

## **Executive Summary**

We looked over plans and walked the library to evaluate expansion and remodel possibilities. Expansion options are limited; the site is land locked on all four sides. Expanding at the current site can only happen vertically, which will require closure during at least part of the construction.

The building is in relatively good shape, but several repairs and service expansions must be addressed in any remodel or expansion. Water problems are damaging the roof in the northeastern corner and encouraging building settlement in several locations. Electrical service is maxed out and requires an upgrade. The suspended ceiling is not braced for earthquakes. Installation of a fire reporting system will be required for any expansion.

State law requires that accessibility issues must be addressed if more than \$125,000 in improvements is spent over three years. Accessibility requirements have several minor elements with modest costs, but will also require constructing large restrooms with accessible stalls to serve the meeting space.

Remodeling the building can be done freely with a few limitations. Interior masonry walls typically support roof and mezzanine or second floor loads and would be expensive to remove. (Removed walls would require replacement with steel beams, columns, and footings.) See the next two pages for the location of structural walls that must remain in a remodel. The first floor can support all library and meeting hall uses, while the second floor can support all uses but stacks and storage.

Expanding the building vertically was not anticipated in the design of the current building. Additional floors can be constructed, but will require extensive work. The existing roof will not function as a floor and must be removed. The existing footings will have to be enlarged, new footings constructed, and walls must be reinforced or replaced with steel columns.

Another option is to build an additional branch, or to sell the existing branch (which is well located for city staff and services) and build a larger branch elsewhere. Estimated costs for these options are located in the cost summary at the end of the report.

## **Overview**

Willdan was asked to investigate several options for upgrading, improving, and replacing the library building. We walked the building and took photographs, reviewed old soils reports and plans, and analyzed various components to evaluate the feasibility of the requested options. The remainder of the report examines various conditions and restrictions that impact the rehabilitation and expansion of the site.

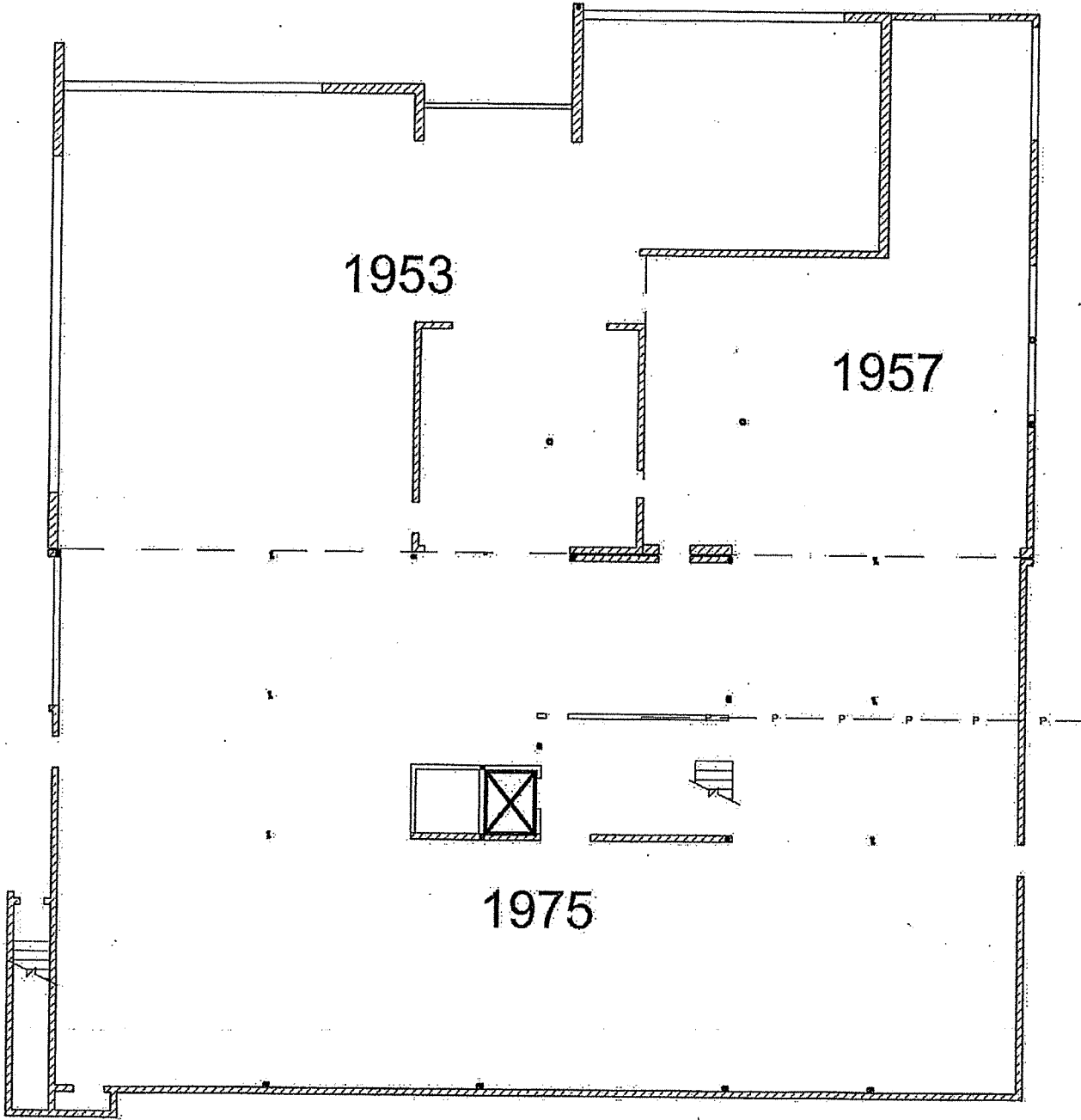
### **A note on prices in this report**

The cited prices are rough estimates based on engineering judgment and educated guesses. Many of the numbers, particularly for new construction, are highly variable—the specific building design, materials, layout, architectural elements, and wall coverings will affect these numbers greatly.

The listed prices are also very specific to this moment in time. Only a year ago, the estimated cost for new construction was almost fifty percent higher due to a competitive labor market and tight material supplies. The current economic downturn has loosened both of these constraints, bringing down the price of both labor and materials. Recent bids have been much lower for new construction than bids on similar buildings only a year ago. How long these lower costs will remain is impossible for us to guess.

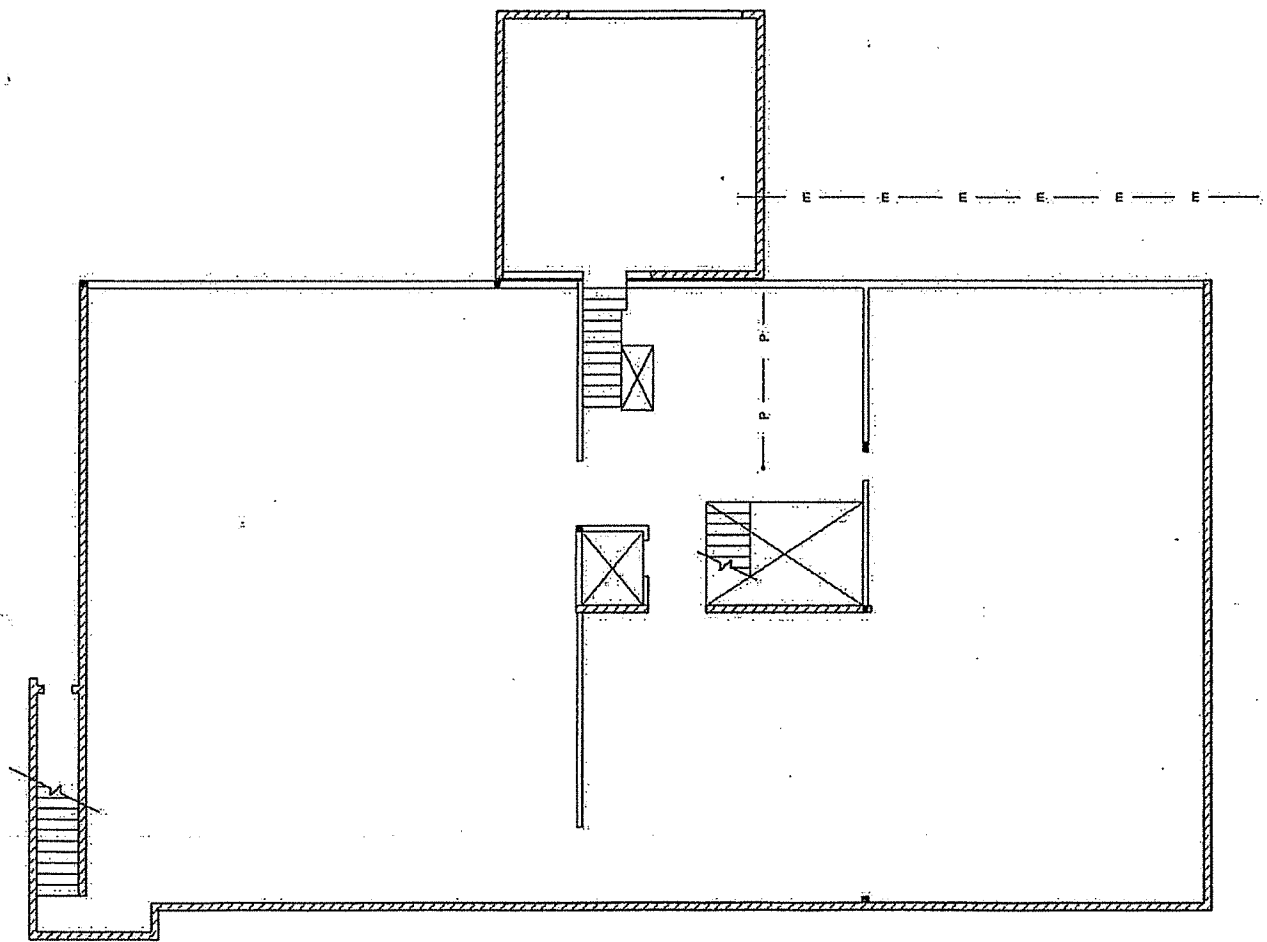
# Porterville Library: First Floor

Scale: 1/16" = 1'-0"



# Porterville Library: Second Floor

Scale: 1/16" = 1'-0"



## **Condition of the Existing Building**

The existing building was constructed in three phases. The original building (around the current entrance) was built in 1953 at 3824 square feet. Four years later an expansion wrapping around east edge of the existing library was built. This added 1760 square feet and completed the one story portion of the current building. In 1974, a two story expansion was approved for addition behind the existing building, and remains through this day. Each floor of the two story addition added 6100 square feet to the library.

An over all assessment of the building reveals the roof to be structurally sound, though it leaks locally when a roof drain backs up. The exterior of the building is in relatively good repair, despite cracking, while the interior needs carpet replacements.

### ***Electrical and Mechanical***

The existing building is almost out of electrical capacity. The building is currently served by a 600 amp 120/208 3 phase 4 wire panel.

The existing mechanical units are solidly supported and in good order. For the current building, they are adequate to the task. They do not appear to have been over sized to support a future building expansion.

### ***Structural***

The existing ground floor slab on grade is adequate to support the heavy loads of a library. (Though see building settlement below for further discussion.) The slab at the 1975 expansion (under the second floor) is in particularly good shape due to the extensive soil work done during its construction.

The second floor consists of open web steel trusses supported by a steel beam and column system. The open web trusses were designed in 1975 by Truss Joist (now iLevel). The supplied trusses were custom designed for the anticipated loads of the second floor. The sixteen foot span at the eastern end of the building was designed for a live load of 125 pounds per square foot. The remainder of the second floor was designed for the lighter live load of 100 pounds per square foot. Similarly, the capacity of the plywood at the second floor is 147 pounds per square foot<sup>1</sup>. The trusses have performed well to date, under their current loading.

### ***Building Settlement***

The original building appears<sup>2</sup> to have been constructed with conservatively sized footings and has suffered little settlement.

The 1957 expansion noted the presence of poor soils (specifically calling the local soils adobe<sup>3</sup>, and using very low design values of 1000 psf). Despite these low values and characterization of the soil as expansive, the footings constructed in this phase are narrow (16" wide, per detail D/S1) and little soil work was done. This helps to explain some of the settlement problems encountered in the northeast corner of the building. Since that

time, efforts have been made to rehabilitate this region, including a 2001 rehabilitation effort.

The 1975 expansion also noted the presence of poor soils. Extensive work was done to excavate and recompact the entire site, and piles were used in many locations. This resulted in greater bearing strengths and seems to have greatly reduced settlement related problems despite the greater load.

In portions of the building the slab is cracked and slopes. (The slope is particularly apparent adjacent to the repaired footing at the north east corner of the building.) The walls have vertical cracks at window boundaries, most pronounced along the alley. The 1957 expansion continued to settle for more than forty years before a rehabilitation effort in 2001. Vertical cracks are common but less pronounced throughout the masonry of the 1953 construction, and are essentially absent from the 1975 expansion..

### ***Water Damage***

Roof leaks were common in the past, but were addressed by a 1984 reroof. Leaks still occur at the northeast corner of the building, where blocked drains often lead to ponding problems at the roof. Installing an oversized backup drain or cutting an outlet through the parapet will extend the life of the existing roof and prevent damage to the building interior due to roof leaks.

At the ground, several gutters deposit roof water at the base of the building or trap water in sunken flowerbeds. This exacerbates the problems of poor soil, may cause pumping, and contributes to the building's settlement problems.

### ***Suspended Ceiling***

The ceiling at the original construction and the 1957 expansion were reduced from 14'-6" high to 11' high to match the new second story. This new suspended ceiling is attached without seismic bracing, and with the insulation installed against the suspended ceiling instead of against the ceiling.

### ***Plumbing***

The existing cast iron pipe is sufficiently sized for the additional restrooms. The pipeline location is listed on the previous sketches.

Several methods exist for repairing or replacing the existing pipe during the construction of new restrooms. Horizontal boring for a new line, a liquid sleeve to extend the life of the existing plumbing, or sawcutting the slab and installing new pipes are all options.

## **Constraints on Remodeling or Expanding the Library**

The California Building Code requires several upgrades to be performed if the library is remodeled or expanded. Libraries and Meeting Rooms are both type A-3 occupancies under the 2007 California Building Code.

### **Accessibility Spending Threshold**

If more than \$126,764.66 is spent on improvements to the building, then the building must be brought into compliance with minimum disabled access requirements<sup>4</sup>. The threshold includes all remodeling performed over a three year period.

### **Electrical**

Electrical service to the building is already completely allocated, with little reserve remaining. Upgrading the main electrical panel from a 600 amp 120/208 3 phase 4 wire panel to 1200 amps is anticipated to cost \$40,000 to \$50,000

### **Fire Safety**

With the renovation a fire safety upgrade is required. A smoke alarm system with central station reporting is a good, inexpensive solution. Its estimated cost is \$25,000.

### **Structural**

The existing second floor is typically designed for 100 pounds per square foot of live load, with a sixteen foot wide 125 psf region. This is adequate to support many of the available uses for the building under the current building code; assembly areas with movable seats are designed for 100 psf, reading rooms are 60 psf, and corridors only require 80 psf. Typical stack rooms, on the other hand, are designed for 150 psf live load in the current code<sup>5</sup>.

The 150 psf live load for stacks is based on several restrictive assumptions. Stack room loading applies to non-mobile double-faced library bookstacks, no more than 90 inches high, 12 inches deep, with at least 36 inch wide aisles. To keep the load below 100 psf would require much greater spacing between stacks, shorter stacks, or other measures to keep the load down.

Seismic upgrades do not appear to be required per CBC 3415, as the structure is not state owned. Any alterations that increase force in an element by ten percent or more require structural analysis. On casual review, the reinforcing in the masonry walls is sufficient to meet modern code. The connections from beams, joists, and rafters to walls are under-strength by modern standards.

### **Accessibility**

The existing building has 3 restroom facilities for each sex, but this will be reduced to 2 if remodeled for accessible accommodations. To remodel the existing second floor restroom to provide accessible stalls would cost about \$60,000. [The number of toilets is insufficient to support the building's uses—see below.]

The central stairway also will require a retrofit to provide a four inch maximum baluster spacing, a twelve inch extension of the hand railing beyond the last step, and sheet metal enclosure of the stair treads, for a total estimated cost of \$4,000.

The existing elevator is sufficiently large for accessibility purposes.

The drinking fountain requires wing walls under the new code to protect the visually impaired. This is estimated to cost \$600.

### ***Restroom Construction***

The existing 2610 square foot meeting room has a calculated occupancy of 372 people. This room alone requires 3 male and 8 female toilets. The 15,174 square feet of library requires an additional 2 male and 4 female facilities.

The number of restroom facilities required by the code is dictated by the size of the meeting room. At its current size, the meeting room requires 3 male and 8 female toilets. If the meeting room were reduced in size as part of a remodel, the number of required toilets would decrease proportionately. Identifying the required size for the meeting room is important to estimating the required number of stalls. New restrooms serving 10 female and 4 male are estimated to cost \$75,000 to \$100,000.

### ***Expansion Constraints***

The library faces several obstacles to expansion. Horizontal expansion of the library is restricted by Thurman Avenue to the north, Hockett Street to the west, an alley to the east, and a fire station to the south. The alley has many services running through it, and would prove expensive to encroach upon. The other directions completely prohibit expansion unless road closure and dedication are planned.

The remaining direction for expansion in place is vertical. The building was not designed with future floors in mind, so any vertical expansion will require extensive new construction support the new areas. Any upward addition will require extensive subgrade and footing work, which will interfere with the library's operation during construction.



## **Remodel Options**

Several options were requested for investigation. Some are structural changes that will require the services of an engineer, while others changes are minor enough that an interior designer can address them, much like a commercial tenant improvement.

### **Room Arrangements**

Several rooms exist on the first and second floor that may be repurposed. The first floor contains several offices and quiet rooms that may be relocated. Similarly, moving the meeting room to the first floor has been analyzed.

In general, the ground floor can support any of the current library functions. Partitions and non-bearing walls may have to be removed to fit a large meeting room or may be desirable to extend the stack area, while new partition walls might be erected to create new quiet rooms or offices.

The second floor can support many library functions. Quiet rooms, reading rooms, and offices can be supported, as can display cabinets. Stack rooms are too heavy for the second floor trusses. Typical tricks for reducing increasing floor capacity (such as adding a beam at the middle of the existing span) do not work with open web trusses, greatly limiting our options.

Rearranging the spaces of the first and second floor, including erecting and removing non-structural partition walls, can be planned by an interior designer.

### **Removing the Old Central Core**

The central core of the structure dates back to the original 1953 construction. Masonry walls support a mezzanine containing a staff room (currently used for storage), a heater room, an old toilet room (currently a janitor's closet), and a mechanical room.

Removing the core at the ground floor (to open up ground floor traffic patterns) would require support of the mezzanine floor and walls above, unless they are also removed. Retaining the mezzanine without the ground floor would be awkward; the eight foot clear to the bottom of floor framing is well below the eleven foot high ceiling throughout the remainder of the building. This would result in a floating box within the overall building, and require retrofitting steel beam and column supports. The offices currently located here would also require relocation.

Removing both the mezzanine and ground floor core is possible, but would have several effects. First, the electrical and mechanical units currently in the mezzanine would have to be relocated elsewhere. Second, the roof framing in this region frames into the masonry walls on two sides and will require support if walls are removed. Also, the roof over the mezzanine is separated from the low roof of the remaining building by a parapet and is set at a higher elevation. If the walls are removed, steel beams will be required. If retaining the offset roof is desired, a structural wall will have to be built (or retained) above the structural beam supporting the low roof.

Altering the central core will require structural analysis. Removing the first floor walls, but leaving the mezzanine and its services intact would cost approximately \$180,000 (This includes supporting the existing floor and joists, demolishing the bottom 10' of masonry, sliding deep wide flange steel beams under the walls, columns, and large footings, plus providing dust catchers, etc. during construction.)

Removing the mezzanine room and walls from slab to roof, including eliminating the mezzanine floor entirely, is anticipated to cost about \$125,000. Removing this region entirely requires relocating the mechanical and electrical services and building new enclosures at a cost of \$150,000.

### **Altering the 1975 Central Core**

The central core of the 1975 expansion includes elements that would be expensive to move. The core is anchored by an elevator pit and stairway. Many of the remaining walls are removable at each level. Investigation did not consider the cost to relocate the elevator.

On the first floor, only two interior masonry walls are structural, including the 17'-2" long masonry wall (with a 3'-4" opening) backing on the existing building (at the time of construction) and the 30'-4" long masonry wall (with a 5' opening) running along the elevator. The elevator shaft and elevator room walls should remain, but all others can be removed or relocated as necessary.

The second floor framing is primarily supported on steel beams with wood joists at the core area. The central roof framing is supported by two wood walls perpendicular to the above interior masonry walls. These walls sit on wide flanged steel beams supported by columns at the corner of the masonry wall adjacent to the elevator. Removing either of these walls would require replacement with a glulam or steel beam to support the roof and equipment.

### **Solar Panels**

Placing solar panels over the existing roof is another way to address energy issues in the building. The existing roof seems to have enough capacity to support many solar panel applications. Solar panel prices vary, but panels costing \$350,000 (with some rebates potentially available from the state and federal governments) could supply a significant portion of the building's power needs.

## **Expansion Options**

As discussed under Constraints, the library is “land locked” and cannot expand horizontally. The remaining options include expanding the building vertically and seeking out a new building site and constructing a new library from scratch. Enlarging the building may trigger a planning review, which brings up the issue of dedicated parking. For a building of its size, about 20,000 square feet of parking is typically required. There is no available space to place this parking at the moment.

### ***Vertical Additions***

The building can be expanded vertically, though it will take a great deal of effort. The existing building was not built with an additional floor (or more) in mind, so vertical expansion will require strengthening the existing building or constructing a “building within a building”.

Vertical expansion will require cutting through the floor slab (and/or sidewalks) to place new footings or to widen the existing footings to resist the new loads. New floor framing members must replace the existing roof, which wasn’t designed for heavy floor loading. The new floor will require independent support—either extending directly to the ground via new steel columns, or built atop the existing walls after careful analysis and reinforcement. Similarly, each floor, wall, and roof will require structural support.

### ***Vertical Replacements***

For radical changes, it may be more cost effective to demolish all or part of the existing library instead of working with the existing structure. Removing and replacing portions of the existing structure will allow for a more flexible layout, with wide open spaces instead of retaining the interior partitions created by the existing masonry walls.

Changes of this extent will require demolition and disposal of the existing structure (or a portion) before new construction can begin. This will also require shutting down the library and storing its books and other media elsewhere while the construction continues.

### ***A New Library***

A new library building will currently cost about \$350 per square foot to construct, after land is acquired and services are extended to the new location. If a new library is built elsewhere with the intent of replacing this branch, the existing building is well located. Other city services/administration will likely be interested in maintaining or upgrading the existing building and converting it to office space or storage. The building is adequate for storage on the first floor, but the second floor trusses are not designed for storage loads. Money gained from sale of the existing building might offset some of the new building costs.

## Cost Summary

Several options for modifying the existing building have been examined. Below, we summarize the costs associated with each of the options.

### Improvements and Repairs

Double electrical capacity (in current location): \$40,000 to \$50,000

Install overflow drains: \$1,500 each

Cut scuppers for emergency outflow: \$1,200/location

Downspout extensions and concrete drain work: \$1,500

Suspended ceiling bracing & insulation repair: \$15,000

Plumbing line rehabilitation: \$6,000

Plumbing line replacement: \$15,000

### Required for Remodels (and Expansions) over \$125,000

Install smoke alarm system with central reporting: \$25,000

Build new 10 stall female and 4 stall male restrooms: \$75,000 to \$100,000

Enclose steps and extend handrails: \$4,000

Drinking fountain wing walls: \$600

### Remodel Options

Remodel second floor restrooms for accessibility: \$60,000

Demolish existing non-bearing partitions: \$400/foot

Construct non-bearing partition walls: \$110/foot

Remove old central core, ground floor only: \$180,000

Remove old central core, ground and mezzanine: \$125,000 \*requires relocating utilities

Relocate utilities and build a new enclosure: \$150,000

Roof mounted solar panels: \$350,000 (for about 50 Kw)

### Expansion and New Building Options

Demolition of 1953+1957 section: \$225,000

New construction on existing site, costs from \$300/SF

Building over the existing one-story library, including strengthening the existing structure as required for support: \$350/SF

New Library Building: From \$350/SF building construction cost.

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<sup>1</sup> 240c Sturdiflör is good for 147 psf, while 48/24 plywood would be capable of supporting 194 psf, with bending controlling the design (per APA Q225).

<sup>2</sup> The initial building plans are incomplete; only the five architectural sheets of the first phase remain in the city's possession. The structural drawings of other phases depict these older footings as relatively wide and centered, which helps to explain the relative lack of settlement related issues.

<sup>3</sup> Adobe soils have a large shrink swell potential as part of their definition.

<sup>4</sup> CBC 1134B.2.1

<sup>5</sup> CBC Table 1607.1, #23 Libraries, and footnote b (re: Stacks)