

Citywide
Facility Condition Assessment

Report of
Facility Condition Assessment

For
City of Novato
Hamilton Firehouse
555 Hangar Avenue, Novato, CA



March 4, 2013

Provided By:

Faithful+Gould, Inc.

Provided For:



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SECTION 1 - EXECUTIVE SUMMARY

INTRODUCTION

In accordance with the agreement held between City of Novato, dated January 18, 2013 and Faithful+Gould Inc, this completed report provides a comprehensive Facility Condition Assessment of Hamilton Firehouse located at 555 Hangar Avenue, Novato, CA (The Facility).

This report provides a summary of the facility information known to us at the time of the study, the scope of work performed, an equipment inventory, evaluation of the visually apparent condition of the Property and an expenditure forecast of expenditures anticipated over the next 20 years. The expenditure forecast does not account for typical planned maintenance items such as changing filters to fan coil units and only considers deficiencies above a \$500 aggregated value.

Our cost rates to produce life cycle and replacement cost estimates are based on our knowledge of the local regional market rates. Our line item costs assume that the work will be undertaken by either in-house or by direct sub-contract labor. Identified recommended works that are required during the twenty-year study period have been included with an allowance of 25% for professional fees and general contractor overhead/profit and management costs (where applicable).

Chart EX-1 provides a summary of the anticipated primary expenditures over the 20 year study period. Further details of these expenditures are included within each respective report section and within the 20 year expenditure forecast, in Appendix A.

The report also calculates the Facility Condition Index (FCI) of the building based upon the calculated FCI. Further discussion of the Facility Condition Index is detailed in the sections below.

This report was completed in general accordance with the ASTM E2018-08 Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process.

PROJECT DETAILS

On January 23, 2013 Mr. Eric Whitworth and Mr. Mark Taylor of Faithful+Gould visited the facility to observe and document the condition of the building and the site components. During our site visit, Faithful+Gould was assisted by Raymond Dwelly, Director of Operations & Maintenance for the Hamilton Field History Museum.

Overview of the Building and Site



BUILDING SUMMARY

Table EX-1 Facility Details

| | | | |
|--|---|---|---|
| BUILDING NAME: | Hamilton Firehouse | LAT/LONG: | 38°03'23.97"N / -122°03'52.14"W |
| ADDRESS: | 555 Hangar Avenue, Novato, CA 94949 | OCCUPANCY STATUS: | |
| HISTORIC DISTRICT: | YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> | OCCUPIED <input checked="" type="checkbox"/> VACANT <input type="checkbox"/> PARTIALLY <input type="checkbox"/> | |
| GROSS SQUARE FOOTAGE OF BUILDING: | 4,000 | HISTORIC BUILDING: | YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> |
| GROSS SQUARE FOOTAGE OF LAND: | | 28,554 (estimated) Whole Facility | |
| CURRENT REPLACEMENT VALUE: | \$1,627,830 | YEAR OF CONSTRUCTION: | 1934 |
| BUILDING USE: | Field History Museum | NUMBER OF STORIES: | 2 |

BUILDING DESCRIPTION

Hamilton Firehouse is located at 555 Hangar Avenue and was originally built in circa 1934. The building opened as the Hamilton Field History Museum in 2010. The building is managed and looked after by the Novato Historical Guild who have a partnership with the City of Novato. The building is open to the public and is an educational facility. As far as we are aware the building is not on the national Register of Historic Places.

The building has a cast in place concrete framed structure and exterior walls. The pyramidal hip roof construction and two lean to sections is comprised of 2" x 8" wood rafters with a tongue and groove wood roof deck. The roof covering consists of a waterproof membrane with a clay barrel roof tile. The lower first floor museum area consisted of a cast-in-place reinforced concrete slab-on-grade floor slab and a cast-in-place suspended concrete slab at the upper first floor lobby entrance area. The second floor construction consisted of a cast-in-place concrete floor slab. Windows generally consisted of steel single pane casement units. Doors consisted of a swing operated glazed entrance doors and hollow metal personnel doors.

The interior finishes of the building contained ceramic tile and carpet square floor tiles painted walls, concealed and exposed suspended ceiling grid systems.

The HVAC system provides heat for the building. The system is comprised of two gas fueled furnaces located in the attic area.



The Main Distribution Panel is a Square D unit that is rated at 480 volts at 400 amps. The interior lighting is provided by recessed fluorescent fixtures with T8 32 watt bulbs and electronic ballasts and a variety of suspended track lighting which illuminated the museums displays.

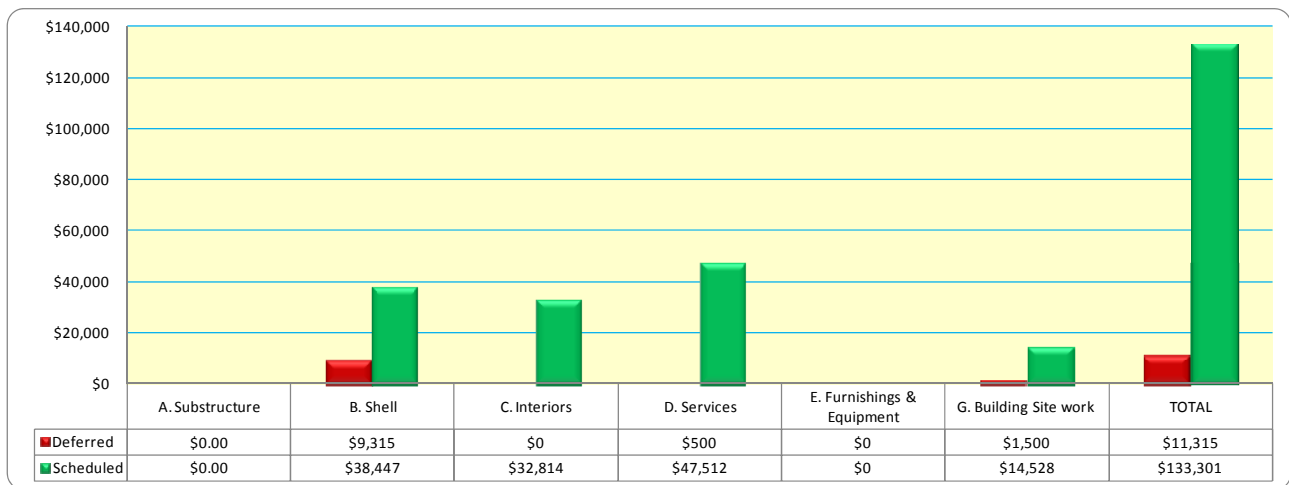
The building contains wet-pipe sprinkler, fire alarm and intruder security alarm systems. There is no generator at the building.






BUILDING EXPENDITURE SUMMARY

The building expenditure summary section provides an executive overview of the findings from the assessments. Chart EX-1 provides a summary of anticipated expenditures over the study period. In addition, we have scheduled key findings highlighting key items of interest and their anticipated failure year. Further details of these expenditures are included within each respective report section and within the expenditure forecast, in Appendix A of this report. The results illustrate a total anticipated expenditure over the study period of circa \$144,616.

Chart EX-1 Building Expenditure Summary ^{1, 2, 3 & 4}



KEY FINDINGS

-  B Shell: Repaint exterior wall surfaces at an estimated cost of \$14,566 in years 2018 and 2026
-  D Services: Replace fire alarm system at an estimated cost of \$20,000 in year 2025
-  G Building Sitework: Asphalt mill and overlay to include re-striping at an estimated cost of \$10,500 in year 2030

¹ All costs presented in present day values

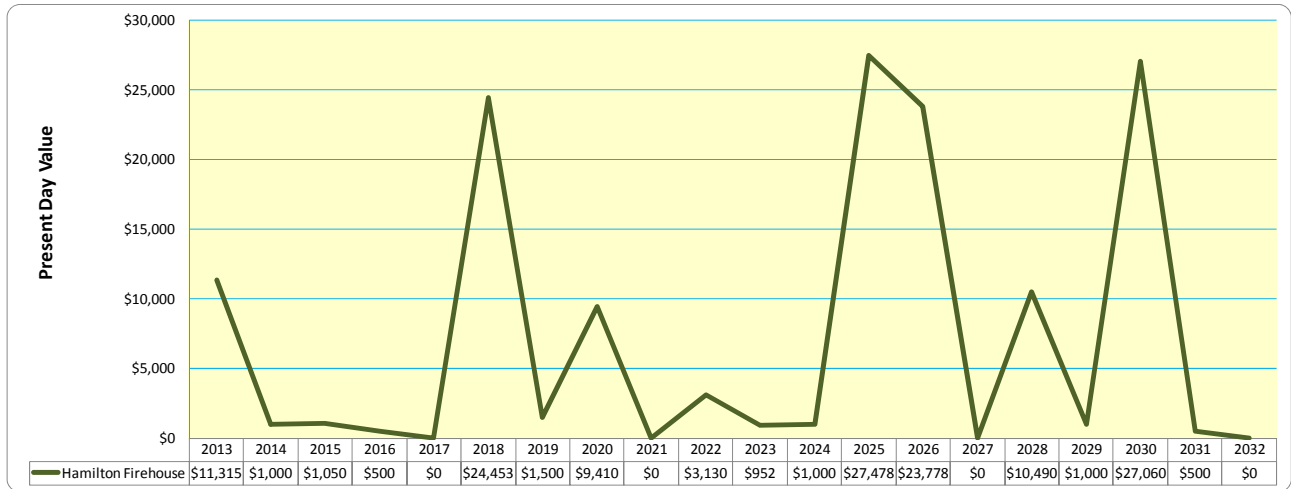
² Costs represent total anticipated values over the 20 year study period

³ An allowance of 25% has been included for professional fees and general contractor overhead/profit and management costs

⁴ ADA Compliance was not examined as part of this project. The costs do not factor in bringing the recommended expenditures into compliance with current ADA rules.

Chart EX-2 illustrates a summary of yearly anticipated expenditures over the cost study period for the building. A detailed breakdown of anticipated expenditures is contained within Appendix A of this report.

Chart EX-2 Expenditure Forecast ^{1, 2, 3 & 4}



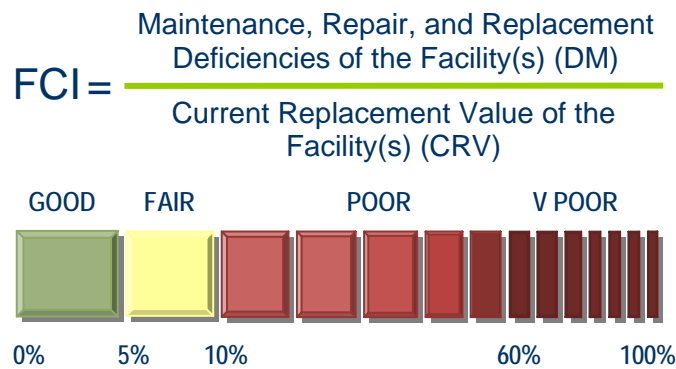
¹ All costs presented in present day values
² Costs represent total anticipated values over the 20 year study period
³ An allowance of 25% has been included for professional fees and general contractor overhead/profit and management costs
⁴ ADA Compliance was not examined as part of this project. The costs do not factor in bringing the recommended expenditures into compliance with current ADA rules.

This chart highlights expenditure for Hamilton Firehouse within years 2018, 2025, 2026 and 2030 primarily due to systems which are expected to reach their Estimated Useful Life (EUL) and therefore due for replacement. The line represents the total expenditure for each year, and is a useful tool to indicate the magnitude of the impending issues the building will face.

INTERPRETING RESULTS

In this report we have calculated the **Facility Condition Index (FCI)** for the facility; illustrating the likely condition of the systems and equipment should the required funding not be expended over the cost study period. The FCI is used in Facilities Management to provide a benchmark to compare the relative condition of a group of facilities. The FCI is primarily used to support asset management initiatives of federal, state, and local government facilities organizations.

The FCI is the ratio of accumulated Deferred Maintenance (DM) (total sum of required and recommended works) to the Current Replacement Value (CRV) for a constructed asset calculated by dividing DM by CRV. The range is from zero for a newly constructed asset, to one for a constructed asset with a DM value equal to its CRV. Acceptable ranges vary by 'Asset Type', but as a general guideline the FCI scoring system is as follows:



The FCI is a relative indicator of condition, and should be tracked over time to maximize its benefit. It is advantageous to define condition ratings based on ranges of the FCI. There are a set of ratings: good (under 0.05 (under 5%)), fair (0.5 to 0.10 (5% to 10%)), and poor (over 0.10 (over 10%)) based on evaluating data from various clients at the time of the publication. Table EX-2 will help interpret the results:

Table EX-2 FCI Scoring System

| Condition | Definition | Score | Percentage Value |
|-----------|---|-------------------|------------------|
| GOOD | In a new or well maintained condition, with no visual evidence of wear, soiling or other deficiencies | 0.00 to 0.05 | 0% to 5% |
| FAIR | Subject to wear, and soiling but is still in a serviceable and functioning condition | 0.05 to 0.10 | 5% to 10% |
| POOR | Subjected to hard or long-term wear. Nearing the end of its useful or serviceable life. | Greater than 0.10 | Greater than 10% |
| V-POOR | Subjected to hard or long-term wear. Has reached the end of its useful or serviceable life. Renewal now necessary | Greater than 0.60 | Greater than 60% |

If the FCI rating is 60% or greater then replacement of the asset/building should be considered instead of renewal.

Table EX-3 provides a calculation of the FCI for the building illustrating both the current condition of the building and the likely condition of the building should the required funding not be expended over the study period. The results of the study indicate that currently the building contains a GOOD facility condition index rating, therefore suggesting that the building is well maintained.

Table EX-3 Facility Condition Index

| Building Name | FCI | Gross Square Foot (GSF) | CRV per GSF | Current Replacement Value (CRV) | Deferred Maintenance Value (DM) <small>1, 2, 3 & 4</small> | FCI Ratio | Property Condition Rating |
|--------------------|-------------------|-------------------------|-------------|---------------------------------|---|-----------|---------------------------|
| Hamilton Firehouse | Current FCI Ratio | 4,000 | \$407 | \$ 1,627,830 | \$ 10,815 | 0.7% | GOOD |
| Hamilton Firehouse | Year 20 FCI Ratio | 4,000 | \$407 | \$ 1,627,830 | \$ 144,616 | 8.9% | FAIR |

¹ All costs presented in present day values

² Costs represent total anticipated values over the 20 year study period

³ An allowance of 25% has been included for professional fees and general contractor overhead/profit and management costs

⁴ ADA Compliance was not examined as part of this project. The costs do not factor in bringing the recommended expenditures into compliance with current ADA rules.

Chart EX-3 indicates the effects of the FCI ratio per year, assuming the required funds and expenditures **ARE** made to address the identified works each year. As explained, the building is in GOOD condition rating (below 5%) at the start of the study period and on a year by year basis will stay there.

Chart EX-3 Year by Year Effects of FCI over the Study Period

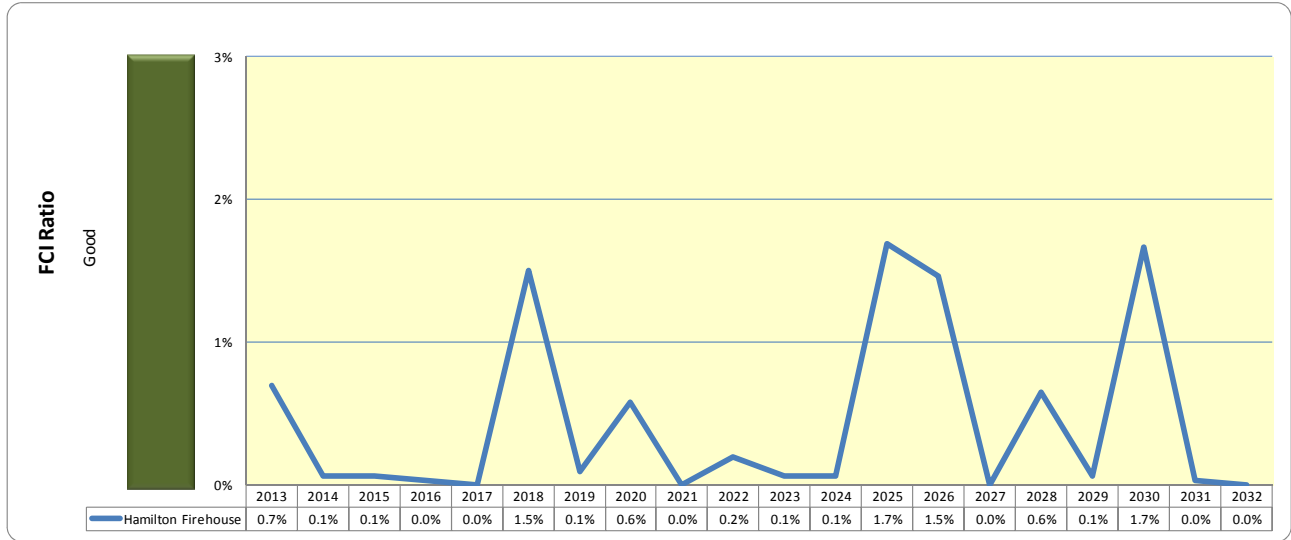
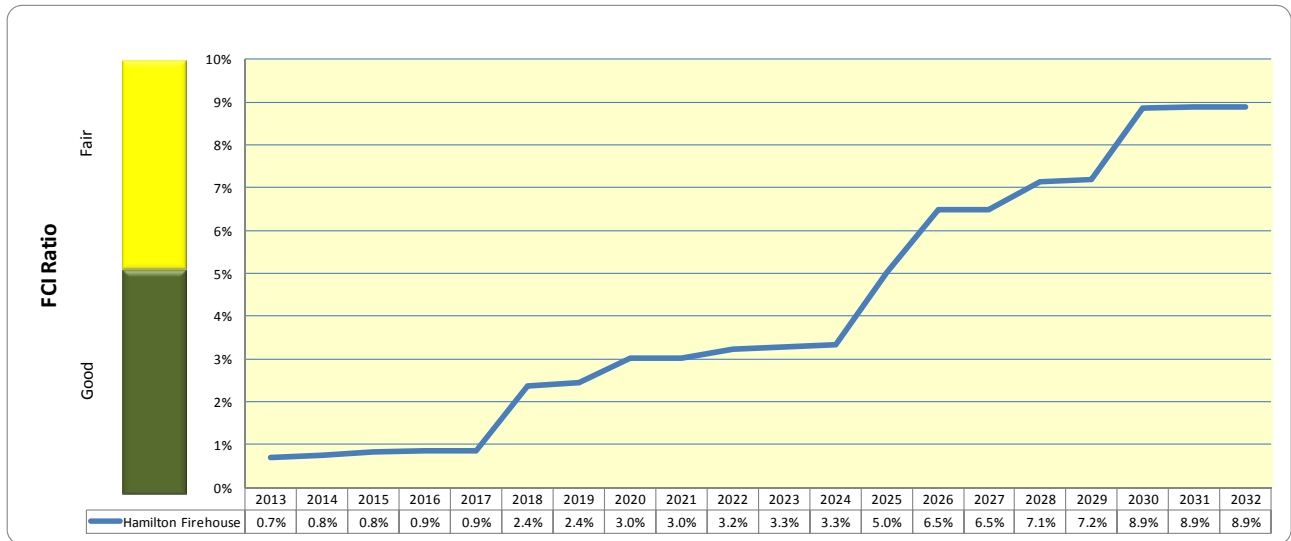


Chart EX-4 indicates the cumulative effects of the FCI ratio over the study period assuming the required funds and expenditures are **NOT** provided to address the identified works and deferred maintenance each year. The results of the study indicate at this current time the building is well maintained, with a facility condition index rating within the GOOD condition; however this rating will fall into the FAIR condition rating in 2025, where it will remain for the rest of the study period.

Chart EX-4 Cumulative Effects of FCI over the Study Period



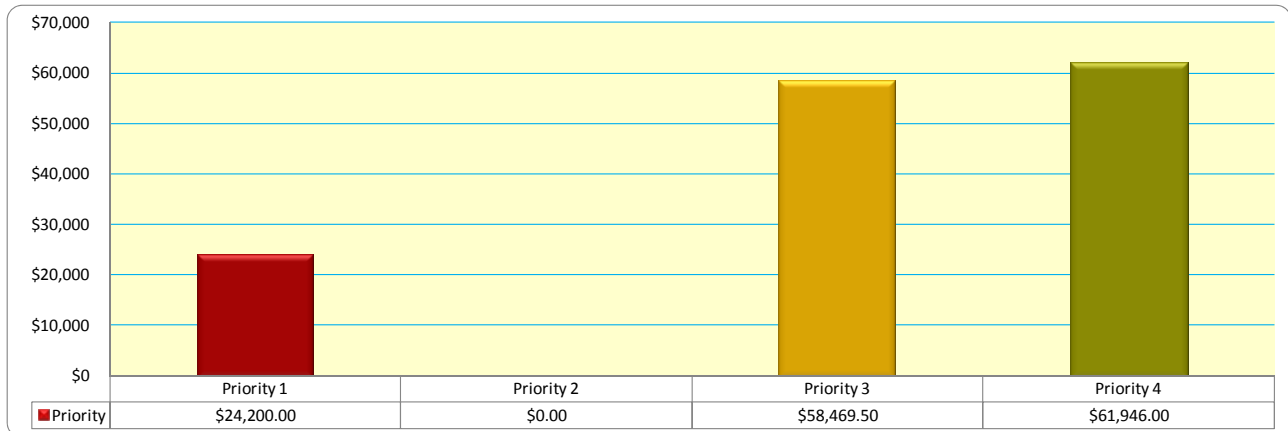
PRIORITIZATION OF WORK

Faithful+Gould has prioritized the identified work in order to assist with analyzing the deficiencies found during the assessments. The following Priorities are shown below:

| | |
|---|---|
| Priority 1 Life Safety/Code Compliance/ADA: | <ul style="list-style-type: none"> • Compromises staff or public safety or when a system requires to be upgraded to comply with current codes and standards |
| Priority 2 Currently Critical: | <ul style="list-style-type: none"> • A system or component is inoperable or compromised and requires immediate action |
| Priority 3 Necessary / Not Critical: | <ul style="list-style-type: none"> • Maintain the integrity of the facility or component and replace those items, which have exceeded their expected useful life |
| Priority 4 Image/Reputation: | <ul style="list-style-type: none"> • Used to maintain the appearance of a system due to image/reputation |

Chart EX-5 illustrates the breakdown of expenditure according to the priority coding providing an opportunity to strategically plan and effectively direct funding to the highest priority.

Chart EX-5 Cumulative Prioritization of Work



Priority 4 appears to require the most amount of expenditure in this study. This category illustrates that the work which needs to be undertaken is associated with maintaining the appearance of the building.

Chart EX-6 Year by Year Cumulative Prioritization of Work

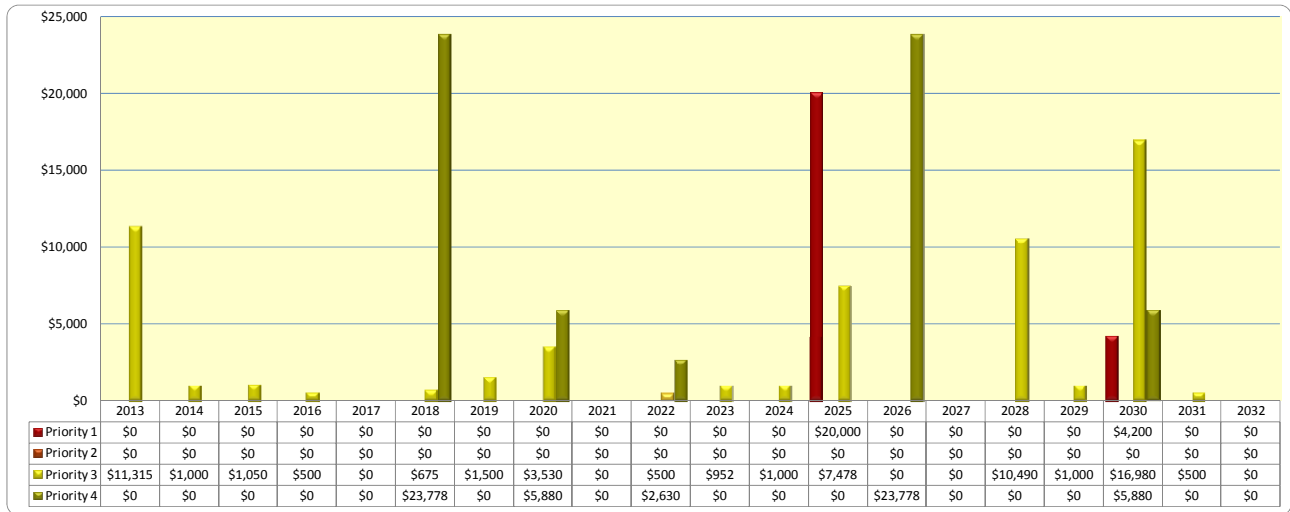


Chart EX-6 illustrates that there are important expenditure years for Priorities 1, 3 and 4 coding, throughout the study period.

PLAN TYPES

Faithful+Gould has prioritized the identified work according to the Plan Type or deficiency categories in order to assist with analyzing the deficiencies found during the assessments. The following Plan Types are shown below:

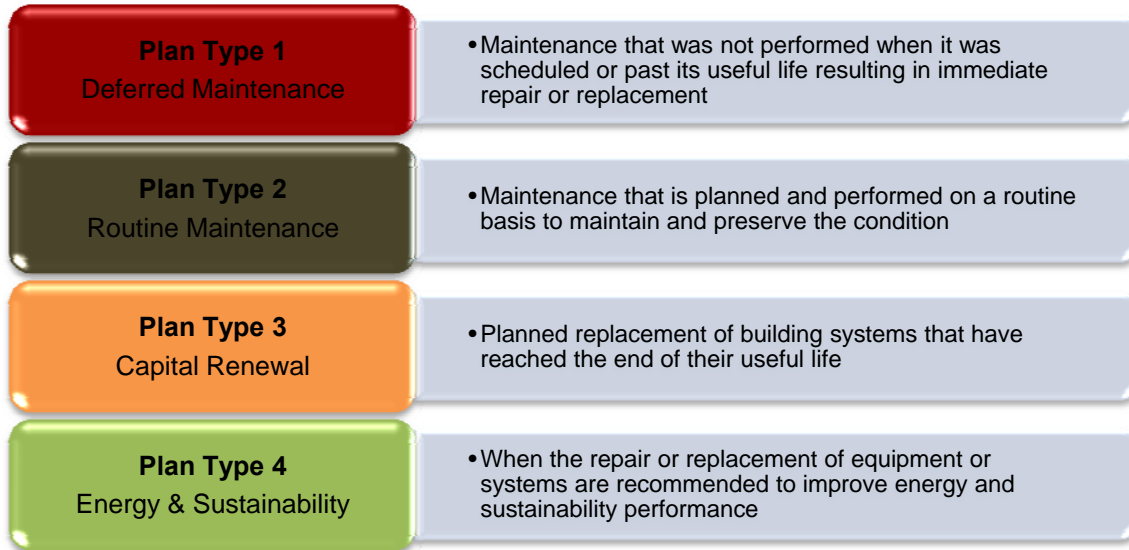
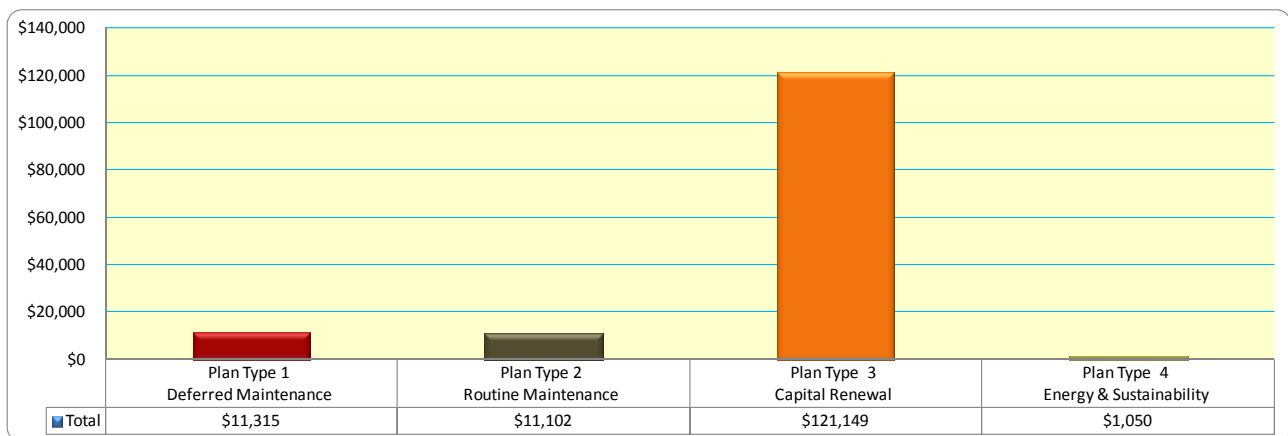


Chart EX-7 illustrates the breakdown of expenditure according to the Plan Type or deficiency categories providing an opportunity to strategically plan and effectively direct funding.

Chart EX-7 Cumulative Expenditure by Plan Type



Plan Type 3 – Capital Renewal appears to require the majority of the expenditure in this study.

Chart EX-8 illustrates the breakdown of expenditure per each year within the 20 year study period according to the Plan Type or deficiency categories.

Chart EX-8 Yearly Expenditure by Plan Type

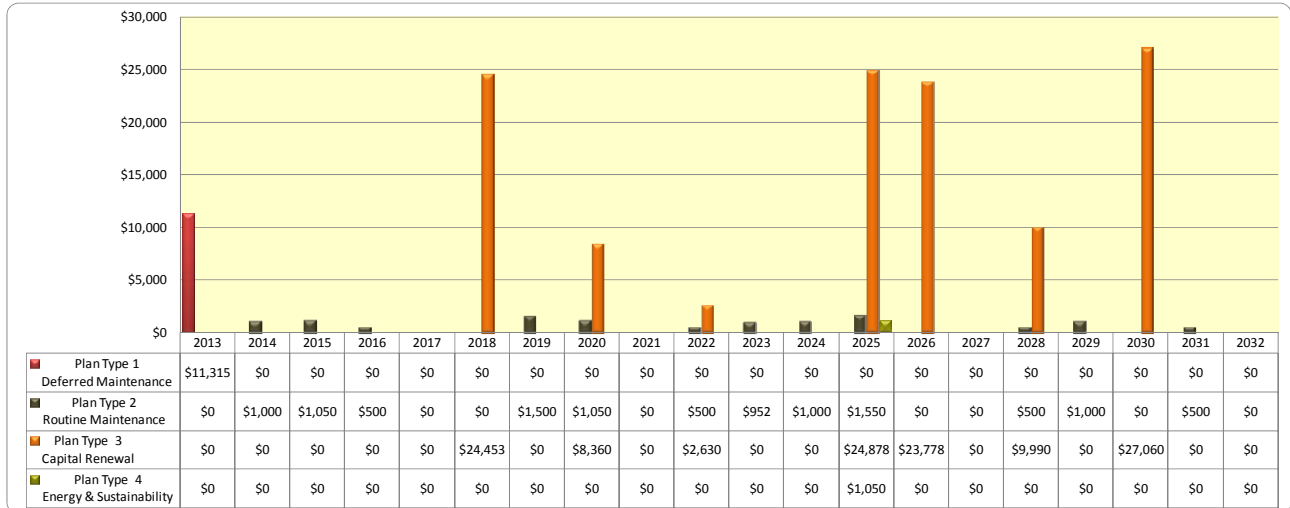


Chart EX-8 illustrates that there is expenditure needed in multiple years for Plan Type 3 during the study period.

SECTION 2 - A SUBSTRUCTURE

A10 FOUNDATIONS

DESCRIPTION

The description of the respective structural systems for the building is based upon our review of available drawings, and our observation of exposed portions of the building structure. The drawings reviewed can be found in Appendix D.

A1010 STANDARD FOUNDATIONS

A1011 Wall Foundations

In the absence of detailed structural drawings we have based our descriptions of the foundation system upon our visual observations (where possible) of the systems and our experience with similar structural systems.

The structure, we noted as cast in place concrete walls which we assume are all supported via the foundation system. Based on the sizing, type and anticipated loads of these wall systems and our visual observation of geotechnical conditions, we anticipate that they are all founded on a series of mild-steel reinforced cast-in-place concrete isolated, wall, and grade beam footings (reference Photograph 1 in Appendix B).

A1030 SLABS-ON-GRADE

A1031 Standard Slab on Grade

The lower first floor level of the building generally consisted of cast-in-place concrete slab-on-grade, reinforced with welded wire fabric. We assume that the floor slab was placed over a compacted gravel fill, with the thickness of the slab being approximately 6"-8" laid over a 2" sand bed. The compressive strength of the concrete is unknown.

CONDITION

A1010 STANDARD FOUNDATIONS

A1011 Wall Foundations

The footings are not visible due to their location below the exterior wall construction. However the foundation systems appeared to be in good condition, with no evidence of overloading or failure noted. We do not anticipate any works within the twenty-year study period.

A1030 SLABS-ON-GRADE

A1031 Standard Slab on Grade

The floor slab appeared to be in poor to fair condition. We noted uneven areas within the concrete floor slab in the area previously used as the main bay area for the firetrucks. It is unknown whether the slab was intended to be in this configuration to allow for proper drainage when washing the fire trucks, whether the weight of the fire trucks had anything to do with the uneven slab. The inspection was limited due to the existing floor finishes.

PROJECTED EXPENDITURES

No projected expenditures are identified for A Substructure within the study period.

SECTION 3 - B SHELL

B10 SUPERSTRUCTURE

DESCRIPTION

The description of the respective structural systems for the building is based upon our review of available drawings, and our observation of exposed portions of the building structure. The drawings reviewed can be found in Appendix D.

B1010 FLOOR CONSTRUCTION

B1012 Upper Floor Construction

The floor slab at the upper first floor level and second floor level is cast-in-place concrete slab supported by cast-in-place concrete beam and columns of varying sizes, depending on the superimposed load (reference Photograph 2 in Appendix B).

B1020 ROOF CONSTRUCTION

B1022 Pitched Roof Construction

The roof above the majority of the building consisted of pitched roof assembly of wood rafters, joist and purlins, which span various directions (reference Photograph 4 in Appendix B). The roof construction is supported via the exterior wall, various sizes of wood framing and posts providing mid-frame support. The wood deck was replaced in the year 2000.

B1030 STRUCTURAL FRAME

B1032 Concrete Frame Structure

The structure of the building was noted to be of a cast-in-place reinforced concrete structural frame (reference Photograph 6 in Appendix B).

CONDITION

B1010 FLOOR CONSTRUCTION

B1012 Upper Floor Construction

The upper floor construction and supporting structures appeared to be in fair condition. There were no visible signs of failure, such as cracking present. We do not anticipate any expenditure during the cost study period.

B1020 ROOF CONSTRUCTION

B1022 Pitched Roof Construction

The pitched roof construction appeared to be in fair condition. There were no visible signs of failure noted. We do not anticipate any expenditure during the cost study period.

B1030 STRUCTURAL FRAME

B1032 Concrete Frame Structure

The concrete framed structure appeared to be in fair condition. We do not anticipate the replacement of such structural elements during the cost study period.

B20 EXTERIOR ENCLOSURES

DESCRIPTION

The description of the respective exterior enclosure for the building is based upon our review of available drawings, and our observation of exposed portions of the building structure. The drawings reviewed can be found in Appendix D.

B2010 EXTERIOR WALLS

B2011 Exterior Wall Construction

The firehouse building was enclosed with an approximately 12" thick cast in place concrete walls which contained a smooth finished stucco surface (reference Photograph 6 in Appendix B). At high level we noted a decorative indented detail just below the fascia as well as circular attic ventilation.

B2020 EXTERIOR WINDOWS

B2021 Windows

At each of the elevations there were generally operable steel windows with single pane glazing (reference Photograph 8 in Appendix B). The window frames contain caulking at the point where they meet the wall construction. There were also two newer aluminum windows on the north side of the building (reference Photograph 9 in Appendix B).

B2030 EXTERIOR DOORS

B2031 Glazed Doors & Entrances

The entrance at the west side of the building contained glazed aluminum doors (reference Photograph 5 in Appendix B).

B2039 Other Doors & Entrances

The building contained single and double hollow metal doors and frames at the perimeter (reference Photograph 6 in Appendix B), mainly at the east and west elevations. Door hardware consisted of lever handles, with emergency push bars at the interior as well as self closing devices. The east elevation contained 4 double hung decorative wooden doors (reference Photograph 12 in Appendix B) that were recently installed to match the previous firehouse doors. The building manager noted that they were constructed in Mexico at a cost of \$5,000 per door.

CONDITION

B2010 EXTERIOR WALLS

B2011 Exterior Wall Construction

The exterior wall system construction and stucco surface appeared to be in fair to good condition. We understand that the stucco walls were last painted two-years ago and therefore based on their current observed condition and the typical EUL of eight-years repainting of the painted surfaces are recommended early in the study period and then every eight-years after to maintain the exterior appearance of the building.

We noted sections of the exterior walls on the west side that were reconfigured which the in-fill had contracted causing an uneven surface and cracking and also around a fire sprinkler supply line located at the south east corner of the building (reference Photograph 7 in Appendix B). We suggest that the cracks and stucco texture be repaired before starting repainting repair work.

B2020 EXTERIOR WINDOWS

B2021 Windows

The exterior window units appeared to be in fair condition. We assume they are part of the original construction and date back to 1930's. Metal windows have a typical EUL of fifty-years; therefore replacement would fall within the twenty-year study period. However being that this building has historic value we do not recommend full replacement during the twenty-year study period. We noted that the caulking is in fair to poor condition. We estimate that the sealant will reach its EUL in seven-years and will need to be replaced with a suitable polyurethane sealant. Typically painting the windows would coincide with the exterior painting, however the window frames are currently deteriorated and require re-painting to maintain the exterior appearance of the building (reference Photograph 11 in Appendix B).

B2030 EXTERIOR DOORS

B2031 Glazed Doors & Entrances

The glazed entrance doors appeared to be in good condition as they were recently installed. Through regular maintenance the doors should last beyond the study period.

B2039 Other Doors & Entrances

The metal doors appeared to be in good condition with no observed issues noted. There is no anticipated requirement for replacement of the doors during the study period. The operation of the swing doors were satisfactory and operated without any difficulty. Repainting along with the exterior elevation repainting works will be necessary to the other previously painted doors.

B30 ROOFING

DESCRIPTION

B3010 ROOF COVERINGS

B3011 Roof Finishes

The facility contained three steep-sloped roof areas; these roof areas are shown on the following aerial plan:

Overview of Roof Locations & Configurations



The steep-sloped roof areas 1 through 3 contained a tapered, semicylindrical roofing tile laid convex side up to overlap flanking, similar tiles laid concave side up (reference Photographs 6, 13 and 14 in Appendix B). The age of the roof covering systems are unknown, however we estimate them to be over fifty-years old.

The roof levels each drain to perimeter roof gutters leading to exterior mounted downspouts which appear to be connected to storm water drains.

CONDITION

B3010 ROOF COVERINGS

B3011 Roof Finishes

Faithful+Gould were unable to walk the field of the roofs as they were generally steep-sloped and therefore observations were taken from and assessed at ground level.

The clay tile roof covering appeared to be in fair condition at each of the roof areas, with no roof leaks reported. We understand that the clay roof tile covering is approximately fifty-years. The roof tiles however were removed in the year 2000 to install a new water proof membrane and then reinstalled. We do not expect any expenditure to the roof covering during the twenty year study period.

The roof appears to drain well with adequate slope at all areas to allow water to run to the drains. The gutters and outlets appear to be free from debris, adequately sized and spaced properly.

PROJECTED EXPENDITURES

Identified recommended works that are required during the twenty-year study period are detailed below. We have included a 25% allowance for professional fees and general contractor overhead/profit and management costs (where applicable).

| Element No. | Building Element | Recommendation | Qty | Unit | Rate | Cost | Year | Priority Code |
|---|----------------------------|--|-------|------|---------|----------|------|---------------|
| B2011 | Exterior Wall Construction | Repaint exterior wall surfaces | 7,748 | SF | \$1.88 | \$14,566 | 2018 | 4 |
| B2011 | Exterior Wall Construction | Repaint exterior wall surfaces | 7,748 | SF | \$1.88 | \$14,566 | 2026 | 4 |
| B2021 | Windows | Replace sealant at perimeter of window panes | 828 | LF | \$11.25 | \$9,315 | 2013 | 3 |
| B2021 | Windows | Replace sealant at perimeter of window panes | 828 | LF | \$11.25 | \$9,315 | 2028 | 3 |
| Total Anticipated Expenditure for B Shell | | | | | | \$47,762 | | |

SECTION 4 - C INTERIORS

C10 INTERIOR CONSTRUCTION

DESCRIPTION

C1010 PARTITIONS

C1011 Fixed Partitions

The building contained painted gypsum board partitions, with fiberglass batt insulation throughout the building (reference Photograph 16 in Appendix B).

C1020 INTERIOR DOORS

C1021 Interior Doors

The building generally contained single flush wood doors which are housed within metal frames (reference Photograph 16 in Appendix B). The doors all appeared to be one directional swing operation.

C1023 Interior Door Hardware

The doors contained aluminum hardware consisting of lever door handles and door closers.

C1030 FITTINGS SPECIALTIES

C1031 Fabricated Toilet Partitions

The restrooms contained laminate wood floor mounted fixed partition cubicles.

CONDITION

C1010 PARTITIONS

C1011 Fixed Partitions

The interior fixed partitions all appeared to be in good condition. There were no deficiencies found in relation to the wall structures. The fixed partitions are suitable for the current use.

C1020 INTERIOR DOORS

C1021 Interior Doors

The interior doors appeared to be in good condition with no deficiencies noted. We do not anticipate any expenditure in relation to the interior doors during the cost study period.

C1023 Interior Door Hardware

The hardware at each of the doors appeared satisfactory with no issues of deterioration or failure noted generally throughout the building. The operation of the door handles, locks and hinged swing were noted to be in fair to good condition. We do not anticipate any expenditure during the study period.

C1030 FITTINGS SPECIALTIES

C1031 Fabricated Toilet Partitions

The fabricated cubicles appeared to be in good condition. We do not anticipate any expenditure during the study period.



C20 STAIRS

DESCRIPTION

C2010 STAIR CONSTRUCTION

C2011 Regular Stairs

Within the building there was one cast in place concrete staircase from the first floor to the second floor workshop area which the public cannot access. The staircase has fully enclosed risers with a metal handrail mounted on one side (reference Photograph 17 in Appendix B).

CONDITION

C2010 STAIR CONSTRUCTION

C2011 Regular Stairs

The staircases appeared to be in a fair condition with no issues reported or identified. We do not anticipate any actions in association with the staircases during the study period.

C30 INTERIOR FINISHES

DESCRIPTION

C3010 WALL FINISHES

C3012 Wall Finishes to Interior Walls

Interior walls throughout the building contained a painted gypsum wall board surface (reference Photographs 15 and 16 in Appendix B). The public restrooms both contained ceramic 4" x 4" wall tiles to mid height (reference Photograph 18 in Appendix B).

C3020 FLOOR FINISHES

C3024 Flooring

The building contained a combination of floor coverings which consisted of carpet squares (reference Photograph 3 in Appendix B) as well as ceramic 2" x 2" floor tiles within the restrooms (reference Photograph 18 in Appendix B).

C3025 Carpeting

We noted 3' X 3' unbonded carpet squares throughout the lobby as well as the main museum display areas (reference Photograph 15 in Appendix B).

C3030 CEILING FINISHES

C3031 Ceiling Finishes

There were painted gypsum board ceilings throughout the restroom areas (reference Photograph 19 in Appendix B) and formed to create soffits at various locations throughout the building.

C3032 Suspended Ceilings

The building had a suspended ceiling systems present. We noted a 2' x 2' acoustic lay-in tile set in a white enameled exposed grid system. The suspended grid system is supported with wires from the underside of the floor and roof construction above (reference Photograph 20 in Appendix B). The ceiling system incorporated lighting and air-handling components.

CONDITION

C3010 WALL FINISHES

C3012 Wall Finishes to Interior Walls

Interior wall finishes appeared to be in fair to good condition generally throughout the building. We understand that the painted walls had been recently repainted in 2010 and therefore with a typical EUL of eight-years repainting would be required mid and late term in the study period. However we understand that painting is undertaken on an as needed basis, which makes it difficult to provide a forecast of expenditure. Therefore we have made recommendations to repaint the interior walls on a cyclical basis with the next period due in 2018.

The ceramic wall tiles and grout appeared to be in good condition with no issues noted. We anticipate that the ceramic wall tiles will last beyond the study period however we do recommend re-grouting the ceramic wall tile along with the ceramic floor tile later in the study period to maintain its appearance.

C3020 FLOOR FINISHES

C3024 Flooring

The ceramic tile flooring appeared to be in good condition. Ceramic tile flooring has a typical EUL of thirty-years and therefore based on the EUL and observed conditions the ceramic tile flooring will last beyond the study period without replacement necessary. However we do recommend re-grouting the ceramic floor tile late in the study period to maintain its appearance.

C3025 Carpeting

The carpet floor coverings appeared to be in good condition. We understand that the carpet which is present generally throughout the lobby and museum building is two-years old and therefore with a typical EUL of ten-years replacement is recommended mid and late term in the study period.

C3030 CEILING FINISHES

C3031 Ceiling Finishes

The painted gypsum ceilings appeared to be in fair to good condition. Painted surfaces usually have a typical EUL of eight-years; therefore we recommend that they are repainted at the same time as the wall surfaces.

C3032 Suspended Ceilings

The suspended ceiling systems appeared to be in fair to good condition overall. We do not anticipate a requirement for its replacement during the study period.

PROJECTED EXPENDITURES

Identified recommended works that are required during the twenty-year study period are detailed below. We have included a 25% allowance for professional fees and general contractor overhead/profit and management costs (where applicable).

| Element No. | Building Element | Recommendation | Qty | Unit | Rate | Cost | Year | Priority Code |
|---|---------------------------------|--|-------|------|---------|----------|------|---------------|
| C3012 | Wall Finishes to Interior Walls | Repaint interior wall surfaces | 4,900 | SF | \$1.88 | \$9,212 | 2018 | 4 |
| C3012 | Wall Finishes to Interior Walls | Repaint interior wall surfaces | 4,900 | SF | \$1.88 | \$9,212 | 2026 | 4 |
| C3024 | Ceramic Tile | Re-grout ceramic tile (restrooms) | 225 | SF | \$11.69 | \$2,630 | 2022 | 4 |
| C3025 | Carpeting | Replace carpet floor covering (main areas) | 147 | SY | \$40.00 | \$5,880 | 2020 | 4 |
| C3025 | Carpeting | Replace carpet floor covering (main areas) | 147 | SY | \$40.00 | \$5,880 | 2030 | 4 |
| Total Anticipated Expenditure for C Interiors | | | | | | \$32,814 | | |

SECTION 5 - D SERVICES

D20 PLUMBING

DESCRIPTION

D2010 PLUMBING FIXTURES

D2011 Water Closets

The building contains floor and wall mounted vitreous china water closets which are tank-less and have their own manual flush valves (reference Photograph 21 in Appendix B).

D2012 Urinals

The building contained a vitreous china wall hung urinal with an automatic flush valve, within the men's restroom (reference Photograph 18 in Appendix B).

D2013 Lavatories

The building contains wall hung vitreous china lavatories (reference Photograph 18 in Appendix B). The lavatories generally consisted of swan neck non-metering faucets with lever type handles. Water is supplied via copper pipe and assumed drained through cast iron pipe work and fittings.

D2014 Sinks

We noted a single fiberglass mop sink within the mechanical/electrical room located through the men's restroom. The sink contained double lever handle non-metering faucet.

D2020 DOMESTIC WATER DISTRIBUTION

D2021 Cold Water Service

Cold water piping throughout the building consisted of copper. We believe the cold water service for the facility is supplied directly from the street pressure. Taps are made to the water line downstream of the meter and routed to plumbing fixtures and equipment via copper pipe work. The water enters the facility at the southeast side of the building.

D2022 Hot Water Service

Domestic hot water was generated via one electric water heater located within the mechanical/electrical room located through the men's restroom (reference Photograph 22 in Appendix B).

Table D20-1 provides a summary of the water heater:

Table D20-1 Summary of the Domestic Water Heating Equipment

| Location | Manufacturer | Model # | Serial # | Fuel/ Rating | Capacity | ≈ Year of Installation |
|-----------------------------------|----------------|------------|-------------|-----------------|-----------|---------------------------|
| Mechanical/ electrical room | Bradford White | PCE3020RTA | 0815M001588 | Electric | 30 Gallon | Assumed 2010 |

Unknown = Access limited or equipment had no name plates present.

Assumed = Based on size of unit and area it serves / or possible year installed.

D2030 SANITARY WASTE

D2031 Waste Piping

Waste piping was not directly inspected, however based on typical construction methods available at the time of construction, the piping is suspected to be cast iron pipe with newer PVC added at a later time.

CONDITION

D2010 PLUMBING FIXTURES

D2011 Water Closets

The water closets and flush valves appeared to be in good condition as they were recently installed. The water closets flushed properly and did not have any cracks in the china, therefore based upon observed conditions and with a typical EUL of thirty-five-years, we anticipate that there will be no requirement for their replacement during the study period. However we do recommend the flush valves are rebuilt mid to late term during the study period to maintain optimal performance.

D2012 Urinals

The urinal and flush valves appeared to be in good condition as they were recently installed. The urinal flushed properly and did not have any cracks in the china therefore based upon observed conditions and with a typical EUL of thirty-five-years, we anticipate that there will be no requirement for their replacement during the study period. However we do recommend the flush valves are rebuilt mid to late term during the study period to maintain optimal performance.

D2013 Lavatories

The lavatories and faucets appeared to be in good condition as they were recently installed. The sinks drained properly and did not have any cracks in the china, therefore based upon observed conditions and with a typical EUL of thirty-five-years, we anticipate that there will be no requirement for their replacement during the study period. However we do recommend the faucets are replaced mid to late term during the study period to maintain optimal performance.

D2014 Sinks

The mop sinks appeared to be in fair condition. We anticipate that there will be no requirement for replacement within the study period. However we do recommend the faucets are replaced mid to late term during the study period to maintain optimal performance.

D2020 DOMESTIC WATER DISTRIBUTION

D2021 Cold Water Service

The domestic water system appeared to be in fair to good condition. No major problems were observed that could be attributed to age and deferred maintenance.

D2022 Hot Water Service

The domestic water heater appeared to be in good condition. It was observed to be functional and operating correctly, however water heaters generally have a typical EUL of ten-years. The water heater we assume was installed in 2010; therefore the water heater will require replacement to maintain efficiency during the study period.

The hot water distribution pipes appeared to be in fair to good condition. We do not anticipate any expenditure within the cost study period.

D2030 SANITARY WASTE

D2031 Waste Piping

No visually apparent problems with the sanitary waste piping were observed.

D30 HVAC

DESCRIPTION

D3010 FUEL ENERGY SUPPLY SYSTEMS

D3012 Gas Supply System

There is natural gas service to the building. The pressure reducing station and gas meter are located at the northwest corner. Gas service is routed to the furnaces.

D3020 HEAT GENERATION SYSTEMS

All of the main heating generation systems are located in the attic area of the building, within an enclosed walled area.

D3021 Boilers

The building contains two high efficiency gas fired forced air furnaces located in the attic area which provides heating to the building. The furnaces are manufactured by Carrier and were installed during the renovation in 2010 (reference Photograph 23 in Appendix B).

D3040 HEAT HVAC DISTRIBUTION SYSTEMS

D3041 Air Distribution Systems

The ductwork is sheet metal, except for flexible duct connections to ceiling diffusers.

D3042 Exhaust Ventilation Systems

The buildings restrooms contained ceiling mounted exhaust fans. The fans are located within the hard lid of the restrooms and all exhaust to the exterior of the building.

Table D30-1 provides a summary of the HVAC equipment:

Table D30-1 Summary of the HVAC Equipment

| Location | Equipment Type | Manufacturer | Model No. | Serial No. | Capacity / Rating | Fuel Type | Year |
|----------|----------------|--------------|-----------|------------|------------------------------|-------------|------|
| Attic | Boiler | Carrier | 58MXB | 1608A03203 | 60,000-120,000 BTU/HR Output | Natural Gas | 2010 |
| Attic | Boiler | Carrier | 58MXB | Unknown | 60,000-120,000 BTU/HR Output | Natural Gas | 2010 |

Unknown = Access limited or equipment had no name plates present.

D3060 HVAC INSTRUMENTATION AND CONTROLS

D3063 HVAC Electric Controls

The HVAC system is controlled by local thermostats located within the building (reference Photograph 24 in Appendix B).

CONDITION

D3010 FUEL ENERGY SUPPLY SYSTEMS

D3012 Gas Supply System

No visually apparent problems with the gas distribution piping were observed at the building. No issues have been reported regarding performance; therefore we believe the supply will be serviceable, through the end of the study period.

D3020 HEAT GENERATION SYSTEMS

D3021 Boilers

The gas fired furnaces were observed to be in good condition. The typical EUL of a boiler of this kind is thirty-years; therefore as the boiler is under three-years old replacement will not be required during the study period. However repair works should be undertaken on the boiler at regularly scheduled intervals.

D3040 HEAT HVAC DISTRIBUTION SYSTEMS

D3041 Air Distribution Systems

Only a small proportion of the ducting of the building was reviewed but the portion was noted to be in fair condition with no deficiencies. We recommend that the duct work is cleaned every five-years starting at the start of the study period as it was unclear when they were last cleaned.

D3042 Exhaust Ventilation Systems

All exhaust fans are in good working order and serve each restroom appropriately.

D3060 HVAC INSTRUMENTATION AND CONTROLS

D3063 HVAC Electric Controls

The HVAC controls appeared to be in good condition. We are unaware of any operational issues.

D40 FIRE PROTECTION

DESCRIPTION

D4010 SPRINKLERS

D4011 Sprinkler Water Supply

The building is protected with an automatic wet-pipe fire suppression system utilizing standard pendent commercial sprinkler heads fixed to fire-line pipes which are supported via the upper structure. The system is monitored by water flow and tamper switches connected to the fire alarm system. The sprinkler main enters the building at the south east elevation. The water main incoming is a 6" line at the point of service. There is a fire main indicator post located at the south east corner of the lot.

D4030 FIRE PROTECTION SPECIALTIES

D4031 Fire Extinguishers

Multipurpose portable wall mounted handheld fire extinguishers were provided throughout the building (reference Photograph 25 in Appendix B).

CONDITION

D4010 SPRINKLERS

D4011 Sprinkler Water Supply

The sprinkler system was observed to be in good condition and all inspections up to date. No visible corrosion or leaks were observed however with the sprinkler heads have a typical EUL of twenty-years as with time the fire sprinkler heads can decrease in functionality and therefore lessen the efficiency of the entire sprinkler system. We anticipate that there will be a requirement for their replacement mid-term during the study period.

D4030 FIRE PROTECTION SPECIALTIES

D4031 Fire Extinguishers

Fire extinguishers appeared to be in good condition. We understand they are maintained on a yearly basis. We do not anticipate a requirement to replace any fire extinguishers during the study period, as we expect that they will be replaced on an as-needed basis.

D50 ELECTRICAL

DESCRIPTION

The following information was obtained through our visual observations of the building systems. The electrical systems include the service entrance equipment, panel boards, safety switches, motor controls, lighting fixtures, and security systems.

D5010 ELECTRICAL SERVICE & DISTRIBUTION

D5012 Low Tension Service & Dist.

The Main Distribution Panel (MDP) is manufactured by Square D and is rated at 480 volts at 4000 amps and is located within the electrical room (reference Photograph 26 in Appendix B). Branch panels are typically located throughout the building and are rated at varying amps.

D5020 LIGHTING & BRANCH WIRING

D5021 Branch Wiring Devices

The branch wiring devices at the building included switches, receptacles and other devices that would be generally associated with this type of building. Branch wiring was observed to typically be distributed in Electric Metallic Tubing (EMT) and flexible metal conduit.

D5022 Lighting Equipment

The interior lighting within the building is provided by 2' x 4' 3 lamp recessed troffer fixtures (reference Photograph 20 in Appendix B), suspended halogen display lighting and a variety of other fixtures including decorative chandeliers (reference Photograph 20 in Appendix B) once hanging in the officers club. All of the in-room lighting is controlled via local switching in the respective rooms.

D5030 COMMUNICATIONS & SECURITY

D5033 Telephone Systems

Telephone and data system was present at the west side of the building within the electrical room (reference Photograph 28 in Appendix B).

D5037 Fire Alarm Systems

The building is protected by a digital automatic fire detection alarm system. The main Fire Alarm Control Panel (FACP) is located within the electrical room, and is manufactured by Simplex. The FACP model is 4008 (reference Photograph 28 in Appendix B). An annunciation panel is located in the main lobby and was also manufactured by Simplex. Addressable devices are located throughout each floor level such as smoke detectors, pull stations and fire bell.

D5038 Security and Detection Systems

The building contains an intruder alarm system, which consists of a programmable security alarm panel and motion sensors. The alarm panel is located near to the south staff entrance and the motion sensors are located throughout the building (reference Photograph 29 in Appendix B). We understand that the security system is also monitored by Stanley Security.

D5090 OTHER ELECTRICAL SYSTEMS

D5092 Emergency Light & Power Systems

Emergency exit signs are provided at exit routes from the building (reference Photograph 30 in Appendix B).

CONDITION

D5010 ELECTRICAL SERVICE AND DISTRIBUTION

D5012 Low Tension Service & Dist.

The major electrical equipment items appeared to be in fair condition and assumed original to the building. There was no indication of damage from short circuit or overload conditions. We were not provided preventative maintenance records for the main electrical equipment, and therefore we do recommend further evaluation of the equipment via an infrared electrical inspection which will highlight if high temperatures, excessive electrical resistance, failing components, ground faults and short circuiting issues exist.

We recommend budgeting for a cyclical allowance above and beyond normal annual electrical maintenance expenditures for cleaning the interiors of all enclosures, and infrared scans of connections, fuses, and breakers in switches, panel boards, and motor starters beginning at the start of the study period and repeated no more than every three-years thereafter. Any items identified as abnormal during the infrared scans should be corrected at that time.

Electrical panel boards generally have a EUL of thirty-years and based on the age of the panel boards present and their observed conditions we anticipate that there will be no requirement for their replacement during the study period.

D5020 LIGHTING & BRANCH WIRING

D5021 Branch Wiring Devices

The general receptacles and wiring appeared to be in fair to good condition. We do not anticipate a requirement for their replacement during the cost study period.

D5022 Lighting Equipment

The interior lighting was observed in fair to good condition and all fixtures were operating properly with no broken lenses or deteriorated housings. We anticipate the lamps will be replaced on an as needed basis. Based on a typical EUL of twenty-years light fixture replacement is recommended based on industry standards late in the study period.

D5030 COMMUNICATIONS & SECURITY

D5033 Telephone Systems

The existing telephone and data equipment was observed to be in fair to good condition. Based on a typical EUL of twenty-years replacement is recommended based on industry standards late in the study period.

D5037 Fire Alarm Systems

The fire alarm system appeared to be in fair to good condition. We are unaware of any issues with the system and it appeared that it receives regular testing. We assume it was upgraded and installed in 2009. Based on a typical EUL of fifteen-years replacement is recommended based on industry standards mid to late term in the study period.

D5038 Security and Detection Systems

The intruder alarm system appeared to be in fair to good condition. We are unaware of any issues with the system. We assume it to be installed in 2009. Based on a typical EUL of ten-years replacement is recommended based on industry standards mid and late term in the study period.

D5090 Other Electrical Systems

D5092 Emergency Light & Power Systems

Emergency exit signs appeared to be in good condition. We do not anticipate their replacement during the cost study period, apart from replacement of the signs on an individual basis, no actions are recommended during the study period.

PROJECTED EXPENDITURES

Identified recommended works that are required during the twenty-year study period are detailed below. We have included a 25% allowance for professional fees and general contractor overhead/profit and management costs (where applicable).

| Element No. | Building Element | Recommendation | Qty | Unit | Rate | Cost | Year | Priority Code |
|-------------|-------------------------|--|-------|------|--------|---------|------|---------------|
| D2011 | Water Closets | Rebuild flush valves | 3 | EACH | \$238 | \$714 | 2023 | 3 |
| D2012 | Urinals | Rebuild flush valve | 1 | EACH | \$238 | \$238* | 2023 | 3 |
| D2013 | Lavatories | Replace faucets | 2 | EACH | \$225 | \$450* | 2018 | 3 |
| D2014 | Sinks | Replace faucet | 1 | EACH | \$225 | \$225* | 2018 | 3 |
| D2013 | Lavatories | Replace faucets | 2 | EACH | \$225 | \$450* | 2028 | 3 |
| D2014 | Sinks | Replace faucet | 1 | EACH | \$225 | \$225* | 2028 | 3 |
| D2022 | Hot Water Service | Replace water heater | 30 | GAL | \$35 | \$1,050 | 2025 | 3 |
| D3041 | Air Distribution System | Clean ductwork | 4,000 | SF | \$0.25 | \$1,000 | 2014 | 3 |
| D3041 | Air Distribution System | Clean ductwork | 4,000 | SF | \$0.25 | \$1,000 | 2019 | 3 |
| D3041 | Air Distribution System | Clean ductwork | 4,000 | SF | \$0.25 | \$1,000 | 2024 | 3 |
| D3041 | Air Distribution System | Clean ductwork | 4,000 | SF | \$0.25 | \$1,000 | 2029 | 3 |
| D4011 | Sprinkler Water Supply | Replace fire sprinkler heads | 4,000 | SF | \$1.05 | \$4,200 | 2030 | 1 |
| D5012 | Low Tension Service | Preventative Maintenance of the electrical equipment | 1 | LS | \$500 | \$500 | 2013 | 3 |
| D5012 | Low Tension Service | Preventative Maintenance of the electrical equipment | 1 | LS | \$500 | \$500 | 2016 | 3 |
| D5012 | Low Tension Service | Preventative Maintenance of the electrical equipment | 1 | LS | \$500 | \$500 | 2019 | 3 |
| D5012 | Low Tension Service | Preventative Maintenance of the electrical equipment | 1 | LS | \$500 | \$500 | 2022 | 3 |
| D5012 | Low Tension Service | Preventative Maintenance of the electrical equipment | 1 | LS | \$500 | \$500 | 2025 | 3 |
| D5012 | Low Tension Service | Preventative Maintenance of the | 1 | LS | \$500 | \$500 | 2028 | 3 |

| | | | | | | | | |
|--|---------------------------|--|-------|----|--------|----------|------|---|
| | | electrical equipment | | | | | | |
| D5012 | Low Tension Service | Preventative Maintenance of the electrical equipment | 1 | LS | \$500 | \$500 | 2031 | 3 |
| D5033 | Telephone System | Replace telephone system | 4,000 | SF | \$1.00 | \$4,000 | 2030 | 3 |
| D5037 | Fire Alarm System | Replace fire alarm system | 4,000 | SF | \$5.00 | \$20,000 | 2025 | 1 |
| D5038 | Security Detection System | Replace security detection system | 4,000 | SF | \$0.62 | \$2,480 | 2020 | 3 |
| D5038 | Security Detection System | Replace security detection system | 4,000 | SF | \$.62 | \$2,480 | 2030 | 3 |
| Total Anticipated Expenditure for D Services | | | | | | \$48,012 | | |

SECTION 6 - E EQUIPMENT & FURNISHINGS

E20 FURNISHINGS

DESCRIPTION

E2010 FIXED FURNISHINGS

E2012 Fixed Casework

We noted a wooden reception counter and desk at the main reception within the main lobby entrance. The wood desk generally consisted of hardwood writing surface with a raised glass panel counter.

CONDITION

E2010 FIXED FURNISHINGS

E2012 Fixed Casework

The fixed cabinets and reception counter appeared to be in good condition and functional. Fixed cabinets as well as reception counters usually have a typical EUL of twenty-years; therefore replacement will not be anticipated during the cost study period.

PROJECTED EXPENDITURES

There are no projected expenditures for E Equipment & Furnishings during the study period.

SECTION 7 - G BUILDING SITEWORK

G20 SITE IMPROVEMENTS

DESCRIPTION

G2020 PARKING LOTS

G2021 Bases and Sub-Bases

The main building parking lot is located at the south side of the building and can be accessed from Hangar Drive, and caters for visitors to the museum. The parking lot has an asphalt surface with white line striping denoting areas of parking stalls (reference Photograph 31 in Appendix B). We were not provided with the original specification details of the paving and therefore cannot comment on the specific asphalt mix type, classification or its suitability for its existing use. Table G20-1 provides a summary of the site systems.

Table G20-1 Schedule of Site Systems

| System Type | System Surface | Location | Measurement | No. of Parking Spaces | No. of ADA Parking Spaces |
|-------------|----------------|-------------------|-------------|-----------------------|---------------------------|
| Parking Lot | Asphalt | South Parking Lot | 700 SY | 21 | 2 |

G2030 PEDESTRIAN PAVING

G2031 Paving & Surfacing

The building contained concrete paving along the perimeter of the building as well as a red brick patio to the front of the building. We assume the paving is supported via a flexible base of sand setting bed and compacted sub grade.

G2033 Exterior Steps

The building contained cast-in-place concrete ramps at the south west side of the building, which connect the museum site to the parking area. The ramps contained galvanized steel tubular handrails at either side.

G2050 LANDSCAPING

G2056 Planters

Landscaping consisted of large grass areas with younger trees around the south of the building and lining Hangar Drive.

G2057 Irrigation Systems

The landscaped areas throughout the property are irrigated via a below grade automatic irrigation system. The irrigation system is supplied by below grade PVC piping and controllers. Pop-up type sprinkler heads are scattered throughout the site.

CONDITION

G2020 PARKING LOTS

G2021 Bases and Sub-Bases

The asphalt paved areas throughout the parking lot appeared to be in good condition. All areas of the asphalt should undergo asphaltic-based seal coat and the re-application of surface markings every five-years to extend the life of the pavements. We also recommend undertaking full depth asphalt pavement repair followed by restriping in these areas every twenty years.

G2030 PEDESTRIAN PAVING

G2031 Paving & Surfacing

The concrete paving along with the red brick pavers appeared to be in fair to good condition overall with the exception of one area located at the south west side of the building where subsidence or sinking of the paving was noted. We understand that pilings were driven down in this area when the building was earthquake stabilized in 2000. The concrete paving has been built up with cement mortar to prevent a trip hazard as a temporary fix. However we recommend removing and replacing the area of concrete and brick pavers that has shifted.

G2033 Exterior Steps

The cast-in-place concrete ramps appeared to be in good condition with no issues observed and no reported instances of disrepair. We do not anticipate replacement during the study period.

G2050 LANDSCAPING

G2056 Planters

The planted materials are in good overall condition. The plant materials will require routine maintenance and replacement and should be addressed on an as-needed basis as part of routine maintenance and funded as an operational expense.

G2057 Irrigation Systems

The irrigation system at the building is in good condition overall. The irrigation supply lines directly south of the redbrick patio has been modified which we assume was done at the time of the patio construction which eliminated approximately three sprinkler heads which is evident in the lack of grass growing. We recommend replacement during the beginning of the study period to reinstate watering to the bare grass area and increase aesthetics. The cost of this work has not been included in the cost study as it is anticipated to fall below the threshold level in this instance.

PROJECTED EXPENDITURES

Identified recommended works that are required during the twenty-year study period are detailed below. We have included a 25% allowance for professional fees and general contractor overhead/profit and management costs (where applicable).

| Element No. | Building Element | Recommendation | Qty | Unit | Rate | Cost | Year | Priority Code |
|---|---------------------|--|-----|------|---------|----------|------|---------------|
| G2021 | Bases and Sub-Bases | Undertake seal coating including re-striping at the parking lot | 700 | SY | \$1.50 | \$1,050 | 2015 | 3 |
| G2021 | Bases and Sub-Bases | Undertake seal coating including re-striping at the parking lot | 700 | SY | \$1.50 | \$1,050 | 2020 | 3 |
| G2021 | Bases and Sub-Bases | Undertake seal coating including re-striping at the parking lot* | 700 | SY | \$1.50 | \$1,050 | 2025 | 3 |
| G2021 | Bases and Sub-Bases | Asphalt mill and overlay to include re-striping | 700 | SY | \$15.00 | \$10,500 | 2030 | 3 |
| G2031 | Paving & Surfaces | Replace sealant to paving construction joints | 78 | LF | \$11.25 | \$878 | 2025 | 3 |
| G2031 | Paving & Surfaces | Repair concrete paving and brick pavers that are subsiding | 1 | LS | \$1,500 | \$1,500 | 2012 | 3 |
| Total Anticipated Expenditure for G Building Sitework | | | | | | \$16,028 | | |

* none in 2030 due to asphalt mill and overlay

Appendix A
Twenty-Year
Expenditure Forecast
2013 - 2032

20 YEAR EXPENDITURE FORECAST

Hamilton Firehouse
555 Hangar Avenue
Novato, CA



| Element No. | Component Description | Estimated Useful Life or Replacement Cycle (Yrs) | Remaining Useful Life (Yrs) | Quantity | Unit of Measurement | Unit Cost | Plan Type | Priority | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | Total | Total | Combined Total | | | | | | | | |
|--|--|--|-----------------------------|----------|---------------------|------------|-------------------------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|----------|----------|----------|----------|----------|-----------|-----------|-----|
| | | | | | | \$ | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | Deferred | Scheduled | | | | | | | | | |
| A. SUBSTRUCTURE | | | | | | | | | Deferred | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Scheduled | Deferred | Scheduled | | | | | | | | |
| A. SUBSTRUCTURE SUB-TOTALS | | | | | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | | | |
| B. SHELL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B2011 | Repaint exterior wall surfaces | 8 | 5 | 7,748.00 | SF | \$1.88 | Capital Renewal | 4 | \$0 | \$0 | \$0 | \$0 | \$0 | \$14,566 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$14,566 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$29,132 | \$29,132 | | | | | | | | |
| B2021 | Replace sealant at perimeter of window panes | 15 | 0 | 828.00 | LF | \$11.25 | Deferred Maintenance | 3 | \$9,315 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$9,315 | \$0 | \$9,315 | | | | | | | | |
| B2021 | Replace sealant at perimeter of window panes | 15 | 15 | 828.00 | LF | \$11.25 | Capital Renewal | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$9,315 | \$9,315 | | | | | | | | |
| B. SHELL SUB-TOTALS | | | | | | | | | \$9,315 | \$0 | \$0 | \$0 | \$0 | \$14,566 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$14,566 | \$0 | \$9,315 | \$0 | \$0 | \$0 | \$0 | \$9,315 | \$38,447 | \$47,762 | | | | | |
| C. INTERIORS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C3012 | Repaint interior wall and ceiling surfaces | 8 | 5 | 4,900.00 | SF | \$1.88 | Capital Renewal | 4 | \$0 | \$0 | \$0 | \$0 | \$0 | \$9,212 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$9,212 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$18,424 | \$18,424 | | | | | | | | |
| C3024 | Re-grout ceramic tile (restrooms) | 15 | 9 | 225.00 | SF | \$5.00 | Capital Renewal | 4 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$2,630 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$2,630 | \$2,630 | | | | | | | | |
| C3025 | Replace carpet floor coverings (main areas) | 10 | 7 | 147.00 | SY | \$40.00 | Capital Renewal | 4 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$5,880 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$5,880 | \$0 | \$11,760 | \$11,760 | | | | | | | |
| C. INTERIORS SUB-TOTALS | | | | | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$9,212 | \$0 | \$5,880 | \$0 | \$2,630 | \$0 | \$0 | \$0 | \$0 | \$0 | \$9,212 | \$0 | \$0 | \$0 | \$5,880 | \$0 | \$0 | \$0 | \$0 | \$0 | \$32,814 | \$32,814 | | | | |
| D. SERVICES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D2011 | Rebuild flush valves (water closets) | 15 | 10 | 3.00 | EACH | \$238.00 | Routine Maintenance | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$714 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$714 | \$714 | | | | | | | | |
| D2011 | Rebuild flush valves (urinals) | 15 | 10 | 1.00 | EACH | \$238.00 | Routine Maintenance | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$238 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$238 | \$238 | | | | | | | | |
| D2013 | Replace faucets (lavatories) | 10 | 5 | 2.00 | EACH | \$225.00 | Capital Renewal | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$450 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$900 | \$900 | | | | | | | | |
| D2013 | Replace faucets (sinks) | 10 | 5 | 1.00 | EACH | \$225.00 | Capital Renewal | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$225 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$450 | \$450 | | | | | | | | |
| D2022 | Replace water heater | 15 | 12 | 30.00 | GAL | \$35.00 | Energy & Sustainability | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,050 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,050 | \$1,050 | | | | | | | | |
| D3041 | Clean ductwork | 5 | 1 | 4,000.00 | SF | \$0.25 | Routine Maintenance | 3 | \$0 | \$1,000 | \$0 | \$0 | \$0 | \$0 | \$1,000 | \$0 | \$0 | \$0 | \$0 | \$1,000 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$4,000 | \$4,000 | | | | | | | | |
| D4011 | Replace sprinkler heads | 20 | 17 | 4,000.00 | SF | \$1.05 | Capital Renewal | 1 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$4,200 | \$4,200 | | | | | | | | | |
| D5012 | Preventative maintenance of the electrical system | 3 | 0 | 1.00 | LS | \$500.00 | Deferred Maintenance | 3 | \$500 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$500 | \$0 | \$500 | | | | | | | | |
| D5012 | Preventative maintenance of the electrical system | 3 | 3 | 1.00 | LS | \$500.00 | Routine Maintenance | 3 | \$0 | \$0 | \$0 | \$500 | \$0 | \$0 | \$500 | \$0 | \$0 | \$500 | \$0 | \$0 | \$500 | \$0 | \$0 | \$500 | \$0 | \$0 | \$0 | \$0 | \$0 | \$3,000 | \$3,000 | | | | | | | | |
| D5033 | Replace telephone system | 15 | 12 | 4,000.00 | SF | \$1.00 | Capital Renewal | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$4,000 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$8,000 | \$8,000 | | | | | | | | |
| D5037 | Replace fire alarm system | 15 | 12 | 4,000.00 | SF | \$5.00 | Capital Renewal | 1 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$20,000 | \$20,000 | | | | | | | | |
| D5038 | Replace security detection system | 10 | 7 | 4,000.00 | SF | \$0.62 | Capital Renewal | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$2,480 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$4,960 | \$4,960 | | | | | | | | |
| D. SERVICES SUB-TOTALS | | | | | | | | | \$500 | \$1,000 | \$0 | \$500 | \$0 | \$675 | \$1,500 | \$2,480 | \$0 | \$500 | \$952 | \$1,000 | \$25,550 | \$0 | \$0 | \$1,175 | \$1,000 | \$10,680 | \$500 | \$0 | \$500 | \$47,512 | \$48,012 | | | | | | | | |
| E. EQUIPMENT & FURNISHING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E. EQUIPMENT & FURNISHING SUB-TOTALS | | | | | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | |
| F. SPECIAL CONSTRUCTION AND DEMOLITION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F. SPECIAL CONSTRUCTION AND DEMOLITION SUB-TOTALS | | | | | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |
| G. BUILDING SITEWORK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G2021 | Undertake seal coating including re-stripping at the parking lot | 5 | 2 | 700.00 | SY | \$1.50 | Routine Maintenance | 3 | \$0 | \$0 | \$1,050 | \$0 | \$0 | \$0 | \$0 | \$1,050 | \$0 | \$0 | \$0 | \$0 | \$1,050 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$3,150 | \$3,150 | | | | | | | | |
| G2021 | Asphalt mill and overlay to include re-stripping | 20 | 17 | 700.00 | SY | \$15.00 | Capital Renewal | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$10,500 | \$10,500 | | | | | | | | |
| G2031 | Replace sealant to paving construction joints | 15 | 12 | 78.00 | LF | \$11.25 | Capital Renewal | 3 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$878 | \$878 | | | | | | | | |
| G2031 | Repair concrete paving and brick pavers that are subsiding | 40 | 0 | 1.00 | LS | \$1,500.00 | Deferred Maintenance | 3 | \$1,500 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,500 | \$0 | \$1,500 | | | | | | | |
| G. BUILDING SITEWORK SUB-TOTALS | | | | | | | | | \$1,500 | \$0 | \$1,050 | \$0 | \$0 | \$0 | \$1,050 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,028 | \$0 | \$0 | \$0 | \$0 | \$0 | \$10,500 | \$0 | \$0 | \$1,500 | \$14,528 | \$16,028 | | |
| Z. GENERAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z. GENERAL SUB-TOTALS | | | | | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |
| Expenditure Totals per Year | | | | | | | | | \$11,315 | \$1,000 | \$1,050 | \$500 | \$0 | \$24,453 | \$1,500 | \$9,410 | \$0 | \$3,130 | \$952 | \$1,000 | \$27,478 | \$23,778 | \$0 | \$10,490 | \$1,000 | \$27,060 | \$500 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$11,315 | \$133,301 | \$144,616 | |
| Total Cost (Inflated @ 4% per Yr.) | | | | | | | | | \$11,315 | \$1,040 | \$1,136 | \$562 | \$0 | \$29,751 | \$1,898 | \$12,383 | \$0 | \$4,455 | \$1,409 | \$1,539 | \$43,992 | \$39,592 | \$0 | \$18,892 | \$1,873 | \$52,710 | \$1,013 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$11,315 | \$312,246 | \$223,561 | |

Appendix B

Photographs



Photograph No. 1

View of the an isolated concrete footing and grade beam supporting the floor construction.



Photograph No. 2

View of the concrete floor construction.



Photograph No. 3

View of the interior ramp which connects the split lower level. Also shows the painted gypsum board walls.



Photograph No. 4

View of the timber roof construction and pendant sprinkler head system which is present throughout the building.



Photograph No. 5

View of the wall mounted steel canopy over entrance door. Also shows a double glazed exterior door and wall mounted light fixtures.



Photograph No. 6

View of the exterior cast-in-place concrete walls forming the structural frame. The walls have a stucco finish. Also shows single painted hollow metal door and double wood carved door.



Photograph No. 7

View of a cracked section of stucco surrounding the pipe.



Photograph No. 8

View of a typical painted metal window.



Photograph No. 9

View of a newer painted aluminum framed window.



Photograph No. 11

View of the painted metal framed window unit and deteriorated putty.



Photograph No. 12

View of a carved double wood door with glazing.



Photograph No. 13

View of the double lap clay tile roof covering.



Photograph No. 14

View of cracked/missing roof tiles.



Photograph No. 15

View of the lobby. Shows carpet tile floor and stud walls with rough plaster finish.



Photograph No. 16

View of an interior single wood door. Also shows a gypsum board partition wall.



Photograph No. 17

View of the interior concrete staircase leading to upper level.



Photograph No. 18

View of the ceramic floor and wall tile finishes in the men's restroom. Also shows the vitreous china wall mounted urinal and lavatory.



Photograph No. 19

View of the painted gypsum board ceiling in the men's restroom. Also shows 4' wall mounted strip light fixture.



Photograph No. 20

View of the 2' x 2' suspended ceiling system. Also shows 2' x 4' recessed light fixtures.



Photograph No. 21

View of the vitreous china ADA compliant water closet.



Photograph No. 22

View of the electric water heater.



Photograph No. 23

View of the gas furnace located in the attic.



Photograph No. 24

View of one of the thermostats located throughout the building.



Photograph No. 25

View of the fire extinguisher located in the electrical room.



Photograph No. 26

View of the main distribution panel (MDP) located in the electrical room.



Photograph No. 27

View of one of the decorative chandelier light fixtures within the museum.



Photograph No. 28

View of the fire alarm control panel located in the electrical room. Also shows the telephone system.



Photograph No. 29

View of a motion sensor for the alarm system.



Photograph No. 30

View of an illuminated emergency exit sign.



Photograph No. 31

View of the parking lot.

Appendix C

Asset Inventory

| Location | Facility | Location of Asset | Life Cycle Code | Type | Equipment Type | Manufacturer | Model No. | Serial No. | Tag | Fuel Type | Capacity / Rating | Speed (FPM) | No. of Landings | Year Manufacture |
|--------------------|--------------------|------------------------------|-----------------|------------------------|----------------|----------------|------------|-------------|-----|-------------|--------------------------------|-------------|-----------------|------------------|
| Hamilton Firehouse | Hamilton Firehouse | Mechanical / Electrical Room | D2022 | Hot Water Service | Water Heater | Bradford White | PCE3020RTA | 0815M001588 | | Electric | 30 US Gallons | | | Assumed 2010 |
| Hamilton Firehouse | Hamilton Firehouse | Attic | D3021 | Heat Generation System | Boiler | Carrier | 58MXB | 1608A03203 | | Natural Gas | 60,000-120,000 BTU / HR Output | | | 2010 |
| Hamilton Firehouse | Hamilton Firehouse | Attic | D3021 | Heat Generation System | Boiler | Carrier | 58MXB | Unknown | | Natural Gas | 60,000-120,000 BTU / HR Output | | | 2010 |

Appendix D

Document Review and
Warranty Information

DOCUMENT REVIEW & WARRANTY INFORMATION

In addition to the completion of our visual evaluation, Faithful+Gould interviewed the various representatives from the City of Novato (where possible), and reviewed the following documentation:

Hamilton Firehouse Museum. TWM Architects (Electronic Format):

Drawings A0.1 through P2.1

Hamilton Firehouse Conversion Simplex Grinnel June 19, 2008 (Electronic Format):

Drawings FA-000 through FA-201

Appendix E

Glossary of Terms

Acronyms & Glossary of Terms

| | |
|--------|--|
| CMU | Concrete Masonry Unit |
| BUR | Built-Up Roof |
| EIFS | Exterior Insulation and Finish System |
| EPDM | Ethylene Propylene Diene Monomer |
| SC | Solid Core Doors |
| HM | Hollow Metal Doors |
| MH | Man Holes |
| ABC | Aggregate Base Course |
| EMT | Electrical Metallic Conduit |
| | |
| EUL | Estimated Useful Life |
| RUL | Recommended Useful Life |
| EOL | End of Life |
| FCI | Facility Condition Index |
| CRV | Current Replacement Value |
| DM | Deferred Maintenance |
| | |
| SF | Square Foot |
| SY | Square Yards |
| PSF | Pounds-Per-Square-Foot |
| PSI | Pounds-Per-Square-Inch |
| | |
| NFPA | National Fire Protection Association |
| FACP | Fire Alarm Control Panel |
| NAC | Notification Appliance Circuit |
| FCC | Fire Command Center |
| HVAC | Heating Ventilating and Air conditioning |
| VAV | Variable Air Volume |
| AHU | Main Air Handling Units |
| HP | Horse Power |
| FSS | Fuel Supply System |
| MDP | Main Distribution Panel |
| SES | Service Entrance Switchboard's |
| NEMA | National Electrical Manufactures Association |
| HID | Intensity Discharge |
| EMT | Electrical Metallic Tubing |
| KVA | kilovolt-ampere |
| RO | Reverse Osmosis |
| BTU/HR | British Thermal Units per Hour |
| KW | Kilowatt |
| FPM | Feet per Minute (Elevator Speed) |
| Amp | Amperage |

Acronyms & Glossary of Terms

BTU – British Thermal Unit; the energy required to raise the temperature of one pound of water by one degree.

Building Envelope - The enclosure of the building that protects the building's interior from the outside elements, namely the exterior walls, roof and soffit areas.

Building Systems – Interacting or independent components or assemblies, which from single integrated units, that comprise a building and its site work, such as, pavement and flatwork, structural frame, roofing, exterior walls, plumbing, HVAC, electrical, etc.

Caulking – Soft, putty-like material used to fill joints, seams, and cracks.

Codes – See building codes.

Component – A fully functional portion of a building system, piece of equipment, or building element.

Deferred Maintenance – Physical deficiencies that cannot be remedied with routine maintenance, normal operating maintenance, etc., excluding de minimis conditions that generally do not present a material physical deficiency to the subject property.

Expected Useful Life (EUL) – The average amount of time in years that an item, component or system is estimated to function when installed new and assuming routine maintenance is practiced.

Facility – All or any portion of buildings, structures, site improvements, complexes, equipment, roads, walks, passageways, parking lots, or other real or personal property located on site.

Flashing – A thin, impervious sheet of material placed in construction to prevent water penetration or to direct the flow of water. Flashing is used especially at roof hips and valleys, roof penetrations, joints between a roof and a vertical wall, and in masonry walls to direct the flow of water and moisture.

Remaining Useful Life (RUL) – A subjective estimate based upon observations, or average estimates of similar items, components, or systems, or a combination thereof, of a number of remaining years that an item, component, or system is established to be able to function in accordance with its intended purpose before warranting replacement. Such period of time is affected by the initial quality of an item, component, or system, the quality of the initial installation, the quality and amount of preventative maintenance exercised, climatic conditions, extent of use, etc.

Thermal Resistance (R) – A unit used to measure a material's resistance to heat transfer. The formula for thermal resistance is: $R = \text{Thickness (in inches)} / K$

Structural Frame – The components or building systems that support the building's nonvariable forces or weights (dead loads) and variable forces or weights (live loads).

Warranty – Legally enforceable assurance of quality or performance of a product or work, or of the duration of satisfactory performance. Warranty guarantee and guaranty are substantially identical in meaning; nevertheless, confusion frequently arises from supposed distinctions attributed to guarantee (or guaranty) being exclusively indicative of duration of satisfactory performance or of a legally enforceable assurance furnished by a manufacturer or other third party. The uniform commercial code provisions on sales (effective in all states except Louisiana) use warranty but recognize the continuation of the use of guarantee and guaranty.