Oakland County Technology Planning Toolkit

Development Regulations/Standards

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Purpose:

Location, location, location is the old mantra of the real estate world; however the mantra has changed to location, location, connection. In the dynamic world of technology development, the physical building itself can be more enticing to an emerging business, technology company or not, than the physical location. However, the technology bells and whistles in "advanced technology" buildings are more than additional amenities for many companies; they are the necessity and lifeblood for success. Moreover, the old amenities of buildings do not carry the appeal they once did. Gone are the days of marble entryways and mirrored elevators as draws for potential tenants. Companies today want high-speed internet, 24/7 security and other technology amenities. Advanced technology infrastructure is building that contains such technology infrastructure as fiber optics, wireless communication, multiple carriers, and power redundancy.

Oakland County recognizes that advanced technology infrastructure buildings are a key component in site selection for companies both in the high-tech and traditional business fields. In order to compete with other building space in local, regional, national, and international marketplaces, Oakland County municipalities must require and incentivize upgrades to existing buildings and ensure that new buildings have advanced technology infrastructure. Including advanced technology infrastructure in buildings add a significant amount of hard costs to construction; however, the potential to draw from a diverse group of tenants, lower vacancy rates, increase in building life span, increase in lease income, and higher rents per square foot, make up for higher upfront costs (1).

In order to attract and retain companies, especially those in the emerging technological fields that Oakland County is hoping to attract, access to buildings with advanced technology infrastructure is a necessity. To encourage and implement technology development growth, Oakland County is providing model technology development policies for advanced technology infrastructure

buildings to promote a universal framework and technology standardization for infrastructure design, development, and operation for buildings throughout all Oakland County municipalities.

Standardization of regulations for technology advanced infrastructure buildings establishes consistency across the County, allows and provides for timely and more rapid development of both high-tech and traditional industries, and eliminates potentially confusing processes and obstacles. Moreover, standardization ensures tenants the minimum technology infrastructure necessary to compete in the today's economy. The purpose of establishing technology development regulations and standards is not to set the ceiling for technology components in buildings, but rather to establish the minimum technology components that a building must include to be considered an advanced technology infrastructure building.

Minimum requirements for telecom/technology readiness for site development for New Development:

Site Selection:

First and foremost, selection of a site with access to existing utilities, including power and telecommunication facilities, is a key component to advanced technology infrastructure building location. Some of the obstacles in developing advanced technology infrastructure buildings are procuring electricity to towers and facilities that are a significant distance from any main power source and garnering access to a fiber optic backbone for T-lines and high-speed internet access. As part of a Strategic Plan for Telecommunications (see Community Master Plan section for more details), a municipality should promote the development of infrastructure to ensure power and telecommunication facilities are available throughout the community.

Point of Demarcation to Property:

Once a site location has been procured that affords access to all the necessary utilities, it essential to determine the point of demarcation to the property, especially on sites with multiple advanced technology infrastructure buildings. The point of demarcation to a property is where telecommunication lines are serviced and redistributed throughout the site. A number of options are available based upon site specific needs and criteria:

Option	Details	Advantage/Disadvantage
Controlled Environmental Vault (CEV)	Large underground vault, equipped with power and HVAC	Out of Site Expensive
Hybrid Manhole	Climate controlled manhole, half of which is below ground	Functionally similar to a CEV, but less expensive. Visibility Concerns
Telecommunications Hut	Above ground facility equipped with power and HVAC	Less expensive than CEV Bulkier on site; Highly visible
Space within building on property	Conditioned and secure space or room in building	Inexpensive; Accessible; Located within one facility; greater risk of fire or other damage
Property Easement	Minimally sized at 30' x 30', the easement would provide for placement of a fiber node directly on property.	Out of Site; Accessibility

Interbuilding Distribution System:

Once the point of demarcation has been established, the layout of the interbuilding distribution system must be determined. The interbuilding distribution system is the conduit, tunnel system, overhead, or buried telecommunication system support structures for wire between buildings on a development where access to and from the point of demarcation is provided via a system of backbone conduits and access points. Both building layout and distance from the point of demarcation when considering type of interbuilding distribution system.

Minimum requirements for telecom/technology readiness for new buildings or building retrofit:

It is important that detailed requirements regarding specific quantities, types, materials and methodologies be established on a project-by-project basis by a qualified professional, and based on accepted standards. All components and installations must adhere to applicable construction industry standards and bear an Underwriters' Laboratories (UL) listing. In addition, all components and installations must conform to the latest edition or revision of all applicable codes, standards or guidelines as well as all local, state and federal codes. With the rapid advances in technology, reference should be made to the National Institute of Standards and Technology (NIST), International Committee for Information Technology Standards (INCITS), American National Standards Institute (ANSI) and other applicable standardizing bodies for up to date technology standards.

Advanced technology buildings should contain some, if not all, of the following technology equipment:

- High Speed Internet
- Taller ceiling heights
- High Floor Load Capacity
- Power Redundancy
- Carrier Neutral/Multiple Carriers
- Service Entrance Room
- Equipment Room
- Telecommunications Space
- Raised Flooring
- Flexible Connectivity
- Advanced Fire Protection Systems
- 24/7 Security
- Tenant Controlled HVAC
- Flexible Work Stations
- Building Component Connectivity
- Energy Efficient

Smart Buildings:

"Smart" Buildings incorporate the entire aforementioned list of advanced technology infrastructure, combined with technologies that are able to observe the internal, external and environment components of a building and adapt as needed. In Smart Buildings, cable infrastructure connects all building components including heating, ventilation, and air conditioning (HVAC); lighting; fire, life and safety systems; elevators; and, security systems, which allows them to share information and communicate between each other. Smart Buildings are touted as energy efficient because they are able to adapt and control heat, air conditioning, lighting and other building systems based upon internal, external and environmental conditions. Similar to advanced technology infrastructure buildings, research has shown that the total lifecycle cost of a Smart Building is less than a traditional building, as the money spent up front is saved over the course of the building through energy savings. Additionally, research has shown that Smart Buildings are more attractive to possible tenants, thus creating less vacancies and increased lease income (2, 3).

Green Buildings:

Green building design and construction practices address methods for increasing the efficiency of buildings; their site use and use of energy, water, and materials; reducing building impacts on

human health and the environment through better sitting, design, construction, operation, maintenance, and removal as part of the complete building life cycle. (4)

Advanced technology infrastructure buildings and/or Smart Buildings might or might not be Green Buildings and vice-versa. While there is overlap between Green Buildings and Advanced technology infrastructure buildings, standards for Green Buildings have a different primary focus and should have separately prepared standards that reference those established by the U.S. Green Building Council.

Building Matrix:

Building Matrix

	Definition / Application	Smart Building	Advanced Technology Infrastructure Building
High Speed Telecommunication / Fiber Optics	Digital Internet access that enables the user to upload and download more data at a much higher speed than a traditional dial up connection.	>256 kbit/s	>256 kbit/s
Ceiling Heights	Maximum heights of ceilings	Minimum of 12 feet: Allows for height of tall equipment racks	Minimum of 12 feet: Allows for height of tall equipment racks
High Floor Load Capacity	Maximum load capability of a floor - usually given in lbs. per square inch.	Minimum of 100 pounds per square foot in order to support weight of equipment	Minimum of 100 pounds per square foot in order to support weight of equipment
Power Redundancy	Ability to connect to two or more different power stations/grids in case one fails.	Connection to two or more power grids	Connection to two or more power grids
Service Entrance Room	Room in which outside cable is terminated and interconnects with the backbone cable used throughout building	Has dedicated Service Entrance Room	Has dedicated Service Entrance Room
Equipment Room	Room dedicated to housing and supporting telecommunication systems including voice switching mode, backbone network equipment, and/or video transmission equipment	Has dedicated Equipment Room	Has dedicated Equipment Room
Telecommunications Space	Space on each floor dedicated to interconnect the building backbone (riser) system to station (horizontal) locations	Has Telecommunications space on each floor	Has Telecommunications space on each floor
Carrier Neutral/Multiple Carriers	Access to multiple Internet providers to offer diversity of choices to consumers based upon pricing and needs.	Access to Multiple Carriers	Access to Multiple Carriers
Raised Flooring	Raised flooring provides a plenum as a space for power cabling and allowing air to circulate below the floor, as part of the air conditioning system.	6" to 2'	6" to 2'
Flexible Connectivity	Allows for connectivity of voice, data & video, including single and multi-mode fiber, T1 and Category 3 copper and broadband coaxial distribution for broadcast video	Allows Flexible Connectivity	Allows Flexible Connectivity
Advanced Fire Protection Systems	Dry material to prevent accessory (water) fire damage to sensitive advanced equipment.	Dry material (Aragonite or FM-200)	Dry material (Aragonite or FM-200)
24/7 Security	Advanced 24 hour a day, seven day a week security including use of video cameras, alarms, and manned security	Video, alarm, and 24/7 manned security	Video, alarm, and 24/7 manned security
Tenant Controlled HVAC	Individual HVAC controls based upon tenant needs	Allows for individual HVAC control based upon tenant needs	Allows for individual HVAC control based upon tenant needs
Flexible Work Stations	Advancement of wireless communications allows individual workstation configuration	Allows individual workstation configuration	Allows individual workstation configuration
Building Component Connectivity	Cable infrastructure connecting all building components including heating, ventilation, and air conditioning (HVAC); lighting; fire, life and safety systems, elevators, and security systems, which allows them to share information and communicate between each other.	Advanced building component Connectivity	No / Limited building component connectivity
Energy Efficient	Reduction in energy consumption while achieving the same level of end-use services (e.g. lighting, heating, motor drive Source: US Department of Energy	Adapts heat, air conditioning, lighting and other building systems in order to save energy	May or may not be energy efficient
Green Building	Design and construction practices address increasing the efficiency with which buildings and their sites use and harvest energy, water, and materials, and reducing building impacts on human health and the environment through better sitting, design, construction, operation, maintenance, and removal as part of the complete building life cycle	Includes some components of green buildings by use of energy efficiency tools	May or may not include "green building" components

Design Guidelines and Controls

A major criticism of advanced technology infrastructure buildings is that they are aesthetically unappealing and have unsightly architecture; however, through architectural controls many of the aesthetic concerns can be mitigated. If designed properly, there are few visible differences between building with advanced technology infrastructure and those without.

1. *Material and Design Standards*

Require that material use and design of new or rehabbed construction meet the character and standards of the surrounding community. Buildings may need to be adapted on a case-by-case basis depending on desired tenant or tenant specific needs.

2. *Screening of infrastructure (HVAC units, wiring, antennas, etc)*

Proper screening of unsightly infrastructure is achievable and practical, with little cost to the developer through the use of a parapet wall or mechanical screening. A parapet is a low wall projecting from the edge of a platform, terrace, or roof. The use of parapet walls allow for large components of infrastructure to be hidden from street view.

Visual Screening of HVAC System

Photo courtesy of Strongwell

If a parapet wall is not possible, desirable, or does not properly shield the equipment, a screening material should be used. The screening material should become a design feature of the building with materials and aesthetic details matching the architectural design of the building.

3. *Technology advancement and creative design of communication towers and antennas*

There have been great advances in the aesthetics of communication towers and antennas, largely due to advancements in technology, which allow smaller, less bulky, concealed units. The use of "stealth antennas" and whip antennas has allowed many communication towers to be "invisible" to the casual observer. Additionally creative designs have allowed communication towers and antennas to "blend" into their surroundings. Communication towers may be hidden in the form of flag poles, water tanks, trees, etc.

Communication Tower disguised as a tree and clock tower

Photos courtesy of UNC Charlotte
Cameron Applied Research Center

4. *Shared use / collocation of towers*

Require sharing and collocation of towers allows for less visual clutter; however, municipalities must ensure regulations do not violate Federal requirements.

Case Studies:

(Under Development)

Endnotes:

1. (Under Development)
2. Energy Design Resources
3. Bcc Research
4. U.S. Green Building Council