



I. 4.

Palmer City Council Meeting

Meeting Date: 08/27/2024

Submitted For: Brad Hanson, Community Development Director

Department: Community Development

Agenda Category: New Business **Approved**

Subject

Action Memorandum No. 24-052: Authorizing the City Manager to Issue a Contract to Perform Additional Interior Demolition at The Palmer Public Library to Determine the Full Scope of Structural Damagewith Steppers Construction Inc. for an Amount Not to Exceed \$44,844

Summary Statement/Background

On July 9, 2024, City Staff and our representatives, Wolf Architecture, PND Engineers and Combs Insurance conducted a site visit with APEI Insurance, Sedgwick Insurance Adjusters, MKA International to the Palmer Public Library. The purpose of the site visit was for our insurance company and adjusters to fully understand the extent of the structural damage from the roof collapse of February 15, 2023. At Sedgwick Insurance adjusters' request, the City of Palmer prepared a response to their original anticipated claim costs. The cities claim is much higher than what insurance believes is the cost to repair. The council had previously authorized additional expenditures with Wolf Architecture, PND Engineers and Valley Mechanical to determine the full extent of the damage. Our findings indicated that substantially more damage occurred from the collapse and sitting unheated during the rest of the winter than what was being offered for a settlement.

PND's findings indicated additional structural damage and Valley Mechanical found the domestic water supply, heating system and fire suppression system were damaged to the point that completing new systems is necessary.

On July 26, the city sent out a request to quote seven contractors. Three returned quotes to perform the work. Steppers Construction Inc. was the low bidder with a bid of \$44,844. These costs will be covered as a part of the insurance settlement.

Administration's Recommendation:

Authorize the City Manager to issue a contract with Steppers Construction Inc. in the amount not exceed \$44,844.

Fiscal Impact

Total Amount of funds listed in this legislation: \$44,844

Legislation creates expenditure in the amount of: \$44,844

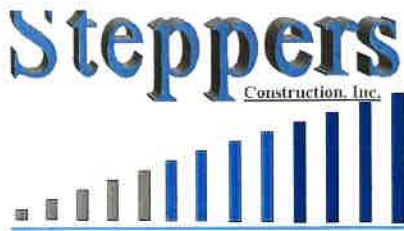
Budgeted Y/N?: N

Line Item(s): 08-01-25-6030 Contractual Services

Attachments

Demolition Quote

City Response to Claim



6382 E Beechcraft Rd
Wasilla, AK 99654
907-746-1880
www.steppers-alaska.com

CONSTRUCTION PROPOSAL & CONTRACT

Name: City of Palmer	Date: August 6, 2024
Address: 645 E Cope Industrial Way	Mobile: 907-745-3709
City/State: Palmer, AK 99645	Email: bahanson@palmerak.org

Project Name: Palmer Public Library Select Interior Demo

Project Location: 137 E Arctic Ave, Palmer, AK 99645

SCOPE OF WORK

Steppers Construction will furnish all material, equipment, and labor to complete the work as follows:

Demolition and removal in specified areas per drawings of the following:

- Gypsum Wall Board at Ceilings and soffit
- Light Gauge metal framing at ceiling
- Light Fixtures
- Electrical Wiring and Conduits
- Batt Insulation
- Ductwork

Remove and Salvage in specified areas per drawings the following:

- Linear Metal Ceiling panels
- Sprinkler Piping

The General Contractor will document the demolition photographically throughout the course of demolition with emphasis on mechanical systems. Reception casework will be kept in place and protected or removed within area of demolition.

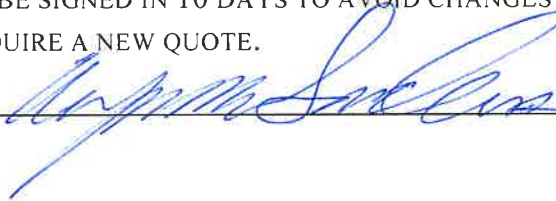
- ADDENDUM 1 ACKNOWLEDGEMENT 07/25/24
- OWNER REQUIRED ITEMS: - CITY OF PALMER TO PROVIDE DUMPSTER AT SITE AND PAY DUMP FEES
- EXCLUSIONS: PERMITTING, SURVEY, BONDING, TESTING, UTILITIES, AND INSPECTIONS. ASBESTOS OR OTHER HAZARDOUS MATERIALS, DEMOLITION OF ANY MATERIAL NOT SPECIFIED IN DEMO SECTION ABOVE. PROTECTION OF FLOORING. LIABILITY OF ANY EXISTING DAMAGE TO FACILITY.
- TOTAL: **\$44,844.00 FORTY-FOUR THOUSAND EIGHT HUNDRED FORTY-FOUR DOLLARS.**
- TERMS: PAYMENT DUE UPON COMPLETION.

➤ SCHEDULE: AUGUST 2024 WITH COMPLETION BY SEPTEMBER 10, 2024.

All work to be completed in a workman like manner according to standard practices. Any alteration or deviation from above specifications involving extra costs will be executed only upon written orders, and will become an extra charge over and above the estimate. All agreements contingent upon strikes, accidents or delays beyond our control. Our workers are fully covered by Workmen's Compensation Insurance.

➤ NOTE: THIS PROPOSAL MUST BE SIGNED IN 10 DAYS TO AVOID CHANGES IN PRICING. ANY CHANGES IN DESIGN WILL REQUIRE A NEW QUOTE.

Date and Authorized Signature:



ACCEPTANCE OF PROPOSAL - THE ABOVE PRICES, SPECIFICATIONS AND CONDITIONS ARE SATISFACTORY AND ARE HEREBY ACCEPTED. YOU ARE AUTHORIZED TO DO THE WORK AS SPECIFIED.

Date of Acceptance:

Authorized Signature:

Palmer Public Library Damage Survey and Assessment

May 15, 2024



City of Palmer
231 West Evergreen Avenue
Palmer, Alaska 99645

W O L F
ARCHITECTURE

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May 13, 2024

City of Palmer
231 W Evergreen
Palmer, Alaska 99645

Attn: Mr. John Moosey, City Manager

Subject: Palmer Library Damage Architectural Assessment

Overview

On February 15, the Palmer Library suffered a partial roof collapse due to drifting snow and presumably the accumulated weight of ice on the roof. The collapse of the roof damaged not only the structure but also the hydronic systems and exposed the interior of the building to the exterior in subzero temperatures and was for months open to the exterior. Assessments of the damage to the structure and hydronic system are a part of this report.

Wolf Architecture was commissioned to provide an overall assessment of the probable cost of repair and reconstruction. Wolf Architecture, along with structural engineers, PND Engineers, Mechanical Engineers, Jernstrom & Associates, Electrical Engineers, EIC Engineering, and Tonsina Estimating developed an assessment of the likely condition of the existing systems and the extent to which the systems could be salvaged along with the probable impact caused by demolition and reconstruction relative to the overall cost of the project. The assessment assumed the project would be either delivered in a traditional design/bid/build or General Contractor/Construction Manager project delivery scenario.

Since that assessment was completed the City of Palmer conducted some additional due diligence, commissioning PND an opportunity to conduct additional investigations with the aid of having access to concealed structural spaces. The engineers were then able to visually inspect the internal damage to the roof structure. In addition, Valley Mechanical, a local commercial mechanical contractor, was engaged to pressure test piping and assess the actual condition of the existing hydronic systems. This report synthesizes these two studies and updates the original architectural and cost assessments.

Structural Assessment

Based on further investigation, PND has determined that the Palmer Library suffered "Substantial Structural Damage" - a code based technical designation denoting the extent of damage a structure may have incurred. The 2021 IBC requires specific repairs/retrofits to buildings meeting the "Substantial Structural Damage" criteria. The PND report outlines the retrofits and repairs which include 1) reinforcing existing exterior masonry shear walls, 2) Improvements to roof diaphragm, and 3) upgrades to structural members and collectors.

Mechanical System Assessment

Valley Mechanical visually inspected, and where possible, pressure tested the existing hydronic systems throughout the facility. The inspections and testing resulted in the following: 1) The cast iron sprinkler system was damaged during the collapse and although some of the system was drained due to the damage, water remained in much of the system damaging the flexible fittings on the piping. 1a) The main water pipe entering the building froze below grade and is believed to be damaged and in need of repair or replacement. 2) The copper heating piping and terminal units, such as base boards and VAV boxes froze rendering the terminal units and piping to the terminal units unusable. 3) The domestic water supply piping throughout the facility froze. The piping would not hold pressure and a variety of broken piping was observed.

Architectural Assessment

The new investigative work confirmed much of the original design assumptions relative to anticipated damage to the structure and hydronic systems. The work required to remove and repair the reported damage will require the following effort.

1) Reinforcement existing exterior masonry shear walls

- a. Excavate existing earth berming to expose exterior wall
- b. Removal exterior siding and interior finishes
- c. Sawcut slab as required to install shear panels
- d. Patch and repair wall to original condition
- e. Reconstruct earthwork and planting to original condition

2) Improvements to roof diaphragm, structural members and collectors

- a. Remove interior ceiling as required to expose structure along grids B,D, 2, & 3.
- b. Removal of some interior walls to expose exterior wall
- c. Remove roofing and roof sheathing at the section of roof bounded by grids B,D, 2, & 3 – Approximately 2,950 sf
- d. Remove and replace standing seam metal roof adjacent to damaged roof panels. – (approximately 14,000 sf)
 - i. It is assumed the entire standing seam roof will need to be replaced as part of this project (=/-18,000 sf total)

3) Repair Water Main

- a. Excavation of existing earth berming
- b. Removal of existing retaining wall
- c. Remove and repair main
- d. Reconstruct retaining wall
- e. Reconstruct berming and landscaping

4) Removal and repair of hydronic systems

- a. Remove approximately 80% of existing ceiling system and some interior walls.

- b. Removal of interior finishes on plumbing walls as required to replace piping
- c. Remove all heating piping, terminal units and 7 VAV units – it is assumed all VAV boxes will be replaced as part of the effort for maintenance considerations.
- d. Reconfigure bathroom to comply with the Americans with Disabilities Act
 - i. Remove and replace all supply waterlines
 - ii. Repair walls damaged as required to replace piping, replace finishes
 - iii. Replace all plumbing fixtures

5) Interior Finishes

The work to expose and repair the identified damage to the existing library is extensive. The construction process will undoubtedly damage the building to an even greater extent than is obvious now. Efforts to minimize the damage to the building will, in turn, increase the overall cost of repair and reconstruction. Further the building will have been exposed to the exterior environment for nearly two years. There is a potential that mold could now be introduced throughout the facility due to the prolonged exposure to moisture in the non-conditioned structure. It is anticipated the following finishes will be required to be replaced throughout the facility.

- a. Flooring in all rooms, except bathrooms and mechanical rooms
- b. Ceilings throughout entire building
- c. Wall Finishes: Patch and repaint all wall surfaces

6) Casework

The work to expose and repair the identified damage to the existing library will necessitate that all the existing casework be removed to minimize further damage to the casework and to allow construction workers complete access to the structure. The casework will need to be stored throughout the course of construction and reinstalled at the conclusion of the repairs.

7) Replace Area under roof collapse

- a. Reconstruct area bounded by grid lines 3, 4, A.2, & D to new condition.

8) Assumptions

- a. Existing Boilers are assumed to be reusable
- b. Existing Electrical system is assumed to be reused except as impacted by other repairs
 - i. Essentially all the ceilings are assumed to be required to be removed and replaced in order to complete the construction activities. It is assumed that all light fixtures will be removed and replaced as part of the work.
- c. Existing AHU to remain “as-is”

- i. A substantial amount of ductwork will be removed and reinstalled. Terminal units will likely be replaced.

Conclusion

The damage to the Palmer Library by the roof collapse is extensive and extends throughout the facility. The structural damage extends beyond the area of immediate collapse as noted in the PND report which triggers remedial repairs far beyond the area of immediate damage.

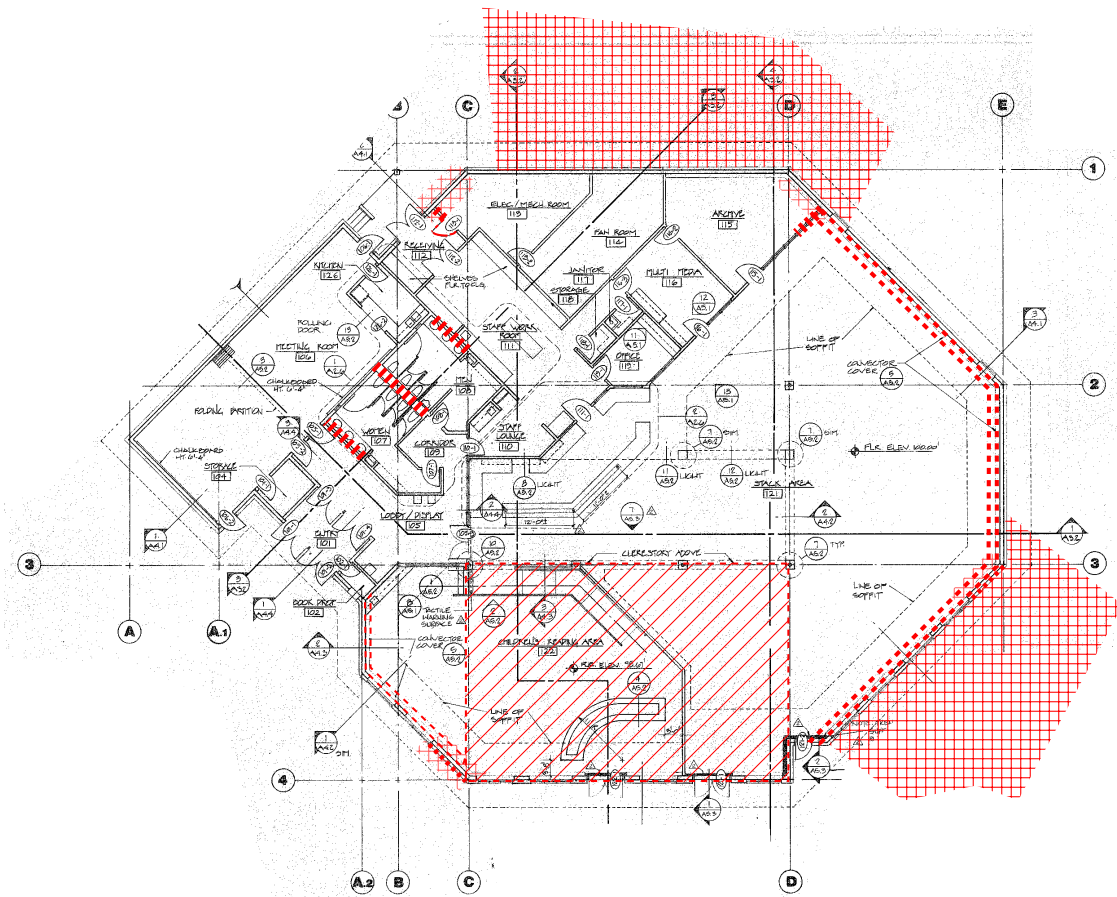
In addition to the structural damage, the exposure to months of sub-freezing temperatures caused systemic damage to all of the hydronic systems, in spite of immediate efforts by the City of Palmer to drain systems and safeguard the facility. The efforts did save the boilers which can be reused.





One additional complication to take into consideration the public construction procurement process and level of risk for all parties who would be engaged in design and reconstruction of the facility. Without the finishes for the entire building being removed such that there was nothing hidden, there would remain a risk that damage to piping or structure was concealed. This fact alone will increase the cost of construction either because 1) a General Contractor will increase his fee because of the risk or 2) the design team will insist on exposing concealed elements to mitigate design risks which will increase the cost of repairs, or 3) the concealed areas remain concealed, and damaged is exposed during or after construction (because of some failure), and additional cost is incurred either through a change in project scope or the cost of repair within an occupied building. In any conception, this repair is going to be extensive and expensive.

Sincerely,



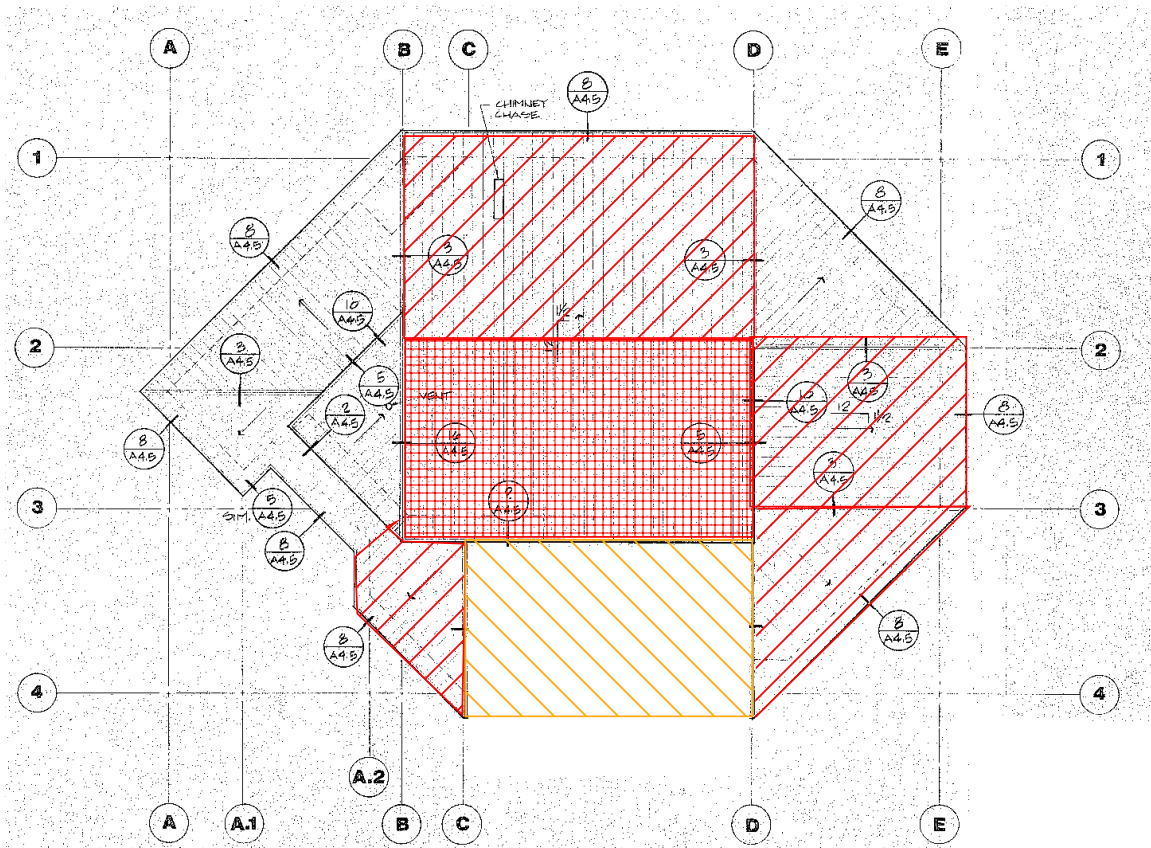
Gary Wolf, AIA
Architect






-  EXISTING BERMING TO BE REMOVED /REPLACED TO FACILITATE STRUCTURAL REPAIR
-  REMOVE AND REPLACE STANDING SEAM ROOFING
-  AREA OF COLLAPSE TO BE REPLACED
-  INTERIOR/EXTERIOR WALL CONSTRUCTION REQUIRE TO REPAIR STRUCTURAL/PLUMBING DAMAGE

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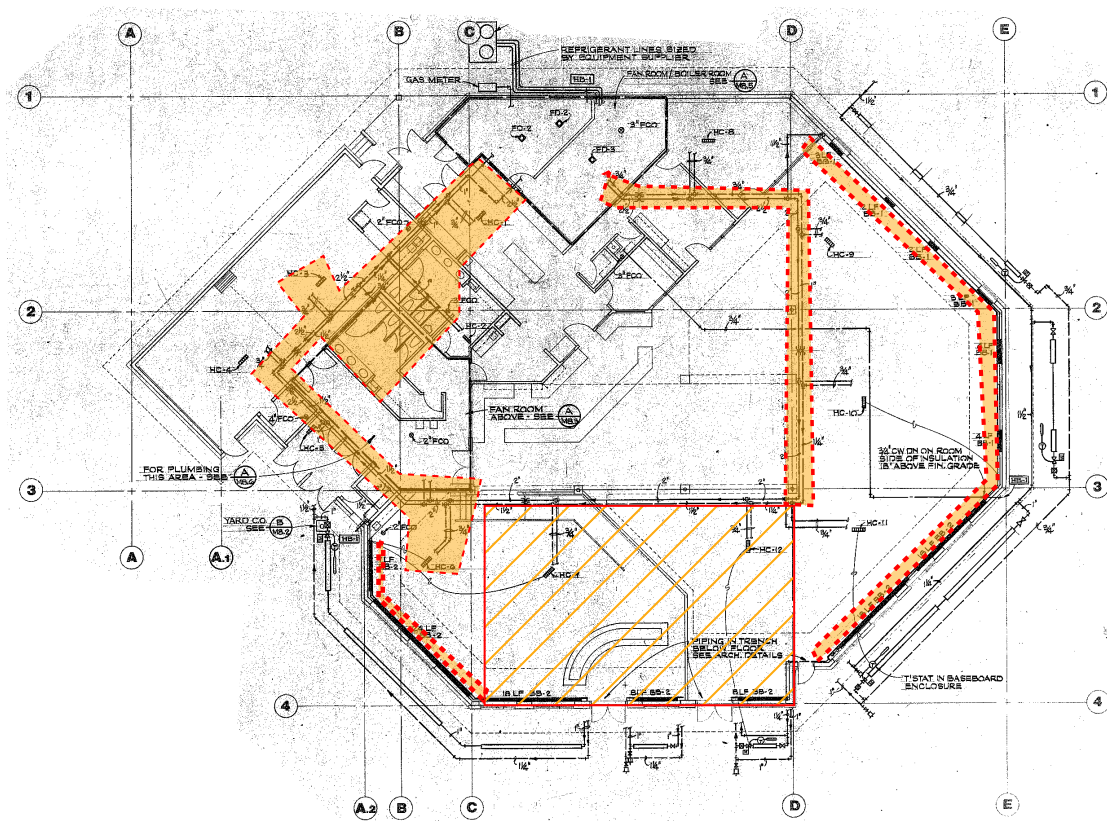
Palmer Public Library
Existing Conditions Damage Assessment
Structural Exterior and Interior Wall Demolition/Repair




- 
 1) REPAIR STRUCTURE, 2) REMOVE AND REPLACE SHEATHING, 3) REPLACE ROOFING
- 
 REMOVE AND REPLACE STANDING SEAM ROOFING
- 
 AREA OF COLLAPSE TO BE REPLACED

W O L F
ARCHITECTURE

Palmer Public Library
Existing Conditions Damage Assessment
Roof Structural Demolition/Repair

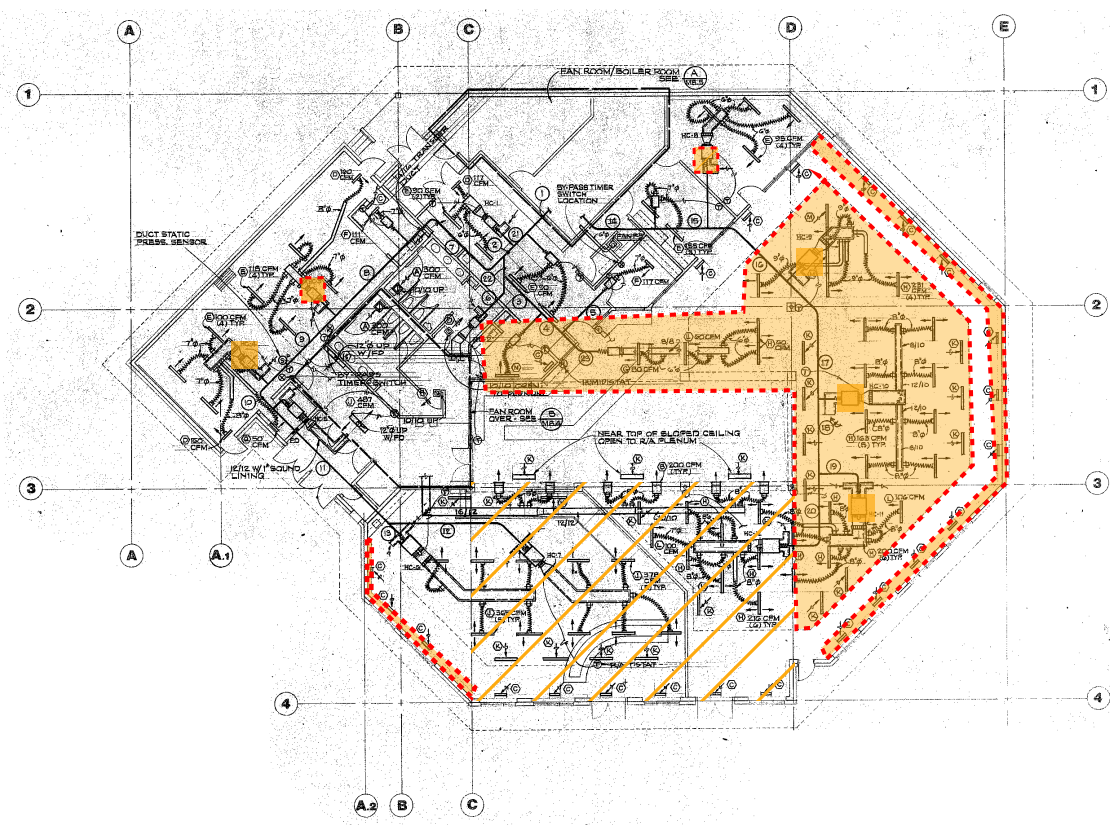



 DAMAGED WATER PIPING TO BE REMOVED AND REPLACED


 AREA OF COLLAPSE TO BE REPLACED

W O L F
ARCHITECTURE

Palmer Public Library
Existing Conditions Damage Assessment
Hydronic System Plan - Demolition/Repair

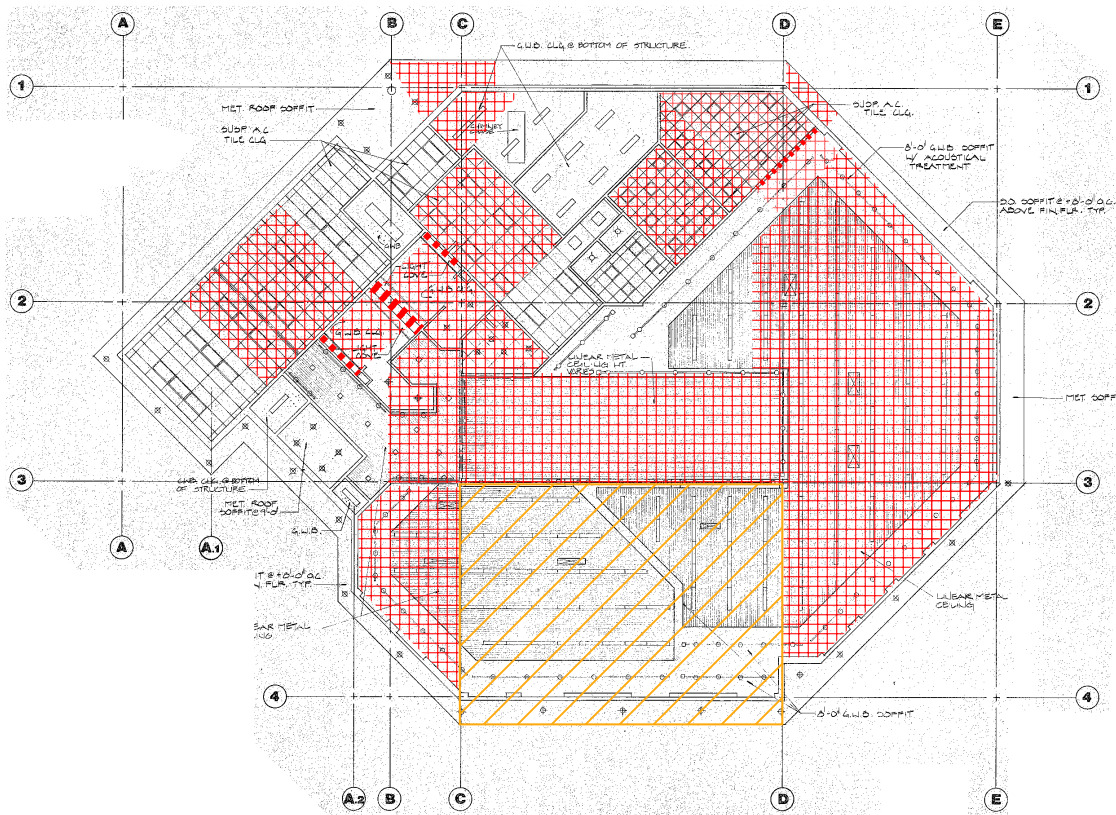




 DAMAGED WATER PIPING / VAV BOXES TO BE REMOVED AND REPLACED

 AREA OF COLLAPSE TO BE REPLACED

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ARCHITECTURE

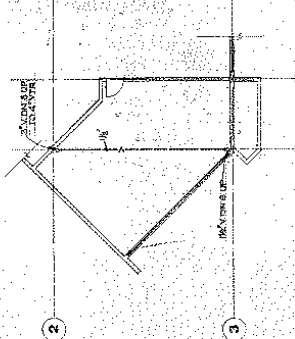
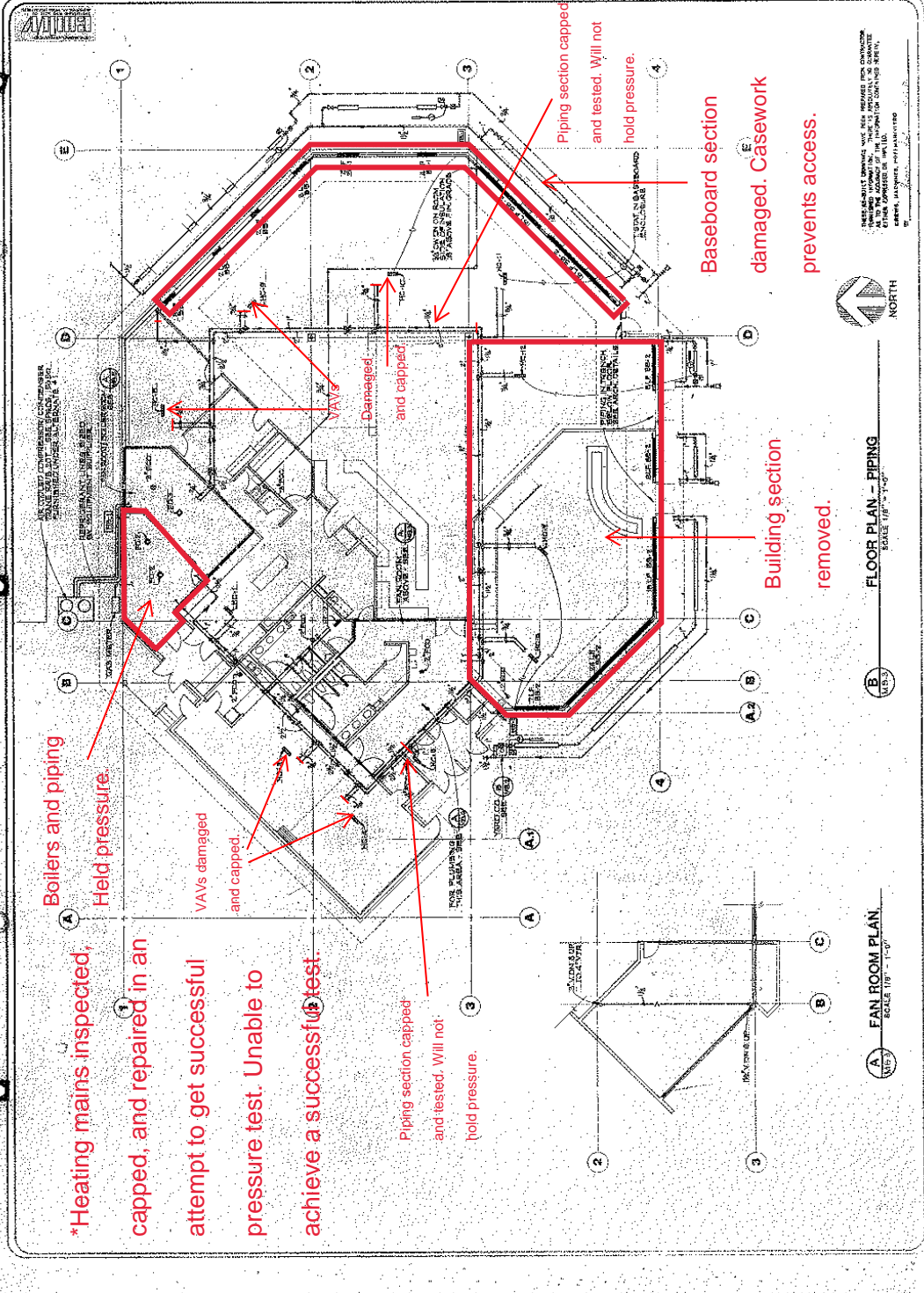
Palmer Public Library
Existing Conditions Damage Assessment
HVAC System Ceiling - Demolition/Repair



-  EXISTING CEILING OR SOFFITING TO BE REMOVED AND REPLACED
-  AREA OF COLLAPSE TO BE REPLACED

WOLF
ARCHITECTURE

Palmer Public Library
Existing Conditions Damage Assessment
Overall Ceiling - Demolition/Repair



FLOOR PLAN - PIPING
 SCALE 1/8" = 1'-0"

B

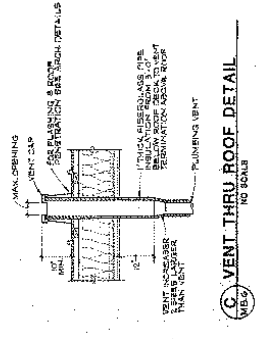
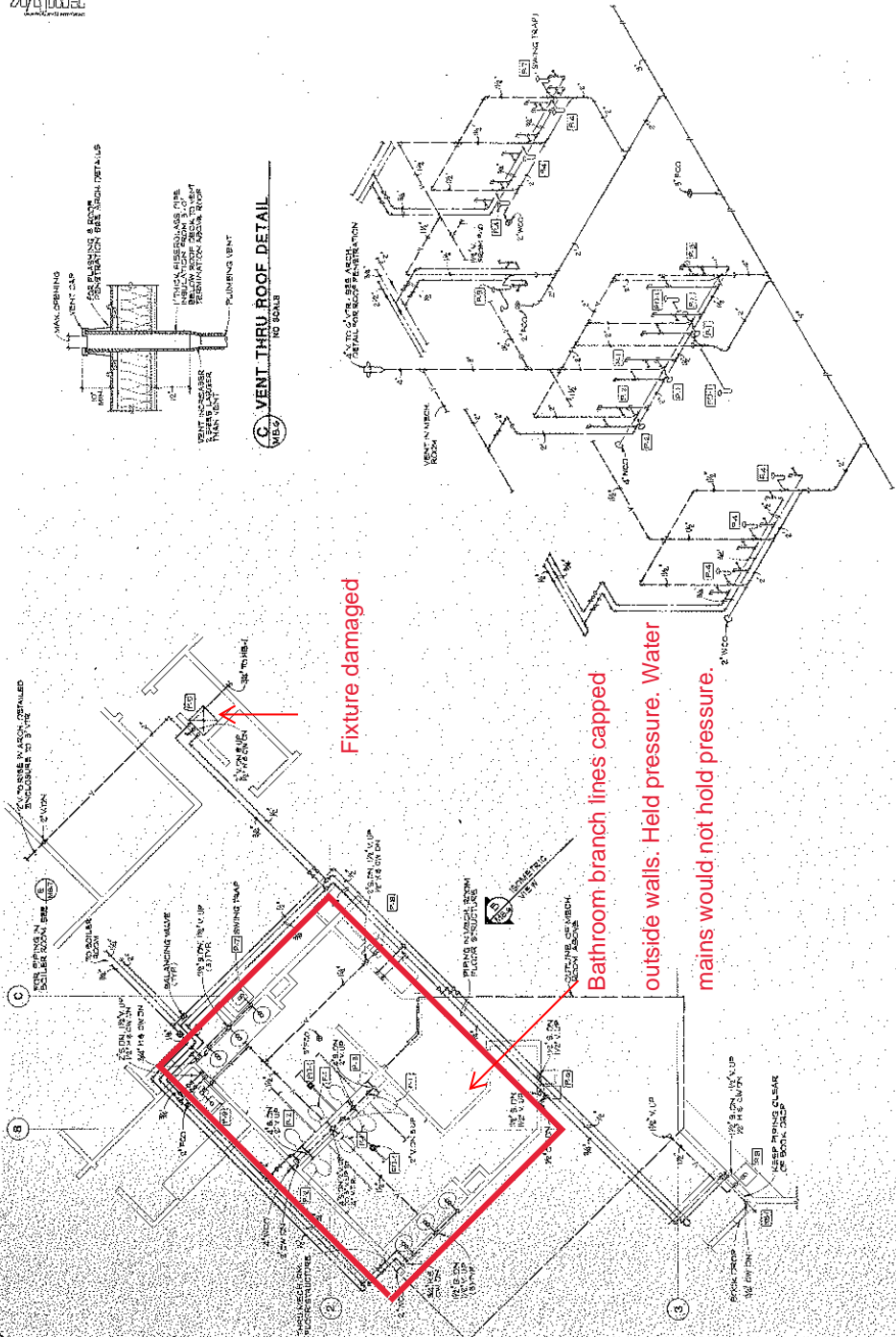
A



PROJECT NO. 10000
 SHEET TITLE PLUMBING
 DRAWN BY J. WYCOFF

SHEET NO. 6
 OF 8 ISOMETRIC

SHEET NO. M-8.6
 OF 7



C. VENT THRU ROOF DETAIL
 NO SCALE

B. PLUMBING ISOMETRIC
 NO SCALE

A. PLUMBING PLAN
 SCALE 1/4" = 1'-0"

NOTE: ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE 2012 ALASKA PLUMBING CODE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND INSURANCE. GENERAL CONTRACTOR TO VERIFY ALL CONDITIONS AND CONDITIONS OF WORK.

Fixture damaged

Bathroom branch lines capped
 outside walls. Held pressure. Water
 mains would not hold pressure.



PALMER PUBLIC LIBRARY

Structural Analysis Report

April 24, 2024

PND Project Number: 231146

PREPARED FOR:



CITY OF PALMER

231 West Evergreen Avenue
Palmer, Alaska 99645

PREPARED BY:



ENGINEERS, INC.

PND ENGINEERS, INC.

625 South Cobb Street Suite 202
Palmer, Alaska 99645

PREPARED BY

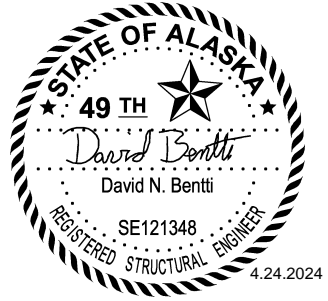
David Benti, P.E., S.E.
Elizabeth Swan, P.E.
[Click or tap here to enter text.](#)

CLIENT REPRESENTATIVE

Brad Hanson
Community Development Director
City of Palmer
bahanson@palmerak.org
(907) 761-1322

April 24, 2024

PND Project No.: 231146



PND Engineers, Inc. | Palmer Office

David Benti

David Benti, P.E., S.E.
Principal

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1. INTRODUCTION



Image 1: Palmer Library Roof Collapse

The roof of the Palmer Public Library suffered a partial collapse on February 15, 2023. The collapse occurred mainly over the children’s section of the library. However, surrounding areas were also impacted by the roof collapse. The City of Palmer engaged PND Engineers, Inc. (PND) to analyze the existing structure. PND used the International Existing Building Code (IEBC) to determine the

extents of structural retrofitting that would be code required due to the roof collapse, and to analyze the lateral and gravity systems of the structure to determine the extents of the retrofitting that would be required. This was completed in order to determine the feasibility of repairing the structure versus replacing the structure.

2. BACKGROUND

The Palmer Public Library is a single-story building, designed in 1984, that is approximately 11,500 square feet. The building is founded on a traditional concrete shallow foundation. The building uses a combination of concrete masonry unit (CMU) walls, steel columns and dimensional wood walls to support the wood framed roofs. The roof framing consists of glu-lam beams supporting engineered wood I-joists. The City of Palmer provided PND a complete set of record drawings for use and review. The record drawings indicate that the building was designed in accordance with the 1982 edition of the Uniform Building Code (UBC). The UBC was the building code used in many parts of the United States from 1927 to 1997. The UBC was replaced by the IBC after 1997.

3. BUILDING ANALYSIS

This portion of the report will provide a review of the code required analysis, rehabilitation, and retrofit extents prescribed in the IEBC as well as an analysis of the existing structure and summary of the current deficiencies.

3.1 REVIEW OF IEBC CODE REQUIREMENTS.

The IEBC defines “Substantial Structural Damage” as buildings that meet one of the following three conditions:

- Vertical elements of Lateral system have reduced capacity by more than 33%
- Vertical elements supporting more than 30% of the structure's gravity loads have been reduced by more than 20% from their pre-damaged state and can no longer support 75% of the current code required loads.
- Vertical elements supporting more than 30% of the structure's snow loads have been reduced by more than 20% from their pre-damaged state and can no longer support 75% of the current code required loads.

The Palmer library currently meets all three of these requirements. The beam line failure that led to the collapse supported more than 30% of the building's loads, including snow loads. Additionally, the area between the low and high roof where the collapse occurred is part of the lateral system as it is a transfer area carrying lateral loads from the high roof diaphragm to the low roof diaphragm. Therefore, this structure is considered, by code, to have sustained substantial structural damage. See Figure 1 for a diagram of the extents of the building damage. This figure only identifies the areas of known damage. Additional damage may be discovered as building finishes are removed.

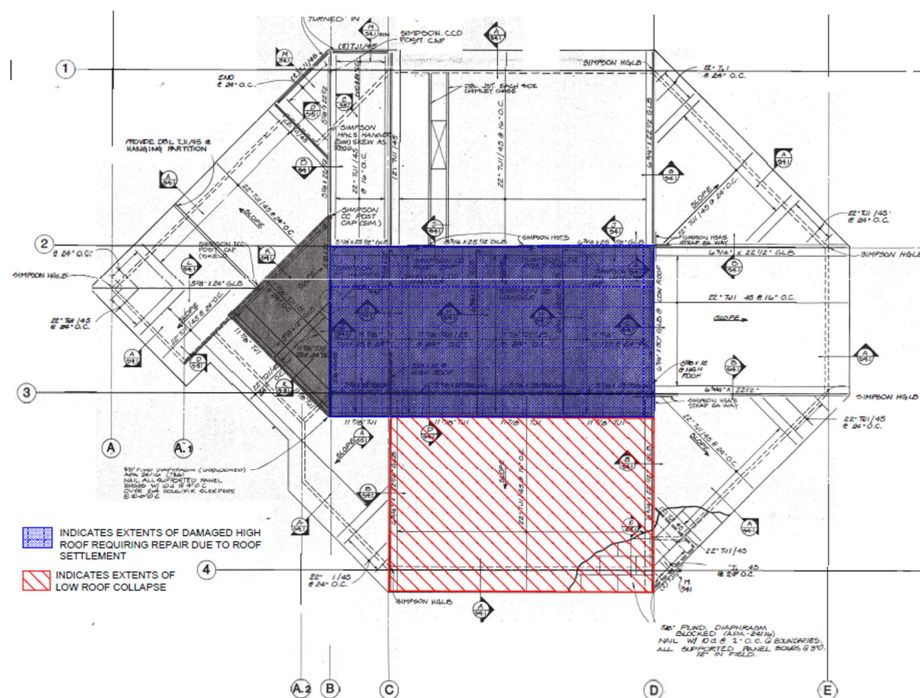


Figure 1: Existing building roof plan with a summary of the damage observed during PND's site visit.

Section 4 of the IEBC discusses the required repairs for significantly damaged structures. Section 405.2.3 states, “A building that has sustained *substantial structural damage* to the vertical elements of its lateral force-resisting system shall be evaluated in accordance with Section 405.2.3.1, and either repaired in accordance with Section 405.2.3.2 or repaired and retrofitted in accordance with Section 405.2.3.3.” Section 405.2.3.1 requires that the building be analyzed under the current code required seismic loads, reduced by a factor of 0.75. PND performed this analysis and the results are contained in the following section. If the building in its original state cannot meet the loads required then the entire structure must be retrofitted per Section 405.2.3.3. Additionally, Section 405.2.1.1 states that any structure that is damaged due to snow loading must be repaired to resist the current code required snow loads. Lastly, section 405.2.4 states that gravity members that sustained damage and the members that support them must be rehabilitated in a manner such that they are capable of supporting the current code required loads.

Therefore, due to the extent of the damage and cause of the damage, all members of the structure that were damaged during the roof collapse and the members supporting them must be replaced with members capable of withstanding the current code required gravity loads. Furthermore, due to the significant damage of the vertical elements of the high to low roof shear wall that provides diaphragm shear load transfer, the entire building must be seismically retrofitted to resist 75% of the current code required loads if the pre-damage state of the structure cannot resist that level of load.

3.2 SEISMIC ANALYSIS OF EXISTING BUILDING

PND performed an analysis of the building’s lateral system using 75% of the current code required seismic loads. Due to the irregular shape of the structure, the walls were modeled using a RAM Structural System software to distribute the lateral forces from the roof diaphragm to the walls throughout the structure. Sensitivity testing was completed to ensure that the results were in line with the expected loads found in hand calculations that would have likely been performed at the time of the building’s construction. The results of the analysis are categorized by building component below.

3.2.1 MASONRY SHEAR WALLS

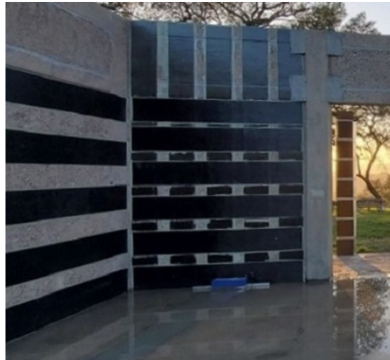


Image 1: FRP Reinforced wall by Simpson

Under the current code the walls would be required to be special reinforced masonry shear walls. An analysis showed that the walls are compliant with all the required aspects of special reinforced shear walls except for one. This item is the requirement that the horizontal bars be hooked around the vertical bars at the wall ends in shear walls. Code section 405.2.3.3 does not require that the walls be updated to meet the current design standard of special reinforced shear walls if they have the capacity to resist the 75% of current code forces.

The masonry walls were analyzed for the forces that were determined using the RAM model of the structure. It was determined that there are 5 walls that are overstressed under the current required design loads. Four of the five walls were overstressed by 120% with the worst case wall at 162% over capacity. The deficient walls are highlighted

in red in the diagram below. These walls must be retrofitted to be brought into compliance. The exterior and interior finishes would need to be removed to expose the walls. A product like Fiber Reinforced Polymer (FRP) could be installed to add additional strength to the walls. Fiber reinforced polymer is composed of strong fibers that are arranged in a matrix that are applied to the surface of existing concrete or masonry walls to add strength to the wall. Image 1 shows an example of FRP applied to a concrete wall using a system by Simpson Strong-Tie.

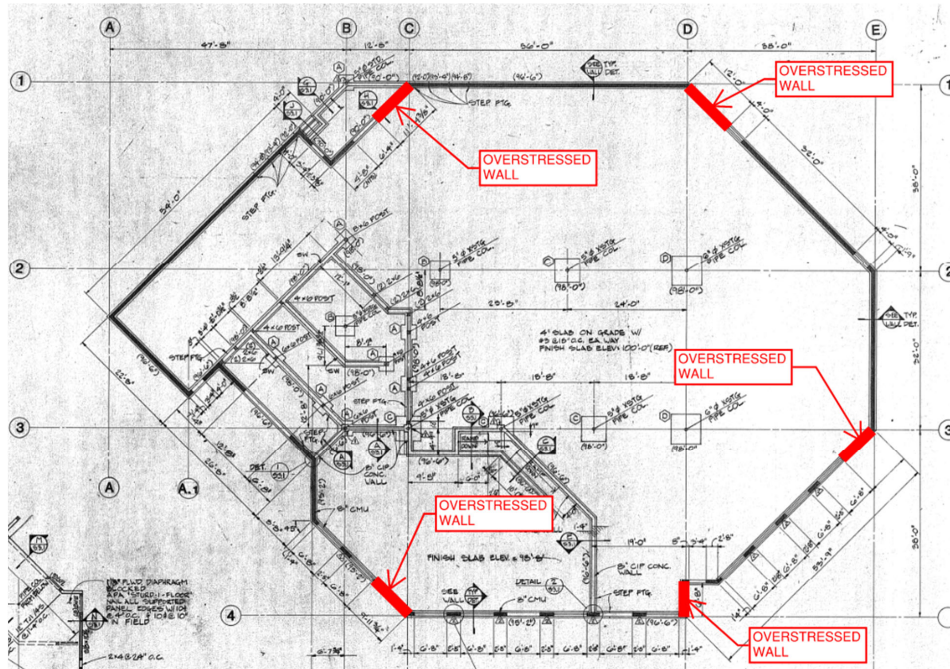


Figure 2: Diagram indicating overstressed walls in red

3.2.2 VERTICAL IRREGULARITY IN DIAPHRAGM

There is a vertical irregularity in the diaphragm along grid 3, where the diaphragm is split to form a low and high roof. This is defined as a type 3 diaphragm discontinuity irregularity in ASCE 7. The diaphragm is the primary element that takes the loads induced in a seismic or wind event and transfers them to the shear walls. The loads accumulate across the building and then must be transferred from the high roof to the low roof. This is referred to as a transfer area. These types of irregularities are often improperly detailed in high seismic areas. In the past it was common to design the diaphragms as two, three sided diaphragms, this assumes that they will act independently from each other. Improvements in the code and design techniques for this type of irregularity have occurred in recent years. It is now understood that it is imperative that the transfer area be designed and detailed to properly tie the two regions together. If the two regions are not tied together properly then there is a high likelihood that during a high lateral load event the two diaphragms will deflect differently putting large stresses on the members, and leading to roof collapses, not unlike the one that has occurred.

The irregularity at the library consists of three bays of windows framed by glu-laminated strut beams, supported on metal studs. See Figure 3 for the elevation at the vertical irregularity. Between grid B and grid C there is a double-sided shear wall that is intended to transfer the shear loads to the diaphragm below. The wall is capable of transferring the required load, however, the glu-laminated struts are not. Per the elevation below, there is a strap on either side of each GLB, this strap has a capacity of approximately 1,900 pounds. Likewise, at the low roof level the load must be transferred out of the shear wall and back into the diaphragm so it can be transferred to the masonry shear walls. The straps used on the beams below provide only 1,875 pounds of resistance. Additionally, due to the likelihood of failure at one of these points the code now requires the elements of this nature be designed for an increased load of 125%. Therefore, a retrofit of the drag struts would need to be designed for approximately 15,000 pounds. The capacity of the straps needs to be increased from the current capacity of a maximum of 1900 pounds to the code required 15,000 pounds.

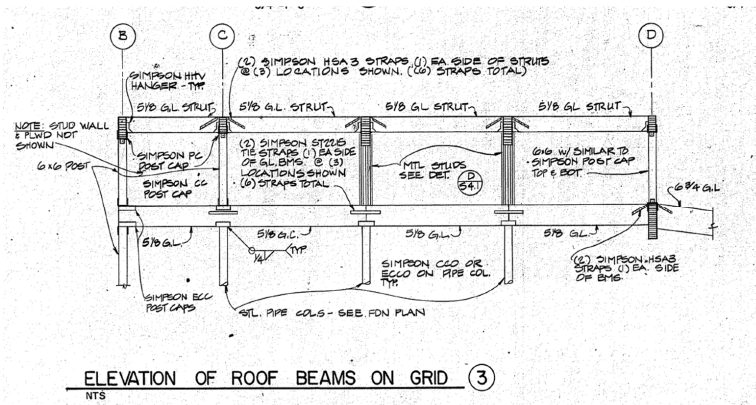


Figure 3: Elevation of vertical irregularity at grid 3

3.2.3 COLLECTORS

Collectors are elements designed to transfer the diaphragm load along a wall or beam line into the shear walls along that line. A recent addition to the code for this type of building construction requires that collector elements be designed for overstrength. The overstrength factor is 2.5 for masonry shear walls. This means that the axial capacity of the members as well as their connections along collector lines must be designed for two and a half times the load that is present in them. The drawings do not indicate any connection of the members along the collector lines indicating that this was not likely considered at the time of the original design. Additionally, glu-laminated members that were analyzed for gravity loads after the collapse were found to have little reserve capacity, and it is unclear if axial collector loads were considered during the original design. All collector beams will need to be further analyzed to determine if they are adequate for the combined axial and lateral forces and straps will need to be designed to tie members together.

3.3 GRAVITY ANALYSIS OF THE BUILDING

3.3.1 SNOW LOAD

The record drawings specify that the roof was designed for a uniform roof snow load of 40 pounds per square foot (psf). It is possible that the original library designers may have considered additional snow loading to account for potential snow drifts. Snow drift loads are applied to the structure in addition to the uniform roof snow load in to account for the extra weight present on the roof in areas where snow drifts are likely to accumulate. There are no notes within the record drawings that indicate snow loads beyond the 40 psf uniform roof snow load were considered. Snow drifts were likely not included in the original analysis as the 1982 UBC did not include specific provisions for snow drift loading. These requirements were not widely recognized as necessary for building safety until later. Under the currently adopted 2021 version of the International Building Code (IBC), the code required uniform roof snow load for Palmer is still 40 psf. However, modern codes also include provisions to account for snow drifts.

PND performed calculations on the existing roof members to evaluate the expected capacity of the members when possible. The record drawings indicate that the low roof joists are Trus Joist TJI 45 series joists spaced at 16" on center. No product data older than 1985 was available for the Trus Joist products. In the absence of this legacy data, approximate calculations were performed the on joists by analyzing the modern-day joists that have the same flange dimensions as the joists observed in the field. The observed TJI 45 joists had 3-1/2" wide flanges which are similar to the modern I90 joists by Boise Cascade. Using this rough approximation, it appears the roof members were likely correctly sized for a uniform roof snow load of 40 psf. The low roof and high roof glu-lam beams were also analyzed, many of the members had very little reserve capacity left available after the application of the building self-weight and uniform snow load. The low roof members were then evaluated with the additional snow drift loading that would be required by the current building code. Current building code requires the application of a tapered snow drift over the 16.5 feet of low roof starting at the step between the high and low roofs along gridline 3. The snow drift adds 59 psf of snow load in addition to the 40 psf uniform snow drift and the tappers to zero over the 16.5 feet. This drift loading was not required in the 1980s when the structure was designed. With the additional snow drift loading, it was found that the 5-1/8" x 18" glu-lam beams supporting the low roof would be at 120% of their bending capacity.

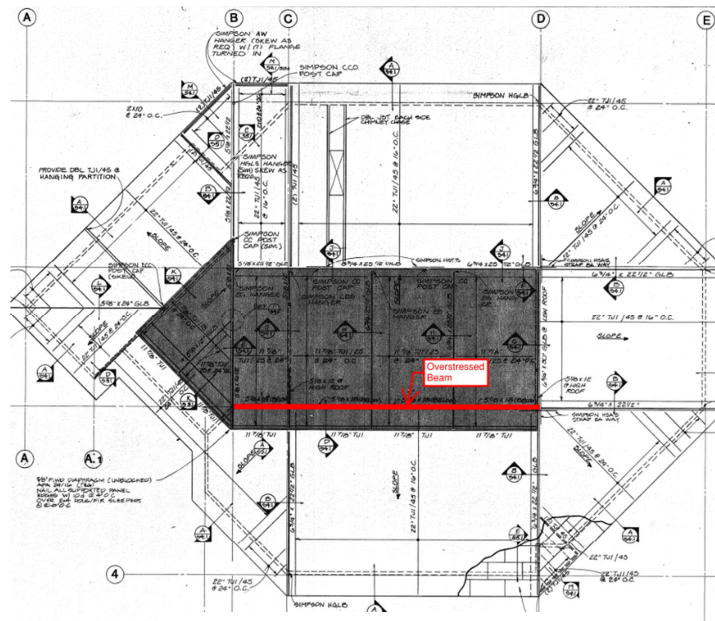


Image 4: FRP Reinforced wall by Simpson

4. RECOMMENDATIONS

The International Existing Building Code requires, if the building is to be repaired, that much of the structure will need to be retrofitted to meet the requirements of the current code standards. The roof joists that were part of the roof collapse region on both the low and high roofs shall be replaced with modern joists that are sized to support the snow drift loads present. Each member that supports the beams and trusses that collapsed will need to be analyzed for damage and for its capacity to support the snow drift loads. This includes the beams, columns, and walls that support the members that failed. It was found that the glu-laminated beams in the portion of the structure that collapsed will need to be replaced with larger beams that can support the full snow load. Additionally, there is no evidence that collectors were considered during the original design of the building. These beams must be sized to adequately transfer seismic axial loads, with an overstrength factor of 2.5, as well as carry the gravity loads. Based on the discovery that many of the beams did not have much reserve capacity, it is possible that beams that form the collector lines in the structure may need to be replaced or reinforced.

Major upgrades need to be completed on the transfer area between the low and high roof. The beams will need to be replaced and sized for the combined gravity and axial loads. Straps need to be provided that are capable of providing adequate resistance on both the high and low roof beams so that the load may be transferred to the shear wall. Additionally, strapping needs to be added to all beams that are part of the collector system in the building. This will require the removal of drywall, ceiling, and other finishes throughout most of the building to gain access to the roof framing members. Lastly, the 5 masonry shear walls that are overstressed will need to be brought up to current code standards. This will require the

removal of finishes and application of a strengthening system such as FRP. Alternatively, openings may be filled in to allow for longer portions of full height shear walls to remove load from the overstressed walls.

Summary of Required Structural Repairs			
Item No	Item	Description	Report Section
1	Roof Joist Replacement	Replace joists that are part of the collapsed portion of the roof with joist sized to withstand current code required loads	3.3.1
2	Roof Girder Replacement	Replaced all damaged or overstressed girders with girders that are sized to withstand current code required loads	3.3.1
3	Collector	Analyze collectors for combined gravity and axial forces add strapping that is capable of withstanding overstrength seismic loads	3.2.3
4	High to Low Roof Transfer Area	Replace beams with members that are capable of resisting the combined axial and gravity loads	3.2.2
5	Drag Strut Strapping	Add strapping to drag struts that are capable of withstanding overstrength seismic loads	3.2.2



May 9, 2024

Mr. Gary Wolf
Wolf Architecture

Subject: Restoration of the Palmer Public Library – Cost Evaluation

NARRATIVE

While an estimator can have an accurate view of the costs of labor and materials for new construction, there are many variables that affect an accurate estimate in a restoration or remodeling project. Most general contractors are loathe to provide hard bids for such work, preferring instead to bill their work on a time and material basis, with a negotiate fee or percentage mark-up. There are too many conditions present in a renovation that fall beyond the expected scope. This leads to change order requests and/or claims, both of which are uncomfortable for both the owner and the contractor.

You have identified similar observations of problematic contracting in your assessment letter to John Moosey, dated May 3, 2024 of which I am in complete agreement.

In the estimate I am providing, I will take this in three parts: 1) The known visual damages caused by the roof failure and evaluation by PND Engineers; 2) The expected damages to other parts of the building that you have identified in your evaluation of work in your aforementioned letter to the City Manager; and 3) The cost of thorough inspections and construction measures necessary to meet my educated expectations of quality assurance measures needed to return the building to public occupancy.

The wage scales are the current (02/23/2024) "Little Davis Bacon" determinations from the State of Alaska with added labor burden for a 50 hour (five ten-hour days) work week. In my current experience, these have NOT kept up with prevailing wages, but I used them for guidance. For my first run at a new library, I used \$105/mh for carpenters, \$112/mh for plumbers, and \$125/mh for electricians. It reflects the "new" reality.

If you see any holes in the attached estimate, please let me know.

Ken Castner, Principal
Tonsina

Palmer Public Library Restoration Project

<i>Part One</i>						
Section 1: Components At Collapsed Area						
PND: Page 8 and Wolf Page 3, Item 7						
		Material	Labor	Equipment	MH	Total
Selective Demolition and Prep for New					93.08/MH	
Prepare Area for New Work			\$ 5,585		60	\$ 5,585
Remove Temporary Protection			\$ 1,862	\$ 1,000	20	\$ 2,862
Temporay Bracing (Screw Shearwalls)	1140	\$ 25,080	\$ 4,815	\$ 1,000	50	\$ 30,895
Remove Temporary Bracing			\$ 4,815	\$ 1,000	50	\$ 5,815
Concrete Cutting Base Reinforcement	5		\$ 1,870	\$ 1,200	17	\$ 3,070
Hand Excavation for Concrete Pour	5			\$ 961	10	\$ 961
Selective Demo					207	\$ 39,341
New Structural Steel / Parallam Beams				Crew	525.00	
149 LF @ GL 3		\$ 69,000	\$ 24,150	\$ 8,500	62	\$ 101,650
140 LF Drag Struts @ GL 3 & 4		\$ 64,400	\$ 22,540	\$ 8,500	59	\$ 95,440
100 VF (5 Columns) on GL 3		\$ 46,000	\$ 16,100	\$ 7,500	45	\$ 69,600
36 VF (3 Col) on GL 4		\$ 16,560	\$ 5,796	\$ 3,000	17	\$ 25,356
36 LF GL 3 to GL 4		\$ 16,560	\$ 5,796	\$ 3,000	17	\$ 25,356
Add for Base Plates & AB's: 10 ea		\$ 3,000	\$ 3,300	\$ 1,000	30	\$ 7,300
Add for Column Caps / Blocking / Bolts	15	\$ 8,600	\$ 1,575	\$ 750	14	\$ 10,925
Add for Drag Strut/Collector Strap	90	\$ 14,400	\$ 9,450	\$ 2,000	86	\$ 25,850
Expanded Concrete footers @ Columns	5	\$ 2,125	\$ 2,889	\$ 50	30	\$ 5,064
Welding Time & Steel Bracing		\$ 8,000	\$ 12,000	\$ 1,450	70	\$ 21,450
Total Structural Steel					360	\$ 361,477
Roof Joists / Sheathing					96.29/MH	
TJI 5.5x18x16	45	\$ 12,240	\$ 1,670	\$ 1,000	17	\$ 14,910
Blocking, Clips and Hangers	90	\$ 3,150	\$ 1,890		20	\$ 5,040
Sheathing SF	2494	\$ 1,680	\$ 4,000		42	\$ 8,174
Roof Joists / Sheathing					79	\$ 28,124
Standing Seam Metal Roof (Replacement)						
Ice & Water Shield	2400	\$ 3,120	\$ 2,080		22	\$ 5,200
Standing Seam Metal Roof	2400	\$ 72,000	\$ 16,177	\$ 1,500	168	\$ 89,677
Roof Insulation	2400	\$ 6,960	\$ 7,164	\$ 750		\$ 14,874
Interior GWB Finishes	2400	\$ 10,200	\$ 5,340	\$ 1,500	55	\$ 17,040
Replacement Roof					190	\$ 126,791
Clerestory	12	\$ 3,000	\$ 1,733	\$ 1,000	18	\$ 5,733
Windows and Doors South Wall	3	\$ 11,400	\$ 867		9	\$ 12,267
Transom Light	1	\$ 325	\$ 120		1	\$ 445
ADA Double Doors	1	\$ 6,800	\$ 433		5	\$ 7,233
Entry Double Door w/ Hardware	1	\$ 5,200	\$ 385		4	\$ 5,585
Doors and Windows South Wall					37	\$ 31,264

Palmer Public Library Restoration Project

South Wall Framing Assembly/GWB						
South Wall and Clerestory w/ Siding	812	\$ 31,262	\$ 7,703	\$ 750	80	\$ 39,715
Fascia and Soffits	650	\$ 13,000	\$ 1,446	\$ 1,000	15	\$ 15,446
Interior GWB Finishes	812	\$ 3,451	\$ 1,807	\$ 300	19	\$ 5,558
South Wall Framing Assembly/GWB					114	\$ 60,719
Flooring Prep and Replacement						
Prep Grids C to D, 3 to 4	2720	\$ 550	\$ 2,025	\$ 400	22	\$ 2,975
Commercial Carpet Tile Same Area	310	\$ 13,950	\$ 2,985		31	\$ 16,935
Base Trim	220	\$ 440	\$ 424		4	\$ 864
Flooring Prep and Replacement					53	\$ 19,910
						\$ -
Summary of this Area		Material	Labor	Equipment	Line Total	
Subtotals of Work		\$ 472,453	\$ 180,791	\$ 49,111		\$ 702,355
8% General Conditions					758,543	\$ 56,188
15% Estimator's Contingency					872,324	\$ 113,781
12% General Contractor's O,H. & P					977,003	\$ 104,679
12% A & E						\$ 117,240
Total Section 1						\$ 1,094,244

Section 2: Components At Masonry Shear Walls

PND: Page 3, 3.2.1 and Wolf Page 2, Item 1

96.29/MH

		Material	Labor	Equipment	MH	Total
Erterior Excavation and Surface Prep						
Excavation Contractor	50		\$ 1,000	\$ 14,000	16	\$ 15,000
Hand Work for Exterior Surface Prep	5	\$ 75	\$ 5,777	\$ 1,000	60	\$ 6,852
Interior Demo and Surface Prep	5	\$ 240	\$ 5,777	\$ 160	60	\$ 6,177
FRP (Simpson System) Reinforcement	1400	\$ 19,600	\$ 13,481	\$ 450	140	\$ 33,531
New Siding Married to Existing	700	\$ 8,400	\$ 2,427	\$ 625	25	\$ 11,452
Paint Siding	700	\$ 1,680	\$ 1,348	\$ 325	14	\$ 3,353
Interior Furring	700	\$ 455	\$ 2,022	\$ 325	21	\$ 2,802
5/8 GWB - Hang, Tape, Finish, Paint	700	\$ 1,015		\$ 625	28	\$ 1,640
Landscape to Original Condition	1000	\$ 2,425	\$ 2,696	\$ 630	60	\$ 5,751
Erterior Excavation and Surface Prep					424	\$ 86,558
Summary of this Area						
Subtotals of Work		\$ 33,890	\$ 34,528	\$ 18,140		\$ 86,558
8% General Conditions					93,483	\$ 6,925
15% Estimator's Contingency					107,505	\$ 14,022
12% General Contractor's O,H. & P					120,406	\$ 12,901
12% A & E						\$ 14,449
Total Section 2						\$ 134,855

Palmer Public Library Restoration Project

<i>Part Two</i>							
Section 3: Improvements at High Roof							
Wolf Page 2, Item 2		96.29					
		Material	Labor	Equipment	MH	Total	
Demolition							
Interior Ceilings	440		\$ 2,118	\$ 200	22	\$ 2,318	
Interior Walls	1000		\$ 4,815	\$ 600	50	\$ 5,415	
Temp Support in Section 1						\$ -	
5/8 GWB - Hang, Tape, Finish, Paint	1500	\$ 2,175	\$ 5,777	\$ 625	60	\$ 8,577	
Demo Roof and Sheath B to D, 2 to 3	3000	\$ 1,200	\$ 11,555	\$ 1,000	120	\$ 13,755	
Demolition					132	\$ 30,065	
Standing Seam Metal Roof Grids B to D, 2 to 3							
Sheathing SF	2175	\$ 3,477	\$ 4,506		47	\$ 7,983	
Ice & Water Shield	3000	\$ 3,900	\$ 2,600		27	\$ 6,500	
Standing Seam Metal Roof	3000	\$ 90,000	\$ 20,221	\$ 1,500	210	\$ 111,721	
Replacement Roof					237	\$ 118,221	
Remaining Roof Replacement							
Demo Roof and Sheath B to D, 2 to 3	14000	\$ 4,200	\$ 26,961	\$ 1,000	280	\$ 32,161	
Ice & Water Shield	14000	\$ 18,200	\$ 12,133		126	\$ 30,333	
Standing Seam Metal Roof	14000	\$ 420,000	\$ 94,364	\$ 1,500	980	\$ 515,864	
Summary of this Area							
Subtotals of Work		\$ 543,152	\$ 185,050	\$ 6,425		\$ 734,627	
8% General Conditions					793,397	\$ 58,770	
15% Estimator's Contingency					912,406	\$ 119,010	
12% General Contractor's O,H. & P					1,021,895	\$ 109,489	
12% A & E						\$ 122,627	
Total Section 3						\$ 1,144,523	
Section 4: New Connection to City Water							
Wolf Page 2, Item 3		96.29					
		Material	Labor	Equipment	MH	Total	
Civil Water Work							
Retaining Wall Removal			\$ 1,155	\$ 280	12	\$ 1,435	
Curb/Concrete Cut, Water Main Tap, Asphalt, Labor		\$ 21,442	\$ 16,754	\$ 12,840	174	\$ 51,036	
Reconstruct Retaining wall		\$ 3,480		\$ 500	24	\$ 3,980	
New Landscaping		\$ 700	\$ 5,777	\$ 600	60	\$ 7,077	
Civil Water Work						\$ 63,529	
Summary of this Area							
Subtotals of Work		\$ 25,622	\$ 23,687	\$ 14,220		\$ 63,529	

Palmer Public Library Restoration Project

8% General Conditions					68,612	\$ 5,082
15% Estimator's Contingency					78,903	\$ 10,292
12% General Contractor's O,H. & P					88,372	\$ 9,468
12% A & E						\$ 10,605
Total Section 4						\$ 98,976

Section 5: Hydronics and Plumbing

Wolf Page 2, Item 4 \$ 100 96.29

		Material	Labor	Equipment	MH	Total
Demolition						
Interior Ceilings	11200	\$ 1,200	\$ 5,777	\$ 1,800	60	\$ 8,777
Interior Walls	4800	\$ 500	\$ 2,311	\$ 600	24	\$ 3,411
Plumbing Demo	9000	\$ 1,200	\$ 35,896	\$ 2,200	360	\$ 39,296
Fixture Demo	63	\$ 400	\$ 6,910		69	\$ 7,310
Heating Wall Work		\$ 150	\$ 1,994	\$ 600	20	\$ 2,744
Trap and Drain Inspection Replacement		\$ 650	\$ 1,795		18	\$ 2,445
Demolition					551	\$ 61,538
HVAC & Plumbing Renovations						
Plumber's Mob	1	\$ 6,500	\$ 2,393		24	\$ 8,893
Carpentry at Plumbing Walls		\$ 1,650	\$ 2,311		24	\$ 3,961
Insulated Water Line Replacement	1250	\$ 22,000	\$ 31,658		318	\$ 53,658
Bathroom Upgrades and Fixtures	16	\$ 12,992	\$ 9,572		96	\$ 22,564
ADA Compliance	2	\$ 6,000	\$ 1,926		20	\$ 7,926
Bathroom Accessories	2	\$ 4,800	\$ 1,926		20	\$ 6,726
Hydronic Line Replacement	980	\$ 17,248	\$ 24,820		249	\$ 42,068
VAV Boxes	7	\$ 22,400	\$ 1,047	\$ 700	11	\$ 24,147
Sprinkler System						\$ 64,500
Ceiling GWB - Hang, Tape, Finish, Paint	11200	\$ 16,240	\$ 43,138	\$ 625	448	\$ 60,003
Walls GWB - Hang, Tape, Finish, Paint	4800	\$ 6,960	\$ 18,488	\$ 625	192	\$ 26,073
Protection, Final Cleaning - Floors	550	\$ 1,018	\$ 1,155		12	\$ 2,173
Plumber's O, H, & P		\$ 50,781				\$ 50,781
HVAC & Plumbing Renovations					1,389	\$ 373,472
Summary of this Area						
		Material	Labor	Equipment		Line Total
Subtotals of Work		\$ 172,689	\$ 193,116	\$ 7,150		\$ 372,955
8% General Conditions					402,791	\$ 29,836
15% Estimator's Contingency					463,210	\$ 60,419
12% General Contractor's O,H. & P					518,795	\$ 55,585
12% A & E						\$ 62,255
Total Section 4						\$ 581,051

Section 6: Remaining Finishes to Renewed

Wolf Page 2, Item 5 \$ 100 96.29

Palmer Public Library Restoration Project

		Material	Labor	Equipment	MH	Total
Other Finishes						
Unseen Wall Areas w/ GWB Removal	7500	\$ 500	\$ -	\$ 600	24	\$ 1,100
Walls GWB - Hang, Tape, Finish, Paint	7500	\$ 10,875	\$ 28,887	\$ 625	300	\$ 40,387
Metal Linear Ceiling	4900	\$ 57,330	\$ 14,700		153	\$ 72,030
Suspended Acoustical Ceiling	2600	\$ 8,450	\$ 7,150		74	\$ 15,600
Other Walls Patched & Painted	8000	\$ 6,880	\$ 16,800	\$ 1,200	174	\$ 24,880
Flooring Removal	9500	\$ 550	\$ 7,074	\$ 400	76	\$ 8,024
Flooring Replacement	9500	\$ 45,600	\$ 91,476		950	\$ 137,076
Base Trim	1450	\$ 2,900	\$ 2,792		29	\$ 5,692
						\$ 304,789
Summary of this Area		Material	Labor	Equipment		Line Total
Subtotals of Work		\$ 133,085	\$ 168,879	\$ 2,825		\$ 304,789
8% General Conditions					329,172	\$ 24,383
15% Estimator's Contingency					378,548	\$ 49,376
12% General Contractor's O,H. & P					423,974	\$ 45,426
12% A & E						\$ 50,877
Total Section 5						\$ 474,851

Section 7: Casework and Shelving

Wolf Page 2, Item 6

\$ 100

96.29

		Material	Labor	Equipment	MH	Total
Remove / Store Casework & Shelving						
Casework Removal			\$ 19,258		200	\$ 19,258
Mark, Palletize, Protect for storage		\$ 22,000	\$ 5,640		60	\$ 27,640
Transport to Storage			\$ 2,068	\$ 1,600	22	\$ 3,668
Storage Costs - 4 months		\$ 2,000				\$ 2,000
Transportback to Job			\$ 2,068	\$ 1,600	22	\$ 3,668
Repair/Reinstall Casework		\$ 850	\$ 19,258		200	\$ 20,108
Misc. Countertop Replacements	100	\$ 5,200	\$ 6,702		70	\$ 11,902
Remove / Store Casework & Shelving					574	\$ 88,244
Summary of this Area		Material	Labor	Equipment		Line Total
Subtotals of Work		\$ 30,050	\$ 54,994	\$ 3,200		\$ 88,244
8% General Conditions					95,303	\$ 7,060
15% Estimator's Contingency					109,599	\$ 14,295
12% General Contractor's O,H. & P					122,751	\$ 13,152
12% A & E						\$ 14,730
Total Section 6						\$ 137,481

Part Three

Section 8: Estimator's Assumptions of Additional Work

96.29

					101.07	
Hazardous Materials						

Palmer Public Library Restoration Project

Haz-Mat Survey		\$ 50,000				\$ 50,000
Black Mold Abatement	6000	\$ 18,000	\$ 4,333		45	\$ 22,333
Hazardous Materials						\$ 72,333
Area Lighting						
Light Fixture Removal	220	\$ 2,200	\$ 13,341	\$ 3,600	132	\$ 19,141
New Light Fixtures	220	\$ 71,500	\$ 20,012	\$ 3,600	198	\$ 95,112
Misc Lock-outs for Wall/Ceiling Work			\$ 2,021		20	\$ 2,021
Misc Wiring Repairs		\$ 2,200	\$ 3,032	\$ 1,200	30	\$ 6,432
Misc. Switch and Recept. Replacement		\$ 2,000	\$ 1,668		17	\$ 3,668
Electrician's Call-outs (@ \$150/hr)	6	\$ 3,600				\$ 3,600
Electrician's Mob		\$ 6,000	\$ 2,426		24	\$ 8,426
Electrician's O, H, & P		\$ 34,600				\$ 34,600
Area Lighting						\$ 173,000
Interior Soffit Work						
Interior Soffit Removals		\$ 600	\$ 2,311	\$ 1,400	24	\$ 4,311
Interior Soffit Replacement		\$ 4,800	\$ 1,926	\$ 1,600	19	\$ 8,326
Walls GWB - Hang, Tape, Finish, Paint	480	\$ 696	\$ 1,849	\$ 625	19	\$ 3,170
Interior Soffit Work						\$ 15,807
Heating System Restart						
Work on Boilers, Tanks and Pumps		\$ 22,000	\$ 11,965		120	\$ 33,965
New Hot Water Heater		\$ 5,000	\$ 2,300		23	\$ 7,300
Plumb O, H, & P		\$ 10,316				\$ 10,316
Heating System Restart						\$ 51,582
Summary of this Area		Material	Labor	Equipment		Line Total
Subtotals of Work		\$ 233,512	\$ 67,184	\$ 12,025		\$ 312,721
8% General Conditions					337,739	\$ 25,018
15% Estimator's Contingency					388,399	\$ 50,661
12% General Contractor's O,H. & P					435,007	\$ 46,608
12% A & E						\$ 52,201
Total Section 7						\$ 487,208
Summary						
Section 1		\$ 1,094,244				
Section 2		\$ 134,855				
Section 3		\$ 1,144,523				
Section 4		\$ 98,976				
Section 5		\$ 581,051				
Section 6		\$ 474,851				
Section 7		\$ 137,481				
Section 8		\$ 487,208				
Grand Total:		\$ 4,153,188				