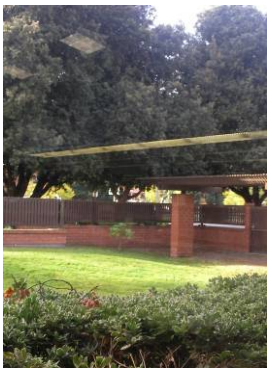

SUNNYVALE

Library of the Future

Existing Facility Assessment

Prepared in collaboration with the

Sunnyvale Public Library

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by

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For more information about Sunnyvale's Library of the Future, visit

libraryofthefuture.inSunnyvale.com

Table of Contents

section i

Executive Summary
section ii

Executive Summary

Project Description

The Sunnyvale Library, in pursuing the Library of the Future Study and Strategy, initiated a review of the existing facility to determine the opportunities and constraints associated with the building and site. This information will inform the development of Facility Scenarios, and will support evaluation of the capacity of the existing building and site to accommodate the services and building program requirements planned to serve the community.

The following comments summarize the site analysis by Architectural, Structural, Mechanical, Plumbing, and Electrical consultants.

Site Considerations

Access to the site from major streets is adequate, but directional signage to the building and from the parking area to the main building entry requires improvement. The traffic patterns throughout the parking lot would require reconfiguration to safely accommodate pedestrian path of travel.

There are accessibility concerns at numerous locations around the site; access from exiting paths is not sufficient to accommodate accessible egress. In addition, accessible paths from the public path of travel do not allow for full access to all public entrances of the facility.

The constructible area of the site has been fairly maximized; there is an additional parcel to the rear of the site that is owned by the City that may allow the site to accommodate the required construction and parking for the full future programmed facility. However, the parcel as currently designated would not accommodate the square footage required to expand this building adequately. If a vertical expansion is constructed, with numerous additional parking required, the current site configuration would not accommodate the total number of spaces. This could possibly require construction of a parking structure, which not only impacts the cost of the project, but may also cause concern with the neighborhood and City campus aesthetic.

The following are the major recommendations for the site:

1. Accessibility issues on the site should be resolved to accommodate federal accessibility regulations and code required exit path of travel requirements.
2. If significant expansion to the facility is considered, adjacent parcels would likely be required to accommodate both construction and parking requirements.

Architectural Opportunities and Constraints

The existing interior finishes and structure present challenges to expanding the technology level of the library; the brick finish not only causes difficulty with running significant technology other than in exposed conduit, but is also a physical barrier to the efficient use of wireless technology.

The lighting throughout the facility does not appear to meet adequate lighting levels for reading areas. Replacing the existing lighting with energy efficient lighting fixtures that take advantage of the natural light levels allowed by the existing glazing will also provide appropriate lighting levels when natural light is not available.

Regarding the actual square footage of the floor plan, the expansion required to

Executive Summary
section ii

Executive Summary

accommodate the services planned for the Library of the Future is not easily achievable in the existing facility. Expansion on the ground floor would require use of adjacent parcels to accommodate the required square footage. The cost benefit of constructing a second story would likely be inefficient compared to the costs required for new construction; a duplicate structural system would be required to support the upper level, also causing loss of usable space on the lower level to accommodate the new structure.

The expansiveness of the existing floor plan does not lend itself to clear further expansion for use as a library as oversight of the current facility is difficult and would be exacerbated with continued horizontal expansion. However, there are opportunities for adaptive reuse of the facility for other occupancy types. Office type uses could be accommodated in the facility with renovation of the systems and the floor plan layout.

General key findings from November 6, 2006 site walk:

- Further expansion of the facility will increase the difficulty in maintaining visual access and oversight library areas
- Upgrades to technology and wiring will be difficult to achieve without significant exposed equipment and conduit, due to the brick interior finishes.
- Brick finishes will cause difficulty in achieving effective wireless technology, as it acts as a barrier to the transmission of wireless signals.
- Existing interior finishes (especially in high traffic areas) are worn and require replacement.
- Accessibility concerns will need to be addressed: exiting and entry paths, stair landings, head height clearance issues, etc.
- HVAC equipment that has not been upgraded will require replacement, and additional loading on the building may require upgrade and/or additional equipment to the recently renovated systems.
- Lighting throughout the building should be upgraded to accommodate appropriate reading light levels even when supplementary natural light is not available.
- The facility is adequate for reuse for occupancies other than a library; office type uses would be appropriate for further study.

The following are the major recommendations for the architectural aspects of the facility:

1. Study the cost effectiveness of any expansion to the facility to determine if the cost benefit outweighs that of new construction.
2. Upgrade outdated building systems to accommodate use of the existing facility and increase the energy efficiency.
3. Evaluate the cost effectiveness of a smaller expansion to the existing facility that accommodates a portion of the proposed building program, as another facility would need to accommodate the remaining programmatic elements. As outlined in the Community Needs Assessment and Plan of Service, this service delivery strategy has inherent redundancy and results in increased operational costs.
4. Consider library planning and use principles when evaluating any expansion of the floor plan to allow for effective oversight and flow patterns, as well as zoning of activities.

Executive Summary
section ii

Executive Summary

Structural Considerations

FEMA 310 lists the 1997 UBC as the design criteria for life/safety hazard mitigation for the original core building and the 1976 UBC for the additions to the structure for these construction types. The additions and the upgrades to the original core building appear to have used the 1976 UBC design criteria, therefore it seems that the additions portion of the building should essentially meet the intent of the design requirements for life/safety hazard mitigation. However, the original core building would have to be upgraded to the 1997 UBC in order to meet this requirement. Given some of the items listed above, the Structural consultant recommends that both the original and additions buildings undergo a complete review for life/safety as a minimum requirement for continued use.

General key findings from November 6, 2006 site walk:

- The building additions were based upon the 1976 structural code. There will likely be minor life safety upgrades required, and a major addition would likely trigger a structural system upgrade to current code, which will likely be significant, including upgrades to out-of-plan loading and tying any new structure back to the existing structure.
- Seismic joint spacing may need to be increased to meet current code, which will likely be significant.
- The addition of a second story to the building would trigger an upgrade to the structure of the remainder of the building, not just local structural upgrades.
- The existing structure consists of reinforced brick columns that have limited capacity above their current bearing status. A second story would require a duplicate structure to support the upper level, and would likely have to be seismically separated from the current structure.

The following are the major recommendations for the structural systems:

1. Given the occupancy of the building as well as the desire for its continued long-term use, it is recommended that the buildings be evaluated using the current edition of the California Building Code. Retrofitting to this design criteria will not only meet minimum life/safety requirements but will also provide building serviceability in the event of a code level earthquake.

Mechanical Opportunities and Constraints

The mechanical systems of the building are a mixture of different new construction and renovations, presumed to be 1959, 1983 and 2006. With the exception of piping and some air-handling units, the units appear to be either new or in general good condition and capable of supplying the building's needs for years to come. In general, the HVAC systems are of relative good quality but are not energy efficient.

General key findings from November 6, 2006 site walk:

- The existing chiller is noisy and sound escapes to the exterior of the building and to the main entry area. Acoustic treatment is suggested for this area.
- Many of the existing HVAC units have been recently replaced and are in new condition. However, the remaining equipment is at the end of their useful life. It is suggested that this equipment be replaced, including the boiler, which is not code-

Executive Summary
section ii

Executive Summary

compliant. This is likely a difficult and costly replacement, due to the location of the existing boiler.

- There is not enough exhaust air in the system; it is suggested the system is upgraded to include the proper amount of exhaust transfer.
- The existing system is not an energy-conserving system, and the mechanical towers are old. There are no existing variable frequency drives installed, and the controls for the building are off-site due to city policy. This does not allow for adequate on-site controls for the system and thus does not allow for energy-reducing elements of the controls of the system.
- If a second story is added to the building, there would be significant ductwork renovation, which will likely be very costly.
- The mechanical system is not appropriately zoned for reuse as a facility other than a library. The different areas of the building are not easily separated into smaller zones. The capacity of the system would require review prior to any other use to verify capacity to accommodate for additional people or equipment.

The following are the major recommendations for upgrade of the systems:

1. Conduct a study to determine the life cycle cost of upgrading the existing chilled water plant to an all variable flow system including addition of variable frequency drive to the chiller and cooling towers.
2. Add balancing valves to all cooling coils and balance the water systems.
3. Upgrade boiler room's combustion air for compliance with California Mechanical Code.
4. Conduct a thorough review of seismic isolation of the mechanical system and upgrade as required to current codes.
5. Consider that expanding the existing building by 80,000 sq. ft. is possible, but the changes required are quite extensive. Considering the minimal energy efficiency of the existing building, it is questionable whether it is cost effective on a life cycle basis to proceed on this path rather than construct a new building.
6. Consider that use of the existing building for other City purposes it is anticipated to require most systems to be changed to a variable air volume system with extensive re-design of the duct distribution system. Furthermore, it is also anticipated that additional capacity may be required in the form of new air handling units, 4-pipe fan coil units, split air-cooled, water source heat pump or packaged rooftop units. Another important issue to consider is the addition of partitions to areas with high ceilings. Mitigation measures for these partitions include adding supply ductwork and diffusers at the high roof area or addition of a raised access floor system, and the use of same for air distribution, to any new office areas.

Electrical Opportunities and Constraints

The electrical systems of the library are generally well designed and are of sufficient capacity to meet the library's current needs. Based on the current usage, the existing electrical service will accommodate a moderate increase in load. The existing switchboard appears to have some available spaces. However, modifications of the existing main service entrance switchboard may require bringing the switchboard up to current code. Currently the switchboard installation under piping does not meet current

Executive Summary
section ii

Executive Summary

codes. Determining the capacity of the existing branch panel boards was not determined at this time.

The following are major recommendations for upgrade of the systems:

1. Conduct a study to determine the life cycle cost of upgrading the existing lighting control system to utilize a programmable controller with photocell controls for day lighting. Selected light fixtures may be replaced with dimmable ballasts for optimum performance.
2. Conduct a thorough review of seismic isolation of the electrical system and upgrade as required to current codes.
3. Conduct a load metering program to determine actual loads on existing branch panels, distribution panels and main switchboard.
4. Conduct a load test on the emergency generator to confirm actual condition and load capacity on the generator.
5. Obtain copies of the annual fire alarm system test report to confirm capacity and available spaces for expansion.

Significant addition of square footage to the existing building, while possible, would require extensive changes. It is questionable whether it is cost effective on a life cycle basis to proceed on this path. It would likely be more cost effective to construct a new building instead.

Regarding adaptive reuse of the existing building for another use, it is anticipated that more branch panels and a larger network room will be required. Distribution of power and data in the high ceiling areas may be difficult to conceal. The lighting circuits should be modified to control smaller areas for optimum user control and energy saving.

Telecom (Voice/Data) and Security Systems Opportunities and Constraints

The telecom (data and voice) systems of the library are adequately designed and installed; however the infrastructure to support current and future requirements is somewhat lacking in serviceability to meet the library's current needs. Based on the current configuration, the existing incoming services to the library, fed by AT&T and the City of Sunnyvale may accommodate added network traffic (public and private); however, the network feed now provides both intercity and public data access, along with internet access to library computers. The existing gigabit fiber connection between the IT department and library is high enough bandwidth to support current requirements; however, it may need to be increased in speed depending on future media delivery of text, movies, teleconferencing requirements of the library. There is currently a copper only feed into the library from AT&T which would support only limited voice and data transport.

The following are major recommendations for upgrade and expansion of the data and voice systems:

- Conduct a study to review and document all internal pathways for fiber and copper cabling.
- Review length limits on existing cabling
- Determine locations for satellite data cabinets and active electronics

Executive Summary
section ii

Executive Summary

With regards to adding 80,000 sq.ft to the existing building, while this is possible, the demolition, changes and upgrades for the data and voice systems would be extensive. It is open to discussion whether it is cost effective on a life cycle basis to proceed on this path and would apt be more cost effective to construct a new building. The data systems infrastructure would need extensive rerouting and configuration since a majority of cables traverse the peaked ceiling areas in the main open area.

With regards to use of the existing building as open offices, it is projected that several satellite data closets (IDF'S) will be necessary, along with a larger network server (MDF) room. The existing services feeding the building from City "IT" department and AT&T will require added cabling and/or fiber optic feeds depending on use and services required. Distribution of data and voice in the high ceiling areas may be difficult to conceal, however should space be segmented into offices with walls, much of the cabling could be concealed in a new ceiling area. Should the office space be open with the use of partition type furniture, all cabling would be in surface wire way or tele-power poles located throughout the building. In either scenario, new cabling to new offices, cubicles, etc. will be required.

The City does have capacity through the existing conduit system to the IT building across Olive Ave. to add a high capacity of fiber optic runs, via blown fiber optics. Additionally, the City would be able to add voice services through the existing Definity G3 telephone switch, which could be connected via high count copper circuits or possibly thru a satellite system housed at/in the library building, connected via fiber optics to the G3 system.

Introduction
section I

Facility History

The Sunnyvale Library is a single story facility located on the corner of West Olive and South Pastoria Avenue in Sunnyvale, California. The existing building has grown in stages since the **1959 Original Construction**. Two additions and numerous renovation projects have been completed since this original construction – all years referenced below are the dates on construction documents and may not reflect the year in which construction was completed. The following projects incorporate the change in the facility since original construction:

- 1961 - Library Maintenance Shed Project and Parking Lot Renovations: renovation of parking lot layout and upgrade to parking lot lighting
- 1962 - Library Sprinkler System
- **1969 – Building Addition #1** and Council Chambers Project: addition of stack area, mezzanine, and basement at northeast corner of facility, and stack area at northwest corner of facility. In addition, the Council Chambers space was removed from the facility and a new facility was constructed off site to house this function.
- 1972 – Parking Lot Lighting Upgrade
- 1977 – Library Multi-Purpose Room Re-roof
- 1979 – Fire Sprinkler System Upgrade
- **1983 – Building Addition #2** - Additions and Alterations Project: upgrades to existing facility, addition of three stack and reading room areas, and a technical support area (expansion of administrative areas).
- 1989 - Fountain Project: renovation of fountain at entry lobby
- 1990 – Additions and Alterations: Main Counter upgrade
- 1991 – Periodical Storage Room Renovations
- 1994 – Library Space Optimization project: renovation of interior plan layout, interior lighting upgrades, minor floor plan adjustments (constructed in 1998)
- 1995 – Roof Replacement Project and HVAC System Modification
- 1995 – Supply Fan Replacement
- 1996 – Library Book Drop Project
- 1997/1998 Abatement Project: hazardous materials were removed from the building as part of this effort.
- 2006 – HVAC Upgrade Project

As-built documents for these projects were reviewed as part of the Facility Assessment.

Introduction
section I

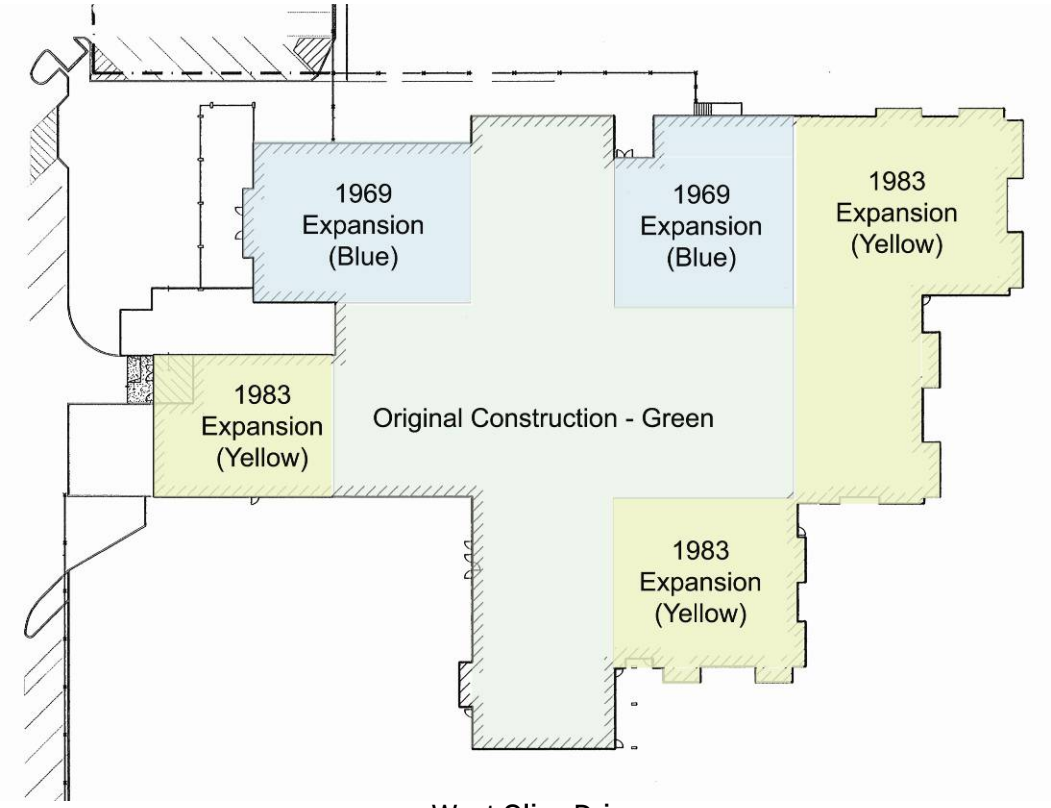
Facility History

The total area of the building has been confirmed on site by the Sunnyvale Facilities Department at 60,800 SF total, including the mezzanine and basement areas. This documented building area will be carried in the Study and Strategy.

The total building areas as calculated from the reviewd plan drawings is as follows:
- 1959 Original Construction – 45,800 SF total
- 1969 Building Addition – estimated 63,821 SF total
- 1983 Building Addition – estimated 75,045 SF total

This represents a discrepancy and it is likely that the square footage planned and designed in the expansion projects was not fully constructed.

The site plan shown below gives a simple graphic representation of the areas included in the original construction and the two additions.



Introduction
section I

Facility Assessment Methodology

Assessment of the site consisted of review of the as-built drawings of the facility as well as a visual review of the site on November 6, 2006. Visual review of the facility occurred, as did brief conversations among the site walk participants:

- Architectural consultants, Anderson Brule Architects, Inc.
- Structural consultants, Biggs Cardosa Associates, Inc.
- Mechanical/Plumbing and Electrical consultants, Guttman & Blaevoet Engineers
- Library Staff representatives
- City of Sunnyvale Facilities Department representative
- City of Sunnyvale Department of Public Works representative

The Facility Assessment documentation intends to establish a professional objective overview of the condition of the existing facility. The assessment was guided by knowledge of applicable codes and regulations, and was conducted in a non-destructive manner. The consultants reviewed plan documents provided by the Library under the assumption that these documents are an accurate reflection of the actual installations on the site.

All accessibility issues were evaluated against both the Americans with Disabilities Act and local codes and regulations.

Site Considerations
section II

Site Access and Signage

The site is accessible from both West Olive Boulevard and South Pastoria Avenue. The curb cuts and driveway entrances appear to meet current city standards. Small light-post mounted signage for the facility is located at the entrances to the property and directional signage at is located at adjacent intersections to direct the community to the library site.

Access from public transportation is provided by a bus stop directly outside of the library main entrance on West Olive Avenue. This bus route travels to the nearby Sunnyvale station of the Lightrail and Caltrain routes located at Evelyn Avenue.

Parking

The site currently has 142 parking spaces designated for the use of the library; this number includes 6 accessible spaces that meet ADA requirements. There are an additional 32 parking spaces reserved for the use of the library staff. Parking spaces are distributed around the perimeter of the facility, and there are landscaped areas between the spaces and drive aisles. Drive aisles appear to be appropriately sized and have adequate painted signage to indicate path of travel through the parking areas. Signage is clearly indicated for the parking areas. There is an adequate distribution of ADA accessible spaces around the site, and the striping for the spaces appears to meet current code.

However, the combination of pedestrian and vehicular traffic in the parking lot creates conflict. Pedestrians parking in certain locations of the parking areas must traverse the

Site Considerations
section II

Parking

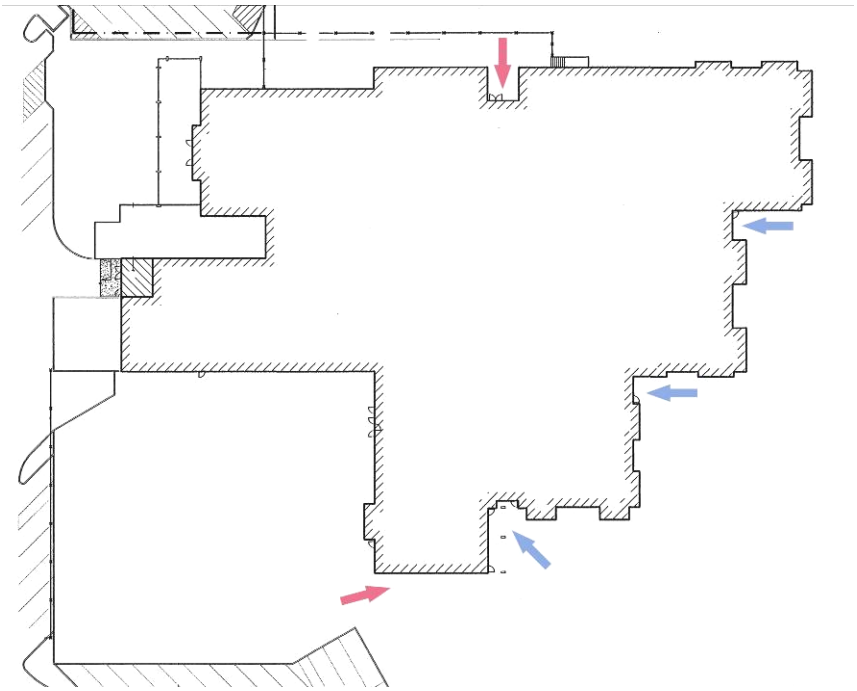
drive aisles to enter the library. Traffic pattern assessment and walk path striping should be considered.

Accessibility Issues

Accessible curb cuts from the parking lot are appropriately located adjacent to the accessible parking spaces. The accessible path of travel from the public sidewalks appears to meet current accessibility requirements.

Some existing pedestrian pathways from sidewalks to building entrances do not meet the correct grade requirements for accessible path of travel. These conflicts should be remedied to comply with the Americans with Disabilities Act requirements. Refer to the red arrows on the site plan below for locations.

Some exit paths from the building are not adequate; the sidewalks terminate right outside of the exit doors and do not continue to the public sidewalks in accordance with fire code requirements for exiting path of travel. This issue should be remedied to comply with code requirements. See the blue arrows on the site plan below for locations.



West Olive Drive

Facilities Considerations
section III

Architectural Opportunities and Constraints

Exterior

The exterior of the building consists of brick facing and glazed elements, fixed dual pane storefront window and door systems, as well as glass block walls. The existing perimeter window systems allow for a significant amount of natural light entry into the building. Art glass installations exist in some of the window systems that highlight the adjacent reading areas. The windows are fixed, and the exit doors are alarmed for exiting.

There are large overhangs at the perimeter of the building; the eaves are finished with exposed wood siding. There is an existing sprinkler system intact to protect this wood finish from fire damage. There have been problems with gutter blockage that forces water to stream over the edge of the gutter and has caused flooding at the storefront exits in the past.

Facilities Considerations

section III

Architectural Opportunities and Constraints

The existing roof finish is concrete tile shingle roofing at the sloped roof areas as well as single-ply sheet roofing at the flat roof areas. Numerous types of skylights and translucent roofing panel installations throughout the facility highlight special features of the building or provide natural light at the joints between the original building footprint and the subsequent additions. There is minor mechanical equipment on the roof, including some exhaust fans and chimney extensions.

The landscape elements of the building are consistent across the entire property. There is a natural feeling to the landscaped planters, and there are many mature trees on the property. The paving areas are finished with brick and provide for entry procession from the parking areas to the entry of the building. Enclosed courtyards are provided at certain locations around the facility, but do not appear to be accessible as the doors leading out to these spaces seem to be alarmed and for exit use only.

Facilities Considerations

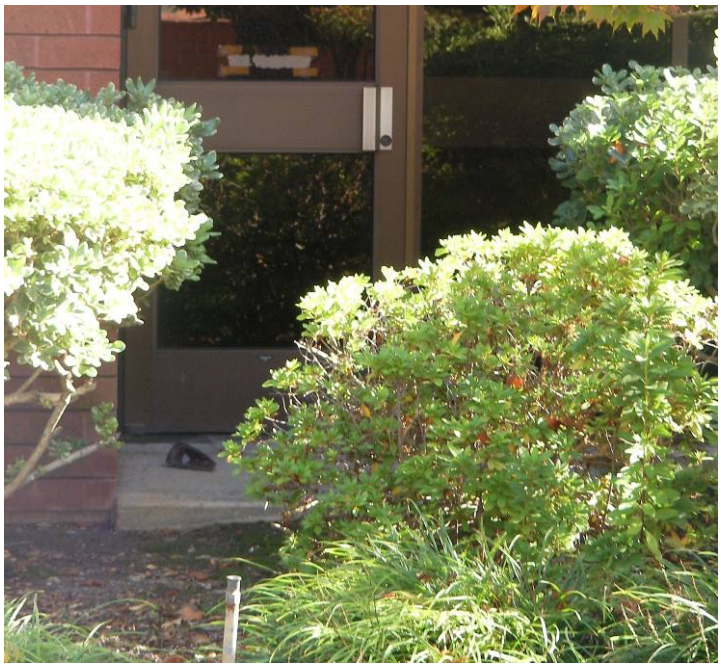
section III

Architectural Opportunities and Constraints

The main entry has a drainage trench to capture rain runoff, but the staff indicated problems with water infiltration and of consistent issues with pedestrians tracking significant water into the building during rain.

The major opportunities for the building exterior are as follows:

- The exterior has been well maintained, and there does not appear to be any structural damage that would require repair.
- The window systems allow for significant access to natural light. However, the lighting within the building is fairly dim because of tree cover adjacent to the window systems.



The major constraints for the building exterior are as follows:

- The accessibility of the paths from the fire exit doors should be remedied to provide code-complaint exiting.
- There are accessibility issues at some of the public pathways leading to the entrances of the building.
- The perimeter of the building contains significant window systems, and if additions were made to the building, the integrity of these systems would be compromised.
- There is a lack of appropriate signage at the actual site. Signage at adjacent intersections are not very visible and do not clearly direct traffic onto the library site. There is no significant building signage or signage at the Library entry to designate the main entrance to the building. The signage that does exist is obscured by trees and their shade.

Facilities Considerations

section III

Architectural Opportunities and Constraints

Interior

The interior finishes consist of brick wall facing and painted gypsum board wall finish. The ceilings are finished with areas of acoustical ceiling tile direct glued over gypsum board as well as areas of both exposed wood ceiling finish and painted gypsum board ceiling finish.

Asbestos-containing material from the original construction was removed from the facility as part of an abatement effort in November of 1997 and August of 1998. Per the reports documenting this abatement effort and the information discussed with the Facilities Department during the site walk on November 6, 2006, this completed the removal of the asbestos-containing materials from the facility.

The existing library is well used by the community of Sunnyvale. The facility and the finishes have worn due to the amount of use the facility receives. In general, the toilet room finishes are worn and damaged. Lighting in the toilet rooms does not appear to be adequate.

Facilities Considerations

section III

Architectural Opportunities and Constraints

Lighting throughout the facility consists of fluorescent strip fixtures, mostly direct/indirect fixture types. In combination with the natural light, this provides for significant lighting throughout the spaces. The electrical light alone does not appear to adequately illuminate the spaces for appropriate reading light levels, and therefore after dark the building seems very dimly lit.

Exit signage is located at each exit door. Stairs to the mezzanine do not appear to meet current code; the landing at the main entry doors at the mezzanine does not accommodate the appropriate clear distance for accessibility requirements. There is a head-height clearance concern at the underside of the stairway to the mezzanine and there have been temporary measures taken to cover exposed sharp stair handrail post protrusions.

Facilities Considerations
section III

Architectural Opportunities and Constraints

Some of the office furniture layouts require that the existing window wall systems are covered with opaque covering, which obscures and blocks light transfer. The brick wall finish does not allow for concealed technology conduit and equipment and therefore a consistent issue with technology conduit and wiring remaining exposed exists.

The major opportunities for the building interior are as follows:

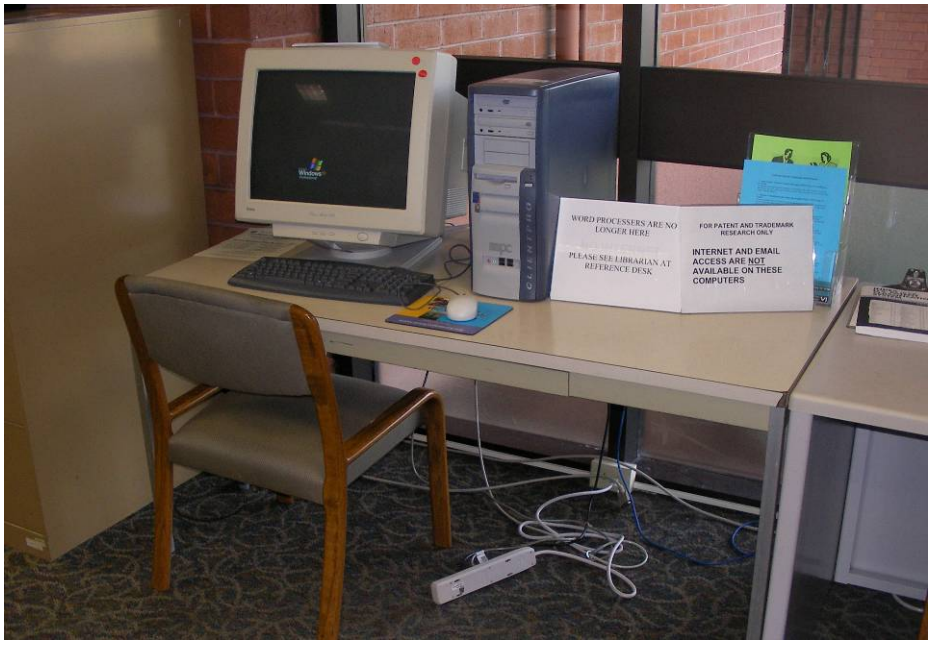
- The floor plan layout allows for access to natural light in almost all interior spaces.

The major constraints for the building interior are as follows:

- The interior brick wall finish will be difficult to retrofit without exposed conduit and equipment. The nature of the brick finish impedes wireless technology systems; in order to achieve coverage for the entire facility, additional wireless access points will be required over a standard installation in order to overcome the barrier of the brick finish. This issue also is evident at the window wall systems. Conduit and wiring are exposed and visible from the exterior of the building as well as from the interior.

Facilities Considerations
section III

Architectural Opportunities and Constraints



- The floor plan layout is expansive and does not allow for easy oversight of the entire facility from one location.
- Where there is no access to natural lighting, the spaces are too dim to accommodate the appropriate lighting levels needed for reading.

Accessibility

Exterior accessibility does have some challenges as noted in the site section above, but in general, the facility appears to be compliant. The parking accessibility appears to be compliant. Interior accessibility is adequate other than access to the mezzanine and/or basement levels. The only elevator in the facility is located in a secure location so that it is not accessible to the public. The mezzanine and basement levels currently house only non-public functions, but still require accessibility means. The landing at the mezzanine door does not appear to meet accessibility code requirements.

Some light fixtures have been installed too low and cause head height clearance issues. These should be relocated to accommodate the appropriate clearances. The location shown below is adjacent to the stairs leading to the mezzanine, but other lighting throughout the library should be reviewed.

Facilities Considerations
section III

Architectural Opportunities and Constraints

The toilet rooms include accessible stalls and fixture mounting heights. The sink locations do not appear to meet accessibility requirements for front access. There does not appear to be the appropriate turnaround clearances in the toilet rooms.

Door hardware throughout the building does appear to be accessibility compliant. Some exit devices are of outdated push bar types and should be replaced with hardware that is more current.

Structural Considerations

Building Description

The subject building consists of the main core building with building additions that took place at a later date. The original core building structural drawings and the additions and alterations drawings are dated September 21, 1959 and April 23, 1983 respectively, by Structural Engineers, Pregnoff and Matheu. The building contains two partial basements (approximately 6200 square feet in area) and a partial mezzanine (approximately 4200 square feet in area). The library presently houses several offices, program rooms, conference rooms, microfilm/computers, in addition to library space dedicated to children's and adult reading books/study areas. The building is approximately 60,000 square feet in area (including the basements and mezzanine). At approximately the center of the building, adjacent to the patron services, is a very large fireplace which is constructed with a combination of brick masonry and steel frames. In addition, a fountain which is no longer in use was constructed across from the entry to the library. The fountain was constructed of concrete walls along with a steel framework at the lintel level. Both the fireplace and the fountain were constructed during the additions/alterations phase. Additionally, the library contains numerous skylights in the field of the structure.

Structural Systems Assessment

The purpose of this review is to ascertain the present condition of the building, to comment on the original structural design, and to point out deficiencies in relation to current design standards. The review consisted of a field observation of the building on November 6, 2006

Facilities Considerations

section III

Structural Considerations

and a review of the original structural drawings. Original calculations, soils report, and specifications were not available for use.

1. The information given in this report was based on a walk through of the site and a review of the drawings, supplied to the consultant. The site walk through was brief and was not intended to be a comprehensive site investigation of the structure. In most locations, architectural finishes were not removed to allow viewing of the structure.

2. Biggs Cardosa Associates makes no warranty either expressed or implied, as to the findings, recommendation, or professional opinions stated in this report.

3. Biggs Cardosa Associates take no responsibility for the conformance of the as-constructed structure with the intent of the design documents.

4. No reliance of this report shall be made by anyone other than the City of the Sunnyvale.

5. Biggs Cardosa Associates has made reasonable efforts to assure that this report is accurate; however, cannot assume liability for damages which may result from its use or any conditions which this report might fail to disclose.

Vertical Load System

The roof construction of the original core building consists of ½" plywood sheathing over 2x T & G decking supported by 6 x 12 beams spaced at 8'-0" on center. The 6 x 12 beams are supported at the ridge and exterior of building with steel beams. The steel ridge beams in turn are supported by steel moment resisting frames that clear span the space and are supported by brick clad concrete pilasters at exterior lines of the building at approximately 16'-0" on center.

The walls on the exterior of the building are brick cavity walls with grout and steel reinforcing in the middle and of reinforced precast concrete columns with brick veneer. The foundation system of both the original core building and the additions are spread footings and reinforced concrete slab on grade.

The first basement that is part of the original core building consists of a raised reinforced concrete structural slab and beams with concrete retaining walls and conventional footings.

The roof construction of the additions is also ½" plywood sheathing over 2x T & G decking supported by open web truss joists spaced at 4'-0"center to center that are supported by steel ridge beams and steel beams at the exterior walls of the building. The steel ridge beams are supported by steel bents with moment resisting connections at their ends to steel columns. The foundation system of the additions consists of spread and continuous footings as well as concrete tie beams, used to resist the thrust from the steel moment bents.

The second basement (storage B-1) constructed at a later date after the main core building

Facilities Considerations
section III

Structural Considerations

consists of a reinforced concrete one way structural slab with joists and concrete columns. The mezzanine (Reception M-2) directly above the basement appears to consist of wood framing.

Please note that the structural drawings for this basement/mezzanine portion of building were not supplied for review. This addition took place between the original core building and the 1983 additions, since upgrades to the mezzanine and roof/attic framing were part of the seismic upgrades that took place during the 1983 additions & alterations.

Lateral Load System

The lateral load system of both the original core building and the additions consist of a horizontal plywood diaphragm over 2x T & G decking. The horizontal diaphragm distributes the loads to reinforced grout filled brick cavity walls and concrete shear walls in the original building and to concrete shear walls in the additions. The concrete shear walls in turn transfer the loads down to the foundation system.

Document Review Comments

In general, both the original core building and the additions were well designed. The vertical load carrying systems do not appear to be exhibiting any obvious signs of distress and appear to have been well maintained. Assuming the loading of the systems do not change and the systems continue to be well maintained, they could be expected to perform well in the future.

The seismic systems of both the original core building and the additions are fairly well defined with load paths provided for lateral forces. The core building, which was designed in 1959, did have modifications to its lateral carrying capacity by the addition of reinforced concrete shear walls. These modifications were part of the additions work performed in 1983 under the 1976 Uniform Building Code. Calculations of the upgrades were not provided, therefore confirmation that all elements not meeting the 1976 UBC were upgraded in 1983 would require further analysis and calculations.

Based on the work done in 1983 it appears that the original core building and the additions may essentially meet the requirements of the 1976 Uniform Building Code. FEMA 310 lists the 1997 UBC as the minimum design criteria for life/safety hazard mitigation for the original core building and the 1976 UBC for the additions portion of the building for this construction type (please note that the original core building has shear walls made of reinforced brick masonry cavity wall construction and is under a different category than the concrete shear walls constructed in the additions).

Several important changes relating to these buildings have occurred in the building code since the 1976 UBC. Primary of these are the increased requirements for providing anchorage of concrete walls to the roof diaphragm, distributing these anchorage forces to the diaphragm, increased lateral load demand on the diaphragm, the collectors and their connections, and the seismic joint clearances that occur between the additions and the original building.

Since design criteria is more stringent in the present code, wall connections to the

Facilities Considerations

section III

Structural Considerations

diaphragms as well at the distribution of the anchorage forces may have to be upgraded along with diaphragm and collector strengthening. Additional space between buildings may be required at the seismic joints between the buildings. Additional issues which may require upgrade are as follows:

1. The top of the exterior brick masonry wall on the south, north, and west side of the original core building does not extend to the roof diaphragm and therefore has no support for out-of-plan lateral loads.

2. The top of the brick masonry wall on the north & south walls of the east wing encloses the W10x21 beam bottom flange with 2 inches of grout. This connection is deficient. It does not adequately transfer the out-of-plane brick masonry wall loads to the roof diaphragm.

3. Concrete shear walls were added to the original core building to supplement the buildings lateral load capacity during the additions phase in 1983. These walls were added along critical lines of the building both at the interior and exterior. The added 10 inch thick concrete shear walls may be sufficient to carry the in-plane loads, however, the attachment of the concrete wall to the wide flange beam is similar as described in item no. 2 and therefore does not adequately transfer the out of plane wall loads to the diaphragm.

4. The added structure, during the 1983 phase, on the west side of the building (the technical services building, room 105) does not contain sufficient positive connections to tie to the original core structure. What was done was to install a ledger up against the original ledger with a continuous diaphragm joint between the two ledgers. Any lateral load across the double ledgers will cause the ledger to bend out of plane in the weak direction of the wood member and possibly cause failure. Additionally, along the boundaries of the structure, there is not a sufficient collector connection to distribute the lateral load along the added portion of the structure and the original core building.

5. The north – west structure (adult fiction, room 112) does not contain sufficient ties at the roof diaphragm level so that it acts in unity with the existing core building structure (reference, reference/desk, & business, room 114 area), nor are there any collectors connecting the two structures together.

6. The skylight opening over the fountain (near the entry/display area), which takes up approximately half of the diaphragm width contains no collector straps across roof framing members to transfer diaphragm shear loads past the openings to the diaphragm beyond in the north/south direction.

7. Soils information was unavailable for our review. Since soils design requirements may change over time and in particular since liquefaction has recently been identified as a new issue on many sites, our office recommends that a new soils

Facilities Considerations
section III

Structural Considerations

report be performed on this site to confirm that the existing foundation systems are adequate.

General Key Findings

General key findings from November 6, 2006 site walk:

- The building additions were based upon the 1976 structural code. There will likely be minor life safety upgrades required, and a major addition would likely trigger a structural system upgrade to current code, which will likely be significant, including upgrades to out-of-plan loading and tying any new structure back to the existing structure.
- Seismic joint spacing may need to be increased to meet current code, which will likely be significant.
- The addition of a second story to the building would trigger an upgrade to the structure of the remainder of the building, not just local structural upgrades.
- The existing structure consists of reinforced brick columns that have limited capacity above their current bearing status. A second story would require a duplicate structure to support the upper level, and would likely have to be seismically separated from the current structure.

Recommendations

FEMA 310 lists the 1997 UBC as the design criteria for life/safety hazard mitigation for the original core building and the 1976 UBC for the additions part of the structure for these construction types. Given the additions and the upgrades to the original core building appear to have used the 1976 UBC for their design it seems that the additions portion of the building should essentially meet the intent of the design requirements for life/safety hazard mitigation. However, the original core building would have to be upgraded to the 1997 UBC in order to meet this requirement. Given some of the items listed above, our office recommends that both the original and additions buildings undergo a complete review for life/safety as a minimum requirement for continued use of the buildings.

Given the occupancy of the building as well as the desire for its continued long term use, our office recommends that the buildings be evaluated using the current edition of the California Building Code. Retrofitting to this design criteria will not only meet minimum life/safety requirements but will also provide building serviceability in the event of a code level earthquake.

Facilities Considerations
section III

Mechanical Systems

Building Description

The project is a 60,000 square feet single story building with a mezzanine and basement, built in 1959 with 2 majors additions since then. The HVAC system components are a combination of installations on 1959, 1983 and 2006, with the latest mechanical project recently completed but not yet handed over to the Library.

Introduction

This Report is an evaluation of the HVAC, Plumbing and Fire-Protection systems of the Sunnyvale Library at 665 West Olive Avenue, Sunnyvale, California and is primarily based on a survey conducted on November 6, 2006 and review of available mechanical drawings. Existing drawings reviewed include partial schematic piping diagrams and mechanical floor plans of the original 1959 installation, 1983 renovation and 2002 HVAC upgrade. Based on the dates on the drawings the 2002 renovations were approved by the City in May 2005, with installation recently completed.

General Key Findings

General key findings from November 6, 2006 site walk:

- The existing chiller is noisy and sound escapes to the exterior of the building and to the main entry area. Acoustic treatment is suggested for this area.
- Many of the existing HVAC units have been recently replaced and are in new condition. However, the remaining equipment is at the end of their useful life. It is suggested that this equipment be replaced, including the boiler, which is not code-compliant. This is likely a difficult and costly replacement, due to the location of the existing boiler.
- There is not enough exhaust air in the system; it is suggested the system is upgraded to include the proper amount of exhaust transfer.
- The existing system is not an energy-conserving system, and the mechanical towers are old. There are no existing variable frequency drives installed, and the controls for the building are off-site due to city policy. This does not allow for adequate on-site controls for the system and thus does not allow for energy-reducing elements of the controls of the system.
- If a second story is added to the building, there would be significant ductwork renovation, which will likely be very costly.
- The mechanical system is not appropriately zoned for reuse as a facility other than a library. The different areas of the building are not easily separated into smaller zones. The capacity of the system would require review prior to any other use to verify capacity to accommodate for additional people or equipment.

Mechanical System Description

HVAC systems consist of chilled water plant, hot water plant, air handling systems, and miscellaneous system components, as described below.

Chilled Water Plant:

The chilled water plant consists of a new 157 Ton Trane manufacture R-22 water cooled screw chillers (with a power consumption of 0.65 KW/Ton), two forced draft cooling towers, one condenser water pumps, and one chilled water pump. Chiller, chilled water pump, and condenser water pumps are constant speed units.

Facilities Considerations
section III

Mechanical Systems

Cooling coils are equipped with 3-way control valves and there are no balancing valves installed on the cooling coils. According to the operations staff, there is excessive flow in the coils causing noise in the piping which is mitigated by throttling the shutoff ball valves. There is an air separator in the chilled water system and the operations staff have bled the system of all entrained air (entrained air could be a cause of water noise).

As a result of the fact that there are no balancing valves on the chilled water coils, the system has not been balanced except for the total chilled water flow rate through the chiller.

The chiller is in a basement room with door louvers which transfer air from a basement passageway which at one end is open to outdoors via an open stair. We understand from the operations staff that noise of the chiller is transferred to the grounds and to inside the building via the open passageway.

Two forced draft cooling towers, manufactured by Baltimore Air Coil, are located on grade and immediately adjacent to the building and in the close proximity of the basement. One cooling tower is brand new, while there is no information regarding age of the older cooling tower. Tower fans cycle on/off to maintain condenser water setpoint temperature.

According to the operations staff the water treatment was discontinued for a period of time due to budgetary restraints.

There was no visible sign of water leakage from the HVAC systems and the staff indicated that the piping are not leaking.

Boiler Plant:

Boiler plant consists of one Ajax manufacture model WGB, 1,250 MBH input gas fired hot water boiler and one hot water pump. From the boiler's serial number we have surmised that it was manufactured in 1990. There is no information as to condition of the boiler's water tubes.

Combustion air to the boiler room is provided by a fresh air supply fan with a wall supply grille. There are no other air paths into or out of the boiler room.

Air Handling Units:

There are a total of 7 constant volume supply fans or air handling units supplying conditioned air to various areas of the building. The units are single zone, multi-zone or are provided with duct mounted heating and cooling coils. In one air handling unit, there is a cooling coil upstream of 3 zone heating coils, thus allowing the possibility of reheat on a constant volume system which is in conflict with the Energy Code. Based on the 1983 drawings there are a total of 54,300 cfm of air supplied to the building, equating to

Facilities Considerations
section III

Mechanical Systems

approximately 0.9 cfm/sq.ft.

It appears that all air handling systems are provided with a power exhaust arrangement or counterweight backdraft dampers at individual spaces.

There are 3 areas in the Library with apparent excessive noise. In two cases the noise appear to generated by the square supply air diffusers while the third source of noise, from a large return air grille, appears to fan generated noise.

Drawings do not indicate fire dampers or fire & smoke dampers except for marked up notes at the chiller room.

There is substantial amount of rectangular ductwork from the air handling units to the areas served. Majority of diffusers are ceiling mount, 4-way discharge or double deflection grilles. A portion of the library is supplied from floor mount bar grilles, with ductwork in the basement level. Might fluorescent light fixtures have an air slot for return air at their perimeter.

Building Management System:

As advised by operations staff there is a recently installed Trane Tracer direct digital control system controlling the mechanical systems.

The system does not have local temperature adjustment and the Library staff need to call maintenance staff in another building to make adjustment necessary.

Control valve actuators for chilled water and heating hot water coils have been replaced with Belimo manufactured actuators.

Seismic Isolation:
The seismic isolation of the mechanical system was not easily observed, although it is likely that the ductwork, piping and all old equipment are not adequately braced.

Recommendations

The system is a mixture of different construction/renovations, presumed to be 1959, 1983 and 2006. With the exception of piping and some air handling units the units appear to be either new or in general good condition, capable of supplying the building's needs for years to come. Even the 1959 air handling systems are likely capable of many years of service, although efficiency of the fan and motor are unknown and they will require higher level of service than newer units**.**

Chilled Water System:
The major components of the system are mostly new and capable of many years of service. However, all systems are constant volume which is not desirable for energy conservation. The cooling coil control valves are 3-way valves which is a primary cause of the "low delta-

Facilities Considerations
section III

Mechanical Systems

T syndrome" which causes operational difficulties and wastes energy by forcing the chiller to operate in an inefficient manner.

The 157 Ton size of the chiller equates to approximately 380 sq.ft/Ton which is inline with the average requirements for office occupancy.

Changing the cooling coil control valves to 2-way and changing the entire chilled water plant to variable flow (chilled water and condenser water), including addition of a variable frequency drive to the chiller, would substantially reduce the chiller plant's energy consumption.

Addition of balancing valves to cooling coils will help staff mitigate noise problems and reduce nuisance water flow/capacity issues with the air handling units.

The chiller noise transmitted to the basement passageway and therefrom to the grounds and to the Library could be reduced by addition of acoustic louver at the door louvers, and acoustic absorption panels in the chiller room as well as the basement passageway. A through analysis by an acoustical engineer is required to recommend specific mitigation measures.

The forced draft cooling towers are not energy efficient, as compared to induced draft cooling towers, however, their replacement is not a viable option. Nevertheless, addition of variable frequency drives to the towers will be able to provide much better control of condenser water supply temperature and also save energy.

Water treatment system is an essential component of a hydronic system and must be maintained as its discontinuation has the possibility of extensive deterioration of the piping systems.

Boiler Plant:
The boiler appears to be in relative good condition and if properly maintained, and assuming that its water tubes are in a good condition, should have a life expectancy of 5 to 10 years. Nevertheless if the building is to be expanded, requiring additional heating capacity, changing the boiler to a condensing type boiler would be good option.

The boiler plant with an output of 1000 MBtu/Hr equates to approximately 17 Btu/sq.ft which is lower that rule-of-thumb value of 20-25 Btu/sq.ft for an office occupancy. It is therefore likely, that if the occupancy of the space is changed to office environment, the boiler capacity will not be adequate for the loads imposed.

Combustion air supply for the boiler room does not conform to current codes with regards to high and low louvers connected to outdoors. While addition of two ducts from the boiler room to the roof, through the library, will mitigate the problem, valuable space must be sacrificed. Another solution would be to consult the boiler manufacturer to see if combustion air can be directly ducted to the burner thus creating a sealed combustion boiler.

Facilities Considerations
section III

Mechanical Systems

Air Handling Systems:
Except for some air handling units installed in 1959, the units observed are either new or appear to be in general good condition and capable of many years of service. Based on visible inspection of the exterior of the 1959 air handling unit, they may still provide years of service, however, their maintenance will increase. It is assumed that the coils connected to the units have been changed and are in acceptable condition.

All units are constant volume, whereas it is desirable to change the units to variable air volume to reduce energy consumption. This however, is only an option for spaces with low ceiling height. The total air supply of 0.9 cfm/sq.ft is inline with requirements of an office environment

There is one air handling unit with one cooling coil upstream of 3 heating coils, thus allowing the possibility of reheat on a constant volume system. While it is presumed that the Buildings Department have accepted this as an existing non-conforming condition, it should nevertheless be investigated to determine if mitigation measures could be developed to avoid reheat, or to minimize it.

Areas with excessive noise should be evaluated by an acoustical engineer to reduce noise problems.

Building Management System (BMS):
We understand that the new BMS is controlling all mechanical equipment and should not require any upgrade or expansion.

Recommendations

We understand that there are no leaks in the piping. Nevertheless, as the chemical treatment system was discontinued for a period of time, and due to the fact that the oldest piping in the building is approximately 55 years old, it is recommended that non-destructive testing (such as ultrasonic testing, requiring removal of pipe insulation for each test point) of chilled water and hot water piping be carried out to determine the life expectancy of piping. However, as currently there are no leaks and as the building has just completed a major upgrade, this may be delayed until leaks start to develop or until the next upgrade project.

Chilled Water System:
It is recommended to a study be conducted to determine the feasibility and life cycle cost of changing the existing chilled water plant to an all variable flow system including addition of variable frequency drive to the chiller and cooling towers.

As apparent from the water noise in and around cooling coils, balancing valves are required and it is recommended that pressure independent balancing valves be provided and that the system be balanced. It is also recommended that the chiller noise be evaluated by an acoustical engineer.

Boiler Plant:

Facilities Considerations
section III

Mechanical Systems

It is recommended that boiler's water tubes be inspected and cleaned and/or replaced, where necessary.

It is also recommended that the boiler room's combustion air supply be upgraded to comply with current codes by addition of new ductwork or consideration of modifications to the existing boilers.

Air Handling
It is recommended that the air handling system with reheat coils be Investigated to determine if mitigation measures could be developed to avoid reheat, or to minimize it. It is also recommended that an acoustical engineer review the excessive noise levels in various areas of the library to reduce noise problems.

Building Management System
There are no recommendations for the Building Management System

Seismic Isolation
It is recommended the seismic isolation of the mechanical system be reviewed thoroughly and upgraded as required to meet current codes.

Current program for the Library expansion calls for an additional 80,000 sq.ft which we understand may be built as additional floors above parts of the existing library. This requires that the existing roof and suspended MEP components be removed and re-installed. Furthermore, the existing chilled water, condenser water, heating hot water, and domestic water heater plants must be expanded and wherever possible interconnected. Heating hot water boilers are relatively inexpensive and a suitable solution is to remove the existing plant and serve the new and existing areas from a new, more efficient plant. However, there is substantial investment in the existing chilled water plant and a study needs to be carried out as to the best way of providing chilled water for the expanded building. Options include maintaining separate systems (for new and existing areas), relocating the existing chiller to a central location or locating the new chiller in an expanded basement chiller room, or connecting two separate systems into a common loop.

While this is possible, the changes required are quite extensive and considering the minimal energy efficiency of the existing building, it is questionable whether it is cost effective on a life cycle basis to proceed on this path or construct a new building.

One of the options under consideration is to build the complete library program space requirement of 140,000 sq.ft at a new location and reuse the existing building as offices. While a complete heating and cooling load calculation must be carried out to ensure that the existing systems can cater to the needs of office environment, it appears based on air quantity of air handling units and size of the chiller and boiler plant that there is adequate overall capacity except for the boiler plant which will likely require additional capacity. Nevertheless, it is probable that capacity of some air handling units will not be adequate.

Facilities Considerations

section III

Mechanical Systems

Furthermore, assuming that partitions will be added to existing open plan areas, zoning will become an issue as currently each zone (with one thermostat) served by the existing air handling units are relatively large, and in order to provide additional temperature control zones, to accommodate various exposures and occupancies, will require that the system be changed to a variable air volume system.

If the capacity of existing systems are inadequate for the needs of an office occupancy, supplemental systems could be added to cater for the additional loads in the form of new air handling units, 4-pipe fan coil units, split air cooled, water source heat pump, or packaged rooftop units.

An architectural issue with mechanical ramifications is addition of partitions to areas with high ceilings. In some large spaces the supply air grilles are located at the perimeter of the space, or at floor or ceiling level, which creates a particular difficulty for supply of conditioned air to interior partitioned spaces. Mitigation measures for this issue include adding supply ductwork and diffusers at the high roof area or addition of a raised access floor system, and use of same for air distribution, to the new office areas.

Facilities Considerations
section III

Plumbing Systems

Existing System Description

The plumbing systems for the building are largely concealed within the building fabric and therefore visible inspection was not possible. However, indications are that the basic needs of water supply and sanitary drainage are met and that the systems are functional. There is a new storage type electric water heater in the basement mechanical room.

The 1983 plumbing drawings indicate 5 solar collector panels used for partial heating of the domestic hot water, however, we are not aware if the system exists or is functional. The building appears to have a complete coverage sprinkler system. We assume that the normal five year inspection and certification has occurred and is satisfactory.

Recommendations

There are no recommendations for the plumbing systems.

Facilities Considerations

section III

Electrical Systems

Building Description

The project is a 60,000 square feet single story building with a mezzanine and basement built in 1959 with 2 major additions since then. The electrical system components are a combination of installations from 1959 to 1983 with the latest electrical project recently completed.

Introduction

This Report is an evaluation of the Electrical system of the Sunnyvale Library at 665 West Olive Avenue, Sunnyvale, California and is primarily based on a survey conducted on November 6, 2006 and review of available electrical drawings. Existing drawings reviewed include single line diagrams and electrical floor plans of the original 1959 installation, 1983 renovation and 2002 HVAC upgrade. Based on the dates on the drawings the 2002 were approved by the City in May 2005, with installation recently completed.

General Key Findings

General key findings from November 6, 2006 site walk:

- The existing electrical service is adequate for the current use, but any building addition would require upgrade or an additional service inlet.
- The existing transformer would likely require replacement with any upgrade to the electrical service. The voltage would likely change from the current 208 volt to 480 volt to accommodate increase in building capacity needs.
- The existing switchgear would need to be upgraded for code compliance; this is costly upgrade. The current installation location is not code compliant.
- As the existing servers accommodate a large number of computer equipment, it is likely that most other uses for the building could be accommodated. Specific uses would have to be reviewed with regard to capacity of the system.
- Confirmation of the city telecommunications systems inlet is needed.

Electrical System Description

The existing electrical system consists of a 1600 amp, 208/120 volt switchboard with life safety power from a 50KW standby generator.

Main switchboard:
The main switchboard and PG&E meter is located in basement #1 accessible from the service yard. The switchboard power is derived from the PG&E pad mounted transformer located in the service yard. There is no apparent PG&E vault in the near vicinity. The switchboard is the original installation, but in serviceable condition. According to the PG&E billing, the switchboard appears to be about 60% of capacity. There is a 20% spare capacity due to the 80% main breaker rating.

Modifications should be kept to adding circuit breakers in existing spaces for any additional panel boards. The available space appears to be limited. Another problem may be in finding circuit breakers that can easily fit into this older model type switchboard. For any kind of remodeling, we recommend providing new panel boards rather than trying to get into the existing flush mounted panel boards throughout the spaces.

Emergency power:

Facilities Considerations
section III

Electrical Systems

The pad mounted generator is located in the service adjacent to the pad mounted transformer. The exhaust stack is attached to the roof and extends beyond the top of the roof line as required by code. The generator appears to be in serviceable condition.

The standby generator appears to be in good condition. There was no available monthly testing data to confirm the condition or existing load capacity. The size of the generator is adequate for the current use. The generator would probably need to be resized if a UPS is considered for future network room requirements.

Lighting System:
The existing light fixtures have recently been upgraded to T-8 lamps. The lighting levels appear to be adequate for current needs. The lights are currently controlled by time switches, located in a panel, with external override switches.

The existing light fixtures are in serviceable condition. As a possible energy-saving project, the library may want to consider replacing the existing time switches with a programmable lighting controller with relays and photocells to optimize the daylighting available.

Fire Alarm System:
The existing fire alarm system is currently up to code due to the recent remodeling. The fire alarm system should be serviced annually per code. We would recommend reviewing the testing to confirm current spare capacity and system condition.

Security System:
Per the User, the existing security system will be upgraded in an upcoming project.

For all intents and purposes, the current electrical systems are sufficient for the current needs. The existing electrical system should be able to accommodate a 20% load increase. However, confirmation would be required by connecting a recording load meter for at least three days.
The existing major electrical equipment are in serviceable condition. Major additions or modifications to the equipment may require current code upgrades.

Recommendations

1. Attach a recording load meter to confirm actual usage in KW or KVA. The conversion from the available kilowatt-hour value to kilowatt is an estimate only.

2. Install a programmable lighting controller to reduce energy if the building will be used as is, or moderately remodeled.

3. Confirm expansion capacities of the existing fire alarm system.

Current program for the Library expansion calls for an additional 80,000 sq.ft which we understand will be built as additional floors above parts of the existing library. This will require additional branch panels for both lighting and power. The existing distribution

Facilities Considerations
section III

Electrical Systems

panels served from the main switchboard may be able to accommodate the additional panels. Load metering of these distribution panels will be required to confirm the current capacity. Options include maintaining separate systems for new and existing areas. That means adding one new distribution panel for the expansion area.

The emergency generator exhaust stack may need to be extended or relocated to clear the new roof line per code.

One of the options under consideration is to build the complete library program space requirement of 140,000 sq.ft at a new location and turn over the existing building to the City for use as offices. While a complete power and lighting load calculation must be carried out to ensure that the existing systems can cater to the needs of office environment, it is probable that some panels have adequate capacity while the majority of the panels do not. Furthermore, assuming that partitions will be added to existing high ceiling open plan areas, providing power to the partitions will become an issue. Lighting should also be modified to control smaller areas to meet current energy code.

If the capacity of existing systems are inadequate for the needs of an office occupancy, supplemental systems could be added for the additional loads. These systems could be a new pad mounted transformer at 480/277 volt to replace the existing 208/120 volt pad mounted transformer. The new transformer would feed a new main switchboard at 480/277 volt and have a sub-feed to the existing transformer and switchboard. The city would have to purchase the existing PG&E pad mounted transformer or replace it with a city-owned pad mounted transformer. This provides for minimum disruption to the existing areas. There may not be adequate space in the existing service yard to accommodate a second pad mounted transformer and new service entrance switchboard.

Telecommunications and Security Systems

Building Description

The project is a 60,000 square feet single story building with a mezzanine and basement built in 1959 with two major additions since then. The data cabling was upgraded in recent renovations with additional conduit runs to services areas within the library; however, with limits in pathway and routing availability due to building construction, pathways may place data cabling over the industry standard length limits of 90 meters. There has been anticipation of future growth requirements by the placement of spare fiber optic cabling (six strand) at two “future” or potential IDF locations.

Introduction

This Report is an evaluation of the data, voice and security systems of the Sunnyvale Library at 665 West Olive Avenue, Sunnyvale, California and is primarily based on a survey conducted on November 20, 2006. It is not known if current infrastructure drawings exist depicting the systems, conduits, pathways, etc. within the building. We met on site with Michael Papa, network engineer for the City of Sunnyvale and toured the facility in its entirety.

Facilities Considerations
section III

Telecommunications and Security Systems

Data and Voice System Description

The existing data and voice systems are currently fed from the 650 W. Olive Ave. facility, and consist of multi strand blown fiber and high count copper feeders providing services to the library staff and users.

Data distribution is through a high end Cisco routing switch providing essential city network services to library personnel and internet services to library users. All traffic is routed over the same connection back to the servers in the IT department.

Infrastructure throughout the facility is comprised of new conduits feeding specific areas, along with existing conduits and walker floor duct, which is inadequate in capacity and coverage. Many of the newly installed conduits were not terminated in disconnect or floor boxes, but stubbed directly into casework, stacks and work areas. Any type of reuse of the space or remodel places these conduits at risk of becoming unusable and must be cut and capped to prevent trip hazards if found in open or walkway areas.

Building Access Control System Description

The building access control system (card readers) is a networked system which is fed from a central server database located in the IT department at 650 W. Olive avenue. The system is fed over the existing lines to the library and interfaces with door controllers, door release hardware and proximity card readers. It is not known if the existing system utilizes a distributed database, which in the event of communications being severed from the main server would allow the system to continue to work to allow card holders access into controlled areas. We were unable to open panels to ascertain if the systems were on standby batteries or deriving power from the small emergency generator on site.

Intrusion Detection System Description

The facility currently uses a Radionics intrusion alarm consisting of alarm panel, keypads and alarm sensors within the building. It was not evident in the site review if motion sensors, alarm contacts or break glass type sensors are in place; however, it is understood that the system does generate an alarm at the public safety office upon forced entry. It is unknown what level of security for break-ins exists. It is assumed that all perimeter doors are protected.

Public Address System Description

The existing public address system has been recently relocated and repaired to include new cable between the old and new locations and new volume control panels for area speakers. The system is not zoned, except in the sense that areas volumes may be adjusted individually for the all call type paging utilized. Access to the system is by telephone or hardwired microphone. The system is approximately 20 years old and was installed as part of a prior library upgrade. Ceiling speakers exist throughout each area providing adequate voice paging coverage. No page was made during the site review and determination of audibility and coverage was not possible.

Recommendations

For all intents and purposes, the current data and voice systems are sufficient for the present needs. The existing data and voice system should be able to accommodate moderate expansion with the understanding that future satellite data closets will become a necessity, especially on the far reaching areas from the main data frame. The recent addition of conduits for voice and data service will help alleviate expansion into certain areas/rooms;

Facilities Considerations

section III

Telecommunications and Security Systems

depending on future use, those conduits may not be sufficient to feed open spaces, future kiosks, meeting rooms, etc. Major additions or modifications to the equipment may require creation of new rooms and the addition of cooling systems for data active equipment.

Main data distribution area/room:
This area should be closed off and a separate "IT" space created to secure the incoming data and voice services into the facility. As with any facility housing equipment below grade or sublevel, there is always a potential for water damage and migration into the cabling and active equipment. Cooling of the space should be a consideration since future requirements for maintaining the existing services or adding new will mandate additional active components which generate heat load. Any new services should include the ability to keep on line essential services and equipment through extended run UPS systems or small UPS systems connected to a standby generator of sufficient size to accommodate critical building and systems power to include materials handling technologies (check out and check in).

Satellite IDF rooms:
Any remodel of the current facility should include remote or satellite data and voice distribution rooms which would house active network hardware and systems. Consideration should be given to location to maintain length limits on Category type cabling within given spaces or floor zones. Any new services should include the ability to keep on line essential services and equipment through extended run UPS systems or small UPS systems connected to a standby generator of sufficient size to accommodate critical building and systems power

Access Control:
The existing access control system is limited to key doors for city personnel to access the facility. The system may be expanded to include control doors and areas as needed with the addition of door control panels, door hardware and card reader assemblies. Panels will require building power for operation and should be connected to building emergency power systems. The system utilized proximity card readers to allow access to the facility by card holders with allowed access via the main server database.

Intrusion Systems:
The existing intrusion alarm system is capable of providing perimeter and interior point or sensor monitoring for intrusion detection. The system as installed may be adequate for current requirements; however it should be reviewed for coverage of doors, windows, etc. with a comprehensive security evaluation.

Paging System:
The existing system services the needs of the current facility; however any expansion, growth or remodel of the facility will require upgrades or replacements of existing amplifiers, controls and cabling. It is unknown what audibility level is available through the system and whether it is intelligible in all areas and that overall coverage is adequate. Radio communication, ideally used for quick staff response in customer service, is hampered by the building structure and materials.

Facilities Considerations
section III

Telecommunications and Security Systems

Recommendations for Next Steps:

1. Document all existing data and voice lines, routes, and pathways into a living building document, preferable into a CAD program such as AutoCAD. This would allow the City and contractors the ability to review, add and enhance the overall cabling plan within the facility.
2. Develop network segment plans to separate City data traffic from library internet traffic
3. Review and add satellite data rooms for active equipment and zoned cabling
4. Ensure there is a industry standard plan (BICSI guidelines) for all new or changed cabling within the facility.

Current program for the Library expansion calls for an additional 80,000 sq.ft which we understand may be built as additional floors above parts of the existing library. Any expansion will mandate the installation of satellite data equipment and cabling for data and voice services. Many of the voice and data circuits traverse above the ceilings spaces (concealed) and may require abandoning those cables, demolishing and/or rerouting around remodel and new construction areas where upper floors would be included.

One of the options under consideration is to build the complete library program space requirement of 140,000 sq.ft at a new location and turn over the existing building to the City for use as office space. This scenario would most likely add capacity above and beyond the capacities of the current conduit and cabling infrastructure. Office spaces would require new cables, conduits and pathways with potential for new conduits, etc. to be installed via saw cutting the slab or extensive redesign of the above ceiling conduit and cabling to service City staff telecom needs. The incoming services to the building may be adequate providing that City “IT” feeds the building similar to the current configuration. This scenario will require the creation of a dedicate MDF room and satellite IDF rooms strategically placed within the facility. The electrical power requirements to add computer loads and HVAC loads will need to be evaluated to ascertain sufficient capacity to provide adequate resources for data equipment and computer power.

Facilities Considerations

section III

Key Concepts Moving Forward

The site has little remaining open space. Any building additions and additional parking areas will have to be coordinated within the layout of the existing buildings.

Exterior finishes do not appear to require major upgrades other than coordination with any building additions. It is suggested that interior finishes be upgraded in the toilet rooms. All other interior finishes have been well maintained and could remain unless an aesthetic upgrade is desired. The existing brick finish will make technology upgrades difficult to accomplish without exposure of conduit and equipment.

Lighting throughout the building should be upgraded to receive fixtures that are more current and to allow for appropriate reading light levels.

Accessibility concerns should be addressed in the existing facility as noted in the sections above, as should remaining mechanical and electrical issues that have been indicated to require upgrades. HVAC equipment upgrades to accommodate building additions will have to be reviewed specifically in regard to increased capacity.

Structural considerations will need to be reviewed in regards to specific locations of building additions to determine structural and financial feasibility.