# Section 6

# BUILDING TECHNOLOGY CONSIDERATIONS

The new Searcy Public Library should strive to utilize a full range of technologies to enhance public service, streamline internal functions, and provide library administration with information for accountability and management purposes. The primary systems for a library include:

- Resource management systems, including the Library's Integrated Library System (ILS);
- Public computing;
- Staff computing;
- Telecommunications systems, including data, Internet, voice, and video systems; and
- Materials security systems.

## LIBRARY TECHNOLOGIES

**Integrated Library System** - The Integrated Library System (ILS), or automation system, is the technological heart of any library. This is becoming increasingly true as ILS vendors add functions that were traditionally done manually or by a separate application. The inclusion of cash management systems, or point of sale systems, to track and manage payment for fines and fees is an example. The design of the Searcy library building and information technology (IT) infrastructure should be influenced by both current and future automation system requirements. These may include PACs, self-check stations, information carts, research stations for the public, and charging and discharging (circulation), reference, reporting, administrative, and technical services stations for library staff.

**Radio Frequency Identification** - The building must accommodate Radio Frequency Identification (RFID) technology for future implementation. RFID technology a means of enhancing material tracking and handling. In the library setting, an RFID tag (consisting of a tiny antenna and a microchip) is placed inside each book or other circulating item instead of or in addition to a barcode label. Like a barcode, each RFID tag contains a number that identifies the tagged item to the Integrated Library System. Unlike barcodes, which can only be read one at a time by a laser reader which must see each label, several RFID tags can be read simultaneously by placing a stack of books on or near a reader.

In basic deployment, RFID technology increases the speed by which staff can check out and in library materials while reducing the risk of repetitive stress injuries which sometimes arise from the staff's need to align each book's barcode with the reader. In

more advanced deployments, RFID technology may significantly decrease demands on staff by:

- Facilitating self-service check-out and check-in by library customers; and
- Mechanizing the movement and sorting of returned materials through the use of RFID-enabled automated material handling systems (AMHS).

Other benefits of RFID library technology may include improved safeguarding of library materials (especially where no existing security system is in place) and rapid, accurate inventory control, i.e. shelf reading and weeding.

Deciding to implement RFID technology as part of a building program presents important cost and design considerations. Both of these considerations are heavily dependent upon the extent to which the library chooses to deploy the technology and upon the choice of RFID vendors. A simple example of how the choice of a vendor may impact library design considerations can be found in the differences between two major vendors' RFID security gates. Two RFID gates from one vendor can be placed 4' apart and are sufficient to provide a total of 8' of security coverage (2' additional on the "outside" of each gate), while another vendor's gates must be no more than 3' apart with no extra coverage area. Moreover, issues regarding interoperability of RFID components from different vendors may mean that the library's choice of one vendor for phase one of an RFID deployment may effectively commit the library to specific vendors for other components and phases of the long-term project, including security systems and AMHS.

When used to manage the charging and discharging of library materials, the RFID system is integrated with the library's ILS. Specific components that ***must*** be designed to accommodate RFID include:

- Library services desk charging and discharging stations;
- Workspace charging and discharging stations;
- Self-check stations;
- Technical services tagging or processing stations; and
- Security or exit "gates."

For these reasons, it is strongly recommended that the Searcy Public Library carefully select an RFID vendor prior to, or early in, the design stage of this building project. Selecting an RFID vendor before the completion of the design drawings should substantially reduce the chance of costly change orders.

**High-Speed Public and Staff Internet Access** - High-speed Internet access is an integral part of any library. The building technology plan should incorporate an adaptable and secure network infrastructure to distribute Internet access to all computers throughout the library building.

**Public Computers** - All libraries must stay abreast of changes in technology, in the saturation of personal computers, and in the use of remote access to library information resources, in order assess future changes in library computer use. The planning for public computers may include any or all of the following functionality:

- ***PAC –*** Public Access Catalogs (PAC) should be strategically located in the primary service areas and throughout the bookstacks. A location at or near service desks allows staff to efficiently assist or train customers. PACs located in the bookstacks may utilize a small footprint computer and be mounted on the shelving end-panels;
- ***Self-Service Check Stations*** – Self-service check, or express service stations, should be provided to allow library customers to check out their own library materials. Self-check stations should be located so that circulation staff may easily provide assistance. An increase in the number of self-check stations should be planned over the life of the facility; and
- ***Printers*** – Printers, preferably laser, must be located within easy access of the various groupings of public computers. Network connections must be provided in these locations.

**Staff Computers -** Planning must also accommodate an expanding number of computers for the staff of the Library.

Desktop (work surface) space should be large enough to accommodate the monitor, speakers, and a variety of peripherals that may include PDA dock, barcode scanner, and personal printer.

Offices should be configured with voice and data jacks, and power outlets on at least two different walls within an office, ideally on each wall as the budget allows. Jack and power outlet placement should take into account the furniture design and placement to avoid having data jacks and power outlets inaccessible behind desk modesty panels, bookcases or credenzas. The Library may also wish to include additional phone jacks for faxing and CATV connections.

**Desktop Computers** – The library building programming consultant has noted a decrease in use of library provided desktops as reported by some libraries. However, there is a reported increase in the total use of computers as measured by access to the digital resources of a library. The driving factor is the fact that more and more library customers are bringing their own devices to the library and are expecting to be able to print, scan, fax, etc. using library multifunction stations in a wireless environment.

### Furniture for Library Technologies

The furniture selected to house the various pieces of equipment should be able to accommodate a wide variety of CPU designs. Furniture must not be designed for one size of footprint or style of equipment but is flexible to accommodate future equipment designs and combinations. The furniture selected should be adjustable to either a

standup or sit down configuration, be ADA compliant, and provide adequate cable management.

Desktop space at the public computers should also provide for placement and use of a personal laptop computer.

**Print Management System**

Print management systems are designed to manage printing and copying resources and processes. The Library's building design should include space for the following components:

- Print release stations; and
- Add-Value stations for payment accounts and/or cards.

All should be easily accessible and visible to customers who are using the printers.

**Laptop and Wireless Devices Network Access**

Areas throughout the library should be provided to accommodate library customers who bring their own laptops to the facility. Furniture may include power and data connections, as well as a security loop that will accommodate a customer-provided laptop security device. A variety of locations should be provided for customer laptop access, including those designed for individual users and those designed for small groups.

In addition to the wired locations, wireless network access should be provided throughout the building.

**Printers, Scanners, Copiers, and Fax Systems**

Multifunction group stations ***must*** be located within easy access of the various groupings of public computers. Networked printers are recommended for both staff and groupings of public computers. Local, personal printers should be used minimally for staff use where privacy and efficiency are of concern. The printing and copying area for library customers should be centralized and clearly identified by signage.

**INFRASTRUCTURE FOR TECHNOLOGY**

Planning and design of electrical and cabling systems should be approached in an integrated fashion with the design for furniture, fixtures, and equipment (FF&E) to assure the proper electrical and network connections are available precisely at the actual point of need. The most efficient location of work areas can be substantially compromised by limited availability of connections for power, data, and telephone circuits.

The library ***must*** have power, cabling, etc. that comes into library space directly from the "street." This is very important in order to maintain the operations of the library's many systems.

All network jacks in public areas must be designed so that unauthorized persons may not connect personal devices to the network or disconnect library devices from the jacks.

To meet these needs, electrical work should conform to the applicable rules and regulations of the National Electrical Code, Life Safety Code, the National Building Code, and applicable NFPA Standards. Network cabling should meet applicable Electronics Industry Association (EIA) and Telecommunications Industry Association (TIA) standards. All electrical and data networks should meet or exceed all applicable state, county, or city codes.

Lighting levels and lighting design in such areas should enhance the ability to see the computer screen without glare.

**Power**

In order for the capabilities of technology to be realized there must, of course, be ample power available. The following discussion addresses this need.

**Primary and Secondary Electrical Service Distribution** - Normal power should be obtained from the local utility company, in accordance with utility standards. A battery back-up system shall be provided in accordance with the requirements of applicable local code(s) to provide emergency power to the following:

- Exit lighting;
- All egress lighting fixtures;
- Lighting in areas of public assembly in accordance with codes; and
- Life safety equipment.

The telephone system and public address system must also be capable of functioning in a power outage.

Circuits intended for supplying power to computer devices should be "conditioned." Special requirements for providing conditioned and uninterruptable power to servers and to other network devices are included in the Building Program.

**Amperage Requirements** - A useful rule of thumb for calculating branch circuit requirements for convenient electrical receptacles is an average minimum amperage load of five amps per workstation. Amperage requirements will be higher if extensive

high technology equipment is to be used and if task lighting is to be employed. Design should provide for the potential of maximum power consumption.
The exact amperage is difficult to specify because each type and model of equipment differs. More recent models of equipment, for example, often have lower requirements because of improved technology.

To provide a margin of safety, it is generally recommended that no more than 50 percent of each outlet should be planned for use.

Some pieces of equipment require dedicated circuits. Photocopy equipment is an example. PCs should also be on independent circuits due to the large amperage load required when the equipment is initially activated. In a shared network system, up to five computers, plus a printer, may be on one circuit. The central servers, however, require independent circuits.

While significant strides have been made in the area of energy efficiency, a typical system consisting of a computer, a monitor, and a laser printer is rated as high as 1,000 watts when the printer is in use. The Environmental Protection Agency's "Energy Star Program" maintains and updates lists of equipment that keep electrical energy use down. In most cases, this involves equipment that "powers down" to a sleep state after a period of non-use. For example, monitors shut down and return to a fully powered state by simply touching a key or the mouse.

**Electrical Outlets** - In addition to the grid system, a minimum of one wall or column outlet is recommended for every 30 to 50 square feet (SF). Provide outlets in compliance with the applicable building code(s).

Receptacles should be on a one pole, 15-ampere circuit, with a maximum of six 15-ampere receptacles. Receptacles should be on a one pole, 20-ampere circuit, with a maximum of two 20-ampere receptacles. Cleaning and specialty receptacles should be circuited in accordance with program requirements.

Accommodations requiring flexible placement of outlets will include:

- Local-area (LAN) and wide-area networks (WAN);
- Network hardware (servers, hubs, switches, etc.);
- Computers;
- Printers and scanners;
- Video monitors;
- Task lighting;
- Multifunction group station;
- Telephones;
- Wireless access points; and
- Other devices.

**Surge Suppressers and Uninterruptable Power Supplies** - Voltage surges, spikes, and sags can create significant problems and can potentially damage equipment and destroy data. Therefore, the facility should provide for protection of devices on the network from these hazards.

Common plug-in surge protectors are designed to provide some protection from spikes and surges. However, the installation of commercial quality surge protection at each power distribution panel is preferable to buying separate surge protectors for each networked device.

Power “sags” refers to low-voltage conditions and actual interruptions of electrical current. Uninterruptable Power Supplies, or UPSs, can be effective in providing some protection from low-voltage hazards. Protection should be considered for all network servers, routers, and mission critical client stations. As a "rule of thumb," a UPS unit should be selected that has a Volt-Amp rating of two times the combined wattage ratings of all of the power supplies that the UPS will support.

**Grounding System** - In addition to the grounding requirements of the National Electrical Code, the electrical system servicing the project should be grounded by means of individual insulated equipment ground conductors in the feeders to all switchboards, panel boards, motors, motor control centers, receptacles, etc., in the building. It is intended that the ground conductors be in the same raceway as the current conductors.

**Branch Wiring and Feeder Systems** - Requirements for power, data, and signal distribution are outlined below. Other than those requirements, when possible, lighting and receptacle branch circuit wiring should be installed in conduit concealed in suspended ceilings and walls in finished areas, and exposed in mechanical spaces and areas without suspended ceilings. In areas without suspended ceilings or raised floors, vertical raceways servicing devices should be concealed in walls whenever possible. Exposed conduit in mechanical rooms, electric rooms, storage areas, and equipment rooms should be rigid steel or plastic specifically designed for conduit.

Feeder wiring in the building should be run in rigid steel conduit with threaded couplings and fittings. Branch circuit and feeder wiring run outside the building, cast into slabs on grade, and below grade should be run in rigid steel conduit with couplings and fittings. Conduit seal fittings and expansion joint fittings should be provided where required.

Conductors serving the fire alarm system and miscellaneous low voltage systems should be run in rigid steel conduit. The minimum conduit size should be 3/4-inch.

General branch circuit and feeder conductors should be copper with heat-resistant thermoplastic (Type THW) or moisture- and heat-resistant thermoplastic (Type THHN) insulation, rated at 600 volt. Insulation should be silicone (SF) when terminating in

fixtures. Electric service conductors shall be Type use with moisture- and heat-resistant rubber (RHW) insulation. Conductors for miscellaneous low voltage systems should be specified in accordance with system requirements.

**Distribution System Equipment** - Service switchgear should be specified in accordance with utility company standards, and a service switch or switches to accommodate the library building requirements should be provided. A separate service switch for a fire pump, if required, should be specified in accordance with applicable codes. Service switches should be of the fused, bolted pressure type. Metering should also be specified in accordance with utility company standards. Switch and fuse-type distribution boards should be specified to provide service to the various panels and miscellaneous loads throughout the building.

**Power Wiring Systems** - The electrical installation should provide feeders for heating, ventilation, air conditioning, and plumbing equipment.

Motor starters should be grouped in motor control group control panels with combination starters. Each starter should be provided with an H-O-A selector switch, pilot light, control transformer, and two sets of Form C contacts. Motor control centers should be NEMA Class I, Type C.

Separately mounted fused switch combination starters should be provided where service from a motor control center is not practical. Where special equipment, such as alarm systems, communications systems, etc., is provided, special provisions for supply to this equipment should be made.

## TELECOMMUNICATION NETWORK

A long-term network infrastructure, based on standards, **must** be provided.

***Cabling Standards*** - The Electronics Industry Association (EIA) and the Telecommunications Industry Association (TIA) are large industry trade groups that promulgate and update wiring standards on an ongoing basis. The documents cited below contain the detailed architectural, engineering and wire management specifications needed for the Library project.

The Library's voice and data wiring system should be designed at the same time and in an integrated fashion. Increasingly, telephone, computer, and video technologies are merging as all standardize on digital transmission. The following standards apply to the library's electronic information infrastructure although a telecommunications consultant will want to verify the most recent edition(s), as change is constant in this field:

- ANSI/EIA/TIA-568 Commercial Building Telecommunications Cabling Standard;
- ANSI/EIA/TIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces;

- ANSI/EIA/TIA-570-A Residential and Light Commercial Telecommunication Wiring Standard;
- ANSI/EIA/TIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings;
- ANSI/EIA/TIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications;
- TSB-67 Testing Standard;
- BICSI Telecommunications Distribution Methods Manual;
- FCC Docket 88-57 and related rules regarding inside wire and demarcation points;
- IEEE 802.3 Specification;
- IEEE 802.3af Power Over Ethernet (POE) Specification;
- IEEE 100BaseT Specification;
- IEEE 1000BaseT-TX Specification;
- IEEE 1000BaseT-FX Specification; and
- IEEE 802.11 Specification for Wireless Transmission.