized to navigate neighborhood routes.
Centralized Virtual: Telecom City will represent the geographic center of the region's virtual linkages, expressed as a centralized telecommunications cluster combining both satellite-based Internet access facilities and T1 line connections.

PUBLIC SPACES INFRASTRUCTURE

Centralized Physical: The Malden River is being opened to the public for the first time in decades. A fundamental redefinition of the river as a public regional gathering focus could bolster Telecom City's symbolic connection with the neighborhood.
Dispersed Physical: The river could also act as the anchor for a network of smaller public gathering spaces and parks throughout the development. Thus a more usable and accessible network of public spaces could then effectively generate a greater range of activities and peoples on site.
Centralized Virtual: Public Internet access nodes are the most robust within Telecom City's largest physical public spaces. The larger nodes will most likely be housed in controlled environments, such as those suggested in Internet cafes, and offer a full range of virtual services, including synchronous teleconferencing and high-end display facilities.
Dispersed Virtual: Further away from the geographic center of the project area, smaller Internet access nodes are distributed evenly throughout the surrounding communities. The smaller neighborhood nodes will be more stripped down, taking the shape of booth-like Internet kiosks on street corners that would be available for usage 24 hours a day.

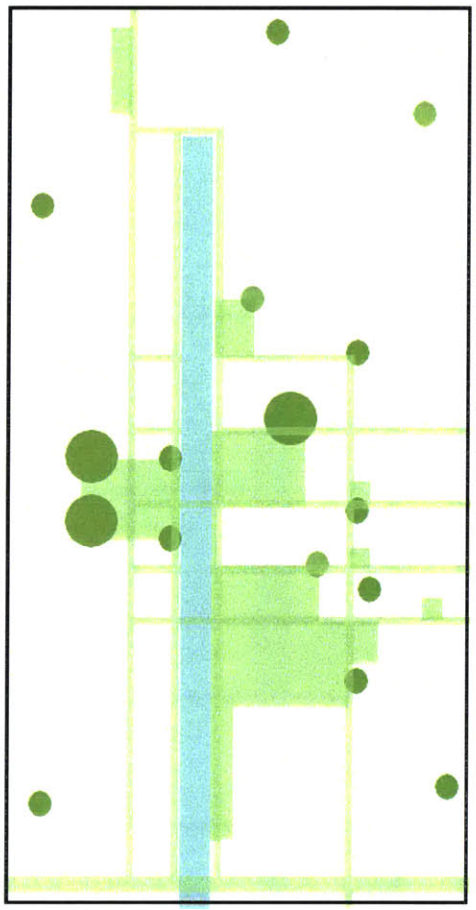

Figure 13. Public Spaces Infrastructure Diagram.

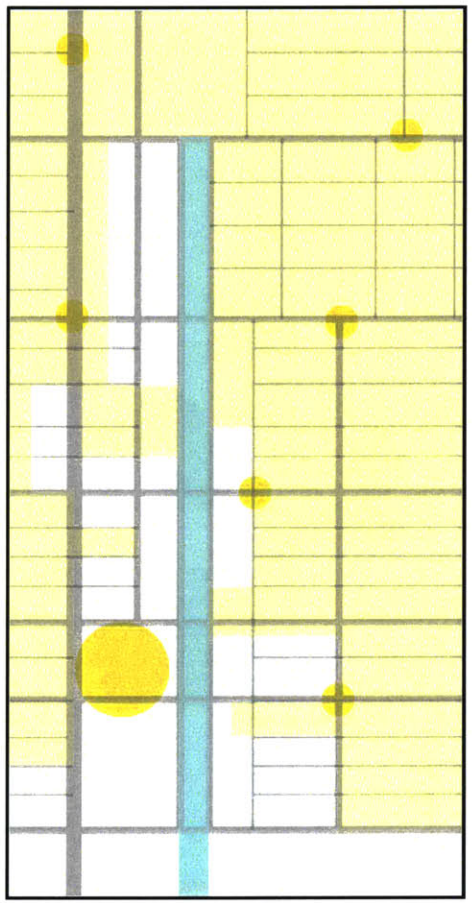

Figure 14. Residential Services Diagram.

RESIDENTIAL (DOMESTIC SERVICES) INFRASTRUCTURE

Dispersed Physical: Housing is a critical provision of the revised Telecom City masterplan as it proposes to infuse more residential stock into the boundaries of the project area. This will reinforce the notion that Telecom City is not only a place to come to work, but conceivably to live in at the same time.

Centralized/Dispersed Virtual: The circular symbols on this diagram illustrate the locations of residential-based virtual portals. Since these portals are housed in residential complexes, such as apartment lobbies and receptions, these access nodes represent a more private option to Internet access than the ones located in the public spaces of the masterplan. The circular notations also represent locations of centralized package drop-off and pick-up centers. The centers basically amount to oversized mailboxes, which, for the sake of expediting delivery routes, are consolidated in controlled centers throughout the neighborhood. Drop-offs can occur at scheduled, regular times throughout the day, while residents with card access can pickup packages in their respective mailboxes 24 hours during the day.

HEALTHCARE SERVICES INFRASTRUCTURE

Dispersed Physical: Smaller, locally based healthcare clinics and suites can supplant the development pattern of regionally-based hospital centers. The advent of remote monitoring and telemedicine allows the trimming of individual facilities and their locally based distribution offers more convenience and reliable house-call options. This is especially important given the sizable elderly populations in the surrounding neighborhoods.
Centralized/Dispersed Virtual: Elderly residents will rely increasingly on situating online facilities and monitoring devices within their homes for convenient online access with their physicians. Due to higher-end equipment requirements that are needed to sustain this virtual around-the-clock synchronous activity, these transactions necessitate higher bandwidth in assisted living units or the homes of elderly. The virtual portals listed in this diagram illustrate how clusters of high-bandwidth infrastructure could service a localized region of elderly residents.

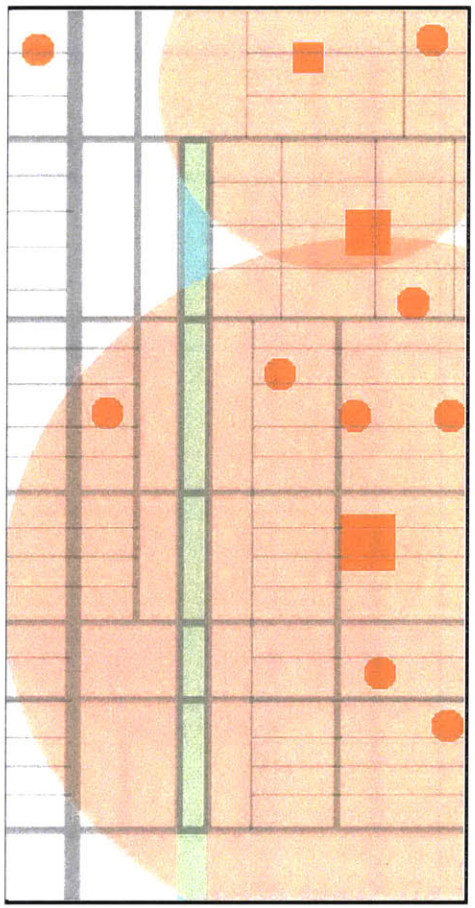

Figure 15. Healthcare Services Diagram.

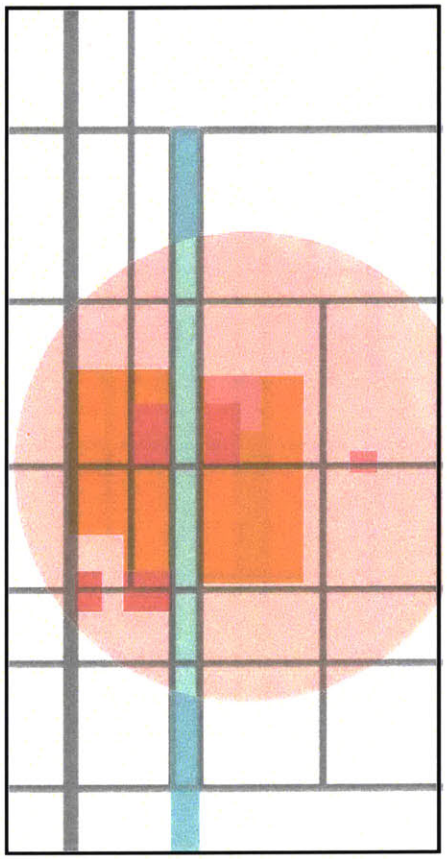

Figure 16. Mixed Core/Institutional Center Diagram.

MIXED CORE / INSTITUTIONAL CENTER INFRASTRUCTURE (also includes retail and entertainment)

Centralized Physical: Mixing Retail, Entertainment, and Office functions along with Institutional places will further activate the site's public gathering core at the river. A sizable amount of shops must be dedicated to usage throughout the day, given the merging boundaries between places of work and living. Shops in the mixed use-district should support the day-to-day activities of both resident and worker alike and could include dry-cleaning, health-clubs, cafes, and restaurants. By compacting different uses in a more confined area, the mixed-use district not only offers the convenience of lesser distances to travel to conduct physical transactions but also would facilitate face-to-face interactions.
Centralized Virtual: By virtue of its intense mixing of uses and activities alongside the river's banks, the mixed use district should be one of Telecom City's most concentrated area of high bandwidth. Doing so will attract more users, workers and residents and further activate the district with density and activity.

OFFICE AND WORKSPACE INFRASTRUCTURE

Centralized Physical: Most of the office and research & development spaces will be strategically situated along the transportation edges of the site. Furthermore, Internet and e-commerce related businesses would also be located near the site's transportation lines and warehouses. Offices located away from the transportation edges and closer to the river are housed in smaller scale buildings. These smaller units without warehouse attachments are more appropriate to the needs of software and multimedia ventures, companies that usually don't require much physical space to conduct day-to-day business. Furthermore, most of these work units, especially those housing incubator businesses and startups, should be organized as a commune of businesses to allow for sharing of high-end telecommunications resources.

Dispersed Virtual: The virtual components of the Office and Workspace Infrastructure are represented by the notion of shared high-end telecommunication suites. These suites would be outfitted to provide high-quality teleconferencing and computing that can be shared and rented amongst a commune of business tenants. These telecommunication suites could also be located remotely from the physical office and integrated into the residential fabric of apartment lobbies and receptions. Such an arrangement would cater to the burgeoning population of telecommuting home-business owners in the area.

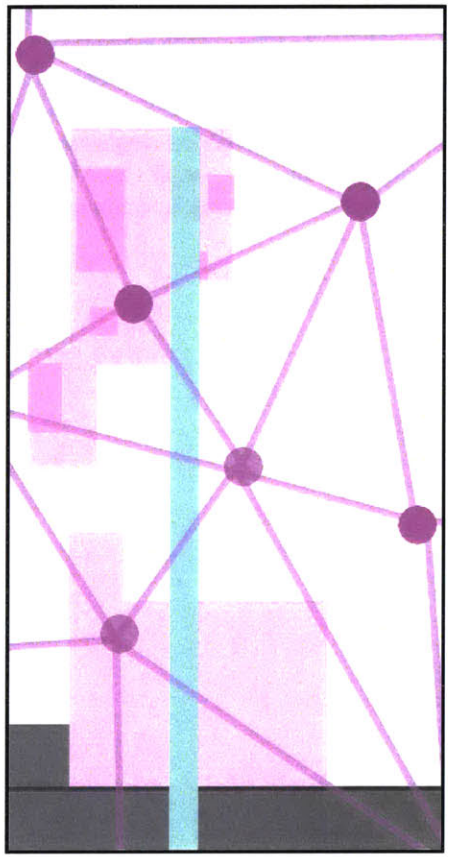

Figure 17. Office and Workspace Diagram.

In overlaying the Network effects of information technologies upon the Neighborhood, the resulting masterplan suggests that a traditional urban framework can best house the processes mentioned above. In contrast to the coarse grained single-use zoning of Telecom City's office park scheme, the reconsideration of the project as a Network / Neighborhood would support much more uses, service a greater range of peoples, and would contribute more value back to the surrounding host communities.

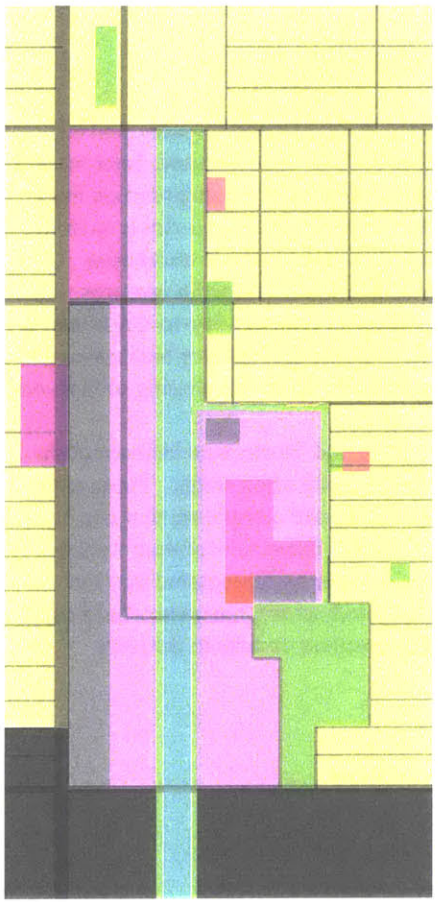

Figure 18. Diagram of Office Park Urbanism.

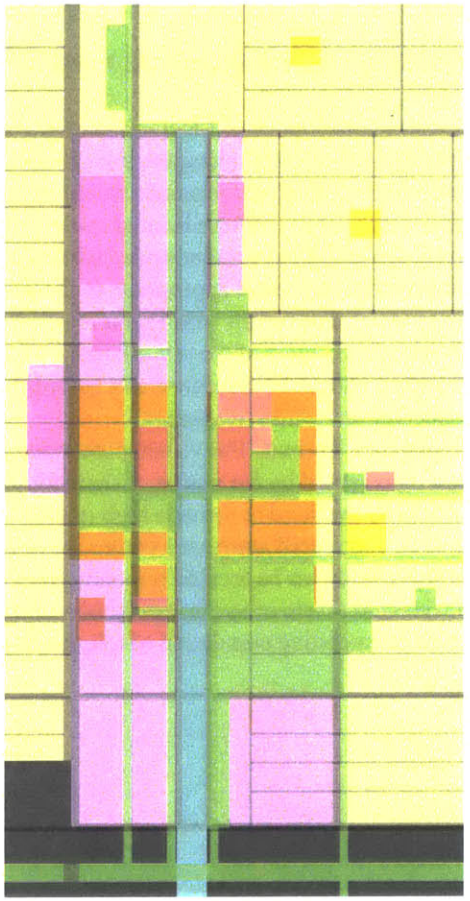

Figure 19. Diagram of Traditional Urbanism.

PHYSICAL MASTERPLAN AND TRADITIONAL URBANISM

The thesis then proposes that a traditional small town urban framework is indeed the best one that can sustain the processes of a Network / Neighborhood. The diagrams above illustrate how a Network / Neighborhood needs both a centralized and clustered hub of services to service more dispersed and locally distributed sub-nodes into the surrounding communities. These processes then rely on the creation of mixed, clustered uses and locally-scaled places, both key tenets in traditional town planning. The series of masterplan drawings below describe how the physical layout of such a locally-scaled Network / Neighborhood may look like.

COLLAPSING OF TIME, DISTANCE REQUIREMENTS BETWEEN USES

By introducing a finer-grained network of streets and spaces, services can be distributed more easily from Telecom City's regional hubs into the surrounding residential fabric. Furthermore, the masterplan also describes the importance of positioning those hubs, nodes, and sub-nodes of delivering services over walkable distances. The diagram shown illustrates an instance of public transportation nodes being located within ¼ mile (or 5 minute walk) within each other.

MIXING OF USES

One of the greatest assets a development like Telecom City can offer is the mixing of live and work places into a compact area, mitigating the hassles associated with automobile commutes. Bringing workplaces closer to a residential and recreational context will provide an attractive environment for today's information economy workers and companies. In mixing uses across a neighborhood fabric, there are also many more opportunities for face-to-face interactions amongst different groups of people. Furthermore, an influx of varied housing types and businesses would also foster a greater range of socio-economic demographics and income mixing.

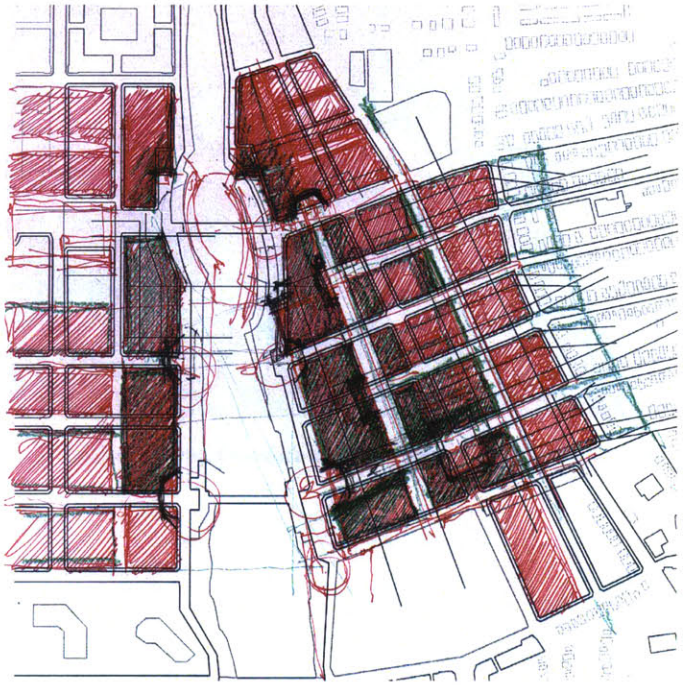

Figure 20. Early sketch of re-integrated urban fabric and the creation of a regional gathering place at the river's center.

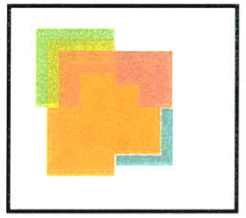

Figure 21. Conceptual diagram of mixed use

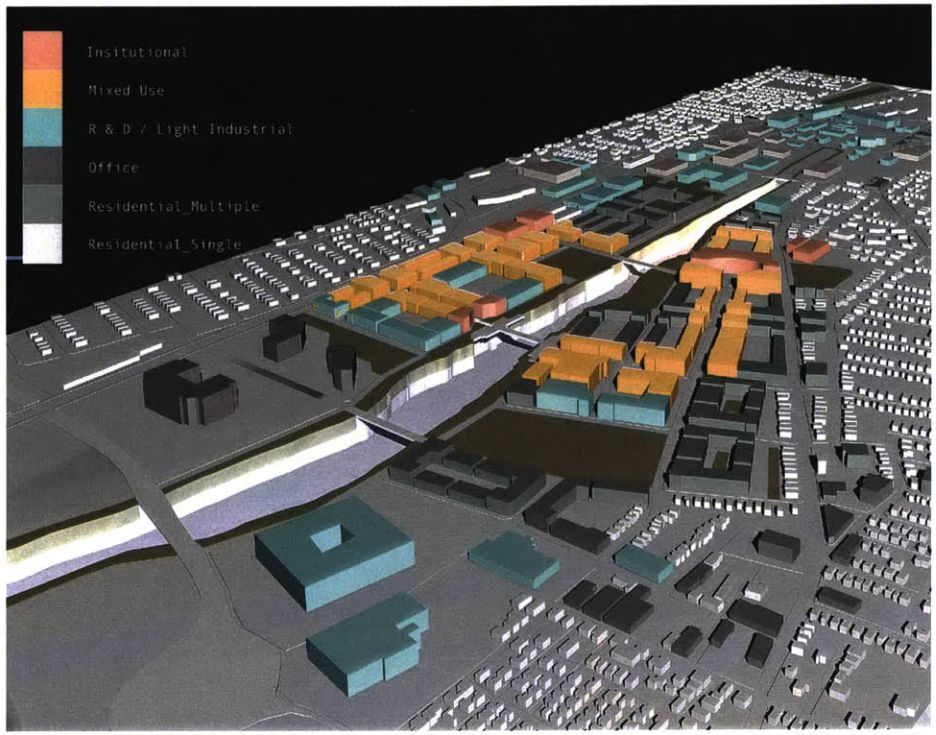

Figure 22. Early digital rendering of cyber-district's regional massing.

Figure 23. Photographs of massing site model.

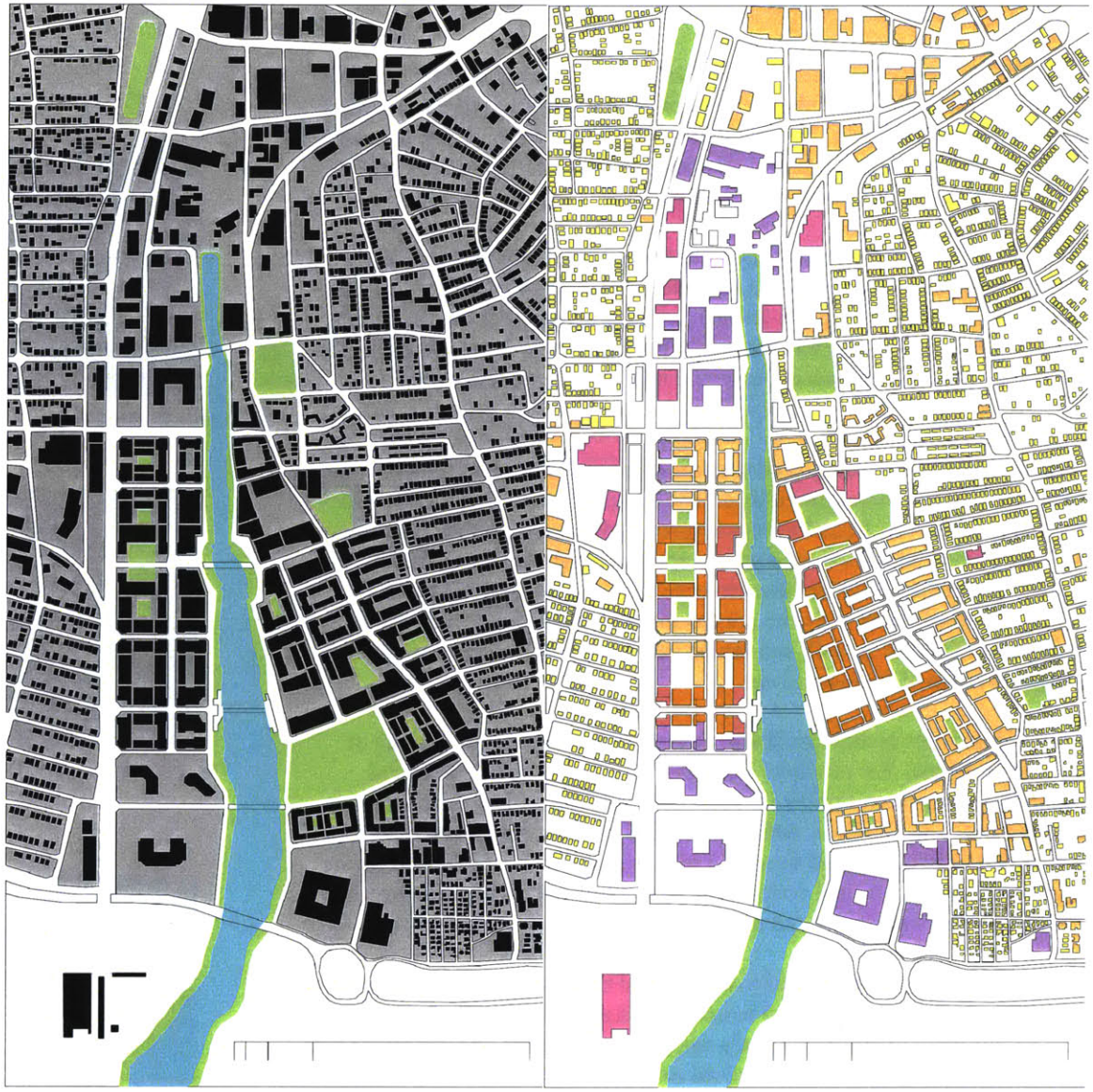

Figure 24. Figure/ground and program masterplans of the new cyber-district.

STREET SECTIONS: SYNCHRONOUS MAIN STREETS, ASYNCHRONOUS SERVICE ALLEYS

The distinction between synchronous and asynchronous activities is also considered when exploring how traditional street sections and conventional architectural layouts may better adapt to the networked neighborhood. Traditional town street sections provide a simple but effective framework that can organize different modes of interaction. The sections illustrate how main streets can codify face-to-face interactions while placing around-the-clock activities, such as the ones engendered by e-commerce deliveries and computing clusters towards the service-oriented zones at the back of the traditional street section.

Physical Synchronous Activities: The capability of a place to sustain spontaneous and casual face-to-face interactions is critical, especially with regards to a social network of information age tenants where most of the substantive knowledge transfer occurs in cafes and bars as opposed to office building conference rooms (Mackun, 2000). Face-to-face gathering spaces such as restaurants, health clubs, conference rooms, and residential porches and living rooms can be located in buildings alongside the main street. The creation of semi-public gathering spaces within buildings can also provide for more chance and informal encounters within a neighborhood building as well.

Figure 25. Street Section A.

Physical Asynchronous Activities: The Internet and networked technologies has placed even more pressure on communities to sustain 24-hour asynchronous activities in the physical realm. The need for separating irregular, around-the-clock activities, such as delivery drop-offs and domestically-situated work activities, such as telecommuting from the more regular rhythms of the public synchronous domain is thus especially important. Furthermore, since these asynchronous activities are not enacted regularly throughout the day and because they require a secure, almost black-box spatial organization, it makes sense to code these uses away from the main street and closer to the backs of the traditional street section. Although these activities are distanced from the public main street and its rhythms, these asynchronous clusters can generate gatherings of people as well, and can become more internalized semi-public nodes within the street section as opposed to the outdoor public realm of the main street.

Figure 26. Street Section B.

Virtual Synchronous and Asynchronous Activities: The traditional street section could also similarly prescribe the positioning of virtual and telecommunications-based activities, but to a limited degree. For example, it still makes sense to centralize shared computing and networking facilities in a building. As internally-focused semi-private spaces, teleconference suites and computing clusters are more appropriately codified within the middle and backs of buildings. Maintenance and modular attachments, such as individually installed satellite dishes and Internet line connections can be handled through a service grid also located alongside the backs of buildings as well. But for the most part, the traditional street section and architectural layouts do not necessarily prescribe a logical ordering of smaller-scaled computing activities, such as laptop computing and mobile telephony.

Profiles: The thesis then explored how various residents and tenants could be serviced in the adapted traditional main street sections. The user profiles listed below represent a wide range of income and needs, and should be considered in the design of Telecom City's building units. Although the delineation between domestic and work spaces differs greatly among these scenario layouts, the pattern of differentiating face-to-face synchronous activities and around-the-clock activities is indeed reinforced even across very different profiles of units. Finally screen stills of possible virtual tranactions underscore how online networks complement the physical spaces of a unit (display activities as a gathering point in the living room, for example) and creates the need for new types of physical spaces (black-box computing clusters and scaled up maildrops to pick up Internet-ordered packages).

Figure 27. Street Section C.

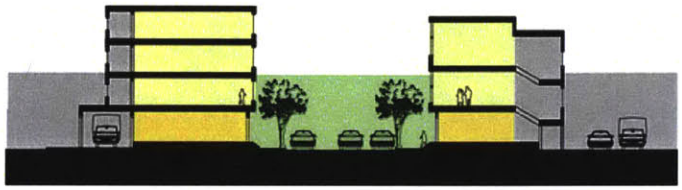

Figure 28. Physical Activities, Section A: Rowhouses, Triple-Deckers
Attached Assisted Living Units, Detached Units

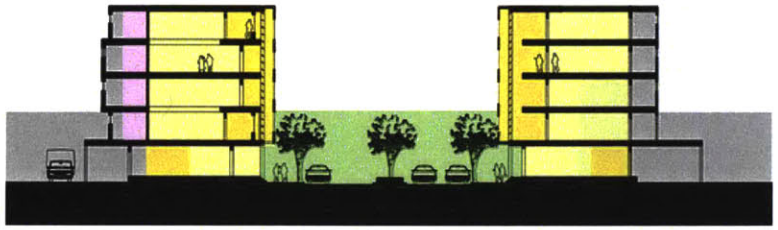

Figure 29. Physical Activities, Section B: Walkup Apartments
Big Family Units, Assisted Living Units

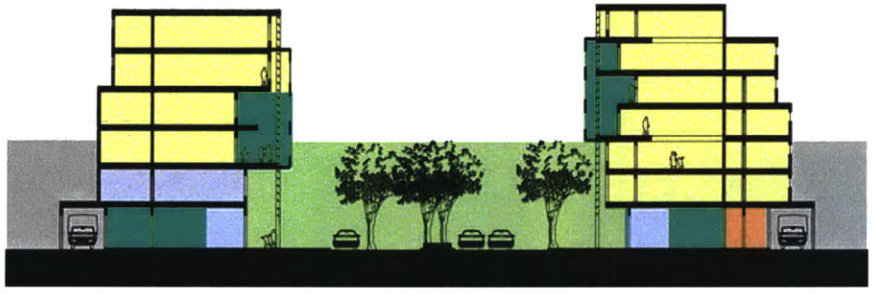

Figure 30. Physical Activities, Section C: Mixed-Use Mid-Rise
Big Family Units, Assisted Living Units, Efficiency Units

Figure 31. Virtual Nodes, Section A: Rowhouses, Triple-Deckers
Attached Assisted Living Units, Detached Units

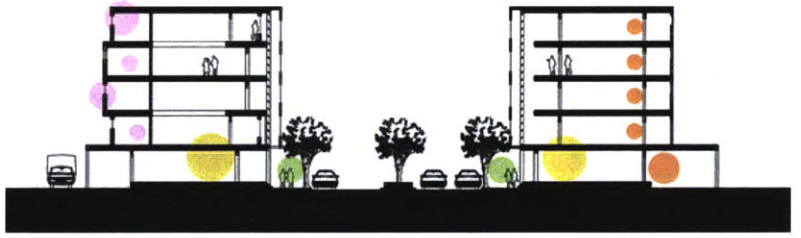

Figure 32. Virtual Nodes, Section B: Walkup Apartments
Big Family Units, Assisted Living Units

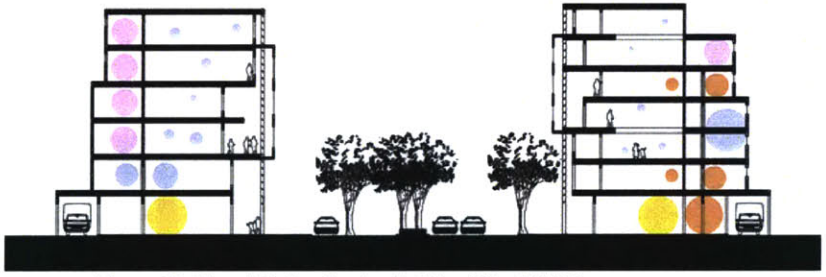

Figure 33. Virtual Nodes, Section C: Mixed-Use Mid-Rise
Big Family Units, Assisted Living Units, Efficiency Units

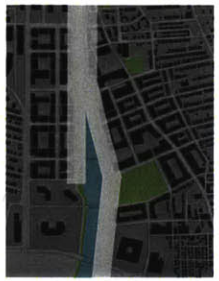

Figure 34. Street Section D.

Figure 37. Physical Activities, Section D: High-Density Mixed-Use Complex
Attached Assisted Living Units, Detached Units, Efficiency Units, Live/Work Suites

Figure 35. Street Section E.

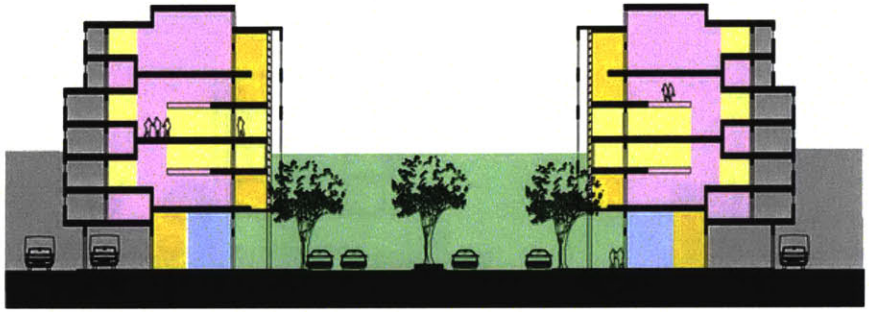

Figure 38. Physical Activities, Section E: Mixed-Use Lofts
Live / Work Units, Incubator Offices, Nightclubs, Bars

Figure 27. Street Section E.

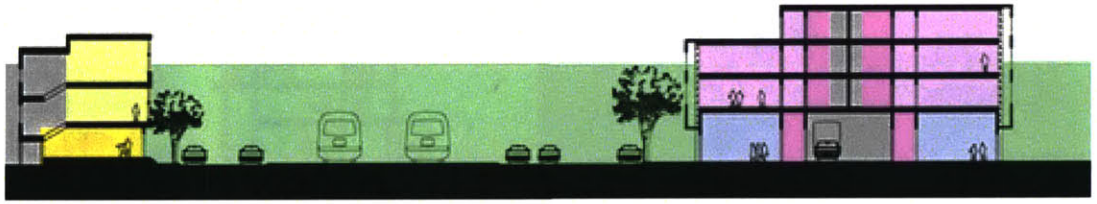

Figure 39. Physical Activities, Boundary Section F: Mid-Rise Office, Industrial with Subway
Incubator workspaces, Startup headquarters, E-commerce warehouse hubs

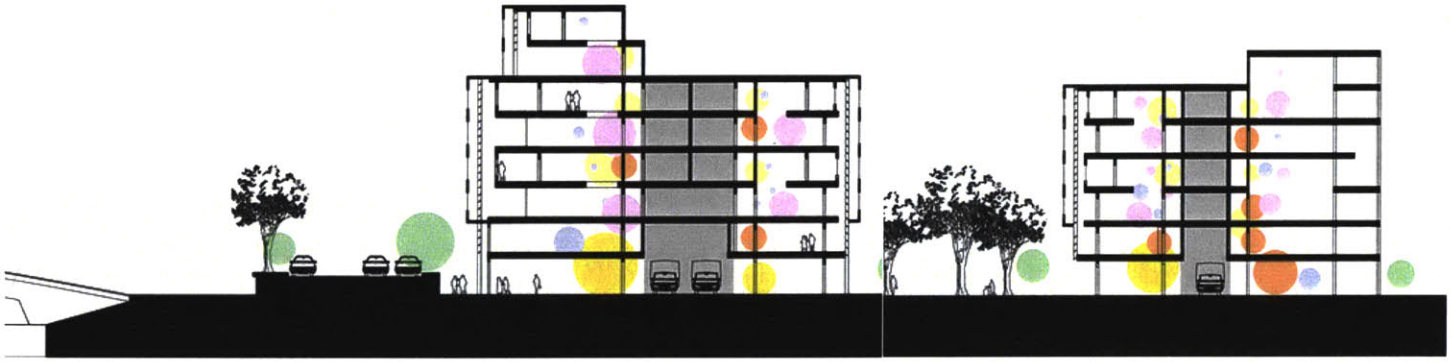

Figure 40. Virtual Nodes, Section D: High-Density Mixed-Use Complex
Attached Assisted Living Units, Detached Units, Efficiency Units, Live/Work Suites

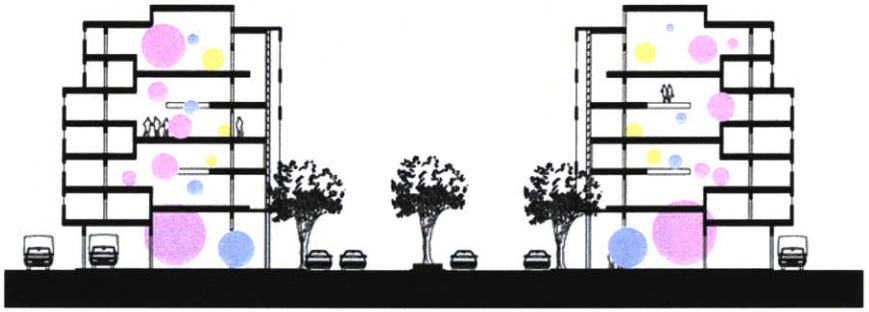

Figure 41. Virtual Nodes, Section E: Mixed-Use Lofts
Live / Work Units, Incubator Offices, Nightclubs, Bars

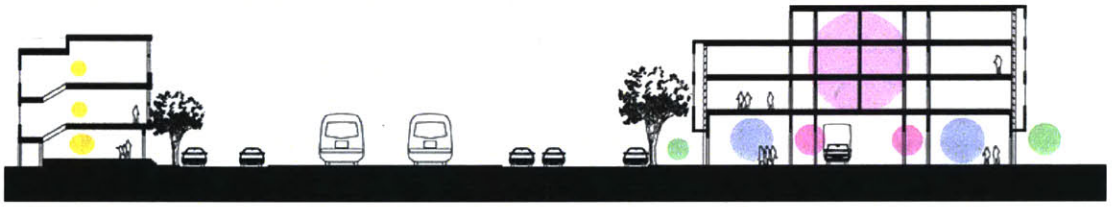

Figure 42. Virtual Nodes, Boundary Section F: Mid-Rise Office, Industrial with Subway
Incubator workspaces, Startup headquarters, E-commerce warehouse hubs

MAPPING THE NETWORK / NEIGHBORHOOD: RESIDENT PROFILES, ARCHITECTURAL LAYOUTS

SCENARIO 1: ELDERLY COUPLE; ASSISTED LIVING UNIT

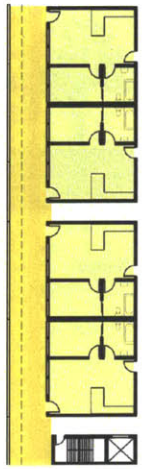

Figure 43. Physical Activities: Semi-Public Communal Meeting Porch Space, Less Live / Work Mixing

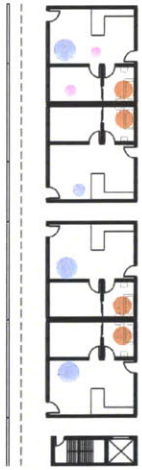

Figure 44. Virtual Nodes: Television, Personal Computing, Telemedicine monitoring sensors.

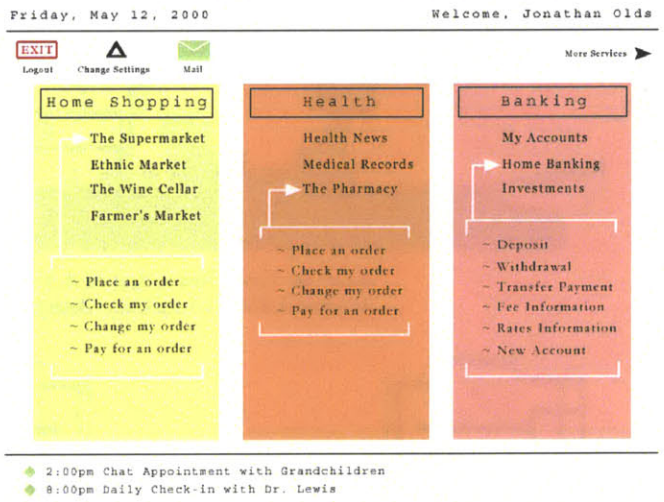

Figure 45. Virtual Asynchronous Activities: Domestic, Healthcare.

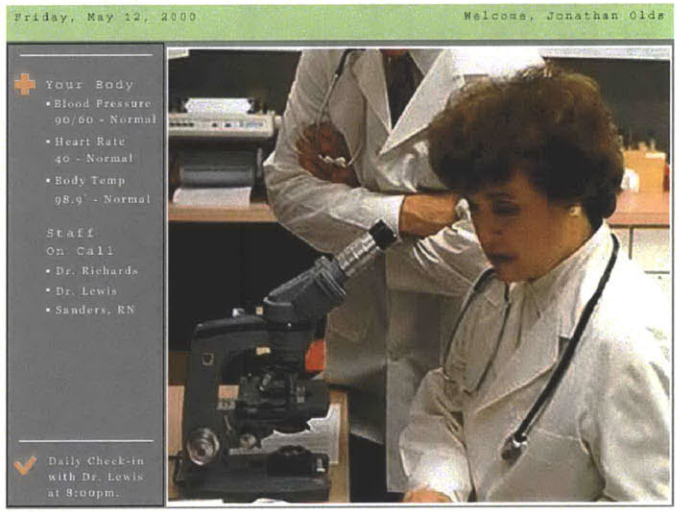

Figure 46. Virtual Synchronous Activities: Teleconference medical checkups

MAPPING THE NETWORK / NEIGHBORHOOD: RESIDENT PROFILES, ARCHITECTURAL LAYOUTS

SCENARIO 2: HOME BUSINESS OWNER, MOTHER OF TWO; BIG FAMILY UNIT

Figure 47. Physical Activities: Uses over two floors, Home Office separated from Live Units

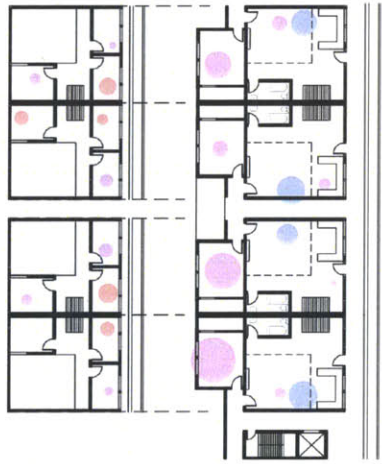

Figure 48. Virtual Nodes: Television, Personal Computing, Rented VideoPhone Services.

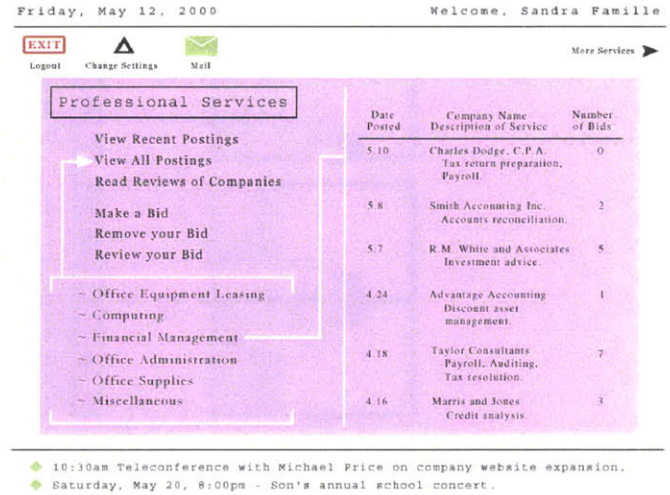

Figure 49. Virtual Asynchronous Activities: Home Business, Domestic

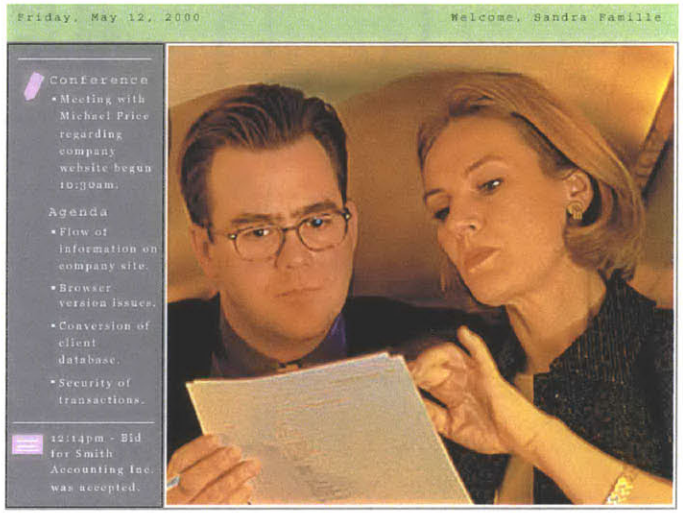

Figure 50. Virtual Synchronous Activities: Telephone, Fax Machine, Teleconference Unit

SCENARIO 3: YOUNG MULTIMEDIA PROFESSIONAL; LIVE / WORK LOFT UNIT

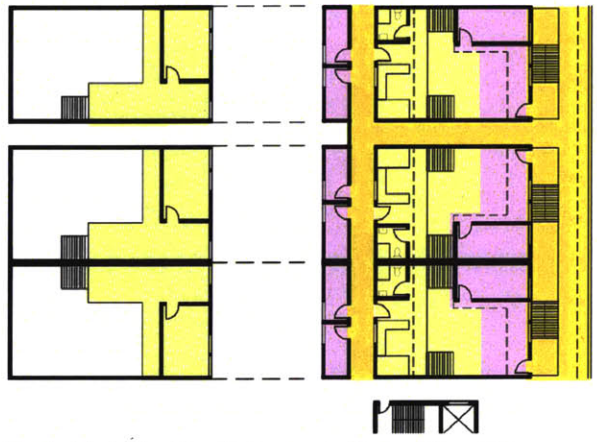

Figure 51. Physical Activities: Live Units separated by level from Office spaces, Gathering Spaces along Office entries.

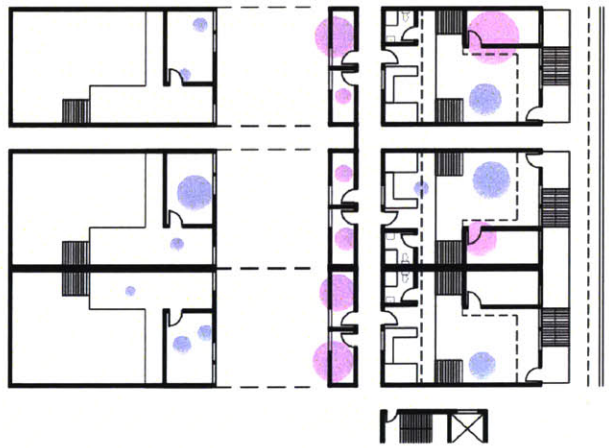

Figure 52. Virtual Nodes: Television, Personal Computing, Laptop Computing, Gaming Clusters.

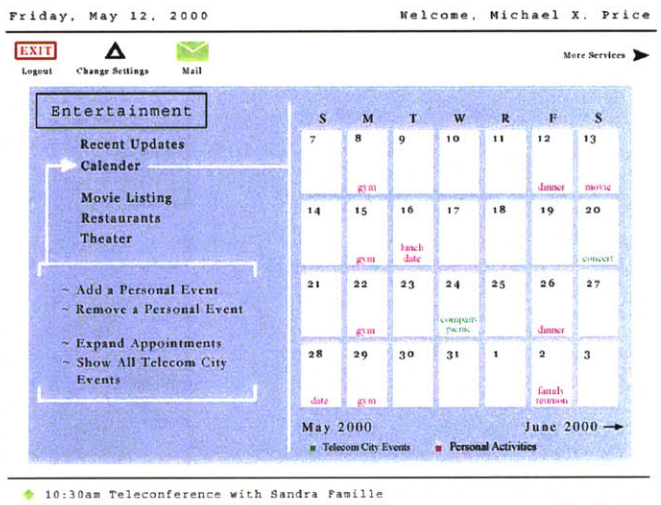

Figure 53. Virtual Asynchronous Activities: Postings on Business/Career, Entertainment Services

Figure 54. Virtual Synchronous Activities: Telephone, Fax, Videophone, Teleconferencing

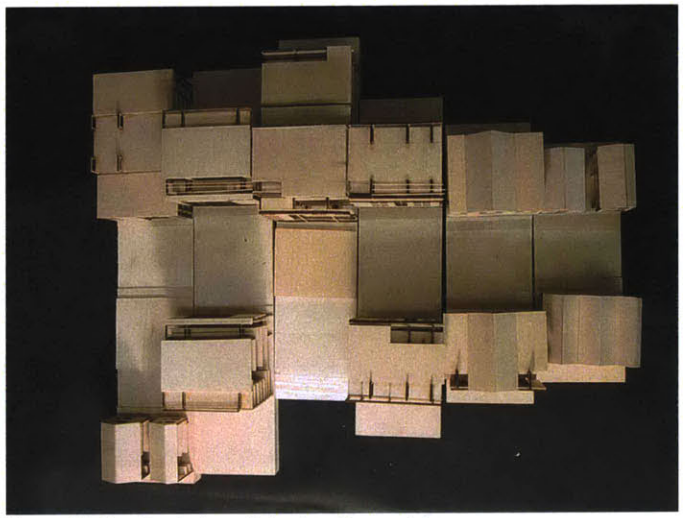

Figure 55. Overhead view of street section models.

MAPPING THE NETWORK / NEIGHBORHOOD: ARCHITECTURAL IMAGERY

Telecom City's Network / Neighborhood must be expressed in an appropriate architectural imagery. A frame and panel system is especially appropriate given its inherent flexibility of construction components and modularity. Along the street, the building frame facing the street will be built up in a language of panels and screens to express a contemporary architectural backdrop for the face-to-face asynchronous activities. Alongside the service wall, the frame would house modular attachments and devices that would leave the visual qualities of the wall in greater flux than the street wall.

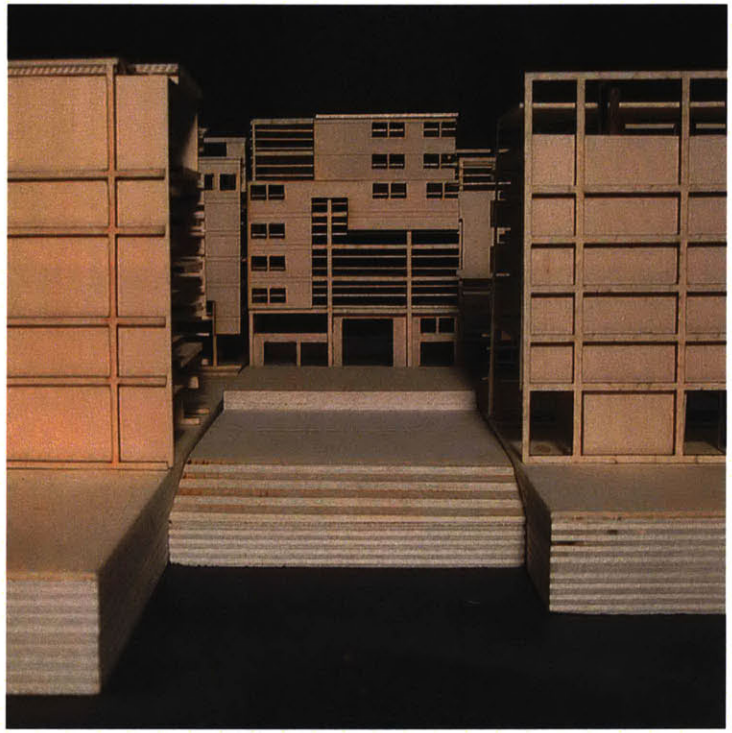

Figure 56. Street section models.

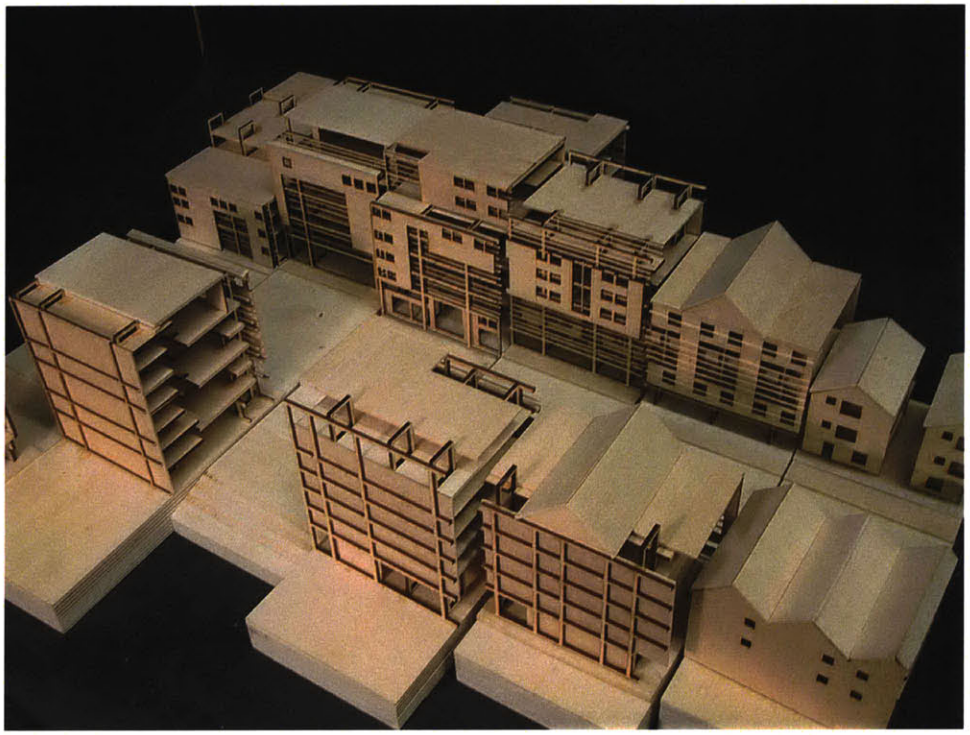

Figure 21. Street section models (from left to right, Section F to Section A)

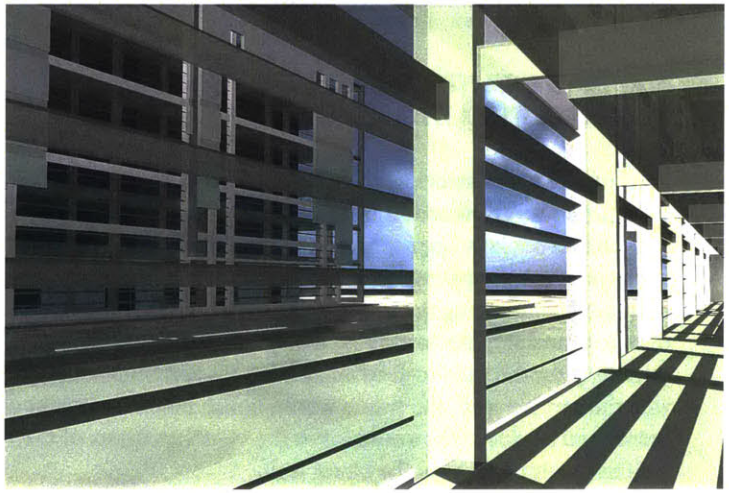

Figure 58. (left) Digital rendering of interior perspective.

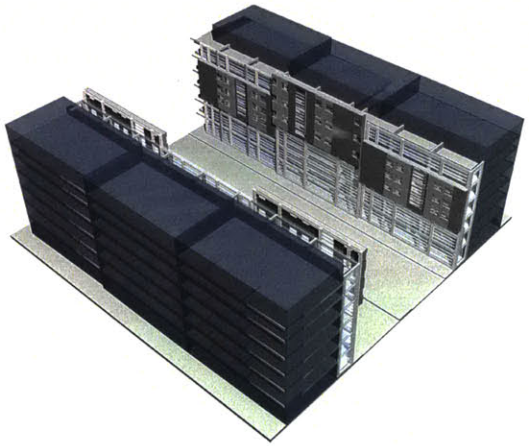

Figure 59. (right) Axonometric view of Frame System: Screens/Panels along a built up street wall, Modular attachments along alley wall.

Figure 60. Digital rendering of street perspective along a mixed use district

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New England Cyber-Districts

http://www.haverhillcyberdistrict.com
Website of Haverhill's Cyber-District, located in the city's historic old mill town district.

Once the home to the world's largest producers of shoes and leather goods, the city is attempting to position itself in the high technology industries in data communications, software communications, and e-commerce.

http://www.lynnma.net/cyberbizplan/
Website outlining the business plan competition for Lynn's Cyber-District.

The city is planning to set aside a six-block area in the downtown core for Internet companies and software developers. Low rents subsidized by government grants and cheaper rates for high-performance Internet access provided by Shore.net.

http://www.cyberdistrict.org
Website of New England's cyber-district headquarters, located in Boston.

The Cyber District Association represents a cooperative of businesses, organizations and individuals to foster innovation and growth in the interactive industries through professional workshops, networking events, and community educational outreach programs.

New York's Silicon Alley

http://206.98.160.91/da-s2.cfm
Central website of New York's Downtown's Information Technology District.

Extending south of Chambers Street to the tip of Manhattan, the IT District houses hundreds of high-growth information technologies that are expected to revitalize the Downtown into a 24-hour community.

http://www.55broad.com
Website of the New York Information Technology Center at 55 Broad Street, the 400,000 s.f. anchor building of New York's Information Technology District. Developed through a partnership of municipal, non-profit organization, top universities and information technology companies.

Tenants are offered a full array of networking technologies, including satellite accessibility, single- and multi-mode fiber optics, high speed category 5 copper wire, video conferencing facilities and Internet access from DS-3 to Fractional T-1, ranging from 10 to 100 Mbps of bandwidth. Other amenities include 24-hour, 7-day security and emergency power supplied upon request.

http://www.news-ny.com
The online newsletter of New York's Silicon's Alley, with articles, news postings, along with apartment and employment notices.

San Francisco's Cyber-District

http://www.gulch.com/home.html
Website of San Francisco's Multimedia Gulch, an agglomerative network of creative advertising, web design, and new media companies and free-lancers.

The website matches developers with resources and creative talent to fulfill online advertising, multimedia and databasing needs. The site also serves as an electronic storefront from which prospective clients may browse online portfolios and previous projects.

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