ASCE/SEI 31-03 Seismic Evaluation and Cost Estimate for Seismic Upgrades for Beverly Cleary Fernwood Campus

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CONTENTS

APPENDICES

Appendix A	References
Appendix B	ASCE 31-03 Summary Data Sheets and ASCE 31-03 Checklists
Appendix C	Supporting Calculations for ASCE Checklists and for Seismic Upgrades
Appendix D	Schematic Seismic Upgrade Drawings
Appendix E	Photographs
Appendix F	Direct Construction Cost Summary Prepared by Architectural Cost Consultants, LLC
Appendix G	Roof Area Designations from the 2010 Roof Assessment Report

LIST OF FIGURES

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1.2 EXECUTIVE SUMMARY

The purpose of this seismic evaluation and report is to provide Portland Public Schools with the following information for the Beverly Cleary Fernwood Campus facility:

- seismic deficiencies identified using ASCE/SEI 31-03 *Seismic Evaluation of Existing Buildings*
- schematic design to strengthen structural deficiencies
- an estimate of construction costs for the schematic strengthening

The deficiencies identified for the 1911-1924 Original Building are significant. The primary concern for the building during a seismic event is the prevalence of unreinforced masonry (URM) walls throughout the older areas of the school. This type of construction has consistently performed poorly in earthquakes.

Major upgrade work is required to address structural seismic issues for the older portions of the building and these upgrades will be extensive and invasive. These areas have several significant structural deficiencies including inadequate lateral force resisting elements. The URM walls have inadequate shear capacity to resist seismic loads. Adding new concrete shear walls will provide lateral force resistance as well as out-of-plane wall support in various locations. Additional wall anchorage and bracing will be needed in other locations. In addition to the major issues, there are many other deficiencies identified that should be addressed such as bracing of parapets, bracing or removing clay tile partition walls, reducing chimney height, and anchoring masonry veneer. The construction of new strengthening elements will have a significant impact to the other building systems.

The 1952 Kitchen Addition needs several upgrades as well. Connections between the roof and walls need to be installed, the roof diaphragm needs to be strengthened by adding plywood, clay tile walls need to be braced or replaced, and one or two interior shear walls need to be added to reduce the diaphragm loads.

The upgrades for the 1978 Addition are relatively minor in comparison. The roof-to-wall connections should be strengthened at the same time the roofing material is replaced. The total direct construction cost for these structural seismic upgrades for the 1978 Addition is approximately $113,100, which averages to $3.26 per square foot.

The construction cost for structural seismic upgrades for the entire facility totals approximately $6 million, which averages to $68.14 per square foot.

The estimate does not include costs associated with mechanical, electrical, plumbing, fire alarm, security, data, etc that are likely to be impacted by the upgrades in the older areas of the building. Also these costs do not include bracing of mechanical equipment, ceilings, lighting fixtures electrical equipment, piping, ductwork, furniture, & cabinetry.

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1.3 INTRODUCTION

Portland Public Schools retained the services of James G. Pierson, Inc. to conduct a seismic evaluation of the Beverly Cleary Fernwood Campus using the ASCE/SEI 31-03 Standard and to develop a preliminary concept for seismic upgrades using ASCE/SEI 41-06. A construction cost estimate for these structural upgrades is provided.

1.3.1 Background

The American Society of Civil Engineers *Seismic Evaluation of Existing Buildings* (ASCE/SEI 31-03) is the most current standard that provides a process for seismic evaluation of existing buildings and The American Society of Civil Engineers *Seismic Rehabilitation of Existing Buildings* (ASCE/SEI 41-06) is recognized as a viable tool for designing seismic upgrades for existing buildings.

The requirement for an ASCE 31 Evaluation by the City of Portland Bureau of Buildings can be triggered for buildings undergoing a change in occupancy, a change in use, structural alterations, a structural addition, or repairs due to structural systems damaged by an earthquake. It should also be noted that seismic improvements are required by the City of Portland Bureau of Buildings for Unreinforced Masonry Bearing (URM) Wall Buildings per Chapter 24.85 at the roof level when the roof covering is repaired or replaced. Seismic improvements can also be required if a significant amount of alterations or repairs are performed in a URM building. Since none of these situations are applicable at this time, this seismic evaluation is considered voluntary.

In 1997, Bjornstad Kane Jacobs, Inc. prepared a seismic evaluation of this facility using FEMA-178, *NEHRP Handbook for the Seismic Evaluation of Existing Building.* This document was published in 1992 and is a predecessor to ASCE 31. Another evaluation of this facility was prepared James G. Pierson, Inc. as part of the PPS 2002 Comprehensive Seismic Review which provided seismic evaluations and recommended seismic upgrades for all Portland Public School facilities.

1.3.2 Evaluation Criteria

Performance Objective and Evaluation Tier Level
The ASCE 31 standard provides guidance concerning the potential earthquake-related risk to human life posed by a building or building component. The evaluation can be based on one of two performance levels: either Life Safety Performance Level or Immediate Occupancy Performance Level. The ASCE 31 standard provides a three-tiered process for seismic evaluation of existing structures. For this assessment, the school was evaluated using a Tier 1 evaluation with a Life Safety Performance Objective.

The Life Safety Performance is defined as “building performance that includes damage to both structural and nonstructural components during a design earthquake, such that: (a) partial or

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total structural collapse does not occur, and (b) damage to nonstructural components is non-life-threatening."

The Tier 1 screening phase utilizes three sets of checklists to evaluate structural, nonstructural and foundation/geologic hazard elements of the building and site conditions. In addition to discussing the deficiencies found using the Tier 1 evaluation, this report provides a preliminary concept for seismic upgrades and an estimate of the associated construction costs. If the school district decides to pursue seismic upgrades, a Tier 2 and Tier 3 analysis could be performed to more specifically address the deficiencies identified by the Tier 1 evaluation.

Level of Seismicity
Based on the mapped response acceleration values and site amplification factors, the level of seismicity for this building is defined as "High" in accordance with Table 2-1 of ASCE/SEI 31-03.

Building Type
The oldest portions of the school would generally be defined as Building Type 15: Unreinforced Masonry Bearing Walls, URMA with stiff concrete roof and floor diaphragms. The 1952 kitchen addition is building Type 11: PC1 with flexible wood roof. The 1978 Addition would be classified as Building Type 13: Reinforced Masonry Bearing Walls, RM 1 for the flexible wood roof diaphragm and RM2 for the stiff concrete floor diaphragm. Building construction is described in further detail later in this report.

Benchmark Buildings
Structural evaluations using ASCE 31-03 need not be performed for buildings designed and constructed in accordance with the benchmark provisions listed in ASCE 31-03 Table 3-1. None of the areas of this school would be considered "benchmark building" as they were all designed and constructed prior to the dates of the benchmark building codes. This includes the 1978 Addition. The structural drawings refer to the 1973 Edition of the Oregon State Building Code which was based on the 1973 Uniform Building Code (UBC). This design code precedes the 1976 UBC which is the benchmark for Reinforced Masonry with Stiff Diaphragms (Type RM2).

Historic Significance
The school was designed by Ellis F. Lawrence, one of the most significant architects in Portland during the early twentieth century. The 2009 Oregon Historic Site Form states that although the school is described as a notable historic resource, it does not have integrity of design and material to make it eligible for listing in the National Register of Historic Places. Since the building is not considered of high historic significance, disturbance of architectural elements and finishes to allow testing for further evaluation and to implement seismic upgrades will not be as restrictive as would be the case for a building with more significance.

ASCE 31 Checklists
The following checklists are required for a Tier 1 Evaluation for Life Safety Level of Performance:

Basic Structural
Supplemental Structural
Geologic Site Hazard and Foundation
Basic Nonstructural
Intermediate Nonstructural

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2.0 SITE AND BUILDING DATA

The Beverly Cleary Fernwood Campus is located at the northwest corner of the intersection between NE 33rd Avenue and NE Hancock Street and it currently houses grades 2 through 8. The school was previously known as Fernwood Middle School.

The school facility is comprised of multiple additions constructed over the years with varying types of construction. Refer to Figure 1 for a key map showing the various periods of construction. The various additions can be grouped into three areas based on the type of construction. Each area is described briefly below:

- The original school was designed and constructed in phases, Units #1 through #6, starting in 1911 and finishing in 1924. The main portion of this **Original Building** is a three-story unreinforced masonry bearing wall structure with concrete floors and roof. The lowest level is partially below grade. Units #5 and #6 housing the boys and girls gymnasiums were demolished in 1977.

- In 1952, a single story **Kitchen Addition** was built along the north end of the Original Building. The 1952 Kitchen Addition is a single story concrete bearing wall structure with a wood roof.

- The original boys and girls locker rooms, Phase 5 and Phase 6 of the Original Building, were demolished and replaced by the **1978 Gymnasium/Industrial Arts Addition**. This addition is a two story reinforced masonry bearing wall structure.

The original design and subsequent construction are fairly well documented by the drawings available in the Portland Public Schools archives. Although the drawings for the original building are not fully legible and a few pages appear to be missing, most of the information is available.

In 1998, seismic upgrade work was done in the 1911/1924 Original Building to address the some of the more critical deficiencies near the building exits. Partitions located adjacent to stairwells at the second floor level were laterally braced by anchoring them to metal studs that extend from the second floor level up to the roof structure. Steel framing was attached to the parapet over the Auditorium's west exit to prevent it from falling during a seismic event. Anchors were added to the east exterior wall of the west stairwell and the west exterior wall of the east stairwell to tie the hollow clay tile furring to the unreinforced brick walls.

James G. Pierson, Inc. visited the site on January 12, 2011 and accompanied Architectural Cost Consultants during another site visit on February 15, 2011. A majority of the structure is hidden behind finishes, making verification with the drawings difficult. Areas that could be observed, such as the exterior walls and the exposed structure in the space between the second ceiling and the roof, appear to match the drawings.

Generally the brick is in good condition. No cracks were observed. A white residue is present over some exterior wall areas at the Original Building. The most substantial amount of efflorescence occurs on the west face of the west wing of the Original Building. Refer to Photo 1. Efflorescence, along with water marks, occur in several locations on the interior face of the

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gymnasium walls, indicating roof leaks. See Photo 2. The brick mortar appears to be well maintained and is in good condition. No significant cracks were observed. The mortar can not be scraped away by hand with a screwdriver. Differences in mortar color and tooling on wall areas of the Original Building indicates that repointing has been done in the past. The terra cotta trim on the exterior of the Original Building appear to be in good condition. The joints around the edges of these pieces appear to be in sound as there are no signs of water intrusion. No loose pieces were observed. The original drawings depict ties embedded into the adjacent supporting concrete.

No issues were found with the building during the evaluation of the foundation and geologic site hazards. The building is supported by spread and continuous footings on a level site.

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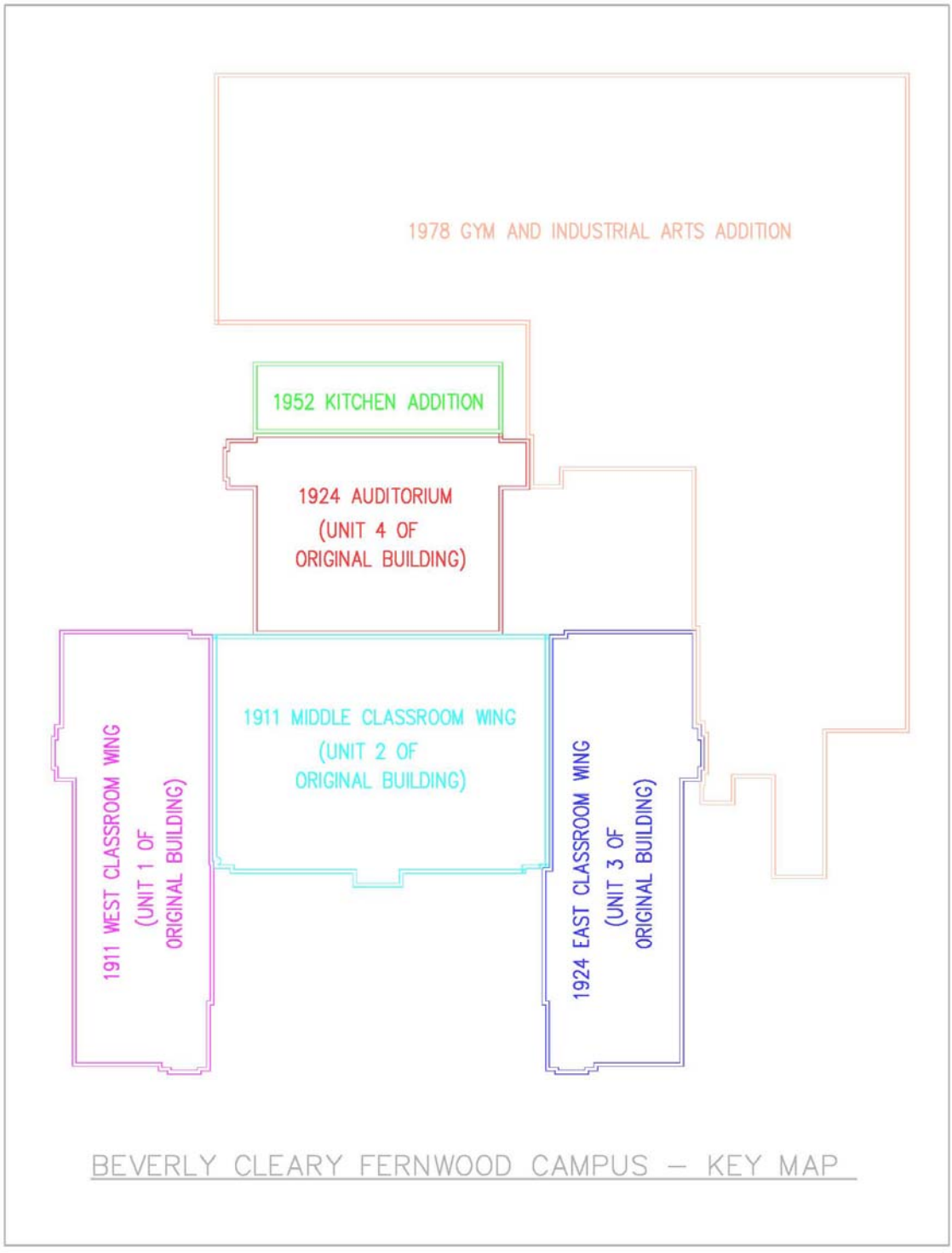

Figure 1

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3.0 STRUCTURAL SYSTEMS AND EVALUATIONS

The structural system descriptions and evaluations for each area of the building area are separated into the three sections that follow:

- Original 1911-1924 Building
- 1952 Kitchen Addition
- 1978 Gym and Industrial Arts Addition

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3.1 Original 1911-1924 Building

3.1.1 Structural System Description

The original drawings for the school are dated 1911 and were prepared by Ellis F. Lawrence Architect. These drawings indicate that the building was conceived to be constructed in phases and with four areas identified: the west wing as Unit #1, the middle wing as Unit #2, the east wing as Unit #3, and the auditorium as Unit #4. The classroom wings built in the first three phases of construction create a U-shaped building in plan.

These oldest areas of original building are three stories with the basement level being partially below grade. The roof and floors systems are concrete slab with one-way concrete joist systems. The drawings dated 1911 do not mention slab reinforcing but the 1923 drawings for Unit #3 call for wire mesh. The drawings specify 4 to 6 inch wide joists conventionally reinforced with straight and bent rebar and formed by hollow clay tile remaining in place. The bottom of this system can be seen in Photo 3. Reinforced concrete lintels sometimes combined with the concrete floor pours, span over the openings. Drawings show the outer layer of brick over windows being supported by steel angles with anchors embedded into the concrete lintels.

The exterior walls are unreinforced brick masonry; wall thickness is 13 inches at the second floor level and 17 inches at the first and basement floor levels. The exterior walls below grade at the basement level are 21 inch thick concrete. The transition from concrete to masonry occurs at about 5 to 6 feet above the basement floor level. The drawings show metal ties for some of the terra cotta trim. The brick patterns around the exterior of the building are predominately running bond absent of any header courses. The interior face of the brick walls are covered by finishes except in the space between the roof structure and the second floor ceiling. Within that space, header courses can be seen every 5 to 7 courses as shown in Photo 4.

The 1923 drawings for Unit #3, the East Classroom Wing, and Unit #4, the Auditorium show more detailed structural information than the previous drawings. These drawings are also prepared by Ellis F. Lawrence and they are stamped by Henry F. Blood, P.E.

The construction of Unit #3 East Classroom Wing is generally the same as the West Classroom Wing; however observations during the site visit found the joists in this construction phase were formed using metal pans rather than the clay tile used in the first two Units. The bottom of this system can be seen in Photo #5.

Interior walls in Units #1, 2, & 3 are identified as 4 inch Hollow Tile Partitions. The drawings specify wider floor joists with additional reinforcing below the partitions.

The single story auditorium, Unit #4, is constructed with one way concrete slabs and concrete beams supported by steel girders. The drawings indicate that the walls are similar in construction to those used in the other Units.

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Drawings dated 1924 show the girls and boys gymnasiums, Units #5 and #6, constructed on the east and west sides of the Original Building. Those one story areas were demolished in 1977 to construct the 1978 Addition.

3.1.2 Structural System Evaluation and Deficiencies

The structural system deficiencies identified in the Tier 1 evaluation are as follows:

SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of ASCE 31-03 Section 3.5.3.3, exceeds 30 psi for clay units.

WALL ANCHORAGE: Exterior walls lack adequate anchorage to the roof and floor diaphragms.

TRANSFER TO SHEAR WALLS: Diaphragms lack adequate connections to transfer loads to the masonry shear walls.

PROPORTIONS: The height-to-thickness ratio of the shear walls at each story are as follows:

Wall Location	Wall Height (ft)	Wall Thickness (in.)	H/t if full wall thickness is adequately tied	Effective Thickness (in.) *	H/t assuming outer wythe acts as veneer	max H/t
2nd floor level	16 to 17.7	13	15 to 16 NG	9	21 to 24 NG	9
1st floor level	12	17	8.5 OK	13	11 OK	15
Basement level	4.5	17	3 OK	13	4 OK	15
Auditorium	18.5	17	13 OK	13	17 NG	13
* Effective Thickness assuming outer wythe is considered veneer						

BEAM, GIRDER, AND TRUSS SUPPORTS: The concrete lintel beams are supported by unreinforced masonry walls and do not have independent secondary columns for support of the vertical loads.

ADJACENT BUILDINGS: Refer to Section 3.3.2 for discussion regarding the seismic joint between this building area and the 1978 Addition.

3.1.3 Nonstructural Components Evaluation and Deficiencies

Other deficiencies identified in the Tier 1 evaluation are as follows:

UNREINFORCED MASONRY PARTITIONS: Many of the original hollow clay tile partition walls remain. Partitions located adjacent to stairwells at the second floor level were laterally upgraded in 1998 by anchoring them to metal studs that extend from the second floor level up to the roof structure. The mechanical rooms in the basement have several unreinforced masonry partition walls. We believe there is one interior unreinforced masonry wall that served as the exterior wall of Unit #1 of the Original Building until Unit #2 was constructed against it.

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The masonry starts at the basement level and continues up through the roof. Bracing is needed to prevent portions of masonry from dislodging due to out-of-plane seismic forces.

CEILING SYSTEMS: The second floor level hollow clay tile partition walls stop at the underside of the suspended metal lath and plaster ceiling; thus the top of the walls rely on the plaster ceiling for lateral support. These types of ceilings behave like structural diaphragms and resist in-plane seismic forces. If the strength of the plaster is exceeded, portions of the ceiling may crack and spall.

MASONRY VENEER TIES: As mentioned in the previous section of this report, the outer wythe of masonry is considered veneer and would be required to have ties to the backing wythes.

URM PARAPETS: The unreinforced masonry parapets exceed the height-to-thickness ratios.

URM CHIMNEYS: The unreinforced masonry chimney height exceeds three times the least dimension of the chimney.

URM WALLS AT STAIRS: Some of the walls around the stair enclosures exceed the height-to-thickness ratio. A few of the walls were braced as part of the 1998 Seismic Upgrades but some walls still need to be braced or removed.

SUSPENDED LATH AND PLASTER CEILINGS: Suspended metal lath and plaster ceilings are not anchored to resist seismic forces for every 12 square feet of area.

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3.2 1952 Kitchen Addition

3.2.1 Structural System Description

In 1952 a one story addition was built along the north end of the auditorium. Drawings for this addition were prepared by Raymond Kermit Thompson School Architect. The roof system consists of sawn wood sheathing over 2 x 12 joists at 12 inch spacing. The exterior walls along the north, east and west sides are 8 inch thick concrete walls faced with brick veneer. An unreinforced hollow clay tile wall was added adjacent to the auditorium's brick masonry wall to support the south end of the kitchen roof. The drawings are unclear about how the roof joists are supported by the concrete wall on the north side. A detail for the window head condition shows a rim joist and roof joists bearing on a steel angle bolted to the concrete lintel. It is possible the steel angle is used along the full length of the north wall to provide vertical support for the roof joists. Given the era of construction, it is also possible the roof joists are individually pocketed into the concrete wall.

All of the partition walls in the kitchen area are constructed of hollow clay tile. Steel angles support the brick veneer and the hollow clay tile over wall openings.

The bearing condition of the joists and the condition of the wood roof framing is unknown due to original metal lath and plaster ceiling plus glued tile concealing the bottom side of the joists.

3.2.2 Structural System Evaluation and Deficiencies

The structural system deficiencies identified in the Tier 1 evaluation are as follows:

LACK OF LOAD PATH: The structure does not have a complete load path for transferring seismic loads between the roof and the perimeter walls.

DETERIORATION OF WOOD (POTENTIAL): If the roof joists are pocketed into the concrete, they are susceptible to rot. The roof drainage system has interior roof drains which increases the chances for water leaks and wood rot. The condition of these joists is unknown due to original metal lath and plaster ceiling concealing the bottom side of the joists.

SHEAR STRESS CHECK: The east wall of the kitchen requires further review since it does not pass the quick check.

REINFORCING STEEL IN WALLS: The drawings for the kitchen addition specify two horizontal reinforcing bars to be placed near the bottom of the concrete lintel spanning over wall openings. If the walls were constructed per the drawings, they are essentially unreinforced concrete walls.

WALL ANCHORAGE/TRANSFER TO SHEAR WALLS: The concrete walls are dependent on the roof diaphragm for out-of-plane lateral support. Seismic loads in the roof diaphragm need to be transferred into shear walls. None of the walls are anchored to the roof structure for either of these load transfer mechanisms.

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DIAPHRAGM: The existing roof diaphragm consists of sawn sheathing which has limited shear capacity and therefore does not comply with the screening criteria.

PROPORTIONS: The roof joists bear on a 2x4 wood plate on top of a 3 inch thick hollow clay tile wall constructed against the existing north wall of the auditorium. Assuming this tile is not adhered or anchored to the existing wall, the height-to-thickness ratio is approximately 35:1, making the wall susceptible to collapse.

3.2.3 Nonstructural Components Evaluation and Deficiencies

Other deficiencies identified in the Tier 1 evaluation are as follows:

PARTITIONS: The interior walls are hollow clay tile partitions. Bracing is needed to prevent portions of masonry from dislodging due to out-of-plane seismic forces.

MASONRY VENEER TIES: Masonry veneer ties are not specifically mentioned in the 1952 drawings but literature dated in this time period indicates masonry veneer was to be anchored with metal ties spaced not farther apart than 24 inches vertically or horizontally. Being unfamiliar with standard construction practice in the area during this time period, we have marked this item as Non Compliant to flag it for further review.

PARAPETS: The unreinforced concrete parapets exceed height-to-thickness ratio.

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3.3 1978 Gym and Industrial Arts Addition

3.3.1 Structural System Description

The two gyms at the north end of the addition are tall one-story structures and the remainder of the addition is two stories. The architectural design was done by Butwell Gordon Beard & Grimes Architects and the structural engineering was done by Moffit Nichols and Bonney.

The roof structure is plywood sheathing over sawn roof joists and glue laminated beams. The second floor system consists of a 2 ½" concrete topping slab with welded wire mesh over precast concrete hollowcore deck. Most of the structural walls are partially grouted reinforced concrete masonry. The exterior walls are faced with brick veneer. A few of the walls at the second floor level are metal stud framed with brick veneer. Foundations are conventional concrete spread footings and the first floor is concrete slab on grade.

3.3.2 Structural System Evaluation and Deficiencies

The structural system deficiencies identified in the Tier 1 evaluation are as follows:

The building structure was well-detailed for its era but the seismic design forces have increased and the connection detailing required by code has become much more stringent. The structural system deficiencies identified in the Tier 1 evaluation are as follows:

ADJACENT BUILDINGS: The connection between the 1978 Addition and the Original Building was constructed with a 1½" seismic joint. This dimension is much less than the dimension allowed using quick check for clearance between two structures. Further analysis is required to determine whether the 1½"is enough to avoid potential pounding between the two building structures.

WALL ANCHORAGE: The wall anchorage for out-of-plane wall forces is spaced too far apart and does not have adequate strength.

WOOD LEDGERS: The roof diaphragms are connected to the perimeter masonry walls with wood ledgers that would be subjected to cross-grain bending and tension.

STIFFNESS OF WALL ANCHORS: Existing wall anchorage lack adequate stiffness.

3.3.3 Nonstructural Components Evaluation and Deficiencies

Other deficiencies identified in the Tier 1 evaluation are as follows: none

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4.0 Recommended Strengthening

Original 1911/1924 Building

This portion of the school has numerous seismic deficiencies, many of them severe. The primary concern for the building during a seismic event is the prevalence of unreinforced masonry walls. This type of construction has consistently performed poorly in earthquakes.

The upgrades required are extensive as this portion of the building essentially needs a new lateral force resisting system. Several upgrade schemes are possible such as installing new concrete shear walls or steel braced frames. Installing any type of lateral force resisting system will be intrusive to the existing building systems.

Concrete shear walls, typically placed against the existing masonry walls, appear to provide the most suitable option. The concrete will provide in-plane shear resistance and at the overlay locations it will also be used to brace the masonry walls for out-of-plane loads. In constructing the new walls, anchorage between the roof/floor diaphragms and the new walls will be addressed.

At locations where the existing unreinforced masonry bearing walls do not receive concrete, out-of-plane wall bracing using metal studs with anchor ties, will be required at the second floor level.

Other seismic upgrades include bracing the unreinforced masonry parapets, reducing the masonry chimney height to the roof level and strengthening the remaining portions.

The following is a list of items that should be upgraded to improve the building's performance during an earthquake. The items are prioritized in descending order of importance from most critical to least critical:

- Install new lateral force resisting system.
- Brace URM bearing walls for out-of-plane loads.
- Brace URM parapets for out-of-plane loads and reduce chimney height to roof level.
- Brace existing clay tile partition walls or remove and replace them with new partitions.
- Verify existence, condition and effectiveness of brick veneer ties.
- Brace suspended ceilings
- Brace mechanical equipment, ductwork, piping, light fixtures, tall narrow furniture, etc.

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1952 Kitchen Addition

The structural and nonstructural deficiencies at the kitchen addition are of varying degrees of concern. These deficiencies are discussed in decreasing order of importance.

The lack of anchorage between the roof and the exterior walls is the most critical concern because the walls could separate from the roof resulting in a partial collapse of the roof. The support of the roof system on the hollow clay tile wall is also of equally great concern.

The concrete shear walls are essentially unreinforced. The out-of-plane seismic loads on inadequately reinforced parapets can result in severe damage and pieces could potentially fall. The wall section located mid-way between the roof and floor would also be subject to cracking due to out-of-plane seismic wall loads but would pose much less of a hazard to occupants. The in-plane shear stresses resulting from seismic loading are relatively low in the north and west walls and thus the potential for that failure mechanism is considered not significant. The east wall has several openings; therefore it did not pass the quick check. Further review is required; however we do not anticipate that strengthening will be found necessary.

When the clay tile partition walls are subjected to out-of-plane seismic loads, portions of the masonry could dislodge and fall.

The roof sheathing has some limited capacity to act as a diaphragm; however it is recommended that plywood sheathing be added to improve its performance capability as this roof diaphragm would be heavily loaded by seismic loads acting in the north-south direction.

Lastly, if the brick veneer is not properly anchored to the concrete walls, pieces can dislodge and fall. Veneer located over exits would present the greatest hazard.

Seismic Upgrades in order of importance are as follows:

- Connect roof to perimeter walls to provide out-of-plane support for the walls and to transfer diaphragm shear loads from the roof to the shear walls. This connection would include out-of-place bracing for the parapet.

- Strengthen or remove and replace clay tile wall along the south side of the kitchen roof to provide adequate roof support.

- Brace existing clay tile partition walls or remove and replace them with new partitions.

- Add plywood sheathing on top of existing sawn sheathing to strengthen the roof diaphragm. Constructing one or two new interior shear walls will likely be required to bring the diaphragm loads down to an acceptable level.

- Verify existence, condition, and effectiveness of brick veneer ties.

- Brace mechanical equipment, ductwork, piping, light fixtures, tall narrow furniture, etc.

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1978 Gym and Industrial Arts Addition

This building structure was well-detailed for its era but the seismic design forces have increased and the connection detailing required by code has become much more stringent. The primary deficiency identified is inadequacy of the connections between the roof and the walls.

The strengthening of the connections between the walls and roof are best accomplished by installing new connections on top of the roof. This requires removing the existing roofing membrane to expose the existing roof sheathing to install the connections. Details T1 through T5 show typical connections which entail installing an angle along the interface between the wall and roof sheathing, anchoring the angle to the wall, and installing steel straps over the roof joists. Most of the work is located in a zone adjacent to the masonry walls but in some instances, additional steel straps are required over middle areas of the roof.

Since installation of the seismic upgrades requires removing portions of the roofing, it is financially efficient to schedule the installation to be done at the same time the entire roofing membrane is replaced. According the school district's records, the 1978 Addition was last re-roofed in 1990. Per the roofing assessment report prepared by Professional Roof Consultants Inc., the built-up roofing over this area of the school is recommended for replacement in 2014.

Other recommended upgrades include install bracing for suspended ceilings, mechanical equipment, ductwork, piping, light fixtures, tall narrow furniture, etc.

Testing

Although destructive testing was outside the scope of this project, it will likely be required to further investigate potential deficiencies and to further develop the strengthening scheme. The following tests may be required:

- Shear testing of URM
- Pull testing of URM
- Tap tests on the terra cotta pieces at the exterior walls, particularly those pieces located above building exits.
- Veneer tests at the exterior walls of the 1978 Addition to determine the effectiveness of the existing ties.

James G. Pierson, Inc. **Consulting Structural Engineers**
610 S.W. Alder Street, Suite 918, Portland, Oregon 97205 Tel: (503) 226-1286 Fax: (503) 226-3130

4.0 Cost Estimate for Recommended Strengthening

The construction costs have been estimated based on the seismic upgrade work shown in the preliminary drawings. These drawings schematically show the new structural elements to be installed to strengthen the building. The cost estimate addresses work required to install the new strengthening elements as well as the work necessary to remove and replace architectural finishes as required for installing these elements.

All of the school's roofing systems expire in the next 1-2 years and it would be advisable to coordinate the roof replacement with the roof level seismic upgrades. However, for the purposes of determining only the costs associated with the seismic upgrades, the cost estimate is based on stripping roofing as needed to install the seismic upgrades and patching back that roofing.

Although the preliminary strengthening schemes have been briefly discussed with the school district, a more in-depth study on the impact of the new elements on the modified floor plan's functionality and on the various building systems would need to take place in the next phase. The mechanical, plumbing, electrical, fire alarm, security, and data systems will be impacted throughout the facility, either by having to be removed, relocated and modified to accommodate new shear walls, wall bracing, and wall replacements. The new shear walls will not only affect functionality of floor space, they may also affect code clearances and disabled access.

Scope of work for improvements to the architectural, mechanical, electrical, plumbing or other systems of the building; disabled access improvements; and fire and life safety upgrading; and relocation of students during construction are unknown and those costs will likely increase the overall costs considerably. Costs for hazardous material abatement are also not included in the cost estimate. It is therefore recommended that a comprehensive architectural and systems feasibility study be conducted to understand the impacts and magnitude of this proposed seismic upgrade.

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Appendix A
References

Evaluation Report in Accordance with FEMA-178 for Fernwood Middle School, Anderson Bjornstad Kane Jacobs, Inc. April 23, 1999.

Portland Public Schools Comprehensive Seismic Status Report, James G. Pierson, Inc., 2002.

ASCE/SEI 31-03, Seismic Evaluation of Existing Buildings, American Society of Civil Engineers and the Structural Engineering Institute.

ASCE/SEI 41-06, Seismic Rehabilitation of Existing Buildings, American Society of Civil Engineers and the Structural Engineering Institute.

FEMA 547 Techniques for the Seismic Rehabilitation of Existing Buildings, 2006 Edition.

2010 Oregon Structural Specialty Code

Building Code of the City of Portland, Oregon, Ordinance No. 103415, Passed by Council January 26, 1956.

Brick and Tile Engineering Handbook of Design, Harry C. Plummer, 1950.

Professional Roof Consultants, 2010 Roof Assessment.

Appendix B
ASCE 31-03 Summary Data Sheets and ASCE 31-03 Checklists

Summary Data Sheet

for Original 1911/1924 Building

Appendix B: Summary Data Sheet

BUILDING DATA

Building Name: Beverly Cleary Fernwood Campus Date: Jan 2011

Building Address: 1915 NE 33rd Ave Portland, OR 97212

Latitude: 45.536788 Longitude: -122.631566 By: Google Earth

Year Built: 1911 - 1924 Year(s) Remodeled: _____ Original Design Code: _____

Area (sf): 46,880 Length (ft): 176 Width (ft): 170

No. of Stories: 3 & 1 Story Height: 17.7/13.1/10.6 & 19.5 Total Height: 40 ft above grade & 25'

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

CONSTRUCTION DATA

Gravity Load Structural System: bearing wall

Exterior Transverse Walls: unreinforced brick masonry Openings? yes

Exterior Longitudinal Walls: " " " Openings? yes

Roof Materials/Framing: Concrete Slab & joist/beam & BUR

Intermediate Floors/Framing: Concrete Slab & joist/beam

Basement ~~Ground Floor~~: Concrete slab on grade

Columns: Concrete Foundation: Continuous conc wall ftg

General Condition of Structure: _____

Levels Below Grade? Basement is partially below grade

Special Features and Comments: _____

LATERAL-FORCE-RESISTING SYSTEM

	Longitudinal	Transverse
System:	URM walls can resist some shear	
Vertical Elements:		
Diaphragms:	Concrete	
Connections:		

EVALUATION DATA

Spectral Response Accelerations: S_s= 0.972 S_1= 0.335

Soil Factors: Class= D F_a= 1.111 F_v= 1.73

Design Spectral Response Accelerations: S_{DS}= 0.72 S_{D1}= 0.387

Level of Seismicity: High Performance Level: Life Safety

Building Period: T= 0.32

Spectral Acceleration: S_a= 0.72

Modification Factor: C= 1.0 Building Weight: W= _____

Pseudo Lateral Force: $V = C S_a W$= _____

BUILDING CLASSIFICATION: URMA unreinforced masonry bearing walls with stiff diaphragms

REQUIRED TIER 1 CHECKLISTS

	Yes	No
Basic Structural Checklist	☒	☐
Supplemental Structural Checklist	☒	☐
Geologic Site Hazards and Foundations checklist	☒	☐
Basic Nonstructural Component Checklist	☒	☐
Intermediate Nonstructural Checklist	☒	☐
Supplemental Nonstructural Checklist	☐	☒

FURTHER EVALUATION REQUIREMENT: _____

3.7.15A Basic Structural Checklist for Building Type URMA: Unreinforced Masonry Bearing Walls with Stiff Diaphragms

This Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

C3.7.15A Basic Structural Checklist for Building Type URMA

These buildings have perimeter bearing walls that consist of unreinforced clay brick, stone, or concrete masonry. Interior bearing walls, where present, also consist of unreinforced clay brick, stone, or concrete masonry. Diaphragms are stiff relative to the unreinforced masonry walls and interior framing. In older construction or large, multi-story buildings, diaphragms consist of cast-in-place concrete. In levels of low seismicity, more recent construction consists of metal deck and concrete fill supported on steel framing.

Building System

* (C) NC N/A LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1)

* AS LONG AS THE URM WALLS REMAIN INTACT

C NC (N/A) MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)

(C) NC N/A WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1)

(C) NC N/A SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2)

(C) NC N/A GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 4.3.2.3)

(C) NC N/A VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)

(C) NC N/A MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)

C NC N/A TORSION: The estimated distance between the story center of mass and the story center of rigidity shall be less than 20 percent of the building width in either plan dimension for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.6)

C NC N/A DETERIORATION OF CONCRETE: There shall be no visible deterioration of concrete or reinforcing steel in any of the vertical- or lateral-force-resisting elements. (Tier 2: Sec. 4.3.3.4)

C NC N/A MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7)

C NC N/A MASONRY JOINTS: The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8)

C NC N/A UNREINFORCED MASONRY WALL CRACKS: There shall be no existing diagonal cracks in wall elements greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy or out-of-plane offsets in the bed joint greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.11)

Lateral-Force-Resisting System

C NC N/A REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

C NC N/A SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units and 70 psi for concrete units for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.5.1)

Connections

C NC N/A WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be 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 3.5.3.7. (Tier 2: Sec. 4.6.1.1)

C NC N/A TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2: Sec. 4.6.2.1)

C NC N/A GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 4.6.4.1)

3.7.15AS Supplemental Structural Checklist for Building Type URMA: Unreinforced Masonry Bearing Walls with Stiff Diaphragms

This Supplemental Structural Checklist shall be completed where required by Table 3-2. The Basic Structural Checklist shall be completed prior to completing this Supplemental Structural Checklist.

Lateral-Force-Resisting System

C (NC) N/A PROPORTIONS: The height-to-thickness ratio of the shear walls at each story shall be less than the following for Life Safety and Immediate Occupancy (Tier 2: Sec. 4.4.2.5.2):

@ 2ND FLR

Top story of multi-story building	9	2ND ⇒ 17(12)/13 = 15 NG
First story of multi-story building	15	1ST ⇒ 12(12)/17 = 8.5 OK
All other conditions	13	

C NC (N/A) MASONRY LAY-UP: Filled collar joints of multi-wythe masonry walls shall have negligible voids. (Tier 2: Sec. 4.4.2.5.3)

Diaphragms

General

(C) NC N/A OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length for Life Safety and 15 percent of the wall length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.4)

(C) NC N/A OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 feet long for Life Safety and 4 feet long for Immediate Occupancy. (Tier 2: Sec. 4.5.1.6)

C NC N/A PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.7)

C NC N/A DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.8)

Connections

C (NC) N/A BEAM, GIRDER, AND TRUSS SUPPORTS: Beams, girders, and trusses supported by unreinforced masonry walls or pilasters shall have independent secondary columns for support of vertical loads. (Tier 2: Sec. 4.6.4.5)

3.8 Geologic Site Hazards and Foundations Checklist

This Geologic Site Hazards and Foundations Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Geologic Site Hazards

The following statements shall be completed for buildings in levels of high or moderate seismicity.

(C) NC N/A 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 feet under the building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.1.1)

(C) NC N/A SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure. (Tier 2: Sec. 4.7.1.2)

(C) NC N/A SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated. (Tier 2: Sec. 4.7.1.3)

Condition of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

(C) NC N/A FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.1)

The following statement shall be completed for buildings in levels of high or moderate seismicity ~~being evaluated to the~~ Immediate Occupancy Performance Level.

C NC N/A DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.2)

Capacity of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C NC (N/A) POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.3.1)

The following statements shall be completed for buildings in levels of moderate seismicity being evaluated to the Immediate Occupancy Performance Level and for buildings in levels of high seismicity.

(C) NC N/A OVERTURNING: The ratio of the horizontal dimension of the lateral-force-resisting system at the foundation level to the building height (base/height) shall be greater than $0.6S_a$. (Tier 2: Sec. 4.7.3.2)

C NC N/A TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Class A, B, or C. (Section 3.5.2.3.1, Tier 2: Sec. 4.7.3.3)

C NC N/A DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.4)

C NC N/A SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.5)

3.9.1 Basic Nonstructural Component Checklist

This Basic Nonstructural Component Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Partitions

C (NC) N/A — UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity. (Tier 2: Sec. 4.8.1.1)

Ceiling Systems

C (NC) N/A — SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.2.1)

Light Fixtures

C NC N/A — EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake. (Tier 2: Sec. 4.8.3.1)

Cladding and Glazing

C NC (N/A) — CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.1)

C NC (N/A) — DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.4.2)

C NC (N/A) — CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.3)

C NC (N/A) — MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.4)

C NC (N/A) — BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel. (Tier 2: Sec. 4.8.4.5)

C NC N/A — INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage. (Tier 2: Sec. 4.8.4.6)

C NC N/A — PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-plane with a minimum of 4 connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.7)

Masonry Veneer

C NC N/A — SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy. (Tier 2: Sec. 4.8.5.1)

C NC N/A — TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.5.2)

C NC N/A — WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 4.8.5.3)

C NC N/A — DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.5.4)

Parapets, Cornices, Ornamentation, and Appendages

C NC N/A — URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.1)

C NC N/A — CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.2)

Masonry Chimneys

C NC N/A — URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.9.1)

Stairs

C NC N/A — URM WALLS: Walls around stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.10.1)

C NC N/A — STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors. (Tier 2: Sec. 4.8.10.2)

Building Contents and Furnishing

C (NC) N/A TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.11.1)

Mechanical and Electrical Equipment

C NC N/A EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake. (Tier 2: Sec. 4.8.12.1)

C NC N/A HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports. (Tier 2: Sec. 4.8.12.2)

C NC N/A DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the anchorage or supports of mechanical or electrical equipment. (Tier 2: Sec. 4.8.12.3)

C NC N/A ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced. (Tier 2: Sec. 4.8.12.4)

Piping

C NC N/A FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996). (Tier 2: Sec. 4.8.13.1)

C NC N/A FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings. (Tier 2: Sec. 4.8.13.2)

Hazardous Materials Storage and Distribution

C NC N/A TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 4.8.15.1)

3.9.2 Intermediate Nonstructural Component Checklist

This Intermediate Nonstructural Component Checklist shall be completed where required by Table 3-2. The Basic Nonstructural Component Checklist shall be completed prior to completing this Intermediate Nonstructural Component Checklist.

Ceiling Systems

C NC (N/A) LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips. (Tier 2: Sec. 4.8.2.2)

C NC (N/A) INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wires or rigid members attached to the structure above at a spacing equal to or less than 12 feet. (Tier 2: Sec. 4.8.2.3)

C (NC) N/A SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 square feet of area. (Tier 2: Sec. 4.8.2.4)

Light Fixtures

C NC N/A INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures. (Tier 2: Sec. 4.8.3.2)

Cladding and Glazing

C NC N/A GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 feet above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked. (Tier 2: Sec. 4.8.4.8)

Parapets, Cornices, Ornamentation, and Appendages

C NC (N/A) CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement. (Tier 2: Sec. 4.8.8.3)

C (NC) N/A APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3. (Tier 2: Sec. 4.8.8.4)

Masonry Chimneys

(C) NC N/A ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof. (Tier 2: Sec. 4.8.9.2)

Mechanical and Electrical Equipment

C NC N/A VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers. (Tier 2: Sec. 4.8.12.5)

Ducts

C NC N/A STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints. (Tier 2: Sec. 4.8.14.1)

Summary Data Sheet

for 1952 Kitchen Addition

Appendix B: Summary Data Sheet

BUILDING DATA

Building Name: Beverly Cleary Fernwood Campus Date: Jan 2011

Building Address: 1915 NE 33rd Ave Portland, OR 97212

Latitude: 45.5360788 Longitude: -122.6315606 By: Google Earth

Year Built: 1952 Year(s) Remodeled: ____ Original Design Code: probably 1949 Bldg Code

Area (sf): 1394 Length (ft): 69.7 Width (ft): 20

No. of Stories: 1 Story Height: 11.75 ft avg Total Height: 15 ft

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

CONSTRUCTION DATA

Gravity Load Structural System: bearing wall

Exterior Transverse Walls: Concrete Openings? yes

Exterior Longitudinal Walls: Concrete north wall/hollow clay tile south Openings? yes

Roof Materials/Framing: 3-ply asphalt BUR over sawn wood sheathing on sawn roof joists

Intermediate Floors/Framing: ____

Ground Floor: Concrete slab on grade

Columns: ____ Foundation: Continuous conc wall ftg

General Condition of Structure:

Levels Below Grade? No

Special Features and Comments:

LATERAL-FORCE-RESISTING SYSTEM

	Longitudinal	Transverse
System:	Shearwall	Shearwall
Vertical Elements:	Concrete wall & hollow clay tile wall	Concrete walls
Diaphragms:	Sawn sheathing	Sawn Sheathing
Connections:	non-existent	

EVALUATION DATA

Spectral Response Accelerations: S_s= 0.972 S_1= 0.335

Soil Factors: Class= D F_a= 1.111 F_v= 1.73

Design Spectral Response Accelerations: S_{DS}= 0.72 S_{D1}= 0.387

Level of Seismicity: High Performance Level: Life Safety

Building Period: T= 0.13

Spectral Acceleration: S_a= 0.72

Modification Factor: C= 1.2 Building Weight: W= 293 kips

Pseudo Lateral Force: $V=CS_aW$= 1.2(0.72)(293) = 254 kips

BUILDING CLASSIFICATION: C2A Concrete shearwalls with flexible diaphragms

REQUIRED TIER 1 CHECKLISTS

	Yes	No
Basic Structural Checklist	☒	☐
Supplemental Structural Checklist	☒	☐
Geologic Site Hazards and Foundations checklist	☒	☐
Basic Nonstructural Component Checklist	☒	☐
Intermediate Nonstructural Checklist	☒	☐
Supplemental Nonstructural Checklist	☐	☒

FURTHER EVALUATION REQUIREMENT: ____

3.7.9A Basic Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms

This Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

C3.7.9A Basic Structural Checklist for Building Type C2A

These buildings have floor and roof framing that consists of wood sheathing on wood framing and concrete beams. Floors are supported on concrete columns or bearing walls. Lateral forces are resisted by cast-in-place concrete shear walls. In older construction, shear walls are lightly reinforced but often extend throughout the building. In more recent construction, shear walls occur in isolated locations and are more heavily reinforced with boundary elements and closely spaced ties to provide ductile performance. The diaphragms consist of wood sheathing or have large aspect ratios and are flexible relative to the walls. Foundations consist of concrete spread footings or deep pile foundations.

Building System

C	(NC)	N/A	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1)
(C)	NC	N/A	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4 percent of the height of the shorter building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.1.2)
C	NC	(N/A)	MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)
(C)	NC	N/A	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1)
(C)	NC	N/A	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2)
(C)	NC	N/A	GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 4.3.2.3)
(C)	NC	N/A	VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)

C NC N/A — MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)

* C NC N/A — DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken, or loose. (Tier 2: Sec. 4.3.3.1) * FURTHER INSPECTION RECOMMENDED

C NC N/A — DETERIORATION OF CONCRETE: There shall be no visible deterioration of concrete or reinforcing steel in any of the vertical- or lateral-force-resisting elements. (Tier 2: Sec. 4.3.3.4)

C NC N/A — POST-TENSIONING ANCHORS: There shall be no evidence of corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used. (Tier 2: Sec. 4.3.3.5)

C NC N/A — CONCRETE WALL CRACKS: All existing diagonal cracks in wall elements shall be less than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, shall not be concentrated in one location, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.9)

Lateral-Force-Resisting System

C NC N/A — REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

* C NC N/A — SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than the greater of 100 psi or $2\sqrt{f'c}$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.1) * FURTHER REVIEW OF EAST WALL RECOMMENDED

C NC N/A — REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area shall be not less than 0.0015 in the vertical direction and 0.0025 in the horizontal direction for Life Safety and Immediate Occupancy. The spacing of reinforcing steel shall be equal to or less than 18 inches for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.2)
DWGS ONLY SHOW (2) 5/8"Ø BARS IN FTG & (2) 5/8"Ø BARS IN LINTEL & WIRE MESH IN SLAB OVER PIPE TRENCH

Connections

C NC N/A — WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be 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 3.5.3.7. (Tier 2: Sec. 4.6.1.1)

C NC N/A — TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2 Sec. 4.6.2.1)

C NC N/A — FOUNDATION DOWELS: Wall reinforcement shall be doweled into the foundation for Life Safety, and the dowels shall be able to develop the lesser of the strength of the walls or the uplift capacity of the foundation for Immediate Occupancy. (Tier 2: Sec. 4.6.3.5)
DETAILS SHOW FTGS CAST INTEGRALLY WITH EXTERIOR WALLS

3.7.9AS Supplemental Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms

This Supplemental Structural Checklist shall be completed where required by Table 3-2. The Basic Structural Checklist shall be completed prior to completing this Supplemental Structural Checklist.

Lateral-Force-Resisting System

C NC (N/A) COUPLING BEAMS: The stirrups in coupling beams over means of egress shall be spaced at or less than $d/2$ and shall be anchored into the confined core of the beam with hooks of 135° or more for Life Safety. All coupling beams shall comply with the requirements above and shall have the capacity in shear to develop the uplift capacity of the adjacent wall for Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.3)

C NC N/A OVERTURNING: All shear walls shall have aspect ratios less than 4-to-1. Wall piers need not be considered. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.4)

C NC N/A CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements shall be confined with spirals or ties with spacing less than $8d_b$. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.5)

C NC N/A REINFORCING AT OPENINGS: There shall be added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.6)

C NC N/A WALL THICKNESS: Thickness of bearing walls shall not be less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 inches. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.7)

Diaphragms

(C) NC N/A DIAPHRAGM CONTINUITY: The diaphragms shall not be composed of split-level floors and shall not have expansion joints. (Tier 2: Sec. 4.5.1.1)

C (NC) N/A CROSS TIES: There shall be continuous cross ties between diaphragm chords. (Tier 2: Sec. 4.5.1.2)

(C) NC N/A OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length for Life Safety and 15 percent of the wall length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.4)

(C) NC N/A PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.7)

(C) NC N/A DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.8)

C (NC) N/A STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered. (Tier 2: Sec. 4.5.2.1)

SHEATHING DIRECTION IS UNKNOWN BUT IS LIKELY STRAIGHT.

C (NC) N/A SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing. (Tier 2: Sec. 4.5.2.2)

C (NC) N/A UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy. (Tier 2: Sec. 4.5.2.3)

IF SHEATHING HAPPENS TO BE DIAGONAL, DIAPHRAGM IS STILL NC

C NC (N/A) NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans of less than 40 feet and shall have span/depth ratios less than 4-to-1. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.3.1)

C NC (N/A) OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Tier 2: Sec. 4.5.7.1)

Connections

C NC (N/A) UPLIFT AT PILE CAPS: Pile caps shall have top reinforcement and piles shall be anchored to the pile caps for Life Safety, and the pile cap reinforcement and pile anchorage shall be able to develop the tensile capacity of the piles for Immediate Occupancy. (Tier 2: Sec. 4.6.3.10)

3.8 Geologic Site Hazards and Foundations Checklist

This Geologic Site Hazards and Foundations Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Geologic Site Hazards

The following statements shall be completed for buildings in levels of high or moderate seismicity.

(C) NC N/A 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 feet under the building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.1.1)

(C) NC N/A SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure. (Tier 2: Sec. 4.7.1.2)

(C) NC N/A SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated. (Tier 2: Sec. 4.7.1.3)

Condition of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

(C) NC N/A FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.1)

The following statement shall be completed for buildings in levels of high or moderate seismicity being evaluated to the Immediate Occupancy Performance Level.

C NC N/A DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.2)

Capacity of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C NC (N/A) POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.3.1)

The following statements shall be completed for buildings in levels of moderate seismicity being evaluated to the Immediate Occupancy Performance Level and for buildings in levels of high seismicity.

(C) NC N/A OVERTURNING: The ratio of the horizontal dimension of the lateral-force-resisting system at the foundation level to the building height (base/height) shall be greater than $0.6S_a$. (Tier 2: Sec. 4.7.3.2)

C NC (N/A) TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Class A, B, or C. (Section 3.5.2.3.1, Tier 2: Sec. 4.7.3.3)

C NC (N/A) DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.4)

C NC (N/A) SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.5)

3.9.1 Basic Nonstructural Component Checklist

This Basic Nonstructural Component Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Partitions

C (NC) N/A — UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity. (Tier 2: Sec. 4.8.1.1)

Ceiling Systems

(C) NC N/A — SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.2.1)

Light Fixtures

C NC N/A — EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake. (Tier 2: Sec. 4.8.3.1)

Cladding and Glazing

C NC (N/A) — CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.1)

* (C) NC N/A — DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.4.2)

* COVERED AREAS NEED TO BE VERIFIED

C NC (N/A) — CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.3)

C NC (N/A) — MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.4)

C NC (N/A) — BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel. (Tier 2: Sec. 4.8.4.5)

C NC (N/A) INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage. (Tier 2: Sec. 4.8.4.6)

C NC (N/A) PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-plane with a minimum of 4 connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.7)

Masonry Veneer

C NC (N/A) SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy. (Tier 2: Sec. 4.8.5.1)

C (NC) N/A TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.5.2)

NEED TO VERIFY TIES

C (NC) N/A WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 4.8.5.3)

(C) NC N/A DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.5.4)

Parapets, Cornices, Ornamentation, and Appendages

C NC (N/A) URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.1)

C NC (N/A) CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.2)

Masonry Chimneys

C NC (N/A) URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.9.1)

Stairs

C NC (N/A) URM WALLS: Walls around stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.10.1)

C NC (N/A) STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors. (Tier 2: Sec. 4.8.10.2)

Building Contents and Furnishing

C NC N/A TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.11.1)

Mechanical and Electrical Equipment

C NC N/A EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake. (Tier 2: Sec. 4.8.12.1)

C NC N/A HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports. (Tier 2: Sec. 4.8.12.2)

C NC N/A DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the anchorage or supports of mechanical or electrical equipment. (Tier 2: Sec. 4.8.12.3)

C NC N/A ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced. (Tier 2: Sec. 4.8.12.4)

Piping

C NC N/A FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996). (Tier 2: Sec. 4.8.13.1)

C NC N/A FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings. (Tier 2: Sec. 4.8.13.2)

Hazardous Materials Storage and Distribution

C NC N/A TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 4.8.15.1)

3.9.2 Intermediate Nonstructural Component Checklist

This Intermediate Nonstructural Component Checklist shall be completed where required by Table 3-2. The Basic Nonstructural Component Checklist shall be completed prior to completing this Intermediate Nonstructural Component Checklist.

Ceiling Systems

C NC (N/A) LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips. (Tier 2: Sec. 4.8.2.2)

C NC (N/A) INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wires or rigid members attached to the structure above at a spacing equal to or less than 12 feet. (Tier 2: Sec. 4.8.2.3)

C NC (N/A) SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 square feet of area. (Tier 2: Sec. 4.8.2.4)

Light Fixtures

C NC (N/A) INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures. (Tier 2: Sec. 4.8.3.2)

Cladding and Glazing

C NC (N/A) GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 feet above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked. (Tier 2: Sec. 4.8.4.8)

Parapets, Cornices, Ornamentation, and Appendages

C (NC) N/A CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement. (Tier 2: Sec. 4.8.8.3)

C NC (N/A) APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3. (Tier 2: Sec. 4.8.8.4)

Masonry Chimneys

C NC (N/A) ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof. (Tier 2: Sec. 4.8.9.2)

Mechanical and Electrical Equipment

C NC (N/A) VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers. (Tier 2: Sec. 4.8.12.5)

Ducts

C NC (N/A) STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints. (Tier 2: Sec. 4.8.14.1)

Summary Data Sheet

for 1978 Gym & Industrial Arts Addition

Appendix B: Summary Data Sheet

BUILDING DATA

Building Name: Beverly Cleary Fernwood Campus Date: Jan 2011

Building Address: 1915 NE 33rd Ave Portland, OR 97212

Latitude: 45.536788 Longitude: -122.631566 By: Google Earth

Year Built: 1978 Year(s) Remodeled: 2008 Original Design Code: 1973 Oregon Bldg Code

Area (sf): 32,210 Length (ft): 224.7 Width (ft): 194

No. of Stories: 1 & 2 Story Height: 27ft & 18ft/13.7ft Total Height: 34 ft

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

CONSTRUCTION DATA

Gravity Load Structural System: bearing wall

Exterior Transverse Walls: Reinforced Concrete masonry Openings? yes

Exterior Longitudinal Walls: " " " Openings? yes

Roof Materials/Framing: 3-ply asphalt BUR over plyd, sawn rafters & glue lam beams

Intermediate Floors/Framing: Concrete topping slab over precast hollowcore deck

Ground Floor: concrete slab on grade

Columns: reinforced concrete Foundation: continuous conc. wall ftg

General Condition of Structure: good

Levels Below Grade? Stairwell access to original bldg's basement

Special Features and Comments: _____

LATERAL-FORCE-RESISTING SYSTEM

	Longitudinal	Transverse
System:	Shearwall	Shearwall
Vertical Elements:	CMU wall	CMU wall
Diaphragms:	plywood at roof	Conc. topping slab at 2nd floor
Connections:	well-detailed for its era but doesn't meet current seismic	

EVALUATION DATA

Spectral Response Accelerations: S_s= 0.972 S_1= 0.335

Soil Factors: Class= D F_a= 1.111 F_v= 1.73

Design Spectral Response Accelerations: S_{DS}= 0.72 S_{D1}= 0.387

Level of Seismicity: High Performance Level: Life Safety

Building Period: T= 0.28

Spectral Acceleration: S_a= 0.72

Modification Factor: C= 1.0RM1/1.2RM2 Building Weight: W= _____

Pseudo Lateral Force: $V=CS_aW$= _____

BUILDING CLASSIFICATION: RM1/RM2 reinforced masonry bearing walls with flexible roof diaph. & stiff floor diaphragm.

REQUIRED TIER 1 CHECKLISTS

	Yes	No
Basic Structural Checklist	☒	☐
Supplemental Structural Checklist	☒	☐
Geologic Site Hazards and Foundations checklist	☒	☐
Basic Nonstructural Component Checklist	☒	☐
Intermediate Nonstructural Checklist	☒	☐
Supplemental Nonstructural Checklist	☐	☒

FURTHER EVALUATION REQUIREMENT: _____

3.7.13 Basic Structural Checklist for Building Type RM1: Reinforced Masonry Bearing Walls with Flexible Diaphragms

This Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

C3.7.13 Basic Structural Checklist for Building Type RM1

These buildings have bearing walls that consist of reinforced brick or concrete block masonry. Wood floor and roof framing consists of wood joists, glulam beams, and wood posts or small steel columns. Steel floor and roof framing consists of steel beams or open web joists, steel girders, and steel columns. Lateral forces are resisted by the reinforced brick or concrete block masonry shear walls. Diaphragms consist of straight or diagonal wood sheathing, plywood, or untopped metal deck, and are flexible relative to the walls. Foundations consist of brick or concrete spread footings or deep foundations.

Building System

(C)	NC	N/A	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1)
C	(NC)	N/A	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4 percent of the height of the shorter building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.1.2) This addition was designed with a ½" seismic joint. 4% (31.67' x 12) = 15.2"
(C)	NC	N/A	MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)
(C)	NC	N/A	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1)
(C)	NC	N/A	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2)
(C)	NC	N/A	GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 4.3.2.3)
(C)	NC	N/A	VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)

C NC N/A MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)

C NC N/A DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken, or loose. (Tier 2: Sec. 4.3.3.1)

C NC N/A MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7)

C NC N/A MASONRY JOINTS: The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8)

C NC N/A REINFORCED MASONRY WALL CRACKS: All existing diagonal cracks in wall elements shall be less than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, shall not be concentrated in one location, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.10)

Lateral-Force-Resisting System

C NC N/A REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

C NC N/A SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.4.1)

C NC N/A REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls shall be greater than 0.002 for Life Safety and Immediate Occupancy of the wall with the minimum of 0.0007 for Life Safety and Immediate Occupancy in either of the two directions; the spacing of reinforcing steel shall be less than 48 inches for Life Safety and Immediate Occupancy; and all vertical bars shall extend to the top of the walls. (Tier 2: Sec. 4.4.2.4.2)

Connections

C NC N/A WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be 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 3.5.3.7. (Tier 2: Sec. 4.6.1.1)

C NC N/A WOOD LEDGERS: The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers. (Tier 2: Sec. 4.6.1.2)

C NC N/A TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2: Sec. 4.6.2.1)

C NC N/A FOUNDATION DOWELS: Wall reinforcement shall be doweled into the foundation for Life Safety, and the dowels shall be able to develop the lesser of the strength of the walls or the uplift capacity of the foundation for Immediate Occupancy. (Tier 2: Sec. 4.6.3.5)

C NC N/A GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 4.6.4.1)

3.7.13S Supplemental Structural Checklist for Building Type RM1: Reinforced Masonry Bearing Walls with Flexible Diaphragms

This Supplemental Structural Checklist shall be completed where required by Table 3-2. The Basic Structural Checklist shall be completed prior to completing this Supplemental Structural Checklist.

Lateral-Force-Resisting System

C NC N/A REINFORCING AT OPENINGS: All wall openings that interrupt rebar shall have trim reinforcing on all sides. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.3)

C NC N/A PROPORTIONS: The height-to-thickness ratio of the shear walls at each story shall be less than 30. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.4)

Diaphragms

(C) NC N/A CROSS TIES: There shall be continuous cross ties between diaphragm chords. (Tier 2: Sec. 4.5.1.2)

(C) NC N/A OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length for Life Safety and 15 percent of the wall length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.4)

(C) NC N/A OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 feet long for Life Safety and 4 feet long for Immediate Occupancy. (Tier 2: Sec. 4.5.1.6)

C NC N/A PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.7)

C NC N/A DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.8)

C NC (N/A) STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered. (Tier 2: Sec. 4.5.2.1)

(C) NC N/A SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing. (Tier 2: Sec. 4.5.2.2)

C NC (N/A) UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy. (Tier 2: Sec. 4.5.2.3)

C NC (N/A) NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans of less than 40 feet and shall have span/depth ratios less than 4-to-1. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.3.1)

C NC (N/A) OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Tier 2: Sec. 4.5.7.1)

Connections

C (NC) N/A STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements shall be installed taut and shall be stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 inch prior to engagement of the anchors. (Tier 2: Sec. 4.6.1.4)

3.7.14 Basic Structural Checklist for Building Type RM2: Reinforced Masonry Bearing Walls with Stiff Diaphragms

This Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

C3.7.14 Basic Structural Checklist for Building Type RM2

These buildings have bearing walls that consist of reinforced brick or concrete block masonry. Diaphragms consist of metal deck with concrete fill, precast concrete planks, tees, or double-tees, with or without a cast-in-place concrete topping slab, and are stiff relative to the walls. The floor and roof framing is supported on interior steel or concrete frames or interior reinforced masonry walls.

Building System

C	NC	N/A	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1)
C	NC	N/A	MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)
C	NC	N/A	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1)
C	NC	N/A	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2)
C	NC	N/A	GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 4.3.2.3)
C	NC	N/A	VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)
C	NC	N/A	MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)
C	NC	N/A	TORSION: The estimated distance between the story center of mass and the story center of rigidity shall be less than 20 percent of the building width in either plan dimension for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.6)

C NC N/A DETERIORATION OF CONCRETE: There shall be no visible deterioration of concrete or reinforcing steel in any of the vertical- or lateral-force-resisting elements. (Tier 2: Sec. 4.3.3.4)

C NC N/A MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7)

C NC N/A MASONRY JOINTS: The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8)

C NC N/A REINFORCED MASONRY WALL CRACKS: All existing diagonal cracks in wall elements shall be less than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, shall not be concentrated in one location, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.10)

Lateral-Force-Resisting System

C NC N/A REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

C NC N/A SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.4.1)

C NC N/A REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls shall be greater than 0.002 for Life Safety and Immediate Occupancy of the wall with the minimum of 0.0007 for Life Safety and Immediate Occupancy in either of the two directions; the spacing of reinforcing steel shall be less than 48 inches for Life Safety and Immediate Occupancy; and all vertical bars shall extend to the top of the walls. (Tier 2: Sec. 4.4.2.4.2)

Diaphragms

C NC N/A TOPPING SLAB: Precast concrete diaphragm elements shall be interconnected by a continuous reinforced concrete topping slab. (Tier 2: Sec. 4.5.5.1)

Connections

C NC N/A WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be 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 3.5.3.7. (Tier 2: Sec. 4.6.1.1)

C NC N/A TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2: Sec. 4.6.2.1)

C NC N/A TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements shall be doweled for transfer of forces into the shear wall or frame elements for Life Safety, and the dowels shall be able to develop the lesser of the shear strength of the walls, frames, or slabs for Immediate Occupancy. (Tier 2: Sec. 4.6.2.3)

C NC N/A FOUNDATION DOWELS: Wall reinforcement shall be doweled into the foundation for Life Safety, and the dowels shall be able to develop the lesser of the strength of the walls or the uplift capacity of the foundation for Immediate Occupancy. (Tier 2: Sec. 4.6.3.5)

C NC N/A GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 4.6.4.1)

3.7.14S Supplemental Structural Checklist for Building Type RM2: Reinforced Masonry Bearing Walls with Stiff Diaphragms

This Supplemental Structural Checklist shall be completed where required by Table 3-2. The Basic Structural Checklist shall be completed prior to completing this Supplemental Structural Checklist.

Lateral-Force-Resisting System

C NC N/A REINFORCING AT OPENINGS: There shall be added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.6)

C NC N/A PROPORTIONS: The height-to-thickness ratio of the shear walls at each story shall be less than 30. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.4)

Diaphragms

C NC (N/A) OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length for Life Safety and 15 percent of the wall length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.4)

(C) NC N/A OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 feet long for Life Safety and 4 feet long for Immediate Occupancy. (Tier 2: Sec. 4.5.1.6)

C NC N/A PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.7)

C NC N/A DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.8)

3.8 Geologic Site Hazards and Foundations Checklist

This Geologic Site Hazards and Foundations Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Geologic Site Hazards

The following statements shall be completed for buildings in levels of high or moderate seismicity.

(C) NC N/A 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 feet under the building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.1.1)

(C) NC N/A SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure. (Tier 2: Sec. 4.7.1.2)

(C) NC N/A SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated. (Tier 2: Sec. 4.7.1.3)

Condition of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

(C) NC N/A FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.1)

The following statement shall be completed for buildings in levels of high or moderate seismicity being evaluated to the Immediate Occupancy Performance Level.

C NC N/A DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.2)

Capacity of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C NC (N/A) POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.3.1)

The following statements shall be completed for buildings in levels of moderate seismicity being evaluated to the Immediate Occupancy Performance Level and for buildings in levels of high seismicity.

(C) NC N/A OVERTURNING: The ratio of the horizontal dimension of the lateral-force-resisting system at the foundation level to the building height (base/height) shall be greater than $0.6S_a$. (Tier 2: Sec. 4.7.3.2)

C NC (N/A) TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Class A, B, or C. (Section 3.5.2.3.1, Tier 2: Sec. 4.7.3.3)

C NC (N/A) DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.4)

C NC (N/A) SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.5)

3.9.1 Basic Nonstructural Component Checklist

This Basic Nonstructural Component Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Partitions

C NC (N/A) UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity. (Tier 2: Sec. 4.8.1.1)

Ceiling Systems

C NC N/A SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.2.1)

Light Fixtures

C NC N/A EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake. (Tier 2: Sec. 4.8.3.1)

Cladding and Glazing

(C) NC N/A CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.1)

(C) NC N/A DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.4.2)

C NC (N/A) CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.3)

C NC (N/A) MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.4)

C NC (N/A) BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel. (Tier 2: Sec. 4.8.4.5)

C NC (N/A) INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage. (Tier 2: Sec. 4.8.4.6)

C NC (N/A) PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-plane with a minimum of 4 connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.7)

Masonry Veneer

C NC N/A SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy. (Tier 2: Sec. 4.8.5.1)

C NC N/A TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.5.2)

C NC N/A WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 4.8.5.3)

(C) NC N/A DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.5.4)

Parapets, Cornices, Ornamentation, and Appendages

C NC (N/A) URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.1)

C NC (N/A) CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.2)

Masonry Chimneys

C NC (N/A) URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.9.1)

Stairs

C NC (N/A) URM WALLS: Walls around stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.10.1)

C NC (N/A) STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors. (Tier 2: Sec. 4.8.10.2)

Building Contents and Furnishing

C NC N/A TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.11.1)

Mechanical and Electrical Equipment

C NC N/A EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake. (Tier 2: Sec. 4.8.12.1)

C NC N/A HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports. (Tier 2: Sec. 4.8.12.2)

C NC N/A DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the anchorage or supports of mechanical or electrical equipment. (Tier 2: Sec. 4.8.12.3)

C NC N/A ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced. (Tier 2: Sec. 4.8.12.4)

Piping

C NC N/A FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996). (Tier 2: Sec. 4.8.13.1)

C NC N/A FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings. (Tier 2: Sec. 4.8.13.2)

Hazardous Materials Storage and Distribution

C NC N/A TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 4.8.15.1)

3.9.2 Intermediate Nonstructural Component Checklist

This Intermediate Nonstructural Component Checklist shall be completed where required by Table 3-2. The Basic Nonstructural Component Checklist shall be completed prior to completing this Intermediate Nonstructural Component Checklist.

Ceiling Systems

C NC N/A LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips. (Tier 2: Sec. 4.8.2.2)

C NC N/A INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wires or rigid members attached to the structure above at a spacing equal to or less than 12 feet. (Tier 2: Sec. 4.8.2.3)

C NC N/A SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 square feet of area. (Tier 2: Sec. 4.8.2.4)

Light Fixtures

C NC N/A INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures. (Tier 2: Sec. 4.8.3.2)

Cladding and Glazing

C NC N/A GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 feet above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked. (Tier 2: Sec. 4.8.4.8)

Parapets, Cornices, Ornamentation, and Appendages

C NC N/A CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement. (Tier 2: Sec. 4.8.8.3)

C NC N/A APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3. (Tier 2: Sec. 4.8.8.4)

Masonry Chimneys

C NC (N/A) ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof. (Tier 2: Sec. 4.8.9.2)

Mechanical and Electrical Equipment

C NC N/A VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers. (Tier 2: Sec. 4.8.12.5)

Ducts

C NC N/A STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints. (Tier 2: Sec. 4.8.14.1)

Appendix C
Supporting Calculations for ASCE Checklists and for Seismic Upgrades

DETERMINE BSE-1 & BSE-2 FACTORS

ASCE 41-06

$$\begin{bmatrix} S_{XS} = F_a S_S \\ S_{X1} = F_V S_1 \end{bmatrix}$$

Conterminous 48 States
2002 Data
Uniform Hazard Spectrum (UHS) for 10 % PE in 50 years (BSE-1)

Latitude = 45.536788
Longitude = -122.631566
B/C Boundary
Data are based on a 0.05 deg grid spacing

Period (sec)	Sa (g)	Sd (inches)	
0.000	0.191	0.000	
0.100	0.374	0.037	
0.200	(0.450)	0.176	S_S
0.300	0.391	0.344	
0.500	0.295	0.722	
1.000	(0.153)	1.490	S_1
2.000	0.069	2.680	

SITE CLASS D $F_a = 1.44$ $F_V = 2.188$

$S_{XS} = F_a S_S = (1.44)(.450) = .648$

$S_{X1} = F_V S_1 = (2.188)(.153) = .335$

Conterminous 48 States
2002 Data
Uniform Hazard Spectrum (UHS) for 2 % PE in 50 years (BSE-2)

Latitude = 45.536788
Longitude = -122.631566
B/C Boundary
Data are based on a 0.05 deg grid spacing

Period (sec)	Sa (g)	Sd (inches)	
0.000	0.410	0.000	
0.100	0.818	0.080	
0.200	(0.972)	0.380	S_S
0.300	0.847	0.745	
0.500	0.641	1.566	
1.000	(0.335)	3.275	S_1
2.000	0.154	6.030	

SITE CLASS D $F_a = 1.111$ $F_V = 1.73$

$S_{XS} = (1.111)(.972) = 1.0799$

$S_{X1} = (1.73)(.335) = .5796$

$\frac{2}{3} S_{XS} = \frac{2}{3}(1.0799) = .7199 > S_{XSBSE}$ (CONTROLS)

$\frac{2}{3} S_{X1} = \frac{2}{3}(.5796) = .3864$

BSE-1 = 0.648

BSE-2 = 1.0799

ASCE-7-10 / 2009 IBC

(DETERMINE CURRENT CODE SEISMIC FACTORS)

Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 45.536788
Longitude = -122.631566
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.05000000074505806 deg grid spacing

Period (sec)	Sa (g)
0.2	0.972 (Ss, Site Class B)
1.0	0.335 (S1, Site Class B)

SUGGESTED REHAB MEASURE TO ADD TO (E) CLAY TILE WALL

$I = 1.25$

$R = 5$ (SPECIAL REINF. CONC. SW)

$C_s = \frac{S_{DS}}{R/I} \Rightarrow \frac{.72}{5/1.25} = .18$

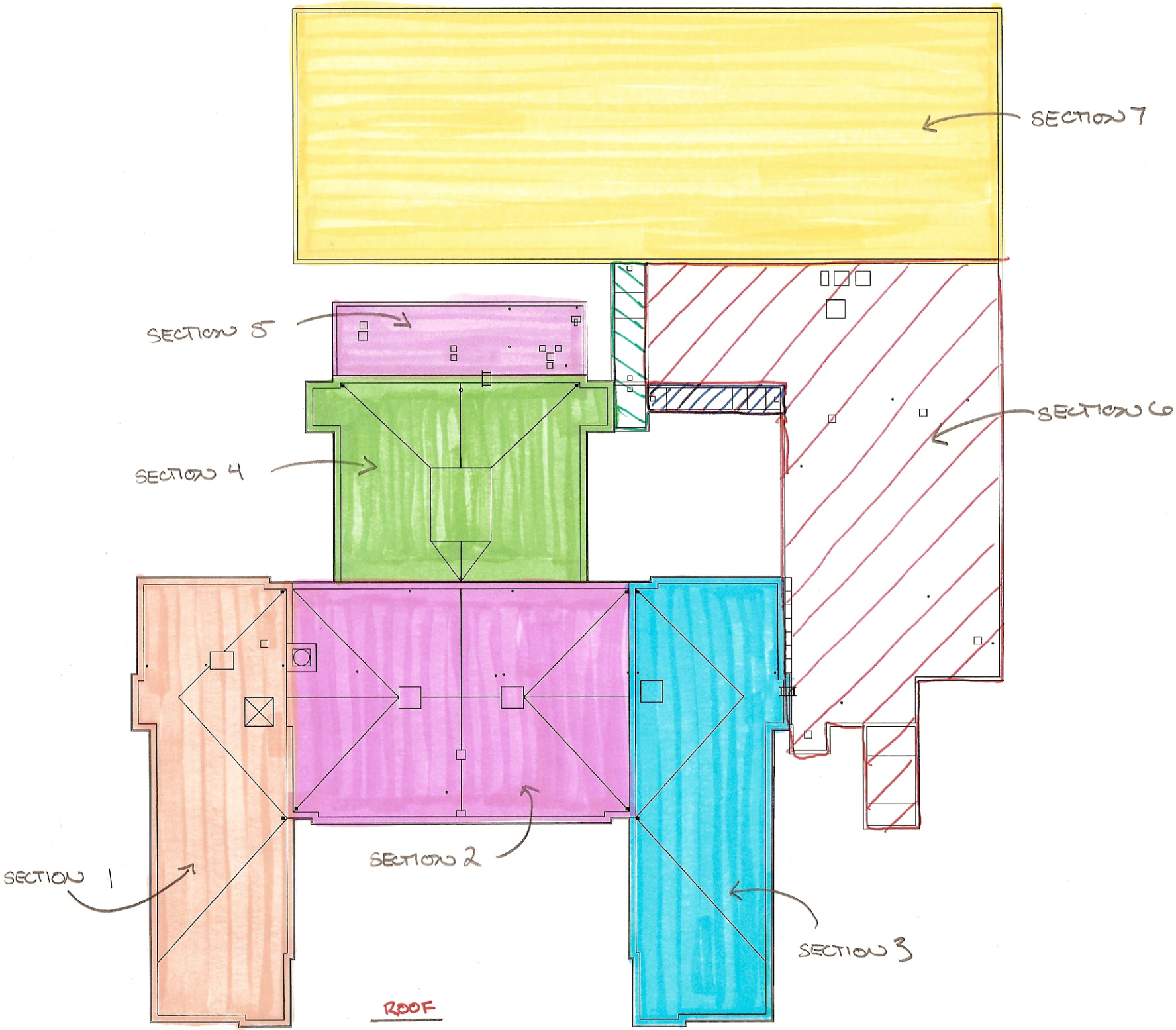
$V = .18W$

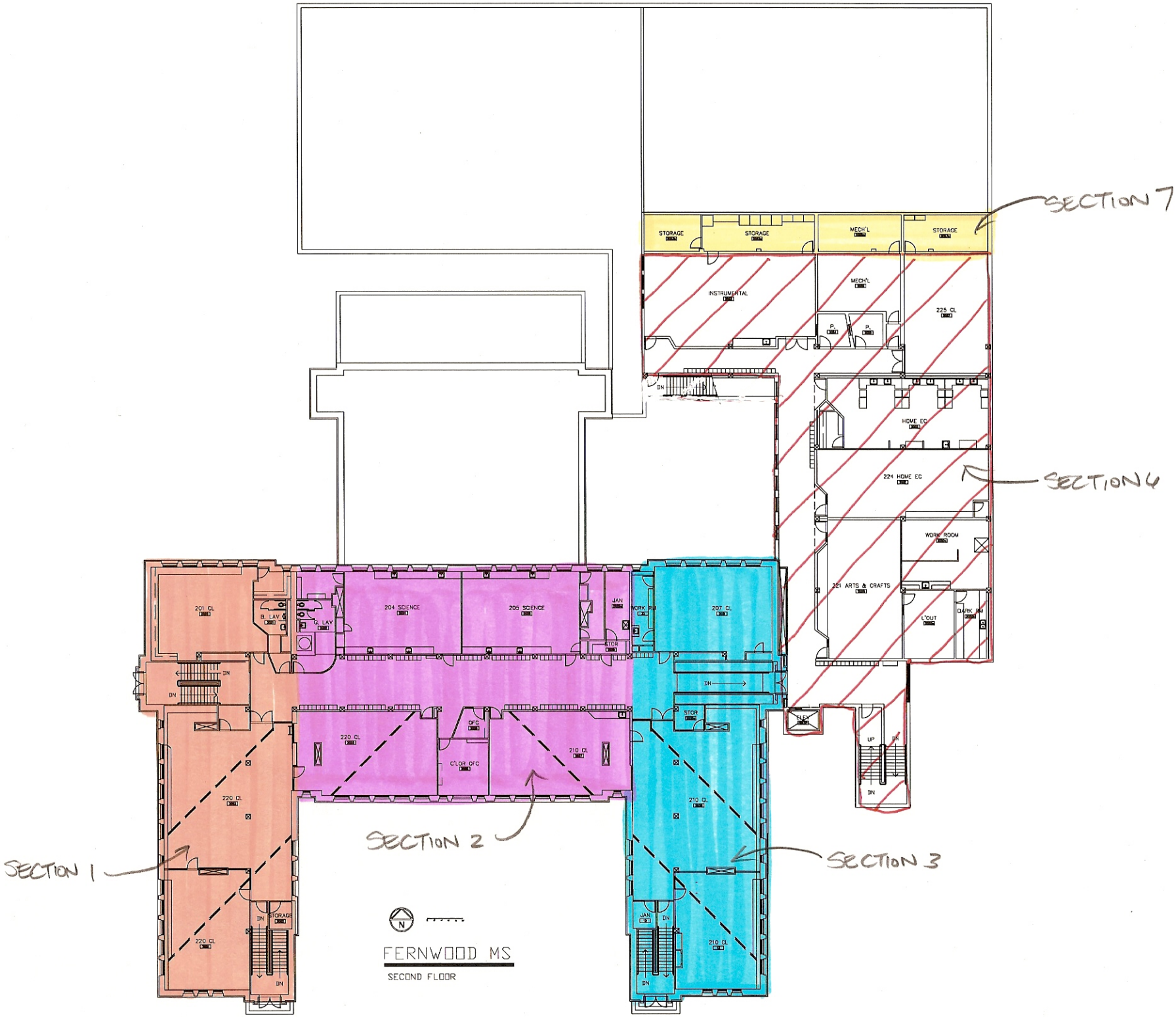
Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 45.536788
Longitude = -122.631566
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class D - Fa = 1.111 ,Fv = 1.73

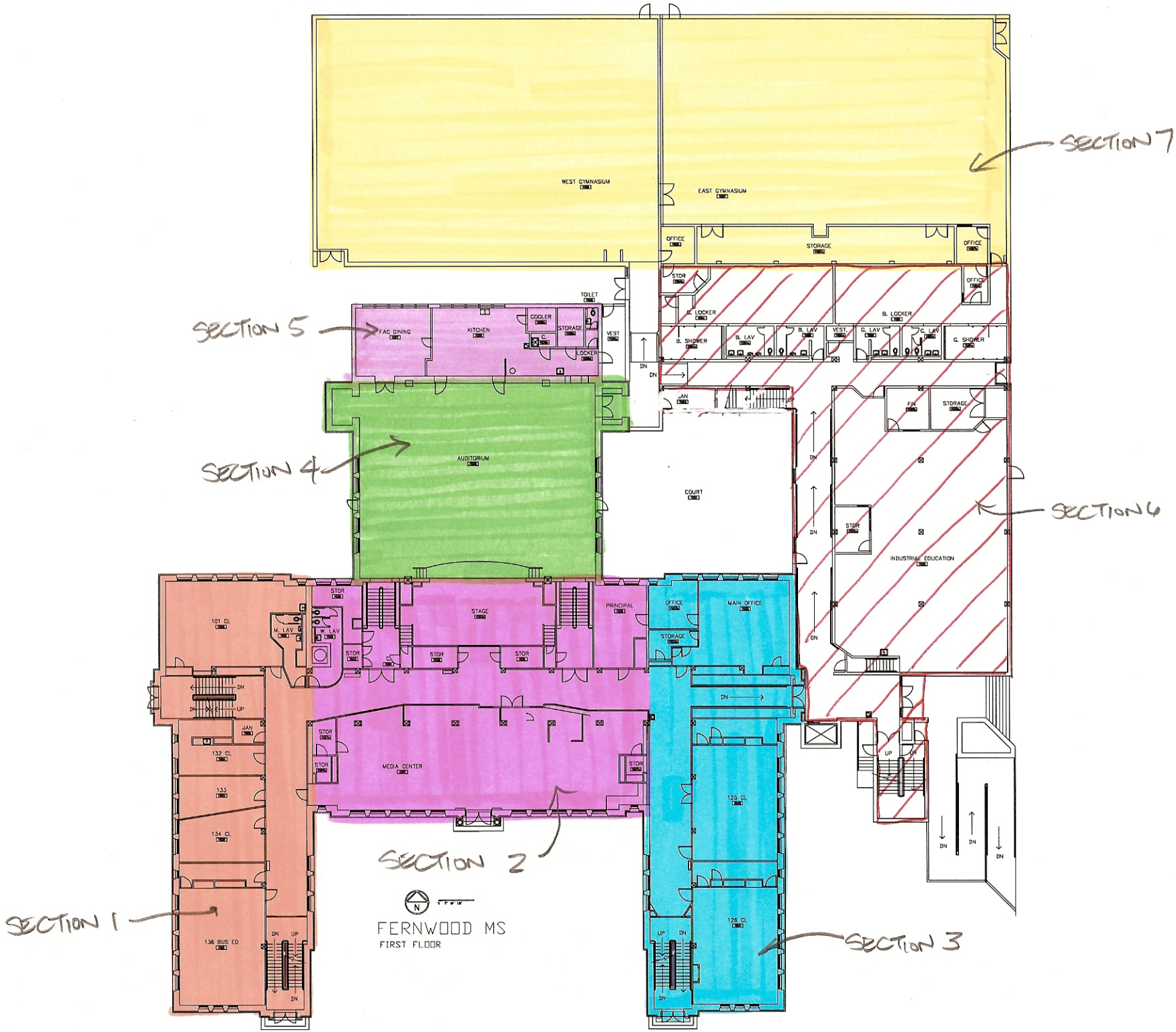
Period (sec)	Sa (g)
0.2	1.079 (SMs, Site Class D)
1.0	0.580 (SM1, Site Class D)

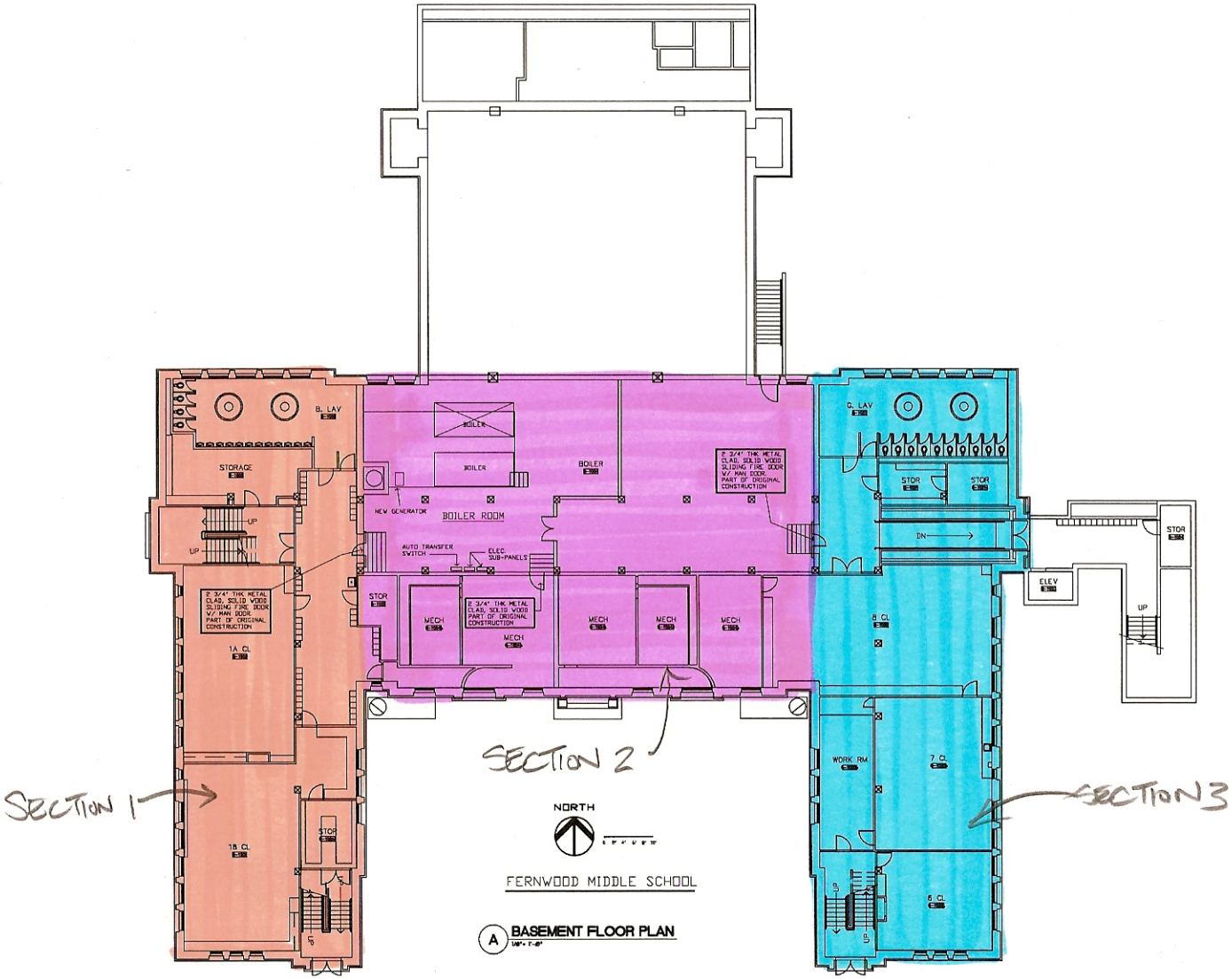
Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 45.536788
Longitude = -122.631566
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.111 ,Fv = 1.73

Period (sec)	Sa (g)
0.2	0.720 (SDs, Site Class D)
1.0	0.387 (SD1, Site Class D)


SECTION 7
SECTION 5
SECTION 6
SECTION 4
SECTION 1
SECTION 2
SECTION 3
ROOF


SECTION 7
SECTION 4
SECTION 2
SECTION 1
SECTION 3
STORAGE
STORAGE
MECH'L
STORAGE
INSTRUMENTAL
MECH'L
225 CL
HOME EC
224 HOME EC
WORK ROOM
221 ARTS & CRAFTS
D'OUT
DARK RM
201 CL
B. LAV
G. LAV
204 SCIENCE
205 SCIENCE
JAN
WORK RM
STOR
207 CL
DN
220 CL
OFC
C'LOR OFC
210 CL
STOR
ELEV
UP
DN
220 CL
STORAGE
220 CL
JAN
210 CL
N
FERNWOOD MS
SECOND FLOOR


SECTION 7
SECTION 5
SECTION 4
SECTION 6
SECTION 2
SECTION 1
SECTION 3
WEST GYMNASIUM
EAST GYMNASIUM
OFFICE
STORAGE
OFFICE
STOR
OFFICE
TOILET
B. LOCKER
B. LOCKER
FAC. DINING
KITCHEN
COOLER
STORAGE
C.
LOCKER
VEST
B. SHOWER
B. LAV
B. LAV
VEST.
G. LAV
C. LAV
G. SHOWER
DN
DN
JAN
FIN
STORAGE
AUDITORIUM
COURT
STOR
INDUSTRIAL EDUCATION
101 CL
M. LAV
W. LAV
STOR
STOR
STOR
STAGE
STOR
PRINCIPAL
OFFICE
MAIN OFFICE
STORAGE
DN
UP
IN
JAN
132 CL
STOR
STOR
MEDIA CENTER
STOR
133
134 CL
125 CL
UP
DN
IN
DN
IN
DN
126 CL
136 BUS ED
IN
UP
IN
UP
DN
IN
N
FERNWOOD MS
FIRST FLOOR


B. LAV
STORAGE
UP
UP
2 3/4" THK METAL CLAD, SOLID WOOD SLIDING FIRE DOOR W/ MAN DOOR PART OF ORIGINAL CONSTRUCTION
1A CL
1B CL
STOR
UP
BOILER
BOILER
BOILER
NEW GENERATOR
BOILER ROOM
AUTO TRANSFER SWITCH
ELEC SUB-PANELS
2 3/4" THK METAL CLAD, SOLID WOOD PART OF ORIGINAL CONSTRUCTION
STOR
MECH
MECH
MECH
MECH
MECH
2 3/4" THK METAL CLAD, SOLID WOOD SLIDING FIRE DOOR W/ MAN DOOR PART OF ORIGINAL CONSTRUCTION
G. LAV
STOR
STOR
DN
STOR
ELEV
UP
8 CL
WORK RM
7 CL
6 CL
UP
UP
SECTION 1
SECTION 2
SECTION 3
NORTH
FERNWOOD MIDDLE SCHOOL
A BASEMENT FLOOR PLAN

SECTION 1 A = 4323 ft²
SECTION 2 A = 5740 ft²
SECTION 3 A = 4323 ft²
Σ = 14386 ft²

FLOOR/ROOF

ROOF
- BUR ROOF = 6 PSF
- CONC. JOIST/CT = 100 PSF
- SUSP. CEILING = 10 PSF
- MECH/ELEC. = 4 PSF

} 120 PSF

2ND FLR & 1ST FLR
- FLOORING & PLASTER = 6 PSF
- CONC JOIST/CT = 100 PSF
- SUSP. CEILING = 10 PSF
- MECH/ELECT = 4 PSF

} 120 PSF

WALLS

EXT:
- PARAPET : 143 PSF
- 2ND : 143 PSF
- 1ST : 183 PSF
- BSMT : 183 PSF (BRICK)
- : 300 PSF (CONC) (BELOW GRADE)

INT
- 4" CT PART : 2[illegible] PSF
- WOOD/STL PART : 10 PSF

SECTION 4 A = 3722 ft²

ROOF:
- BUR ROOF = 6 PSF
- CONC. SLAB & BMS = 80 PSF
- STL GIRDERS = 10 PSF
- LATH & SUSP. CEIL. = 10 PSF
- MECH/ELECT. = 4 PSF

} 110 PSF

WALLS: EXT : 193 PSF

SECTION 5 A = 1283 ft²

ROOF :
- BUR ROOF = 6 PSF
- SHTG 1X SAWN = 2.5
- 2x12 @ 12"o/c = 4 PSF
- 3/4 M LATH = 6.5
- MECH/ELEC = 1

} 20 PSF

WALLS
- EXT : 8" CONC w/ BV & 1/2" PLASTER = 145 PSF
- INT : 6" HCT PART = 24 PSF
- : 3" HCT FURRING = 16 PSF

James G. Pierson, Inc.

Consulting Structural Engineers

320 S.W. Stark, Suite 535 Portland, Oregon 97204
Tel: (503) 226-1286 Fax: (503) 226-3130

Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: JAN 2014
Client: PPS	Sheet no.

ASCE 31 TIER 1 ANALYSIS OF EXISTING BUILDINGS (S_{DS} = 0.72)

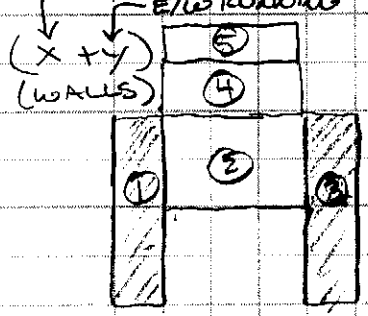
- THE ORIGINAL 1911 & 1923 ADDITIONS (SECTIONS 1-5) HAS BEEN BROKEN DOWN TO SECTIONS 1-5 TO SIMPLIFY THE ANALYSIS OF THE EXISTING SHEARWALLS IN THE STRUCTURE.

PSEUDO LATERAL FORCE : $V = C_S W$

URMA CONSTRUCTION $V = (1)(.72)W = .72W$

CONCRETE CONST. $V = (1.2)(.72)W = .864W$

SECTION 1 & SECTION 3



WT: ROOF = (4323 SF)(120 PSF) = 518760
PARAPET = (300')(35 AVG)(143 PSF) = 180150
2ND FLR EXT = (178+81)(17)(145) = 629629
" " INT = (44 UP)(17)(145) + (57+137)(12)(28) = 172148
2ND FLR = (4323)(120) = 518760
1ST FLR EXT = (178+81)(12)(185) = 568764
" " INT = (44)(12)(143) + (103+209)(12)(28) = 180336
1ST FLR = (4323)(120) = 518760
BSMT EXT = (178+81)(4)(185) + (178+81)(6)(300) = 655788
" INT = (825+143)(10.75)(28) + (44)(10.75)(143) = 133588

1470687 lb
1267860 lb
1308106 lb

PSEUDO FORCE @ 2ND FLR ⇒ (.72)(1470687) = 1058895 lb

" " @ 1ST FLR ⇒ (.72)(1267860) = 912859 lb

" " @ BSMT LVL ⇒ (.72)(1308106) = 941836 lb

SHEAR STRESS IN SHEARWALLS

$$V_j^{avg} = \frac{1}{m}\left(\frac{V_j}{A_w}\right) \qquad m = 1.5$$

@ 2ND t_w = 13"
@ 1ST t_w = 17"
@ BMT t_w = 17"

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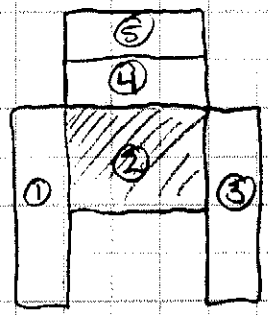
Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: JAN 2011
Client: PPS	Sheet no.

SECTION 2



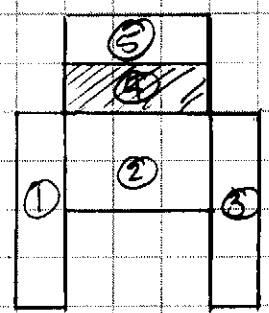
WT: ROOF: 5740(120) = 688800 lb
PARAPET: (185)(3.5)(143) = 92593 lb
2ND EXT: (0+185)(17)(143) = 449735 lb } 1343688 lb
" INT: (150+185)(12)(28) = 112560 lb
2ND FLR: 5740(120) = 688800 lb
1ST EXT: (117)(12)(183) = 256932 lb } 945782 lb
" INT: (960+354)(12)(28) = 151200 lb
1ST FLR: 5740(120) = 688800 lb
BSMT EXT: (117)(4)(183) + (117)(6)(300) = 296244 lb } 1081053 lb
" INT: (1600+1604)(10.583)(28) = 96009 lb

PSEUDO FORCE @ 2ND FLR ⇒ .72(1343688) = 967455 lb

@ 1ST FLR ⇒ .72(945732) = 680927 lb

@ BSMT ⇒ .72(1081053) = 778358 lb

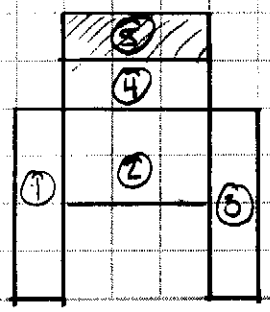
SECTION 4



WT: ROOF: 3722(110) = 409420 lb
PARAPET: (216)(3.5)(143) = 1081081 lb } 1277948 lb
EXT W: (113+84)(20)(193) = 760420

PSEUDO FORCE ⇒ (.72)(1277948) = 920123 lb

SECTION 5



WT: ROOF: (1283)(20) = 25660 lb
EXT: (40+69)(18)(145) = 237078 lb
INT: (54+28)(10)(24) = 19608 lb } 293455 lb
": (6+69)(10)(16) = 11040 lb

PSEUDO FORCE ⇒ (.864)(293455) = 253545 lb

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Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: JAN 2011
Client: PPS	Sheet no.

STORY SHEAR DISTRIBUTION (Fx)

	STORY	FORCE (k)	HT (ft)	PF(HT) (k-ft)	Fx	V_i (lb)
SECTION (1,2,3)	2ND	1058895 1058895 967485 Σ= 3085245	40.67	125476914	.59	1820294
	1ST	912889 912889 680927 Σ= 2506705	23.67	59332287	.28	701860
	BSMT	941836 941836 778358 Σ= 2662030	10.583	28172263 Σ= 212981404	.13	346064
SECTION 4 (ONE LEVEL)		920123	20	–	1.0	920123
SECTION 5 (ONE LEVEL)		309078	12'	–	1.0	309078

SHEAR STRESS TO SHEAR WALLS

$V_i^{avg} = (1/M)(V_i/A_w)$

URMA M= 1.5

CONC. M=

SECTIONS (1,2,3) @ 2ND t_w= 15"
@ 1ST t_w= 17"
@ BSMT t_w= 17"

SECTION 4 t_w= 17"

SECTION 5 t_w= 8"

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Project: SEISMIC EVALUATION & CATEGORY UPGRADE	Job no.
Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: JAN 2011
Client: PPS	Sheet no.

- EXTERIOR WALLS AT ALL SECTIONS ARE ASSUMED TO BE ONLY LATERAL MECHANISM AVAILABLE (INT. WALLS ARE PARTIAL HT)

SECTIONS 1, 2, 3 — REQUIREMENT: $V_j^{avg} < 30$ PSI (URM) OR 100^{PSI} (CONC)

	V_j	$l_{w\,N/S}$	$A_{w\,N/S}$	V_j^{avg} N/S	$l_{w\,E/W}$	$A_{w\,E/W}$	V_j^{avg} E/W
@ 2ND							
M=1.5	1820294	232'	36192 in²	33.5 PSI	178	27769 in²	43 PSI
t_w=18"				NG			NG
@ 1ST	7018600	232'	47528 in²	35.8 PSI	178'	36812 in²	46 PSI
M=1.5	+1820294			NG			NG
t_w=17"	Σ=2522154						
@ BSMT	3460064	232'	47828 in²	40.4 PSI	164'	33456 in²	57 PSI
M=1.5	2522154			NG			NG
t_w=17"	Σ=2868218						

SECTION 4

M=1.5	920123	49'	9996 in²	61.4 PSI	538'	10914 in²	56.2 PSI
t_w=17"				NG			NG

SECTION 5

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Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: JAN 2011
Client: PPS	Sheet no.

1952 KITCHEN ADDN

ASCE 31 TIER 1 ANALYSIS

PSUEDO LATERAL FORCE: $V = C_S W$

CONCRETE CONSTRUCTION $V = (1.2)(0.72)W = 0.864W$

ROOF: BUR ROOF = 6 PSF
1X SAWN SHTG = 2.5 PSF
2X12 RJ @ 12" 4 PSF
3/4" L&P 6.5 PSF
MECH/ELEC/MISC 1 PSF
20 PSF

WALLS: EXT 8" CONC. W/ BV & 1/2" PLASTER 145 PSF
INT. 6" HCT PARTITIONS 24 PSF
3" HCT FURRING 16 PSF

TOTAL MASS
ROOF (11293 SF)(20 PSF) = 256.60
EXT WALLS (40+69)(15)(145) = 237075
INT " (54+20)(10)(24) = 19680
" " (0+69)(10)(16) = 11040
293455 #

AUDITORIUM WALL 193 PSF(20+3)(69) = 306,291 } 599,746#

PSUEDO FORCE 0.864(293455) = 253545
0.864(599,746) = 518180 w/audit. wall

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Project: Seismic Evaluation & Lateral Upgrade	Job no.
Location: Beverly Cleary Fernwood Campus	Date: JAN 2011
Client: Portland Public Schools	Sheet no.

1952 KITCHEN ADDN

SHEAR STRESS IN SHEARWALLS

$$V_j^{avg} = \frac{1}{m}\left(\frac{V_j}{A_w}\right)$$

m = 4.0 for reinf. conc. walls
M = 1.5 ← assume for concrete shearwall that's essentially unreinforced

V_j = 254 k
518 k w/ auditorium wall

$2\sqrt{f'_c} = 2\sqrt{2500} = 100$ psi

$A_{w\ N/S} = 8(19.5'^{W} + 8.5'^{E})\times 12 = 2088\ in^2$

$A_{E/W} = 8(32' + \cancel{4}')\times 12 = 3072\ in^2$ ← neglect wall along south side

$V_{j\ N/S}^{avg} = \frac{1}{1.5}\left(\frac{253,545}{2088\ in^2}\right) = 63$ psi < 100 psi ok

$V_{j\ E/W}^{avg} = \frac{1}{1.5}\left(\frac{253,545}{3072}\right) = 55$ psi < 100 psi ok

$V_{j\ N/S}^{avg} = \frac{1}{1.5}\left(\frac{518,180}{2088\ in^2}\right) = 129$ psi > 100 psi

If M = 2.0, V_j = 97 psi

THE NORTH & WEST WALLS OF KITCHEN PASS QUICK CHECK.
THE EAST WALL REQUIRES FURTHER REVIEW

FOUNDATION - OVERTURNING

$0.6 S_s = 0.6(0.72) = 0.432$

SMALLEST HORIZ. DIMENSION = 20' & BLDG HT = 15'

BASE/HEIGHT = 20/15 = 1.33 > 0.432 ok

James G. Pierson, Inc.	Project: Seismic Evaluation & Lateral Upgrade	Job no.
Consulting Structural Engineers 610 SW Alder, Suite 918 Portland, Oregon 97205 Tel: (503) 226-1286 Fax: (503) 226-3130	Location: Beverly Cleary Fernwood Campus	Date: JAN 2011
	Client: Portland Public Schools	Sheet no.

1952 KITCHEN ADDN

DESIGN NEW ANCHORAGE OF CONCRETE WALL TO WOOD DIAPHRAGM PER 2010 OSSC (ASCE7-05)

$F_p = 0.8 S_{DS} I W_p$

$= 0.8(0.72)(1.25) W_p = 0.72 W_p$

NORTH/EAST/WEST WALLS

$W_p = 145 \text{ PSF} (4\frac{1}{2}' + 4') = 1377.5 \text{ PLF}$

$F_p = 0.72(1377.5) = 708.4 \text{ PLF}$

NEW TENSION TIES AT 4'-0" o/c

$F_p = 708.4(4) = 2834 \#$ LFRD

$2024 \#$ ASD

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	Location: Beverly Cleary Fernwood Campus	Date: JAN 2011
	Client: Portland Public Schools	Sheet no.

1952 KITCHEN ADDN

REINFORCE EXIST 1" SAWN SHTG DIAPHRAGM W/PLY'D PER ASCE 41-06

TABLE 8-3 ASCE 41-06
WOOD STRUCTURAL PANEL OVERLAY ON SHEATHING, CHORDED

$L/b = 69\frac{1}{2}/20 = 3.45 \Rightarrow$ M = 2.1 for LS
M = 2.5 for CP

NORTH/SOUTH MASS

ROOF 22 PSF (20') = 440
WALLS N. 145 PSF $(\frac{11}{2}+4)$ = 1378
S. 193 PSF $(\frac{20'}{2})$ = 1930
S. 16 PSF $(\frac{11}{2})$ = 88
3836 PLF

EAST/WEST MASS

ROOF 22 PSF (69) = 1518
WALLS E/W 145 PSF $(\frac{11}{2}+4) \times 2$ = 2750
24 PSF $(\frac{11}{2}) \times 4$ = 528
4802 PLF

NORTH/SOUTH SEISMIC

S_a = 0.648 BSE-1 (LS) W_{NS} = 3836 (0.648) = 2486 PLF
S_a = 1.0799 BSE-2 (CP) W_{NS} = 3836 (1.0799) = 4142 PLF
BSE-1 $V_{d\,NS}$ = 2486 PLF (69'/2) ÷ 20' = 4290 PLF
BSE-2 $V_{d\,NS}$ = 4142 PLF (69/2) ÷ 20' = 7146 PLF

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Project: Seismic Evaluation & Lateral Upgrade	Job no.
Location: Beverly Cleary Fernwood Campus	Date: JAN 2011
Client: Portland Public Schools	Sheet no.

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DIAPH CAPACITY REQ'D

BSE-1 $v_{n/s} = 4288 \div 2.1 = 2042$ PLF

BSE-2 $v_{n/s} = 7146 \div 2.5 = 2858$ PLF ← GOVERNS

HIGH DIAPH SHEAR DUE TO AUDITORIUM WALL WEIGHT!

23/32 STRUCT I PLYD W/ 2 LINES OF 10d NAILS AT 4"/12" AT ALL PANEL EDGES

DIAPH CAPACITY = 955 PLF (ASD) X 2.0 X 1.5 = 2865 PLF > 2858

BUT FASTENING OVERLAY ON EXIST. SHTG (PROBABLY 3/4" THICK) AND ACHIEVING THAT CAPACITY IS DUBIOUS

∴ SEISMIC UPGRADE SHOULD CONSIDER REPLACING EXIST. HCT WALLS W/ 1 OR 2 NEW SHEARWALLS (CONC OR CMU)

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	Location: Beverly Cleary Fernwood Campus	Date: JAN 2011
	Client: Portland Public Schools	Sheet no.

1952 KITCHEN ADDN

CONCRETE PARAPET W/O REBAR EXCEEDS MAXIMUM HEIGHT-TO-THICKNESS RATIO OF 2.5 ; THEREFORE REQUIRES MORE REVIEW. (ASCE 31-03 SECTION 4.9.8.3)

$H/t = 4 \times 12/8 = 6.0 > 2.5$

OUT-OF-PLANE WALL LOADS

PER ASCE 41-06: $F_p = \chi S_{xs} W_p$

Table 2-4 $\chi = 0.9$ CP
$= 1.2$ LS

BSE-1 LS $F_p = 1.2(0.648) W_p = 0.7776 W_p$

BSE-2 CP $F_p = 0.9(1.0799) W_p = 0.9719 W_p$

PER 2010 OSSC / ASCE 7-05 SECTION 12.11.1: $F_p = 0.4 S_{DS} I W$

$F_p = 0.4(0.72)(1.25) W = 0.36 W_p$

$W_p = \underset{\text{CONC.}}{8/12(150 \text{ pcf})} + \underset{\text{VENEER}}{40 \text{ PSF}} + \underset{\text{PLASTER}}{5 \text{ PSF}} = 145 \text{ PSF}$

$W_u = 0.36(145) = 52.2$ PSF

$M_u = W_u L^2/2 = 52.2(4')^2 \div 2 = 418$ ft-lb/ft

ACI 318-05 Chapter 22 $\phi M_n = \phi 5 \sqrt{f'_c}\, S_m$

$= 0.55(5)\sqrt{2500}\,(12)(8)^2/6$

$= 17{,}600$ in-lb/ft

1467 ft-lb/ft > 418 ft-lb/ft

PARAPET OK

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	Location: Beverly Cleary Fernwood Campus	Date: MAR 2011
	Client: Portland Public Schools	Sheet no.

BEVERLY CLEARY FERNWOOD CAMPUS 12/30/10

1978 ADDITION - DEAD LOADS

ROOF DEAD LOAD AT GYM (Section 7)

5.00	built-up roofing
0.60	6" batt insulation
1.50	1/2" plywood
0.32	2x4 blocking at 48" o.c.
1.69	2x10 roof joists at 24" o.c.
0.49	4x10 purlins at 16 to 18 ft o.c.
5.18	8.75x39 glulam beams at 16 ft o.c.
2.80	5/8" gyp. ceiling
1.50	plumbing, HVAC
18.76	psf
USE **19**	psf

ROOF DEAD LOAD AT INDUSTRIAL ARTS (Section 6)

5.00	built-up roofing
0.60	6" batt insulation
1.50	1/2" plywood
0.32	2x4 blocking at 48" o.c.
4.10	roof joists, typically 2x12 at 24"
1.12	5.125x18 glulam beams at 20 ft o.c.
2.80	5/8" gyp. ceiling
1.50	plumbing, HVAC
16.94	psf
USE **17**	psf

SECOND FLOOR DEAD LOAD, 12" HOLLOW CORE

31.25	2 1/2" concrete topping slab
82.00	12" hollow core deck
2.80	ceiling
1.50	plumbing, HVAC
117.55	psf
USE **118**	psf

SECOND FLOOR DEAD LOAD, 8" HOLLOW CORE

31.25	2 1/2" concrete topping sl
56.00	8" hollow core deck
2.80	ceiling
1.50	plumbing, HVAC
91.55	psf
USE **92**	psf

EXTERIOR WALLS

55.00	8" CMU w/ vert grouted cells at 32" & horiz grouted cells at 48"
40.00	brick veneer
5.00	gypsum plaster
100.00	psf

68.00	10" CMU w/ vert grouted cells at 32" & horix grouted cells at 48"
40.00	brick veneer
108.00	psf

1.57	6" metal studs at 16"
5.6	5/8' gyp each side
40	brick veneer
47.17	psf

INTERIOR WALLS

55.00	8" CMU w/ vert grouted cells at 32" & horiz grouted cells at 48"
10.00	gypsum plaster ea side
65.00	psf

68.00	10" CMU
5.00	gypsum plaster
73.00	psf

1978 ADDITION - SECTION 7

BUILDING MASS

ROOF 19 PSF (70' X 194') = 258,020

E. & W. EXTERIOR WALLS 108 PSF $\left(\frac{23.25'}{2} + \frac{33.92'}{2}\right)$(70') X 2 walls = 432,054

INTERIOR WALL GRIDLINE 3 68 PSF $\left(\frac{23.25}{2} + \frac{33.92}{2}\right)$(70') = 136,065

N. EXTERIOR WALL 108 PSF (23.25)(194') = 487,134

S. EXTERIOR WALL 108 PSF (33.92)(97') = 355,346

S. INTERIOR WALL [55 PSF (15.92') + 68 PSF (18)] X 97' = 203,661

INTERIOR WALL GRIDLINE A, B 55 PSF (30')(97') = 160,050

MECH RM FLOOR 92 PSF (11' X 97') = 98,164

2,130,494

PSUEDO LATERAL FORCE

$V = C S_a W$

$C = 1.0$ FOR BLDG TYPE RM1

$S_{D1} = 0.387$

$S_{DS} = 0.720$

$T = C_t h_n^p = 0.020(33.92)^{0.75} = 0.281$ SEC.

$S_a = S_{D1}/T = 0.387/0.281 = 1.38 > S_{DS} = 0.72$

$\therefore S_a = 0.72$

$V = (1.0)(0.72)W$

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	Client: Portland Public Schools	Sheet no.

1978 ADDN - SECTION 7

STORY SHEAR, V_j

$$V_j = 0.72(2130.5\,k) = 1534.0\,k$$

TIER 1 SHEAR STRESS CHECK
USING QUICK CHECK PROCEDURE OF SECTION 3.5.3.3

$$V_j^{avg} = \frac{1}{m}\left(\frac{V_j}{A_w}\right)$$

$m = 4.0$ for reinforced masonry w/Life Safety Performance Level

A_w N/S DIRECTION 10" WALLS

$$3x(70')(52.4\,in^2/ft\ net\ area) = 110,040\,in^2$$

$$V_{j\ N/S}^{avg} = \frac{1}{4}\left(\frac{1534.0\,k}{110,040}\right) = 35\ psi < 70\ psi$$

A_w E/W DIRECTION 10" WALLS

$$[2x194 - (3'+3'+6.33'+6.33'+3'+3'+3')] \times 52.4\,in^2/ft$$

$$= 18,881\ in^2$$

$$V_{j\ E/W}^{avg} = \frac{1}{4}\left(\frac{1534\,k}{18,881\,in^2}\right) = 20\ psi < 70\ psi$$

∴ SHEAR STRESS IN REINF. MASONRY WALLS COMPLIES

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Project: Seismic Evaluation & Lateral Upgrade	Job no.
Location: Beverly Cleary Fernwood Campus	Date: 1/3/11
Client: Portland Public Schools	Sheet no.

1978 ADDITION - SECTION 6

BUILDING MASS

ROOF LEVEL

ROOF 17 PSF (29'x15.33' + 11.67'x58.5' + 80'x58.5' + 34'x97') = 154,790

WALL ALONG G.L.	B	65 PSF (15.92')(97') =	100,376
" " "	C	10 PSF (13')(97') =	12,610
" " "	D	" " "	12,610
" " "	E	10 PSF (13')(38') =	4940
" " "	F	10 PSF (13')(40') =	6240
" " "	G	" " "	6240
" " "	H	" " " =	6240
" " "	J	65 PSF (13')(24') =	20,280
" " "	J	113 PSF (13')(24') =	35,256
" " "	K	113 PSF (13)(13.33') =	19,582
" " "	M	113 PSF (13)(15.33') =	22,520
" " "	3	113 PSF (13)(34') =	49,946
" " "	5	48 PSF (14')(52') =	34,944
" " "	5	10 PSF (14)(30') =	4200
" " "	6	10 PSF (13)(26') =	3380
" " "	6	65 PSF (13)(80') =	67,600
" " "	7	10 PSF (13)(26'+40) =	8580
" " "	7	113 PSF (16')(40.67') =	73,531
" " "	6.5	113 PSF (16')(29') =	52,432
" " "	9	48 PSF (15')(60') =	43,200
" " "	9	113 PSF (16')(20') =	36,160
			620,867

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Location: Beverly Cleary Fernwood Campus	Date: 1/3/11
Client: Portland Public Schools	Sheet no.

1990 ADDN - SECTION C

BUILDING MASS

SECOND FLOOR LEVEL

FLOOR 118 PSF (29'x15.33' + 11.67'x34.5' + 80'x58.5' + 34'x97') = 1,041,372

WALL ALONG G.L. B	73 PSF (18'x 97') =	127,458
C	10 (18'x97') =	17,460
D	" " "	17,460
E	10 PSF (18')(38') =	6840
F	10 (18)(48) =	8640
G	" " "	8640
H	" " "	8640
J	65 PSF (18')(24') =	28,040
J	113 PSF (18)(24) =	48,816
K	113 PSF (18)(13.33) =	27,113
M	113 PSF (18)(15.33) =	31,181
3	113 PSF (18)(34) =	69,156
5	40 PSF (18)(52') =	44,928
5	10 PSF (18)(30) =	5400
6	10 PSF (18)(26) =	4680
6	65 (18)(80) =	93,600
7	10 (18)(26+40) =	11,880
7	113 (18)(40.67) =	82,723
6.5	113 (18) (29) =	58,986
9	40 (18)(60) =	51,840
9	113 (18)(20) =	40,680
		1,835,533

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Project: Seismic Evaluation & Lateral Upgrade		Job no.
Location: Beverly Cleary Fernwood Campus		Date: 1/3/11
Client: Portland Public Schools		Sheet no.

1978 ADDITION - SECTION G

Vertical Distribution

LEVEL	MASS #	HEIGHT	Wh k-ft	Fx	Trib Mass (k)	V_j
ROOF	620,867	31.67	19,663	0.372	916	792 k
2ND	1,835,533	18.0	33040	0.627	1540	1331 k
	2456400		52,702			2123 k

PSUEDO LATERAL FORCE = (1.2)(0.72)W = 0.864W

TIER 1 SHEAR STRESS CHECK

$$V_j^{avg} = \frac{1}{m}\left(\frac{V_j}{A_j}\right)$$

m = 4.0

A_w N/S DIRECTION 2ND FLR 8" CMU

(40.67' + 23'4.23' + 20' + 11.67')(46.0 in²/ft) = 5444 in²

$$V_j^{avg}{}_{N/S} = \frac{1}{4}\left(\frac{792}{5444}\right) = 36 \text{ psi} < 70$$

A_w E/W DIRECTION 2ND FLR 8" CMU

(97' - 3.33' - 8 + 49.75')(46.0 in²/ft) = 6183 in²

$$V_j^{avg}{}_{E/W} = \frac{1}{4}\left(\frac{792}{6183}\right) = 32 \text{ psi} < 70$$

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Project: Seismic Evaluation & Lateral Upgrade	Job no.
Location: Beverly Cleary Fernwood Campus	Date: 1/3/11
Client: Portland Public Schools	Sheet no.

1978 ADDITION - SECTION 6

A_w N/S DIRECTION 1ST FLR 8" CMU & 10" CMU

$(26 - 3.33 + 5.33 + 70.67' + 4.67' + 16.67' + 6' + 11.67' + 11.67')(46.0\ in^2/ft) + (20')(52.4) = 7918$

$V_j^{adj}_{N/S} = \frac{1}{4}\left(\frac{2123}{7918}\right) = 67\ psi < 70\ psi$

A_w E/W DIRECTION 1ST FLR 8" & 10" CMU

$(97' - 3.33 - 6.67)(52.4\ in^2/ft) + (97 - 3.33 - 6.67 \times 2 + 48.75)(46.0) = 10,494\ in^2$

$V_j^{adj}_{E/W} = \frac{1}{4}\left(\frac{2123}{10,494}\right) = 51\ psi < 70\ psi$

∴ SHEAR STRESS IN REINF MASONRY WALLS COMPLIES

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	Location: Beverly Cleary Fernwood Campus	Date: 1/3/11
	Client: Portland Public Schools	Sheet no.

1978 ADDITION - SECTIONS 6 & 7

TIER 1 - REINFORCING STEEL

REINF IN 8" CMU WALL

(2) #4 HORIZ @ 48" $(2 \times 0.20)/(7.625 \times 48) = 0.00109 > 0.0007$

#5 VERT @ 32" $(0.31)/(7.625 \times 32) = 0.00127 > 0.0007$

$0.00236 > 0.0020$

REINF IN 10" CMU WALL

#5 HORIZ @ 48" $(0.31)/(9.625 \times 48) = 0.00067 \cong 0.0007$

(2) #5 VERT @ 32" $(2 \times .31)/(9.625 \times 32) = 0.00201 > 0.0007$

$0.00268 > 0.0020$

∴ REINFORCING STEEL COMPLIES

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Location: Beverly Cleary Fernwood Campus		Date: 1/3/11
Client: Portland Public Schools		Sheet no.

1978 ADDITION

TIER 1 WALL ANCHORAGE

ASCE/SEI 31-06 SECTION 3.5.3.7 FLEXIBLE DIAPHRAGM CONNECTION FORCES

$T_c = ? S_{DS} W_p A_p$ (Eqn 3-16)

? = 0.9 for Life Safety Performance objective

$S_{DS} = 0.720$

$W_p A_p$ = trib wall mass

- EXISTING ROOF-TO-WALL CONNECTIONS ALONG EAST & WEST WALLS OF GYM AREA (GRIDLINES 1 & 9) CONSIST OF 3X10 PT DOUGFIR LEDGER W/ 3/4" ∅ A.B. @ 2'-0" o/c AND SIMPSON PAT28 PURLIN ANCHORS AT 16 FT TO 18 FT o/c EMBEDDED IN CMU WALL.

$T_c = 0.9(0.720)(108\ PSF)(30.4'/2)(18') = 19.1\ k$ (10" CMU w/ brick veneer) >> WALL CONNECTION CAPACITY

EXISTING ROOF-TO-WALL CONNECTIONS ALONG NORTH & SOUTH WALLS OF GYM AREA (GRIDLINES A & B) CONSIST OF 3X10 PT DOUG FIR LEDGER W/ 3/4" ∅ A.B. @ 2'-8" o/c AND FABRICATED STEEL BEAM SEAT FOR GLULAM BEAMS AT 16 FT o/c (ONE 7/8" ∅ BOLT IN DOUBLE SHEAR)

$T_c = 0.9(0.720)(108\ PSF)\left(\frac{33.2'}{2}\right)(16') = 19.0\ k$ (10" CMU w/ brick veneer) >> WALL CONNECTION CAPACITY

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1978 ADDITION

EXISTING ROOF-TO-WALL CONNECTIONS ALONG GRIDLINE 3 CONSIST OF 3 1/8 X 16 1/2 GL LEDGER W/ 3/4" Ø A.B. @ 2'-0" O/C AND SIMPSON PA18 TIE ON GLULAM PURLINS AT 8'-8" O/C

8" CMU W/ BRICK VENEER

$T_C = 0.9(0.720)(100\ PSF)\left(\frac{13'}{2}+3'\right)(8.67') = 5337\#$

CAPACITY OF SIMPSON PA18 PER 2009 SIMPSON CATALOG = 2815# ALLOWABLE

DEMAND PER 2010 OSSC & ASCE 7-05:

$F_p = 0.8 S_{DS} I W = 0.8(0.72)(1.25)W = 0.72W_p$

$= 0.72(100)\left(\frac{13}{2}+3\right)(8.67) = 5930\#$ LRFD

4236# ASD > 2815

$\frac{4236}{2815} = 1.5$ 50% overstressed

EXISTING ROOF-TO-WALL CONNECTIONS ALONG GRIDLINE B CONSIST OF 3X10 PT DOUGLAS FIR LEDGER W/ 3/4" Ø A.B. @ 2'-8" O/C AND SIMPSON PA18 TIE ON 3X12 BLKG AT 6'-8" O/C

$T_C = 0.9(0.720)(100\ PSF)\left(\frac{13.67}{2}+2.33'\right)(6.67') = 3961\#$

CAPACITY OF SIMPSON ST2122 PER '09 CATALOG = 1530# ALLOWABLE

DEMAND PER 2010 OSSC & ASCE 7-05:

$F_p = 0.72(100)\left(\frac{13.67}{2}+2.33\right)(6.67) = 4403\#$ LRFD

3145 ASD

PA18 $\frac{3145}{2815} = 1.12$ 12% overstressed

ST2122 $\frac{3145}{1530} = 2.06$ 106% overstressed

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	Location: Beverly Cleary Fernwood Campus	Date: 7/14/11
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pa/par/pat

PATENT PENDING

PURLIN ANCHORS

MASONRY SPECIALS — PAM25 AND PATM25 added to line — allows full-block penetration.

This Purlin Anchor line provides a tested 11,500 lbs. of pull value in 2000 psi concrete. The new, heavily embossed hook is embedded 4" into concrete or masonry. (Tabular values given are as limited by allowable code values for bolts or nails.)

PAM and PATM Anchors are especially suitable for use with concrete block construction. PAR Anchors are hinged to allow for irregularities found in construction.

Specifically designed for the new seismic load requirements as well as general tie use between concrete and wood structures.

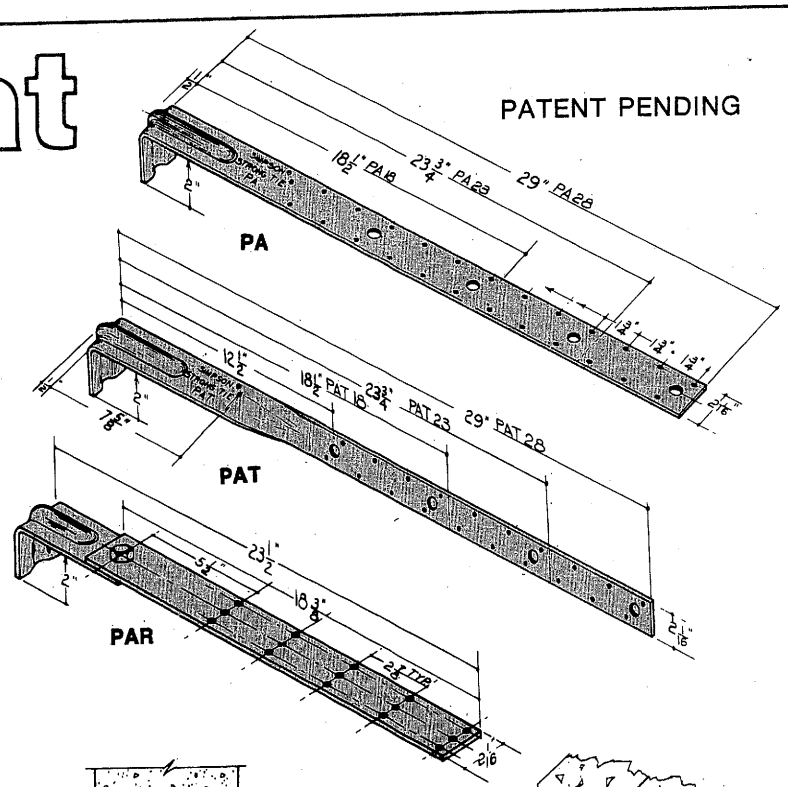
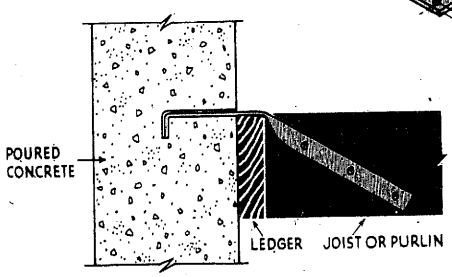


Table 39

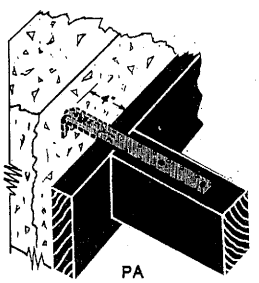
MODEL NO.	MATERIAL GALV.	LENGTH	CONNECTORS TO PURLINS	DESIGN LOADS* OTHER	DESIGN LOADS* ROOF
PA 18	12 ga. x 2⅛"	18½"	12-16d	1.6 Kips	2.1 Kips
PA 23	12 ga. x 2⅛"	23¾"	18-16d	2.4 Kips	3.2 Kips
PAM 25	12 ga. x 2⅛"	25⅜"	18-16d	2.4 Kips	3.2 Kips
PA 28	12 ga. x 2⅛"	29"	24-16d	3.1 Kips	4.1 Kips
PAT 18	12 ga. x 2⅛"	18½"	2-½" MB	1.6 Kips	2.0 Kips
			7-16d	940 lbs.	1175 lbs.
PAT 23	12 ga. x 2⅛"	23¾"	3-½" MB	2.4 Kips	3.0 Kips
			13-16d	1740 lbs.	2175 lbs.
PATM 25	12 ga. x 2⅛"	25⅜"	18-16d	2.4 Kips	3.2 Kips
PAT 28	12 ga. x 2⅛"	29"	4-½" MB	3.1 Kips	3.9 Kips
			19-16d	2550 lbs.	3190 lbs.
PAR	12 ga. x 2⅛"	22½"	3-N54A	1035 lbs.	1035 lbs.
			5-N54A	1725 lbs.	1725 lbs.

*Design load increases of ⅓ allowed for seismic.

APPROVED—See Research Recommendation No. 1211 of the International Conference of Building Officials (Uniform Building Code).

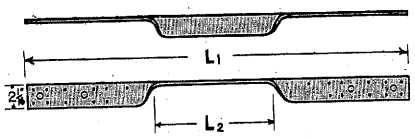


CROSS SECTION VIEW OF PAT INSTALLATION



Provides 4" of embedment into poured concrete.

sa STRAP ANCHORS



Used to provide anchoring of purlins to ledgers, and to make horizontal ties across intervening members.

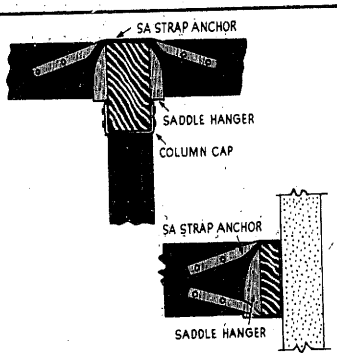


Table 18

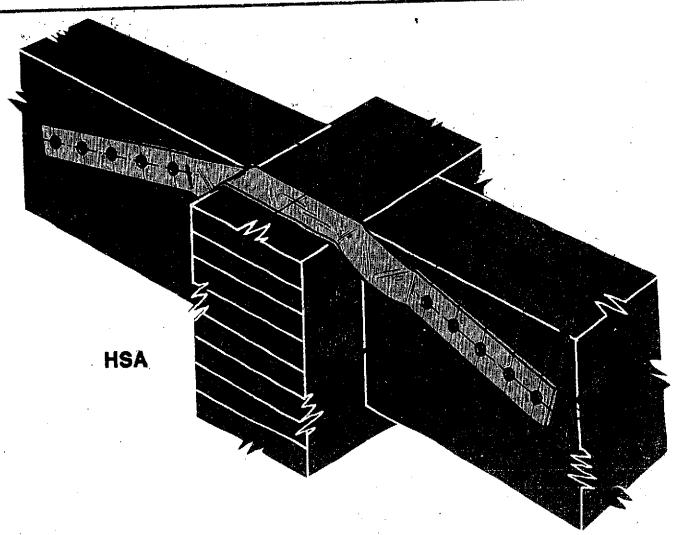
MODEL NO.	L_1	L_2	Bolts ea. side	Bolted Value	Optional Nailing
SA 34	34"	9"	(2) ¾"	2970	11-16d
SA 45	45"	19½"	(2) ¾"	2970	11-16d

MATERIAL: 12 gauge galvanized steel x 2⅛".

APPROVED—See Research Recommendation No. 1746 of the International Conference of Building Officials (Uniform Building Code).

hsa STRUT OR SHEAR CONNECTORS

A High Value cross member Seismic Tie.



HSA

Table 18A

Model No.	Material	L	Bolts (Ea. side)	Allowable Load (lbs.)
HSA 1	¼"	26"	1	1800
HSA 2	¼"	32"	2	3600
HSA 3	¼"	38"	3	5400
HSA 4	¼"	44"	4	7200
HSA 5	¼"	50"	5	9000

1978 ADDITION

EXISTING FLOOR-TO-WALL CONNECTIONS

#4 OR #5 DOWELS @ 24" OR 32" o/c

$T_C = 0.9(0.720)(100\text{ PSF})\left(\frac{13.167}{2} + \frac{19}{2}\right)(2.67') = 2740\#$ (8" CMU + brick veneer)

EXIST. FLOOR-TO-WALL CONNECTIONS OK

James G. Pierson, Inc. Consulting Structural Engineers 610 SW Alder, Suite 918 Portland, Oregon 97205 Tel: (503) 226-1286 Fax: (503) 226-3130	Project: Seismic Evaluation & Lateral Upgrade	Job no.
	Location: Beverly Cleary Fernwood Campus	Date: 1/14/11
	Client: Portland Public Schools	Sheet no.

1978 Gym & Industrial Arts Addition

Anchorage of Walls to Flexible Diaphragms for Out-of-Plane Wall Loads

Design Loads per ASCE 41-06

(Eqn 2-5) $F_p=\chi S_{xs}W$

for Collapse Prevention & Flexible Diaphragm:

$F_p=\chi S_{xs}W = (0.9)(1.0799)\ W = 0.972\ W$

for Life Safety & Flexible Diaphragm:

$F_p=\chi S_{xs}W = (1.2)(0.648)\ W = 0.778\ W$

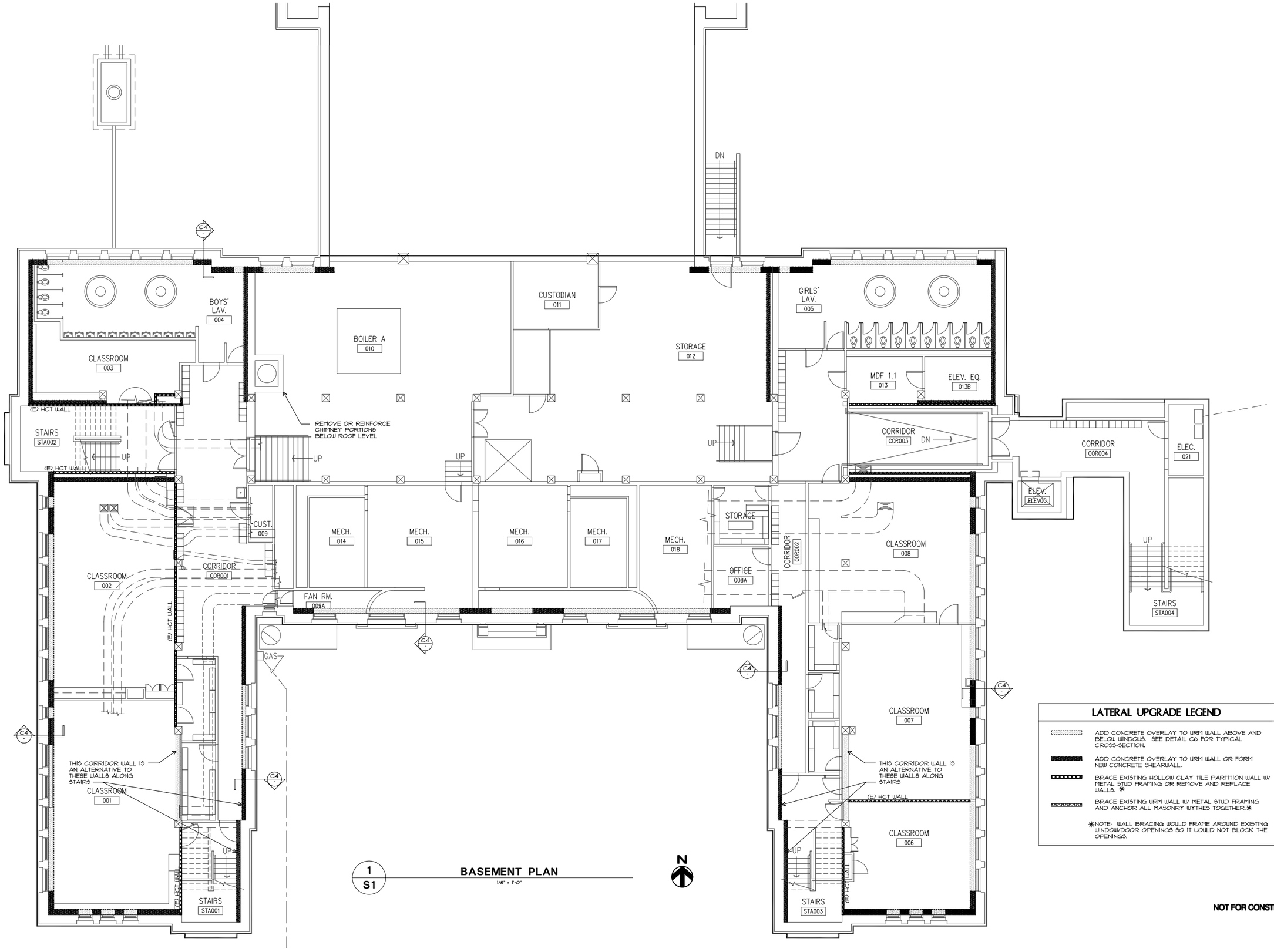
Design Loads per 2010 OSSC & ASCE 7-05:

(Eqn 12.11-1) $F_p=0.8S_{DS}\,I\,W$

$F_p=0.8S_{DS}\,I\,W = (0.8)(0.72)(1.25)\ W = 0.720\ W$

Roof Level North wall of gym along gridline A	10" CMU w/ brick veneer
	108 psf * (22.6'/2 + 0.8') = 1307 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	1307 * 0.72/1.4 = 672 plf ASD
Roof Level South wall of gym along gridline B	10" CMU w/ brick veneer
	108 psf * (31.25'/2 + 2.75') = 1984 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	1984 * 0.72/1.4 = 1021 plf ASD
Roof Level Wall along gridline 8 between gridlines H & J	8" CMU w/ brick veneer
	100 psf * (13.67'/2 + 2.37') = 920.5 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	920.5 * 0.72/1.4 = 473.4 plf ASD
Roof Level Wall along gridline J between gridlines 7 & 8	8" CMU w/ brick veneer
	100 psf * (13.67'/2 + 2.37') = 920.5 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	920.5 * 0.72/1.4 = 473.4 plf ASD
Roof Level Wall along gridline 7 between gridlines J & K	8" CMU w/ brick veneer
	100 psf * (13.67'/2 + 2.37') = 920.5 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	920.5 * 0.72/1.4 = 473.4 plf ASD
Roof Level Wall along gridline 7 between gridlines K & M	8" CMU w/ brick veneer
top of stair	100 psf * (9.7'/2 + 1.38') = 623 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	623 * 0.72/1.4 = 320.4 plf ASD
stair landing	100 psf * (8.17'/2 + 1.38') = 546.5 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	546.5 * 0.72/1.4 = 281.1 plf ASD
Roof Level Wall along gridline M between gridlines 6.4 & 7	8" CMU w/ brick veneer
stair landing	100 psf * (8.17'/2 + 1.38') = 546.5 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	546.5 * 0.72/1.4 = 281.1 plf ASD
Roof Level Wall along gridline 6.4 between gridlines K & M	8" CMU w/ brick veneer
top of stair	100 psf * (9.7'/2 + 1.38') = 623 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	623 * 0.72/1.4 = 320.4 plf ASD
along stair	100 psf * (22'/2 + 1.38') = 1238 plf worst case
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	1238 * 0.72/1.4 = 636.7 plf ASD
stair landing	100 psf * (8.17'/2 + 1.38') = 546.5 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	546.5 * 0.72/1.4 = 281.1 plf ASD
Roof Level Wall along gridline K between gridlines 6 & 6.4	8" CMU w/ brick veneer
	100 psf * (13.67'/2 + 2.37') = 920.5 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	920.5 * 0.72/1.4 = 473.4 plf ASD
Roof Level Wall along gridline 6 between gridlines D & J	8" CMU, assume plaster both sides
	65 psf * (13.67'/2) = 444.3 plf
Out-of-Plane Wall Load per 2010 OSSC & ASCE 7-05	444.3 * 0.72/1.4 = 228.5 plf ASD

Appendix D
Schematic Seismic Upgrade Drawings



1 / S1 **BASEMENT PLAN**

1/8" = 1'-0"

LATERAL UPGRADE LEGEND

- ADD CONCRETE OVERLAY TO URM WALL ABOVE AND BELOW WINDOWS. SEE DETAIL C6 FOR TYPICAL CROSS-SECTION.
- ADD CONCRETE OVERLAY TO URM WALL OR FORM NEW CONCRETE SHEARWALL.
- BRACE EXISTING HOLLOW CLAY TILE PARTITION WALL W/ METAL STUD FRAMING OR REMOVE AND REPLACE WALLS. *
- BRACE EXISTING URM WALL W/ METAL STUD FRAMING AND ANCHOR ALL MASONRY WYTHES TOGETHER.*

*NOTE: WALL BRACING WOULD FRAME AROUND EXISTING WINDOW/DOOR OPENINGS SO IT WOULD NOT BLOCK THE OPENINGS.

NOT FOR CONSTRUCTION

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Consulting Structural Engineers
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PPS

PORTLAND PUBLIC SCHOOLS

BEVERLY CLEARY FERNWOOD CAMPUS SCHEMATIC SEISMIC UPGRADES

SHEET TITLE:

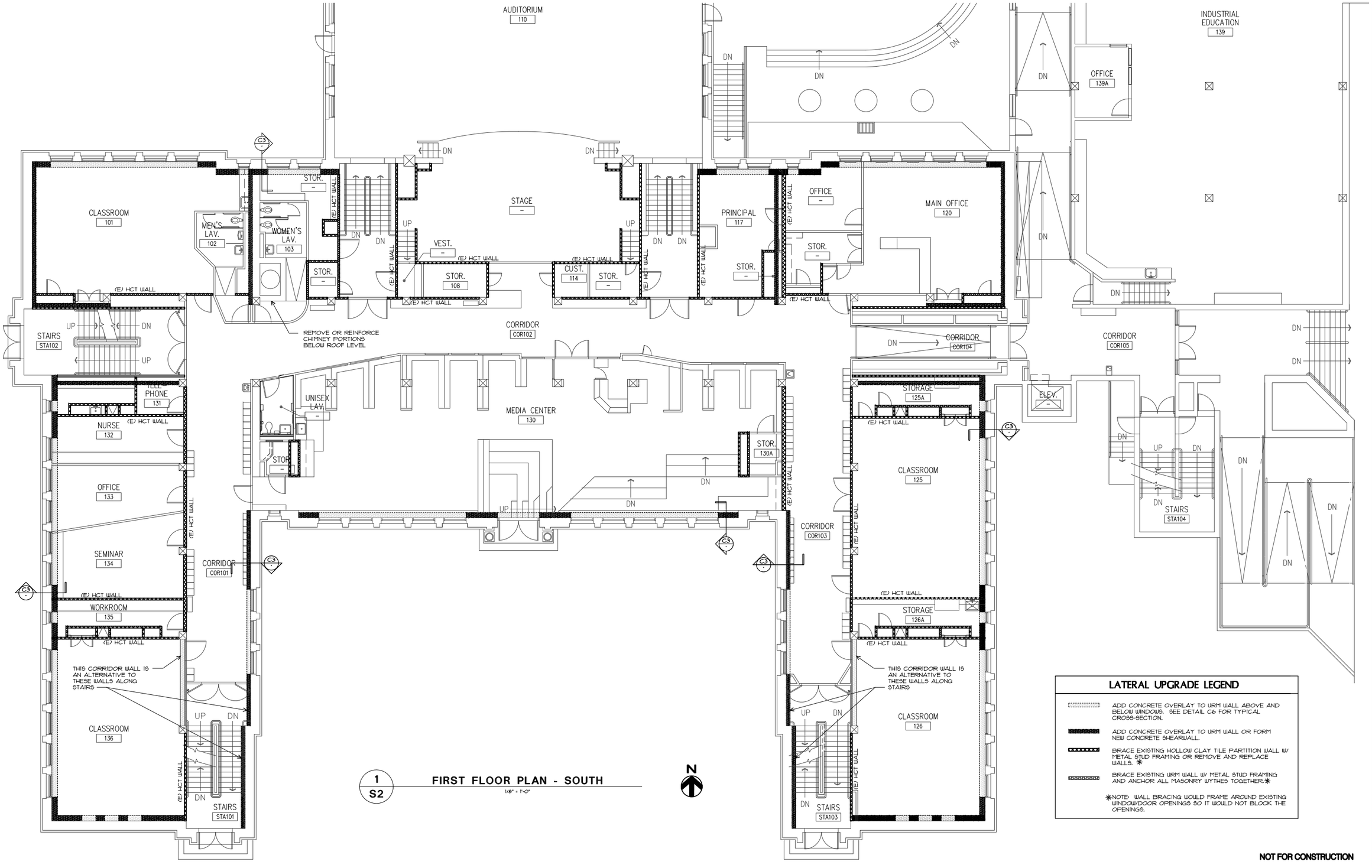
BASEMENT PLAN

Structural Registered Professional Engineer
18760PE
Oregon
February 3, 1987
Tonya K. Halog
EXPIRES: 6-30-11

Date:
Revisions:
Drawn: TKH
Check:
File:
Project:

SHEET NUMBER:

S1



1 / S2 **FIRST FLOOR PLAN - SOUTH**

1/8" = 1'-0"

N

LATERAL UPGRADE LEGEND

- ADD CONCRETE OVERLAY TO URM WALL ABOVE AND BELOW WINDOWS. SEE DETAIL C6 FOR TYPICAL CROSS-SECTION.
- ADD CONCRETE OVERLAY TO URM WALL OR FORM NEW CONCRETE SHEARWALL.
- BRACE EXISTING HOLLOW CLAY TILE PARTITION WALL W/ METAL STUD FRAMING OR REMOVE AND REPLACE WALLS. *
- BRACE EXISTING URM WALL W/ METAL STUD FRAMING AND ANCHOR ALL MASONRY WYTHES TOGETHER.*

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Structural Engineers Since 1945
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Portland, Oregon 97205
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Web: www.jgpierson.com

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PORTLAND PUBLIC SCHOOLS

BEVERLY CLEARY FERNWOOD CAMPUS SCHEMATIC SEISMIC UPGRADES

SHEET TITLE:

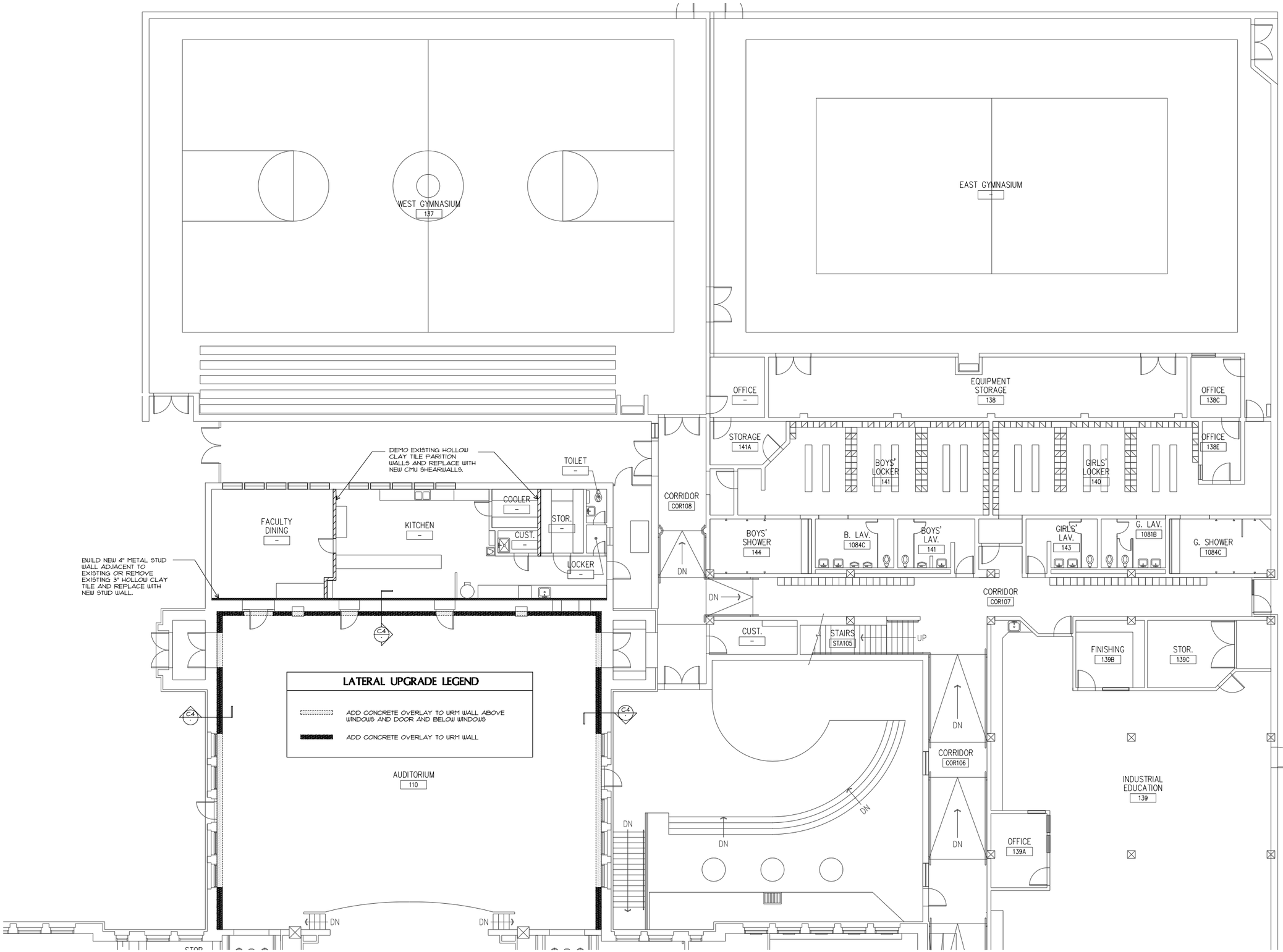
FIRST FLOOR PLAN - SOUTH

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER
18760PE
OREGON
February 3, 1987
TONYA K. HALOS
EXPIRES: 6-30-11

Date:
Revisions:
Drawn: TKH
Check:
File:
Project:

SHEET NUMBER:

S2



1 / S3 FIRST FLOOR PLAN - NORTH

1/8" = 1'-0"

N

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Email: mail@jgpierson.com
Web: www.jgpierson.com

PORTLAND PUBLIC SCHOOLS

BEVERLY CLEARY FERNWOOD CAMPUS SCHEMATIC SEISMIC UPGRADES

SHEET TITLE:

FIRST FLOOR PLAN - NORTH

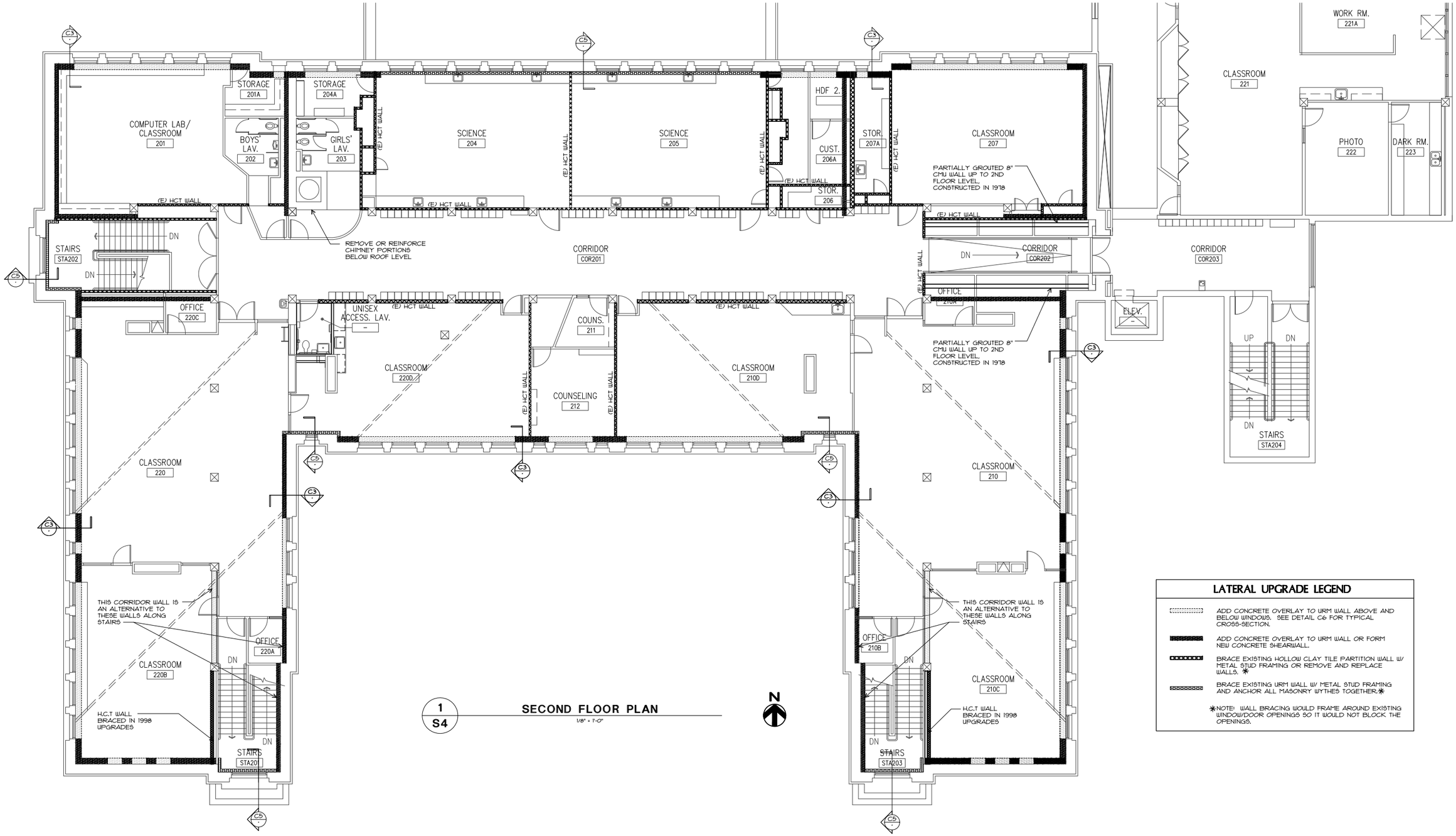
STRUCTURAL REGISTERED PROFESSIONAL ENGINEER
18760PE
OREGON
February 3, 1987
TONYA K. HALOS
EXPIRES: 6-30-11

Date:
Revisions:

Drawn: TKH
Check:
File:
Project:

SHEET NUMBER:

S3



1/S4 SECOND FLOOR PLAN

1/8" = 1'-0"

N

LATERAL UPGRADE LEGEND

- ADD CONCRETE OVERLAY TO URM WALL ABOVE AND BELOW WINDOWS. SEE DETAIL C6 FOR TYPICAL CROSS-SECTION.
- ADD CONCRETE OVERLAY TO URM WALL OR FORM NEW CONCRETE SHEARWALL.
- BRACE EXISTING HOLLOW CLAY TILE PARTITION WALL W/ METAL STUD FRAMING OR REMOVE AND REPLACE WALLS. *
- BRACE EXISTING URM WALL W/ METAL STUD FRAMING AND ANCHOR ALL MASONRY WYTHES TOGETHER.*

*NOTE: WALL BRACING WOULD FRAME AROUND EXISTING WINDOW/DOOR OPENINGS SO IT WOULD NOT BLOCK THE OPENINGS.

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BEVERLY CLEARY FERNWOOD CAMPUS SCHEMATIC SEISMIC UPGRADES

SHEET TITLE:

SECOND FLOOR PLAN

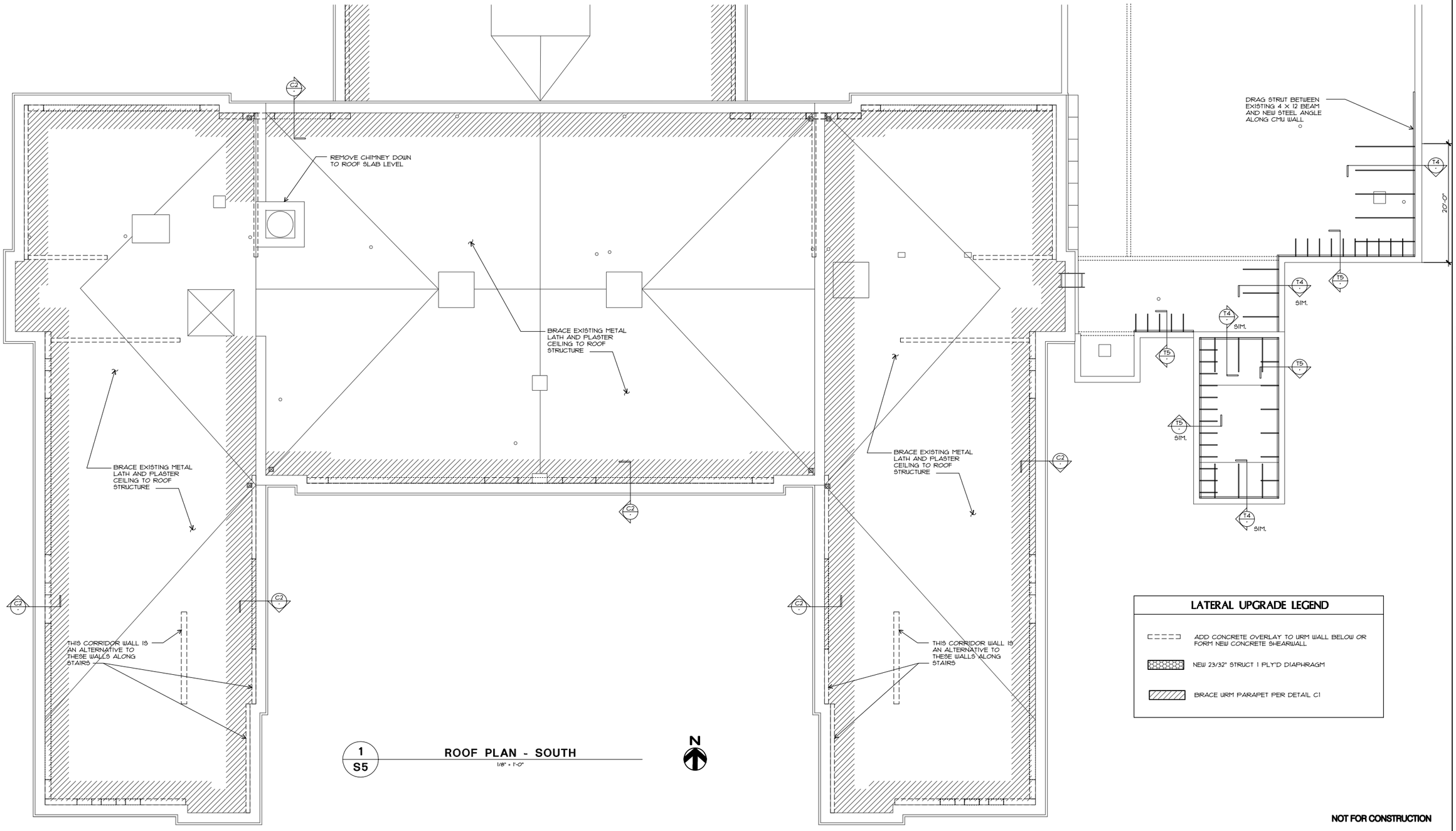
STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 18760PE OREGON February 3, 1987 TONYA K. HALCO

EXPIRES: 6-30-11

Date:
Revisions:
Drawn: TKH
Check:
File:
Project:

SHEET NUMBER:

S4



1 / S5 ROOF PLAN - SOUTH

1/8" = 1'-0"

LATERAL UPGRADE LEGEND

- ADD CONCRETE OVERLAY TO URM WALL BELOW OR FORM NEW CONCRETE SHEARWALL
- NEW 23/32" STRUCT I PLY'D DIAPHRAGM
- BRACE URM PARAPET PER DETAIL C1

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PORTLAND PUBLIC SCHOOLS

BEVERLY CLEARY FERNWOOD CAMPUS SCHEMATIC SEISMIC UPGRADES

SHEET TITLE:

ROOF PLAN - SOUTH

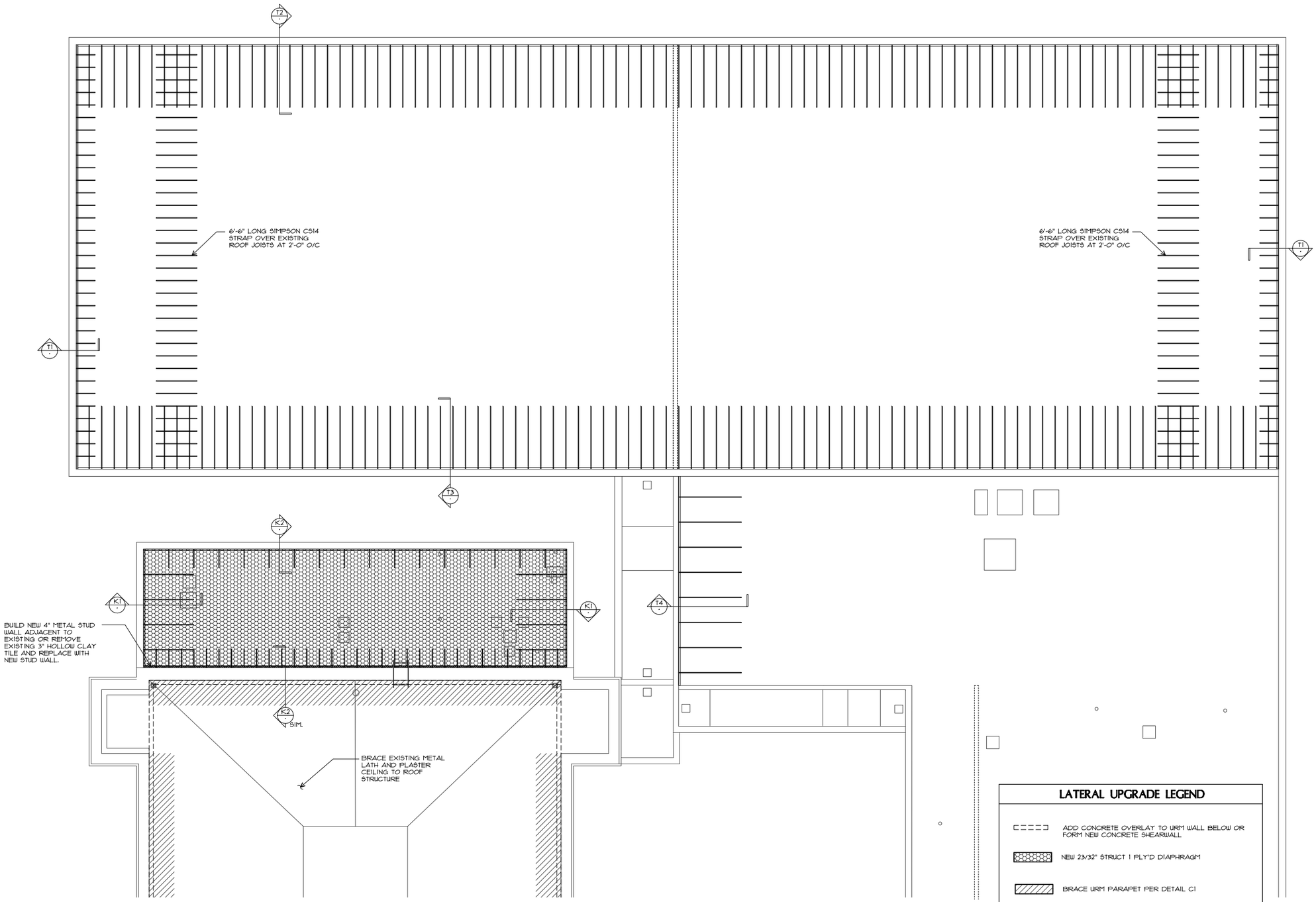
STRUCTURAL REGISTERED PROFESSIONAL ENGINEER
18760PE
OREGON
February 3, 1987
TONYA K. HALCO

EXPIRES: 6-30-11

Date:
Revisions:
Drawn: TKH
Check:
File:
Project:

SHEET NUMBER:

S5



LATERAL UPGRADE LEGEND

- ADD CONCRETE OVERLAY TO URM WALL BELOW OR FORM NEW CONCRETE SHEARWALL
- NEW 23/32" STRUCT I PLY'D DIAPHRAGM
- BRACE URM PARAPET PER DETAIL C1

1 / S6 ROOF PLAN - NORTH

1/8" = 1'-0"

N

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Portland, Oregon 97205
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PORTLAND
PUBLIC
SCHOOLS

BEVERLY
CLEARY
FERNWOOD
CAMPUS
SCHEMATIC
SEISMIC
UPGRADES

SHEET TITLE:

ROOF
PLAN - NORTH

STRUCTURAL
REGISTERED PROFESSIONAL
ENGINEER
18760PE
OREGON
February 3, 1987
TONYA K. HALOG
EXPIRES: 6-30-11

Date:
Revisions:

Drawn: TKH
Check:
File:
Project:

SHEET NUMBER:

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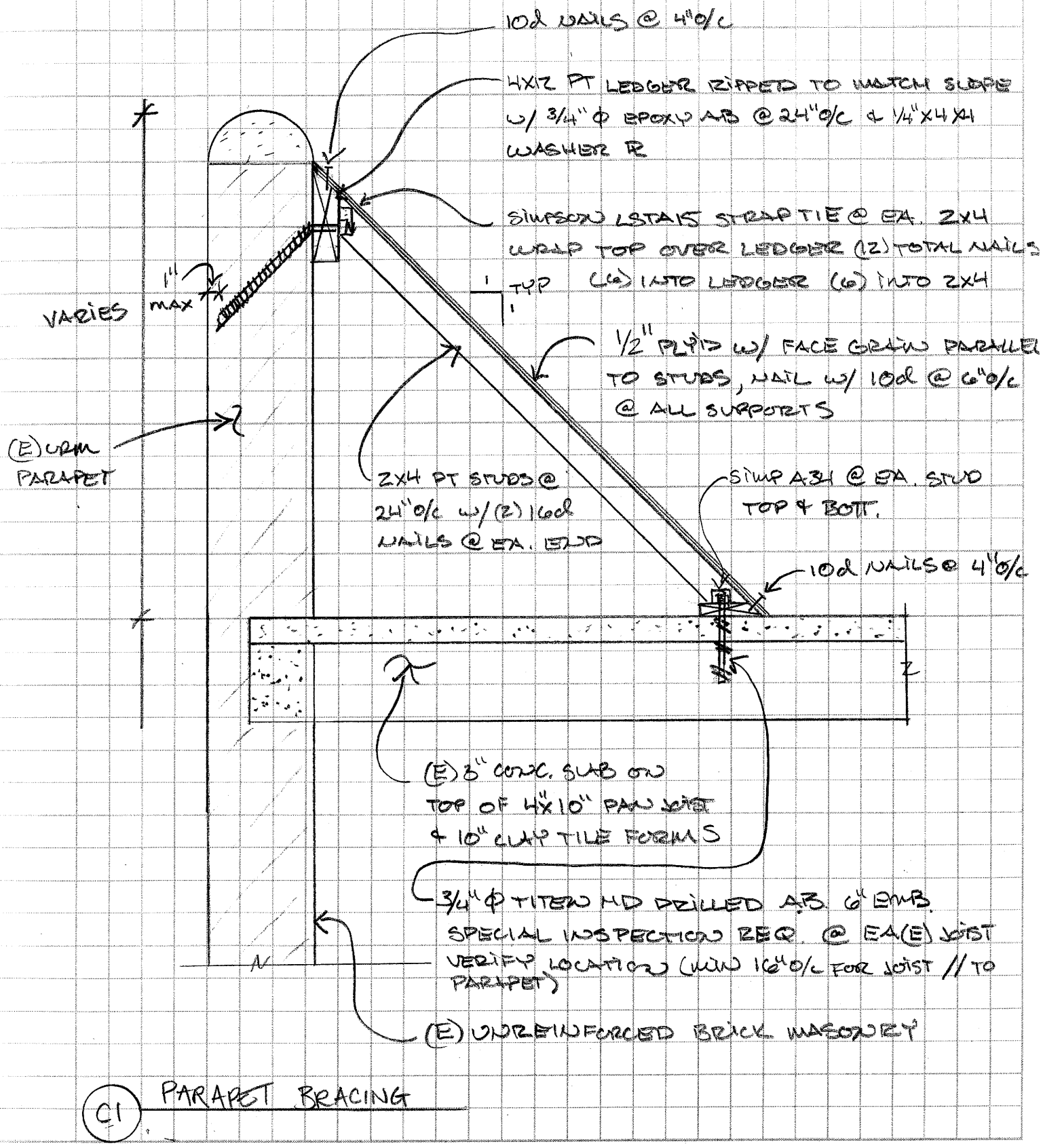


C1 PARAPET BRACING

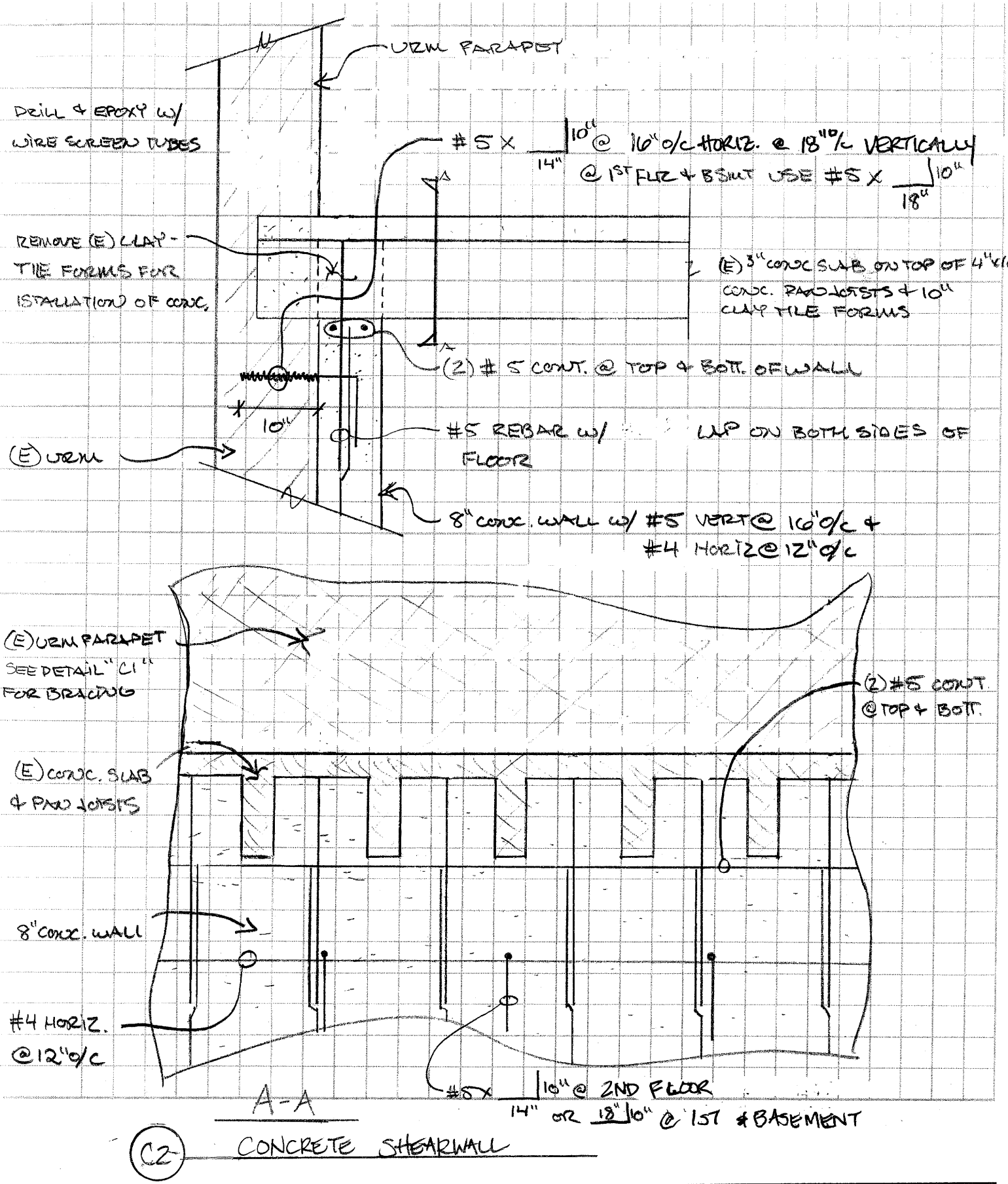
James G. Pierson, Inc.

Consulting Structural Engineers

320 S.W. Stark, Suite 535 Portland, Oregon 97204

Tel: (503) 226-1286 Fax: (503) 226-3130

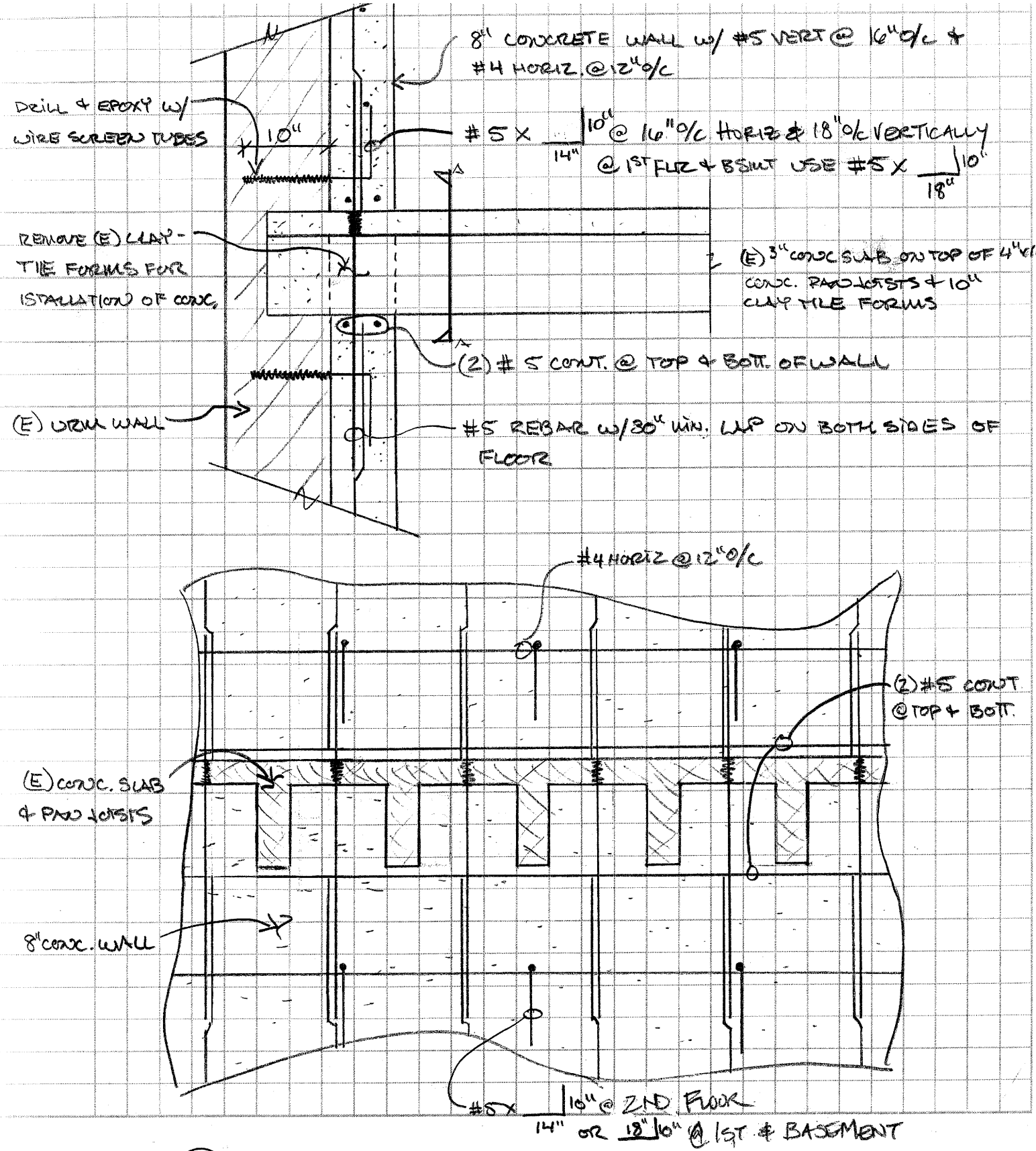
Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: MAR 2011
Client: PORTLAND PUBLIC SCHOOLS	Sheet no. C1



A-A

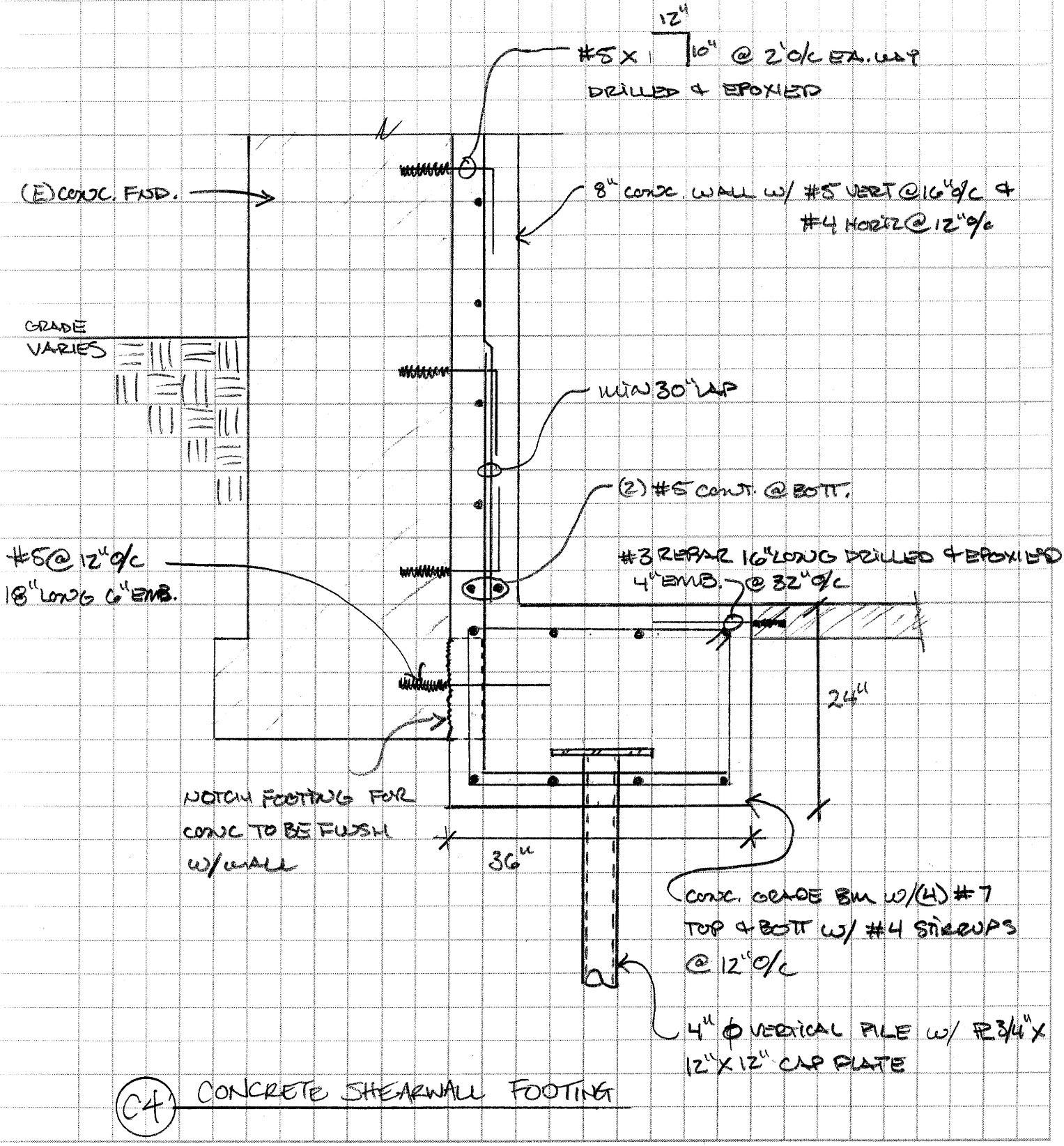
C2 CONCRETE SHEARWALL

James G. Pierson, Inc. **Consulting Structural Engineers** 320 S.W. Stark, Suite 535 Portland, Oregon 97204 Tel: (503) 226-1286 Fax: (503) 226-3130	Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
	Location: BEVERLY CLEARY / FERNWOOD CAMPUS	Date: MAR 2011
	Client: PORTLAND PUBLIC SCHOOLS	Sheet no. C2



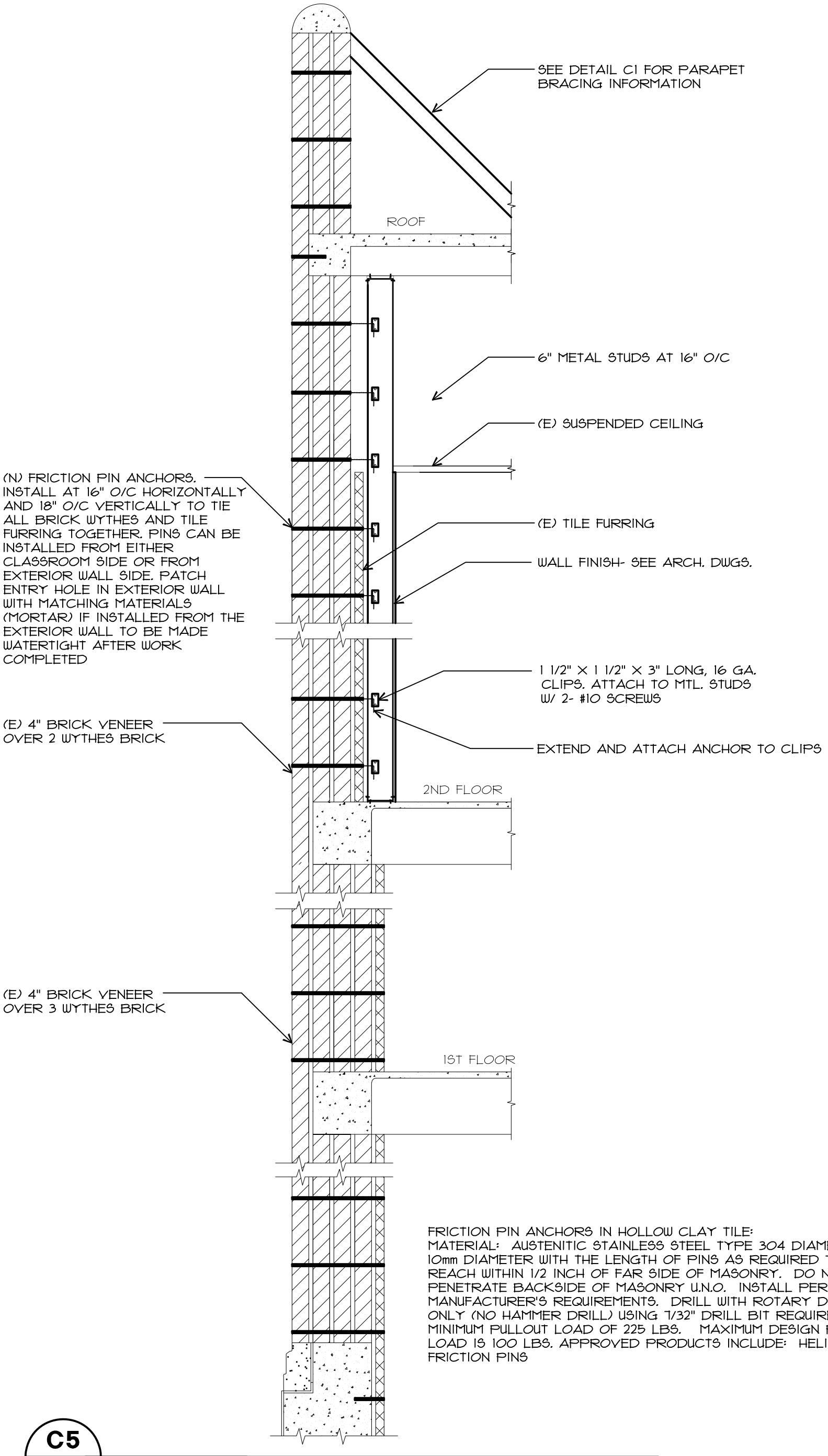
C3

James G. Pierson, Inc. **Consulting Structural Engineers** 320 S.W. Stark, Suite 535 Portland, Oregon 97204 Tel: (503) 226-1286 Fax: (503) 226-3130	Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
	Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: MAR 2011
	Client: PORTLAND PUBLIC SCHOOLS	Sheet no.: C3



C4 CONCRETE SHEARWALL FOOTING

James G. Pierson, Inc. **Consulting Structural Engineers** 320 S.W. Stark, Suite 535 Portland, Oregon 97204 Tel: (503) 226-1286 Fax: (503) 226-3130	Project: SEISMIC EVALUATION & LATERAL UPGRADE	Job no.
	Location: BEVERLY CLEARY FERNWOOD CAMPUS	Date: JAN 2011
	Client: PORTLAND PUBLIC SCHOOLS	Sheet no.: C4



FRICTION PIN ANCHORS IN HOLLOW CLAY TILE:
MATERIAL: AUSTENITIC STAINLESS STEEL TYPE 304 DIAMETER = 10mm DIAMETER WITH THE LENGTH OF PINS AS REQUIRED TO REACH WITHIN 1/2 INCH OF FAR SIDE OF MASONRY. DO NOT PENETRATE BACKSIDE OF MASONRY U.N.O. INSTALL PER MANUFACTURER'S REQUIREMENTS. DRILL WITH ROTARY DRILL ONLY (NO HAMMER DRILL) USING 7/32" DRILL BIT REQUIRED MINIMUM PULLOUT LOAD OF 225 LBS. MAXIMUM DESIGN PULLOUT LOAD IS 100 LBS. APPROVED PRODUCTS INCLUDE: HELIFIX FRICTION PINS

C5

1/2" = 1'-0"

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Consulting Structural Engineers
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Portland, Oregon 97205
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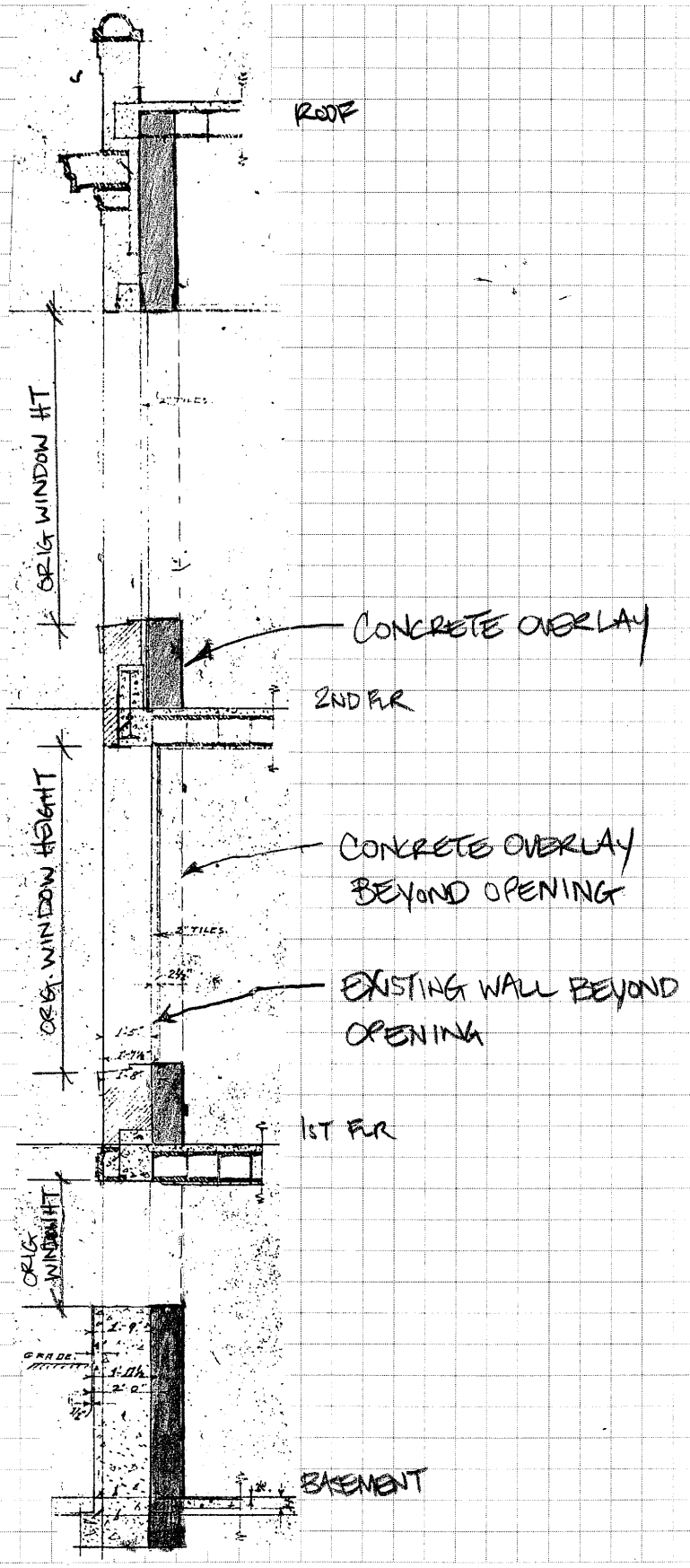
Fax: (503) 226-3130
Email: mail@jgpierson.com
Web: www.jgpierson.com

CLIENT NAME:
PORTLAND PUBLIC SCHOOLS
501 N. DIXON ST.
PORTLAND, OREGON 97227

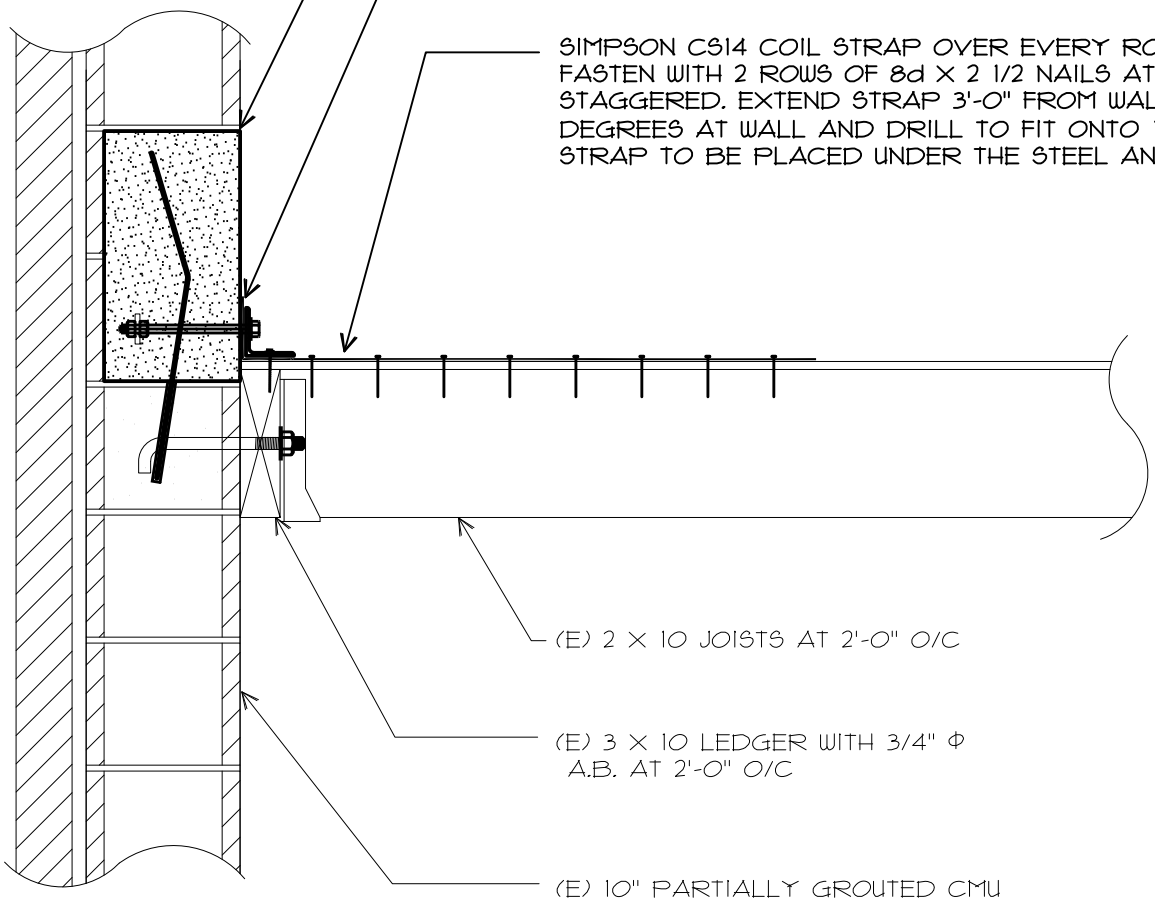
JOB NAME:
BEVERLY CLEARY
FERNWOOD CAMPUS
SCHEMATIC SEISMIC UPGRADES

SHEET NUMBER:
C5



C6 CONCRETE OVERLAY AT WINDOWS

James G. Pierson, Inc.	Project	Job no.
Consulting Structural Engineers 320 S.W. Stark, Suite 535 Portland, Oregon 97204 Tel: (503) 226-1286 Fax: (503) 226-3130	SEISMIC EVALUATION & LATERAL UPGRADE	
	Location BEVERLY CLEARY FERNWOOD CAMPUS	Date APR 2011
	Client PORTLAND PUBLIC SCHOOLS	Sheet no. C6



T1

1" = 1'-0"

James G. Pierson, Inc.
STRUCTURAL ENGINEERS Since 1945
Consulting Structural Engineers
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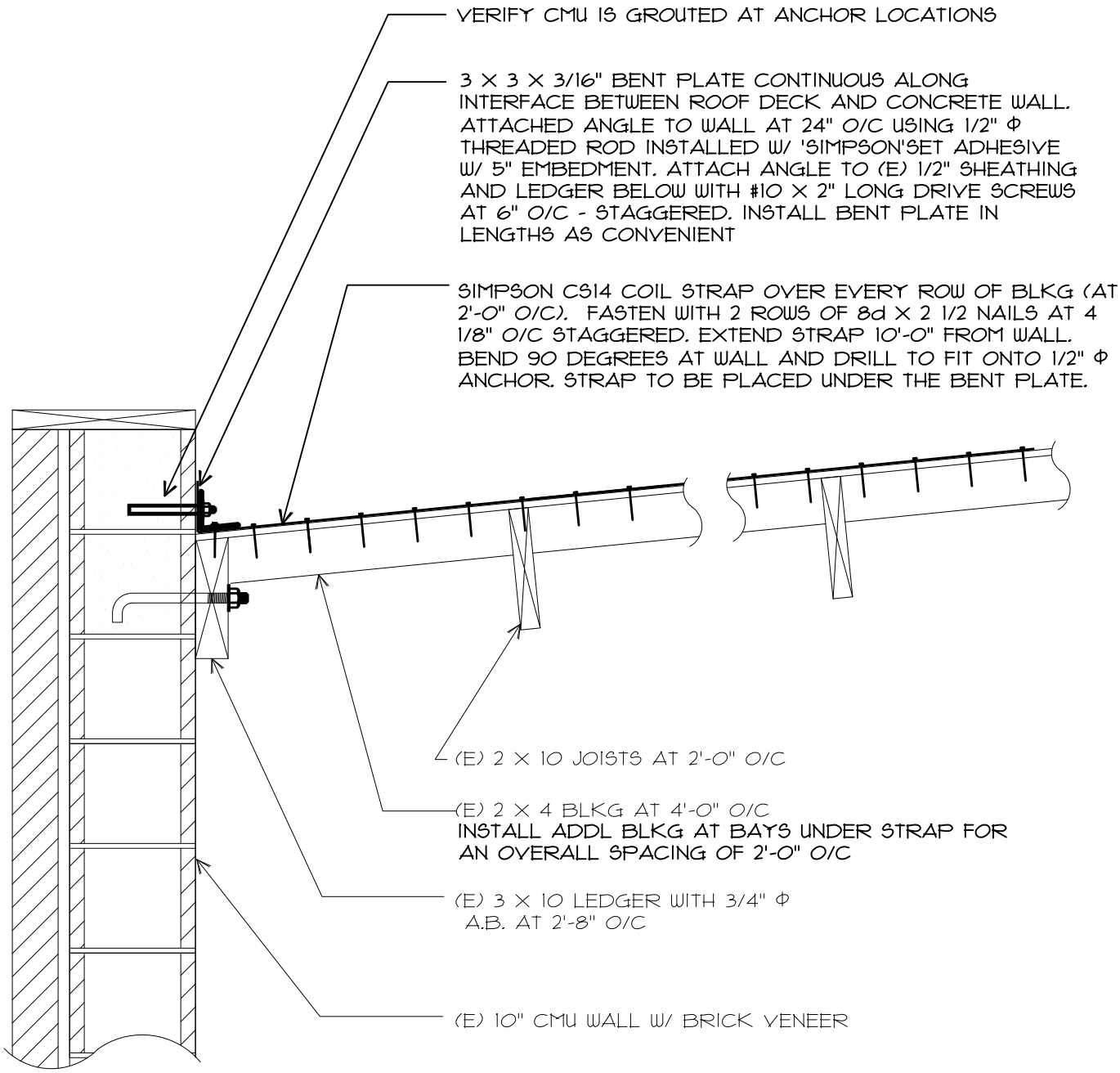
Portland, Oregon 97205
Tel: (503) 226-1286
Fax: (503) 226-3130
Email: mail@jgpierson.com
Web: www.jgpierson.com

CLIENT NAME:	JOB NAME:	SHEET NUMBER:
PORTLAND PUBLIC SCHOOLS 501 N. DIXON ST. PORTLAND, OREGON 97227	BEVERLY CLEARY FERNWOOD CAMPUS SCHEMATIC SEISMIC UPGRADES	T1



T2

1" = 1'-0"

James G. Pierson, Inc.
STRUCTURAL ENGINEERS Since 1945
Consulting Structural Engineers
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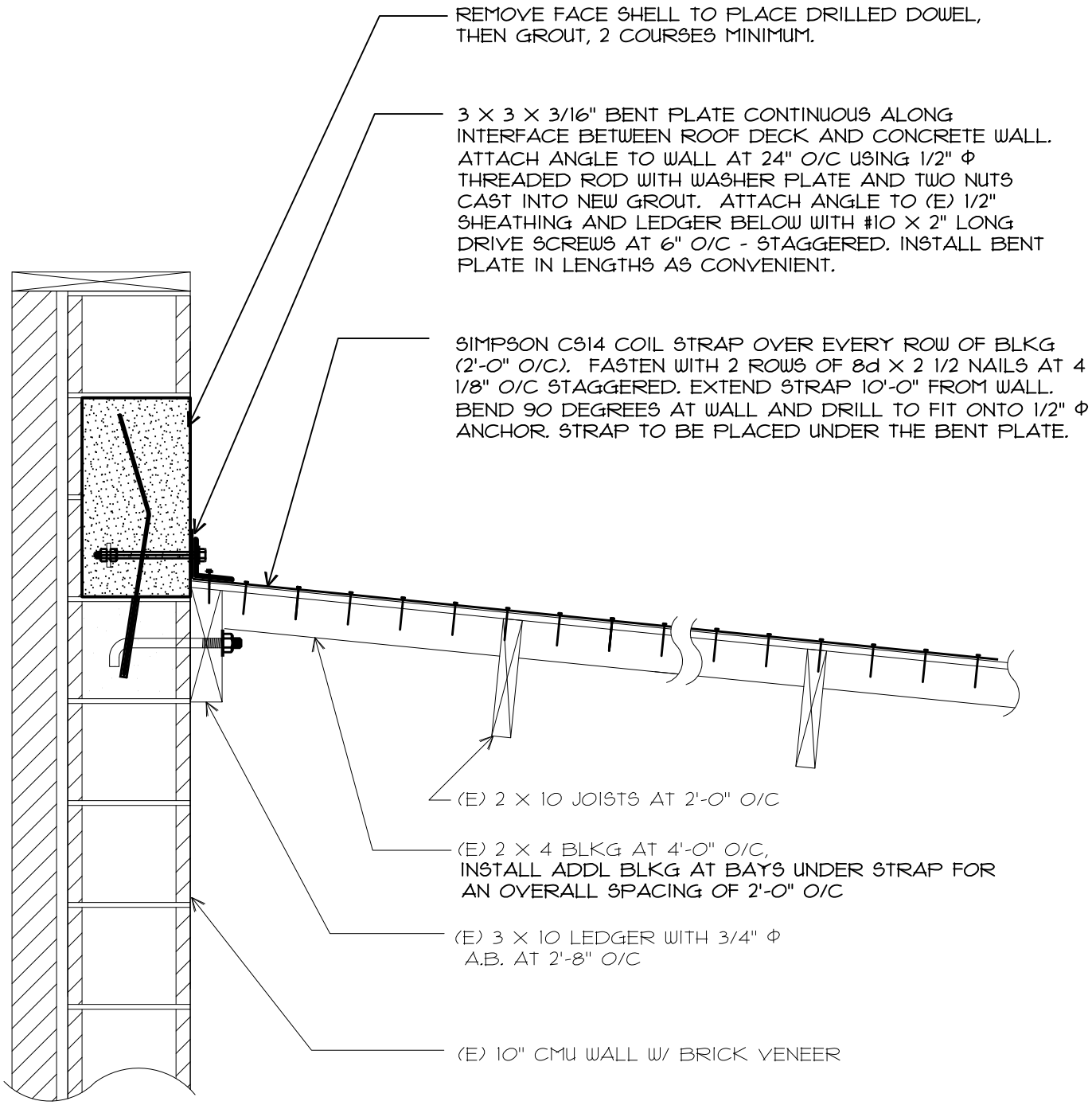
Portland, Oregon 97205
Tel: (503) 226-1286
Fax: (503) 226-3130
Email: mail@jgpierson.com
Web: www.jgpierson.com

CLIENT NAME:	JOB NAME:	SHEET NUMBER:
PORTLAND PUBLIC SCHOOLS 501 N. DIXON ST. PORTLAND, OREGON 97227	BEVERLY CLEARY FERNWOOD CAMPUS SCHEMATIC SEISMIC UPGRADES	T2



T3

1" = 1'-0"

James G. Pierson, Inc.
STRUCTURAL ENGINEERS Since 1945
Consulting Structural Engineers
610 S.W. Alder, Suite 918
Portland, Oregon 97205
Tel: (503) 226-1286
Fax: (503) 226-3130
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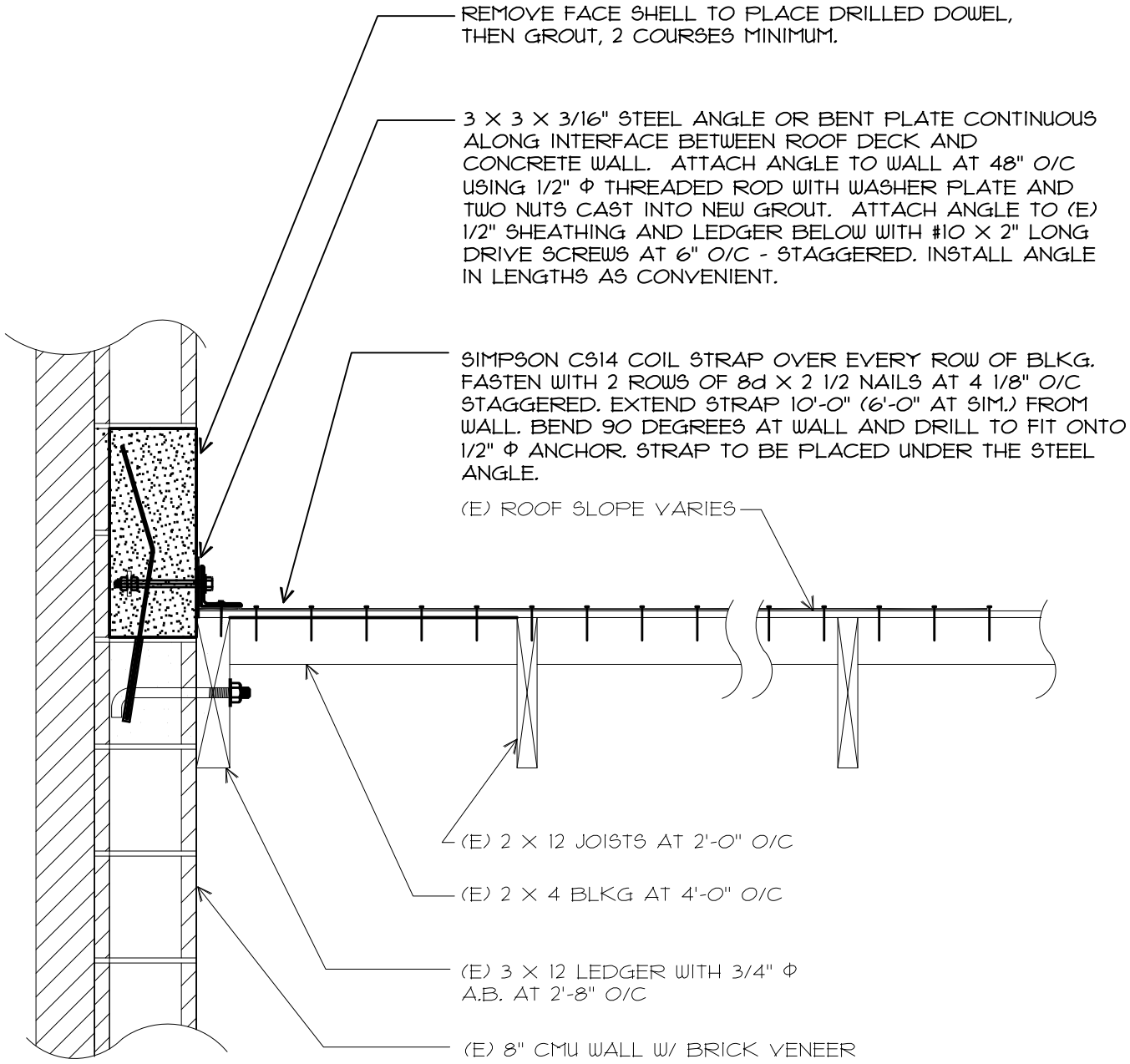
CLIENT NAME:
PORTLAND PUBLIC SCHOOLS
501 N. DIXON ST.
PORTLAND, OREGON 97227

JOB NAME:
BEVERLY CLEARY
FERNWOOD CAMPUS
SCHEMATIC SEISMIC UPGRADES

SHEET NUMBER:
T3



T4

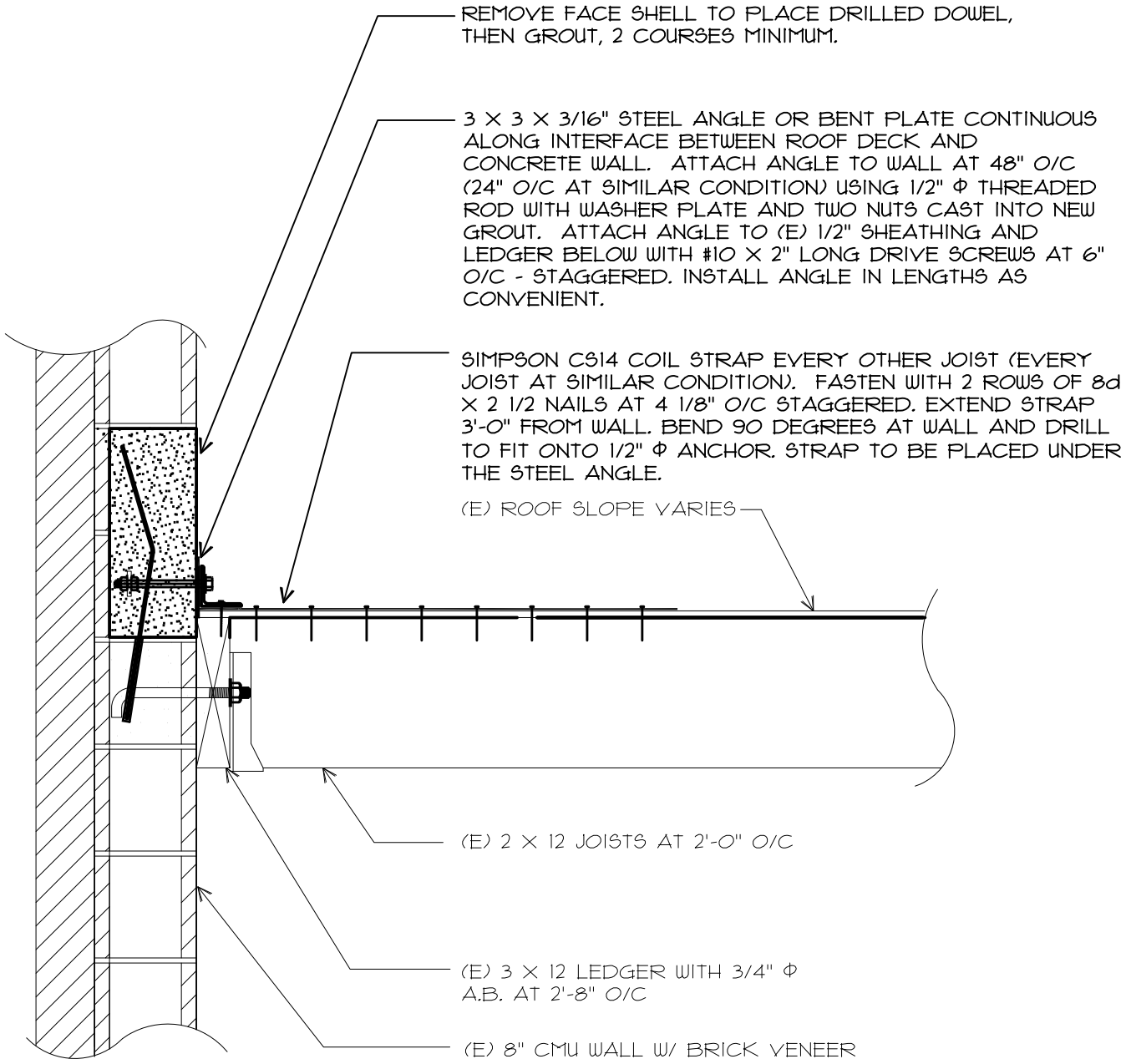
1" = 1'-0"

James G. Pierson, Inc.
STRUCTURAL ENGINEERS Since 1945
Consulting Structural Engineers
610 S.W. Alder, Suite 918
Portland, Oregon 97205
Tel: (503) 226-1286
Fax: (503) 226-3130
Email: mail@jgpierson.com
Web: www.jgpierson.com

CLIENT NAME:
PORTLAND PUBLIC SCHOOLS
501 N. DIXON ST.
PORTLAND, OREGON 97227

JOB NAME:
BEVERLY CLEARY
FERNWOOD CAMPUS
SCHEMATIC SEISMIC UPGRADES

SHEET NUMBER:
T4



T5

1" = 1'-0"

James G. Pierson, Inc.
STRUCTURAL ENGINEERS Since 1945
Consulting Structural Engineers
610 S.W. Alder, Suite 918
Portland, Oregon 97205
Tel: (503) 226-1286
Fax: (503) 226-3130
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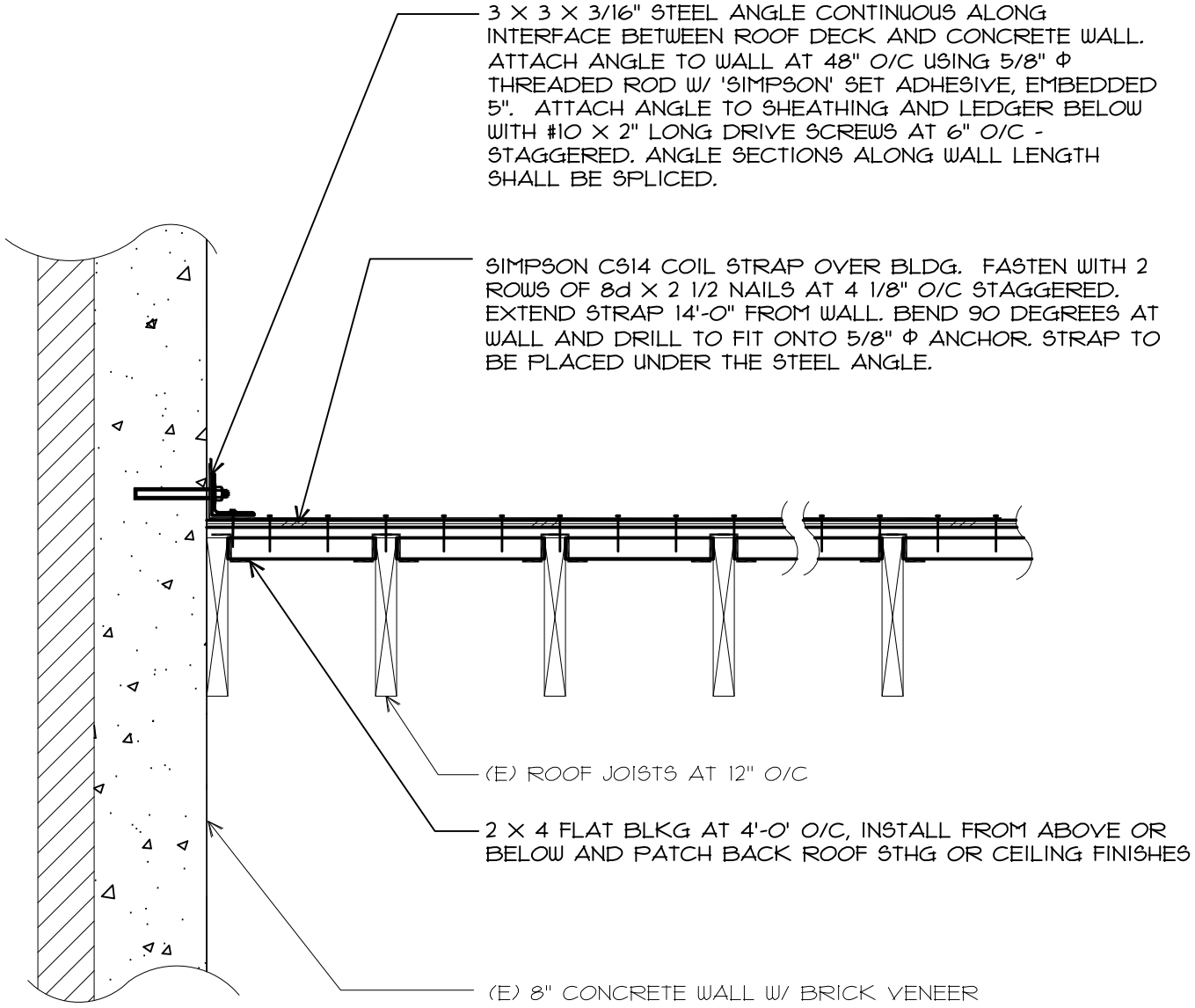
T5



K1

1" = 1'-0"

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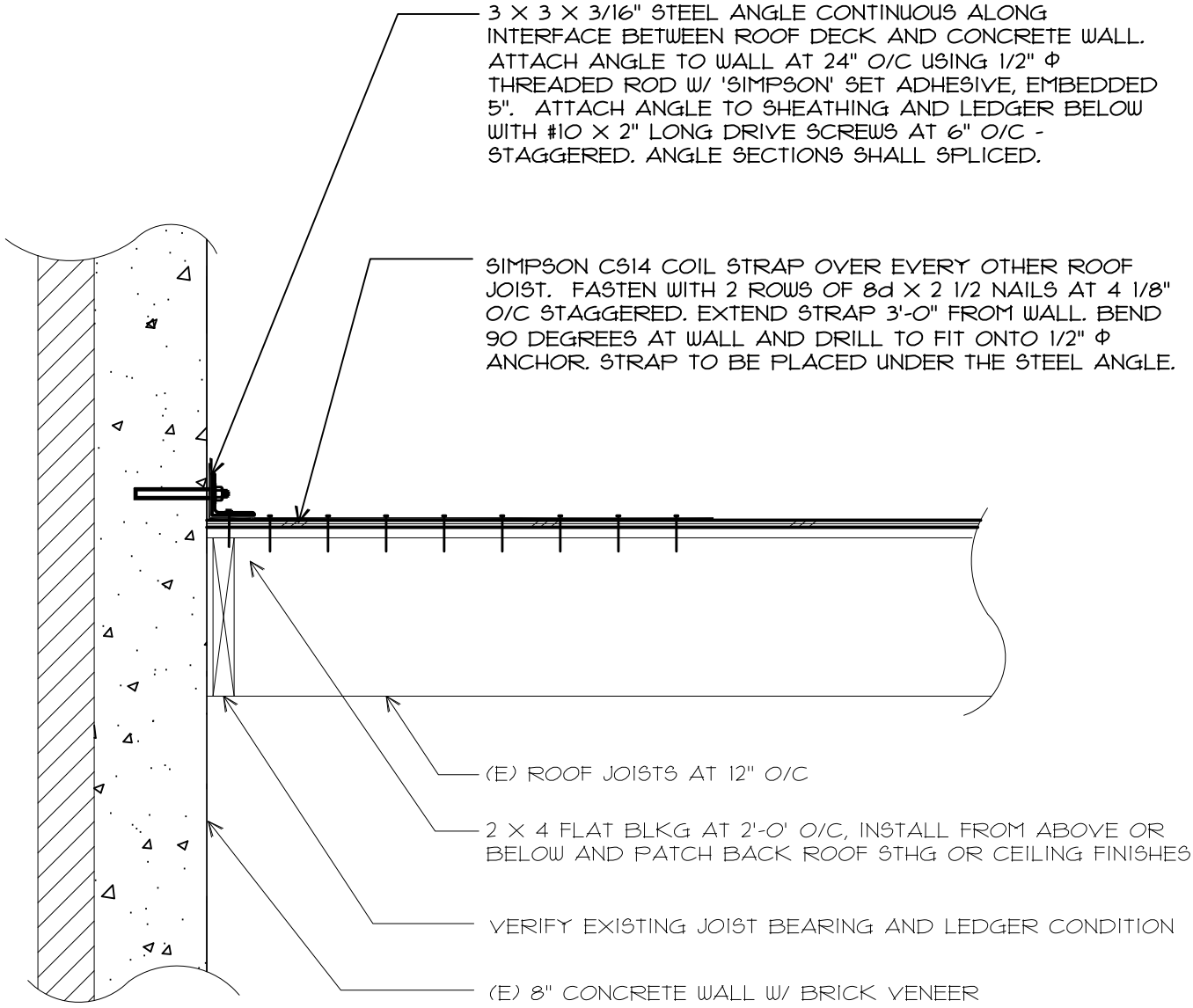
K1



K2

1" = 1'-0"

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SCHEMATIC SEISMIC UPGRADES

SHEET NUMBER:
K2

Appendix E
Photographs

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Appendix F
Direct Construction Cost Summary
Prepared by Architectural Cost Consultants, LLC

Seismic Upgrades	***Architectural Cost Consultants, LLC***	Estimate Date: 11-Apr-11
Beverly Cleary Fernwood Campus	James A. Jerde, AIA - Stanley J. Pszczolkowski, AIA	Document Date: no date
Portland, Oregon	8060 SW Pfaffle Street, Suite 110	Print Date: 11-Apr-11
James G. Pierson, Inc	Tigard, Oregon 97223-8489	Print Time: 3:11 PM
Concept Probable Cost Estimate	Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com	Constr. Start: Summer 12

DIRECT CONSTRUCTION COST SUMMARY

Component	Area	$ / SF	Total
Seismic Upgrade Estimate	87,627 sf	$68.14 /sf	$5,971,278
TOTAL DIRECT CONSTRUCTION COST	87,627 sf	$68.14 /sf	**$5,971,278**

The above estimates are for direct construction cost only. They do not include furnishings & equipment, architect and engineer design fees, consultant fees, inspection and testing fees, plan check fees, state sales tax, hazardous material testing and removal, financing costs, nor any other normally associated development costs.

The above estimates assume a competitively bid project, with at least three qualified bidders in each of the major sub-trades as well as the general contractors.

The above estimates assume a construction start date of: **Summer 12** If the start of construction is delayed beyond the date above, the estimates must be indexed at a rate of 3 to 4% per year compounded.

This is a probable cost estimate based on preliminary documentation provided by the structural engineer. The actual construction documents will vary from this estimate due to document completion, detailing, specification, addendum, etc.. The estimator has no control over the cost or availability of labor, equipment, materials, over market conditions or contractor's method of pricing, contractor's construction logistics and scheduling. This estimate is formulated on the estimators professional judgment and experience. The estimate makes no warranty, expressed or implied, that the quantities, bids or the negotiated cost of the work will not vary from the estimators opinion of probable construction cost.

Reference to roof area designations is from the 2010 Roof Assessment Report. Roofing work is limited to areas of work for seismic work only. Refer to Roof Assessment report for cost of replacing all roofing and flashing systems.

It is recommended a comprehensive architectural and systems feasibility study be conducted to understand the impacts and magnitude of this proposed seismic upgrade. The mechanical, plumbing, electrical, fire alarm, security, data, etc. systems are impacted throughout the facility, either having to be removed, relocated and modified to accommodate the new shear walls. Room clearances and usability may be greatly altered and possibly become non- functional. Code and ADA accessibility may be adversely impacted. Systems equipment, piping, finishes, casework, etc. are reused and modified as required to be re-installed. Systems equipment is not upgraded or replaced. The potential change order risk for this upgrade would be considered to be severe due to the age of systems equipment and condition of facility.

Seismic Upgrades	***Architectural Cost Consultants, LLC***	Estimate Date: 11-Apr-11
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SUMMARY — **Base Building**

DIRECT CONSTRUCTION COSTS	%	$ / sf	Cost	Comments
Area		87,627 sf		
02 | EXISTING CONDITIONS		$5.27	$462,067	
03 | CONCRETE		14.37	1,258,888	
04 | MASONRY		0.16	14,338	
05 | METALS		0.73	64,137	
06 | WOOD, PLASTICS & COMPOSITES		2.02	177,271	
07 | THERMAL & MOISTURE PROTECTION		1.88	164,819	
08 | OPENINGS		0.11	9,918	
09 | FINISHES		4.55	398,963	
10 | SPECIALTIES		0.08	6,950	
11 | EQUIPMENT		0.00	0	
12 | FURNISHINGS		0.00	0	
13 | SPECIAL CONSTRUCTION		3.70	324,159	
14 | CONVEYING EQUIPMENT		0.00	0	
21 | FIRE SUPPRESSION		0.00	0	
22 | PLUMBING		2.31	202,713	allowance, needs further study
23 | HVAC		2.57	225,000	allowance, needs further study
26 | ELECTRICAL		4.62	405,000	allowance, needs further study
27 | COMMUNICATIONS		0.86	75,000	allowance, needs further study
28 | ELECTRONIC SAFETY & SECURITY		0.86	75,000	allowance, needs further study
31 | EARTHWORK		3.63	318,188	
32 | EXTERIOR IMPROVEMENTS		0.00	0	
33 | UTILITIES		0.00	0	
SUB-TOTAL		**$47.73**	**$4,182,411**	
Estimating Contingency	20.00%	9.55	836,482	
Index To Construction Start	4.00%	2.29	200,756	
General Conditions / Insurance / Bond	10.00%	5.96	521,965	
General Contractor OH & Profit	4.00%	2.62	229,665	
TOTAL DIRECT CONSTRUCTION COST		**$68.14**	**$5,971,278**	

Seismic Upgrades	***Architectural Cost Consultants, LLC***	Estimate Date: 11-Apr-11
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Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
02 | EXISTING CONDITIONS						
Structure Demolition						
hazardous material abatement	87,627	sf	0.00	0		NIC, not part of this study
shear wall work						
sawcut slab for new footing	1,110	lf	9.00	9,986		
remove slab	3,179	sf	5.00	15,893		
chip / remove footing / notch	1,060	lf	20.00	21,190		
remove wall finishes for shear wall work	24,197	sf	1.25	30,246		
remove base & flooring @ shear wall work	7,585	sf	0.80	6,068		
remove ct floor & base	351	sf	2.25	790		
cut / remove ceilings for shear wall work	7,936	sf	1.00	7,936		
remove tlt partitions, salvage to reinstall	8	ea	40.00	320		
remove urinal screen, salvage to reinstall	2	ea	30.00	60		
remove / reinstall tlt accessories	4	sum	250.00	1,000		
remove partitions, perpendicular	234	sf	2.50	585		
remove partitions, parallel	110	lf	20.00	2,200		
remove mech room partitions	240	sf	4.50	1,080		
remove door & frame, salvage	17	ea	105.00	1,785		
remove relite, salvage	3	ea	55.00	165		
remove casework, salvage	362	lf	16.00	5,792		
remove, salvage & reinstall mkrbds, etc	1	sum	3,500.00	3,500		
remove, salvage & reinstall lockers	27	frame	55.00	1,485		
misc removals / reinstall	52,925	sf	0.76	40,000		allowance
remove water closets, salvage to reinstall	8	ea	195.00	1,560		
remove urinals, salvage to reinstall	2	ea	195.00	390		
remove wall hung sink, salvage to reinsta	2	ea	165.00	330		
remove casework sink, salvage to reinsta	2	ea	165.00	330		
remove service sink, salvage to reinstall	1	ea	175.00	175		
remove clay tile forms @ floor slab	1,351	lf	7.00	9,457		
core drill floor slab for r/s penetration	1,013	ea	45.00	45,585		
remove clay tile forms @ roof slab	739	lf	7.00	5,170		
roof seismic work						
cut & remove roofing for parapet bracing	4,665	sf	1.25	5,831		@ roof area C,D, E & F
remove / modify & re-install roof ladder	1	sum	1,000.00	1,000		@ roof area A to C
remove roofing & flashing	1,285	sf	1.25	1,606		@ roof area G
cut & remove roofing & flashing	217	sf	1.25	271		@ roof area K
cut & remove roofing & flashing	396	sf	1.25	494		@ roof area A
cut & remove roofing & flashing	5,067	sf	1.25	6,334		@ roof area B
misc removals / reinstall @ above	11,631	sf	0.75	8,723		
weather protection @ above	11,631	sf	1.25	14,538		
remove chimney to roof top	16	vlf	225.00	3,600		
remove clay tile wall @ wall finishes	670	sf	2.75	1,843		@ kitchen - roof area G
remove & reinstall kitchen equipment	1	sum	10,000.00	10,000		
remove & reinstall cabinets	8	lf	45.00	360		
temp window protection	8,291	sf	1.75	14,509		
protection @ interior finishes to remain	52,925	sf	1.04	55,000		allowance
haul & disposal	1	sum	62,380.00	62,380		
misc shoring & support	1	sum	50,000.00	50,000		allowance
mobilization	1	sum	12,500.00	12,500		
Sub-total	87,627	sf	5.27	/sf	462,067	
SUB-TOTAL 02 | EXISTING CONDITIONS					**$462,067**	

Seismic Upgrades	***Architectural Cost Consultants, LLC***	Estimate Date: 11-Apr-11
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Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
03 | CONCRETE						
Poured-In-Place Concrete						
forming						
walls	25,671	sf	13.50	346,559		
Sub-total	87,627	sf	3.95	/sf	346,559	
Reinforcing Steel						
grade beam	27,547	lbs	0.88	24,241		
walls	53,909	lbs	0.98	52,831		
Sub-total	87,627	sf	0.88	/sf	77,072	
Redi-Mix Concrete						
4000 psi	1,022.1	cy	102.00	104,252		
Sub-total	87,627	sf	1.19	/sf	104,252	
Placing						
grade beam	247.2	cy	45.00	11,125		
walls	774.9	cy	155.00	120,104		
pump / transport concrete	1,022.1	cy	35.00	35,773		
Sub-total	87,627	sf	1.91	/sf	167,002	
Finishing						
trowel slabs	3,179	sf	1.25	3,973		
sealer	3,179	sf	0.55	1,748		
break wall ties, patch & plug	25,671	sf	1.50	38,507		
Sub-total	87,627	sf	0.50	/sf	44,228	
Miscellaneous						
wall prep	25,671	sf	1.25	32,089		
drill & epoxy dowel wall @ 18"v x 16" h	12,838	ea	30.00	385,140		
drill & epoxy dowel ftg @ 12" oc	1,060	ea	35.00	37,083		
drill & epoxy dowel exist slab @ 32" oc	415	ea	35.00	14,525		
misc. unaccounted for drill & epoxy	1,431	ea	30.00	42,938		
concrete washdown area	1	sum	8,000.00	8,000		
Sub-total	87,627	sf	5.93	/sf	519,775	
SUB-TOTAL 03 | CONCRETE					**$1,258,888**	
04 | MASONRY						
Concrete Masonry Units (CMU)						
shear wall work						
re-install cmu partitions @ mech room	240	sf	18.50	4,440		
cmu wall @ kitchen	456	sf	18.50	8,436		
r/s - material, install w/ above	2,436	lbs	0.60	1,462		
Sub-total	87,627	sf	0.16	/sf	14,338	
SUB-TOTAL 04 | MASONRY					**$14,338**	
05 | METALS						
Miscellaneous Metals						
reinforce remainder of chimney	1	sum	15,000.00	15,000		allowance, verify scope
miscellaneous	52,925	sf	0.20	10,585		
Sub-total	87,627	sf	0.29	/sf	25,585	

Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
05 | METALS - Continued						
Lt. Gague Studs						
metal stud @ URM wall w/o conc. overlay	1,952	sf	4.75	9,272		
drill & epoxy dowel wall @ 18"v x 16" h	976	ea	30.00	29,280		
Sub-total	87,627	sf	0.44	/sf	38,552	
SUB-TOTAL 05 | METALS					**$64,137**	
06 | WOOD, PLASTICS & COMPOSITES						
Rough Carpentry						
miscellaneous blocking & framing	52,925	sf	0.25	13,231		
parapet bracing detail - dtl C1						@ roof area C,D, E & F
4 x 12 ledger, ripped	933	lf	14.28	13,323		
3/4" epoxy ab @ 24" oc	467	ea	30.00	13,995		
2 x ledger @ roof	933	lf	3.00	2,799		
3/4" titen drilled ab	467	ea	22.00	10,263		
special inspection @ ea jst	1	sum	3,500.00	3,500		
2 x 4 studs @ 24" oc	6,596	sf	2.50	16,491		
simpson A34 @ ea stud t & b	933	ea	1.25	1,166		
1-1/2" plywood sheeting	6,596	sf	2.10	13,852		
seismic work @ roof area G						
5/8" plywood sheathing - struct 1	1,285	sf	2.00	2,570		
drill & anchor to wall	57	ea	18.00	1,026		
14' strap	8	ea	72.80	582		
3' strap	49	ea	15.75	772		
3 x 3 angle	173	lf	6.08	1,052		
seismic work @ roof area K						
drill & anchor to wall	25	ea	18.00	450		
3' strap	19	ea	15.75	299		
6' strap	6	ea	31.50	189		
break out cmu cell wall / grout / pin	25	ea	20.00	500		
3 x 3 angle	81	lf	6.08	492		
seismic work @ roof area A						
drill & anchor to wall	31	ea	18.00	558		
3' strap	19	ea	15.75	299		
6' strap	6	ea	31.50	189		
break out cmu cell wall / grout / pin	31	ea	20.00	620		
3 x 3 angle	107	lf	6.08	651		
drag strut	28	lf	20.00	560		
connection to wall	1	sum	275.00	275		
seismic work @ roof area B						
dtl T1	134	lf				
break out cmu cell wall / grout / pin	134	lf	20.00	2,680		
cont 3 x 3 x 3/16 angle	134	lf	6.08	815		
1/2" simpson titen ab @ 24" oc	67	ea	18.00	1,206		
CS14 strap	66	ea	15.75	1,040		
attach to wall w/ 1/2" simpson titen	66	ea	18.00	1,188		
dtl T2	191	lf				
cont 3 x 3 x 3/16 angle	191	lf	6.08	1,161		
1/2" simpson titen ab @ 24" oc	96	ea	18.00	1,728		
CS14 strap	96	ea	52.00	4,992		
attach to wall w/ 1/2" simpson titen	96	ea	0.00	0		incl w/ angle install

Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
06 | WOOD, PLASTICS & COMPOSITES - Continued						
Rough Carpentry - continued						
dtl T3	191	lf				
break out cmu cell wall / grout / pin	191	lf	20.00	3,820		
cont 3 x 3 x 3/16 angle	191	lf	6.08	1,161		
1/2" simpson titen ab @ 24" oc	96	ea	18.00	1,719		
CS14 strap	66	ea	52.00	3,432		
attach to wall w/ 1/2" simpson titen	66	ea	0.00	0		incl w/ angle install
dtl ?						
6'6" simpson CS14 strap	64	ea	33.80	2,163		
Sub-total	87,627	sf	1.45	/sf	126,809	
Interior Finish Carpentry / Millwork						
modify interior window trim for shear walls	2,546	lf	12.00	30,552		allowance
Sub-total	87,627	sf	0.35	/sf	30,552	
Architectural Wood Casework						
modify as reqd & reinstall casework	362.0	lf	55.00	19,910		
Sub-total	87,627	sf	0.23	/sf	19,910	
SUB-TOTAL 06 | WOOD, PLASTICS & COMPOSITES					**$177,271**	
07 | THERMAL & MOISTURE PROTECTION						
Insulation						
rigid insulation R-30						
@ roof area C,D, E & F	6,596	sf	2.75	18,140		
@ roof area G	1,285	sf	2.75	3,534		
Sub-total	87,627	sf	0.25	/sf	21,674	
Membrane Roofing						
@ roof area C,D, E & F						
membrane roofing @ sloped parapet brac	6,596	sf	5.50	36,280		
patch @ roof to new parapet brace	933	lf	6.00	5,598		
remove / revise drain area	8	ea	2,000.00	16,000		allowance
@ roof area G						
membrane roofing	1,285	sf	5.50	7,068		
parapet flashing	265	sf	7.00	1,855		
patch @ roof area K	217	sf	5.50	1,194		
parapet flashing repair @ roof area K	68	lf	13.00	884		
patch @ roof area A	396	sf	5.50	2,175		
parapet flashing repair @ roof area A	122	lf	13.00	1,586		
patch @ roof area B	5,067	sf	5.50	27,869		
parapet flashing repair @ roof area B	516	lf	13.00	6,708		
Sub-total	87,627	sf	1.22	/sf	107,217	
Flashing & Sheet Metal						
flashing						
termination / parapet flashing @ C,D, E	933	lf	12.00	11,196		
parapet cap - area G	105	lf	12.00	1,260		
wall to roof flashing @ cafeteria wall	67	lf	25.00	1,675		cover embed to wall - area G
miscellaneous						
@ roof area C,D, E & F	6,596	sf	0.35	2,309		
@ roof area G	1,285	sf	0.75	964		
Sub-total	87,627	sf	0.20	/sf	17,404	

Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
07 | THERMAL & MOISTURE PROTECTION - Continued						
Caulking & Sealants						
caulking / fire stopping	52,925	sf	0.35	18,524		
Sub-total	87,627	sf	0.21	/sf	18,524	
SUB-TOTAL 07 | THERMAL & MOISTURE PROTECTION					**$164,819**	
08 | OPENINGS						
Doors, Frames & Hardware (includes installation)						
interior doors						
reinstall door & frame	17	ea	450.00	7,650		
access doors	1	sum	1,500.00	1,500		
Sub-total	87,627	sf	0.10	/sf	9,150	
Relites & Sidelites						
reinstall	3	ea	256.00	768		
Sub-total	87,627	sf	0.01	/sf	768	
Windows						
windows		sf	0.00	0		assume to remain in place
Sub-total	87,627	sf	0.00	/sf	0	
Louvers						
remove / reinstall wall louvers		sf	0.00	0		assume w/ HVAC $ below
Sub-total	87,627	sf	0.00	/sf	0	
SUB-TOTAL 08 | OPENINGS					**$9,918**	
09 | FINISHES						
Gypsumboard Systems						
@ kitchen - roof area G						allowance, no detail
new 4" metal stud wall system	680	sf	3.50	2,380		
new gypboard	680	sf	2.25	1,530		
wall finishes	680	sf	4.75	3,230		
shear wall work						
re-install partitions	1,554	sf	7.85	12,199		
furr out new shear walls	24,197	sf	4.75	114,936		
@ urm wall w/ mtl stud	1,952	sf	2.25	4,392		
misc wall patch / repair	52,925	sf	1.04	55,000		
accessories, misc. etc.	1	sum	9,683.35	9,683		
Sub-total	87,627	sf	2.32	/sf	203,350	
Ceilings						
shear wall work						
patch ceilings	7,936	sf	6.75	53,565		
Sub-total	87,627	sf	0.61	/sf	53,565	
Ceramic Tile						
floor tile	351	sf	15.00	5,265		patch to match
base	143	lf	12.00	1,716		patch to match
wall tile	1,079	sf	12.00	12,948		patch to match
Sub-total	87,627	sf	0.23	/sf	19,929	

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Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
09 | FINISHES - Continued						
Resilient						
floor prep & floor covering patch to match	7,585	sf	3.75	28,442		
shear wall work						
rubber base	4,021	lf	1.75	7,036		
Sub-total	87,627	sf	0.40	/sf	35,478	
Paint & Wall coverings						
wall finishes	25,070	sf	2.75	68,943		allowance, ave $
paint / finish door & frame	17	lvs	115.00	1,955		
paint repaired ceiling to match exist	7,936	sf	0.65	5,158		
misc. specialty painting / touchup	52,925	sf	0.20	10,585		limited to replacement work only
Sub-total	87,627	sf	0.99	/sf	86,641	
SUB-TOTAL 09 | FINISHES					**$398,963**	
10 | SPECIALTIES						
Visual Display Systems						w/ demo / reinstall $ above
marker board		ea	0.00	0		
tack boards		ea	0.00	0		
tack strip		lf	0.00	0		
tackable wall surface		sf	0.00	0		
Sub-total	87,627	sf	0.00	/sf	0	
Signage Systems						w/ demo / reinstall $ above
signs, ada & code required	87,627	sf	0.00	0		
Sub-total	87,627	sf	0.00	/sf	0	
Toilet Partitions - Painted Metal						
reinstall toilet partitions	6	ea	125.00	750		loose 2 to shear wall
urinal screen	2	ea	100.00	200		
Sub-total	87,627	sf	0.01	/sf	950	
Wall Protection & Corner Guards						
corner guards	1	sum	6,000.00	6,000		allowance for replacement
Sub-total	87,627	sf	0.07	/sf	6,000	
Toilet Accessories (includes installation)						
item		sets	0.00	0		w/ demo / reinstall $ above
Sub-total	87,627	sf	0.00	/sf	0	
Lockers						
student lockers		frame	0.00	0		w/ demo / reinstall $ above
Sub-total	87,627	sf	0.00	/sf	0	
SUB-TOTAL 10 | SPECIALTIES					**$6,950**	
11 | EQUIPMENT						
Projection Screens						
manual		ea	0.00	0		w/ demo / reinstall $ above
Sub-total	87,627	sf	0.00	/sf	0	
SUB-TOTAL 11 | EQUIPMENT					**$0**	

Seismic Upgrades	***Architectural Cost Consultants, LLC***	Estimate Date: 11-Apr-11
Beverly Cleary Fernwood Campus	James A. Jerde, AIA - Stanley J. Pszczolkowski, AIA	Document Date: no date
Portland, Oregon	8060 SW Pfaffle Street, Suite 110	Print Date: 11-Apr-11
James G. Pierson, Inc	Tigard, Oregon 97223-8489	Print Time: 3:11 PM
Concept Probable Cost Estimate	Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com	Constr. Start: Summer 12

Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
12 | FURNISHINGS						
Window Treatment						
relites & sidelites		sf	0.00	0		w/ demo / reinstall $ above
windows		sf	0.00	0		
Sub-total	87,627	sf	0.00	/sf	0	
SUB-TOTAL 12 | FURNISHINGS					**$0**	
13 | SPECIAL CONSTRUCTION						
Remove / Reinforce clay tile partitions						allowance, complete survey
boiler room / mechanical	3,144	sf	23.50	73,884		required to understand
basement level	140	lf	157.50	22,050		implications of finishes,
first floor	702	lf	187.50	131,625		casework, specialties, etc.
second floor	560	lf	172.50	96,600		
Sub-total	87,627	sf	3.70	/sf	324,159	
SUB-TOTAL 13 | SPECIAL CONSTRUCTION					**$324,159**	
14 | CONVEYING EQUIPMENT						
Elevators						NIC - no work
passenger hydraulic elevator		stop	0.00	0		
cab finishes		sum	0.00	0		
Sub-total	87,627	sf	0.00	/sf	0	
SUB-TOTAL 14 | CONVEYING EQUIPMENT					**$0**	
21 | FIRE SUPPRESSION						
Fire sprinklers						
sprinklers	87,627	sf	0.00	0		NIC - no work, verify
Sub-total	87,627	sf	0.00	/sf	0	
SUB-TOTAL 21 | FIRE SUPPRESSION					**$0**	
22 | PLUMBING						
Plumbing						
revise roof rain drain system	8	ea	2,500.00	20,000		allowance
reinstall water closets	4	fixt.	308.40	1,234		
modify location	4	fixt.	1,200.00	4,800		
reinstall urinals	2	fixt.	308.40	617		
reinstall wall hung sinks	2	fixt.	222.00	444		
reinstall casework sink	2	fixt.	193.20	386		
reinstall service sink	1	fixt.	231.60	232		
remove / relocate / re-install piping systems	52,925	sf	3.31	175,000		allowance
Sub-total	87,627	sf	2.31	/sf	202,713	
SUB-TOTAL 22 | PLUMBING					**$202,713**	

Seismic Upgrades	***Architectural Cost Consultants, LLC***	Estimate Date: 11-Apr-11
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Portland, Oregon	8060 SW Pfaffle Street, Suite 110	Print Date: 11-Apr-11
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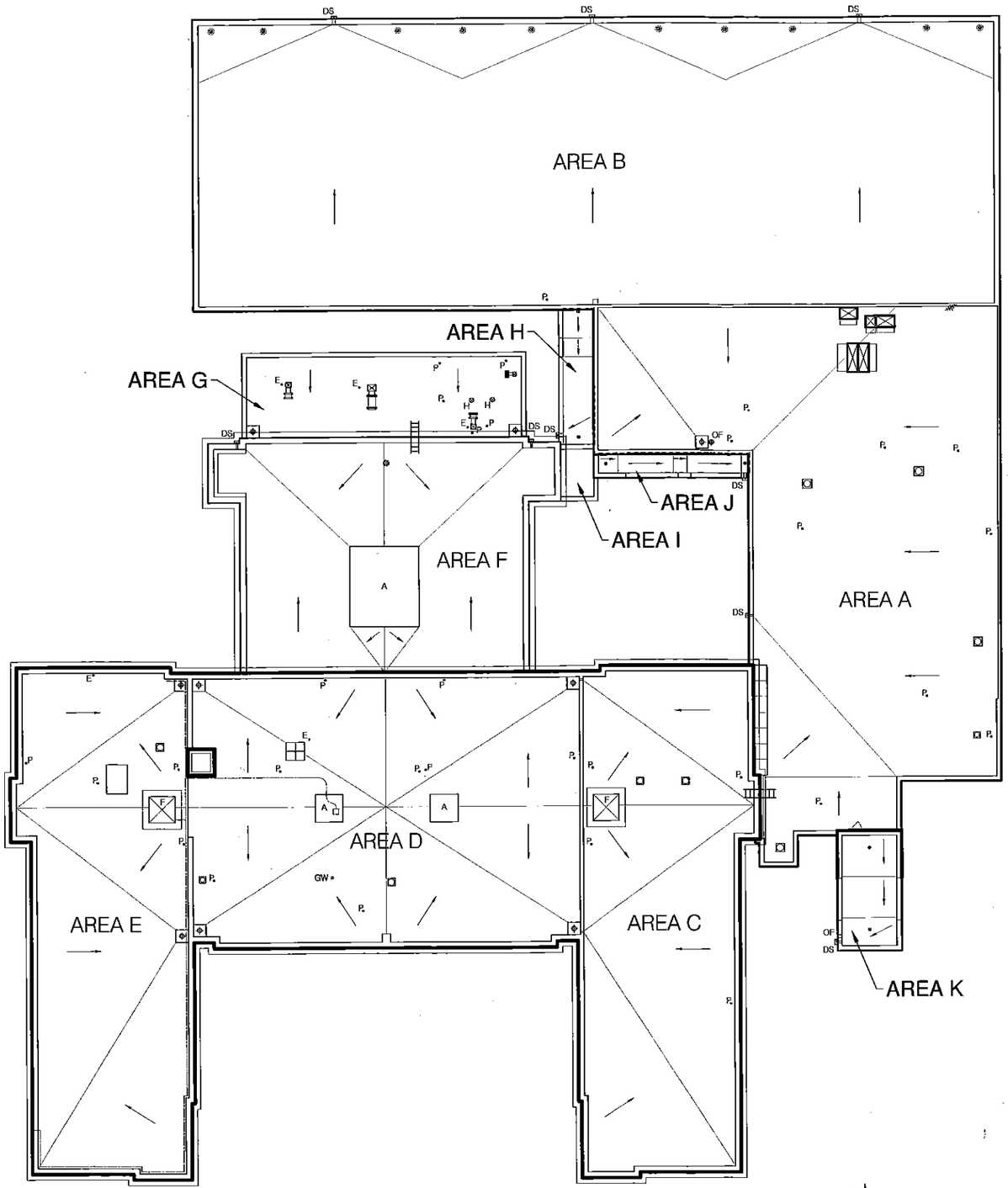
Concept Probable Cost Estimate	Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com	Constr. Start: Summer 12

Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
23 | HVAC						
HVAC						
remove / re-install mech room equip	52,925	sf	1.42	75,000		allowance
remove / relocate / re-install existing	52,925	sf	2.83	150,000		allowance
Sub-total	87,627	sf	2.57	/sf	225,000	
SUB-TOTAL 23 | HVAC					**$225,000**	
26 | ELECTRICAL						
Electrical						
remove / relocate / re-install existing	52,925	sf	7.65	405,000		allowance
Sub-total	87,627	sf	4.62	/sf	405,000	
SUB-TOTAL 26 | ELECTRICAL					**$405,000**	
27 | COMMUNICATIONS						
Communications / Data						
remove / relocate / re-install existing	52,925	sf	1.42	75,000		allowance
Sub-total	87,627	sf	0.86	/sf	75,000	
SUB-TOTAL 27 | COMMUNICATIONS					**$75,000**	
28 | ELECTRONIC SAFETY & SECURITY						
Fire Detection & Alarm / Security						
remove / relocate / re-install existing	52,925	sf	1.42	75,000		allowance
Sub-total	87,627	sf	0.86	/sf	75,000	
SUB-TOTAL 28 | ELECTRONIC SAFETY & SECURITY					**$75,000**	
31 | EARTHWORK						
Excavation & Fill - Building Related						
footing excavation	235	cy	65.00	15,304		
haul & disposal	235	cy	50.00	11,772		
level & grade	3,179	sf	0.35	1,112		
6" gravel under footing	62	cy	0.00	0		NIC, direct on soil
vapor barrier	3,496	sf	0.00	0		NIC, direct on soil
Sub-total	87,627	sf	0.32	/sf	28,188	
Piling						
set-up / mobilization / difficulty access	1	sum	10,000.00	10,000		
helilical anchors	100	ea	2,800.00	280,000		allowance, no dtls / verify qty
Sub-total	87,627	sf	3.31	/sf	290,000	
SUB-TOTAL 31 | EARTHWORK					**$318,188**	
32 | EXTERIOR IMPROVEMENTS						
Item						
item		sf	0.00	0		
Sub-total	87,627	sf	0.00	/sf	0	
SUB-TOTAL 32 | EXTERIOR IMPROVEMENTS					**$0**	

Seismic Upgrades Beverly Cleary Fernwood Campus Portland, Oregon James G. Pierson, Inc Concept Probable Cost Estimate	***Architectural Cost Consultants, LLC*** James A. Jerde, AIA - Stanley J. Pszczolkowski, AIA 8060 SW Pfaffle Street, Suite 110 Tigard, Oregon 97223-8489 Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com	Estimate Date: 11-Apr-11 Document Date: no date Print Date: 11-Apr-11 Print Time: 3:11 PM Constr. Start: Summer 12

Estimate	Quantity	Unit	Cost / Unit	Cost	Sub-totals	Comments
33 | UTILITIES						
Item						
item		lf	28.00	0		
Sub-total	87,627	sf	0.00 /sf		0	
SUB-TOTAL 33 | UTILITIES					**$0**	
SUB-TOTAL			47.73	4,182,411	**$4,182,411**	
Estimating Contingency			20.00%	836,482		
Index To Construction Start	Summer 12		4.00%	200,756		@ ± 4% per year
General Conditions / Insurance / Bond			10.00%	521,965		
General Contractor OH & Profit			4.00%	229,665	1,788,867	42.77%
TOTAL DIRECT CONSTRUCTION COST Estimate	**87,627**	**sf**	**$68.14 /sf**		**$5,971,278**	

Appendix G
Roof Area Designations from the 2010 Roof Assessment Report
Prepared by Professional Roof Consultants



LEGEND

- E — ELECTRICAL PENETRATION.
- P — PLUMBING VENT PIPE PENETRATION.
- H — HOT VENT PIPE PENETRATION.
- OF — SCUPPER OVERFLOW.
- DS — THROUGH-WALL SCUPPER BOX & DOWNSPOUT.
- GW — GUY WIRE.
- LARGE FLANGED VENT (ROUND).
- SMALL FLANGED VENT (ROUND).
- F — FLANGED VENT (SQUARE).
- CURBED VENT (SQUARE).
- CURBED FAN.
- ROOF DRAIN.
- OF — OVERFLOW ROOF DRAIN.
- SUMP ROOF DRAIN.
- ACCESS LADDER.
- SLOPE ARROW.
- OVER-ROOF CONDUIT.
- ANTENNA.
- ROOF ACCESS DOOR.
- A — ABANDONED SKYLIGHT.

ROOF PLAN - BEVERLY CLEARY @ FERNWOOD

SCALE: 1" = 30'

PROFESSIONAL ROOF CONSULTANTS INC
1108 SE GRAND AVENUE, SUITE 300
PORTLAND, OREGON 97214
PH. 503 280 8799 FAX: 503 280 8866

PORTLAND PUBLIC SCHOOLS
BEVERLY CLEARY AT FERNWOOD
YEAR 2010 ROOF ASSESSMENT

SHEET TITLE:
ROOF PLAN

Date: OCT. 20, 2010
Revisions:

Drawn: TWB
Check: SLM
File: R:Beverly_Cleary
Job: 2750.05

SHEET NUMBER:
249