Appendix Three: Facility Standards

The Request for Qualifications (RFQ) for this study of Fort Worth Library facilities tasked the consultants to:

Summarize current public library facility standards, benchmarks, and/or best practices for both public and staff spaces, and recommend minimum standards (square footage, green design, site location, security, lighting, parking, signage, etc.) for future and renovated Fort Worth facilities.

Some Library Facility Standards are considered industry-wide standards, and some are proprietary to Godfrey's Associates. In this Appendix, we include standards of relevance for the Fort Worth Library applied to FWL facilities over the course of developing the *Library Facilities Plan*.

DEFINITION OF TERMS

In order to establish a common language for facility assessment and future planning, we first seek to define key terms to be used throughout this report.

Square Footage Definitions

Square footage, though only a two-dimensional measurement, is a common tool in assessing the space enclosed in public library facilities. There are three types of space in any facility. Here are definitions that we at Godfrey's Associates, Inc. use:

Net Usable Square Footage (NSF). Net square footage represents the actual unobstructed usable floor area or square footage assigned to a primary use for an individual unit, contained within a defined perimeter. In effect, net area is the actual area of book stacks, offices, computer workstations, support areas, or special function areas **exclusive** of partitions, exterior walls, public and private corridors, columns, pipe chases, stairs, mechanical and electrical space, and all similar areas that are not usable for library functions.

Definition of Terms

Net Assignable Square Footage (NASF). Net assignable square footage includes all net areas assigned to a given unit, as well as related corridor space for movement, interior partitions, and other areas incidental to the spatial organization or construction. Additionally, internal corridor (circulation) space shared by units or connecting units to each other is included in this total area. Net assignable area *excludes* the area required for exterior walls, mechanical and electrical spaces and distribution shafts, stairs, rest rooms, elevators, and other common building elements.

In effect, this is the total area *assigned* to a use, functional unit or department, and is comparable to the amount of area occupied for a specific tenant as if it were leased from a landlord. This area includes internal partitions, corridors and allowances for columns, chases, etc., which penetrate the space.

Efficiency factors added to the pure net square footage to accommodate these other assignable spaces might range from 10 to 30 percent of the total net area. When analyzing existing facilities, this assignable factor is calculated by dividing the net usable area (NSF) by the total unit net assignable area (NASF) to determine the overall efficiency of the unit. The net-to-net assignable square footage relationship is primarily a factor of the size, type, configuration, number of individual spaces, and the anticipated width of internal personnel movement and service corridors.

Generally, units comprised of larger individual spaces will require less space for inter- and intra-unit movement. Units comprised of many smaller workstations, especially private offices, require a higher degree of intra- and inter-unit movement and wall space. Experience has shown the efficiency of older facilities is generally less than new construction due to the area required for structure, walls, and formalistic approaches to space planning.

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Building Gross Square Footage (BGSF). Building gross square footage reflects the total area of the building, including all net and net assignable areas as defined above, plus any additional area occupied by rest rooms, vertical movement, janitorial/custodial closets, central mechanical and electrical space, chases, and other spaces related to primary air and power distribution, columns, and exterior walls.

When programming space requirements for new facilities the total building gross area is estimated by applying an overall facility grossing factor to the total programmed net assignable area. Typically, these factors range from 15 to 20 percent in smaller, single-level buildings up to 30 percent in larger, multi-level facilities.

When analyzing existing buildings, the grossing factor, which is a measure of overall efficiency, can be calculated by dividing the total net assignable area by the total building gross area. As a general rule, higher efficiency factors are used for public library facilities due to the amount of open space that accommodates horizontal movement. In a multi-story building however, this is partially offset by the vertical movement required for public access as well as the movement of staff, books, and other library materials.

An Additional Square Footage Definition

In order to reconcile differences in the amount of space determined for FWL facilities by the City of Fort Worth Department of Transportation & Public Works (T/PW) with the amount of space measured by Godfrey's Associates, we have identified an additional definition used for this project:

Building Footprint Square Feet (BFSF): For the purposes of this project, BFSF is defined as the total size of the building footprint under the building roof, as measured from the perimeter edges of all roof overhangs. Typically, these

measurements have been provided by the City of Fort Worth T/PW. While these measurements exceed the space enclosed by exterior walls, they provide a more accurate quantification of roofing materials, for T/PW's building maintenance purposes.

Types of Libraries

In the planning of future library facilities, it is important to "right-size" the facility to the geographic and demographic population the given library is to serve. Different sizes of libraries, and thus types, are described below. First, we define the types of services provided, dependent on size.

A Full-Service Library provides a variety of programs and services, as follows:

- Collections for all ages, including print and non-print, circulating and reference;
- Seating scaled appropriately for all ages
- A full array of information technology (express internet, one- place, two-place, and collaborative computer stations;
- A multi-purpose meeting room seating at least 75 people;
- Conference rooms seating from 8 to 12 each;
- Four- and six-place group study room; and
- Tutoring/research rooms for 2-3 people.

A 21st Century Library service would include current, up-todate collections of materials in all formats plus selected classic titles, a wide array of technology for public and staff use, meeting rooms of different sizes and for different ages, each with state-of-the-art technology, a building infrastructure that both protects and enhances the library experience for all who both use and work in the facility, maintainable landscaping, effective interior and exterior signage, sustainability in design, furnishings, and construction, and adequate parking. **Regional Library.** A Regional Library is defined as a fullservice facility with collections shaped by the population and geographic size of the region it serves. This type of library will also serve as a "back-up" to Community and Neighborhood libraries within its 12 to 15 minute drive time sphere of

influence, i.e. a customer would typically drive between 12 and 15 minutes to reach a regional library.

The collections and technologies are determined by region population, and demographics. The materials provide support for school curriculums through the community college level. The programs offered to children are also designed with the demographics in mind, and many are provided in a special program/storytelling room within the children's section. The collections for adults include in-depth circulating and reference materials, a popular materials collections, and large print books. There is also a space with materials and seating for teens. There are large adult, teen, and children's media collections, e.g. CDs, books-on-CD, and DVDs.

Regional libraries will normally range in size from 30,000 to 50,000 square feet (BGSF). The consultants do not believe a regional library, as defined here, has a place in the Fort Worth Library system at this time.

Community Library. A Community Library is defined as a full-service facility whose collections and technologies are shaped by the community it serves and by the demographics of the community. The materials for children and young people provide support for the school curriculum through high school. The programs offered are designed with the demographics in mind, and many are provided in a special program/storytelling room with the children's section. The collections for adults include circulating and limited reference materials, a popular materials collections, and large print books.

There is also a special space with materials and seating for teens. There are adult, teen, and children's media collections, e.g. CDs, books-on-CD, and DVDs. The size of the media collections will depend upon the demographics of the community being served.

A Community Library will range in size from approximately 16,000 to 25,000 square feet (BGSF), and would expect to serve persons who live within eight to ten minutes drive time of the facility. The consultants recommend that no new libraries be designed and/or implemented on a permanent basis at a size smaller than a Community Library.

Neighborhood Library. A Neighborhood Library is defined as a less than full-service facility. Its collections and technology, although partially shaped by the neighborhood(s) it serves, is not intended to provide the depth of a Community Library. The collection is determined by the demographics within the neighborhoods. The materials for children and young people provide support for the school curriculum through middle school. The programs offered for children, young people, and teens and are designed with the demographics in mind, and may be provided in a special program/storytelling room with the children's section – assuming there is space for such in the building.

The collections for adults include circulating and very limited reference materials, a popular materials collections, and large print books. There is also a space with materials and seating for teens. There are adult, teen, and children's media collections, e.g. CDs, books-on-CD, and DVDs. The size of the media collection will depend upon the demographics of the neighborhood(s) being served.

A Neighborhood Library will range in size from approximately 3,000 to 15,999 square feet, and would expect to serve persons with a drive time of five to seven minutes to the facility. The consultants recommend that no new libraries be designed and/or implemented at this size on a permanent basis – so this category would only apply to existing facilities determined to remain in operation.

Express Library: A small facility, housed in a leased space, in or near an underserved area with a small collection of popular materials for all ages, limited technology, and a staff of two or three. An Express Library will range in size from approximately 400 to 2,999 BGSF. See Section Two: Alternative Library Facility Models of this report for a discussion of this and various other alternatives.

Supermarket Library: A small service outlet located within a large supermarket. There would be a small collection of highly popular adult, teen, and children's materials, limited reference service, and a total staff of two or three depending upon the hours of service. See Section Two of this report for a discussion of this alternate.

Vending Library: A Vending Library is service outlet with a very small collection of books and/or media dispensed from a vending machine, located in a place with considerable pedestrian traffic. Also see Section Two of this report for a discussion of these alternates.

Other Terms

Population. For the purposes of the *FWL Plan*, Godfrey's Associates uses two distinct definitions for population, based on what is being measured, as follows:

• Actual Population: Population for the City of Fort Worth as determined by the City Planning Department, including figures for current 2010 and projected for 2015 and 2020. As the "official" city population, these figures are applied to library system-wide planning parameters only, such as square feet per capita.

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• **Trade Area Population:** The number of people within the trade area of a given library as computed by Buxton Co., measured by drive time. The boundaries of trade area populations for existing branch libraries may overlap, thereby accounting for those persons who use more than one library.

Per Capita Measures. For the purposes of the *FWL Plan*, Godfrey's Associates uses two primary measures based on population. These measures apply the actual total Fort Worth population to total library system-wide planning parameters, because the quantities of both collections and square footage contained at the Central Library skew such calculations made on a branch library basis. Trade area population figures (see above) are used for branch-by-branch per capita measures.

- **Collections per Capita:** The number of collection items (books, periodicals, CDs, DVDs) that a library houses for each person served. As an example, if a library were serving 42,356 persons and had a total collection of 79,345, its Collections per Capita would be 1.87 (79,345 divided by 42,356).
- **BGSF per Capita:** The total amount of enclosed library space a library system has for the total population of the area to be served. As an example, if a library system were serving 623,793 persons and had 12 libraries with a total BGSF of 335,750, it would have 0.54 BGSF per Capita (335,750 divided by 623,793).

Public-Use Computers. Public use computers are defined as those computers available to the general public as a service at each library, including online **public access computers** (PACs), **Internet access** computers, and **productivity** computers (Word, Excel, PowerPoint, etc.) which could accommodate one or multiple users.

Public Seating Types. For the purposes of the Fort Worth Library Facilities Plan, Godfrey's Associates uses the following definitions for various types of seating for the public, based on NSF per seat:

- **Reader Chair:** Chair, un-upholstered, four legs, placed at tables.
- Lounge Chair: Soft seat, fabric, usually one side table accompanies two lounge chairs.
- **Task Chair:** Ergonomic office chair, casters, adjustable seat heights, public use with computers, staff use at workstations, desks, worktables. NSF included with workstations.
- Bench: Usually seats two persons.
- *Read Aloud:* Lounge chair sized for an adult and a young child.
- Floor Seat: Cushion/pillow on floor, very young children.
- **Café Booth:** Banquet seating with a table, similar to a restaurant booth, usually for teen spaces.

Service Hours. The number of hours per week a library is open for public use.

Rankings. How the different libraries within the FWL system as of November 2009, including the Central Library, compare with each other by means of various measurements, as an example, cost per item circulated. One (1) is the best ranking, fifteen (15) the worst.

Charrette. An interactive, focused architectural planning process used to develop new plans for a building. The charrette process was utilized in this comprehensive plan by Godfrey's Associates, Inc. for the recommended improvements at the Fort Worth Central Library.

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LIBRARY BUILDING STANDARDS

Based upon years of experience in library planning, the consultants have developed a list of factors that we believe determines if an existing library is capable of housing and delivering 21st century library service.

Modern Library Factors. We at Godfrey's Associates believe there are eight factors that need to be present in any public library facility for it to be judged a modern library. We have evaluated each of the 15 libraries that comprised the Fort Worth Library system as of December 2009, as well as the new Northwest Library, scheduled to open in September of 2010. We found that none of the 16 has all eight of the factors, and one-half of them have none of the factors. One library, the new Northwest Library that is scheduled to open in the summer of 2010, has seven of the eight factors. See Section Five and Appendix Five for specifics per each existing library facility. The eight factors are:

- **1.** Adequate Size. We believe 16,000 BGSF is the minimum size required to offer a fully responsive range of library services.¹
- 2. User-Friendly Housing of Collections. We believe no book stack should be taller than 72 inches (and 60 or 66 inches for Children's Services), have 48-inch clear aisles, and not be more than 80 percent capacity (80% means there would be 8 to 10 inches of clear space at the end of each book shelf).
- 3. Proper Ratio of Seating to Collections. Neighborhood libraries ratio of 1:1,500 to 1:1,800; Community libraries

Appendix Three: Facility Standards Library Building Standards page A3.6 ratio of 1:1,200 to 1:1,500; Regional libraries ratio of 1:1,000 to 1:1,200; and 1:800 to 1:1,000 for the Central Library exclusive of special collections, such as Local History, Genealogy, and Archives.

- **4.** Significant Technology for Public and Staff. It is not only the numbers of computers, but also what they are capable of doing and how they are organized. Stand-up Internet Express and PAC stations, productivity (with Word, Excel, PowerPoint, etc. capabilities), collaborative spaces, laser color printers, games for children and teens, etc.
- **5.** Age-Specific Spaces. Spaces that "talk" to the age groups: e.g. Children's Services with good space and furniture/ equipment for very young (1 to 6 or 7 years old) and older children (6 or 7 to 10 or 11); teens, adults, and seniors (chairs they can easily get in and out of and good daylighting to name two features for seniors).
- 6. Public Meeting Spaces. A variety; multi-purpose meeting room, conference room(s), group study rooms, individual/two-person rooms for tutoring and/or research, each outfitted with good technology and good visual access to the rooms. The size of the building will determine how many rooms and their capacities.
- **7.** Adequate Staff Work Space. Space in a range of 150 to 200 NASF per FTE staff member as a minimum.
- **8. Efficient Building Infrastructure.** Excellent lighting, good HVAC, ADA compliant rest rooms, plumbing that consistently works, no roof leaks, double-pane windows, fire suppression system, etc.

Building Design Guidelines

The assessments of current library facilities, and the cost estimates for new modern library buildings have been developed based on the following guidelines, many of which are considered sustainable architecture or "green" building:

¹ The 16,000 BGSF applies to any new building that is designed and constructed, or leased, to be a library facility. For a leased space that is intended to be temporary or interim in nature, we believe that 7,500 BGSF is the absolute minimum amount of space needed in order to provide a reasonable range of services.

Appendix Three: Facility Standards Library Building Standards

- Single-Level Building: Staffing efficiencies;
- **Sloped Metal Roof:** Lasting quality, facilitates rainwater harvesting;
- Operable Windows: Energy conservation, user comfort;
- **Centralized HVAC System:** Energy conservation, user control and comfort;
- *Electronically-Operated Plumbing Fixtures in Rest Rooms:* Water conservation, ease of maintenance;
- **Xeriscape Landscaping:** Water conservation, ease of maintenance
- Drip Lawn Irrigation System: Water conservation;
- *Fire Suppression System:* Safety of people, materials, and building;
- Daylighting: Energy conservation;
- Consistent Signage: User-friendly and attractive, with illuminated exterior signage with messaging capabilities;
- **Commercial Grade Carpet Tile:** Ease of maintenance and replacement;
- **Painted Finishes:** Cost savings, ease of maintenance; and
- Drive-Up Library Materials Return (with Drive-In Pick-Up in certain areas): Patron convenience, staffing efficiency.

Book Stack Specifications. Square footage requirements and collection capacities are based on the following:

- 48" clear aisles throughout public spaces;
- 72"high maximum for all adult collections; and
- 48" high for easy/picture books and 66" high for the balance of youth collections.

Seating Specifications. Seating quantities are based on the following:

Age-appropriate, diverse mix of seating types and meeting spaces;

- No fabric on reader chairs for ease of maintenance and cleanliness;
- Ergonomic seating for all computer and machine stations; and
- Office systems furniture for staff workstations and some public computer stations.

Technology Specifications. Information technology considerations are based on these primary goals:

- Fiber to the Desktop, wireless for the public, as practical;
- PCs Networked to combination Laser Printer/Photocopy Machines; and
- Faxing from office and workroom PCs.

BGSF per Capita. Godfrey's Associates recommends the City of Fort Worth and the FWL public library system establish a standard of 0.60 BGSF per capita. FWL now utilizes approximately² 326,000 BGSF for a 2010 population of 720,250, or 0.45 BGSF per capita. Allocating all of the space at 500 West Third to the Central Library, including unoccupied space as well as the space occupied by Community Access Television (CATV), would raise the system-wide total to 388,000 BGSF. So, including all the space within the Central Library building, the Fort Worth Library could have 0.54 BGSF per capita in 2010.

To reach the recommended 0.60 BGSF per capita by 2020, when the City of Fort Worth population is estimated to be 926,080 by the City's Planning Department, there will have to be a total of about 556,000 BGSF of public library space, or a minimum of approximately 230,000 additional BGSF of space.

² There are differences between what the Library reported in the RFQ and what the consultants have determined through building measurements from CAD drawings, as described above in the square footage discussions about BGSF & BFSF.

It may not be a reachable number within the 10-year planning period of this study. See Section Five and Appendix Five for additional information.

Collections. Godfrey's recommends that a reasonable standard for the FWL system is a total collection of two items per capita (2.00). This number would be exclusive of special collections in the Central Library such as the Local History, Genealogy, and Archives collection(s).

At this time, the FWL has a total collection, exclusive of Local History, Genealogy, and Archives, of about 995,000 items, or 1.38 items per capita. To reach 2.00 an additional 945,160 items will need to be added. This goal is not attainable by 2020 given the existing size of facilities, even with the facility recommendations contained later in this report.

Service Hours. Godfrey's Associates recommends the FWL increase its hours of operation as a means to improve service delivery and obtain greater value from the capital investments in library facilities.

Staffing. Godfrey's Associates recommends the Fort Worth Library deploy the following mix of staff:

- **Manager:** Assign one manager in each branch library and each Central Library division. A manager will typically be a professional, as defined below. For public service units the Manager should spend at least 25 percent of his/her time assisting customers. The balance of his/her time will be devoted to managerial and/or library system responsibilities.
- **Professional:** Assign a minimum of two professionals in each branch library and each Central Library division. A professional will usually have a master's degree in library service or a master's degree in an appropriate field related to his/her primary responsibilities. For public service units,

a professional should spend at least 50 percent of his/her time assisting customers. The balance of his/her time will be devoted to managerial and/or library system responsibilities.

- **Paraprofessional:** Assign a minimum of two paraprofessionals in each branch library and each Central Library division. A paraprofessional will usually have a bachelor's degree or at least 10 years of library experience. For public service units, a paraprofessional should spend at least 50 percent of his/her time assisting customers. The balance of his/her time will be devoted to library system responsibilities.
- Clerical: Assign a minimum of at least one clerical position in each branch library and each Central Library division. Clerical staff will usually have a high school education, and preferably an associate (two-year) college degree or at least seven years of library experience. For public service units, a clerical staff person should spend at least 75 percent of his/her time assisting customers. The balance of his/her time will be devoted to library system responsibilities.
- Page: Assign a minimum of at least one page (shelver) in each branch library and each public service Central Library division. For public service units, the standard for determining the number of page hours required should be determined by the formula illustrated by the following example:
 - Assume Division X has an annual circulation of 300,000.
 - Assume Division X has in-library use of materials equal to 25 percent of annual circulation.
 - Assume Division X has new acquisitions each year equal to five percent of annual circulation.

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- Therefore, the total number of items to be shelved equals 300,000 + 0.25 x 300,000 + 0.05 x 300,000 = 390,000 items.
- One page should be able to sort, shelve, and conduct a quick "shelf read" at a rate of 75 collection items per hour.
- Assuming a standard work week is 40 hours, or 2,080 hours per year, then one page should be able to shelve 156,000 items per year (75 collection items per hour x 2,080 hours per year).
- Therefore, there is a need for 5,200 page hours per year (390,000 items divided by 75 items per hour), or a full-time equivalent (FTE) of 2.50 (5,200 page hours divided by 2,080 hours per year = 2.50 FTEs).

The equation can be summarized as follows:

Page FTEs = (annual circulation x 1.30)/156,000

• **Staffing a Public Service Unit:** See Table 5.4 for a spreadsheet that recommends staffing levels for a typical branch library.

Public-Use Computers. By 2015, we recommend FWL provide public-use computers at the Enhanced standard of one computer for every 2,000 residents, as defined by the Texas State Library and Archives Commission (TSLAC), in cooperation with the Texas Library Association (TLA). This will require an additional 101 public-use computers. By 2020, FWL should strive to reach the Comprehensive standard of one public-use computer for every 1,500 residents, or a total of 613 public computers to meet the standard.

Public-Use Computer Quantities. The quantity of public-use computers to be deployed at a given branch library will depend upon whether the TLA Comprehensive or Enhanced level standard is applied.

Public-Use Computer Space Allocations. Godfrey's Associates recommends the Fort Worth Library allocate net square footage for various sizes of public computer stations, as follows:

- **Public Access Computer (PAC):** Stand-up station, 24 NSF.
- Express Computer Station: Stand-up station, 24 NSF.
- **Computer Station:** One seat, 36 NSF for adults and teens, and 30 NSF for children (seat and table heights vary, depending upon age).
- **Dual Computer Station:** Two seats for two persons at one computer or perhaps two persons at two computers, 48 NSF for adults and teens, and 40 NSF for children (seat and table heights vary, depending upon age).
- **Collaborative Computer Station:** Three to six persons at one or two computers, with a large wall-mounted monitor, 24 NSF per seat.

Public-use computers would require reservations, with the following time limits placed on usage:

- Express computer stations (15 minutes);
- Computer stations (60 minutes);
- Dual computer stations (60 minutes); and
- Collaborative computer stations (as reserved).

Public Seating Capacities. Godfrey's Associates recommends the Fort Worth Library provide total quantities of public seating based on the following library building sizes:

- **12,000 BGSF or smaller:** Provide one seat for every 1,500 to 1,800 collection items.
- **12,000 to 15,999 BGSF:** Provide one seat for every 1,200 to 1,500 collection items.
- **16,000 to 24,999 BGSF:** Provide one seat for every 1,000 to 1,200 items.

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- **25,000 BGSF & larger:** Provide one seat for every 800 to 1,000 items.
- **Central Library:** Provide one seat for every 800 items, exclusive of Local History, Genealogy, & Archives.
- Local History, Genealogy, & Archives: The existing seating quantity is adequate.

Public Seating Space Allocations. Godfrey's Associates recommends the Fort Worth Library allocate net square footage for the various types of seats as outlined below. Seating is based on one seat per person unless otherwise noted.

- 4-Place Table: One table with 4 reader chairs, 100 NSF.
- 2-Place Table: One table with 2 reader chairs, 70 NSF.
- **1-Place Table:** One table with 1 reader chair, 35 NSF, often referred to as a carrel or study carrel.
- Lounge Chair: One seat, 30 NSF (two lounge chairs with side table, 65 NSF).
- Bench: Two persons, 10 NSF.
- **Read Aloud:** Lounge chair sized for an adult and a young child.
- *Floor Seat:* Cushion/pillow on floor, very young children, 5 NSF.
- **Café Booth:** One table with 4 seats, usually for teen spaces, 100 NSF.

Gathering Spaces. Godfrey's Associates recommends the Fort Worth Library provide the following types of gathering spaces, with total quantities of seating based on library building sizes:

- Multi-Purpose Meeting Room: Provide a minimum seating capacity for the given building size, allocated as follows:
 - One room for a building less than 12,000 BGSF;
 - Two rooms for buildings of 12,000 to 15,999 BGSF;

- 50-seat capacity for any building less than 12,000 BGSF;
- 75 seats for buildings of 12,000 to 15,999 BGSF;
- 100 seats for buildings of 16,000 to 24,999 BGSF; and
- 150 seats for buildings of 25,000 BGSF and larger.
- **Conference Rooms:** Provide a minimum seating capacity for the given building size, allocated as follows:
 - 10-seat capacity for buildings less than 12,000 BGSF;
 - 14-seat capacity for buildings 12,000 to 15,999 BGSF;
 - 30-seat capacity, divided between two rooms, for buildings of 16,000 to 24,999 BGSF; and
 - 50-seat capacity, divided between four rooms, for buildings of 25,000 BGSF and larger.
- **Group Study Rooms:** Provide a minimum seating capacity for the given building size, allocated as follows:
 - 4-seat capacity for buildings of less than 12,000 BGSF;
 - 10-seat capacity, divided between 4-seat and 6-seat rooms, for buildings of 12,000 to 15,999 BGSF;
 - 20-seat capacity, divided between two 4-seat rooms and two 6-seat rooms, for buildings of 16,000 to 24,999 BGSF; and
 - 40-seat capacity, divided between four 4-seat rooms and four 6-seat rooms, for buildings of 25,000 BGSF and larger.
- Tutoring/Research Rooms: These rooms can be "built" using office system furniture, and easily reconfigured. Each room should accommodate two persons. Depending on building size, provide a minimum of:
 - Three rooms for buildings of 16,000 to 24,999 BGSF; and

Appendix Three: Facility Standards Library Building Standards page A3.10 • Six rooms for buildings of 25,000 BGSF and larger.

LIBRARY SPACE PLANNING STANDARDS

Based upon years of experience planning, programming, designing, furnishing, equipping, and monitoring constructions the Godfrey's Associates, Inc. team has developed a set of Library Space Planning Standards that we firmly believe result in a library facility that is ADA compliant, user-friendly, and can be designed and built economically. The standards are organized into four sections:

- Personnel Offices & Workstations;
- User Seating & Gathering Spaces;

- Library Collections; and
- Support Spaces.

For each of the four sections the Standards provide the following:

- A brief description of the occupancy, activity, or task associated with the standard;
- A space code, designated by the Consultants for shorthand reference to specific items;
- The net square feet (nsf) required to adequately accommodate the occupant, activity, and/or task; and
- Notes that provide additional information.

	space		
position	code	nsf	notes
Library Director	PO-A	300	Privacy & security required, host group meetings
Assistant Director	PO-B	250	Privacy & security required, host group meetings
Division Head	PO-C	200	Privacy & security required, host group meetings
Department Head/Manager	PO-D	150	Privacy & security required, host group meetings
	PO-E	120	Office, too small, not recommended
	SPO-F	96	Cubicle, too large, not recommended
Technical Services	SPO-G	64	Cubicle, accommodate two book trucks
Senior Librarian	SPO-H	48	Cubicle, presumed limited time at workstation
Public Services Librarian	SPO-H	48	Cubicle, presumed limited time at workstation
Customer Services Rep/Rep II	SPO-H	48	Cubicle, presumed limited time at workstation
Library Associate/Associate II	SPO-I	36	Cubicle, presumed limited time at workstation
Clerical Support	SPO-I	36	Cubicle, presumed limited time at workstation
Shelver (Page)	SPO-J	24	Cubicle, shared workstation with other shelvers
Volunteer	SPO-J	24	Cubicle, shared workstation with other volunteers

Personnel Offices & Workstations

PO = Private Office with door SPO = Semi-Private Office (Systems Furniture Workstation)

User Seating & Gathering Spaces

	space		
position	code	nsf	notes
Collaborative Computer Station	SPO-G	64	Systems furniture workstation, number of ergonomic task chairs varies from 3 to 6
Two-Place Computer Station	SPO-H	48	Systems furniture workstation, ergonomic task chairs
Microform Machine	SEAT-A	45	"Microform" includes microfilm & microfiche, ergonomic task chair
Lounge Seat	SEAT-B	40	Space includes shared end or side table
One-Place Computer Station	SPO-I	36	Systems furniture workstation, ergonomic task chair
Computer Station	SEAT-C	35	CPU mounted under table, reader chair
Study Carrel	SEAT-C	35	Square feet per person, conventional study carrel not recommended
One-Place Table	SEAT-C	35	Square feet per person
Visual Magnifier	SEAT-D	30	Square feet per person
Conference Room	SEAT-D	30	Square feet per person, conference room includes credenza
Computer Lab	SEAT-D	30	Square feet per person, ergonomic task chair at training table
Four-Place Table	SEAT-E	25	Square feet per person, reader chair
Two-Place Table	SEAT-E	25	Square feet per person, reader chair
Group Study Room	SEAT-E	25	Square feet per person, ergonomic task chair
Tutoring Room	SEAT-E	25	Square feet per person, ergonomic task chair
Index Table	SEAT-F	20	Square feet per person, reader chair
Sloped Top Table	SEAT-F	20	Square feet per person, reader chair or stool
Café Booth & Table	SEAT-F	20	Square feet per person, banquette seats
Youth Four-Place Table	SEAT-F	20	Square feet per person, reader chair or stool
Multi-Purpose Meeting Room	SEAT-G	15	Square feet per person, stack chair at training table
Children's Program Room	SEAT-H	12	Square feet per person, combination floor & chair seats
Multi-Purpose Meeting Room	SEAT-H	12	Square feet per person, stack chair only, no tables
Multi-Purpose Meeting Room	SEAT-I	10	Square feet per person, stack chair only, no tables
Youth Floor Seat	SEAT-J	8	Square feet per person
Bench Seat	SEAT-K	5	Square feet per person

Library Collections SHLV = Steel book stacks with adjustable shelves, upright height determined by Library Consultant

	space		
materials format	code	nsf	notes
Artwork Display	SHLV-X	2.00	Size varies, display of circulating flat art
Current Periodicals	SHLV-A	1.00	Face-out display, hinged tilt shelf over flat shelf
Youth Kits	SHLV-A	1.00	Hanging bags
Popular Display	SHLV-B	0.20	Combination face-out & spine-out display, minimum items per Shelf
Backfile Periodicals	SHLV-C	0.15	Spine-out; bound or in "Princeton" boxes
Oversize	SHLV-C	0.15	Spine-out; some very large may lay flat
Reference (all ages)	SHLV-D	0.12	Spine-out
Special Collections	SHLV-D	0.12	Spine-out
Adult Non-Fiction	SHLV-E	0.10	Spine-out
Adult Fiction	SHLV-F	0.09	Spine-out
Large Print	SHLV-F	0.09	Spine-out
Teen Fiction/ Non-Fiction	SHLV-F	0.09	Spine-out
Youth Non-Fiction	SHLV-F	0.09	Spine-out
Videocassettes	SHLV-F	0.09	Spine-out
Books-on-CD	SHLV-F	0.09	Spine-out; or special housing to be determined by Library Consultant
Youth Fiction	SHLV-G	80.0	Spine-out
Easy/Picture Books	SHLV-H	0.05	Spine-out &/or in bins face-out
Music CDs	SHLV-I	0.04	Face-out display; in bins or special housing
DVDs	SHLV-I	0.04	Face-out display; in bins or special housing

Facility Support Spaces

	space		
position	code	nsf	notes
Public Service Desk	SVDSK-A	120	Circulation desk, seated or stand-up work space for 1 staff, public queuing space
Public Service Desk	SVDSK-B	80	Reference desk, seating & work space for 1 staff, public queuing space
Public Service Desk	SVDSK-C	64	Reference desk, stand-up work space for 1 staff & public
Information Desk	SVDSK-D	48	Seating & work space for 1 staff & public
Self-Check Station	SVDSK-E	30	No staff
Information Kiosk	INFO-A	30	Electronic station, no staff
Shared Computer Station	SPO-I	36	Systems furniture workstation, ergonomic task chair
PAC Station	SPO-J	24	Public access computer, systems furniture workstation, stand-up, no seat
Express Internet Station	SPO-J	24	Stand-up, systems furniture workstation, no seat

Appendix Three: Facility Standards Library Space Planning Standards page A3.13

Facility Support Spaces (continued)

	space	_	
position	code	nsf	notes
Printer/Scanner Station	SPO-K	16	Systems furniture station
Printer/Scanner/Fax Station	COPY-A	48	Free-standing machine
Photocopier	COPY-B	24	Table-top machine, systems furniture workstation
Paper Cutter	TOOL-A	12	Table-top unit
Laminator	TOOL-A	12	Table-top unit
Binding Machine	TOOL-B	8	Table-top unit
Art or Youth Feature	ART-X	50	Size varies
Literature Rack	LIT-X	24	Size varies, free-standing, wall-mounted, or Service Desk mounted
Atlas Stand	ATLS-X	12	Size varies, not recommended, best to house atlases on steel book stack shelving
Dictionary Stand	DICT-X	8	Size varies, not recommended, best to house dictionaries on book stack shelving
Globe	GLOB-X	9	Size varies
Display Case	CASE-X	50	Size varies, freestanding, wall-mounted, or recessed
Map Case/Flat File Cabinet	FILE-F	40	Space allows for extended drawer & user
Microform Cabinet	FILE-M	30	"Microform" includes film and fiche, space allows for drawer extended & user
File Cabinet	FILE-L	20	Lateral-pull cabinet
File Cabinet	FILE-V	18	Vertical front-pull cabinet, not recommended
Library Materials Return	MDRP-A	225	Includes drive-up return & drive-up checkout
Library Materials	MDRP-B	64	Walk-up return room
Book Bin Parking	BKTRK-A	10	Book bin, in Library Materials Return Room or at Circulation Service Desk
Booktruck Parking	BKTRK-B	8	Large truck; double-sided, 3 shelves each side
Booktruck Parking	BKTRK-C	5	Small truck, single-sided, 3 shelves
Work Counter	CNTR-A	48	Up to 12 linear feet of countertop
Work Counter with Sink	CNTR-AS	48	Up to 12 linear feet of countertop & sink
Work Counter	CNTR-B	32	Up to 8 linear feet of countertop
Work Counter with Sink	CNTR-BS	32	Up to 8 linear feet of countertop & sink
Workroom Shelving	SHLV-DF	18	Double-face section
Workroom Shelving	SHLV-SF	9	Single-face, wall-mounted section
Worktable	WKTBL-A	96	Up to 4 ergonomic task chairs
Worktable	WKTBL-B	75	Up to 2 ergonomic task chairs
Staff Locker	LKR-A	6	Full-height unit
Staff Locker	LKR-B	3	Half-height unit
Public Locker	LKR-C	1	Five units high, for special purpose use
Coat Rack	COAT-X	4	Size varies

Appendix Three: Facility Standards

Library Space Planning Standards

Facility Support Spaces (continued)

	space		
position	code	nsf	notes
Storage/Supply Room	STOR-X	120	Size varies
Supply Cabinet	SPLY-A	18	
Recycle Station	STOR-E	9	Four sorting bins
Trash Receptacle	STOR-F	4	Single trash can
Safe	SAFE-X	8	Size varies wall-mount recommended
Card Catalog	CARD-X	16	Size varies, not recommended unless housing legacy files
Performance Area	STAGE-X	100	Size varies, within Multi-Purpose Meeting Room or Teen area
Lectern	STAGE-A	10	Within Multi-Purpose Meeting Room
Kitchen	KIT-A	120	10' x 12' room
Kitchen	KIT-B	80	8' X 10" room/space
Kitchenette	KIT-C	32	Up to 8 linear feet of countertop & sink
Kitchenette	KIT-D	20	Up to 5 linear feet of countertop & sink
Vending	VEND-A	25	
Vending	VEND-B	15	
Vending	VEND-C	10	
Vestibule	VEST-A	100	
Vestibule	VEST-B	70	
Green Room	VEST-C	64	
Entrance Lobby	LOB-X	200	Size varies
Display/Gallery	GAL-X	200	Size varies
Building Directory	DIR-X	12	Size varies
Computer Data Center	DATA-X	400	Size varies
Computer Room	DATA-A	100	
Telecomm Equipment	TELE-X	81	Size varies
AV Equipment Room	EQUIP-X	64	Size varies
Loading Dock	LOAD-X	200	Size varies
Maintenance Room	MAINT-X	200	Size varies
Public Toilet	TLT-3	120	ADA-compliant, 3 toilet/urinal room
Staff Toilet	TLT-1	50	Uni-sex, ADA-compliant, 1 toilet room
Library Café	CAFÉ-X	250	Preparation area
Library Coffee Cart	CAFÉ-C	64	
Library Store	STORE-X	225	Friends of the Library or Outside Vendor

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PARKING STANDARDS

In most public library situations, adequate off-street parking accessible and convenient to the entrance of the library building is a principal factor in user satisfaction, as well as the amount of use a library facility will receive. Without adequate parking, there is every reason to anticipate usage of the library facility(ies) will not reach its/their full potential. Godfrey's Associates, Inc. believes this is true of both central (main) and branch libraries.

Parking Determination Factors

There are different ways to determine the number of spaces required. A review of the different factors follows.

Ratio of Square Footage to Parking. In the zoning ordinances of many municipalities, parking requirements for public use and commercial facilities are often expressed as a ratio of the square footage of the building. For example:

- One parking space for every four hundred square feet of building space; or
- One square foot of parking area (not parking spaces) for one square foot of building space.

Ratio of Parking to Seating. Another factor relates needed parking to seating requirements. Assuming a vehicle typically carries two people, the ratio of one parking space for every two reader seats within the library building is one factor. This number must be supplemented with parking for the meeting rooms in the building. The latter are often covered by local ordinance, even if library buildings are not specifically covered.

Parking for Staff. Parking for staff may also be regulated by local ordinance. Failure to provide adequate staff parking may become a source of staff frustration and discontent. Staff parking should be provided in a quantity of one parking space for every 1.5 full-time equivalent (FTE) staff.

Parking for Volunteers. Parking for volunteers should also be provided. Local ordinances for staff may include volunteers. If not, volunteers should be included as part of staff on a FTE basis for the purposes of calculating total parking needs.

Central Library Parking Requirements

There are no standardized parking calculations for a central library facility. In a survey of several major urban libraries conducted by Godfrey's Associates, Inc., the amount of parking available for users and the staff ranged from 55 spaces to over 2,000. In every case, except where there were 2,000 plus spaces, the library indicated that the number of parking spaces was inadequate.

The parking provided for many of these libraries was determined not by what was needed, but by the available space on site that could be allocated for parking. Other factors that influenced these projects were the availability of public transit, the corresponding number of customers expected to drive to the library, the number of seats in meeting rooms, and planning for subsequent expansion of the library building.

In developing library parking requirements for a central library building, we base our recommendations on the following:

- The total size of the facility; and
- The fact that over 90 percent of the library users will arrive by vehicle.

Three alternative calculations for determining central library parking spaces are proposed:

1. One parking space per every 400 to 500 square feet (SF) of building, stated as:

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XXX,XXX square feet = YYY parking spaces
400 or 500SF
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2. One parking space per every two adult reader seats and one space per every five seats in a multi-purpose meeting room, stated as:

 $\frac{XXX \text{ reader seats}}{2} = YYY \text{ spaces}$ Plus

 $\frac{XXX \text{ seats in meeting room(s)}}{5} = YYY \text{ spaces}$

- = YYYY total parking spaces
- 3. One Parking space for every 150 square feet of public service space, plus one parking space per every 400 square feet of staff offices/workroom space, plus one parking space per every five seats in meeting room(s), stated as:

XXX,XXX SF public space = YYY space 150 SF

Plus

XX,XXX SF staff space = YYY spaces 400 SF Plus

XXX seats in meeting room(s) = YYY spaces

5

= YYYY total parking spaces

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Branch Library Parking Requirements

To provide adequate parking, based upon the factors described above, we recommend:

- One parking space for every 200 building gross square feet (BGSF) is necessary for Community and Neighborhood Libraries up to 29,999 BGSF;
- One space for every 250 BGSF for Regional Libraries between 30,000 and 39,999 BGSF; and
- One space for every 300 BGSF for Regional Libraries between 40,000 and 50,000 BGSF.

For buildings above 50,000 BGSF, we recommend the Central Library factors be applied.

Land Requirements for Parking

To provide for each parking space, entrance(s) and points of egress, turning spaces, and landscaping the standard for square feet per parking space is 350. Thus, for a 20,000 square foot community library with 100 parking spaces, the land required for the parking would be 35,000 square feet.

Shared Parking

Depending upon where the new facility is located, it may be possible to share parking with an adjacent building(s). For instance, a public library's greatest need for parking is typically:

- Morning, when many senior citizens use the building and/or story hours are held;
- Noon hour, when many persons visit during their lunch break;
- After school until about 5:30 or 6:00 PM; and
- Mid-evening from 7:30 to 8:30 PM.

Of course, there are also great demands for parking on weekends, and when there is a popular program planned for the meeting room.

These times sometimes conflict with the needs of other buildings, especially in the afternoon and weekends. Therefore, shared parking while feasible should not be viewed as an answer to more than 15 to 20 percent of the library's total needs.

Conclusion

Lack of parking is often the major complaint expressed by persons who use the public library. There are also reported instances when the absence of safe, convenient parking has been a principal reason for persons not using their public library.

The public library is a service business. As for any successful business, adequate parking must be provided parking that is convenient and safe, if library policy-makers expect their public library facility(ies) to be utilized to maximum potential.

BRANCH LIBRARY DESIGN GUIDELINES

The building infrastructure systems for each type of branch library are outlined below. These systems are categorized on the pages that follow, for each type of branch, under four headings:

- Mechanical Systems;
- Plumbing Systems;
- Fire Protection Systems; and
- Electrical Systems.

In some cases, the systems for one type of branch library are similar, or identical, to the systems of another branch(es). Descriptions of these systems are not repeated in their entirety, but are referenced to previous descriptions

NEIGHBORHOOD LIBRARY

This narrative describes building infrastructure design guidelines for mechanical, electrical, and plumbing (MEP) systems for a modern Neighborhood Library of 3,000 to 16,000 square feet (SF). These guidelines form the baseline against which existing FWL facilities are assessed, as well as the basis for estimates of construction costs for future library facilities.

HVAC Systems

These design guidelines should be used to develop a sustainable, integrated mechanical, HVAC, and controls system that is economical to operate and maintain. Buildings are to be certified LEED Silver or better when the certification cost does not exceed 5 percent of the construction cost. Designs shall comply with current local mechanical codes, City amendments, ASHRAE 62 and ASHRAE 90.1 latest editions for minimum energy performance requirements and installations.

Packaged DX/Gas-fired Rooftop Units. The facility should incorporate high efficiency, constant volume, direct expansion (DX) packaged rooftop air handling units with natural gas-fired heat exchangers. Each packaged rooftop unit should be provided with MERV 7 pre-filter and MERV 11 final filters, DX cooling coil, natural gas-fired heat exchanger, and supply fan motor. The DX refrigeration system should incorporate multiple compressors and gas-fired heat exchanger with full modulating gas valve. Rooftop units should be high efficiency and utilize non-CFC-based refrigerants such as R-410A, R-134A, or R-407C. The same refrigerant should be utilized throughout the entire facility. In order to maintain humidity levels, the packaged rooftop units should be provided with multiple compressors with one of the compressors providing variable or stepped capacity control. Refrigeration circuits should be provided with hot gas reheat. Rooftop units should be sized based on the zone type and size of the zone served, with special attention given to high

Appendix Three: Facility Standards Branch Library Design Guidelines page A3.18 occupancy areas and exterior zones. The use of centralized humidifiers should be determined in conjunction with exact requirements of materials use and storage within each facility.

Special Systems. Dedicated cooling only systems should be provided for Information Technology (IT) rooms and for Electrical rooms which house electrical panels and transformers. Mechanical cooling systems for these rooms should be direct expansion, high efficiency split systems utilizing R-410A or R-134A refrigerant.

Air Distribution – Ductwork & Diffusers. Ductwork construction for HVAC systems should consist of low pressure class ductwork. All ductwork should be constructed of galvanized sheet metal in accordance with SMACNA standards. Supply and return air ducts shall be fully ducted systems. Internal duct liner should be installed at a minimum distance downstream from each rooftop unit with additional elbows added for sound attenuation purposes. Duct liner should be provided with factory applied coating to help guard against the incursion of dust or dirt into the substrate minimizing the potential for biological growth. Diffusers should be ceiling or sidewall type. Aluminum material air devices should be utilized for Restrooms, Janitor Closets, and other potential wet/damp areas.

Natural Gas Piping. Piping materials for natural gas piping should be black steel piping with welded fittings for pipe sizes 3" and larger and screwed for piping sizes less than 3". Piping located on the roof should be located on factory roller-support units with protected roofing material underneath.

Control Systems. Controls for the HVAC systems should be a direct digital control (DDC) type with a computer based interface located in the facility office with internet interface capabilities. The DDC system should control all aspects for the heating and cooling systems; and, where applicable, provide system alarm output for the fire alarm. Demand control ventilation using

carbon dioxide (CO_2) sensors should be incorporated within the occupied spaces, especially high occupancy density areas as a means to adjust outside air requirements for the facility and reduce operating expenses. Humidity sensors should be utilized in various rooms to insure control and monitoring of humidity levels.

For public spaces, room temperature sensors should be utilized in lieu of adjustable sensors. Private office areas could be provided with adjustable room temperature sensors with fixed maximum operating range to insure no user implemented extreme temperature set points.

Commissioning, Testing, Adjusting, & Balancing (TAB)

Systems. The entire HVAC system should be provided with a commissioning and TAB effort. This effort should be provided by an independent contractor not directly associated with any other trade on the project. This includes both air and hydronic systems as well as plumbing systems.

Plumbing Systems

Plumbing Fixtures. Plumbing fixtures anticipated for the Public and Private Restrooms should include a combination of barrier free and standard wall mounted flush valve type vitreous china water closets, counter mounted oval and wall mounted vitreous china lavatories with wrist blade type faucets, wall mounted flush valve type vitreous china urinals, and stainless steel selfrimming counter sinks in the Break Rooms. Floor drains should be provided in all Restrooms. Janitor's closet should include a floor mounted 24"x24" molded stone mop sink basin and a medium duty floor drain with a cast iron grate. Electric water coolers should be ADA accessible bi-level water coolers capable of providing an approximate 9.6 gallons per hour of refrigerated and filtered cold water. An option to ADA lever type handles and flush valve operators is automatic flush-o-meter systems. Depending on LEED implementation, additional water reducing

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methods of low consumption water closets and urinals should be employed.

Domestic Water System. The domestic water system should extend from the City utility water main and water meter to a room within the building such as a Janitor Closet. A City approved reduced pressure backflow preventer device should be installed at the location where the domestic water enters the building. No domestic water piping or equipment should be located in same room as Electrical equipment. A dedicated room shall be provided for Electrical equipment. Exterior water hose connections should be at locations acceptable with a minimum spacing not to exceed 75 feet. The domestic water (potable water) should extend to all plumbing fixtures.

The domestic hot water system should include a centrally located gas-fired, low NOx domestic water heater with lined storage tank. The unit should be mounted at floor level on concrete housekeeping pad. The heated domestic water should pass through a thermostatic type water-tempering valve to provide tempered water as required per the City and Codes. The domestic hot water distribution system should include a hot water recirculation system to minimize the amount of time the plumbing fixture user will have to wait for domestic hot water. The domestic hot water recirculation system should include an in-line pump with calibrated balancing valves to adjust water flow through the system when domestic hot water is not being used.

All domestic water piping within the facility should be copper and insulated with fiberglass pipe insulation.

Sanitary Waste & Vent System. Sanitary waste piping should extend from plumbing fixtures located throughout the facility to connections with the City utility sanitary sewer systems. Sanitary waste piping located under the ground floor level and above floor should be standard weight cast iron piping with drainage waste and vent fittings. Cast iron should be used

above floor for compliance with smoke development and fire spread rating requirements in plenum spaces designated for use as a return air plenum and for reduced noise from use of the piping systems. All sanitary vent piping penetrating the roof should be insulated with fiberglass insulation from the roof penetration to within 10 feet of the roof penetration to avoid possible condensation.

Storm Water System. Storm water roof drainage systems should be internally collected from cast iron dome type roof drains at flat roof areas that will be exposed to standard roof conditions. Additional overflow roof drains (when required) should be piped independently of the primary roof drainage system and should discharge at grade in a visible location with an exterior downspout nozzle. Roof and overflow drainage piping above floor should be standard weight cast iron piping with drainage waste and vent fittings. Cast iron should be used above floor for compliance with smoke and fire development rating requirements in plenum spaces designated for use as a return air plenum and for reduced noise from use of the piping systems. All roof drainage piping should be insulated with fiberglass type pipe insulation with a vapor barrier.

HVAC Condensate System. Condensate drain piping from the package units should extend to points of indirect discharge into the sanitary sewer systems. Condensate p-traps should be provided at each air-handling unit to reduce losses in air pressure through drain connections at the cooling coils and to accommodate gravity drainage from each air-handling unit. Condensate drain piping should be copper with pipe insulation and a vapor barrier.

Natural Gas Piping. Natural gas distribution systems should extend into the facility from a natural gas meter provided and installed by the local natural gas utility company. Each gas-fired appliance or equipment should be provided with a gas shutoff

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valve and minimum of 6" dirt leg (sediment trap) prior to connection to the appliance or equipment.

Fire Protection Systems

The facility should be protected with a wet pipe fire sprinkler system capable of suppressing potential fire spread throughout the facility. A minimum of 6" fire service main should be extended from the city utility water main to a dedicated Fire Sprinkler Riser Room within the building. Fire department connections and hose stream demand factors should be in accordance with NFPA 13 and city requirements. The fire sprinkler distribution system should be designed and hydraulically calculated by the Fire Sprinkler Contractor based on flow and pressure available at the facility and the distribution system routing determined by the Fire Sprinkler Contractor. All fire sprinkler piping downstream of the wet type valve shall be black steel, with iron fittings, and shall be a minimum of Schedule 10 for the sprinkler mains and Schedule 40 for all branch lines. Library return / drop off area should be provided with dedicated clean-agent fire suppression system.

Electrical Systems

Electrical system design should take into account energy efficiency, safety, and ease of operation and comply with applicable building codes and the current version of the National Electrical Code (NEC), the Life Safety Code (NFPA 101) and the Fire Alarm Code (NFPA 72), including amendments by the City of Fort Worth and requirements by the Authority Having Jurisdiction (AHJ). As mentioned before, buildings should be designed to achieve certification as LEED Silver or better when the budget allows. Each system should be designed with energy efficiency in mind. Lighting controls should be automatic and other systems should be intuitive enough for non-trained personnel to use. Library buildings are usually not staffed with technically trained personnel. Electrical equipment presents risks of arc flash, especially if covers are removed by non-trained personnel. To minimize risk, the first layer of protection at distribution panels should be with fuses. Although fuses do not eliminate the risk of arc flash, they react considerably faster and let less energy pass through under fault conditions than circuit breakers do. Circuit breakers should be used on the second layer of protection at circuit panel boards.

Power Distribution. Service should be 120/208V or 480/277V, 3-phase, 4-wire or 480/277V. Do not provide single phase systems. Single-phase A/C systems require more maintenance than three-phase systems and are only suitable for smaller loads, such as IT rooms. Provide underground service if possible for aesthetic purposes. Provide at least 30% of spare capacity at main board, 20% spare circuits for lighting loads and 40% spare circuits for electrical outlet loads. This is required for future flexibility of electrical outlet load allocation. Segregate A/C, lighting and electrical outlet loads into different panels and provide means for future metering if pursuing LEED certification. Provide isolated ground bus for computer loads at the electrical outlet panel. The isolated ground shall be connected directly to the grounding bus at the service entrance panel (120/208V systems) or to the grounding connection at the transformer (480/277V systems with step-down transformers). Provide dedicated, lockable rooms for electrical equipment with enough space for future expansion and to add future alternative energy source equipment (PV panel controls, inverters, etc.).

Emergency Power. Emergency power is needed for egress purposes only. Due to the size of this facility, it is not recommended to provide a separate generator for emergency power distribution. Battery backed lighting units are more cost effective at this range.

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Electrical Outlet Distribution. Electrical outlets in offices and support areas should take into account loads to be served. Computer loads should be served with isolated-ground circuits. Using an under-floor distribution system for electrical outlets and data ports is recommended. Such systems provide flexibility to change the public area layout as library needs change.

Lighting. Provide lighting in office areas using direct/indirect pendant-mounted fixtures with high-efficiency 48-inch lamps and high-efficiency ballasts. Provide multiple light levels in larger areas, and provide occupancy sensors for automatic switching in most spaces. Also provide direct/indirect lighting fixtures for public areas. Follow current IESNA recommended practices for reading use in public areas and adjust lighting levels according to users' age levels. Provide automatic daylight controls for lighting close to windows or under skylights.

Egress Lighting. Provide egress lighting provisions for public, office and support areas. Provide egress lighting with 90-minute battery backup. Lighting fixtures may be integrated into the general lighting or provided separately. Extend egress lighting to egress doors or to safe point if indicated on egress plans.

IT Infrastructure. Follow the latest edition of BICSI's Telecommunications Distribution Methods Manual (TDMM), the current edition of the National Electrical Code (NEC) and applicable codes and ANSI/TIA standards.

Provide separate, dedicated, lockable rooms for IT and other low-voltage equipment. Provide space in these rooms for fire alarm, security, public address, cable and other low voltage systems. Provide dedicated, isolated-ground electrical outlets for all equipment in this room. Internet, cable, telephone and other services should terminate in one of these rooms. The quantity of IT rooms will depend on the building's area and shape. Follow TDMM's recommendations for number of rooms and maximum distance for horizontal runs.

Appendix Three: Facility Standards Library Design Guidelines

Provide data ports in office as support areas according to TDMM recommendations. Avoid whenever possible, using MUTOA's or point concentrators. Provide wireless access points in public and office and support areas according to TDMM recommendations.

Other Low-Voltage Systems. Provide a complete and monitored fire alarm system fully compliant with NFPA 72 for the facility. Provide a complete and monitored security alarm system. Provide a public address (PA) system for all office, public and support areas. The system shall be operable from the front desk and reach all areas in the library. The phone system may be integrated to the PA system. Use of the speaker phones as a PA system is not recommended.

COMMUNITY LIBRARY

This narrative describes building infrastructure design guidelines for mechanical, electrical, and plumbing (MEP) systems for a Community Library of 16,000 to 25,000 square feet (SF). These guidelines form the baseline against which existing FWL facilities are assessed, as well as the basis for estimates of construction costs for future library facilities.

HVAC Systems

These design guidelines should be used to develop a sustainable, integrated mechanical, HVAC, and controls system that is economical to operate and maintain. Buildings are to be certified LEED Silver or better when the certification cost does not exceed 5 percent of the construction cost. Designs shall comply with current local mechanical codes, City amendments, ASHRAE 62 and ASHRAE 90.1 latest editions for minimum energy performance requirements and installations.

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Packaged DX/Gas-Fired Air Handling Units. The facility should incorporate high efficiency, direct expansion (DX) packaged rooftop air handling units with natural gas-fired heat exchangers with the majority of units configured as variable air volume units. Each rooftop variable air volume (VAV) air handling unit should be provided with outside air airflow measuring station, MERV 7 pre-filter and MERV 11 final filters, DX cooling coil, gas-fired heat exchanger, and variable frequency driven supply fan motor. The DX refrigeration system should incorporate multiple compressors with variable capacity control compressors or stepped compressors, hot gas reheat or additional means to provide reheat and gas-fired heat exchanger with full modulating gas valve. Rooftop air handling units should utilize non-CFC-based refrigerants such as R-410A, R-134A, or R-407C. The same refrigerant should be utilized throughout the entire facility. Associated with each VAV air handling unit (AHU) should be terminal units with electric 460 volt reheat. The terminal units should be sized based on the zone type and size of the zone served and should have the VAV valve, air flow monitoring station, electric reheat coil, and a digital control interface that will communicate with the building control system. The main heat exchanger located at the air handling unit shall primarily operate as a pre-heat coil. The use of centralized humidifiers should be determined in conjunction with exact requirements of materials use and storage within each facility.

Special Systems. Dedicated cooling only systems should be provided for Information Technology (IT) rooms and for Electrical rooms which house electrical panels and transformers. Mechanical cooling systems for these rooms should be direct expansion, high efficiency split systems utilizing R-410A or R-134A refrigerant.

Air Distribution – Ductwork and Diffusers. Ductwork construction for HVAC systems should consist of low and medium pressure class ductwork. Supply and return air ducts shall be fully ducted systems. All ductwork should be constructed of galvanized sheet metal in accordance with SMACNA standards. Internal duct liner should be installed at a minimum distance downstream from each AHU and downstream from each VAV terminal unit for sound attenuation purposes. Remaining ductwork should be provided with external wrapped insulation. Duct liner should be provided with factory applied coating to help guard against the incursion of dust or dirt into the substrate minimizing the potential for biological growth.

Diffusers should be ceiling or sidewall type suitable for variable air volume application. Aluminum material for air devices should be utilized for Restrooms, Janitor Closets, and other potential wet/damp areas.

Natural Gas Piping. Piping materials for natural gas piping should be black steel piping with welded fittings for pipe sizes 3" and larger and screwed for piping sizes less than 3".

Control Systems. Controls for the HVAC systems should be a direct digital control (DDC) type with a computer based interface located in the facilities office with internet interface capabilities. The DDC system should control all aspects for the heating and cooling systems; and, where applicable, provide system alarm output for the fire alarm. DX refrigeration systems should incorporate temperature reset capabilities to maximize energy savings. Controls should also include static pressure optimization for variable volume air flow applications. Demand control ventilation using carbon dioxide (CO₂) sensors should be incorporated within the occupied spaces as a means to adjust outside air requirements for the facility and reduce operating expenses. Humidity sensors should be utilized in various rooms to insure control and monitoring of humidity levels.

For public spaces, room temperature sensors should be utilized in lieu of adjustable sensors. Private office areas could be provided with adjustable room temperature sensors with fixed maximum operating range to insure no user implemented extreme temperature set points.

Commissioning, Testing, Adjusting, & Balancing (TAB)

Systems. Entire HVAC system should be provided with a commissioning and TAB effort. This effort should be provided by an independent contractor not directly associated with any other trade on the project. This includes both air and hydronic systems as well as plumbing systems.

Plumbing Systems

Plumbing systems for a Community Library are similar to those described under the heading of Neighborhood Library Design Guidelines above.

Fire Protection Systems

Fire Protection systems for a Community Library are identical to those described for the Neighborhood Library.

Electrical Systems

Electrical systems for a Community Library are similar to those of the Neighborhood Library, with the exception of Emergency Power, as described below.

Emergency Power. Emergency power is needed for egress purposes only. The use of an emergency generator may be suitable for a facility this size. The designer should consider a providing a generator instead of batter-backed lighting fixtures. The decision should be made on a case by case basis.

REGIONAL LIBRARY

This narrative describes building infrastructure design guidelines for mechanical, electrical, and plumbing (MEP) systems for a Regional Library of 30,000 to 50,000 square feet (SF). These guidelines form the baseline against which the existing FWL Central Library was assessed, as these guidelines approximate the scale of that building and its systems.

HVAC Systems

These design guidelines should be used to develop a sustainable, integrated mechanical, HVAC, and controls system that is economical to operate and maintain. Buildings are to be certified LEED Silver or better when the certification cost does not exceed 5 percent of the construction cost. Designs shall comply with current local mechanical codes, City amendments, ASHRAE 62 and ASHRAE 90.1 latest editions for minimum energy performance requirements and installations.

Chilled Water System. The facility should incorporate hydronic cooling and heating mechanical systems. The cooling system should be comprised of air cooled chillers pad mounted outdoors, chilled water pumps, and air-side air handling units. Two air cooled chillers, each sized for about 60 percent of the facility load, in parallel will provide some means of redundancy for the system and allow chiller maintenance without having to completely shut down the entire system. Air cooled chillers, rated for high efficiency, should utilize non-CFC-based refrigerant such as R-410A, R-134A, or R-407C. The same refrigerant should be utilized throughout the entire facility. The chilled water system should be a primary-secondary configuration. This configuration requires a constant volume pump dedicated to each chiller and a variable flow pump dedicated to the facility side of the system. The constant volume chiller loop will "connect" to the variable flow facility loop via a "common leg" of piping. The design chilled water temperature

differential for the facility side of the system should be a minimum of 14 degrees. Pumps should be frame mounted end suction type with premium efficiency motors that, where applicable, and rated for use with variable frequency drives. The pumps should be mounted on inertia bases that have spring supports.

Two-way control valves should be located at each remote coil location allowing variable flow to each piece of equipment.

Heating Water System. The heating system should be comprised of gas-fired Low NOx condensing type boilers and a variable flow heating water pump. The heating water system should be a variable primary configuration with two-way control valve installation at all remote coils. Minimum flow conditions for the pumps should be reviewed to determine sufficient by-pass provided at system minimum flow conditions. Pumps should be frame mounted end suction type with premium efficiency motors that, where applicable, are rated for use with variable frequency drives. The pumps will be mounted on inertia bases that have spring supports.

Chemical Treatment. The chilled water and heating water systems will require a chemical treatment system to maintain water quality, this system will be an inline shot feeder type. Additionally, chemical treatment storage tanks should be provided.

Mechanical Rooms. A central Mechanical room should house the main chilled and heating water equipment including pumps, boilers, and any required hydronic accessories and chemical treatment. Major equipment should be located on concrete housekeeping pads. The room should be adequate size to allow sufficient clearance for maintenance and removal of equipment for future replacement. Overhead door(s) or over-sized man door(s) should be provided to the room. Direct access from the mechanical room to the exterior of the facility would be beneficial. Main electrical switch gears, transformers, and panels should not be located in the Mechanical room, but rather in a dedicated Electrical Room. Additional mechanical rooms should be provided to house the remaining air-side equipment.

Air-Side Equipment. Indoor air handling systems should be comprised of variable air volume (VAV) air handling units with variable air volume terminal units with a combination of electrical and heating water reheat. Emphasis for VAV terminal units serving exterior zones should be provided with heating water while some interior zones provided with electric heating depending on actual location of terminal unit. VAV terminal units should be sized based on the zone type and size of the zone served and will have the VAV valve, air flow monitoring station, reheat coil as required, and a digital control interface that will communicate with the building control system.

Each air handling unit (AHU) should be provided with filter section, heating water pre-heat coil as required, chilled water coil, and fan section. Double wall AHU design should be incorporated. Sufficient distance should be provided between components within each AHU to allow access for cleaning. Filter section should contain pre-filter (MERV 7) and a final filter (MERV 11). An airflow measuring station should be installed within the outside air path of the air handling unit in order to maintain minimum outside air flow rates throughout the entire operating range of the air handling unit. Chilled water coil face velocities should be a maximum of 500 feet per minimum and a maximum coil row depth of 8 rows. Adequate clearance should be provided around each side of the AHU's and include clearance for coil removal. The use of centralized humidifiers should be determined in conjunction with exact requirements of materials use and storage within each facility.

Exhaust air systems should be provided for all Restrooms, Break Rooms, and Janitor Closets.

Appendix Three: Facility Standards Branch Library Design Guidelines page A3.25 **Special Systems.** Dedicated cooling only systems should be provided for Information Technology (IT) rooms and for Electrical rooms which house electrical panels and transformers. Mechanical cooling systems for these rooms should be direct expansion, high efficiency split systems utilizing R-410A or R-134A refrigerant.

Air Distribution – Ductwork and Diffusers. Ductwork construction for HVAC systems should consist of low and medium pressure class ductwork. Supply and return air systems shall be fully ducted. All ductwork should be constructed of galvanized sheet metal in accordance with SMACNA standards. Internal duct liner should be installed at a minimum distance downstream from each AHU and downstream from each VAV terminal unit for sound attenuation purposes. Remaining ductwork should be provided with external wrapped insulation. Duct liner should be provided with factory applied coating to help guard against the incursion of dust or dirt into the substrate minimizing the potential for biological growth.

Diffusers should be ceiling or sidewall type suitable for variable air volume application. Aluminum material for air devices should be utilized for Restrooms, Janitor Closets, and other potential wet/damp areas.

Water Distribution Piping. Piping materials for the chilled and heating water systems should be welded black steel for pipes above 3" and threaded black steel or copper for pipes under 3".

Control Systems. Controls for the HVAC systems will be a direct digital control (DDC) type with a computer based interface located in the facilities office with internet interface capabilities. The DDC system should control all aspects for the heating and

cooling systems; and, where applicable, provide system alarm output for the fire alarm. Chilled and heating water control systems should incorporate temperature reset capabilities such as heating water set point based on outside air temperature to maximize energy savings. Controls should also include static pressure optimization for variable volume air flow applications. Demand control ventilation using carbon dioxide (CO₂) sensors should be incorporated within the occupied spaces as a means to adjust outside air requirements for the facility and reduce operating expenses. Humidity sensors should be utilized in various rooms to insure control and monitoring of high humidity levels.

For public spaces, room temperature sensors should be utilized in lieu of adjustable sensors. Private office areas could be provided with adjustable room temperature sensors with fixed maximum operating range to insure no user implemented extreme temperature set points.

Plumbing Systems

Plumbing systems for a Regional Library are identical to those described for the Community Library Design Guidelines.

Fire Protection Systems

Fire Protection systems for a Regional Library are identical to those described for the Neighborhood and Community Libraries.

Electrical Systems

Electrical systems for a Regional Library are identical to those of the Community Library.