TIER 1 SEISMIC EVALUATION

Immediate Occupancy Structural Performance Level

Campbell City Hall

Campbell, California

Final Report

Prepared For:
City of Campbell
70 North First Street
Campbell, California

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TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

Biggs Cardosa Associates has been retained by the City of Campbell to provide a Tier 1 seismic assessment of the Campbell City Hall in order to upgrade the existing building as an Essential Facility. As prescribed in ASCE 41-13, the reference document used for this seismic evaluation, the lateral load-resisting system of an Essential Facility must comply with requirements of the Immediate Occupancy Structural Performance Level. This report contains the structural/seismic findings, qualitative conceptual seismic retrofit recommendations and an order-of-magnitude construction cost estimate for the required retrofit work based on our Tier 1 seismic assessment (using the Immediate Occupancy performance level) as well as our experience with buildings of similar size, age and construction type.

The Campbell City Hall is a 2-story, 32,600 sf structure that was constructed in 1970. The building consists of wood-framed roof and second floor, with steel columns, and concrete masonry walls at the 1st story and wood-framed walls at the 2nd story. The building is constructed with two rectangular wings that are connected with a smaller rectangular lobby. Foundations consist of isolated spread footing below columns and continuous footings below walls. The lateral system comprises of plywood roof and floor diaphragms, plywood shear walls at the 2nd story and masonry walls at the 1st story. The first floor is a slab-on-grade.

Overall, the building is currently in good structural condition. The Campbell City Hall contains a complete vertical load-carrying system with no observed evidence of any significant structural damage, distress or deterioration. There were no visible indications that the building has undergone any significant settlement or differential settlement.

The deficiencies identified were based on a review of the available drawings, a limited walk-through of the building, completion of Tier 1 seismic assessment checklists, and our experience with structures of similar size, age and construction type. No destructive investigation was undertaken to either verify the existing conditions shown in the available documents, to identify unknown conditions, or to ascertain the extent of damage where evidence of potential structural damage was present.

Since the City Hall building houses the City of Campbell Police Department, it is therefore, by code, an Essential Service Building. For this type of building, the primary structural elements are required to meet the Immediate Occupancy Structural Performance Level as described in ASCE 41-13. However, originally as directed by the City, a seismic evaluation was performed using the Life Safety seismic performance criteria based on the assumption that the Police Department would be relocated to a new facility. The findings and recommendations of the Life Safety seismic evaluation were summarized in our “Tier 1 Seismic Evaluation (Life Safety)” report, dated December 16, 2015.

As per current direction from the City, the building is likely to continue housing the Campbell Police Department (which makes it an essential facility) and, therefore, a seismic evaluation needs to be performed using the Immediate Occupancy performance criteria. An Immediate Occupancy performance level is significantly more stringent than the Life Safety performance level, and thus requires considerably more seismic retrofit work to upgrade an existing building due to the much higher seismic demands.

The findings of this Tier 1 seismic assessment indicate that while the existing City Hall building apparently has a complete lateral load-resisting system, it may have significant deficiencies in the required continuity and/or strength for many of its structural elements/connections that are necessary for satisfactory seismic behavior under the design earthquake. The building is likely to maintain its gravity load-carrying system after the design level earthquake but may experience significant structural damage. Continued post-earthquake building operations may not be possible and the repair costs may be too high to be economically feasible. The existing Campbell City Hall, therefore, does not meet the seismic resistance requirements for the Immediate Occupancy Structural Performance Level and would require considerable seismic retrofit work to reliably serve as an Essential Facility.

The order-of-magnitude conceptual cost estimate for the required seismic retrofit work identified through our Tier 1 seismic evaluation to meet the Immediate Occupancy performance level is **$1.1 million** (refer to Appendix 3 for details and assumptions). This estimate only includes retrofit costs directly related to structural strengthening of the building's primary lateral load-resisting system. Potential costs of all other improvements (related to non-structural elements, MEP equipment and systems, furnishings, utility services, etc.) required to upgrade the building as an Essential Facility are excluded.

Further evaluation of the structure using ASCE 41 Tier 2 Deficiency-Based procedures as well as field verification of various as-built conditions are required and recommended before finalizing the seismic retrofit program for the City Hall building.

Continued post-earthquake use of a building is not limited just by the extent of earthquake damage to its structural system but, more often than not, might be limited by damage or disruption to non-structural elements of the building, furnishings, MEP components and systems, and availability of utility services. A seismic evaluation of these items is recommended to ensure that all non-structural items of the City Hall are also adequately upgraded to comply with the Essential Facility requirements.

PROJECT OVERVIEW

Biggs Cardosa Associates has been retained by the City of Campbell to provide a Tier 1 seismic assessment (using ASCE 41-13 methodology) and conceptual seismic retrofit recommendations for the existing Campbell City Hall in order to upgrade the building as an Essential Facility. As outlined in ASE 41-13, the appropriate seismic performance level for essential facilities is the Immediate Occupancy Structural Performance Level.

Since the City Hall building houses the City of Campbell Police Department, it is therefore, by code, an Essential Service Building. For this type of building, the primary structural elements are required to meet the Immediate Occupancy Structural Performance Level as described in ASCE 41-13. However, originally as directed by the City, a seismic evaluation was performed using the Life Safety seismic performance criteria based on the assumption that the Police Department would be relocated to a new facility. The findings and recommendations of the Life Safety seismic evaluation were summarized in our "Tier 1 Seismic Evaluation (Life Safety)" report, dated December 16, 2015.

As per current direction from the City, the building is likely to continue housing the Campbell Police Department (which makes it an essential facility) and, therefore, a seismic evaluation needs to be performed using the Immediate Occupancy performance criteria. An Immediate Occupancy performance level is significantly more stringent than the Life Safety performance level, and thus requires considerably more seismic retrofit work to upgrade an existing building due to the much higher seismic demands.

This report contains the structural/seismic findings based on our Tier 1 seismic assessment (using the Immediate Occupancy performance level), our limited observation of existing field conditions, and our experience with buildings of similar size, age and construction type. Potential seismic deficiencies are identified and qualitative conceptual recommendations are outlined for remedial work. An order-of-magnitude conceptual cost estimate is provided for the proposed seismic retrofit work.

The findings and recommendations of our Tier 1 assessment outlined herein pertain only to the existing City Hall building's primary lateral load-resisting system. This assessment does not cover seismic anchorage and/or bracing of non-structural items such as electrical/mechanical equipment, ceilings, partitions, or other architectural elements. Further, an assessment of other building systems/features such as mechanical, electrical, plumbing, fire protection, accessibility, egress, drainage, waterproofing, utility services, etc. is beyond the scope of this report.

The scope of services for the Tier 1 structural/seismic assessment described in this report is summarized below:

1. Review available as-built structural drawings, previous seismic assessment reports,

geotechnical reports, etc. for the building.

2. Perform a site visit to observe the existing structural conditions of the building, including the nature and layout of the primary lateral load-resisting system, physical condition of structural members and connections, and damage or deterioration of existing structural framing/connections. [Building finishes will not be disturbed during the site visit and our observation will be limited to the readily visible framing elements].
3. Perform a Tier 1 seismic assessment of the building based on the methodology outlined in ASCE41-13, using the Immediate Occupancy performance level.
4. Identify structural/seismic deficiencies in the building's framing system based on our field observations during the site visit(s) and the Tier 1 (Immediate Occupancy) seismic assessment.
5. Prepare qualitative conceptual recommendations for the required retrofit work to remedy the identified structural/seismic deficiencies in order to upgrade the building to the Immediate Occupancy performance level as well as for the repair/replacement of the damaged or deteriorated structural framing observed during the site visit.
6. Coordinate with our cost estimating subconsultant, Faithful + Gould (F+G), to prepare an order-of-magnitude conceptual-level construction cost estimate for the proposed structural/seismic retrofit work.
7. Prepare a brief letter report describing the findings of structural/seismic assessment, recommendations for seismic retrofit/repair, and conceptual construction cost estimate for seismic retrofit.

AVAILABLE DOCUMENTS

The City researched its records for available documents – structural drawings, geotechnical reports, previous seismic assessment reports, etc. – and provided us the following drawings to review for this seismic assessment:

- Accessibility Modifications, S-1 to S-3, Steven Duquette, SE and Starks Miers Scott, Architects, dated Aug. 1, 1994.
- Partial Roofing Framing Details, S1, Duquette Engineering, dated July 2004
- Police Station Renovations, A2.01, A4.01, and A5.01, Stowers Associates Architects, date Aug. 20, 2004
- City Hall Remodel – New Steel Rigid Frame, S1 and S2, Duquette Engineering, dated April 14, 2005
- Original design drawings (architectural and structural) for "Campbell City Hall." This set included:

- Six architectural drawings (sheets 7-12), prepared by William W. Hedley, Jr. Architects, dated March 23, 1970, and
- Thirteen structural drawings (sheets S1-S13), prepared by Donald R. James, Civil Engineer, dated March 13, 1970.

The findings and conclusions in this report are based on the available drawings and our site visits on October 22, 2015 and July 18, 2017. While most of the structural framing and detailing of the City Hall are covered up by architectural finish materials and cannot be observed directly, areas that could be observed suggest that the building's construction appears to conform with the original design drawings, although this needs to be verified as the project develops.

BUILDING DESCRIPTION

The 2-story Campbell City Hall was constructed in the early 1970's and houses the following city services and departments:

- Construction Division
- City Clerk
- City Manager
- Code Enforcement
- Finance Department
- Human Resources
- Police Department
- Public Works

The building has administrative offices, meeting rooms, council chambers, staff facilities, and public areas.

The existing Campbell City Hall building is a 2-story, 32,600 sf structure constructed in the early 1970's. The structure is divided in three areas; the North Wing, which is 15,400 sf; the South Wing, which also is 15,400 sf; and the Central Lobby which is located between the two wings and is 1,800 sf.

The building is located on a relatively flat site but has been graded so that the South Wing has full basement walls on south, east and west sides and a partial basement wall on the north side next to the Central Lobby. The North Wing has a full basement wall on the east side and partial basement walls on the south side, next to the Central Lobby, west side and north side which leads to the fenced in parking lot for police vehicles and equipment.

Access to the building is available on all four elevations with the primary access for the public through the East and West elevations of the Central Lobby.

DESCRIPTION OF STRUCTURE

The building is constructed with two 70-ft x 110-ft rectangular wings that are offset by 30 feet in the east-west direction. These two wings are separated by a 30-ft x 30-ft central lobby area. The floor- to-floor height of the basement is 12'-4" while the second level floor-to-roof heights are divided into two heights of either 12'-0" for the lower roof framing and 19'-4" for the upper roof framing.

The roof and second floor of the building are primarily wood-framed construction, with the second floor constructed with wood-framed exterior walls and steel tubular columns located at the interior and at the exterior perimeter walls. The basement (and partial basement), which serves as the 1st floor level, is constructed with concrete masonry block walls with some cast-in-place concrete sections and with interior steel tubular columns.

The upper roof which is located over the central lobby and the main corridor, which ties the North and South Wings together, has built up roofing on ½" plywood sheathing supported on 2x6 rafters spaced at 24" oc. The 2x6 rafters are supported on either 4x8 or 6x8 timber beams. The 4x and 6x beams are supported on 5x5 steel tubular steel columns located along the outside walls of the corridor. These steel corridor columns are supported at the second floor level.

The low roof, which comprises a major portion of the roof, has built-up roofing installed over either ¾" or ½" plywood sheathing. The ¾" sheathing spans a maximum of 48" between fabricated truss-joists while the ½" plywood spans a maximum of 24" between 2x rafters. The truss-joists and rafters are supported on either sawn timber beams, glue-laminated beams or steel wide flange beams. These roof beams are supported on tubular steel columns which are located on the interior of the building and at the exterior perimeter walls.

The second floor framing has a 2-inch cellular concrete topping slab poured over 5/8" T&G (tongue and groove) plywood sheathing supported on 2x floor joists spaced at 16" oc. Depending on the span length of the floor joists, 2x6, 2x8, 2x12 and 2x14 floor joists are used. The floor joists are supported on either interior glue-laminated beams of various sizes, 4x sawn timber beams, built-up 2x beams or on the perimeter basement walls of the North and South wings. The perimeter basement walls are 8 inch fully-grouted reinforced concrete masonry block with, in some locations, a cast-in-place reinforced concrete beam located at the top of the concrete masonry block walls. The various size floor beams are supported on interior 5x5 steel tubular columns located in the basement.

The basement floor is a 4" slab-on-grade with welded wire mesh reinforcement. The slab is placed on a prepared subgrade consisting of 2" sand layer, membrane vapor barrier and 4" crushed rock layer. The building foundation system consists of continuous reinforced concrete footings below basement masonry walls and isolated reinforced concrete spread footings below steel tube columns.

The building was designed to resist both wind and seismic loads using the plywood sheathing at the high and low roof levels and at the second floor as horizontal diaphragms. The high roofs are laterally braced using the flexural strength of the 5x5 steel tubular columns which transfer lateral loads to the larger lower roof. The lower roof is laterally supported with either plywood shear walls, which are located at the perimeter of each wing of the building, interior plywood shear walls, which are located on each side and at each end of the main corridor of the building and one steel rigid frame that replaced one of the corridor shear walls in the North Wing during a remodeling project. The second floor diaphragm is laterally braced with the reinforced masonry block basement walls at the perimeter of each wing of the building and interior plywood shear walls at the same approximate locations as the second floor plywood shear walls.

There are four entrances to the building at the first story. At grade doors at the north and south ends provide access to finished grade, while a long sloping ramp provides access to both floors near the main entrance located on the east and west sides of the building. The second story has two entrances at each wing of the building and as well as access at the sloping ramps. The roof overhangs the perimeter walls by approximately 3-ft and is supported by exterior steel columns.

Selected recent photos of the building are included in Appendix 1.

EXISTING CONDITIONS

In order to perform a Tier 1 seismic assessment of the Campbell City Hall, the nature of construction and layout of the current structure had to be determined. The available drawings (noted above) and our site visits on October 22, 2015 and July 18, 2017 provided the basic information to accomplish this task.

No destructive investigation or physical testing of existing conditions or materials was performed as part of this assessment. As most of the structural framing is concealed by architectural finishes, not all structural elements of the building were visible during the site visit and not all of the building components relevant for this assessment were able to be verified. The available structural drawings were used to ascertain various details, materials and components. For final design of the retrofit work, a field investigation requiring the removal of finishes in selected areas of the building may be required to verify additional existing conditions and materials.

Overall the building appears to be in good physical condition. The wood framing observed at the second floor and roof showed no signs of moisture-related damage or any other type of deterioration. The steel columns and steel connection hardware showed no signs of corrosion. There were no visible indications (cracks in walls, slabs, sidewalks, etc.) that the building has undergone any significant settlement or differential settlement.

The masonry walls appeared to be in good structural condition. No significant visible cracks were present during the site visits although the masonry wall has been painted and this could obscure small cracks.

The presence of steel clips, wood blocking, and other details indicate that the City Hall building was originally designed considering seismic loads. There have been several modifications to the building since its original construction. An existing wood-framed shear wall was removed at the first floor to modify the interior office space. In order to replace the strength of the removed shear wall a new steel moment frame was constructed in a nearby location. Based on the reviewed structural drawings, the moment frame appears to have adequately detailed and constructed to resist seismic loads. Several other non-seismic modifications were made to the building, including new access doors and roof framing strengthening for new rooftop mechanical equipment.

SEISMIC EVALUATION AND FINDINGS

Evaluation Basis

The purpose of this evaluation was to determine whether significant seismic deficiencies exist, to determine the potential seismic risk, and to provide general conceptual recommendations for reduction of seismic risk through mitigation. The Tier 1 methodology of ASCE 41-13 was used for this preliminary assessment; a full ASCE 41 compliance review using more advanced procedures (such as Tier 2 or Tier 3) was neither intended nor performed. The ASCE 41 Basic Configuration and Structural Checklists for Immediate Occupancy performance level were completed to help identify the potential seismic deficiencies in the City Hall building's lateral load-resisting system. See Appendix 4.

The performance criteria used to evaluate a building varies based on the occupancy use of the building. If a building houses a facility such as a police station, fire station, hospital, etc., the building is classified as an essential facility and is required to remain operational after an extreme event such as a major earthquake. The evaluation methodology of ASCE 41 requires an essential facility to be evaluated to the more stringent Immediate Occupancy performance standard. This performance level increases the seismic forces on the structure by a factor of two over the Life Safety criteria (which is commonly used for standard office occupancy buildings). This results in several additional retrofit measures that need to be implemented in order for the building to meet the Immediate Occupancy performance criteria.

The analysis methodology of ASCE 41 includes three levels of analytical procedures for seismic assessment of existing structures: a quick check procedure (Tier 1) intended to serve as an aid in quickly identifying high seismic risk structures; a more intensive deficiency-based analysis procedure (Tier 2), and a systematic analysis procedure (Tier 3).

The Tier 1 quick check employs a set of checklists for each building type, which contain evaluation statements that help identify areas of concern with regard to the structure's ability to adequately transmit earthquake forces to the foundation and supporting grade. This evaluation utilized the Tier 1 checklists, along with the Quick Checks required under this procedure. See Appendix 4.

It should be noted that with each building code cycle (every three years), building codes for new design are modified to enhance structural performance during seismic events. However, engineering standards developed to evaluate existing buildings have lagged behind in development. Revisions to ASCE 41 Seismic Evaluation and Retrofit of Existing Buildings were recently completed and this document is intended to replace previous evaluation guidelines as the standard of practice for the seismic evaluation of existing buildings. One of the primary goals of this document is to include lessons learned from past earthquakes.

For the Campbell City Hall, only a structural seismic evaluation of the primary lateral load-resisting system was done per ASCE 41. An assessment of non-structural elements, fire protection, egress, accessibility, mechanical, electrical, plumbing, utility services, waterproofing or drainage requirements was not performed. The Campbell City Hall would require these other improvements to meet the Essential Facility code requirements, but an assessment of these systems was beyond the scope of this report.

Lateral Load-Resisting System

Lateral loads for buildings result primarily from earthquake inertia forces acting on structural and non-structural elements. Out-of-plane forces acting on interior and exterior walls are transferred to the roof and floor diaphragms, then to seismic system elements (shear walls, braced frames, etc.) parallel to the direction of the earthquake or wind loads. These elements then transfer the forces to the foundations.

At the high roof of the City Hall, the plywood roof diaphragm transfers lateral forces through the steel cantilevered columns into the lower roof diaphragm. At second story the plywood roof diaphragm transfers lateral forces into the perimeter plywood shear walls. At the first story, the plywood second floor diaphragm transfers lateral forces into the masonry shear walls at perimeter of the building. The forces from the second-story plywood shear walls are transferred directly into the first-story masonry shear walls, which then transfer the combined lateral forces to the foundations.

Seismic Evaluation Results

Our assessment of Campbell City Hall was based on ASCE 41 Tier 1 analysis, our field observations, our review of the structural drawings, and our experience with buildings of similar size, age and construction type.

The findings of our Tier 1 seismic assessment indicate that while the City Hall building apparently has a complete lateral load-resisting system, it may have significant deficiencies in the required continuity and/or strength for many of its structural elements/connections that are necessary for satisfactory seismic behavior under the design earthquake. The building is likely to maintain its gravity load-carrying system after the design level earthquake but may experience significant structural damage. Continued post-earthquake building operations may not be possible and the repair costs may be too high to be economically feasible. The existing Campbell City Hall, therefore, does not meet the seismic resistance requirements for the Immediate Occupancy Structural Performance Level and would require considerable seismic retrofit work to reliably serve as an Essential Facility.

Based on the original structural drawings, the masonry shear walls at the first story are fully grouted and reinforced and appear to be adequate for transferring the in-plane seismic loads to the foundations. The in-plane shear connection between the second floor diaphragm and the masonry walls below consists of wood blocking and steel angle clips attached to a continuous wood sill plate with anchor bolts embedded into the masonry wall at each joist. This connection appears to be inadequate for transferring the seismic loads. New anchor bolts will need to be drilled and epoxied through the wood sill and into the masonry walls.

The plywood shear walls at the second story appear to be inadequate for transferring the in-plane seismic loads at the Immediate Occupancy performance level. Additional shear walls or other seismic resisting elements will be required. Holdowns at the ends of plywood shear walls, while present on the drawings, were concealed by architectural finishes and could not be observed during our site visit. The holdowns shall be field verified and unless their strength is adequate, additional holdowns will need to be added to the existing walls

The shear capacities of the roof and second floor plywood diaphragms appear to be adequate for transferring the seismic forces to the shear walls; the details and capacities of the roof diaphragm chords/collectors, however, need strengthening. The steel cantilever columns supporting the high roof appear to be inadequate for transferring the seismic forces into the main roof diaphragm. New lateral elements will need to be added in the clearstory between the high roof and low roof.

Based on the Tier 1 evaluation performed (using the Immediate Occupancy performance level), we believe the Campbell City Hall may have the following potential seismic deficiencies:

1. At low roof level, collectors along shear wall lines are inadequate for transferring the diaphragm load to the shear walls. Addition of new steel straps with blocking between joists is required.
2. At second floor level, building cross-ties are inadequate for transferring out-of-plane masonry wall loads into the floor diaphragm. Addition of new horizontal steel straps or steel rods with holdowns is required at beam splice locations (typically at columns).

3. At the second floor level, the wood shear walls are inadequate to transfer in-plane seismic loads. Addition of new plywood at the existing shear walls along with steel straps, and steel rods with holdowns is required.
4. At the second floor level, the masonry wall-to-floor connections appear to be inadequate for both in-plane and out-of-plane wall loads. The addition of new anchor bolts will be required.
5. At the high roof level the steel cantilever columns are inadequate for transferring seismic loads into the main roof diaphragm. New infill stud walls with plywood sheathing are required.

RECOMMENDATIONS

Based on the seismic deficiencies identified through this preliminary assessment, we believe that the Campbell City Hall requires, at a minimum, the following retrofit work:

1. At low roof level, provide new collectors along shear wall lines by adding new steel straps over plywood sheathing, with new blocking between the joists. [See Deficiency 1 above].
2. At second floor level, provide building cross-ties by adding new horizontal steel straps or steel rods with holdowns at beam splice locations (typically at columns). [See Deficiency 2 above].
3. At second floor level, provide new plywood at several existing shear walls along with new steel straps and steel rods with holdowns. [See Deficiency 3 above].
4. At the second floor level, provide new anchors bolts drilled through the existing wood sill plate and epoxied into the top of the existing masonry walls. [See Deficiency 4 above].
5. At the high roof level, provide several new infill wood stud walls with new plywood sheathing at the clearstory between the low roof diaphragm and high roof diaphragm.

Refer to Appendix 2 for conceptual seismic retrofit plans showing the extent of this proposed seismic retrofit work.

CONCEPTUAL COST ESTIMATE

The order-of-magnitude conceptual cost estimate for the required seismic retrofit work identified through our Tier 1 seismic evaluation to meet the Immediate Occupancy performance level is **$1.1 million** (refer to Appendix 3 for details and assumptions). This estimate only includes retrofit costs directly related to structural strengthening of the building's primary lateral load-resisting system. Potential costs of all other improvements (related to non-structural elements, MEP equipment and systems, furnishings, utility services, etc.) required to upgrade the building as an Essential Facility are excluded.

FURTHER ACTIONS

As indicated by the potential seismic deficiencies in the Campbell City Hall building outlined above - most of which need further field work, analysis and verification – we recommend the following further steps to fully define the scope of required seismic retrofit:

1. Perform an investigative field verification of existing conditions to determine the necessary information on pertinent structural framing and connection details.
2. Perform a detailed ASCE 41 Tier 2 Deficiency-Based Seismic Evaluation of the building using the deficiencies outlined above to allow a more accurate verification and definition of the building's seismic retrofit needs. Develop retrofit concepts.
3. Continued post-earthquake use of a building is not limited just by the extent of earthquake damage to its structural system but, more often than not, might be limited by damage or disruption to non-structural elements of the building, furnishings, MEP components and systems, and availability of utility services. A seismic evaluation of these items is recommended to ensure that all non-structural items of the City Hall are also adequately upgraded to comply with the Essential Facility requirements.

The implementation of these actions will help determine the full extent of structural and non-structural upgrades required for the building and ensure that the upgraded City Hall facility meets the seismic safety requirements for Essential Facilities as well as help define the project's anticipated total construction costs.

LIMITATIONS AND DISCLAIMERS

The evaluation, findings, conclusions and recommendations outlined in this report were based on limited information. This report has been prepared using the same degree of care and skill ordinarily exercised for this type of professional service by structural engineers practicing in this area at this time. No other warranty, expressed or implied, is made as to the professional advice in this report.

This report has been prepared for exclusive use of the City of Campbell and may not be used by any other individual or entity without the express written approval of Biggs Cardosa Associates, Inc.

Appendix 1

Photos

Photo 1 – West elevation view

Photo 2 – West elevation view (north end)

Photo 3 – South elevation view

Photo 4 – East entrance view

Photo 5 – North elevation view

Photo 6 – Ramp at East entrance

Photo 7 – High roof with steel cantilevered columns

Photo 8 – Clearstory at High roof

Photo 9 – Broken tiles at upper roof

Photo 10 – Interior steel columns at second floor

Photo 11 – Interior open roof framing below upper roof

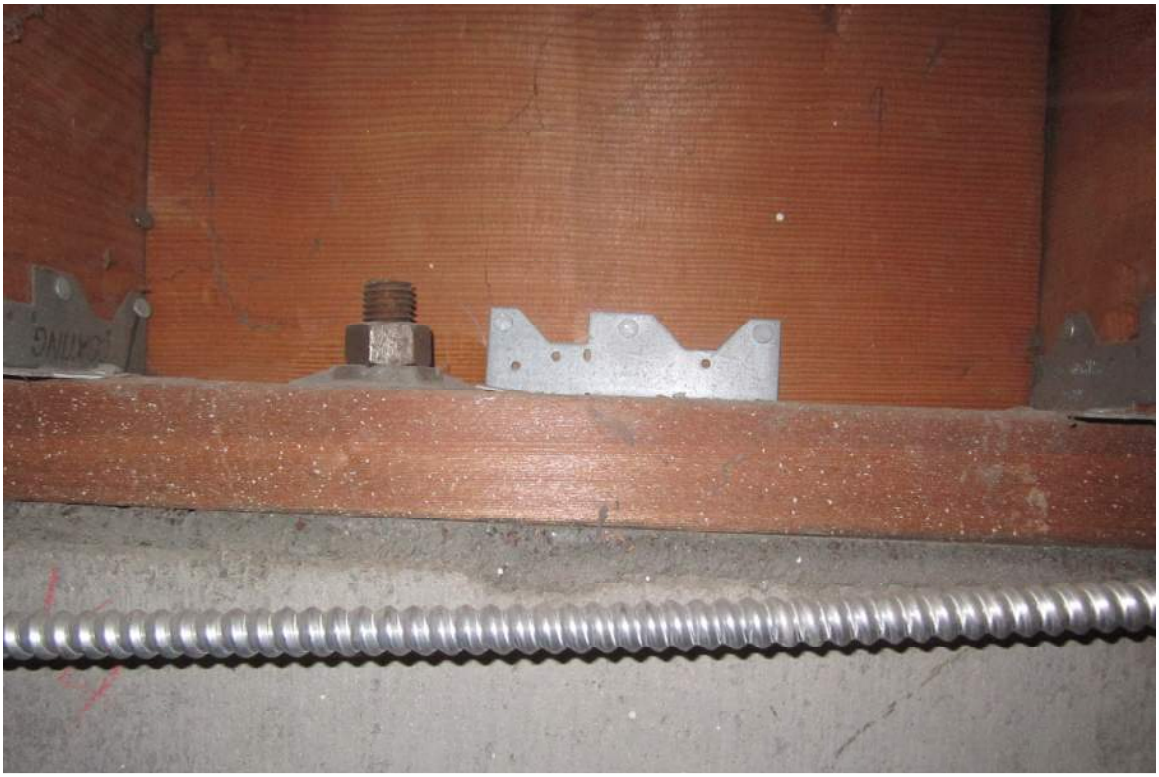


Photo 12 – Bolted wood sill plate at masonry wall

Photo 13 – Wood floor joists

Photo 14 – Wood blocking at plywood diaphragm

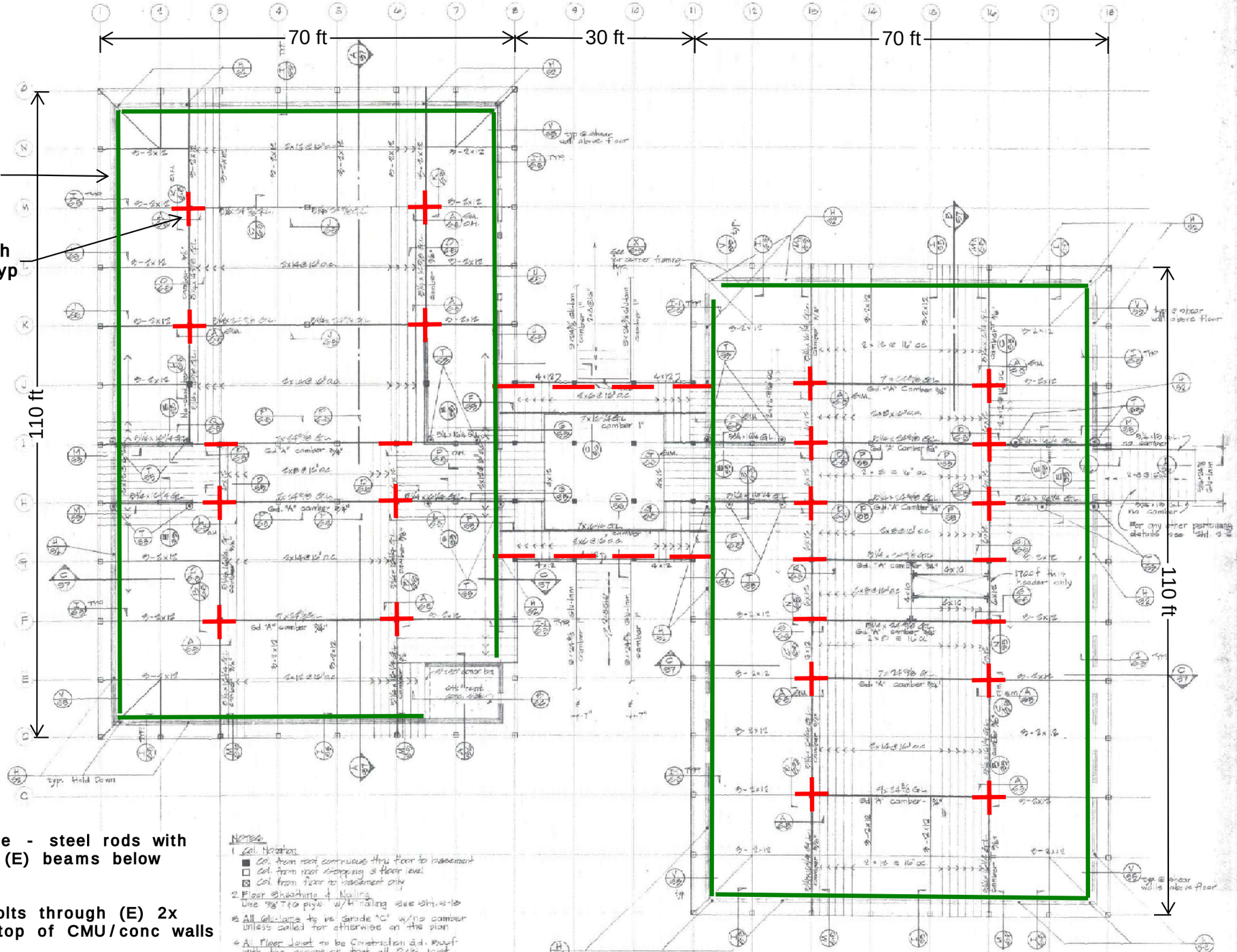
Photo 15 – Simpson steel clips at floor framing

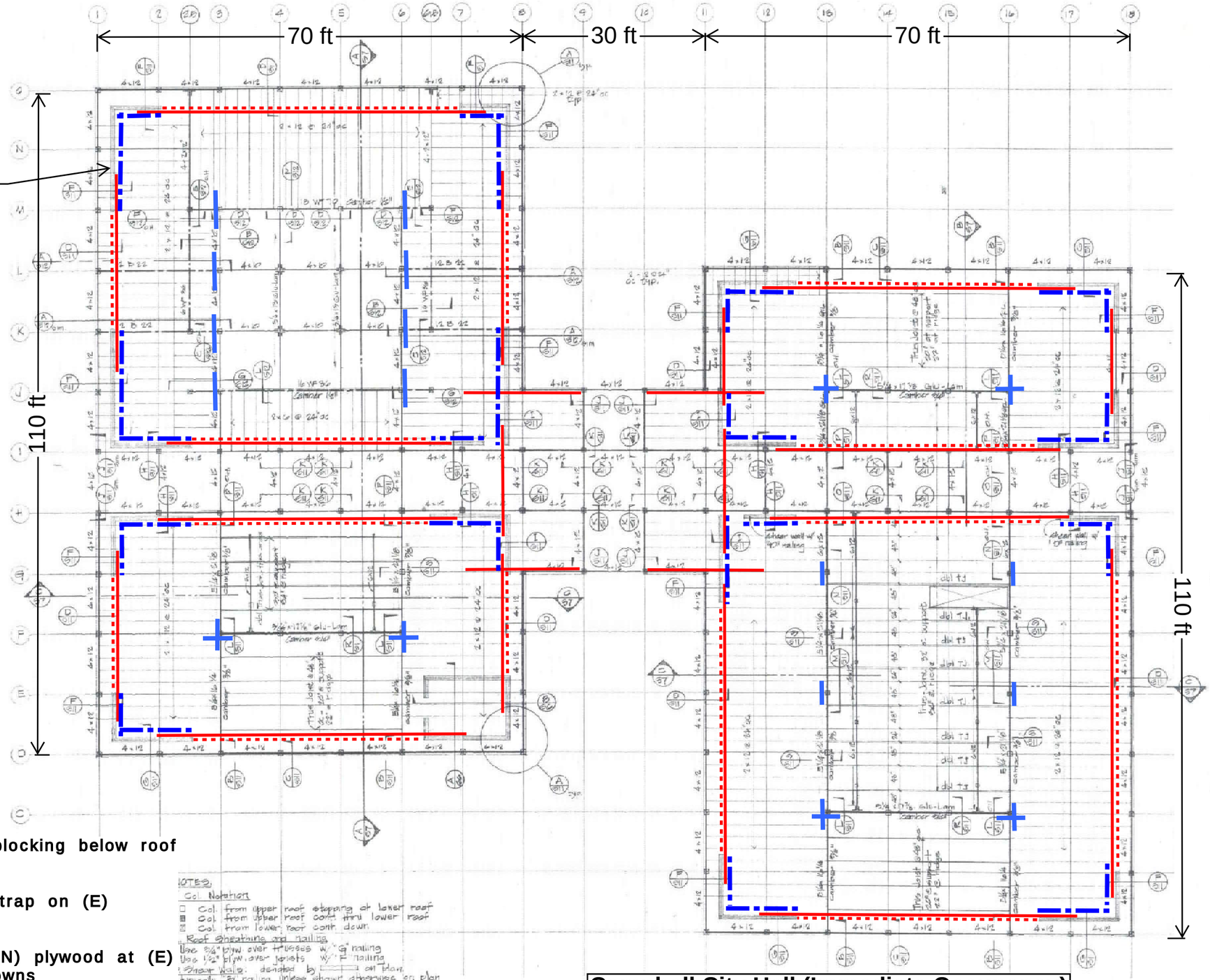
Photo 16 – Ramp at West elevation

Photo 17 – Wood ledger at concrete vault

Appendix 2

Conceptual Seismic Retrofit Plans


70 ft
30 ft
70 ft
110 ft
110 ft
(E) Concrete masonry shearwall below, typ
Holdowns with steel rods, typ
N
typ. Hold Down
Indicates (N) seismic tie - steel rods with holdowns each side of (E) beams below second floor diaphragm
Indicates (N) anchor bolts through (E) 2x wood sill epoxied into top of CMU/conc walls at 4'-0" on center
Notes:
1 Col. Notation
Col. from roof continuous thru floor to basement
Col. from roof stopping @ floor level
Col. from floor to basement only
2 Floor Sheathing & Nailing
Use 7/8" T&G ply w. w/ nailing see shts. s-1a
3 All Cantilevers to be Grade "C" w/no camber unless called for otherwise on the plan
4 All Floor Joist to be Construction Std. Douglas Fir with the exception that all 2x6's joist shall be Construction Std. 1700f
SECOND FLOOR PLAN
Campbell City Hall (Immediate Occupancy)
70 N. First St, Campbell, CA
December 21, 2017
FLOOR FRAMING PLAN
REVISIONS
DONALD R. JAMES
CIVIL ENGINEER
THE OFFICE OF
WILLIAM W. HEDLEY JR.
a.i.a.
architect
CAMPBELL CITY HALL
CAMPBELL, CALIFORNIA
SHEET NO.
S4
OF 15



Indicates (N) wood blocking below roof diaphragm

Indicates (N) steel strap on (E) plywood diaphragm

Indicates additional (N) plywood at (E) shearwalls with holdowns

Indicates (N) seismic tie - steel rods with holdowns each side of (E) beams below lower rood diaphragm

NOTES
Col. Notation
- Col. from upper roof stopping at lower roof
- Col. from upper roof cont. thru lower roof
- Col. from lower roof cont. down

Roof Sheathing and nailing
Use 3/8" plyw. over trusses w/ "G" nailing
Use 1/2" plyw. over joists w/ "F" nailing
Shear Walls designated by [ ] on plan, typically "B" nailing unless shown otherwise on plan
Glu-Lams to be grade "G" w/ 4" Camber unless called for otherwise on plan

LOWER ROOF PLAN

Campbell City Hall (Immediate Occupancy)
70 N. First St, Campbell, CA
December 21, 2017

LOWER ROOF FRAMING PLAN

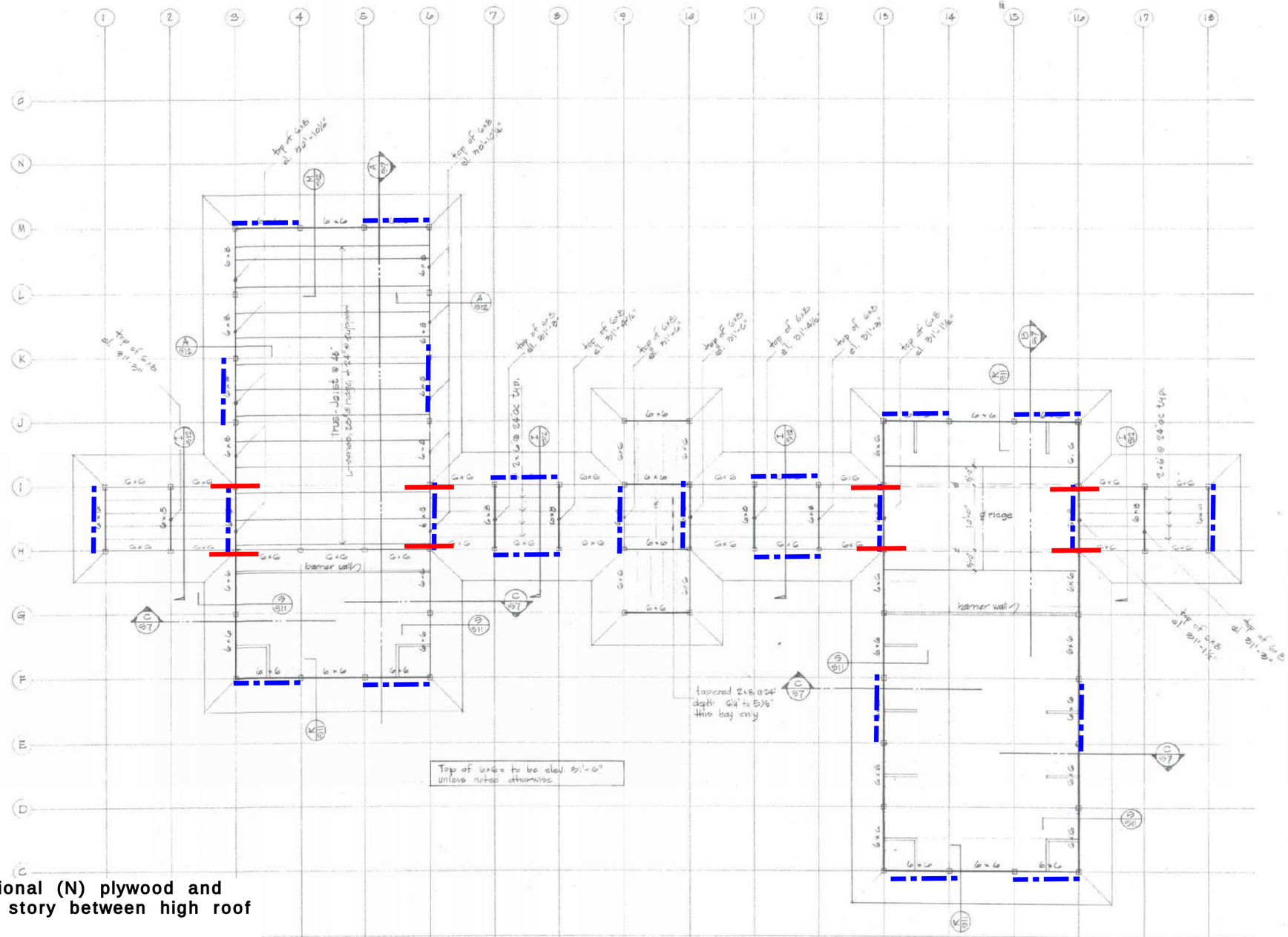
REVISIONS

DONALD R. JAMES
CIVIL ENGINEER

THE OFFICE OF
WILLIAM W. HEDLEY JR.
architect

CAMPBELL CITY HALL
CAMPBELL, CALIFORNIA

SHEET NO. S 8 OF 18



Indicates additional (N) plywood and studs at clear story between high roof and low roof

Indicates (N) seismic tie - steel rods with holdowns each side of (E) beams below high roof

Campbell City Hall (Immediate Occupancy)
70 N. First St, Campbell, CA
December 21, 2017

HIGH ROOF PLAN

A S10 UPPER ROOF FRAMING PLAN 1/8" = 1'-0"

N

UPPER ROOF FRAMING PLAN

REVISIONS

DONALD R. JAMES
CIVIL ENGINEER

THE OFFICE OF
WILLIAM W. HEDLEY JR.
architect
a.i.a.

CAMPBELL CITY HALL
CALIFORNIA

SHEET NO. S10

Appendix 3

Conceptual Cost Estimate

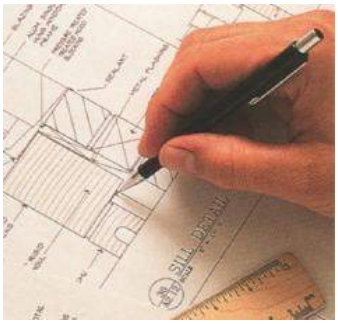
Campbell City Hall

Tier 1 - Seismic Assessment (Essential Facility)

Campbell, CA

Rough Order of Magnitude Cost Estimate (DRAFT)

August 15, 2017



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INTRODUCTION

This opinion of probable cost has been prepared to reflect the anticipated construction cost for the proposed seismic retrofit work based on a Tier 1 Seismic Assessment (Essential Facility) for Campbell City Hall, Campbell, California.

This document is based on the measurement and pricing of quantities wherever information is provided and/or reasonable assumptions for other works not covered in the drawings and programs as stated in this document. The unit rates reflected herein have been obtained from historical records and discussion with subcontractors and suppliers. All unit rates relevant to subcontractor works include the subcontractors' overheads and profit.

Project Scope

The proposed seismic retrofit work covers 2 levels that includes seismic ties using steel rods and hold downs at existing glu-lam beams and anchor bolts to perimeter walls below the second floor diaphragm. The work on the lower roof plan consists of wood blocking, steel straps and new plywood with steel rods and hold downs at corner walls. The high roof clearstory will be selectively replaced with infill plywood on stud framing. Finishes are replaced only at locations where seimsic work are needed.

Documentations

Faithful+Gould received the following documents from Biggs Cardosa Associates, Inc. for the preparation of this estimate:

Drawings

Marked-up existing second floor, lower roof and high roof plans dated August 15, 2017.
Architectural drawings sheet 7, 8, 9, 10, 11 and 12 dated March 23, 1970
Photographs extracted from Draft Report Tier 1 Seismic Evaluation Campbell City Hall dated November 12, 2015.

Reports

No reports or narratives are available

Phasing and Temporary Works

No phasing or temporary works have been included in the cost estimate.

Design Contingency

A design contingency of 20% is included for the development of the design drawings to 100% CD set.

Escalation

No escalation has been included in the cost estimate.

Exclusions

Legal and accounting fees
Relocation of existing owner's furniture, furnishings and equipment
Removal of unforeseen obstructions behind walls
Overtime and weekend work
Hazardous material abatement

INTRODUCTION

Temporary swing space and temporary accommodation for the various functional spaces while under construction.

Design-build procurement delivery

Phased work is excluded.

Escalation

Fire inspection fees

Special inspection fees

Permits, expediting and filing

Items that may affect the cost estimate

Modifications to the scope of work included in this estimate.

Unforeseen sub-surface conditions.

Restrictive technical specifications or excessive contract conditions.

Non-competitive bid/market situations.

Recommendation for Cost Control

Faithful+Gould recommends that the owner, architect and engineers carefully review this document, including line item descriptions, unit prices, clarifications, exclusions, inclusions and assumptions, contingencies, escalation, and markups. If the project is over budget, or if there are unresolved budgeting issues, alternative systems/schemes should be evaluated before proceeding into the Bidding phase.

Requests for modifications of any apparent errors or omissions to this document must be made to Faithful+Gould within ten (10) days of receipt of this estimate. Otherwise, it will be understood that the contents have been concurred with and accepted.

Opinion of Probable Cost

This opinion has been based on a competition open bid situation with a recommended 5 - 7 reputable bids from general contractors and a minimum of 3 bidders for all items of sub-contracted work. Experience indicates that a fewer number of bidders may result in higher bids, conversely an increased number of bidders may result in more competitive bids.

Since Faithful+Gould has no control over the cost of labor, materials, or equipment, or over the contractor's method of determining prices, or over competitive bidding or market conditions, the opinion of probable construction cost provided for herein is made on the basis of professional experience and qualifications. The opinion represents Faithful + Gould's best judgment as a professional construction consultant familiar with the construction industry. However, Faithful+Gould cannot and does not guarantee that proposals, bids, or the construction cost will not vary from opinions of probable cost prepared by them.

Area Tabulation

Location	*Wing (SF)*	*Central Lobby (SF)*	*Total Area (SF)*
First Floor	15,400	900	***16,300***
Second Floor	15,400	900	***16,300***
Total	**30,800**	**1,800**	**32,600**

COST SUMMARY

	Descriptions		$	32,600 SF
1	General Requirements			0.00
2	Existing Conditions		156,223	4.79
3	Concrete			0.00
4	Masonry			0.00
5	Metals		138,821	4.26
6	Woods and Plastics		104,719	3.21
7	Thermal Moisture and Waterproofing		51,857	1.59
8	Doors and Windows			0.00
9	Finishes		159,345	4.89
10	Specialties			0.00
11	Equipment			0.00
12	Furnishings			0.00
13	Special Construction			0.00
14	Conveying Equipment			0.00
21	Fire Suppression			0.00
22	Plumbing			0.00
23	Heating, Ventilating and Air-conditioning (HVAC)		6,000	0.18
25	Integrated Automation			0.00
26	Electrical		12,000	0.37
27	Communications			0.00
28	Electronic Safety and Security			0.00
31	Earthwork			0.00
32	Exterior Improvements			0.00
33	Utilities			0.00
TOTAL Building and Siteworks			***628,964***	***19.29***
18	Phasing and Temporary Works	*0.00%*	0	0.00
19	Insurance and Bond	*2.00%*	12,579	0.39
20	General Requirements (4 months construction)		145,000	
21	Profit	*10.00%*	78,654	2.41
BASIC CONSTRUCTION ESTIMATE			***865,198***	***22.09***
22	Design Contingency	*20.0%*	173,040	5.31
TOTAL CONSTRUCTION COST (Present)			***1,038,238***	***27.40***
23	Escalation (Excluded)	*0.00%*	0	0.00
I . TOTAL CONSTRUCTION COST (Future)			**1,038,238**	**27.40**
A.	Architect and Engineering Fees	*0.00%*	0	0.00
B.	Project Management Fees	*0.00%*	0	0.00
C.	Miscellaneous Consulting Services	*0.00%*	0	0.00
D.	Project/Construction Contingency	*0.00%*	0	0.00
II. TOTAL SOFT COST			**0**	**0.00**
GROSS TOTAL (I+II (Future Cost)			***1,038,238***	***27.40***

DETAILED ESTIMATE

Description	Qty	Unit	Rate	Total
1 GENERAL REQUIREMENTS				
See Summay page				
TOTAL GENERAL REQUIREMENTS				
2 EXISTING CONDITIONS				
Selective Demolition				
Open up ceiling soffits to access work areas				
hard ceiling (25% assumption)				
beam below second floor	163	SF	25.00	4,063
perimeter concrete / CMU wall	348	SF	25.00	8,688
below roof diaphragm at lower roof	505	SF	25.00	12,625
- suspended ceiling (75% assumption)				
beam below second floor	488	SF	10.00	4,875
perimeter concrete / CMU wall	1,043	SF	10.00	10,425
below roof diaphragm at lower roof	1,515	SF	10.00	15,150
Remove roofing tile for new metal strap	864	LF	10.00	8,640
Remove existing finishes and prepare for new plywood wall lining	3,850	SF	5.00	19,250
Remove glazed clearstory				
interior	198	SF	30.00	5,940
exterior	594	SF	30.00	17,820
Temporary barricades and protection	56	LOC	500.00	28,000
Miscellaneous				
Miscellaneous demolition	1	LS	10,747.50	10,748
Haul and dispose	1	LS	10,000.00	10,000
TOTAL EXISTING CONDITIONS				**156,223**
3 CONCRETE				
Not Applicable				
TOTAL CONCRETE				
4 MASONRY				
Not Applicable				
TOTAL MASONRY				

DETAILED ESTIMATE

Description	Qty	Unit	Rate	Total
5 METALS				
Seismic tie comprising steel rods with hold-downs each side of glu-lam beams where indicated				
- intersecting cross beams	18	LOC	1,089.39	19,609
- longitudinal beams at interior walls	6	LOC	704.70	4,228
- longitudinal beams at exterior walls	8	LOC	432.35	3,459
- longitudinal beams below high roof	8	LOC	704.70	5,638
New anchor bolts including drilling through existing 2 x wood sill and epoxied into top of CMU / concrete wall	174	EA	75.00	13,031
Prepare existing plywood roof diaphragm and install steel straps	864	LF	45.00	38,880
Hold downs at plywood wall lining	30	LOC	800.00	24,000
Miscellaneous metal allowance	1	LS	10,321.00	10,321
Scaffolding, allowance	9,828	SF	2.00	19,655
TOTAL METALS				**138,821**
6 WOODS AND PLASTICS				
3 x Wood blocking between roof joists	540	LF	35.00	18,900
1/2" thick plywood wall sheathing	3,850	SF	10.00	38,500
Clearstory window infill comprising plywood on wood stud framing				
interior (plywood lining both sides)	198	SF	50.00	9,900
exterior (plywood lining one side)	594	SF	40.00	23,760
Miscellaneous rough carpentry etc	1	LS	13,659.00	13,659
TOTAL WOODS AND PLASTICS				**104,719**
7 THERMAL MOSITURE AND WATERPROOFING				
Replace roofing tiles to match including membrane underneath	864	LF	25.00	21,600
Wall insulation at infill to clearstory opening	594	SF	3.00	1,782
Flashing at clearstory infill	486	LF	35.00	17,010
Caulking and sealants	1,638	LF	7.00	11,465
TOTAL THERMAL MOSITURE AND WATERPROOFING				**51,857**
8 DOORS AND WINDOWS				
Not Applicable				
TOTAL DOORS AND WINDOWS				
9 FINISHES				
Exterior Finishes				
Cement plaster including paint finish at clearstory infill to match existing exterior walls	594	SF	35.00	20,790

DETAILED ESTIMATE

Description	*Qty*	*Unit*	*Rate*	*Total*
Interior Finishes				
Wall Finishes				
Patch and paint gypsumboard wall sheathing	3,850	SF	10.00	38,500
Paint plywood infill at clearstory	990	SF	12.50	12,375
Allowance for wall tiles in restroom walls	481	SF	15.00	7,219
Ceiling Finishes				
Patch and paint gypsumboard ceiling soffits	1,015	SF	35.00	35,525
Replace suspended ceiling tiles	3,045	SF	10.00	30,450
Miscellaneous				
Make good adjacent finishes, allowances	1	LS	14,485.88	14,486
TOTAL FINISHES				**159,345**
10 SPECIALTIES				
Not Applicable				
TOTAL SPECIALTIES				
11 EQUIPMENT				
Not Applicable				
TOTAL EQUIPMENT				
12 FURNISHINGS				
Not Applicable				
TOTAL FURNISHINGS				
13 SPECIAL CONSTRUCTION				
Not Applicable				
TOTAL SPECIAL CONSTRUCTION				
14 CONVEYING EQUIPMENT				
Not Applicable				
TOTAL CONVEYING EQUIPMENT				
21 FIRE SUPPRESSION				
Not Applicable				
TOTAL FIRE SUPPRESSION				

DETAILED ESTIMATE

	Description	Qty	Unit	Rate	Total
22	**PLUMBING**				
	Not Applicable				
	TOTAL PLUMBING				
23	**HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)**				
	Allowances for diffuser removal and relocation etc	1	LS	6,000.00	6,000
	TOTAL HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)				**6,000**
25	**INTEGRATED AUTOMATION**				
	Not Applicable				
	TOTAL INTEGRATED AUTOMATION				
26	**ELECTRICAL**				
	Allowances for light fixture removal and relocation etc	1	LS	12,000.00	12,000
	TOTAL ELECTRICAL				**12,000**
27	**COMMUNICATIONS**				
	Not Applicable				
	TOTAL COMMUNICATIONS				
28	**ELECTRONICS SAFETY AND SECURITY**				
	Not Applicable				
	TOTAL ELECTRONICS SAFETY AND SECURITY				
31	**EARTHWORK**				
	Not Applicable				
	TOTAL EARTHWORK				
32	**EXTERIOR IMPROVEMENTS**				
	Not Applicable				
	TOTAL EXTERIOR IMPROVEMENTS				
33	**UTILITIES**				
	Not Applicable				
	TOTAL UTILITIES				

Appendix 4

ASCE 41 Tier 1 Checklists

APPENDIX C
SUMMARY DATA SHEET

BUILDING DATA

Building Name: Campbell City Hall Date: 7/17/17

Building Address: 70 N First Street, Campbell, CA

Latitude: 37.288 N Longitude: 121.944 W By:

Year Built: 1970 Year(s) Remodeled: Original Design Code: UBC 1967

Area (sf): 32,600 Length (ft): 170 Width (ft): 140

No. of Stories: 2 Story Height: 12 Total Height: 31.83

USE ☐ Industrial ☒ Office ☐ Warehouse ☐ Hospital ☐ Residential ☐ Educational ☐ Other:

CONSTRUCTION DATA

Gravity Load Structural System: Plywood roof on glu-lam beams over steel columns

Exterior Transverse Walls: Wood framed / Masonry Openings?

Exterior Longitudinal Walls: Wood framed / Masonry Openings?

Roof Materials/Framing: Plywood / 2x wood joists / Glu-lam beams

Intermediate Floors/Framing: Plywood / 2x wood joists / Glu-lam beams

Ground Floor: Slab on grade

Columns: Steel tubes Foundation: Spread footings

General Condition of Structure: Good

Levels Below Grade? 0

Special Features and Comments:

LATERAL-FORCE-RESISTING SYSTEM

	First Story -Longitudinal-	Second Story -Transverse-
System:	Concrete-masonry shear walls	Wood shear walls
Vertical Elements:	CMU Walls / Steel Columns	Stud walls / Steel Columns
Diaphragms:	5/8" Plywood	3/4" Plywood
Connections:	Sill plate and anchor bolts	Wood Blkg and nails

EVALUATION DATA

BSE-1N Spectral Response Accelerations: S_{Ds} = 1.059 S_{D1} = 0.602

Soil Factors: Class = D F_a = 1.0 F_v = 1.5

BSE-1E Spectral Response Accelerations: S_{XS} = 1.01 S_{X1} = 0.548

Level of Seismicity: High Performance Level: Immediate Occupancy

Building Period: T = 0.254 sec

Spectral Acceleration: S_a = 1.01

Modification Factor: $C_mC_1C_2$ = 1.1 Building Weight: W = 1465 kips

Pseudo Lateral Force: V= 1.11 W

$C_mC_1C_2S_aW$= 1626 kips

BUILDING CLASSIFICATION:

REQUIRED TIER 1 CHECKLISTS	**Yes**	**No**
Basic Configuration Checklist	☒	☐
Building Type _____ **Structural Checklist** W2 / RM1	☒	☐
Nonstructural Component Checklist	☐	☒

FURTHER EVALUATION REQUIREMENT:

Project: Campbell City Hall Location: Campbell, CA

Completed by: GJT Date: 7/17/17

16.1.2IO IMMEDIATE OCCUPANCY BASIC CONFIGURATION CHECKLIST

Very Low Seismicity

Building System

General

(C) NC N/A U LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)

(C) NC N/A U ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)

C NC (N/A) U MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)

Building Configuration

(C) NC N/A U WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)

(C) NC N/A U SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffnessof the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)

(C) NC N/A U VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)

(C) NC N/A U GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)

(C) NC N/A U MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)

(C) NC N/A U TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)

Low Seismicity: Complete the Following Items in Additionto the Items for Very Low Seismicity.

Geologic Site Hazards

(C) NC N/A U LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)

(C) NC N/A U SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)

(C) NC N/A U SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

(C) NC N/A U OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)

(C) NC N/A U TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)

Project: Campbell City Hall Location: Campbell, CA

Completed by: GJT Date: 7/17/17

16.3IO IMMEDIATE OCCUPANCY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Very Low Seismicity

Seismic-Force-Resisting System

(C) NC N/A U REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)

C (NC) N/A U SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1):

Structural panel sheathing	1,000 lb/ft
Diagonal sheathing	700 lb/ft
Straight sheathing	100 lb/ft
All other conditions	100 lb/ft

(C) NC N/A U STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)

(C) NC N/A U GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)

(C) NC N/A U NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)

(C) NC N/A U WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)

C NC (N/A) U HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)

C NC (N/A) U CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)

C NC (N/A) U OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)

(C) NC N/A U HOLD-DOWN ANCHORS: All shear walls have hold-down anchors, constructed per acceptable construction practices, attached to the end studs. (Commentary: Sec. A.3.2.7.9. Tier 2: Sec. 5.5.3.6.6)

Connections

(C) NC N/A U WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)

(C) NC N/A U WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)

(C) NC N/A U GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)

Foundation System

C NC (N/A) U DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil. (Commentary: Sec. A.6.2.3.)

C NC (N/A) U SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story high. (Commentary: Sec. A.6.2.4)

Low, Moderate, and High Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Seismic-Force-Resisting System

C NC N/A U NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 1.5-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)

Diaphragms

(C) NC N/A U DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)

C (NC) N/A U ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)

C NC (N/A) U PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities. (Commentary: Sec. A.4.1.7. Tier 2: Sec. 5.6.1.4)

(C) NC N/A U DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)

C NC (N/A) U STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)

(C) NC N/A U SPANS: All wood diaphragms with spans greater than 12 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)

C NC (N/A) U DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft and aspect ratios less than or equal to 3-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)

(C) NC N/A U OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)

Connections

(C) NC N/A U WOOD SILL BOLTS: Sill bolts are spaced at 4 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)

Project: Campbell City Hall Location: Campbell, CA

Completed by: GJT Date: 7/17/17

16.15IO IMMEDIATE OCCUPANCY STRUCTURAL CHECKLIST FOR BUILDING TYPES RM1: REINFORCED MASONRY BEARING WALLS AND RM1A: REINFORCED MASONRY BEARING WALLS WITH STIFF DIAPHRAGMS

Very Low Seismicity

Seismic-Force-Resisting System

(C) NC N/A U REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)

C NC N/A U SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than 70 lb/in.^{2}. (Commentary: Sec. A.3.2.4.1. Tier 2: Sec. 5.5.3.1.1)

(C) NC N/A U REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in., and all vertical bars extend to the top of the walls. (Commentary: Sec. A.3.2.4.2. Tier 2: Sec. 5.5.3.1.3)

Connections

(C) NC N/A U WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers. (Commentary: Sec. A.5.1.2. Tier 2: Sec. 5.7.1.3)

(C) NC N/A U TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms. (Commentary: Sec. A.5.2.1. Tier 2: Sec. 5.7.2)

(C) NC N/A U FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation. (Commentary: Sec. A.5.3.5. Tier 2: Sec. 5.7.3.4)

(C) NC N/A U GIRDER–COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)

C (NC) N/A U WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections shall have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 4.5.3.7. (Commentary: Sec. A.5.1.1. Tier 2: Sec. 5.7.1.1)

Stiff Diaphragms

C NC (N/A) U TOPPING SLAB: Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab. (Commentary: Sec. A.4.5.1. Tier 2: Sec. 5.6.4)

C NC (N/A) U TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements are doweled for transfer of forces into the shear wall or frame elements. (Commentary: Sec. A.5.2.3. Tier 2: Sec. 5.7.2)

Foundation System

C NC (N/A) U DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil. (Commentary: Sec. A.6.2.3)

C NC (N/A) U SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story high. (Commentary: Sec. A.6.2.4)

Low, Moderate, and High Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Seismic-Force-Resisting System

(C) NC N/A U REINFORCING AT WALL OPENINGS: All wall openings that interrupt rebar have trim reinforcing on all sides. (Commentary: Sec. A.3.2.4.3. Tier 2: Sec. 5.5.3.1.5)

(C) NC N/A U PROPORTIONS: The height-to-thickness ratio of the shear walls at each story is less than 30. (Commentary: Sec. A.3.2.4.4. Tier 2: Sec. 5.5.3.1.2)

Diaphragms (Stiff or Flexible)

(C) NC N/A U OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length. (Commentary: Sec. A.4.1.4. Tier 2: Sec. 5.6.1.3)

C NC (N/A) U OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 4 ft long. (Commentary: Sec. A.4.1.6. Tier 2: Sec. 5.6.1.3)

C NC (N/A) U PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities. (Commentary: Sec. A.4.1.7. Tier 2: Sec. 5.6.1.4)

(C) NC N/A U DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)

Flexible Diaphragms

C (NC) N/A U CROSS TIES: There are continuous cross ties between diaphragm chords. (Commentary: Sec. A.4.1.2. Tier 2: Sec. 5.6.1.2)

C NC (N/A) U STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)

(C) NC N/A U SPANS: All wood diaphragms with spans greater than 12 ft consist of wood structural panels or diagonal sheathing. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)

C NC (N/A) U DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft and aspect ratios less than or equal to 3-to-1. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)

C NC (N/A) U NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft and have aspect ratios less than 4-to-1. (Commentary: Sec. A.4.3.1. Tier 2: Sec. 5.6.3)

(C) NC N/A U OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)

Connections

(C) NC N/A U STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. before engagement of the anchors. (Commentary: Sec. A.5.1.4. Tier 2: Sec. 5.7.1.2)