PHASE 2

Washington State
School Seismic Safety Assessments Project

SOUTH BEND JR/SR HIGH SCHOOL MAIN BUILDING

South Bend Public Schools

SEISMIC UPGRADES CONCEPT DESIGN REPORT

June 2021

PREPARED FOR

PREPARED BY

DYKEMAN · rolluda architects · PRODIMS · WSP · DCI ENGINEERS · wrk engineers · Reid Middleton

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WASHINGTON STATE SCHOOL SEISMIC SAFETY ASSESSMENTS PROJECT

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South Bend Jr/Sr High School – HS Main Building

South Bend Public Schools

June 2021

Prepared for:

State of Washington
Department of Natural Resources and Office of Superintendent of Public Instruction

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EXECUTIVE SUMMARY

This report documents the findings of a seismic evaluation of the South Bend High School constructed in 1968 in South Bend, Washington. This school building is a single-story structure with a generally rectangular footprint with two interior courtyard spaces and a high roof at the gymnasium. The building is constructed on a relatively level site with a total building footprint of approximately 51,000 square feet. The building features multiple classrooms, a library, a gymnasium, and administrative spaces. The roof framing system consists of plywood sheathing supported by wood joists and beams spanning between wood stud bearing walls and wood posts. The lateral system consists of flexible plywood roof diaphragms spanning between plywood-sheathed wood shear walls. The floor structure is a combination of concrete slab on grade at the interior corridors and courtyards, a section with elevated concrete slab at the locker rooms, and an elevated wood floor assembly with wood joists spanning between concrete piers and masonry/concrete bearing walls. The foundation system is composed of grade beams and concrete pile caps with driven wood piles.

WRK Engineers performed a Tier 1 screening in accordance with the ASCE 41-17 standard *Seismic Evaluation and Retrofit of Existing Buildings*. The evaluation included field observations and review of record drawings to verify the existing construction. The structural seismic evaluation indicated that the building has multiple seismic deficiencies; the most susceptible ones being an incomplete structural load path, vertical irregularities, roof chord discontinuities, and large unblocked diaphragm spans. Geotechnical investigation is recommended due to the likelihood that this building is on liquefiable soils; foundation mitigation and ground improvement may be required.

Conceptual seismic upgrade recommendations for the structural systems are provided to improve the performance of the building to meet the Life Safety structural performance objective criteria of ASCE 41-17. Sketches for the concept-level seismic upgrades are provided in Appendix B. The structural upgrades include adding plywood to existing wood-stud walls for lateral system strengthening, adding blocking and nailing over the gymnasium and other locations with high diaphragm stress concentrations, adding steel strapping around corners of diaphragm openings to resist corner forces induced by stress concentrations, adding supplemental in-plane shear connections at existing shear walls to ensure adequate load transfer, and adding steel strapping over the existing roof structure for diaphragm load transfer to shear walls and tensile chord action at diaphragm boundaries. The recommendations for nonstructural upgrades are bracing tall and narrow contents, ensuring that heavy items on upper shelves are restrained by netting or other means, removing and replacing heavy partitions in the locker rooms with new wood-stud walls, and bracing ceiling light fixtures as required.

An opinion of probable construction costs is provided in Appendix C. It is our opinion that the total cost (construction costs plus soft costs) to upgrade the structure would range between \$5.23M and \$9.81M, with the baseline estimated total cost being \$6.54M. Note however that this estimated cost and cost range could be significantly higher depending on the presence and amount of liquefiable soils and if it requires ground improvements on the South Bend Jr/Sr High School campus to mitigate post-earthquake liquefaction settlement. A detailed geotechnical investigation is also recommended prior to doing a seismic upgrade design project.

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Acronyms

AACE	Association for the Advancement of Cost Engineering
ADA	Americans with Disabilities Act
ASCE	American Society of Civil Engineers
A-E	Architects-Engineers
BPOE	Basic Performance Objective for Existing Buildings
BSE	Basic Safety Earthquake
CMU	Concrete Masonry Unit
CP	Collapse Prevention
DNR	Department of Natural Resources
DCR	Demand-to-Capacity Ratio
EERI	Earthquake Engineering Research Institute
EPAT	EERI Earthquake Performance Assessment Tool
FEMA	Federal Emergency Management Agency
GC/CM	General Contractor / Construction Manager
GWB	Gypsum Wallboard
IBC	International Building Code
ICOS	Information and Condition of Schools
IEBC	International Existing Building Code
IO	Immediate Occupancy
LS	Life Safety
MCE	Maximum Considered Earthquake
MEP	Mechanical/Electrical/Plumbing
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
OSPI	Office of Superintendent of Public Instruction
PBEE	Performance-Based Earthquake Engineering
PR	Position Retention
ROM	Rough Order-of-Magnitude
SSSSC	School Seismic Safety Steering Committee
UBC	Uniform Building Code
URM	Unreinforced Masonry
USGS	United States Geological Survey
WF	Wide Flange
WGS	Washington Geological Survey
WSSSSAP	Washington State School Seismic Safety Assessments Project

Reference List

Codes and References

2018 IBC, *2018 International Building Code,* prepared by the International Code Council, Washington, D.C.

AACE International Recommended Practice No. 56R-08, 2020, *Cost Estimate Classification System*, prepared by the Association for the Advancement of Cost Engineering International, Fairmont, West Virginia.

ASCE 7-16, 2017, *Minimum Design Loads for Buildings and Other Structures*, prepared by the Structural Engineering Institute of the American Society of Civil Engineers, Reston, Virginia.

ASCE 41-17, 2017, *Seismic Evaluation and Retrofit of Existing Buildings*, prepared by the Structural Engineering Institute of the American Society of Civil Engineers, Reston, Virginia.

FEMA E-74, 2011, *Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide*, prepared by Applied Technology Council, Redwood City, California.

Structural Engineers of Northern California, 2017, Earthquake Performance Rating System ASCE 41-13 Translation Procedure: The Buildings Ratings Committee, a sub-committee of the Existing Buildings Committee of The Structural Engineers Association of Northern California.

Structural Engineers of Northern California, 2015, Earthquake Performance Rating System User's Guide: The Buildings Ratings Committee, a sub-committee of the Existing Buildings Committee of The Structural Engineers Association of Northern California.

Drawings

Hovind, Harthorne & Smith Architects, December, 1966, existing drawings titled "Addition to South Bend High School," South Bend, Pacific County, Washington (Main Building)

1.0 Introduction

1.1 Background

In 2018-2019, the Washington Geological Survey (WGS), a division of the Department of Natural Resources (DNR), led a Washington State School Seismic Safety Assessments Project (WSSSSAP) that seismically and geologically screened 222 school buildings and 5 fire stations across Washington State to better understand the current level of seismic risk of Washington State's public-school buildings. This first phase of the WSSSSAP was executed with the help of Washington State's Office of Superintendent of Public Instruction (OSPI) and Reid Middleton, along with their team of structural engineers, architects, and cost estimators.

Building upon the success of Phase 1, WGS, OSPI, and Reid Middleton's team embarked on Phase 2 of this project to seismically and geologically screen another 339 school buildings and 2 fire stations, mostly located in the high-seismic risk regions of Washington State. Similar to Phase 1, the two main components of Phase 2 of this seismic safety assessments project are: (1) geologic site characterization, and (2) the seismic assessment of buildings. As a part of the seismic assessments, Tier 1 screening of structural systems and nonstructural assessments were performed in accordance with the American Society of Civil Engineers' (ASCE) Standard 41-17 *Seismic Evaluation and Retrofit of Existing Buildings*. Concept-level seismic upgrades were developed to address the identified deficiencies of a select number of school buildings to evaluate seismic upgrade strategies, feasibilities, and implementation costs.

Seventeen school buildings were selected in consultation with WGS and OSPI to receive concept-level seismic upgrade designs utilizing the ASCE 41 Tier 1 evaluation results. This report documents the concept-level seismic upgrade design for one of those school buildings. The concept-level seismic upgrades will include structural and nonstructural seismic upgrade recommendations, with concept-level sketches and rough order-of-magnitude (ROM) construction costs determined for each building. The 17 school buildings were selected from the list of schools with the intent of representing a variety of regions, building uses, construction eras, and construction materials.

The overall goal of the project is to provide a better understanding of the current seismic risk of our state's K-12 school buildings and what needs to be done to improve the buildings in accordance with ASCE 41 to meet seismic performance objectives.

The seismic evaluation consists of a Tier 1 screening for the structural systems performed in accordance with ASCE 41-17.

1.2 Scope of Services

The project is being performed in several distinct and overlapping phases of work. The scope of this report is as listed in the following sections.

1.2.1 Information Review

1. Project Research: Reid Middleton and their project team researched available school building records, such as relevant site data and record drawings, in advance of the field investigations. This research included searching school building records and contacting the districts and/or the Office of Superintendent of Public Instruction (OSPI) to obtain building plans, seismic reports, condition reports, or related construction information useful for the project.

2. Site Geologic Data: Site geological data provided by the WGS, including site shear wave velocities, was utilized to determine the project Site Class in accordance with ASCE 41, which is included in the Tier 1 checklists and concept-level seismic upgrades design work.

1.2.2 Field Investigations

1. Field Investigations: Each of the identified buildings was visited to observe the building's age, condition, configuration, and structural systems for the purposes of the ASCE 41 Tier 1 seismic evaluations. This task included confirmation of general information in building records or layout drawings and visual observation of the structural condition of the facilities. Engineer field reports, notes, photographs, and videos of the facilities were prepared and utilized to record and document information gathered in the field investigation work.

2. Limitations Due to Access: Field observation efforts were limited to areas and building elements that were readily observable and safely accessible. Observations requiring access to confined spaces, potential hazardous material exposure, access by unsecured ladder, work around energized equipment or mechanical hazards, access to areas requiring Occupational Safety and Health Administration (OSHA) fall-protection, steep or unstable slopes, deteriorated structural assemblies, or other conditions deemed potentially unsafe by the engineer were not performed. Removal of finishes (e.g., gypsum board, lath and plaster, brick veneer, roofing materials) for access to concealed conditions or to expose elements that could not otherwise be visually observed and assessed was not performed. Material testing or sampling was not performed. The ASCE 41 checklist items that were not documented due to access limitations are noted.

1.2.3 Seismic Evaluations and Conceptual Upgrades Design

1. Seismic Evaluations: Limited seismic assessments of the structural and nonstructural systems of the school buildings were performed in accordance with ASCE 41-17 Tier 1 Evaluation Procedures.

2. Conceptual Upgrades Design: Further seismic evaluation work was performed to provide concept-level seismic retrofits and/or upgrade designs for the selected school buildings based on the results of the Tier 1 seismic evaluations. The concept-level seismic upgrades design work included narrative descriptions of proposed seismic retrofits and/or

upgrade schemes and concept sketches depicting the extent and type of recommended structural upgrades.

3. Architectural Review: The seismic upgrade concept developed by the structural engineers was reviewed by Rolluda Architects, Inc., for general guidance and consideration of the architectural aspects of the seismic upgrade. The architects discussed the seismic upgrade concepts with the structural engineer and reviewed existing drawings that were available, pictures taken during the engineer's field investigations, and the ASCE 41 Tier 1 Screening reports. However, field visits by the architect and meetings with the school district and facilities personnel to discuss phasing and programming requirements were not included in the project scope of work. The architectural considerations are discussed in Section 4.4 Nonstructural Recommendations and Considerations. These conceptual designs were reviewed with high-level recommendations. Future planning for seismic improvements should include further review with a design team.

4. Cost Estimating: Through the concept-level seismic upgrades report process, ProDims, LLC, provided opinions of probable construction costs for the concept-level seismic upgrade designs for the selected school buildings. These concept-level seismic upgrade designs and the associated opinions of probable construction costs are intended to be representative samples that can be extrapolated to estimate the overall capital needs of seismically upgrading Washington State schools.

1.2.4 Reporting and Documentation

1. Conceptual Upgrade Design Reports: Buildings that were selected to receive a conceptual upgrade design will have a report prepared that will include an introduction summarizing the overall findings and recommendations, along with individual sections documenting each building's seismic evaluation, list of deficiencies, conceptual seismic upgrade sketches and opinions of probable construction costs.

2. Building Photography: Photos were taken of each building during on-site walkthroughs to document the existing building configurations, conditions, and structural systems. These are available upon request through DNR/WGS.

3. Existing Drawings: Select and available existing drawings and other information were collected during the evaluation process. These are available upon request through DNR/WGS.

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2.0 Seismic Evaluation Procedures and Criteria

2.1 ASCE 41 Seismic Evaluation and Retrofit Overview

The current standard for seismic evaluation and retrofit (upgrades) of existing buildings is ASCE 41-17. ASCE 41 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process, implemented by first following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process. The flow chart in Figure 2.1 illustrates the evaluation process.

TIER 1 – Screening Phase

- Checklists of evaluation statements to quickly identify potential deficiencies
- Requires field investigation and/or review of record drawings
- Analysis limited to "Quick Checks" of global elements
- May proceed to Tier 2, Tier 3, or rehabilitation design if deficiencies are identified

TIER 2 – Evaluation Phase

- "Full Building" or "Deficiency Only" evaluation
- Address all Tier 1 seismic deficiencies
- Analysis more refined than Tier 1, but limited to simplified linear procedures
- Identify buildings not requiring rehabilitation

TIER 3 – Detailed Evaluation Phase

- Component-based evaluation of entire building using reduced ASCE 41 forces
- Advanced analytical procedures available if Tier 1 and/or Tier 2 evaluations are judged to be overly conservative
- Complex analysis procedures may result in construction savings equal to many times their cost

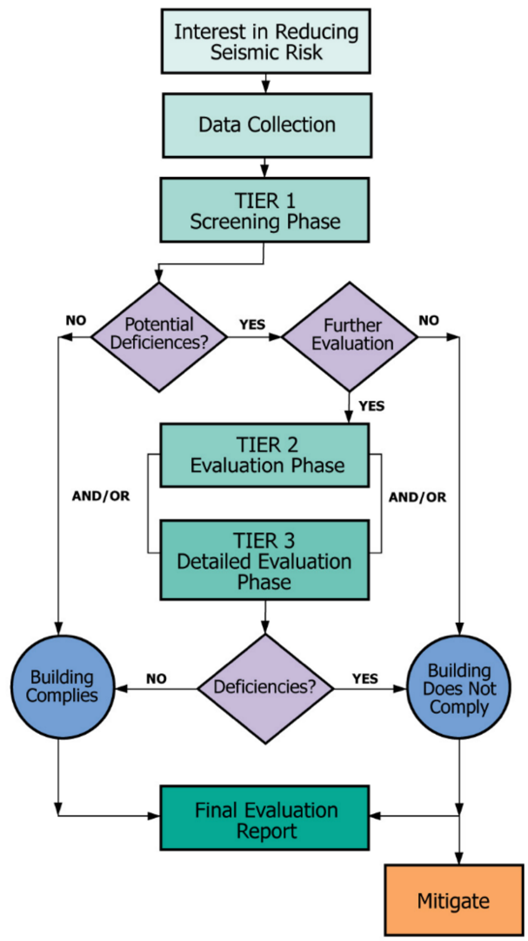

Figure 2-1. Flow Chart and Description of ASCE 41 Seismic Evaluation Procedure.

The Tier 1 checklists in ASCE 41 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system. Tier 1 screenings also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration.

Tier 2 evaluations then follow with more-detailed structural and seismic calculations and assessments to either confirm the potential deficiencies identified in the Tier 1 review or demonstrate their adequacy. A Tier 3 evaluation involves an even more detailed analysis and advanced structural and seismic computations to review each structural component's seismic demand and capacity. A Tier 3 evaluation is similar in scope and complexity to the types of analyses often required to design a new building in accordance with the International Building Code (IBC), with a comprehensive analysis aimed at evaluating each component's seismic performance. Generally, Tier 3 evaluations are not practical for typical and regular-type buildings due to the rigorous and complicated calculations and procedures. As indicated in the Scope of Services, this evaluation included a Tier 1 screening of the structural systems.

2.2 Seismic Evaluation and Retrofit Criteria

Performance-Based Earthquake Engineering (PBEE) can be defined as the engineering of a structure to resist different levels of earthquake demand in order to meet the needs and performance objectives of building owners and other stakeholders. ASCE 41 employs a PBEE design methodology that allows building owners, design professionals, and the local building code authorities to establish seismic hazard levels and performance goals for individual buildings.

2.2.1 Site Class Definition

The building site class definition quantifies the site soil's propensity to amplify or attenuate earthquake ground motion propagating from underlying rock. Site class has a direct impact on the seismic design forces utilized to design and evaluate a structure. There are six distinct site classes defined in ASCE 7-16, Site Class A through Site Class F, that range from hard rock to soils that fail such as liquefiable soils. Buildings located on soft or loose soils will typically sustain more damage than similar buildings located on stiff soils or rock, all other things being equal. The Washington State Department of Natural Resources measured the time-averaged shear-wave velocity at each site to 30 meters (100 feet) below the ground surface, Vs30. This measured shear-wave velocity was used to determine the site class. The site class for this building was determined to be **Site Class E**.

2.2.2 South Bend High School Seismicity

Seismic hazards for the United States have been quantified by the United States Geological Survey (USGS). The information has been used to create seismic hazard maps, which are currently used in building codes to determine the design-level earthquake magnitudes for building design.

The Level of Seismicity is categorized as Very Low, Low, Moderate, or High based on the probabilistic ground accelerations. Ground accelerations and mass generate inertial (seismic) forces within a building (Force = mass x acceleration). Ground acceleration therefore is the parameter that classifies the level of seismicity. From geographic region to region, as the ground accelerations increase, so does the level of seismicity (from low to high). Where this building is located, the design short-period spectral acceleration, S_{DS}, is 1.177 g, and the design 1-second period spectral acceleration, $S_{D1,}$ is 1.843 g. Based on ASCE 41 Table 2-4, the Level of Seismicity for this building is classified as **High**.

The ASCE 41 Basic Performance Objective for Existing Buildings (BPOE) makes use of the Basic Safety Earthquake – 1E (BSE-1E) seismic hazard level and the Basic Safety Earthquake – 2E (BSE-2E). The BSE-1E earthquake is defined by ASCE 41 as the probabilistic ground motion with a 20 percent probability of exceedance in 50 years, or otherwise characterized as a ground motion acceleration with a probabilistic 225-year return period. The BSE-2E earthquake is defined by ASCE 41 as the probabilistic ground motion with a 5 percent probability of exceedance in 50 years, or otherwise characterized as a ground motion acceleration with a probabilistic 975-year return period. The BSE-2N seismic hazard level is the Maximum Considered Earthquake (MCE) ground motion used in current codes for the design of new buildings and is also used in ASCE 41 to classify the Level of Seismicity for a building. The BSE-2N has a statistical ground motion acceleration with 2 percent probability of exceedance in 50 years, or otherwise characterized as a ground motion acceleration with a probabilistic 2,475-year return period.

Table 2.2.1-1 provides the spectral accelerations for the 225-year, 975-year, and 2,475-year return interval events specific to South Bend High School that are considered in this study.

Table 2.2.1-1. Spectral Acceleration Parameters (Site Class E).

BSE-1E 20%/50 (225-year) Event		BSE-1N 2/3 of 2,475-year Event		BSE-2E 5%/50 (975-year) Event		BSE-2N 2%/50 (2,475-year) Event	
0.2 Seconds	0.717 g	0.2 Seconds	1.177 g	0.2 Seconds	1.235 g	0.2 Seconds	1.766 g
1.0 Seconds	0.436 g	1.0 Seconds	1.843 g	1.0 Seconds	1.831 g	1.0 Seconds	2.764 g

2.2.3 South Bend High School Structural Performance Objective

The school building is an Educational Group E occupancy (Risk Category III) structure and has not been identified as a critical structure requiring immediate use following an earthquake. However, Risk Category III buildings are structures that represent a substantial hazard to human life in the event of failure. According to ASCE 41, the BPOE for Risk Category III structures is the Damage Control structural performance level at the BSE-1E seismic hazard level and the Limited Safety structural performance level at the BSE-2E seismic hazard level. The ASCE 41 Tier 1 evaluations were conducted in accordance with ASCE 41 requirements and ASCE 41 seismic performance levels. Concept-level upgrades were developed for the **Life Safety** structural performance level at the **BSE-1N** seismic hazard level in accordance with DNR direction, the project scope of work, and the project legislative language.

At the Life-Safety performance level, the building may sustain damage while still protecting occupants from life-threatening injuries and allowing occupants to exit the building. Structural and nonstructural components may be extensively damaged, but some margin against the onset of partial or total collapse remains. Injuries to occupants or persons in the immediate vicinity may occur during an earthquake; however, the overall risk of life-threatening injury as a result of structural damage is anticipated to be low. Repairs may be required before reoccupying the building, and, in some cases, repairs may be economically unfeasible.

Knowledge Factor

A knowledge factor, *k*, is an ASCE 41 prescribed factor that is used to account for uncertainty in the as-built data considering the selected Performance Objective and data collection processes (availability of existing drawings, visual observation, and level of materials testing). No in-situ testing of building materials was performed; however, some material properties and existing construction information were provided in the existing record drawings. If the concept design is developed further, additional materials tests and site investigations will be required to substantiate assumptions about the existing framing systems.

ASCE 41 Classified Building Type

Use of ASCE 41 for seismic evaluations requires buildings to be classified from a group of common building types historically defined in previous seismic evaluation standards (ATC-14, FEMA 310, and ASCE 31-03). The school is classified in ASCE 41 Table 3-1 as a wood-frame building with flexible diaphragms, **W2**, which consist of wood joists, beams, or trusses spanning between exterior walls sheathed with plywood, stucco, plaster or diagonal or straight sheathing.

2.3 Report Limitations

The professional services described in this report were performed based on available record drawing information and limited visual observation of the structure. No other warranty is made as to the professional advice included in this report. This report provides an overview of the seismic evaluation results and does not address programming and planning issues. This report has been prepared for the exclusive use of DNR/WGS and is not intended for use by other parties, as it may not contain sufficient information for purposes of other parties or their uses.

3.0 Building Description & Seismic Evaluation Findings

3.1 Building Overview

3.1.1 Building Description

Original Year Built: 1968
Building Code: 1964 UBC

Number of Stories: 1
Floor Area: 51,000 SF

FEMA Building Type: W2
ASCE 41 Level of Seismicity: High
Site Class: E

Constructed in 1968, South Bend High School is a one-story structure, which was renovated in 2010. The structure is on relatively level ground and located south of the Willapa River in South Bend, Washington. The building footprint is approximately 51,000 square feet and is rectangular with two interior courtyards and a gable roof and approximate plan dimensions of 300 feet by 182 feet. The 1966 drawings indicate the building's construction consists of a wood-framed roof system spanning between wood shear and bearing walls and wood posts. The roof is a flexible diaphragm with plywood sheathing over wood joists and beams. The floor structure is a combination of concrete slab on grade at the interior corridors and courtyards, an elevated concrete slab at the locker rooms, and an elevated wood floor assembly with wood joists spanning between concrete piers and masonry/concrete bearing walls. The foundation system is composed of grade beams spanning between concrete pile caps with driven wood piles.

3.1.2 Building Use

The building is a public high school that includes classrooms, a cafeteria, offices, and a gymnasium. South Bend High School has over 250 student occupants.

3.1.3 Structural System

Table 3.1.3-1. Structural System Descriptions.

Structural System	Description
Structural Roof	The roof system is comprised of wood joists and beams with a flexible plywood diaphragm.
Structural Floor(s)	The floors are comprised of concrete slab on grade and plywood over wood joists spanning between concrete piers.

Table 3.1.3-1. Structural System Descriptions.

Structural System	Description
Foundations	The foundation system is composed of grade beams spanning between concrete pile caps with driven wood piles.
Gravity System	The gravity system is composed of wood joists spanning between wood-stud bearing walls and wood posts.
Structural Roof	The roof system is comprised of wood joists and beams with a flexible plywood diaphragm.

3.1.4 Structural System Visual Condition

Table 3.1.4-1. Structural System Condition Descriptions.

Structural System	Description
Structural Roof	No visible signs of corrosion, damage, or deterioration.
Structural Floor	No visible signs of corrosion, damage, or deterioration.
Foundations	Unknown.
Gravity System	No visible signs of corrosion, damage, or deterioration.
Lateral System	No visible signs of corrosion, damage, or deterioration.

3.2 Seismic Evaluation Findings

3.2.1 Structural Seismic Deficiencies

The structural seismic deficiencies identified during the Tier 1 evaluation are summarized below. Commentary for each deficiency is provided based on this evaluation.

Table 3.2.1-1. Identified Structural Seismic Deficiencies Based on Tier 1 Checklists.

Deficiency	Description
Load Path	The windows along the north side of the building create a break in the load path from the roof diaphragm to the shear walls.
Vertical Irregularities	The wood-stud walls surrounding the upper roof do not have full-height plywood sheathing, creating a vertical discontinuity in the lateral load path.

Table 3.2.1-1. Identified Structural Seismic Deficiencies Based on Tier 1 Checklists.

Deficiency	Description
Shear Stress	There are walls with excessive shear stresses due to inadequate shear strength of the lateral system and a lack of diaphragm collector members.
Wall Openings	The northern exterior wall line has openings in excess of 80% of the wall length.
Roof Chord Continuity	Roof chord does not appear to be continuous through roof elevation changes.
Unblocked Diaphragms	There are unblocked diaphragms with spans greater than 40 feet.

3.2.2 Structural Checklist Items Marked as "U"nknown

Where building structural component seismic adequacy was unknown due to lack of available information or limited observation, the structural checklist items were marked as "unknown". These items require further investigation if definitive determination of compliance or noncompliance is desired. The unknown structural checklist items identified during the Tier 1 evaluation are summarized below. Commentary for each unknown item is provided based on the evaluation.

Table 3.2.2-1. Identified Structural Checklist Items Marked as Unknown.

Deficiency	Description
Liquefaction	"Moderate to High" liquefaction potential is identified per ICOS based on state geologic mapping. Requires further investigation by a licensed geotechnical engineer to determine liquefaction potential.
Slope Failure	Requires further investigation by a licensed geotechnical engineer to determine susceptibility to slope failure. The structure appears to be located on a relatively flat site.
Surface Fault Rupture	Requires further investigation by a licensed geotechnical engineer to determine whether site is near locations of expected surface fault ruptures.
Cripple Walls	All cripple walls may not be braced to the foundation. The addition of wood structural panels to cripple walls may be appropriate to mitigate seismic risk. Further investigation should be performed.

3.2.3 Nonstructural Seismic Deficiencies

Table 3.2.3-1 summarizes the seismic deficiencies in the nonstructural systems. The Tier 1 screening checklists are provided in Appendix A.

Table 3.2.3-1. Identified Nonstructural Seismic Deficiencies based on Tier 1 Checklists.

Deficiency	Description
P-1 Unreinforced Masonry	There does not appear to be adequate bracing for URM partitions.
P-2 Heavy Partition Supported by Ceilings	There does not appear to be adequate bracing for heavy partitions.
LF-1 Independent Support	Light fixtures do not appear to be independently braced.
CF-2 Tall Narrow Contents	It did not appear that contents taller than 6 feet were adequately restrained.

3.2.4 Nonstructural Checklist Items Marked as "U"nknown

Where building nonstructural component seismic adequacy was unknown due to lack of available information or limited observation, the nonstructural checklist items were marked as "unknown". These items require further investigation if definitive determination of compliance or noncompliance is desired. The unknown nonstructural checklist items identified during the Tier 1 evaluation are summarized below. Commentary for each unknown item is provided based on the evaluation.

Some nonstructural deficiencies may be able to be mitigated by school district staff. Other nonstructural components that require substantial mitigation may be more appropriately included in a long-term mitigation strategy. Some typical conceptual details for the seismic upgrade of nonstructural components can be found in the FEMA E-74 Excerpts appendix.

Table 3.2.4-1. Identified Nonstructural Checklist Items Marked as Unknown.

Deficiency	Description
CF-3 Fall-Prone Contents	There may be equipment, stored items, or other contents weighing more than 20 pounds whose center of mass is more than 4 feet above the adjacent floor level. Heavy items on upper shelves should be restrained by netting to mitigate seismic risk.

4.0 Recommendations and Considerations

4.1 Seismic-Structural Upgrade Recommendations

Concept-level seismic upgrade recommendations to improve the lateral-force-resisting system were developed. The sketches in Appendix B depict the concept-level structural upgrade recommendations outlined in this section. The following concept recommendations are intended to address the structural deficiencies noted in Table 3.2.1-1. This concept-level seismic upgrade design represents just one of several alternative seismic upgrade design solutions and is based on preliminary seismic evaluation and analysis results. Final analysis and design for seismic upgrades must include a more detailed seismic evaluation of the building in its present or future configuration. Proposed seismic upgrades include the following.

4.1.1 Roof Diaphragm Nailing and Blocking

The shear capacity of the existing unblocked wood roof diaphragms is insufficient to transfer load to the shear walls in regions with high stress concentrations. It is recommended that blocking with an increased diaphragm nailing pattern be added at diaphragm boundaries over the gymnasium and other locations with high stress concentrations and at ends of long diaphragm spans between supporting elements.

4.1.2 New Wood Shear Walls and Collectors

The building contains long roof diaphragm spans and vertical discontinuities that interrupt the load path for seismic forces. To reduce roof diaphragm spans and create a complete load path at vertical discontinuities, it is recommended that select existing partition walls be strengthened with plywood sheathing to serve as new interior shear walls. It is also recommended to add continuous steel strapping along lines of lateral resistance in order to transfer the diaphragm load to the shear walls. The conceptual strengthening plan in Appendix B shows locations of steel strapping and proposed shear wall locations.

4.1.3 Diaphragm Reinforcement at Openings

The existing building contains numerous openings and changes in roof elevation that create diaphragm discontinuities and cause local stress concentrations. It is recommended that blocking with steel strapping be added around diaphragm openings and discontinuities to resist the corner forces around openings induced by diaphragm stress concentrations.

4.1.4 In-plane Connections at Existing Shear Walls

In-plane shear connections between diaphragms, shear wall elements, and foundations are inadequate. It is recommended that steel clips such as Simpson A35's or A34's be added between the top of existing wood-stud shear walls and the roof diaphragm. It is also recommended that Simpson Titen HD anchors be added to supplement the existing sill anchors.

The conceptual first floor strengthening plan in Appendix B shows locations of existing shear walls.

4.2 Foundations and Geotechnical Considerations

A detailed geotechnical analysis of the site soils was not included in the scope of this study. As a result, the geotechnical seismic effects on the existing building and its foundations, such as the presence of liquefiable soils, allowable soil bearing pressures, and pile capacities are unknown at this time. However, based on state of Washington liquefaction mapping, this building is located on soils classified with a moderate to high susceptibility of liquefaction.

Liquefaction is the tendency of certain soils to saturate and lose strength during strong earthquake shaking, causing it to flow and deform similar to a liquid. Liquefaction, when it occurs, drastically decreases the soil bearing capacity and tends to lead to large differential settlement of soil across a building's footprint. Liquefaction can also cause soils to spread laterally and can dramatically affect a building's response to earthquake motions, all of which can significantly compromise the overall stability of the building and possibly lead to isolated or widespread collapse in extreme cases. Existing foundations damaged as a result of liquefiable soils also make the building much more difficult to repair after an earthquake.

Buildings that are not founded on a raft foundation or deep foundation system (such as grade beams and piles), and those with conventional strip footings and isolated spread footings that are not interconnected well with tie beams, are especially vulnerable to liquefiable soils. Mitigation techniques used to improve structures in liquefiable soils vary based on the type and amount of liquefiable soils and may include ground improvements to densify the soil (aggregate piers, compaction piling, jet grouting), installation of additional deep foundations (pin piling, augercast piling, micro-piling), and installation of tie beams between existing footings.

The existing South Bend Jr/Sr High School, High School Main Building is founded on grade beams spanning to pile caps and driven wood piles. The soil capacity and pile capacity to resist seismic demands is unknown at this time. It is recommended that a detailed geotechnical study and investigation be completed on the building site to determine the nature of the liquefaction hazard, the characteristics of the site soils, and adequacy of the wood piling. Foundation mitigation and ground improvement may be required and the recommended geotechnical investigation could have a major impact on the scope of work required for seismic retrofit.

4.3 Tsunami Considerations

Tsunami analysis was outside the scope of this project. However, based on Washington State Department of Natural Resources tsunami inundation mapping, the location of the building is within the expected tsunami inundation zone for a Cascadia Subduction Zone earthquake. While there is significant uncertainty surrounding tsunami inundation heights, the mapping indicates that there is a likelihood of tsunami inundation at the building location.

It may be worthwhile to conduct a detailed tsunami study prior to performing building seismic upgrades. Since tsunamis can cause significant infrastructure damage and also pose a significant risk to life safety, it can often be more cost effective to build a new school outside of the tsunami inundation zone rather than seismically upgrade the existing building. Alternatively, seismically upgrading the facility could allow occupants to safely evacuate and reach locations away from the tsunami inundation zone. Construction of a tsunami vertical evacuation structure may be another alternative to provide safe refuge from a tsunami. In any case, it is recommended that a detailed tsunami evacuation plan be used that gives people a high likelihood of successfully escaping a tsunami regardless of whether the plan is to reach higher ground or take refuge in a vertical evacuation structure. A detailed tsunami study could comparatively evaluate different options and provide recommendations on appropriate actions to take.

4.4 Nonstructural Recommendations and Considerations

Table 3.2.3-1 identifies nonstructural deficiencies that do not meet the performance objective selected for South Bend High School. It is recommended that these deficiencies be addressed to provide nonstructural performance consistent with the performance of the upgraded structural lateral-force-resisting system. As-built information for the existing nonstructural systems, such as fire sprinklers, mechanical ductworks, and piping, are not available for review. Only limited visual observation of the systems was performed during field investigation due to limited access or visibility to observe existing conditions. The conceptual mitigation strategies provided in this study are preliminary only. The final analysis and design for seismic rehabilitation should include a detailed field investigation.

4.4.1 Architectural Systems

This section addresses existing construction that, while not posing specific hazards during a seismic event, would be affected by the seismic improvements proposed.

For any remodel project of an existing building, the International Existing Building Code (IEBC) would be applicable. The intent of the IEBC is to provide flexibility to permit the use of alternative approaches to achieve compliance with minimum requirements to safeguard the public health, safety, and welfare insofar as they are affected by the work being done.

Energy Code

Elements of the exterior building envelope to be affected by the proposed seismic upgrade work may be required to be brought up to the current Washington State Energy Code per Chapter 5, where applicable.

Accessibility

It should also be noted that, as a part of any upgrade to existing buildings, the IEBC will require that any altered primary function spaces (classrooms, gyms, entrances, offices) and routes to these spaces, be made accessible to the current accessibility standards of the Americans with Disabilities Act (ADA), unless technically infeasible.

This would include but is not limited to accessible restrooms, paths of travel, entrances and exits, parking, signage, and Life Safety alarm systems. Under no circumstances should the facility be made less accessible. The IEBC does, however, have exceptions for areas that do not contain a primary function (storage room, utility rooms) and states that costs of providing the accessible route are not required to exceed 20 percent of the costs of the alterations affecting the area of Primary Function.

As with any major renovation and modernization, an ADA study should be performed to determine the extent to which an existing facility would need to be improved to comply with current ADA requirements.

Hazardous Materials Survey

Given the age of the building, there may be existing construction elements such as floor tile and/or adhesive, pipe insulation, etc., that could contain asbestos. Verify that a Hazardous Materials survey and abatement of the building has been performed, prior to the start of any demolition work.

In-plane Connections at Existing Shear Walls

Steel clips (Simpson A35, A34 or similar) should be added between the top of existing wood-stud shear walls and the roof diaphragm.

Simpson Titen HD anchors should be added to supplement the existing sill anchors.

The drywall at top and bottom of affected walls will need to be patched after the anchor bolt inspection. Work may include painting of the entire wall and installation of new rubber base.

A 5-foot portion of the existing furred tile ceiling will need to be removed for access to wall-diaphragm connections. It may be difficult to match the existing acoustic ceiling tiles that are currently installed. Given the age and condition of the tiles, it may be best to replace all existing ceiling tiles in the library as a part of an overall modernization project.

New Wood Shear Walls and Collectors

Select existing partition walls are recommended to be strengthened with plywood sheathing to serve as new interior shear walls.

Continuous steel strapping is recommended to be added along lines of lateral resistance to aid in transfer of the diaphragm load to the shear walls.

New shear walls will require removal of the flooring materials at least three feet out from the walls in order to construct the new foundations. The existing flooring appears to be vinyl composition tiles; given the age of the building, the tile and/or adhesive could contain asbestos. An asbestos survey of the building would be recommended prior to any demolition.

A 5-foot portion of the existing furred tile ceiling will need to be removed for access to wall-diaphragm connections. It may be difficult to match the existing acoustic ceiling tiles that are currently installed. Given the age and condition of the tiles, it may be best to replace all existing ceiling tiles in the library as a part of an overall modernization project.

Existing electrical outlets, switches, and other items will need to be reinstalled in new 2x6 stud shear walls with 5/8-inch gypsum board on both sides. Paint and new rubber base would need to be installed to match adjacent wall finishes.

Roof Diaphragm Nailing and Blocking

Blocking with an increased diaphragm nailing pattern should be added at diaphragm boundaries over the gymnasium and other locations with high stress concentrations and at ends of long diaphragm spans between supporting elements.

This work would require replacing the building's roof. The existing roof system most likely includes batt insulation laid above the interior ceiling surfaces, creating an unconditioned attic space above. As part of the reroof project, we recommend installing an above-roof continuous rigid insulation of R-38 over the entire roof to comply with current energy code. Any mechanical equipment curbs should be raised to accommodate the thicker insulation.

Diaphragm Reinforcement at Openings

There are numerous openings and changes in roof elevation that create diaphragm discontinuities and cause local stress concentrations. Blocking with steel strapping should be added around diaphragm openings and discontinuities, to resist the corner forces around openings induced by diaphragm stress concentrations.

This work would require replacing the building's roof (see above).

Ceiling in Paths of Egress

The suspended ceiling in the main corridor is an integrated acoustical ceiling system, likely with a suspended metal T-grid. Because this corridor is a main path of egress, it is recommended that the ceiling grid support system be further investigated and checked for proper seismic bracing and compression support for every 12 square feet of area and proper edge clearance detailing at the corridor walls. Preventing the risk of a fallen integrated ceiling system will mitigate the risk of obstructions impeding the paths of egress as students and faculty evacuate the building following a seismic event.

Lighting Fixtures in Paths of Egress

The light fixtures observed in the main corridor are supported within an integrated ceiling system that is over a main path of egress. Maintenance and facility staff should verify that each fixture is independently supported to the roof structure from opposite corners and add wire supports as necessary.

Contents and Furnishings

Buildings often contain various tall and narrow furniture, such as shelving and storage units, that are freestanding away from any backing walls. High book shelving in the library, for example, can be highly susceptible to toppling if not anchored properly to the backing walls or to each other, and can become a life safety hazard. It is recommended that maintenance and facility staff verify that the tops of the shelving units are braced or anchored to the nearest backing wall or provide overturning base restraint. Heavy items weighing more than 20 pounds on upper shelves or cabinet furniture should also be restrained by netting or cabling to avoid becoming falling hazards to students or faculty below.

4.4.2 Mechanical Systems

The main seismic concerns for mechanical equipment are sliding, swinging, and overturning. Inadequate lateral restraint or anchorage can shift equipment off its supports, topple equipment to the ground, or dislodge overhead equipment, making them falling hazards. Investigation of above-ceiling mechanical equipment and systems was not part of this study, but an initial investigation for the presence of mechanical equipment bracing can be performed by maintenance and facility staff to see if equipment weighing more than 20 pounds with a center of mass more than 4 feet above the adjacent floor level is laterally braced. If bracing is not present, and the equipment poses a falling hazard to students and faculty below, further investigation is recommended by a structural engineer.

4.5 Opinion of Probable Conceptual Seismic Upgrades Costs

An opinion of probable project costs of the concept-level seismic upgrade recommendations provided in this report is included in Appendix C. The input of the scope of work to develop the probable costs is the Tier 1 checklists and the preliminary concept-level seismic upgrades design recommendations and sketches. These preliminary concept-level design sketches depict a design concept that could be implemented to improve the seismic safety of the building structure. It is important to note the preliminary seismic upgrades design concept is based on the results of the Tier 1 seismic screening checklists and engineering design judgement and has not been substantiated by detailed structural analyses and calculations.

For this preliminary opinion of probable costs the estimate of construction costs of the preliminary scope of work is developed based on current 1st Quarter (1Q) 2021 costs. Costs are then escalated to 4Q 2022 at 6% per year of the baseline cost estimate. Costs are developed based on the Tier 1 checklist, concept-level seismic upgrade design sketches, and project narratives.

A range of the cost estimate of -20% (low) to +50% (high) is used to develop the range of the construction cost estimate for the concept-level scope of work. The -20% to +50% range guidance is from Table 1 of the AACE International Recommended Practice 56R-08, *Cost Estimate Classification System*. This estimate is classified as a Class 5 based on the level of design of 0% to 2%. The range of a Class 5 construction cost estimate based on the AACE guidance selected for this estimate is a -20% to +50%.

The estimated total cost (construction costs plus soft costs) to mitigate the deficiencies identified in the Tier 1 checklists of the South Bend Jr/Sr High School, High School Main Building, ranges between approximately $5.23M and $9.81M (-20%/+50%). The baseline estimated total cost to seismically upgrade this building is approximately $6.54M. On a per-square-foot basis, the baseline seismic upgrade cost is estimated to be approximately $128 per square foot in 4Q 2022 dollars, with a range between $103 per square foot and $192 per square foot. Note however that this estimated cost and cost range could be significantly higher depending on the presence and amount of liquefiable soils and if it requires ground improvements on the South Bend Jr/Sr High School campus to mitigate post-earthquake liquefaction settlement. A detailed geotechnical investigation is also recommended prior to doing a seismic upgrade design project.

4.5.1 Opinion of Probable Construction Costs

This conceptual opinion of construction cost includes labor, materials, equipment, and scope contingency, general contractor general conditions, home office overhead, and profit. This is based on a public sector design-bid-build project delivery method. Project delivery methods such as negotiated, state of Washington GC/CM, and design-build are not the basis of the construction costs. Owner's soft costs are described below in Section 4.1.2.

The cost is developed in 1Q 2021 costs. The costs are then escalated to 4Q 2022 using an escalation rate of 6.0% per year. If the mid-point of construction will occur at a date earlier or later than 4Q 2022, then it is appropriate to adjust the escalation to the revised mid-point of construction. Construction costs excluded from the estimate are site work, phasing of construction, additional building modifications not directly related to the seismic scope of work, off hours labor costs, accelerated schedule overtime labor costs, replacement/relocation/additional FF+E, and building code changes that occur after this report.

For project budget planning purposes, it is highly recommended that the opinion of probable project costs is determined including: the overall construction budget of the seismic upgrade and additional scope of work for the building via the services of an A/E design team to study the proposed seismic mitigation strategies to refine the concept-level seismic upgrades design approach contained in this report, determine the construction timeline to adjust the escalation costs, define the construction phasing, if any, and the project soft costs.

4.5.2 Opinion of Probable A-E Design Budgets and Owner's Additional Project Costs (Soft Costs)

Additional owner's project costs would likely include owner's project administration costs, including project management, financing/bond costs, administration/contract/accounting costs, review of plans, value engineering studies, building permits, bidding costs, equipment, fixtures, furnishings and technology, and relocation of the school staff and students during construction. These costs are known as soft costs.

These soft costs have been included in the opinion of probable costs at 40% of the baseline probable construction cost for the seismic upgrade of this building.

The soft costs used for the projects that total to 40% are:
A+E Design - 10%
QA/QC Testing - 2%
Project Administration - 2%
Owner Contingency - 11%
Average Washington State Sales Tax - 9%
Building Permits - 6%

It is typical for soft costs to vary from owner to owner. Based upon our team members' experience on K-12 school projects in the state of Washington, it is our opinion that an allowance of 40% of the average probable construction cost is a reasonable and appropriate soft cost recommendation for planning purposes. We also recommend that each owner develop their own soft costs as part of their budgeting process and not rely solely on this recommended percentage.

4.5.3 Opinion of Escalation Rate

A 6.0%/year construction cost escalation rate is used for planning purposes for the conceptual estimates. The rate is compounded annually to the projected midpoint of construction. This rate is representative of the escalation based on the previous five years of market experience of construction costs throughout the State of Washington and is projected going forward for these projects. This rate is calculated to the 4th Quarter of 2022 as an allowance for planning purposes. The actual construction schedule for the project is to be determined and we recommend the escalation cost be revised based on revised construction schedule using the 6%/year rate.

Table 4.5.3-1. Seismic Upgrades Opinion of Probable Construction Costs.

Building	FEMA Bldg Type	ASCE 41 Level of Seismicity / Site Class	Structural Performance Objective	Bldg Gross Area	Estimated Seismic Upgrade Cost Range $/SF (Total)			Estimated Seismic Upgrade Cost/SF (Total)
South Bend High School Main Bldg	W2	High / D-E	**Structural**					
			Life Safety	51,000 SF	$49 ($2.49M)	-	$91 ($4.67M)	$61 ($3.12M)
			Nonstructural					
			Life Safety	51,000 SF	$24 ($1.25M)	-	$46 ($2.34M)	$31 ($1.56M)
			Total					
				51,000 SF	$73 ($3.74M)	-	$137 ($7.01M)	$92 ($4.67M)
							Estimated Soft Costs:	$1.87M
							Total Estimated Project Costs:	**$6.54M**

W: Wood-Framed; URM: Unreinforced Masonry; RM: Reinforced Masonry; C: Reinforced Concrete; PC: Precast concrete; S: Steel-framed

Appendix A: ASCE 41 Tier 1 Screening Report

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1. South Bend, South Bend Jr/Sr High School, Main Building High School

1.1 Building Description

Building Name:	Main Building High School
Facility Name:	South Bend Jr/Sr High School
District Name:	South Bend
ICOS Latitude:	46.662053
ICOS Longitude:	-123.791702
ICOS Building ID:	51397
ASCE 41 Bldg Type:	W2
Enrollment:	27
Gross Sq. Ft. :	51000
Year Built:	1968
Number of Stories:	1
$S_{XS\ BSE\text{-}2E}$:	1.235
$S_{X1\ BSE\text{-}2E}$:	1.831
ASCE 41 Level of Seismicity:	High
Site Class:	E
V_{S30}(m/s):	109
Liquefaction Potential:	moderate to high
Tsunami Risk:	Yes
Structural Drawings Available:	Yes
Evaluating Firm:	

** Liquification Potential and Tsunami Risk is based on publicly available state geologic hazard mapping.*

Constructed in 1968, South Bend High School is a one-story structure which was renovated in 2010. The structure is on level ground and located south of the Willapa River in South Bend, Washington. The building footprint is approximately 51,000 square feet and is rectangular with two interior court yards and a gable roof. The 1966 drawings indicated the building's construction consisted of a wood-framed roof system spanning between wood shear and bearing walls. The roof is a flexible diaphragm with plywood sheathing over wood joists. The floor structure is a combination of concrete slab on grade and an elevated wood floor assembly with wood joists spanning between concrete piers. The foundation system is composed of concrete pile caps with driven wood piles.

1.1.1 Building Use

The building is a public high school that includes classrooms, offices, and a gym. South Bend High School has over 250 student occupants.

1.1.2 Structural System

Table 1-1. Structural System Description of South Bend Jr/Sr High School

Structural System	Description
Structural Roof	The roof system is comprised of wood joists with a flexible plywood diaphragm.
Structural Floor(s)	The floors are comprised of concrete slab-on-grade and plywood over wood joists spanning between concrete piers
Foundations	The foundation system is driven wood piles below concrete pile caps.
Gravity System	The gravity system is composed of wood joists spanning between wood-stud bearing walls.
Lateral System	The lateral system in both directions consists of wood-stud, plywood shear walls.

1.1.3 Structural System Visual Condition

Table 1-2. Structural System Condition Description of South Bend Jr/Sr High School

Structural System	Description
Structural Roof	No visible signs of corrosion, damage, or deterioration.
Structural Floor(s)	No visible signs of corrosion, damage, or deterioration.
Foundations	Unknown.
Gravity System	No visible signs of corrosion, damage, or deterioration.
Lateral System	No visible signs of corrosion, damage, or deterioration.

Figure 1-1. Northeast Building Elevation

Figure 1-2. South Building Elevation

Figure 1-3. Southwest Building Elevation

Figure 1-4. Unrestrained Storage Above Six Feet

Figure 1-5. Roof Framing at Gym

Figure 1-6. Roof Framing in Classroom

Figure 1-7. Roof Framing in Library

Figure 1-8. CMU Walls in Locker Room

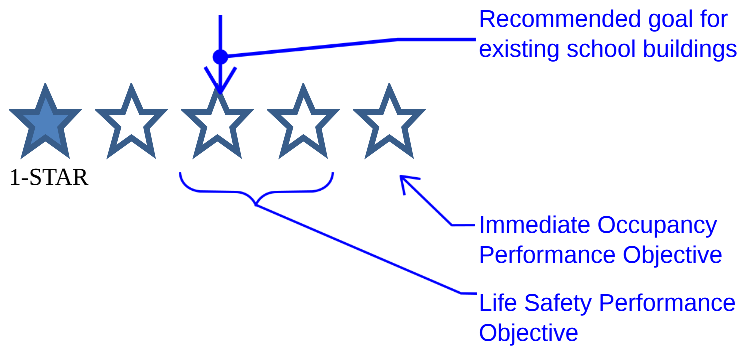
Figure 1-9. Roof Overhang Framing Condition

1.1.4 Earthquake Performance Rating System - Structural Safety Rating

The seismic evaluation items from the ASCE 41 Tier 1 seismic evaluation checklist have been translated to a Structural Safety star-rating using the *EPRS ASCE 41-13 Translation Procedure*. There are two other safety sub-ratings using the EPRS *Translation Procedure*: a Geologic safety sub-rating and a Nonstructural safety sub-rating, that are not included below.

The structural safety star-rating below is a preliminary rating based on the information available for this study. The geologic checklist items have been excluded from the structural safety star-rating. If a building's structural safety star-rating is to be improved, it may also be necessary to further assess the geologic conditions of the building site. Determining the final star-rating of a building is intended to be an iterative process and preliminary ratings will often times be conservative until more field investigation, structural analysis, and engineering judgment is performed by a structural engineer. The intent in providing a preliminary star-rating as part of this study is to provide school districts with the action lists below to further improve the seismic performance and safety of the buildings that were assessed. The tables below indicate the Unknown (U) or Noncompliant (NC) structural seismic evaluation items that should be mitigated or further investigated to improve the Earthquake Performance Rating System (EPRS) structural safety rating for this building.

EPRS Structural Safety Rating for South Bend Jr/Sr High School, Main Building High School:



1-STAR	Risk of Collapse in Multiple or Widespread Locations (Expected performance as a whole would lead to multiple or widespread conditions known to be associated with earthquake-related collapse resulting in injury, entrapment, or death.)
2-STAR	Risk of Collapse in Isolated Locations (Expected performance in certain locations within or adjacent to the building would lead to conditions known to be associated with earthquake-related collapse resulting in injury, entrapment, or death.)
3-STAR	Loss of Life Unlikely (Expected performance results in conditions that are unlikely to cause severe structural damage or loss of life). A 3-star rating meets the Tier 1 Life Safety (LS) structural performance objective.
4-STAR	Serious Injuries Unlikely (Expected performance results in conditions that are associated with limited structural damage and are unlikely to cause serious injuries).
5-STAR	Injuries and Entrapment Unlikely (Expected performance results in conditions that are associated with minimal structural damage and are unlikely to cause injuries or keep people from exiting the building). A 5-star rating meets the Tier 1 Immediate Occupancy (IO) structural performance objective.

Table 1-3. Identified Seismic Evaluation Items to Address for an improved ★★ 2-STAR Rating

Evaluation Item	Tier 1 Screening	Description
Load Path	Noncompliant	The windows along the north side of the building appear to create a break in the load path from the roof diaphragm to the shear walls. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Vertical Irregularities	Noncompliant	It does not appear that all vertical elements are continuous to the foundation. Further investigation should be performed prior to retrofit. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Shear Stress Check	Noncompliant	Per the Quick Check procedure, the shear stress is noncompliant. Further investigation should be performed prior to retrofit. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Cripple Walls	Unknown	Cripple walls appear to be braced to the foundation. The addition of wood structural panels to cripple walls may be appropriate to mitigate seismic risk. Further investigation should be performed.
Openings	Noncompliant	There appear to be walls with openings greater than 80% of the length of the shear wall. Further investigation should be performed. Diaphragm reinforcement may be appropriate to mitigate seismic risk.

Note: All of the evaluation items in Table 3 need to be assessed as Compliant (C) in order to achieve a 2-Star Structural Safety Rating.

Table 1-4. Additional Seismic Evaluation Items to Mitigate or Further Investigate for an improved ★★★ 3-STAR Rating

Evaluation Item	Tier 1 Evaluation	Description
Roof Chord Continuity	Noncompliant	Roof chord is not continuous through roof elevation changes. Further investigation should be performed prior to retrofit. New shear walls at the location of roof chord discontinuity may be appropriate to mitigate seismic risk.
Diagonally Sheathed and Unblocked Diaphragms	Noncompliant	Diaphragm is unblocked with spans greater than 40 feet in locations. Further investigation should be performed prior to retrofit. Diaphragm strengthening through the addition of blocking or additional diaphragm nailing may be appropriate to mitigate seismic risk.

Note: Tables 3 and 4 are cumulative. All of the evaluation items in Table 4 need to be assessed as Compliant (C) in addition to all of the evaluation items in Table 3 being assessed as Compliant (C), in order to achieve a 3-Star Structural Safety Rating.

The Structural Safety star-rating contained in this report is based on ASCE 41 Tier 1 Screening Checklists only. These seismic screening checklists are often the first step employed by structural engineers when trying to determine the seismic vulnerabilities of existing buildings and to begin a process of mitigating these seismic vulnerabilities. School district facilities management personnel and their design consultants should be able to take advantage of this information to help inform and address seismic risks in existing or future renovation, repair, or modernization projects.

It is important to note that information used for these school seismic screenings was limited to available construction drawings and limited site observations by our team of licensed structural engineers. In some cases, construction drawings were not available for review. Due to the limited scope of the study, our team of engineers were not able to perform more-detailed investigations above ceilings, behind wall finishes, in confined spaces, or in other areas obstructed from view. In many cases, further investigation and engineering analysis may find that items marked as unknown or noncompliant may not require seismic mitigation if it is shown that the existing structure is acceptable in its current state. In these cases, further investigation and engineering analysis should be conducted ahead of a seismic upgrade construction project, especially when a building is marked as having many unknown items.

1.2 Seismic Evaluation Findings

1.2.1 Structural Seismic Deficiencies

The structural seismic deficiencies identified during the Tier 1 evaluation are summarized below. Commentary for each deficiency is also provided based on this evaluation.

Table 1-5. Identified Structural Seismic Deficiencies for South Bend South Bend Jr/Sr High School Main Building High School

Deficiency	Description
Load Path	The windows along the north side of the building appear to create a break in the load path from the roof diaphragm to the shear walls. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Vertical Irregularities	It does not appear that all vertical elements are continuous to the foundation. Further investigation should be performed prior to retrofit. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Shear Stress Check	Per the Quick Check procedure, the shear stress is noncompliant. Further investigation should be performed prior to retrofit. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Openings	There appear to be walls with openings greater than 80% of the length of the shear wall. Further investigation should be performed. Diaphragm reinforcement may be appropriate to mitigate seismic risk.
Roof Chord Continuity	Roof chord is not continuous through roof elevation changes. Further investigation should be performed prior to retrofit. New shear walls at the location of roof chord discontinuity may be appropriate to mitigate seismic risk.
Diagonally Sheathed and Unblocked Diaphragms	Diaphragm is unblocked with spans greater than 40 feet in locations. Further investigation should be performed prior to retrofit. Diaphragm strengthening through the addition of blocking or additional diaphragm nailing may be appropriate to mitigate seismic risk.

1.2.2 Structural Checklist Items Marked as Unknown

Where building structural component seismic adequacy was unknown due to lack of available information or limited observation, the structural checklist items were marked as "unknown". These items require further investigation if definitive determination of compliance or noncompliance is desired. The unknown structural checklist items identified during the Tier 1 evaluation are summarized below. Commentary for each unknown item is also provided based on the evaluation.

Table 1-6. Identified Structural Checklist Items Marked as Unknown for South Bend South Bend Jr/Sr High School Main Building High School

Unknown Item	Description
Liquefaction	The liquefaction potential of site soils is unknown at this time given available information. moderate to high liquefaction potential is identified per ICOS based on state geologic mapping. Requires further investigation by a licensed geotechnical engineer to determine liquefaction potential.
Slope Failure	Requires further investigation by a licensed geotechnical engineer to determine susceptibility to slope failure. The structure appears to be located on a relatively flat site.
Surface Fault Rupture	Requires further investigation by a licensed geotechnical engineer to determine whether site is near locations of expected surface fault ruptures.
Cripple Walls	Cripple walls appear to be braced to the foundation. The addition of wood structural panels to cripple walls may be appropriate to mitigate seismic risk. Further investigation should be performed.

1.3.1 Nonstructural Seismic Deficiencies

The nonstructural seismic deficiencies identified during the Tier 1 evaluation are summarized below. Commentary for each deficiency is also provided based on this evaluation. Some nonstructural deficiencies may be able to be mitigated by school district staff. Other nonstructural components that require more substantial mitigation may be more appropriately included in a long-term mitigation strategy. Some typical conceptual details for the seismic upgrade of nonstructural components can be found in the FEMA E-74 Excerpts appendix.

Table 1-7. Identified Nonstructural Seismic Deficiencies for South Bend South Bend Jr/Sr High School Main Building High School

Deficiency	Description
P-1 Unreinforced Masonry. HR-LMH; LS-LMH; PR-LMH.	There does not appear to be adequate bracing for URM partitions. Unreinforced masonry partition walls should be braced at a spacing of six feet or demolished and replaced.
P-2 Heavy Partitions Supported by Ceilings. HR-LMH; LS-LMH; PR-LMH.	There does not appear to be adequate bracing for heavy partitions. Independent bracing for heavy partitions may be appropriate to mitigate seismic risk.
LF-1 Independent Support. HR-not required; LS-MH; PR-MH.	Light fixtures do not appear to be independently braced. Independent bracing for light fixtures may be appropriate to mitigate seismic risk.
CF-2 Tall Narrow Contents. HR-not required; LS-H; PR-MH.	It did not appear that contents taller than 6 feet were adequately restrained. Restraining contents by bracing top of contents to nearest backing wall or providing overturning base restraint may be appropriate to mitigate seismic risk.

1.3.2 Nonstructural Checklist Items Marked as Unknown

Where building nonstructural component seismic adequacy was unknown due to lack of available information or limited observation, the nonstructural checklist items were marked as “unknown”. These items require further investigation if definitive determination of compliance or noncompliance is desired. The unknown nonstructural checklist items identified during the Tier 1 evaluation are summarized below. Commentary for each unknown item is also provided based on the evaluation.

Some nonstructural deficiencies may be able to be mitigated by school district staff. Other nonstructural components that require more substantial mitigation may be more appropriately included in a long-term mitigation strategy. Some typical conceptual details for the seismic upgrade of nonstructural components can be found in the FEMA E-74 Excerpts appendix.

Table 1-8. Identified Nonstructural Checklist Items Marked as Unknown for South Bend South Bend Jr/Sr High School Main Building High School

Unknown Item	Description
CF-3 Fall-Prone Contents. HR-not required; LS-H; PR-H.	Did not observe any equipment, stored items, or other contents weighing more than 20 lb whose center of mass is more than 4 ft above the adjacent floor level. Heavy items on upper shelves should be restrained by netting to mitigate seismic risk.

South Bend, South Bend Jr/Sr High School, Main Building High School

17-2 Collapse Prevention Basic Configuration Checklist

Building record drawings have been reviewed, when available, and a non-destructive field investigation has been performed for the subject building. Each of the required checklist items are marked Compliant (C), Noncompliant (NC), Not Applicable (N/A), or Unknown (U). Items marked Compliant indicate conditions that satisfy the performance objective, whereas items marked Noncompliant or Unknown indicate conditions that do not. Certain statements might not apply to the building being evaluated.

Low Seismicity

Building System - General

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Load Path	The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Tier 2: Sec. 5.4.1.1; Commentary: Sec. A.2.1.10)		X			The windows along the north side of the building appear to create a break in the load path from the roof diaphragm to the shear walls. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Adjacent Buildings	The clear distance between the building being evaluated and any adjacent building is greater than 0.25% of the height of the shorter building in low seismicity, 0.5% in moderate seismicity, and 1.5% in high seismicity. (Tier 2: Sec. 5.4.1.2; Commentary: Sec. A.2.1.2)			X		There are no immediately adjacent structures.
Mezzanines	Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Tier 2: Sec. 5.4.1.3; Commentary: Sec. A.2.1.3)			X		There were no interior mezzanines observed in the building.

Building System - Building Configuration

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Weak Story	The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above. (Tier 2: Sec. 5.4.2.1; Commentary: Sec. A.2.2.2)			X		The building is a single-story structure.
Soft Story	The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Tier 2: Sec. 5.4.2.2; Commentary: Sec. A.2.2.3)			X		The building is a single-story structure.

Vertical Irregularities	All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Tier 2: Sec. 5.4.2.3; Commentary: Sec. A.2.2.4)		X			It does not appear that all vertical elements are continuous to the foundation. Further investigation should be performed prior to retrofit. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Geometry	There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 5.4.2.4; Commentary: Sec. A.2.2.5)			X		The building is a single-story structure.
Mass	There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 5.4.2.5; Commentary: Sec. A.2.2.6)			X		The building is a single-story structure.
Torsion	The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Tier 2: Sec. 5.4.2.6; Commentary: Sec. A.2.2.7)			X		The building has a flexible diaphragm, which typically is not stiff enough to develop torsional effects.

Moderate Seismicity **(Complete the Following Items in Addition to the Items for Low Seismicity)**

Geologic Site Hazards

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Liquefaction	Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building. (Tier 2: Sec. 5.4.3.1; Commentary: Sec. A.6.1.1)				X	The liquefaction potential of site soils is unknown at this time given available information. moderate to high liquefaction potential is identified per ICOS based on state geologic mapping. Requires further investigation by a licensed geotechnical engineer to determine liquefaction potential.

Slope Failure	The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure. (Tier 2: Sec. 5.4.3.1; Commentary: Sec. A.6.1.2)				X	Requires further investigation by a licensed geotechnical engineer to determine susceptibility to slope failure. The structure appears to be located on a relatively flat site.
Surface Fault Rupture	Surface fault rupture and surface displacement at the building site are not anticipated. (Tier 2: Sec. 5.4.3.1; Commentary: Sec. A.6.1.3)				X	Requires further investigation by a licensed geotechnical engineer to determine whether site is near locations of expected surface fault ruptures.

High Seismicity **(Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)**

Foundation Configuration

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Overturning	The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than 0.6Sa. (Tier 2: Sec. 5.4.3.3; Commentary: Sec. A.6.2.1)	X				Building does not appear to have elements of the seismic force-resisting system that would be a concern for excessive overturning.
Ties Between Foundation Elements	The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Tier 2: Sec. 5.4.3.4; Commentary: Sec. A.6.2.2)	X				All foundation elements are continuous around the perimeter of the structure and are interconnecting.

17-6 Collapse Prevention Structural Checklist for Building Type W2

Building record drawings have been reviewed, when available, and a non-destructive field investigation has been performed for the subject building. Each of the required checklist items are marked Compliant (C), Noncompliant (NC), Not Applicable (N/A), or Unknown (U). Items marked Compliant indicate conditions that satisfy the performance objective, whereas items marked Noncompliant or Unknown indicate conditions that do not. Certain statements might not apply to the building being evaluated.

Low and Moderate Seismicity

Seismic-Force-Resisting System

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Redundancy	The number of lines of shear walls in each principal direction is greater than or equal to 2. (Tier 2: Sec. 5.5.1.1; Commentary: Sec. A.3.2.1.1)	X				There are (2) or more lines of shear walls present in each direction.
Shear Stress Check	The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the following values: Structural panel sheathing – 1,000 lb/ft; Diagonal sheathing – 700 lb/ft; Straight sheathing – 100 lb/ft; All other conditions – 100 lb/ft. (Tier 2: Sec. 5.5.3.1.1; Commentary: Sec. A.3.2.7.1)		X			Per the Quick Check procedure, the shear stress is noncompliant. Further investigation should be performed prior to retrofit. Lateral system strengthening, such as adding additional shear walls, nailing, and anchoring may be appropriate to mitigate seismic risk.
Stucco (Exterior Plaster) Shear Walls	Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Tier 2: Sec. 5.5.3.6.1; Commentary: Sec. A.3.2.7.2)			X		The building is a single-story structure.
Gypsum Wallboard or Plaster Shear Walls	Interior plaster or gypsum wallboard is not used for shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Tier 2: Sec. 5.5.3.6.1; Commentary: Sec. A.3.2.7.3)			X		The building is a single-story structure.
Narrow Wood Shear Walls	Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Tier 2: Sec. 5.5.3.6.1; Commentary: Sec. A.3.2.7.4)	X				It appears that shear walls have an aspect ratio less than 2-to-1.
Walls Connected Through Floors	Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Tier 2: Sec. 5.5.3.6.2; Commentary: Sec. A.3.2.7.5)			X		The building is a single-story structure.
Hillside Site	For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-1. (Tier 2: Sec. 5.5.3.6.3; Commentary: Sec. A.3.2.7.6)			X		Building located on a level site.

Cripple Walls	Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Tier 2: Sec. 5.5.3.6.4; Commentary: Sec. A.3.2.7.7)				X	Cripple walls appear to be braced to the foundation. The addition of wood structural panels to cripple walls may be appropriate to mitigate seismic risk. Further investigation should be performed.
Openings	Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Tier 2: Sec. 5.5.3.6.5; Commentary: Sec. A.3.2.7.8)		X			There appear to be walls with openings greater than 80% of the length of the shear wall. Further investigation should be performed. Diaphragm reinforcement may be appropriate to mitigate seismic risk.

Connections

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Wood Posts	There is a positive connection of wood posts to the foundation. (Tier 2: Sec. 5.7.3.3; Commentary: Sec. A.5.3.3)	X				Wood posts appear to have a bolted connection to the structure below.
Wood Sills	All wood sills are bolted to the foundation. (Tier 2: Sec. 5.7.3.3; Commentary: Sec. A.5.3.4)	X				It appears that wood sills are bolted to the foundation.
Girder-Column Connection	There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 5.7.4.1; Commentary: Sec. A.5.4.1)	X				It appears that girders and columns are positively connected.

High Seismicity **(Complete the Following Items in Addition to the Items for Low & Moderate Seismicity)**

Connections

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Wood Sill Bolts	Sill bolts are spaced at 6 ft (1.8 m) or less with acceptable edge and end distance provided for wood and concrete. (Tier 2: Sec. 5.7.3.3; Commentary: Sec. A.5.3.7)	X				Sill bolts appear to be spaced less than 6 ft on center and specified to be in the center of the wood sill plate.

Diaphragms

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Diaphragm Continuity	The diaphragms are not composed of split-level floors and do not have expansion joints. (Tier 2: Sec. 5.6.1.1; Commentary: Sec. A.4.1.1)	X				The diaphragms do not appear to have expansion joints or to be composed of split-level floors.

Roof Chord Continuity	All chord elements are continuous, regardless of changes in roof elevation. (Tier 2: Sec. 5.6.1.1; Commentary: Sec. A.4.1.3)		X			Roof chord is not continuous through roof elevation changes. Further investigation should be performed prior to retrofit. New shear walls at the location of roof chord discontinuity may be appropriate to mitigate seismic risk.
Diaphragm Reinforcement at Openings	There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Tier 2: Sec. 5.6.1.5; Commentary: Sec. A.4.1.8)			X		No openings larger than 50% of the building width in either major plan dimension.
Straight Sheathing	All straight-sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Tier 2: Sec. 5.6.2; Commentary: Sec. A.4.2.1)			X		Building does not appear to use any straight sheathed diaphragms.
Spans	All wood diaphragms with spans greater than 24 ft (7.3 m) consist of wood structural panels or diagonal sheathing. (Tier 2: Sec. 5.6.2; Commentary: Sec. A.4.2.2)	X				Diaphragm has wood structural panel sheathing overlay.
Diagonally Sheathed and Unblocked Diaphragms	All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft (12.2 m) and have aspect ratios less than or equal to 4-to-1. (Tier 2: Sec. 5.6.2; Commentary: Sec. A.4.2.3)		X			Diaphragm is unblocked with spans greater than 40 feet in locations. Further investigation should be performed prior to retrofit. Diaphragm strengthening through the addition of blocking or additional diaphragm nailing may be appropriate to mitigate seismic risk.
Other Diaphragms	The diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Tier 2: Sec. 5.6.5; Commentary: Sec. A.4.7.1)	X				Diaphragms consist of wood.

South Bend, South Bend Jr/Sr High School, Main Building High School

17-38 Nonstructural Checklist

Notes:
C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.
Performance Level: HR = Hazards Reduced, LS = Life Safety, and PR = Position Retention.
Level of Seismicity: L = Low, M = Moderate, and H = High

Life Safety Systems

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
LSS-1 Fire Suppression Piping. HR-not required; LS-LMH; PR-LMH.	Fire suppression piping is anchored and braced in accordance with NFPA-13. (Tier 2: Sec. 13.7.4; Commentary: Sec. A.7.13.1)			X		The building does not have a fire suppression system.
LSS-2 Flexible Couplings. HR-not required; LS-LMH; PR-LMH.	Fire suppression piping has flexible couplings in accordance with NFPA-13. (Tier 2: Sec. 13.7.4; Commentary: Sec. A.7.13.2)			X		The building does not have a fire suppression system.
LSS-3 Emergency Power. HR-not required; LS-LMH; PR-LMH.	Equipment used to power or control Life Safety systems is anchored or braced. (Tier 2: Sec. 13.7.7; Commentary: Sec. A.7.12.1)			X		The building does not have emergency power.
LSS-4 Stair and Smoke Ducts. HR-not required; LS-LMH; PR-LMH.	Stair pressurization and smoke control ducts are braced and have flexible connections at seismic joints. (Tier 2: Sec. 13.7.6; Commentary: Sec. A.7.14.1)			X		The building is a single-story structure.
LSS-5 Sprinkler Ceiling Clearance. HR-not required; LS-MH; PR-MH.	Penetrations through panelized ceilings for fire suppression devices provide clearances in accordance with NFPA-13. (Tier 2: Sec. 13.7.4; Commentary: Sec. A.7.13.3)	X				The building does not have a fire suppression system.
LSS-6 Emergency Lighting. HR-not required; LS-not required; PR-LMH	Emergency and egress lighting equipment is anchored or braced. (Tier 2: Sec. 13.7.9; Commentary: Sec. A.7.3.1)			X		

Hazardous Materials

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
HM-1 Hazardous Material Equipment. HR-LMH; LS-LMH; PR-LMH.	Equipment mounted on vibration isolators and containing hazardous material is equipped with restraints or snubbers. (Tier 2: Sec. 13.7.1; Commentary: Sec. A.7.12.2)			X		Equipment on vibration isolators was not observed.
HM-2 Hazardous Material Storage. HR-LMH; LS-LMH; PR-LMH.	Breakable containers that hold hazardous material, including gas cylinders, are restrained by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 13.8.3; Commentary: Sec. A.7.15.1)			X		Breakable containers with hazardous contents were not observed.
HM-3 Hazardous Material Distribution. HR-MH; LS-MH; PR-MH.	Piping or ductwork conveying hazardous materials is braced or otherwise protected from damage that would allow hazardous material release. (Tier 2: Sec. 13.7.3, 13.7.5; Commentary: Sec. A.7.13.4)			X		Did not observe any piping or ductwork conveying hazardous materials.

HM-4 Shutoff Valves. HR-MH; LS-MH; PR-MH.	Piping containing hazardous material, including natural gas, has shutoff valves or other devices to limit spills or leaks. (Tier 2: Sec. 13.7.3, 13.7.5; Commentary: Sec. A.7.13.3)			X		Did not observe any piping or ductwork conveying hazardous materials.
HM-5 Flexible Couplings. HR-LMH; LS-LMH; PR-LMH.	Hazardous material ductwork and piping, including natural gas piping, have flexible couplings. (Tier 2: Sec. 13.7.3, 13.7.5; Commentary: Sec. A.7.15.4)			X		Did not observe any piping or ductwork conveying hazardous materials.
HM-6 Piping or Ducts Crossing Seismic Joints. HR-MH; LS-MH; PR-MH.	Piping or ductwork carrying hazardous material that either crosses seismic joints or isolation planes or is connected to independent structures has couplings or other details to accommodate the relative seismic displacements. (Tier 2: Sec. 13.7.3, 13.7.5, 13.7.6; Commentary: Sec. A.7.13.6)			X		The building does not have seismic joints.

Partitions

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
P-1 Unreinforced Masonry. HR-LMH; LS-LMH; PR-LMH.	Unreinforced masonry or hollow-clay tile partitions are braced at a spacing of at most 10 ft (3.0 m) in Low or Moderate Seismicity, or at most 6 ft (1.8 m) in High Seismicity. (Tier 2: Sec. 13.6.2; Commentary: Sec. A.7.1.1)		X			There does not appear to be adequate bracing for URM partitions. Unreinforced masonry partition walls should be braced at a spacing of six feet or demolished and replaced.
P-2 Heavy Partitions Supported by Ceilings. HR-LMH; LS-LMH; PR-LMH.	The tops of masonry or hollow-clay tile partitions are not laterally supported by an integrated ceiling system. (Tier 2: Sec. 13.6.2; Commentary: Sec. A.7.2.1)		X			There does not appear to be adequate bracing for heavy partitions. Independent bracing for heavy partitions may be appropriate to mitigate seismic risk.
P-3 Drift. HR-not required; LS-MH; PR-MH.	Rigid cementitious partitions are detailed to accommodate the following drift ratios: in steel moment frame, concrete moment frame, and wood frame buildings, 0.02; in other buildings, 0.005. (Tier 2: Sec. 13.6.2; Commentary: Sec. A.7.1.2)	X				Drift capacity of rigid cementitious partitions appear to be adequate.
P-4 Light Partitions Supported by Ceilings. HR-not required; LS-not required; PR-MH.	The tops of gypsum board partitions are not laterally supported by an integrated ceiling system. (Tier 2: Sec. 13.6.2; Commentary: Sec. A.7.2.1)			X		
P-5 Structural Separations. HR-not required; LS-not required; PR-MH.	Partitions that cross structural separations have seismic or control joints. (Tier 2: Sec. 13.6.2; Commentary: Sec. A.7.1.3)			X		

P-6 Tops. HR-not required; LS-not required; PR-MH.	The tops of ceiling-high framed or panelized partitions have lateral bracing to the structure at a spacing equal to or less than 6 ft (1.8 m). (Tier 2: Sec. 13.6.2; Commentary: Sec. A.7.1.4)			X		

Ceilings

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
C-1 Suspended Lath and Plaster. HR-H; LS-MH; PR-LMH.	Suspended lath and plaster ceilings have attachments that resist seismic forces for every 12 ft2 (1.1 m2) of area. (Tier 2: Sec. 13.6.4; Commentary: Sec. A.7.2.3)			X		No suspended lath and plaster ceilings observed.
C-2 Suspended Gypsum Board. HR-not required; LS-MH; PR-LMH.	Suspended gypsum board ceilings have attachments that resist seismic forces for every 12 ft2 (1.1 m2) of area. (Tier 2: Sec. 13.6.4; Commentary: Sec. A.7.2.3)			X		No suspended gypsum board ceilings observed.
C-3 Integrated Ceilings. HR-not required; LS-not required; PR-MH.	Integrated suspended ceilings with continuous areas greater than 144 ft2 (13.4 m2) and ceilings of smaller areas that are not surrounded by restraining partitions are laterally restrained at a spacing no greater than 12 ft (3.6 m) with members attached to the structure above. Each restraint location has a minimum of four diagonal wires and compression struts, or diagonal members capable of resisting compression. (Tier 2: Sec. 13.6.4; Commentary: Sec. A.7.2.2)			X		
C-4 Edge Clearance. HR-not required; LS-not required; PR-MH.	The free edges of integrated suspended ceilings with continuous areas greater than 144 ft2 (13.4 m2) have clearances from the enclosing wall or partition of at least the following: in Moderate Seismicity, 1/2 in. (13 mm); in High Seismicity, 3/4 in. (19 mm). (Tier 2: Sec. 13.6.4; Commentary: Sec. A.7.2.4)			X		
C-5 Continuity Across Structure Joints. HR-not required; LS-not required; PR-MH.	The ceiling system does not cross any seismic joint and is not attached to multiple independent structures. (Tier 2: Sec. 13.6.4; Commentary: Sec. A.7.2.5)			X		
C-6 Edge Support. HR-not required; LS-not required; PR-H.	The free edges of integrated suspended ceilings with continuous areas greater than 144 ft2 (13.4 m2) are supported by closure angles or channels not less than 2 in. (51 mm) wide. (Tier 2: Sec. 13.6.4 ; Commentary: Sec. A.7.2.6)			X		
C-7 Seismic Joints. HR-not required; LS-not required; PR-H.	Acoustical tile or lay-in panel ceilings have seismic separation joints such that each continuous portion of the ceiling is no more than 2,500 ft2 (232.3 m2) and has a ratio of long-to-short dimension no more than 4-to-1. (Tier 2: Sec. 13.6.4; Commentary: Sec. A.7.2.7)			X		

Light Fixtures

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
LF-1 Independent Support. HR-not required; LS-MH; PR-MH.	Light fixtures that weigh more per square foot than the ceiling they penetrate are supported independent of the grid ceiling suspension system by a minimum of two wires at diagonally opposite corners of each fixture. (Tier 2: Sec. 13.6.4, 13.7.9; Commentary: Sec. A.7.3.2)		X			Light fixtures do not appear to be independently braced. Independent bracing for light fixtures may be appropriate to mitigate seismic risk.
LF-2 Pendant Supports. HR-not required; LS-not required; PR-H.	Light fixtures on pendant supports are attached at a spacing equal to or less than 6 ft. Unbraced suspended fixtures are free to allow a 360-degree range of motion at an angle not less than 45 degrees from horizontal without contacting adjacent components. Alternatively, if rigidly supported and/or braced, they are free to move with the structure to which they are attached without damaging adjoining components. Additionally, the connection to the structure is capable of accommodating the movement without failure. (Tier 2: Sec. 13.7.9; Commentary: Sec. A.7.3.3)			X		
LF-3 Lens Covers. HR-not required; LS-not required; PR-H.	Lens covers on light fixtures are attached with safety devices. (Tier 2: Sec. 13.7.9; Commentary: Sec. A.7.3.4)			X		

Cladding and Glazing

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
CG-1 Cladding Anchors. HR-MH; LS-MH; PR-MH.	Cladding components weighing more than 10 lb/ft2 (0.48 kN/m2) are mechanically anchored to the structure at a spacing equal to or less than the following: for Life Safety in Moderate Seismicity, 6 ft (1.8 m); for Life Safety in High Seismicity and for Position Retention in any seismicity, 4 ft (1.2 m) (Tier 2: Sec. 13.6.1; Commentary: Sec. A.7.4.1)			X		The building does not have any exterior cladding components weighing over 10 lb/ft^2.
CG-2 Cladding Isolation. HR-not required; LS-MH; PR-MH.	For steel or concrete moment-frame buildings, panel connections are detailed to accommodate a story drift ratio by the use of rods attached to framing with oversize holes or slotted holes of at least the following: for Life Safety in Moderate Seismicity, 0.01; for Life Safety in High Seismicity and for Position Retention in any seismicity, 0.02, and the rods have a length-to-diameter ratio of 4.0 or less. (Tier 2: Sec. 13.6.1; Commentary: Sec. A.7.4.3)			X		The building does not have any exterior cladding components.

CG-3 Multi-Story Panels. HR-MH; LS-MH; PR-MH.	For multi-story panels attached at more than one floor level, panel connections are detailed to accommodate a story drift ratio by the use of rods attached to framing with oversize holes or slotted holes of at least the following: for Life Safety in Moderate Seismicity, 0.01; for Life Safety in High Seismicity and for Position Retention in any seismicity, 0.02, and the rods have a length-to-diameter ratio of 4.0 or less. (Tier 2: Sec. 13.6.1; Commentary: Sec. A.7.4.4)			X		The building is a single-story structure.
CG-4 Threaded Rods. HR-not required; LS-MH; PR-MH.	Threaded rods for panel connections detailed to accommodate drift by bending of the rod have a length-to-diameter ratio greater than 0.06 times the story height in inches for Life Safety in Moderate Seismicity and 0.12 times the story height in inches for Life Safety in High Seismicity and Position Retention in any seismicity. (Tier 2: Sec. 13.6.1; Commentary: Sec. A.7.4.9)			X		The building does not have any exterior cladding components.
CG-5 Panel Connections. HR-MH; LS-MH; PR-MH.	Cladding panels are anchored out of plane with a minimum number of connections for each wall panel, as follows: for Life Safety in Moderate Seismicity, 2 connections; for Life Safety in High Seismicity and for Position Retention in any seismicity, 4 connections. (Tier 2: Sec. 13.6.1.4; Commentary: Sec. A.7.4.5)			X		The building does not have any exterior cladding components.
CG-6 Bearing Connections. HR-MH; LS-MH; PR-MH.	Where bearing connections are used, there is a minimum of two bearing connections for each cladding panel. (Tier 2: Sec. 13.6.1.4; Commentary: Sec. A.7.4.6)			X		The building does not have any exterior cladding components.
CG-7 Inserts. HR-MH; LS-MH; PR-MH.	Where concrete cladding components use inserts, the inserts have positive anchorage or are anchored to reinforcing steel. (Tier 2: Sec. 13.6.1.4; Commentary: Sec. A.7.4.7)			X		The building does not have any exterior cladding components.
CG-8 Overhead Glazing. HR-not required; LS-MH; PR-MH.	Glazing panes of any size in curtain walls and individual interior or exterior panes more than 16 ft2 (1.5 m2) in area are laminated annealed or laminated heat-strengthened glass and are detailed to remain in the frame when cracked. (Tier 2: Sec. 13.6.1.5; Commentary: Sec. A.7.4.8)			X		The building does not have any exterior cladding components.

Masonry Veneer

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
M-1 Ties. HR-not required; LS-LMH; PR-LMH.	Masonry veneer is connected to the backup with corrosion-resistant ties. There is a minimum of one tie for every 2-2/3 ft2 (0.25 m2), and the ties have spacing no greater than the following: for Life Safety in Low or Moderate Seismicity, 36 in. (914 mm); for Life Safety in High Seismicity and for Position Retention in any seismicity, 24 in. (610 mm). (Tier 2: Sec. 13.6.1.2; Commentary: Sec. A.7.5.1)			X		The building does not have any masonry veneer.
M-2 Shelf Angles. HR-not required; LS-LMH; PR-LMH.	Masonry veneer is supported by shelf angles or other elements at each floor above the ground floor. (Tier 2: Sec. 13.6.1.2; Commentary: Sec. A.7.5.2)			X		The building is a single-story structure.
M-3 Weakened Planes. HR-not required; LS-LMH; PR-LMH.	Masonry veneer is anchored to the backup adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 13.6.1.2; Commentary: Sec. A.7.5.3)			X		The building does not have any masonry veneer.
M-4 Unreinforced Masonry Backup. HR-LMH; LS-LMH; PR-LMH.	There is no unreinforced masonry backup. (Tier 2: Sec. 13.6.1.1, 13.6.1.2; Commentary: Sec. A.7.7.2)	X				There is no unreinforced masonry backup.
M-5 Stud Tracks. HR-not required; LS-MH; PR-MH.	For veneer with coldformed steel stud backup, stud tracks are fastened to the structure at a spacing equal to or less than 24 in. (610 mm) on center. (Tier 2: Sec. 13.6.1.1, 13.6.1.2; Commentary: Sec. A.7.6.)			X		There is no coldformed steel stud backup.
M-6 Anchorage. HR-not required; LS-MH; PR-MH.	For veneer with concrete block or masonry backup, the backup is positively anchored to the structure at a horizontal spacing equal to or less than 4 ft along the floors and roof. (Tier 2: Sec. 13.6.1.1, 13.6.1.2; Commentary: Sec. A.7.7.1)			X		The building does not have any masonry veneer.
M-7 Weep Holes. HR-not required; LS-not required; PR-MH.	In veneer anchored to stud walls, the veneer has functioning weep holes and base flashing. (Tier 2: Sec. 13.6.1.2; Commentary: Sec. A.7.5.6)			X		
M-8 Openings. HR-not required; LS-not required; PR-MH.	For veneer with cold-formed-steel stud backup, steel studs frame window and door openings. (Tier 2: Sec. 13.6.1.1, 13.6.1.2; Commentary: Sec. A.7.6.2)			X		

Parapets, Cornices, Ornamentation, and Appendages

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
PCOA-1 URM Parapets or Cornices. HR-LMH; LS-LMH; PR-LMH.	Laterally unsupported unreinforced masonry parapets or cornices have height-tothickness ratios no greater than the following: for Life Safety in Low or Moderate Seismicity, 2.5; for Life Safety in High Seismicity and for Position Retention in any seismicity, 1.5. (Tier 2: Sec. 13.6.5; Commentary: Sec. A.7.8.1)			X		There are no URM parapets or cornices.

PCOA-2 Canopies. HR-not required; LS-LMH; PR-LMH.	Canopies at building exits are anchored to the structure at a spacing no greater than the following: for Life Safety in Low or Moderate Seismicity, 10 ft (3.0 m); for Life Safety in High Seismicity and for Position Retention in any seismicity, 6 ft (1.8 m). (Tier 2: Sec. 13.6.6; Commentary: Sec. A.7.8.2)	X				Canopies appeared to be well fastened to structure.
PCOA-3 Concrete Parapets. HR-H; LS-MH; PR-LMH.	Concrete parapets with height-to-thickness ratios greater than 2.5 have vertical reinforcement. (Tier 2: Sec. 13.6.5; Commentary: Sec. A.7.8.3)			X		There are no concrete parapets.
PCOA-4 Appendages. HR-MH; LS-MH; PR-LMH.	Cornices, parapets, signs, and other ornamentation or appendages that extend above the highest point of anchorage to the structure or cantilever from components are reinforced and anchored to the structural system at a spacing equal to or less than 6 ft (1.8 m). This evaluation statement item does not apply to parapets or cornices covered by other evaluation statements. (Tier 2: Sec. 13.6.6; Commentary: Sec. A.7.8.4)			X		There does not appear to be any cornices, parapets, signs and other ornamentation or appendages.

Masonry Chimneys

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
MC-1 URM Chimneys. HR-LMH; LS-LMH; PR-LMH.	Unreinforced masonry chimneys extend above the roof surface no more than the following: for Life Safety in Low or Moderate Seismicity, 3 times the least dimension of the chimney; for Life Safety in High Seismicity and for Position Retention in any seismicity, 2 times the least dimension of the chimney. (Tier 2: Sec. 13.6.7; Commentary: Sec. A.7.9.1)			X		There are no URM chimneys.
MC-2 Anchorage. HR-LMH; LS-LMH; PR-LMH.	Masonry chimneys are anchored at each floor level, at the topmost ceiling level, and at the roof. (Tier 2: Sec. 13.6.7; Commentary: Sec. A.7.9.2)			X		There are no URM chimneys.

Stairs

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
S-1 Stair Enclosures. HR-not required; LS-LMH; PR-LMH.	Hollow-clay tile or unreinforced masonry walls around stair enclosures are restrained out of plane and have height-to-thickness ratios not greater than the following: for Life Safety in Low or Moderate Seismicity, 15-to-1; for Life Safety in High Seismicity and for Position Retention in any seismicity, 12-to-1. (Tier 2: Sec. 13.6.2, 13.6.8; Commentary: Sec. A.7.10.1)			X		There are no stairs.

S-2 Stair Details. HR-not required; LS-LMH; PR-LMH.	The connection between the stairs and the structure does not rely on post-installed anchors in concrete or masonry, and the stair details are capable of accommodating the drift calculated using the Quick Check procedure of Section 4.4.3.1 for moment-frame structures or 0.5 in. for all other structures without including any lateral stiffness contribution from the stairs. (Tier 2: Sec. 13.6.8; Commentary: Sec. A.7.10.2)			X		There are no stairs.

Contents and Furnishings

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
CF-1 Industrial Storage Racks. HR-LMH; LS-MH; PR-MH.	Industrial storage racks or pallet racks more than 12 ft high meet the requirements of ANSI/RMI MH 16.1 as modified by ASCE 7, Chapter 15. (Tier 2: Sec. 13.8.1; Commentary: Sec. A.7.11.1)			X		Does not appear that there are any industrial storage racks taller than 12 feet in the building.
CF-2 Tall Narrow Contents. HR-not required; LS-H; PR-MH.	Contents more than 6 ft (1.8 m) high with a height-to-depth or height-to-width ratio greater than 3-to-1 are anchored to the structure or to each other. (Tier 2: Sec. 13.8.2; Commentary: Sec. A.7.11.2)		X			It did not appear that contents taller than 6 feet were adequately restrained. Restraining contents by bracing top of contents to nearest backing wall or providing overturning base restraint may be appropriate to mitigate seismic risk.
CF-3 Fall-Prone Contents. HR-not required; LS-H; PR-H.	Equipment, stored items, or other contents weighing more than 20 lb (9.1 kg) whose center of mass is more than 4 ft (1.2 m) above the adjacent floor level are braced or otherwise restrained. (Tier 2: Sec. 13.8.2; Commentary: Sec. A.7.11.3)				X	Did not observe any equipment, stored items, or other contents weighing more than 20 lb whose center of mass is more than 4 ft above the adjacent floor level. Heavy items on upper shelves should be restrained by netting to mitigate seismic risk.
CF-4 Access Floors. HR-not required; LS-not required; PR-MH.	Access floors more than 9 in. (229 mm) high are braced. (Tier 2: Sec. 13.6.10; Commentary: Sec. A.7.11.4)			X		
CF-5 Equipment on Access Floors. HR-not required; LS-not required; PR-MH.	Equipment and other contents supported by access floor systems are anchored or braced to the structure independent of the access floor. (Tier 2: Sec. 13.7.7 13.6.10; Commentary: Sec. A.7.11.5)			X		

CF-6 Suspended Contents. HR-not required; LS-not required; PR-H.	Items suspended without lateral bracing are free to swing from or move with the structure from which they are suspended without damaging themselves or adjoining components. (Tier 2: Sec. 13.8.2; Commentary: Sec. A.7.11.6)			X		

Mechanical and Electrical Equipment

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
ME-1 Fall-Prone Equipment. HR-not required; LS-H; PR-H.	Equipment weighing more than 20 lb (9.1 kg) whose center of mass is more than 4 ft (1.2 m) above the adjacent floor level, and which is not in-line equipment, is braced. (Tier 2: Sec. 13.7.1 13.7.7; Commentary: Sec. A.7.12.4)			X		There did not appear to be any elevated equipment weighing more than 20 lb.
ME-2 In-Line Equipment. HR-not required; LS-H; PR-H.	Equipment installed in line with a duct or piping system, with an operating weight more than 75 lb (34.0 kg), is supported and laterally braced independent of the duct or piping system. (Tier 2: Sec. 13.7.1; Commentary: Sec. A.7.12.5)	X				It appeared that the equipment in the mechanical room was adequately braced.
ME-3 Tall Narrow Equipment. HR-not required; LS-H; PR-MH.	Equipment more than 6 ft (1.8 m) high with a height-to-depth or height-to-width ratio greater than 3-to-1 is anchored to the floor slab or adjacent structural walls. (Tier 2: Sec. 13.7.1 13.7.7; Commentary: Sec. A.7.12.6)			X		No equipment taller than 6 feet was observed.
ME-4 Mechanical Doors. HR-not required; LS-not required; PR-MH.	Mechanically operated doors are detailed to operate at a story drift ratio of 0.01. (Tier 2: Sec. 13.6.9; Commentary: Sec. A.7.12.7)			X		
ME-5 Suspended Equipment. HR-not required; LS-not required; PR-H.	Equipment suspended without lateral bracing is free to swing from or move with the structure from which it is suspended without damaging itself or adjoining components. (Tier 2: Sec. 13.7.1, 13.7.7; Commentary: Sec. A.7.12.8)			X		
ME-6 Vibration Isolators. HR-not required; LS-not required; PR-H.	Equipment mounted on vibration isolators is equipped with horizontal restraints or snubbers and with vertical restraints to resist overturning. (Tier 2: Sec. 13.7.1; Commentary: Sec. A.7.12.9)			X		
ME-7 Heavy Equipment. HR-not required; LS-not required; PR-H.	Floor supported or platform-supported equipment weighing more than 400 lb (181.4 kg) is anchored to the structure. (Tier 2: Sec. 13.7.1, 13.7.7; Commentary: Sec. A.7.12.10)			X		
ME-8 Electrical Equipment. HR-not required; LS-not required; PR-H.	Electrical equipment is laterally braced to the structure. (Tier 2: Sec. 13.7.7; Commentary: Sec. A.7.12.11)			X		
ME-9 Conduit Couplings. HR-not required; LS-not required; PR-H.	Conduit greater than 2.5 in. (64 mm) trade size that is attached to panels, cabinets, or other equipment and is subject to relative seismic displacement has flexible couplings or connections. (Tier 2: Sec. 13.7.8; Commentary: Sec. A.7.12.12)			X		

Piping

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
PP-1 Flexible Couplings. HR-not required; LS-not required; PR-H.	Fluid and gas piping has flexible couplings. (Tier 2: Sec. 13.7.3, 13.7.5; Commentary: Sec. A.7.13.2)			X		
PP-2 Fluid and Gas Piping. HR-not required; LS-not required; PR-H.	Fluid and gas piping is anchored and braced to the structure to limit spills or leaks. (Tier 2: Sec. 13.7.3, 13.7.5; Commentary: Sec. A.7.13.4)			X		
PP-3 C-Clamps. HR-not required; LS-not required; PR-H.	One-sided C-clamps that support piping larger than 2.5 in. (64 mm) in diameter are restrained. (Tier 2: Sec. 13.7.3, 13.7.5; Commentary: Sec. A.7.13.5)			X		
PP-4 Piping Crossing Seismic Joints. HR-not required; LS-not required; PR-H.	Piping that crosses seismic joints or isolation planes or is connected to independent structures has couplings or other details to accommodate the relative seismic displacements. (Tier 2: Sec. 13.7.3, 13.7.5; Commentary: Sec. A.7.13.6)			X		

Ducts

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
D-1 Duct Bracing. HR-not required; LS-not required; PR-H.	Rectangular ductwork larger than 6 ft2 (0.56 m2) in cross-sectional area and round ducts larger than 28 in. (711 mm) in diameter are braced. The maximum spacing of transverse bracing does not exceed 30 ft (9.2 m). The maximum spacing of longitudinal bracing does not exceed 60 ft (18.3 m). (Tier 2: Sec. 13.7.6; Commentary: Sec. A.7.14.2)			X		
D-2 Duct Support. HR-not required; LS-not required; PR-H.	Ducts are not supported by piping or electrical conduit. (Tier 2: Sec. 13.7.6; Commentary: Sec. A.7.14.3)			X		
D-3 Ducts Crossing Seismic Joints. HR-not required; LS-not required; PR-H.	Ducts that cross seismic joints or isolation planes or are connected to independent structures have couplings or other details to accommodate the relative seismic displacements. (Tier 2: Sec. 13.7.6; Commentary: Sec. A.7.14.4)			X		

Elevators

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
EL-1 Retainer Guards. HR-not required; LS-H; PR-H.	Sheaves and drums have cable retainer guards. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.1)			X		The building does not have any elevators.
EL-2 Retainer Plate. HR-not required; LS-H; PR-H.	A retainer plate is present at the top and bottom of both car and counterweight. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.2)			X		The building does not have any elevators.

EL-3 Elevator Equipment. HR-not required; LS-not required; PR-H.	Equipment, piping, and other components that are part of the elevator system are anchored. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.3)			X		
EL-4 Seismic Switch. HR-not required; LS-not required; PR-H.	Elevators capable of operating at speeds of 150 ft/min or faster are equipped with seismic switches that meet the requirements of ASME A17.1 or have trigger levels set to 20% of the acceleration of gravity at the base of the structure and 50% of the acceleration of gravity in other locations. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.4)			X		
EL-5 Shaft Walls. HR-not required; LS-not required; PR-H.	Elevator shaft walls are anchored and reinforced to prevent toppling into the shaft during strong shaking. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.5)			X		
EL-6 Counterweight Rails. HR-not required; LS-not required; PR-H.	All counterweight rails and divider beams are sized in accordance with ASME A17.1. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.6)			X		
EL-7 Brackets. HR-not required; LS-not required; PR-H.	The brackets that tie the car rails and the counterweight rail to the structure are sized in accordance with ASME A17.1. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.7)			X		
EL-8 Spreader Bracket. HR-not required; LS-not required; PR-H.	Spreader brackets are not used to resist seismic forces. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.8)			X		
EL-9 Go-Slow Elevators. HR-not required; LS-not required; PR-H.	The building has a go-slow elevator system. (Tier 2: Sec. 13.7.11; Commentary: Sec. A.7.16.9)			X		

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Appendix B: Concept-Level Seismic Upgrade Figures

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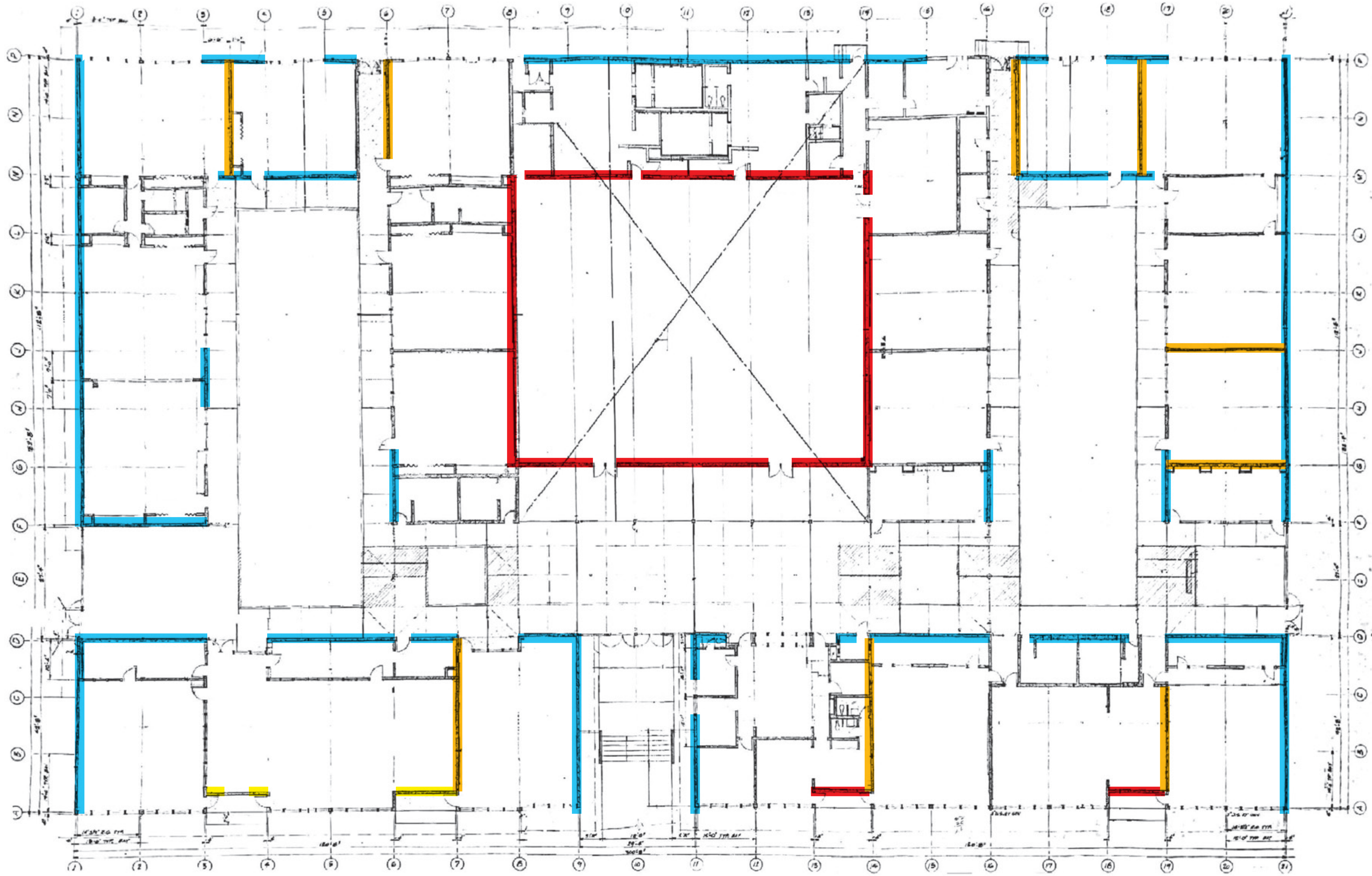


LEGEND

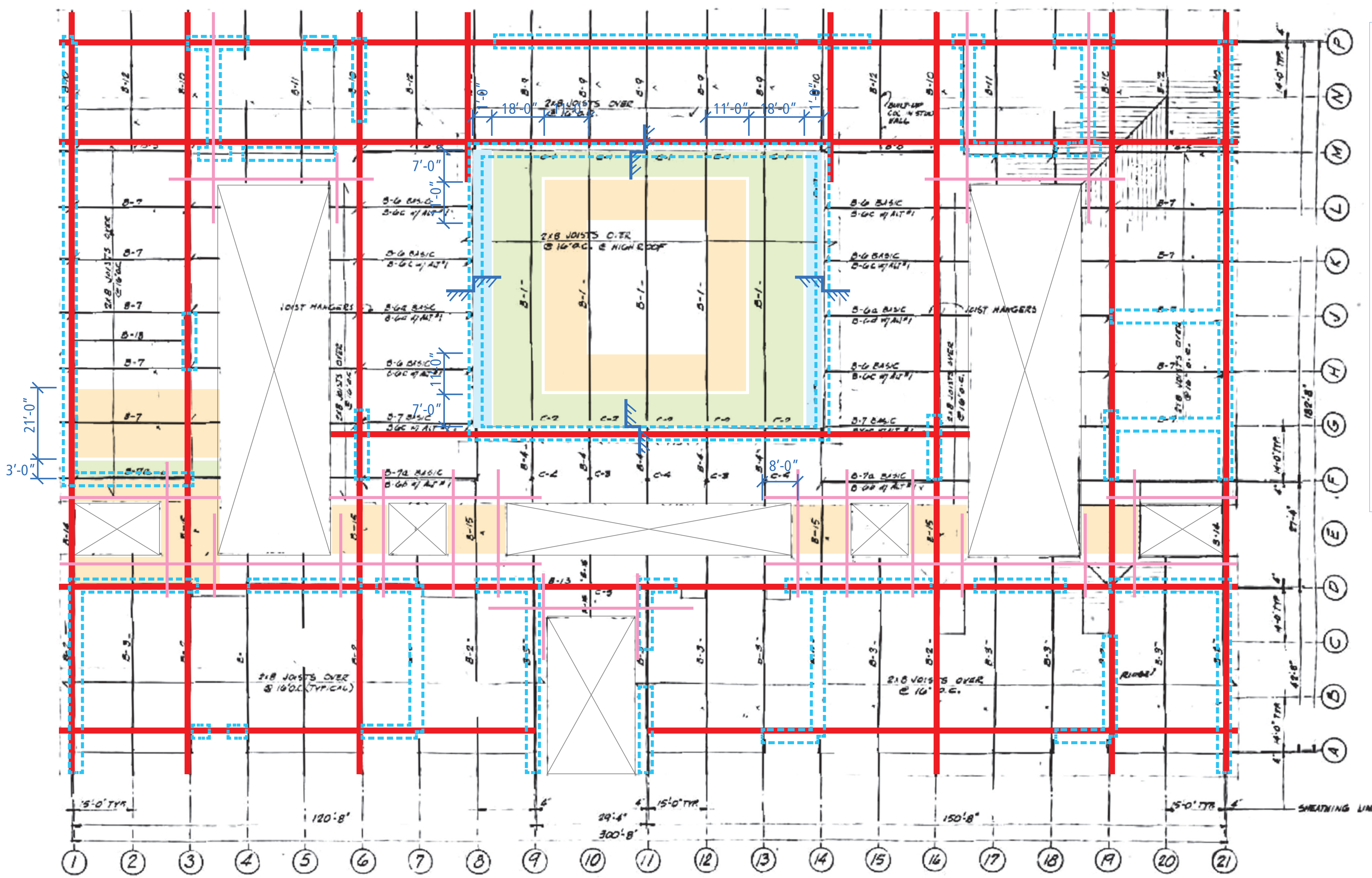
- Existing Wood Stud, Plywood Shear Wall, Supplement Existing Sill Anchors With 5/8"Ø (S) Titen HD Anchors at 48" OC
- Existing Wood Stud Wall With New Plywood Sheathing – Add 1/2" Plywood to Existing Stud Wall With 10d Nails at 3" OC at Panel Edges, Provide (2) Steel Clips at 12" OC Between Wall & Existing Roof Framing, Add Studs as Required to Achieve Stud Spacing of 16" OC at Sill Plate, Install 5/8"Ø (S) Titen HD Anchors at 16" OC, & (S) HDU2 Holddowns Each End
- Existing Wood Stud Wall With New Plywood Sheathing – Add 1/2" Plywood to Existing Stud Wall With 8D Nails at 6" OC at Panel Edges, Provide (1) Steel Clip at 12" OC Between Wall & Existing Roof Framing, Add Studs as Required to Achieve Stud Spacing of 16" OC at Sill Plate, Install 5/8"Ø (S) Titen HD Anchors at 16" OC & (S) HDU2 Holddowns Each End
- Existing Wood Stud Wall With New Plywood Sheathing – Add 1/2" Plywood Each Side of Existing Stud Wall With 8D Nails at 4" OC at Panel Edges, Provide (2) Steel Clips at 12" OC Between Wall & Existing Roof Framing, Add Studs as Required to Achieve Stud Spacing of 16" OC at Sill Plate, Install 5/8"Ø (S) Titen HD Anchors at 16" OC & (S) HDU2 Holddowns Each End

N

NOTES

Remove and replace ceiling and wall finishes as required.

Figure 1 – First Floor Strengthening Plan



LEGEND

- Add (2) 14 Gauge Continuous Straps Staggered & Nailed to Existing Plywood Sheathing, Provide 4x Blocking as Required For Installation of Straps
- Add (1) 14 Gauge Continuous Strap Nailed to Existing Plywood Sheathing, Provide 4x Blocking as Required For Installation of Straps, Provide 8'-0" Extension Beyond Edge of Opening or Extents as Shown on Plan, Typ. at All Diaphragm Openings
- Shear Wall Below, Add (1) Steel Clip at 12" OC Between Top of Wall & Existing Roof Framing or New Blocking Where Indicated
- New 4x Blocking at All Panel Edges, Use 10D Nails at 6" OC at All Panel Edges
- New 4x Blocking at All Panel Edges, Use 10D Nails at 4" OC at All Panel Edges
- New 4x Blocking at All Panel Edges, Use 10D Nails at 2.5" OC at All Panel Edges
- Step in Roof Elevation, See Existing DWGs For Building Elevations

NOTES

Remove and replace roofing.

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South Bend Junior/Senior High School Seismic Upgrades – Main Building

Washington State School Seismic Safety Assessments Project – South Bend Public Schools – June 2021

Figure 2 – Roof Strengthening Plan

Appendix C: Opinion of Probable Construction Costs

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Name:	Wa State School Seismic Safety Assessment Phase 2
Second Name:	South Bend High School
Location:	South Bend, WA
Design Phase:	ROM Cost Estimates
Date of Estimate:	March 3, 2021
Date of Revision:	April 13, 2021
Month of Cost Basis:	1Q, 2021

South Bend High School

Master Estimate Summary

Project Name	Construction Cost Type	Estimated Construction Cost
South Bend High School	Structural Costs	$3,115,255
South Bend High School	Non-Structural Costs	$1,557,628
TOTAL ESTIMATED CONSTRUCTION COST →		**$4,672,883**

Soft Costs	Soft Costs % Construction Cost	Estimated Soft Costs
Project Soft Cost Allowance	40.0%	**$1,869,153**
		Sum of the Above
TOTAL ESTIMATED PROJECT COST →		**$6,542,036**

Estimate Assumptions:

The ROM Construction Cost estimates are based on the Concept Design Report for the Project.
Construction Escalation is not included. Costs are current as of the month of Cost Basis noted above right.

Estimate Qualifications:

The ROM estimates are not be relied on solely for proforma development and financial decisions.
Further design work is required to determine construction budgets.
All Buildings Estimated to the 5' foot line for Utilities, All Sitework is estimated to go with any combination of the buildings and alternatives.
The ROM estimates do not include any Hazardous Material Abatement/Disposal.
For Construction Cost Markups they are additive, not cumulative. Percentages are added to the previous subtotal rather than the direct cost subtotal.
Owner Soft Costs Allowance are: A/E design fees, QA/QC, Project Administration, Owners Project Contingency, Average Washington State Sale Tax and
Estimated labor is based on an 8 hour per day shift 5 days a week. Accelerated schedule work of overtime has not been included.
Estimated labor is based on working on unoccupied facility without phased construction.
Estimate is based on a competitive public bid with at least 3 bona fide submitted and unrescinded general contractor bids.
Estimate is based on a competitive public bid with a minimum 6 week bidding schedule and no significant addendums within 2 weeks of bid opening.
State of Washington General Contractor/ Construction Manager (GC/CM) contracts typically raises construction costs. It is Not Included in this estimate.
Estimated construction cost is for the entire project. This estimate is not intended to be used for other projects.
Please consult the cost estimator for any modifications to this estimate. Unilaterally adding and deleting markups, scope of work, schedule, specifications, plans and bid forms could incorrectly restate the project construction cost.
Construction reserve contingency for change orders is not included in the estimate.
Sole source supply of materials and/ or installers typically results in a 40% to 100% premium on costs over open specifications.

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Structural Costs

South Bend High School

Name:	Wa State School Seismic Safety Assessment Phase 2	Areas	sqft
Second Name:	South Bend High School	Building Area	51,000
Location:	South Bend, WA		
Design Phase:	ROM Cost Estimates		
Date of Estimate:	March 3, 2021		
Date of Revision:	April 13, 2021		
Month of Cost Basis:	1Q, 2021	Total Areas	51,000

Construction Cost Estimate

Subtotal Direct Cost From the Estimate Detail Below $ 2,116,463

	Percentage of Previous Subtotal	Amount	Running Subtotal
Scope Contingency	10.0%	$ 211,646	$ 2,328,109
General Conditions	10.0%	$ 211,646	$ 2,539,755
Home Office Overhead	5.0%	$ 105,823	$ 2,645,578
Profit	6.0%	$ 126,988	$ 2,772,566
Escalation Included to 4Q, 2022	12.4%	$ 342,689	$ 3,115,255
Washington State Sales Tax - Included in Soft Costs			

Total Markups Applied to the Direct Cost 47.19%
Markups are multiplied on each subtotal- They are not multiplied from the direct cost

		$/sqft
TOTAL ESTIMATED CONSTRUCTION COST--→	**$ 3,115,255**	**$ 61.08**
-20% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --→	**$ 2,492,204**	**$ 48.87**
+50% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --→	**$ 4,672,883**	**$ 91.63**

Please see the Master Summary for Assumptions and Qualifications for ROM Cost Estimates

Direct Cost of Construction

WBS	Description	Quantity	U of M	Labor	Labor Total	Material	Material Total	Equipment	Equipment Total	Total $/U of M	Direct Cost
1 - Seismic Retrofit											
Foundations											
	Hold Down System - Nail to Wood Studs, Epoxy Anchor Bolt	26	each	$ 128.76	$ 3,347.76	$ 93.24	$ 2,424.24	$ 13.32	$ 346.32	$ 235.32	$ 6,118.32
Superstructure											
Roof Systems											
	New Shearwall with 1/2" Plywood Sheathing with Studs with Sill Bolts - Remove GWB and Reinstall	10,000	sqft	$ 4.68	$ 46,833.00	$ 2.31	$ 23,067.00	$ 0.42	$ 4,194.00	$ 7.41	$ 74,094.00
	Upgrade Shearwall with Sill Bolts - Remove GWB and Reinstall	750	lnft	$ 11.52	$ 8,640.00	$ 4.48	$ 3,360.00	$ 0.96	$ 720.00	$ 16.96	$ 12,720.00
	4X Blocking at Roof at Panel Edges with Various Nailing Patterns	9,170	sqft	$ 2.76	$ 25,332.13	$ 1.49	$ 13,640.38	$ 0.26	$ 2,338.35	$ 4.51	$ 41,310.85
	Add A35 Steel Clip at 12" o.c. at Top of Wall to Roof	2,500	each	$ 17.85	$ 44,625.00	$ 3.15	$ 7,875.00	$ 1.26	$ 3,150.00	$ 22.26	$ 55,650.00
	CMSTC14 Nailed to Sheathing with 4X Blocking	1,015	lnft	$ 10.40	$ 10,556.00	$ 5.60	$ 5,684.00	$ 0.96	$ 974.40	$ 16.96	$ 17,214.40
	2 Rows of CMSTC14 Nailed to Sheathing with 4X Blocking	2,500	lnft	$ 14.63	$ 36,562.50	$ 7.88	$ 19,687.50	$ 1.35	$ 3,375.00	$ 23.85	$ 59,625.00
	Add 1/2" Plywood Sheathing at Existing Roof - Allowance of 75% of the Roof Area	33,784	sqft	$ 0.86	$ 28,986.46	$ 0.46	$ 15,608.09	$ 0.08	$ 2,675.67	$ 1.40	$ 47,270.22
Roofing System											
	Remove Roofing System Down to Plywood Deck	45,045	sqft	$ 4.04	$ 181,869.19	$ 0.21	$ 9,572.06	$ 0.26	$ 11,486.48	$ 4.51	$ 202,927.73
	New Membrane Roofing System with R-38 Rigid Insulation, Flashing and Trim and Downspout Roof Drainage System	45,045	sqft	$ 8.78	$ 395,269.88	$ 10.73	$ 483,107.63	$ 1.17	$ 52,702.65	$ 20.67	$ 931,080.15

WBS	Description	Quantity	U of M	Labor	Labor Total	Material	Material Total	Equipment	Equipment Total	Total $/U of M	Direct Cost
Interior Wall/Door/Casework/Specialties Systems											
	Remove and Reinstall Floor Finish Systems-Allow 50% of the Floor Area	25,500	sqft	$ 3.01	$ 76,678.50	$ 1.84	$ 46,996.50	$ 0.29	$ 7,420.50	$ 5.14	$ 131,095.50
	Remove and Reinstall Wall Finish Systems-Allow 100% of the Floor Area	51,000	sqft	$ 2.79	$ 142,290.00	$ 1.71	$ 87,210.00	$ 0.27	$ 13,770.00	$ 4.77	$ 243,270.00
	Remove Ceiling and Reinstall New ACT Ceiling Systems-Allow 80% of the Floor Area	40,800	sqft	$ 4.22	$ 172,012.80	$ 2.58	$ 105,427.20	$ 0.41	$ 16,646.40	$ 7.21	$ 294,086.40
Subtotal of the Direct Cost of Construction				**South Bend High School**							**$ 2,116,463**

PRODIMS
520 Kirkland Way, Suite 301
Kirkland, WA 98033
Phone: 425-828-0500 Fax: 425-828-0700
www.prodims.com

Non-Structural Costs

Name:	Wa State School Seismic Safety Assessment Phase 2	Areas	sqft
Second Name:	South Bend High School	Building Area	51,000
Location:	South Bend, WA		
Design Phase:	ROM Cost Estimates		
Date of Estimate:	March 3, 2021		
Date of Revision:	April 13, 2021		
Month of Cost Basis:	1Q, 2021	Total Areas	51,000

South Bend High School

Construction Cost Estimate

Subtotal Direct Cost From the Estimate Detail Below $ 1,058,231

	Percentage of Previous Subtotal		Amount		Running Subtotal
Scope Contingency	10.0%	$	105,823	$	1,164,054
General Conditions	10.0%	$	105,823	$	1,269,878
Home Office Overhead	5.0%	$	52,912	$	1,322,789
Profit	6.0%	$	63,494	$	1,386,283
Escalation Included to 4Q, 2022	12.4%	$	171,345	$	1,557,628
Washington State Sales Tax - Included in Soft Costs					

Total Markups Applied to the Direct Cost 47.19%
Markups are multiplied on each subtotal- They are not multiplied from the direct cost

			$/sqft
TOTAL ESTIMATED CONSTRUCTION COST--	**$**	**1,557,628**	**$ 30.54**
-20% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --	**$**	**1,246,102**	**$ 24.43**
+50% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --	**$**	**2,336,441**	**$ 45.81**

Please see the Master Summary for Assumptions and Qualifications for ROM Cost Estimates

Direct Cost of Construction

WBS	Description	Quantity	U of M	Labor	Labor Total	Material	Material Total	Equipment	Equipment Total	Total $/U of M	Direct Cost
	2- Non- Structural Demo/Restoration*										
	M/E/P/FP Systems										
	Mechanical/Electrical/Fire Protection Systems *	51,000	sqft	$ 10.77	$ 549,082.27	$ 8.81	$ 449,249.13	$ 1.17	$ 59,899.88	$ 20.75	$ 1,058,231.28
	*Allows 50 percent of existing nonstructural systems M/E/P/FP require upgrades/replacement.										
	Subtotal of the Direct Cost of Construction			**South Bend High School**							**$ 1,058,231**

Appendix D: Earthquake Performance Assessment Tool (EPAT) Worksheet

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Washington Schools Earthquake Performance Assessment Tool (EPAT) RESULTS SUMMARY		
District Name	South Bend	**Existing Building Life Safety Risk & Priority for Retrofit or Replacement**
School Name	South Bend High School	
Building Name	Main Building High School	High

Building Data		
HAZUS Building Type	W2	Wood, Commercial & Industrial (>5,000 SF)
Year Built	1968	These parameters determine the capacity of the existing building to withstand earthquake forces.
Building Design Code	<1973 UBC	
Existing Building Code Level	Pre	
Geographic Area	Coastal	
Severe Vertical Irregularity	No	Buildings with irregularities have greater earthquake damage than otherwise similar buildings that are regular.
Moderate Vertical Irregularity	No	
Plan Irregularity	No	

Seismic Data		
Earthquake Ground Shaking Hazard Level	Very High	Frequency and severity of earthquakes at this site
Percentile S_s Among WA K-12 Campuses	90%	Earthquake ground shaking hazard is higher than 90% of WA campuses.
Site Class (Soil or Rock Type)	E	Soft Clay Soil
Liquefaction Potential	Moderate to High	Liquefaction increases the risk of major damage to a building
Combined Earthquake Hazard Level	Extremely High	Earthquake ground shaking and liquefaction potential

Severe Earthquake Event (Design Basis Earthquake Ground Motion)[1]

Building State	**Building Damage Estimate[2]**	**Probability Building is not Repairable[3]**	**Life Safety[4] Risk Level**	**Most Likely Post-Earthquake Tagging[5]**
Existing Building	58%	54%	High	Red
Life Safety Retrofit Building	14%	6.1%	Very Low	Green
Current Code Building	11%	3.8%	Very Low	Green

1. 2/3rds of the 2% in 50 year ground motion
2. Percentage of building replacement value.
3. Probability building is in the Extensive or Complete damage states. For existing buildings, the probability that the building is not economically repairable may be higher: some buildings in the Moderate Damage state are also likely to be demolished.
4. Based on probability of Complete Damage State.
5. Most likely post-earthquake damage state per ATC-20.

Source for the Data Entered into the Tool	
Building Evaluated By:	Brian Knight
Person(s) Who Entered Data in EPAT:	Rami Sabra, Reid Middleton
User Overrides of Default Parameters:	Building Design Code Year, Site Class, Liquefaction

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Appendix E: Existing Drawings

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ADDITION TO SOUTH BEND HIGH SCHOOL

SUPERINTENDENT
GARETH GILES

BOARD OF DIRECTORS
ROBERT GERWIG, PRESIDENT
PAUL WETTERAUER
LAWERANCE REMINGTON
WAYNE PATRICK
DORWIN FOSSE, CLERK

ARCHITECT
HOVIND - HARTHORNE & SMITH

MECHANICAL ENGINEER
BROWN - RADIN

ELECTRICAL ENGINEER
BROWN - RADIN

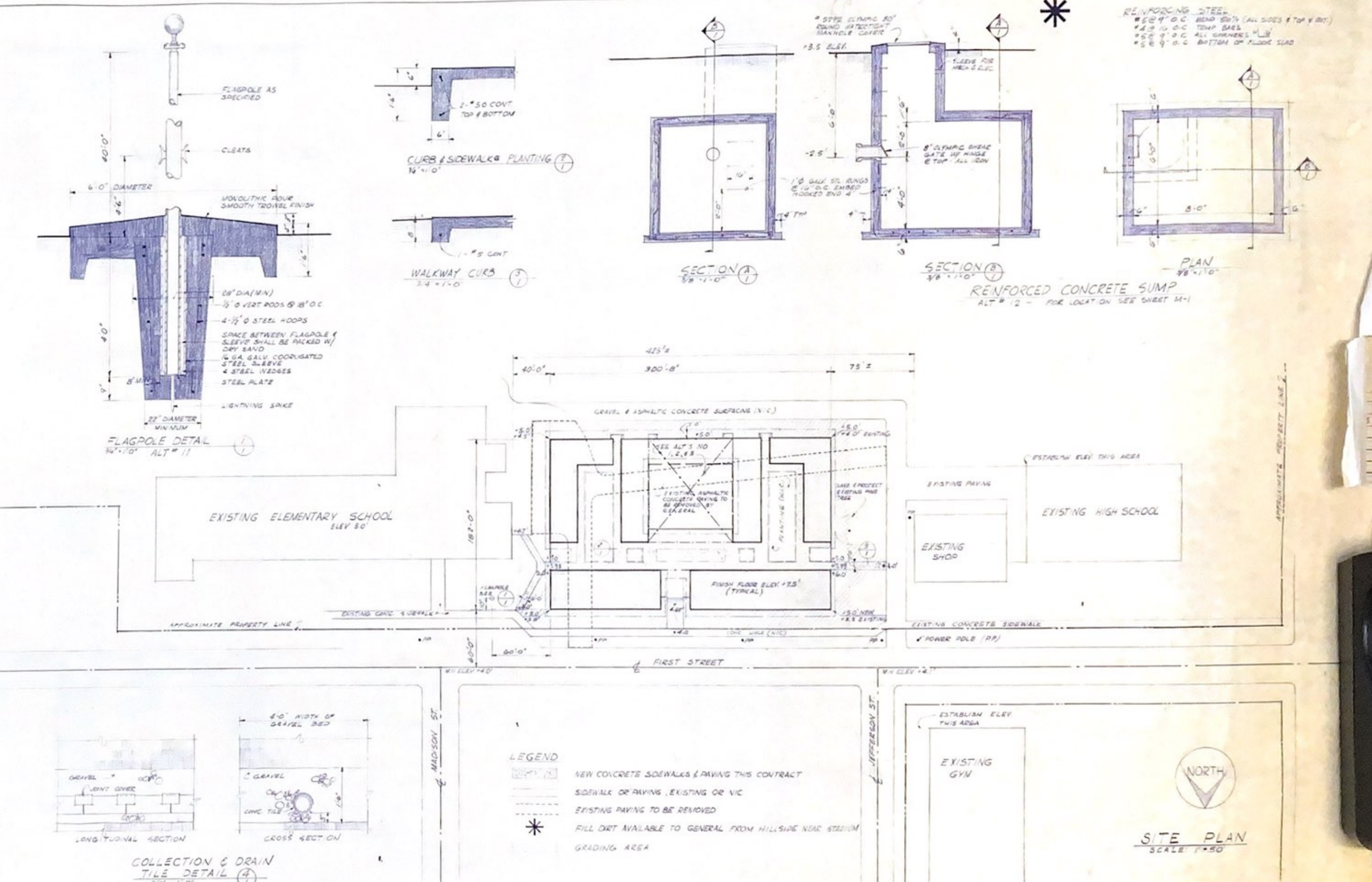
STRUCTURAL ENGINEER
JOHN H. STEVENSON

INDEX TO DRAWINGS

SHEET NUMBER	INDEX TO DRAWINGS
1	INDEX, ABBREVIATION SCHEDULE, SITE PLAN, SITE DETAILS
2	FOUNDATION PLAN, FOUNDATION DETAILS
3	PARTIAL FLOOR PLAN, FINISH SCHEDULE, PLAN DETAILS
4	PARTIAL FLOOR PLAN, ARCHITECTURAL DETAILS
5	DOOR SCHEDULE, DOOR & WINDOW FRAMES & DETAILS
6	BUILDING ELEVATIONS
7	BUILDING ELEVATIONS
8	BUILDING SECTIONS
9	BUILDING SECTIONS & INTERIOR ELEVATIONS
10	INTERIOR ELEVATIONS
11	ARCHITECTURAL DETAILS
12	ARCHITECTURAL DETAILS
13	BASIC BID - PARTIAL PLAN, ELEVATIONS, SECTIONS & DETAILS
S-1	ROOF FRAMING PLAN, GLU-LAM ELEVATIONS
S-2	STRUCTURAL DETAILS, STRUCTURAL NOTES, BEAM & SLAB SCHEDULE
S-3	PILING PLAN
M-1	SITE PLAN, SCHEDULES & DETAILS
M-2	PLUMBING PLAN
M-3	HEATING & VENTILATING PLAN
M-4	MECHANICAL ALTERNATES & SCHEDULES
E-1	SITE PLAN, CRAWL SPACE LIGHTING PLAN, SCHEDULES & DIAGRAMS
E-2	LIGHTING FLOOR PLAN
E-3	ELECTRICAL FLOOR PLAN

ABBREVIATION SCHEDULE

A.B.	ANCHOR BOLT	SGL	SINGLE
A.C.T.	ACOUSTICAL TILE	SHT	SHEET
ALUM	ALUMINUM	S.M.	SHEET METAL
BLDG	BUILDING	S.S.	SERVICE SINK
BLK'G	BLOCKING	ST	STAINLESS
BM	BEAM	STL	STEEL
BOT	BOTTOM	STD.	STANDARD
BRG	BEARING	T.D.	TOWEL DISPENSOR
CEM. PLAS.	CEMENT PLASTER	TYP.	TYPICAL
COL.	COLUMN	T&G.	TONGUE & GROOVE
CONC.	CONCRETE	U.V.	UNIT VENT
CONT.	CONTINUOUS	V.A.T.	VINYL ASBESTOS TILE
C.S.	CRYSTAL SHEET	VERT.	VERTICAL
C.T.	CERAMIC TILE	V.G.	VERTICAL GRAIN
C.W.G.	CLEAR WIRE GLASS		
D.F.	DRINKING FOUNTAIN	T.W.F.	THRU-WALL FLASHING
DIM. PT.	DIMENSION POINT	U.C.	UNDER CUT
D.O.	DOOR OPENING		
D.S.	DOWNSPOUT		
D.S.B.	DOUBLE STRENGTH GLASS		
DTL	DETAIL		
EA.	EACH		
EL. (ELEV.)	ELEVATION		
ELEC.	ELECTRICAL CONTRACTOR		
EXP.	EXPANSION		
EXT.	EXTERIOR		
FAC.	FACTORY		
F.D.	FLOOR DRAIN		
FDN	FOUNDATION		
F.E.C.	FIRE EXTINGUISHER CABINET		
F.H.	FLOOR HARDNER		
FHMS	FLAT HEAD MACHINE SCREW		
F.HT.	FRAME HEIGHT		
FHWS	FLAT HEAD WOOD SCREWS		
FIN.	FINISH		
FL.	FLOOR		
FLSH'G	FLASHING		
F.M.	FIXED MULLION		
FR.	FRAME		
FTG.	FOOTING		
F.W.	FRAME WIDTH		
GA.	GAUGE		
G.I.	GALVANIZED IRON		
GLU-LAM (G.L.)	GLUED LAMINATED		
G.S.W.U.	GLAZED STRUCTURAL WALL UNITS		
H.B.	HOSE BIBB		
HD. WD.	HARD WOOD		
H.W.	HOT WATER		
I.D.	INSIDE DIAMETER		
INSUL	INSULATION		
JST	JOIST		
JT	JOINT		
K.D.	KILN DRIED		
LAM. PLAS. (L.P.)	LAMINATED PLASTIC		
MAT'L	MATERIAL		
MECH	MECHANICAL CONTRACTOR		
MFR	MANUFACTURER		
M.O.	MASONRY OPENING		
MTL	METAL		
N.I.C.	NOT IN CONTRACT		
N.T.S.	NOT TO SCALE		
O.C.	ON CENTER		
O.D.	OUTSIDE DIAMETER		
O.P.	OVERLAID PLYWOOD		
P.B.	PLASTERBOARD		
PLY	PLYWOOD		
P.P.	POLISHED PLATE		
RHMS	ROUND HEAD MACHINE SCREWS		
RHWS	ROUND HEAD WOOD SCREWS		
R.M.	REMOVABLE MULLION		
R.O.	ROUGH OPENING		
S.C.	SOLID CORE		
S.D.	SASH DIMENSION		



DATE	REVISIONS	BY

REGISTERED ARCHITECT
F. J. HARTHORNE
STATE OF WASHINGTON

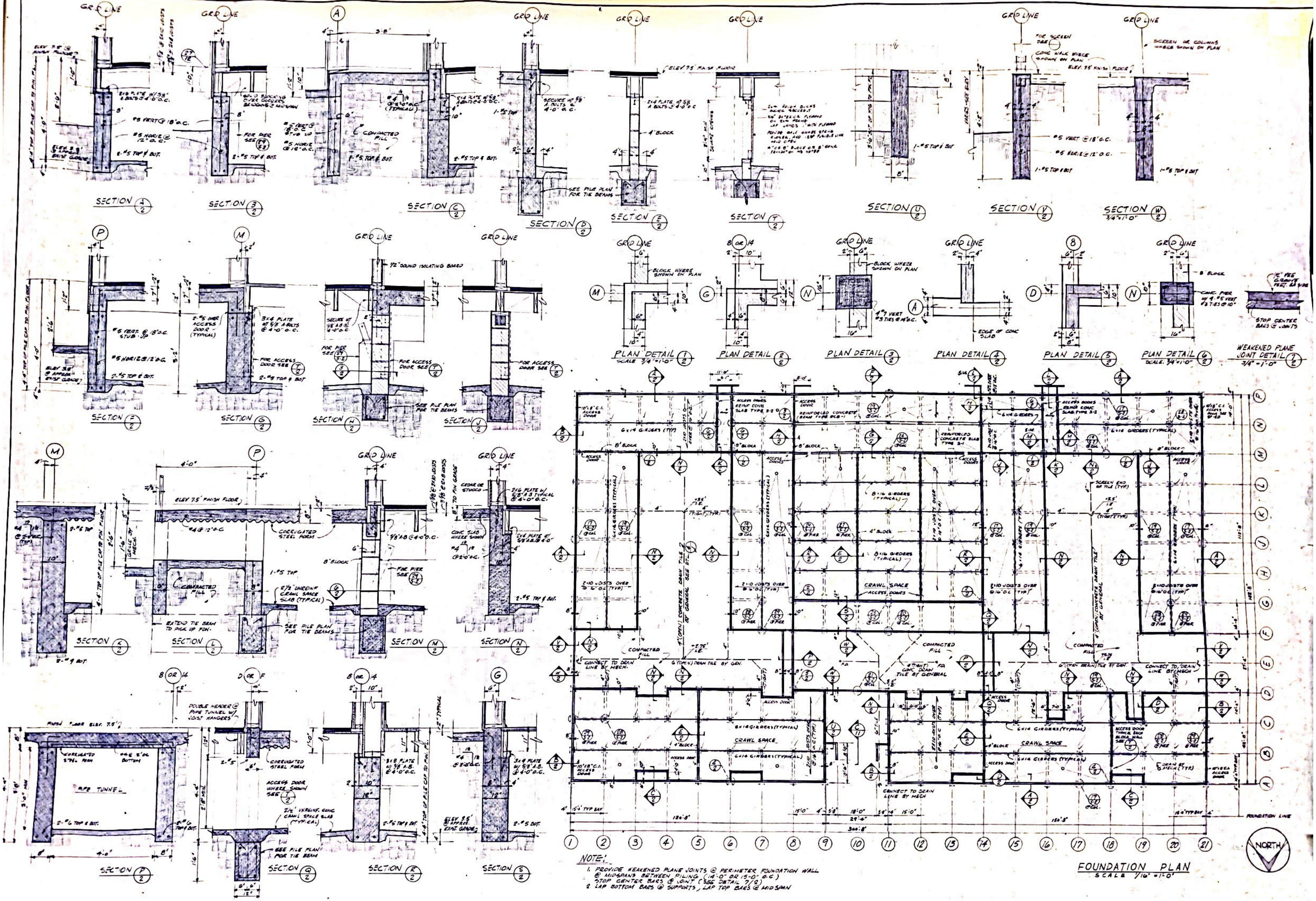
HOVIND · HARTHORNE & SMITH
ARCHITECTS 1500 WESTLAKE NORTH SEATTLE 9, WASH

ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT — NO 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

INDEX TO DRAWINGS
ABBREVIATION SCHEDULE
SITE PLAN @ 1" = 50'-0"
SITE DETAILS

DATE DEC '66
DRAWN BY AT
TRACED BY DO
CHECKED BY WDS

SHEET 1 OF 16 SHEETS
JOB NO. 66-8



NOTE:
1. PROVIDE WEAKENED PLANE JOINTS @ PERIMETER FOUNDATION WALL @ MIDSPANS BETWEEN PILING (14'-0" OR 15'-0" O.C.) STOP CENTER BARS @ JOINT (SEE DETAIL 7/2)
2. LAP BOTTOM BARS @ SUPPORTS, LAP TOP BARS @ MIDSPAN

REVISIONS	BY

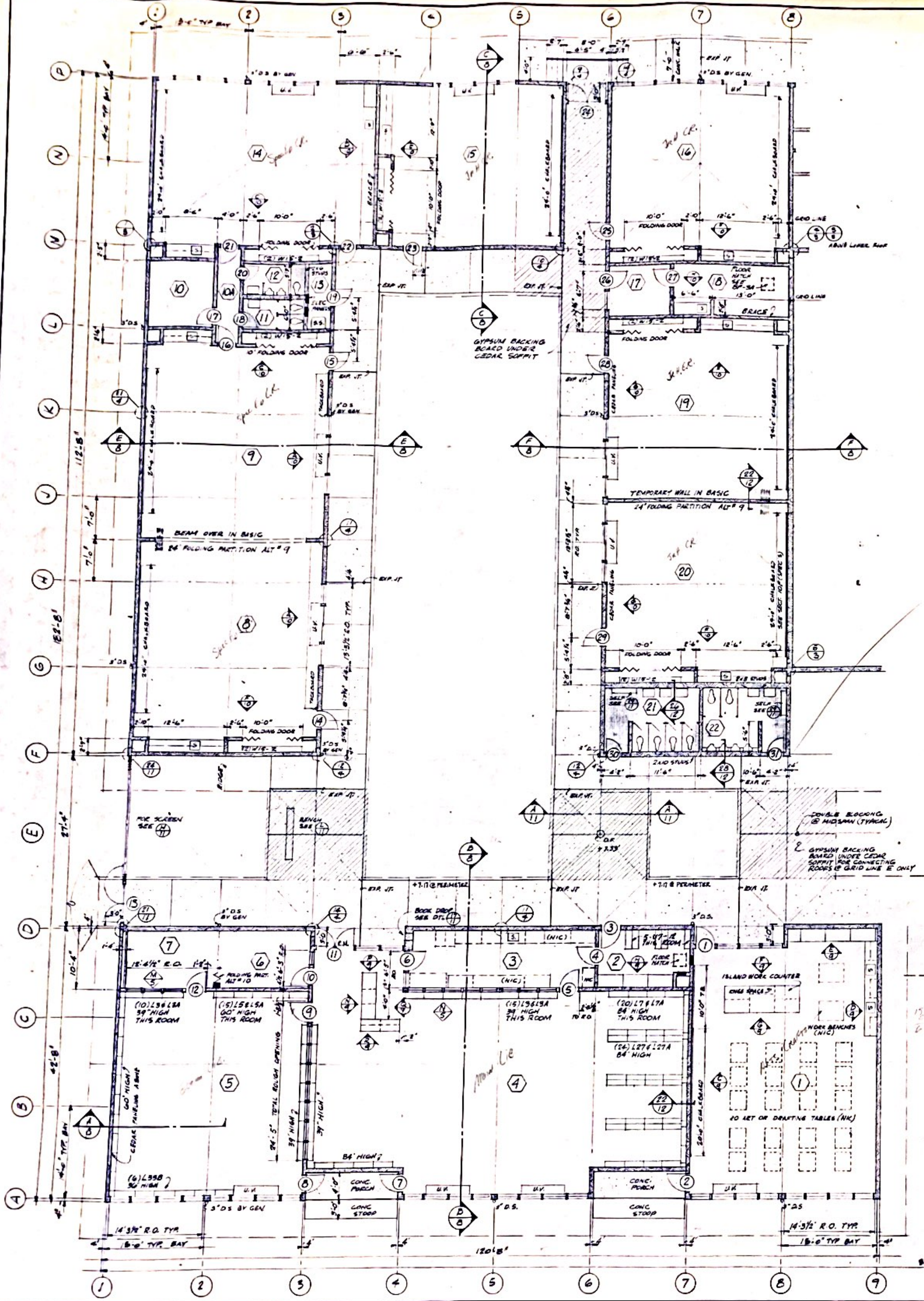
REGISTERED ARCHITECT — STATE OF WASHINGTON

HOVIND · HARTHORNE & SMITH
ARCHITECTS 1500 WESTLAKE NORTH SEATTLE 9, WASH

ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

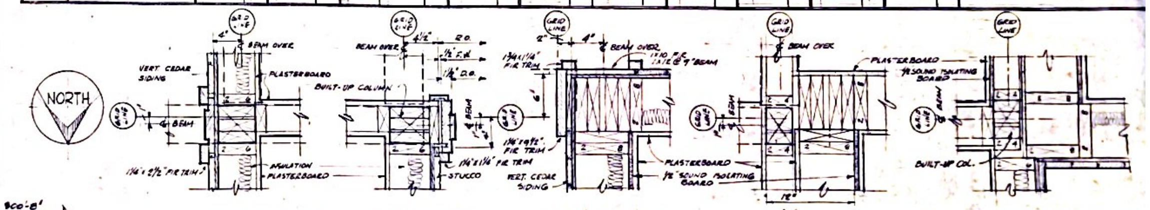
FOUNDATION PLAN @ 1/16"=1'-0"
FOUNDATION DETAILS @ 1/2"=1'-0"

DATE DEC '66
DRAWN BY AT
TRACED BY LW & AT
CHECKED BY WDS



ROOM FINISH SCHEDULE

ROOM NO	ROOM NAME	FLOOR MAT'L	FLOOR FIN	BASE MAT'L	BASE FIN	CEILING HEIGHT	CEILING MAT'L	CEILING FIN	NO WALL MAT'L	NO WALL FIN	SO. WALL MAT'L	SO. WALL FIN	EAST WALL MAT'L	EAST WALL FIN	WEST WALL MAT'L	WEST WALL FIN	STOOL MAT'L	STOOL FIN	TRIM MAT'L	TRIM FIN	CABINETS SHELVING MAT'L	CABINETS SHELVING FIN	REMARKS
1.	ARTS & CRAFTS	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	STOCK	FAC	
2.	STORAGE	LW CONC	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	STOCK	FAC	
3.	WORKROOM	LW CONC	VAT	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	NIC	—	
4.	MAIN LIBRARY	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	STOCK	FAC	
5.	ELEM. LIBRARY	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	STOCK	FAC	
6.	CONFERENCE	LW CONC	VAT	RUBBER	—	8'-0"	ACT.	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
7.	CONFERENCE	LW CONC	VAT	RUBBER	—	8'-0"	ACT	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
8.	SPEC EDUCATION C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	STOCK	FAC	
9.	SPEC EDUCATION C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	STOCK	FAC	
10	STORAGE	LW CONC	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
11.	GIRLS TOILET	CONC	CT	CT	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	METAL STALL
12.	BOYS TOILET	CONC	CT	CT	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	METAL STALL
13.	JANITOR	LW CONC	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
14.	SPEC EDUCATION C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	STOCK	FAC	
15.	JUNIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	STOCK	FAC	
16.	JUNIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	STOCK	FAC	
17.	OFFICE	LW CONC	VAT	RUBBER	—	8'-0"	ACT.	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
18.	STORAGE	LW CONC	VAT	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	STOCK	FAC	
19.	JUNIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	PB		PB	5	PB	5	PB / CEDAR	5/10	PB	5	LP	—	FIR	8	STOCK	FAC	
20.	JUNIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	PB / CEDAR	5/10	PB	5	LP	—	FIR	8	STOCK	FAC	
21.	GIRLS TOILET	CONC	CT	CT	—	8'-0"	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	—	—	FIR	8	LP	—	METAL STALLS
22.	BOYS TOILET	CONC.	CT	CT.	—	8'-0"	CEM. PLAS.	6	CEM. PLAS. (1)	6	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	—	—	FIR	8	LP	—	METAL STALLS (1) CT WAINSCOT @ URINALS
23.	MULTI-PURPOSE	WOOD	MAPLE	WOOD		22'-0"+	ACT	—	PB (2)	5	PB (2)	5	PB (2)	5	PB (2)	5	—	—	FIR	8	—	—	(2) SEE SECT 6F SPECS (1) C.T. WAINSCOT
24.	STORAGE	CONC.	FH	RUBBER	—	10'-0"+	PB	5	PB	5	BLOCK	7	PB	5	BLOCK	7	—	—	FIR	8	—	—	
25.	SHOWER & DRESSING	CONC.	CT.	C.T.	—	8'-0"	CEM. PLAS.	6	BLOCK (1)	—	BLOCK (1)	—	CEM. PLAS. (1)	—	BLOCK (1)	—	—	—	—	—	—	—	(1) C.T. FULL HEIGHT - METAL STALL DOOR
26.	OFFICE	CONC	FH	RUBBER	—	8'-0"	ACT.	—	BLOCK	7	BLOCK	7	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	
27.	VESTIBULE	CONC	FH	RUBBER	—	8'-0"	CEM. PLAS.	6	BLOCK	7	BLOCK / CEM. PL.	7/6	CEM. PLAS.	6	BLOCK	7	—	—	FIR	8	—	—	
28	BOYS LOCKERS	CONC.	FH	G.S.W.U.	—	8'-6"±	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	
29	BOYS TOILET	CONC	FH	G.S.W.U.	—	8'-6"±	CEM. PLAS.	6	BLOCK	7	BLOCK	7	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	METAL STALL
30	BOYS DRYING	CONC	C.T.	G.S.W.U.	—	8'-0"	CEM. PLAS.	6	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	—	—	—	—	—	—	
31.	BOYS SHOWERS	CONC	CT	G.S.W.U.	—	8'-0"	CEM. PLAS.	6	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	—	—	—	—	—	—	
32	GIRLS TOILET	CONC	FH	G.S.W.U.	—	8'-6"±	CEM. PLAS.	6	BLOCK	7	BLOCK	7	BLOCK	7	BLOCK	7	—	—	—	—	—	—	METAL STALL
33.	GIRLS DRYING	CONC.	C.T.	G.S.W.U.	—	8'-0"	CEM. PLAS.	6	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	—	—	—	—	—	—	
34	GIRLS SHOWERS	CONC.	CT	G.S.W.U.	—	8'-0"	CEM. PLAS.	6	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	G.S.W.U.	—	—	—	—	—	—	—	
35	STORAGE	CONC	FH	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
36.	STORAGE	CONC	FH	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	
37.	GIRLS LOCKERS	CONC	FH	G.S.W.U.	—	8'-6"±	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	BLOCK	7		7	—	—	FIR	8	—	—	
38.	VESTIBULE	CONC	FH	RUBBER	—	8'-0"	CEM. PLAS.	6	BLOCK	7	CEM. PLAS.	6	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	
39.	OFFICE	CONC.	FH	RUBBER	—	8'-0"	ACT	—	BLOCK	7	BLOCK	7	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	
40.	SHOWER & DRESSING	CONC	CT	CT	—	8'-0"	CEM. PLAS.	6	BLOCK (1)	—	BLOCK (1)	—	BLOCK (1)	—	BLOCK (1)	—	—	—	—	—	—	—	(1) C.T. FULL HEIGHT - METAL STALL DOOR
41	STORAGE	CONC	FH	RUBBER	—	10'-0"+	PB	5	PB.	5	BLOCK	7	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	
42.	CORRIDOR	CONC.	FH	RUBBER	—	10'-0"+	PB.	5	PB	5	PB	5	BLOCK	7	BLOCK	7	—	—	FIR	8	—	—	
43	LAUNDRY & JANITOR	CONC	FH	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
44.	MECH & ELECT ROOM	CONC	FH	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	PB	5	PB.	5	—	—	FIR	8	—	—	
45.	STORAGE	CONC	FH	RUBBER	—	10'-0"+	PB	5	PB	5	PB	5	PB	5	PB.	5	—	—	FIR	8	—	—	
46.	TEACHERS OFFICE	LW CONC	VAT	RUBBER	—	8'-0"	ACT	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
47.	TEACHERS OFFICE	LW CONC	VAT	RUBBER	—	8'-0"	ACT.	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
48.	SENIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"±	ACT	—	PB	5	PB	5	PB	5	PB / CEDAR	5/10	L.P.	—	FIR	8	—	—	
49.	SENIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB / CEDAR	5/10	L.P.	—	FIR	8	—	—	
50.	BOYS LOCKERS	CONC.	FH.	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	—	—	
51.	SENIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	—	—	
52.	TYPING	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	STOCK	FAC	
53.	BUSINESS MACHINES	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB.	5	PB	5	PB	5	L.P.	—	FIR	8	STOCK	FAC	
54.	BOOKKEEPING	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	—	PB	5	PB	5	PB / CEDAR	5/10	PB	5	LP	—	FIR	8	—	—	
55.	SENIOR HIGH C.R.	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB / CEDAR	5/10	PB	5	LP	—	FIR	8	—	—	
56.	GIRLS LOCKERS	CONC	F.H.	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	—	—	
57.	PREP. & STORAGE	LW CONC.	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	7	PB	5	PB	5	PB	5	—	—	FIR	8	STOCK	FAC	
58.	CHEMISTRY & PHYSICS	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	STOCK	FAC	
59	COOKING	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	-	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	STOCK	FAC	
60.	SEWING	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	STOCK	FAC	
61.	GIRLS TOILET	CONC	CT	C.T.	—	8'-0"	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS.	6	—	—	FIR	8	L.P.	—	METAL STALLS.
62.	BOYS TOILET	CONC	CT	C.T.	—	8'-0"	CEM. PLAS.	6	CEM. PLAS.	6	CEM. PLAS. (1)	6	CEM. PLAS.	6	CEM. PLAS.	6	—	—	FIR	8	L.P.	—	METAL STALLS. (1) CT WAINSCOT @ URINALS
63.	PREP. & STORAGE	LW CONC.	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
64.	BIOLOGY	LW CONC.	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	LP	—	FIR	8	—	—	
65.	WORK & STORAGE	LW CONC	VAT	RUBBER	—	10'-0"+	ACT.	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	STOCK	FAC	
66.	WORK & STORAGE	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	STOCK	FAC	
67.	WOMENS TOILET	LW CONC	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
68	MENS TOILET	LW CONC	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
69.	VAULT	LW CONC	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
70.	JANITOR	LW CONC	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
71.	ADMINISTRATION	LW CONC	VAT	RUBBER	—	10'-0"+	ACT	—	PB	5	PB	5	PB	5	PB	5	—	—	FIR	8	—	—	
72.	HEALTH	LW CONC.	VAT	RUBBER	—	8'-0"	P.B.	5	PB	5	PB	5	PB.	5	PB.	5	—	—	FIR	8	STOCK	FAC.	
73.	TOILET	LW CONC.	VAT	RUBBER	—	8'-0"	PB	5	PB	5	PB.	5	PB	5	PB	5	—	—	FIR	8	—	—	
74.	PRINCIPAL	LW CONC	VAT	RUBBER	—	8'-0"	ACT	—	PB	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	—	—	
75.	CONFERENCE	LW CONC.	VAT	RUBBER	—	10'-0"+	ACT	—	P.B.	5	PB	5	PB	5	PB	5	L.P.	—	FIR	8	—	—	
10-A	PASSAGE	LW CONC.	VAT	RUBBER	—	8'-0"	PB.	5	PB	5	PB	5	PB.	5	PB.	5	—	—	FIR	8	—	—	



PLAN DETAIL 1/5 PLAN DETAIL 2/3 PLAN DETAIL 3/3 PLAN DETAIL 4/3 PLAN DETAIL 6/3

REVISIONS	BY

REGISTERED ARCHITECT — E. L. HARTHORNE — STATE OF WASHINGTON

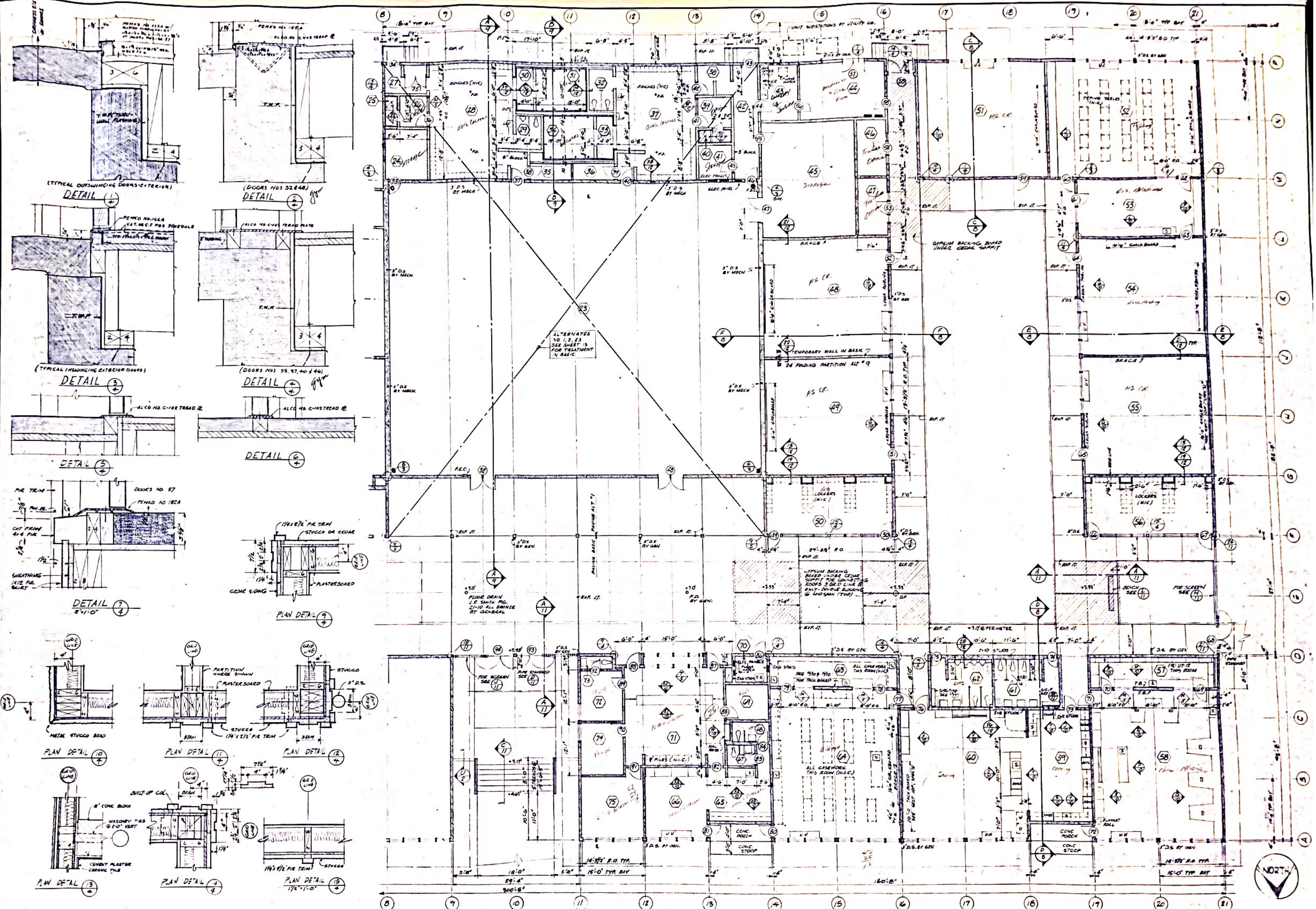
HOVIND · HARTHORNE & SMITH ARCHITECTS 1500 WESTLAKE NORTH SEATTLE 9, WASH

ADDITION TO SOUTH BEND HIGH SCHOOL

SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

PARTIAL FLOOR PLAN @ 1/8" = 1'-0"
FINISH SCHEDULE
PLAN DETAILS @ 1 1/2" = 1'-0"

DATE DEC '66
DRAWN BY AT, LW, WDS
TRACED BY LW, WDS
CHECKED BY WDS



DATE	REVISIONS	BY

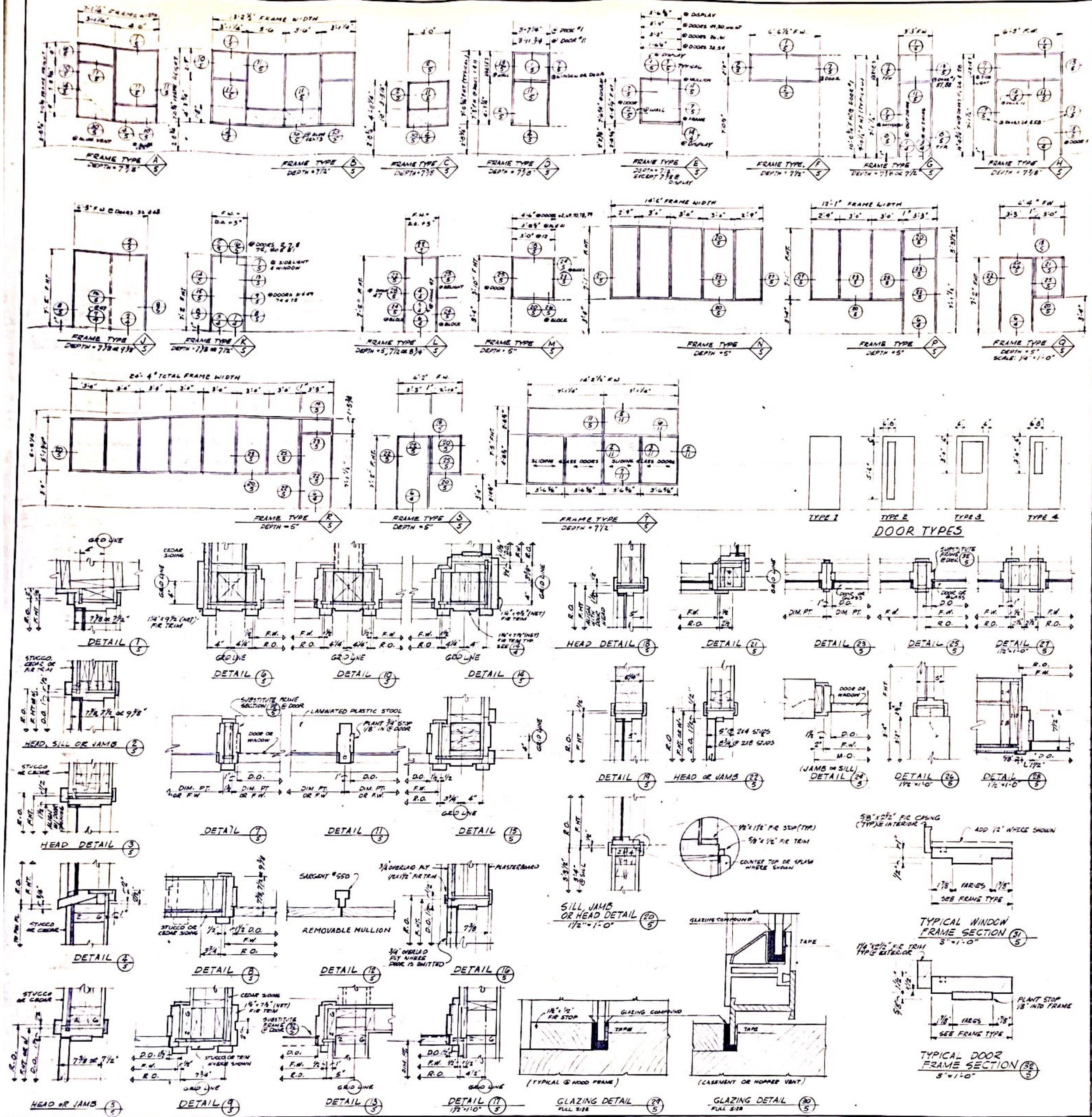
REGISTERED ARCHITECT — STATE OF WASHINGTON

HOVIND · HARTHORNE & SMITH
ARCHITECTS 1500 WESTLAKE NORTH SEATTLE 9, WASH

ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

PARTIAL FLOOR PLAN @ 1/8"=1'-0"
ARCHITECTURAL DETAILS SCALE AS SHOWN

DATE DEC '66
DRAWN BY AT, LW
TRACED BY LW,
CHECKED BY WDS



DOOR SCHEDULE

Opening Number	Opening Size: Width	Opening Size: Height	Frame: Type	Frame: Depth	Frame: Sidelight	Frame: Material	Frame: Transom	Frame: Mullion	Door: Type	Door: Opening	Door: Material	Door: Thickness	Door: Glass	Door: Louver	Hardware: Type	Hardware: Stop	Hardware: Threshold		Remarks
1.	3'0"	7'0½"	G	7⅜"	D	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
2.	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—		1	PT	1/4		
3.	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"			2	WB	4/4		
4.	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	UC¾	3	FB	—		
5.	3'0"	7'0½"	P	5"	P	FIR	DSB	—	3	SGL	SC	1¾"	CWG	24x12	4	FB	6/4		
6.	3'0"	7'0½"	Q	5"	Q	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	4	WB	6/4		
7.	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	1	PT	1/4		
8.	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	1	PT	1/4		
9.	3'0"	7'0½"	R	5"	R	FIR	DSB	—	3	SGL	SC	1¾"	CWG	—	4	FB	6/4		
10.	3'0"	7'0½"	S	5"	S	FIR	—	—	3	SGL	SC	1¾"	CWG		5	WB	6/4		
11.	6'0"	7'0½"	M	7⅜"	D	FIR	C.S.	RM	2	PAIR	SC	1¾"	CWG	—	6	PT	1/4		
12	3'0"	7'0½"	L	5"	M	FIR	—	—	3	SGL	SC	1¾"	CWG	UC¾	5	FB	—		
13.	6'0"	8'5½"	SEE ELEVATION				H/11		1	PAIR	SC	1¾"	—	—	7	—	—		
14	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
15	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
16.	3'0"	7'0½"	L	5"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	24x12	5	WB	4/4		
17.	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	WB	—		
18.	2'6"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	UC¾	8	WB	—		
19	3'0"	7'0½"	K	7½"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	1	PT	1/4		
20.	2'6"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	UC¾	8	WB	—		
21.	3'0"	7'0½"	L	5"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	24x12	5	WB	4/4		
22	3'0"	7'0½"	K	7½"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
23	3'0"	7'0½"	K	7½"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
24	3'0"	7'0½"	M	7⅜"	—	FIR	CWG	—	4	PAIR	SC	1¾"	CWG	—	7	WB	—		
25	3'0"	7'0½"	K	7½"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
26.	3'0"	7'0½"	K	7⅜"	E	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	3/4		
27.	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	24x12	5	WB	—		
28	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
29	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
30	2'6"	7'0½"	K	7½"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	17	WB	3/4		FUSIBLE LINK 135° CLOSER
31	2'6"	7'0½"	K	7½"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	17	WB	3/4		F.L. 135° CLOSER
32	6'0"	7'0½"	J	9⅜"	—	FIR	—	RM	1	PAIR	SC	1¾"	—	—	6	PT	3/4	G	F.L. 135° CLOSER
33	3'0"	7'0½"	L	8⅛"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	10	WB	4/4	G	F.L. 135° CLOSER
34	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	11	PT	1/4	✓	
35.	2'6"	7'0½"	L	5"	—	FIR	—		1	PAIR	SC	1¾"	—	—	12	120	—		
36	2'10"	7'0½"	L	5"	M	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	13	WB	—		
37.	3'0"	7'0½"	L	8⅛"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	9	WB	4/4	G	
38	2'8"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	WB	—		
39	2'8"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	WB	—		
40	3'0"	7'0½"	L	8⅛"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	9	WB	4/4	G	
41	2'10"	7'0½"	L	5"	M	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	13	WB	—		
42	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—		8	WB	—		
43	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	11	PT	1/4	✓	
44	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	FB	4/4		F.L. 135° CLOSER
45	2'10"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	10	FB	—		F.L. 135° CLOSER
46	3'0"	7'0½"	L	8⅛"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	11	WB	4/4	G	
47	6'0"	7'0½"	L	7½"		FIR	—	—	1	PAIR	SC	1¾"	—	[illegible]	14	WB	5/4	G	F.L. 135° CLOSER - 7/8"x8" ST. ASTRAGAL W/ COORDINATOR
48	6'0"	7'0½"	J	9⅜"	—	FIR	—	RM	1	PAIR	SC	1¾"			6	PT	3/4	G	
49	3'0"	7'0½"	K	7½"	E	FIR	—	—	4	SGL	SC	1¾"	CWG	—	17	PT	1/4		F.L. 135° CLOSER
50	3'0"	7'0½"	K	7½"	E	FIR	—	—	4	SGL	SC	1¾"	CWG	—	17	WB	3/4		F.L. 135° CLOSER
51	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
52	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
53.	3'0"	7'0½"	K	7½"	E	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	F/B	3/4		
54	3'0"	7'0½"	K	7½"	E	FIR	—		4	SGL	SC	1¾"	CWG	—	1	F/B	3/4		
55	3'0"	7'0½"	K	7½"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	1	F/B	3/4		
56	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	FB	—		
57	5'0"	7'0½"	J	7⅜"	—	FIR	—	—	1	PAIR	SC	1¾"		[illegible]	15	FB	7/4		
58	3'0"	7'0½"	H	7⅜"	—	FIR	CWG	—	4	PAIR	SC	1¾"	CWG	—	7	WB	—		
59	3'0"	7'0½"	K	7½"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
60	3'0"	7'0½"	K	7½"	—	FIR	—		4	SGL	SC	1¾"	CWG		1	PT	1/4		
61.	3'0"	7'0½"	K	7½"	E	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	WB	3/4		
62	3'0"	7'0½"	L	5"	M	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	3	FB	4/4		
63	3'0"	7'0½"	L	5"	—	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	3	FB	4/4		
64	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
65	3'0"	7'0½"	G	7½"	F	FIR	DSB	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
66.	3'0"	7'0½"	K	7½"	E	FIR	—	—	4	SGL	SC	1¾"	CWG		17	WB	3/4		F.L. 135° CLOSER
67.	3'0"	7'0½"	K	7½"	E	FIR	—	—	4	SGL	SC	1¾"	CWG	—	17	PT	1/4		F.L. 135° CLOSER
68.	6'0"	8'5½"	SEE ELEVATION				H/11		1	PAIR	SC	1¾"	—	—	7	—	—		
69	3'0"	7'0½"	L	5"	M	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	4	FB	—		
70	3'0"	7'0½"	L	5"	M	FIR	—		3	SGL	SC	1¾"	CWG	24x12	4	FB	—		
71.	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
72	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	1	PT	1/4		
73	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
74.	2'6"	7'0½"	K	7½"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	9	WB	3/4		
75.	2'6"	7'0½"	K	7½"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	9	WB	3/4		
76	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
77	3'0"	7'0½"	K	7⅜"		FIR	—	—	4	SGL	SC	1¾"	CWG	—	1	PT	1/4		
78	3'0"	7'0½"	L	5"	M	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	4	WB	—		
79	3'0"	7'0½"	L	5"	M	FIR	—	—	3	SGL	SC	1¾"	CWG	24x12	4	WB	—		
80.	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	1	PT	1/4		
81.	3'0"	7'0½"	K	7⅜"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	1	PT	1/4		
82	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	24x24	5	WB	6/4		
83	2'6"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	UC¾	16	WB	—		
84.	2'6"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	UC¾	16	WB	—		
85	3'0"	7'0½"	L	5"	—	FIR	—		1	SGL	SC	1¾"	—		4	WB	—		
86	3'0"	7'0½"	K	7½"	—	FIR	—		1	SGL	SC	1¾"	—	—	1	WB	3/4		
87.	3'0"	7'0½"	G	7⅜"	—	FIR	DSB	—	2	SGL	SC	1¾"	CWG	—	1	PT	1/4		
88.	3'0"	7'0½"	G	7⅜"	—	FIR	DSB	—	2	SGL	SC	1¾"	CWG	—	1	PT	1/4		
89	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	24x12	4	FB	—		
90.	3'0"	7'0½"	L	5"	—	FIR	—		1	SGL	SC	1¾"	—	24x12	13	WB	—		
91.	3'0"	7'0½"	L	5"	—	FIR	—		1	SGL	SC	1¾"	—	—	13	WB	6/4		
92.	2'6"	7'0½"	L	5"	—	FIR	—		1	SGL	SC	1¾"	—	UC¾	16	WB	—		
93.	6'0"	8'5½"	SEE ELEVATION				H/11		1	PAIR	SC	1¾"	—	—	7	—	—		
94.	6'0"	8'5½"	SEE ELEVATION				H/11		1	PAIR	SC	1¾"	—		7	—	—		
95	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	WB	6/4		@ ROOM 45
96	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	WB	6/4		BASIC BID ONLY - SEE SHEET 13
97	3'0"	7'0½"	L	5"	—	FIR	—	—	1	SGL	SC	1¾"	—	—	4	WB	—		BASIC BID ONLY - SEE SHEET 13

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HOVIND · HARTHORNE & SMITH
ARCHITECTS 1500 WESTLAKE NORTH SEATTLE 9, WASH

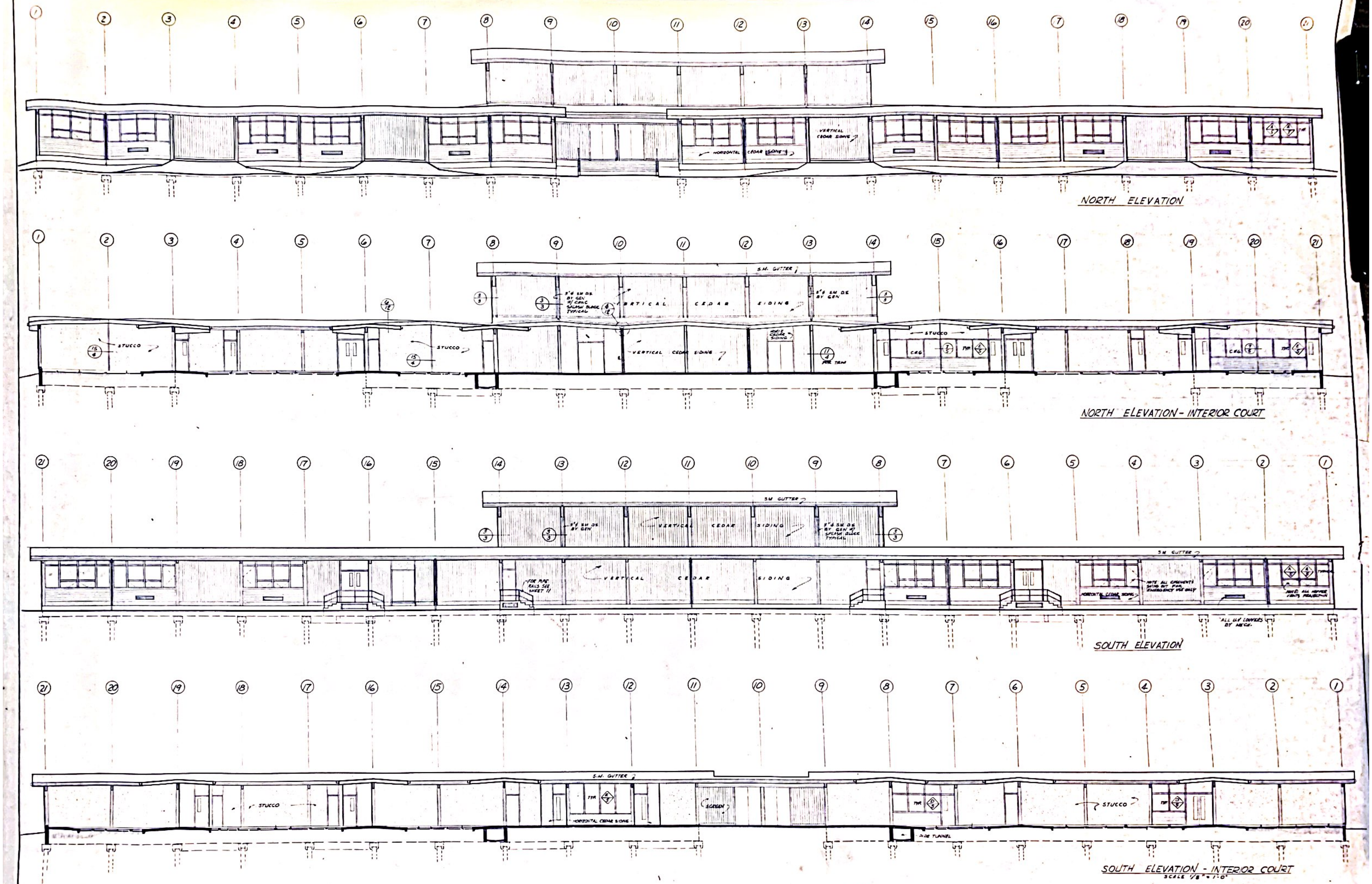
ADDITION TO SOUTH BEND HIGH SCHOOL

SOUTH BEND PUBLIC SCHOOL DISTRICT — NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

DOOR SCHEDULE
DOOR & WINDOW FRAMES @ 1/4"=1'-0"
DOOR & WINDOW DETAILS @ 1½"=1'-0"

DATE DEC '66
DRAWN BY AT, WDS
TRACED BY AT, WDS
CHECKED BY WDS

SHEET 5 OF 16 SH[illegible]
JOB NO. [illegible]



DATE	REVISIONS	BY

REGISTERED ARCHITECT
Harthorne
STATE OF WASHINGTON

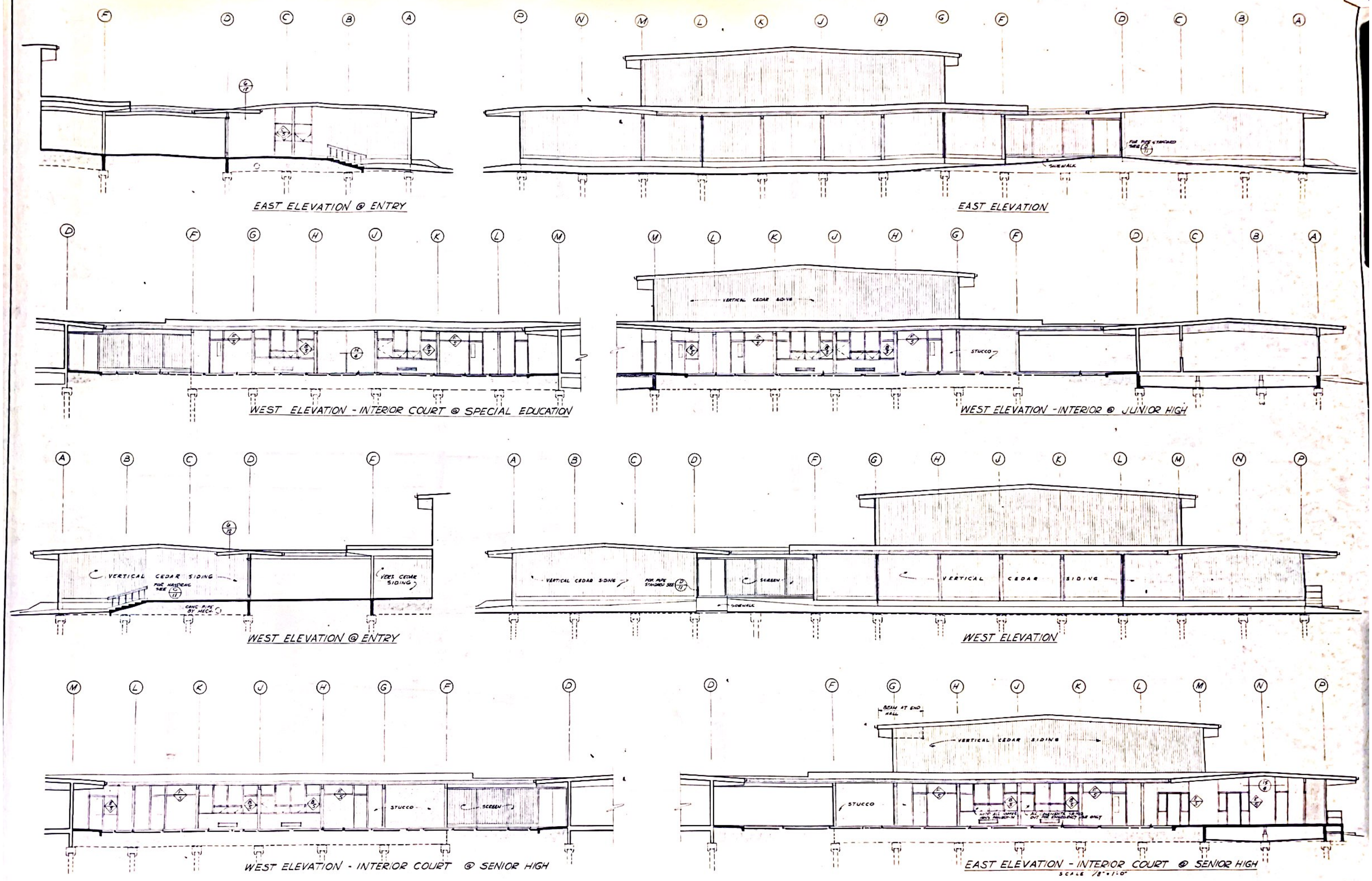
HOVIND · HARTHORNE & SMITH · ARCHITECTS 1500 WESTLAKE NORTH SEATTLE 9, WASH

ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

BUILDING ELEVATIONS @ 1/8" = 1'-0"

DATE DEC '66
DRAWN BY AT
TRACED BY DO
CHECKED BY WDS

SHEET 9 OF 16
JOB NO.



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ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT — NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

BUILDING ELEVATIONS @ 1/8" = 1'-0"

DATE DEC '66
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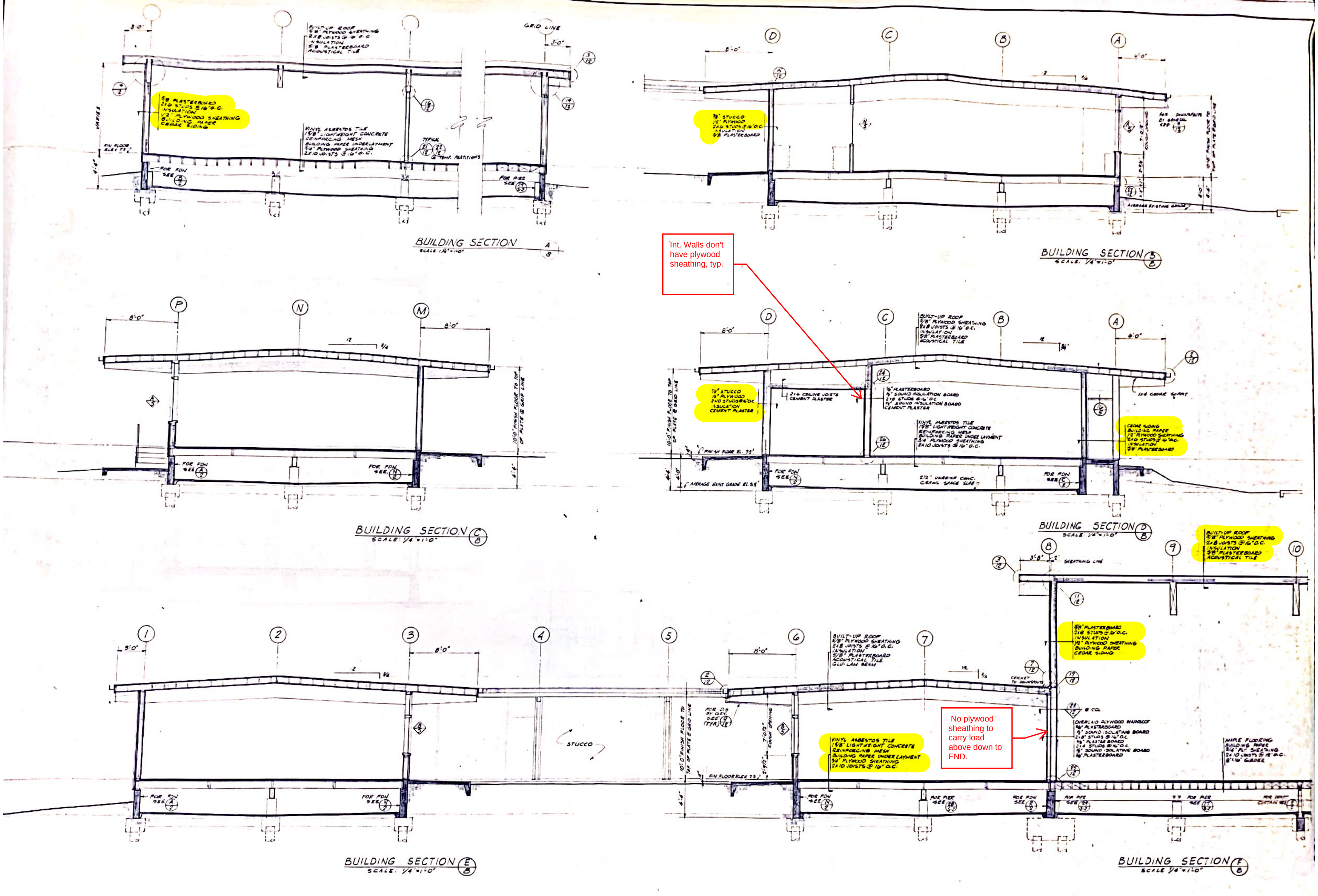
CHECKED BY WDS



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ADDITION TO SOUTH BEND HIGH SCHOOL

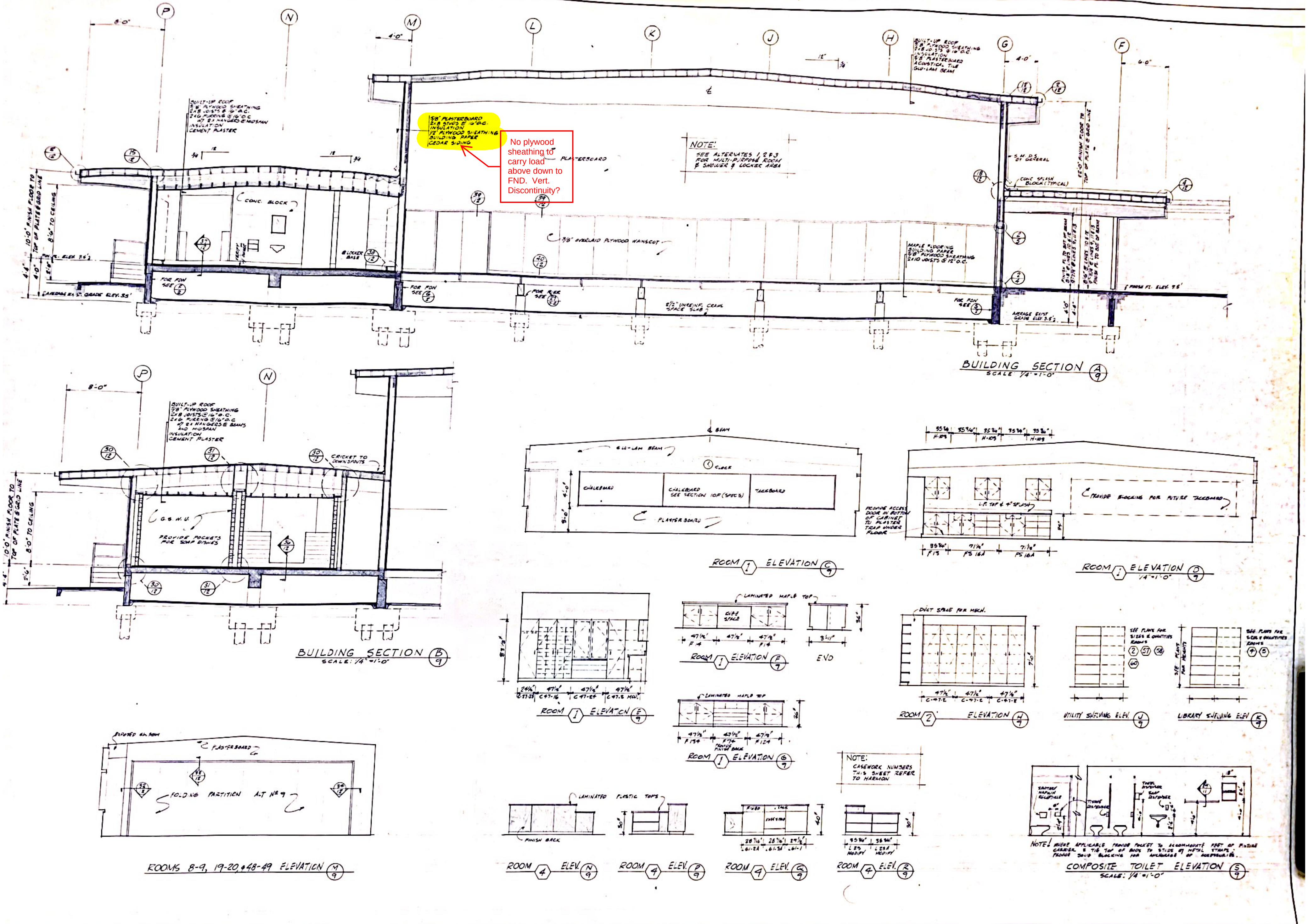
SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118

SOUTH BEND, PACIFIC COUNTY, WASHINGTON

BUILDING SECTIONS @ 1/4"=1'-0"

DATE DEC '66

SHEET 8 OF 16



HOVIND · HARTHORNE & SMITH ARCHITECTS 1500 WESTLAKE NORTH SEATTLE 9, WASH	ADDITION TO SOUTH BEND HIGH SCHOOL SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118 SOUTH BEND, PACIFIC COUNTY, WASHINGTON	BUILDING SECTIONS @ 1/4" = 1'-0" INTERIOR ELEVATIONS @ 1/4" = 1'-0"	DATE DEC '66 DRAWN BY AT TRACED BY AT CHECKED BY WDS SHEET 9 OF 16 SHEETS JOB NO. 66-8

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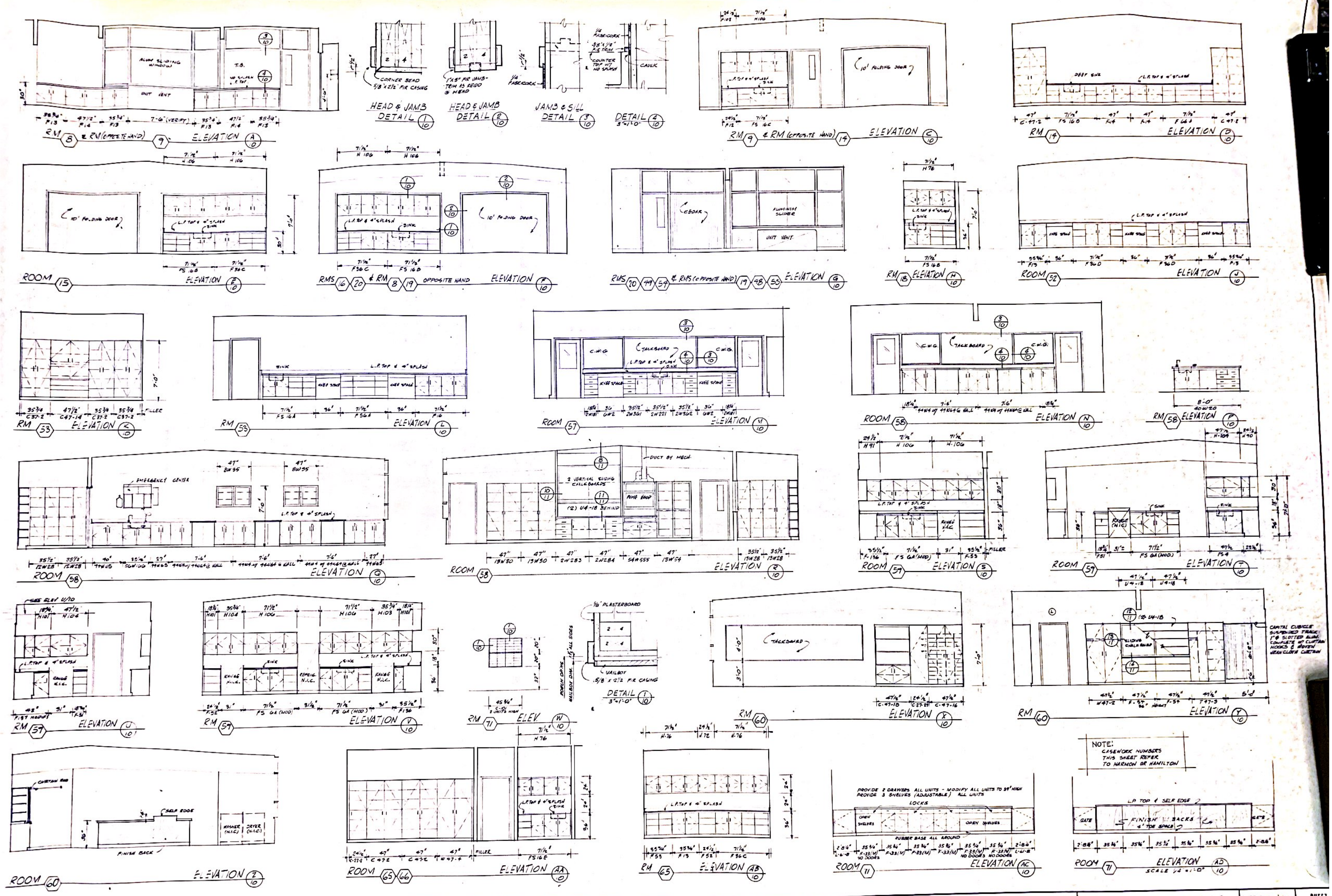

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SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

INTERIOR ELEVATIONS @ 1/4" = 1'-0"

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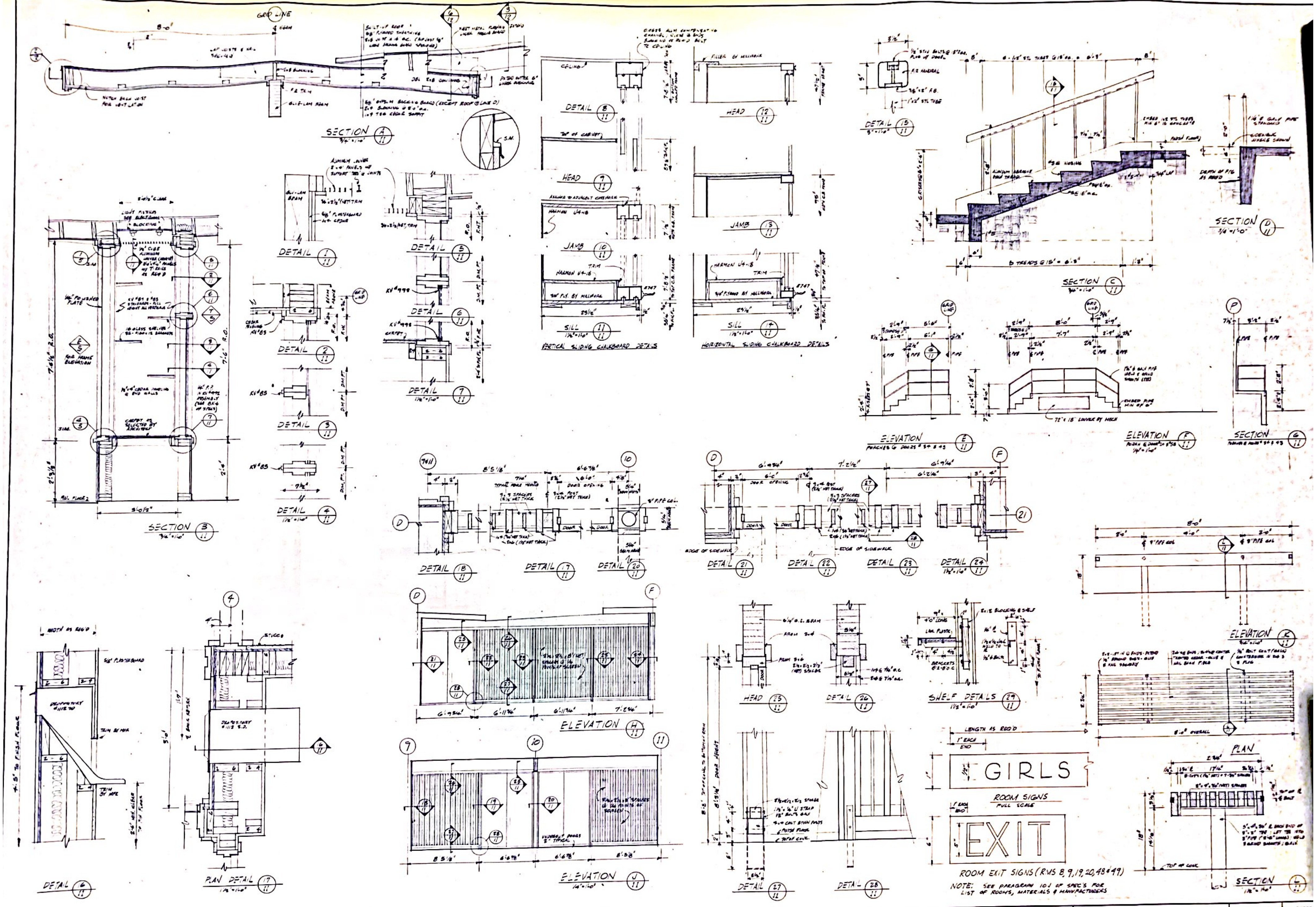
SHEET 10 OF 16



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ADDITION TO SOUTH BEND HIGH SCHOOL

SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

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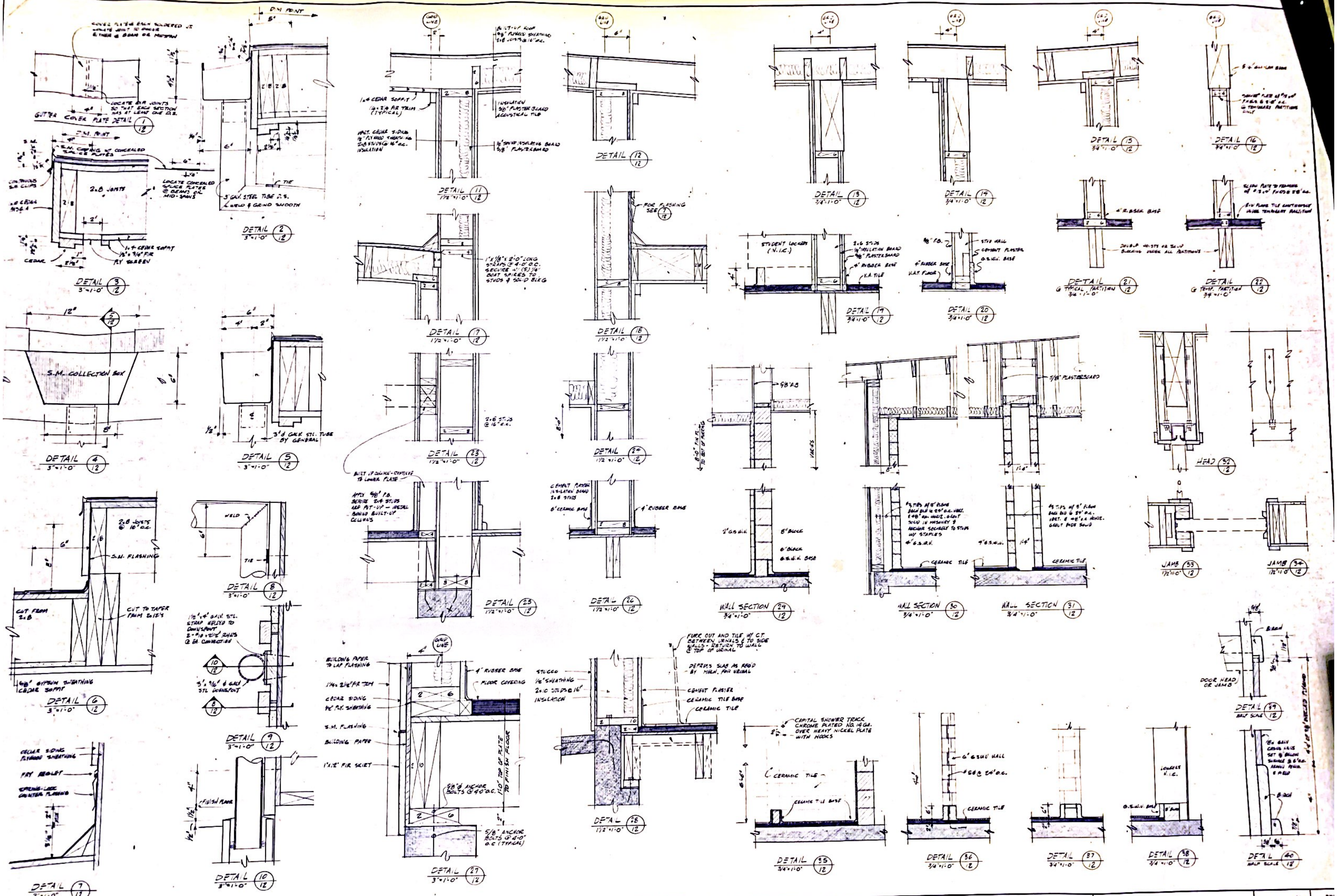

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SOUTH BEND, PACIFIC COUNTY, WASHINGTON

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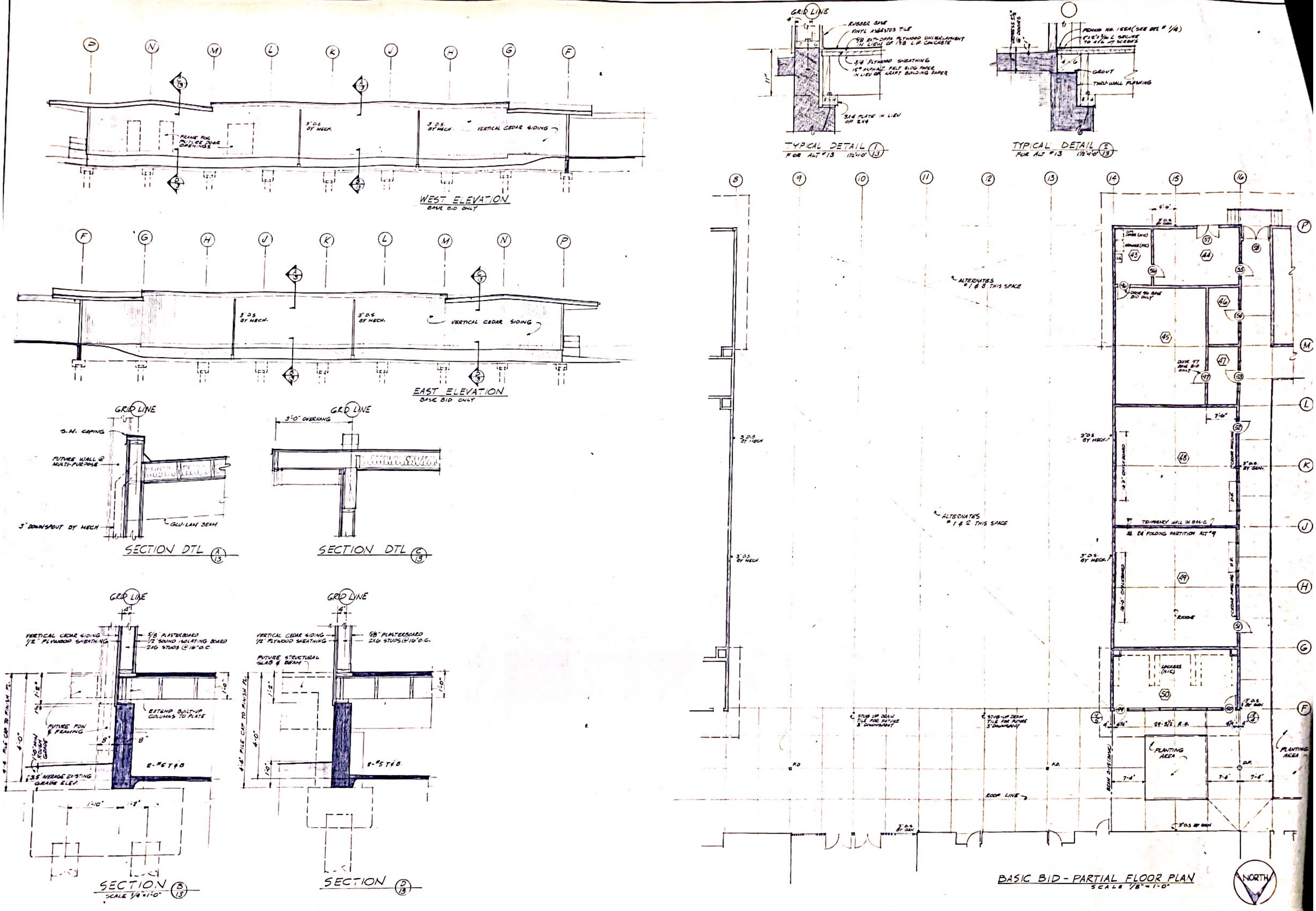

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ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT — NO 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

BASIC BID- PARTIAL FLOOR PLAN @ 1/8"=1'-0"
BASIC BID-ELEVATIONS @ 1/8"=1'-0"
BASIC BID- SECTIONS & DETAILS

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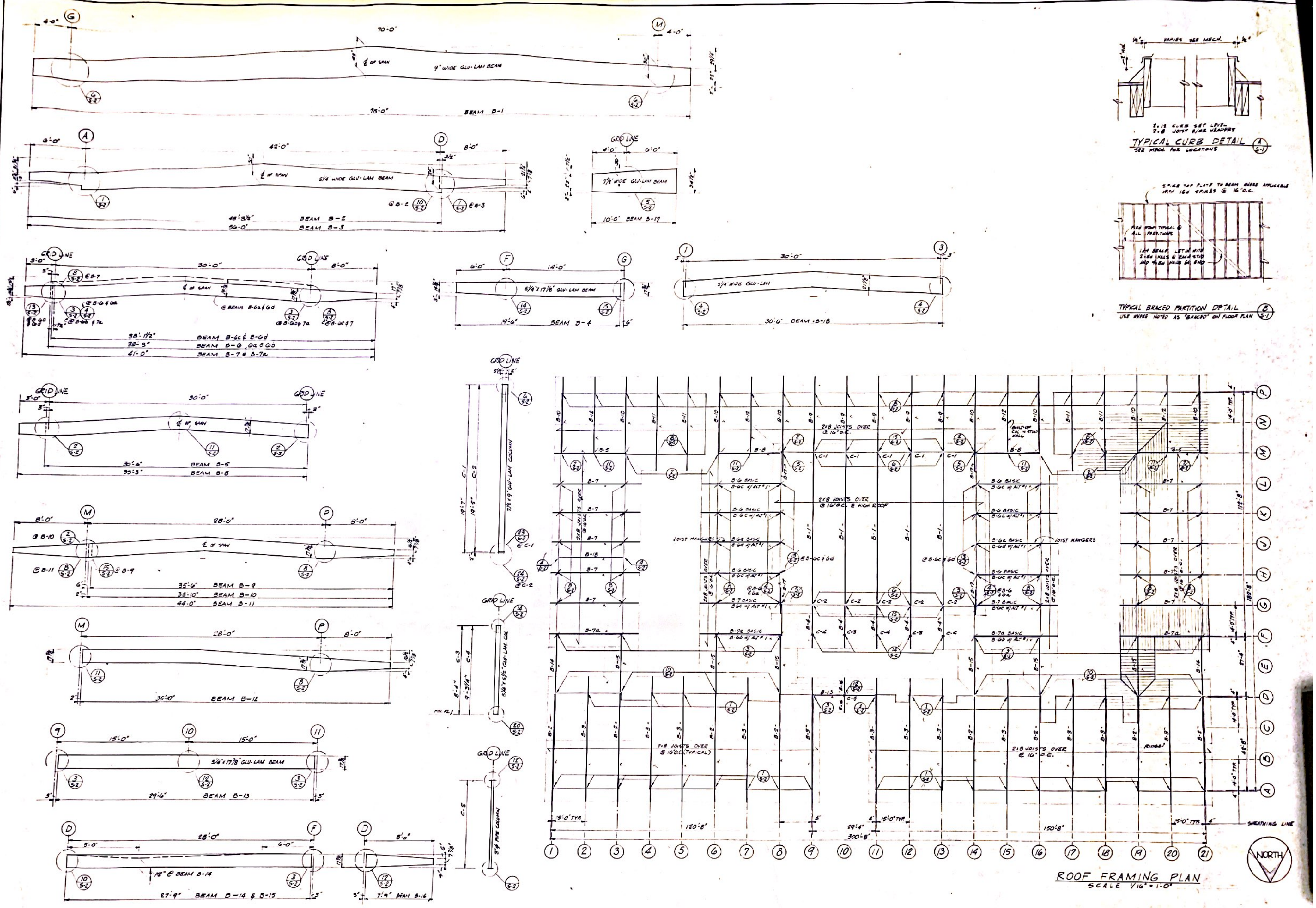
JOB NO. 6



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ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT — NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

ROOF FRAMING PLAN @ 1/16" = 1'-0"
GLU-LAM ELEVATIONS @ 1/4" = 1'-0"

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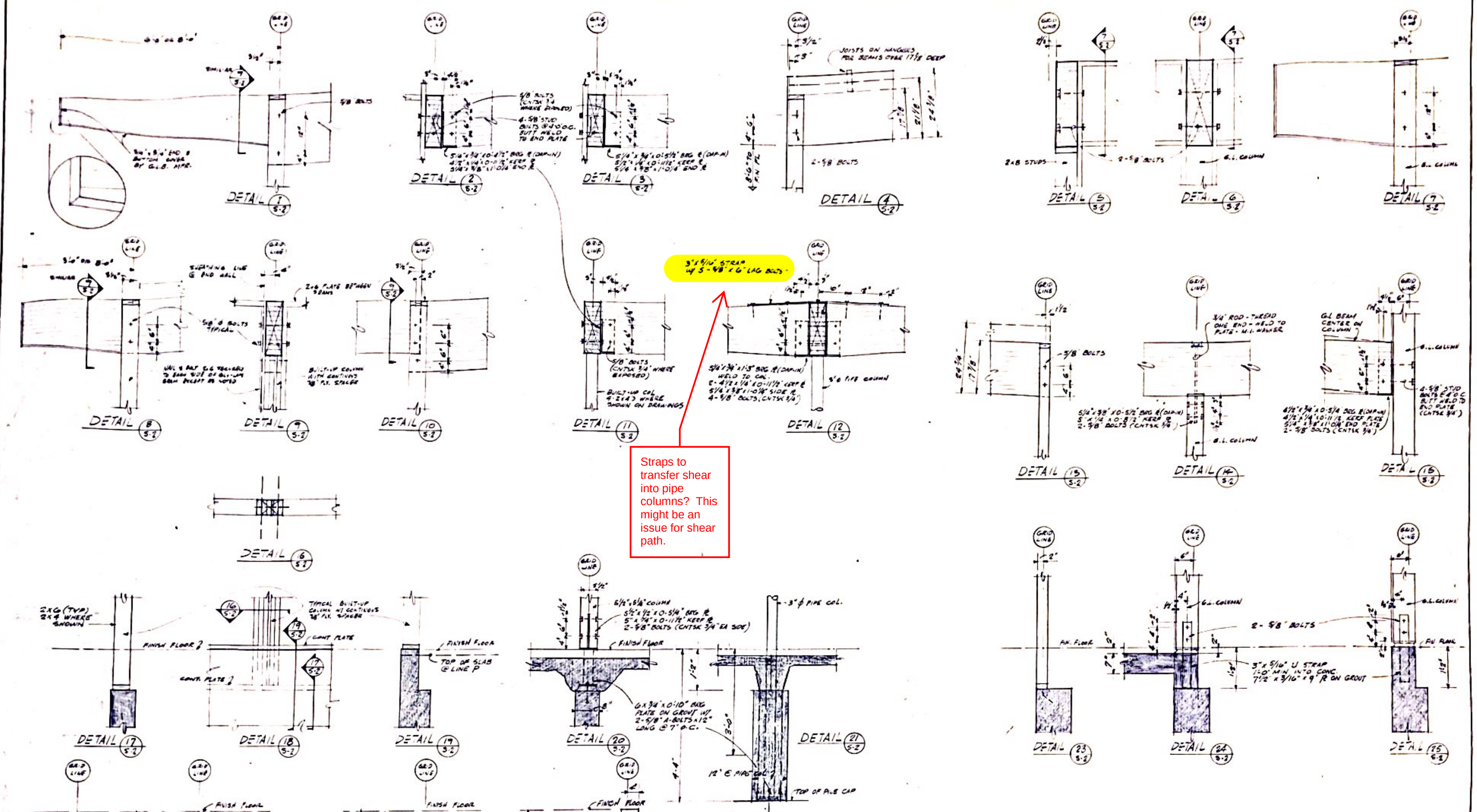

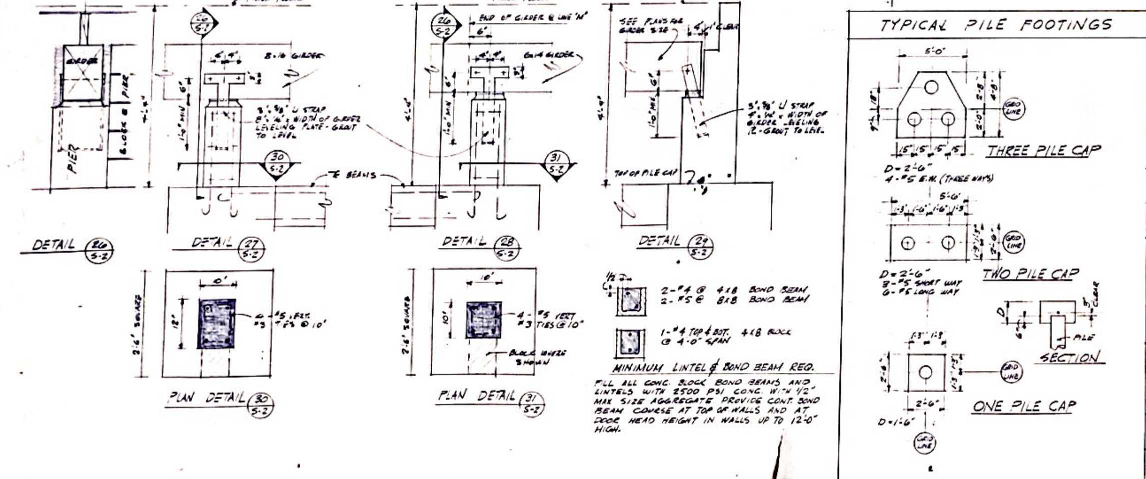

SCHEDULE of TIES, BEAMS & SLABS

MARK	SIZE	REINFORCING STL.		STEEL ARRANGEMENT
T-1	12x12 TIE	2-#4T 2-#4B	#3 ⊔ @ 12"	ALL BARS CONT FROM SUPPORT TO SUPPORT
TB-1	12x12 TIE BEAM	2-#6T 2-#6B	#3 ⊔ @ 12"	LAP TOP BARS @ MID-SPAN LAP BOTTOM BARS @ SUPPORTS
TB-2	12x12	2-#5T 2-#8B	#3 ⊔ @ 12"	
TB-3	12x12	2-#8T 2-#8B	#3 ⊔ @ 12"	
TB-4	12x16	2-#5T 2-#8B	#3 ⊔ @ 12"	
TB-5	12x16	2-#5T 2-#9B	#3 ⊔ @ 12"	
TB-6	12x16	2-#8T 2-#7T 2-#7B	#3 ⊔ @ 12"	2-#7, 2-#8, 2-#7, 2-#7, 14', 14'
TB-7	12x24	2-#5T 2-#11B	#3 ⊔ @ 12"	LAP TOP BARS @ MID SPAN LAP BOTTOM BARS @ SUPPORTS
RCB-1 SEE SHT 2	16x24	3-#10T 2-#10B	#3 ⊔ 6@6 6@8 TYP @12 EE	
S-1	7" THICK SLAB	#5@9"		#5 - 2/3 BENT, 14', 14'
S-2	5" MIN SLAB	#4@12" BOT.		

STRUCTURAL NOTES:

THE FOLLOWING NOTES APPLY EXCEPT WHERE SHOWN OTHERWISE

CODE: UNIFORM BUILDING CODE, 1964

LIVE LOADS

ROOF	25	SHOPS & GYMS	100
CLASSROOMS	40	MECHANICAL SPACE & FAN ROOMS	100
TOILETS, OFFICES	50	SUPPLIES & BULK STORAGE	125
KITCHEN	75	BOILER ROOM	150
STAIRS & CORRIDORS	100		
PUBLIC AREAS	100		

FOUNDATIONS

MAXIMUM SOIL PRESSURE NONE.
EXTERIOR FOOTINGS AND EXTERIOR GRADE BEAMS 1'-0" MINIMUM BELOW FINISH GRADE.
BACKFILL TO BE THOROUGHLY COMPACTED PER SPECIFICATIONS.
PROVIDE 2 - #5 CONTINUOUS MINIMUM BOTTOM OF ALL WALLS AND FOOTINGS.

CONCRETE

CLASS OF CONCRETE	COMPRESSIVE STRENGTH 28 DAYS (PSI)	SLUMP (INCHES)	REMARKS
"A"	3000	4 - 5	5½ SACKS/CUBIC YARD MIN.
"B"	3000	3 - 4	6 SACKS/CUBIC YARD MIN.
"C"	3750	2 - 3	6½ SACKS/CUBIC YARD MIN.
"D"	2500	3 - 4	5½ SACKS/CUBIC YARD MIN.
"E"	2500	3 - 4	5½ SACKS/CUBIC YARD MIN. (3% TO 6% AIR ENTRAINMENT)
"F"	2500	DRY PACK	NON SHRINK ADMIXTURE

EACH CLASS OF CONCRETE SHALL BE USED AS FOLLOWS:

CLASS "A" - FOOTINGS AND FOUNDATION BELOW GROUND FLOOR.
CLASS "B" - STRUCTURAL CONCRETE ABOVE GROUND FLOOR.
CLASS "D" - SLABS ON GRADE AND PIPE TRENCH SLABS.
CLASS "E" - SIDEWALK SLABS, EXTERIOR STAIRS, ETC.
CLASS "F" - SETTING STEEL BEARING PLATES & TILT-UP WALL PANELS.

FOUNDATION WALLS

AT OPENINGS PROVIDE 2 - #5 EXTRA BARS AT TOP, BOTTOM AND EACH SIDE EXTENDING 30 DIAMETER BEYOND CORNERS AND 2 - #5 x 4'-0" DIAGONALS AT EACH CORNER, EXCEPT 6" WALLS 1 - #5 DIAGONAL INSTEAD OF 2.
AT CORNERS AND INTERSECTIONS, EXTEND HORIZONTAL WALL STEEL TO 2" FROM OUTSIDE FACE AND LAP WITH ELBOW BARS (30 DIAMETER) OF SAME SIZE AND SPACING. LAP OUTSIDE FACE ONLY AT CORNERS.
WALL STUBS SHALL PROJECT 27 DIAMETERS AND SHALL BE A MINIMUM OF 1'-6" LONG, SAME SIZE AND SPACING AS VERTICAL STEEL.
WHERE WALLS WITHOUT VERTICAL REINFORCING ARE POURED SEPARATE FROM FOOTING PROVIDE #4 x 1'-6" STUBS AT 18" O.C.

MASONRY AND CONCRETE MASONRY

CONCRETE OR LIGHTWEIGHT BLOCKS LOAD BEARING GRADE A.S.T.M. SPECIFICATIONS C90-52.
BLOCKS SHALL BE LAID UP IN CEMENT LIME MORTAR AS PER SPECIFICATIONS.
REINFORCE WALLS HORIZONTALLY WITH DUR-O-WAL OR EQUAL, EMBEDDED IN MORTAR EVERY THIRD COURSE (24" O.C.). LAP 12" MINIMUM AT SPLICES. AT CORNERS AND INTERSECTIONS CUT DIAGONAL WEB STEEL AND BEND WITH LONGITUDINAL BARS 12" AROUND CORNER, BLOCKS TO BE DOVETAILED TOGETHER.
SEE PLANS FOR BOND BEAM AND LINTEL DETAILS.

ADMIXTURES

CLASS "B", "C" AND "D" CONCRETE - PLASTIMENT, OR EQUAL, AS PER MANUFACTURER'S SPECIFICATIONS.
CLASS "A" - NONE
CLASS "E" - 3% TO 6% AIR ENTRAINMENT TO BE PROVIDED BY AN AIR ENTRAINING ADMIXTURE.

REINFORCING STEEL

REINFORCING STEEL DEFORMED, INTERMEDIATE GRADE fy - 40,000 PSI. A.S.T.M. A-15, EXCEPT COLUMNS. COLUMN VERTICALS TO BE A.S.T.M. A-432. fy - 60,000 PSI.
REINFORCING STEEL DETAILS SHALL BE PREPARED BY AN ENGINEER APPROVED BY THE ARCHITECT AND CONFORM TO STANDARD PRACTICE OUTLINED IN A.C.I. REPORT 315-51.
MARKED RE-BARS MUST BE IDENTIFIED BY A SYSTEM OF COLORED PAINT DENOTING NUMBERS (TAGS NOT ACCEPTED).

CONCRETE COVER OF REINFORCING:

3" CONCRETE POURED AGAINST EARTH
2" FORMED CONCRETE WITH EARTH BACKFILL
1½" BEAMS AND COLUMNS (STIRRUPS, TIES) WALLS EXPOSED TO WEATHER, SLABS ON MOISTURE BARRIER
1" WALLS, INSIDE FACE; 3/4" FORMED SLAB

LAP ALL REINFORCING 30 DIAMETERS AT SPLICES EXCEPT COLUMN VERTICALS, CLASS "B" AND "C" CONCRETE 30 DIAMETERS, CLASS "A" CONCRETE 40 DIAMETERS.
CHAMFER EXPOSED CORNERS OF COLUMNS AND BEAMS ¾".

SLABS AND BEAMS

STEEL SHALL BE RIGIDLY SUPPORTED USING CONCRETE BLOCKS OR OTHER APPROVED METHODS, #3 RAISER BAR ALL SLABS.
WHERE SLAB STEEL IS PARALLEL TO A BEAM OR WALL PROVIDE #4 x 5'-0" AT 12" O.C. IN TOP OF SLAB ACROSS BEAM OR WALL. WHERE SLAB IS ON ONE SIDE ONLY, TOP BARS SHALL BE #4 x 3'-0" AT 12" O.C. OR @ WALLS

SLAB TEMPERATURE STEEL:

SLAB THICKNESS (T)	FLOOR	ROOF
4½"	#4 AT 18 O.C.	#4 AT 18
5"	#4 AT 18 O.C.	#4 AT 16
5½"	#4 AT 18 O.C.	#4 AT 15
6"	#4 AT 16 O.C.	#4 AT 13
6½"	#4 AT 15 O.C.	0.037
7"	#4 AT 14 O.C.	

AT OPENINGS OVER 18" SQUARE, PROVIDE 2 BARS SAME SIZE AS MAIN STEEL EXTENDING 30 DIAMETER PAST OPENING AT EACH SIDE AND DIAGONALLY AT CORNERS.
WHERE BEAM OR SLAB STEEL IS INDICATED AS BENT UP, IT SHALL BE BENT UP AT THE 1/6 POINT OF CLEAR SPAN FOR SIMPLE SUPPORTS AND 1/5 POINT FOR CONTINUOUS SUPPORTS EXTENDING INTO ADJACENT SPAN A DISTANCE EQUAL 1/4 GREATER SPAN.
NON STRUCTURAL SLABS POURED ON EARTH 3½" THICK REINFORCING WITH 6x6-6/6 MESH.

STRUCTURAL STEEL

STRUCTURAL GRADE A.S.T.M. A-36, Fs = 22,000 PSI.
TUBE OR PIPE COLUMNS, A.S.T.M. A-53, GRADE B, YIELD STRESS 35,000 PSI.
ALL STEEL, EXCEPT STEEL EMBEDDED IN CONCRETE, SHALL BE GIVEN ONE COAT OF APPROVED PAINT BEFORE LEAVING SHOP.
WELDS 3/16" MINIMUM CONTINUOUS FILLET BY CERTIFIED WELDERS, HEAVY COATED ELECTRODES.
SHOP CONNECTIONS MAY BE WELDED OR RIVETED AND FIELD CONNECTIONS BOLTED AND EQUIVALENT TO FRAMED BEAM CONNECTIONS A.I.S.C. MANUAL STEEL CONSTRUCTION FOR NUMBER OF BOLTS.
FIELD BOLTS TO BE M.B. A-307.
THE ERECTION OF ALL STRUCTURAL STEEL SHALL BE SECURED FROM COLLAPSING WITH TEMPORARY BRACING UNTIL PERMANENT STIFFENING IS INSTALLED.
WHERE "CINCH" ANCHORS ARE SPECIFIED, THE CONTRACTOR SHALL SUBMIT TO THE STRUCTURAL ENGINEER A SAMPLE OF THE "CINCH" ANCHOR TO BE USED WITH LABORATORY DATA OF PULL-OUT AND SHEAR STRENGTH.

TIMBER

2" roof and wall sheathing laid diagonally.

Solid blocking

STRUCTURAL TIMBER AND LUMBER 1500 PSI STRESS GRADE DOUGLAS FIR (CONSTRUCTION OR INDUSTRIAL GRADE) PARAGRAPHS 122B, 123B, 124B, 125B AND 153B W.C.L.A. GRADING RULES #15.
2" ROOF AND WALL SHEATHING AND SUBFLOORS LAID DIAGONALLY.
PROVIDE DOUBLE JOISTS UNDER PARTITIONS THAT EXTEND AT LEAST HALF JOIST SPAN.
BOLT HEADS AND NUTS BEARING AGAINST WOOD TO BE PROVIDED WITH M.I. WASHERS EXCEPT ON SILL PLATES AND STEEL BEAM NAILERS USE CUT WASHERS.
NAILERS TO STEEL BEAMS SHALL BE ATTACHED WITH 5/8" BOLTS AT 3'-0" O.C. STAGGERED.
WOOD BEARING ON OR INSTALLED WITHIN 1" OF MASONRY OR CONCRETE TO BE TREATED WITH AN APPROVED PRESERVATIVE.
SOLID BLOCKING OF NOT LESS THAN 2" THICKNESS SHALL BE PROVIDED AT ENDS AND AT ALL SUPPORTS OF JOISTS AND RAFTERS. BETWEEN SUPPORTS PROVIDE BLOCKING OR APPROVED BRIDGING AT 8'-0" O.C. FOR JOISTS, 10'-0" O.C. FOR RAFTERS.

GLUE-LAM MEMBERS

GLUED LAMINATED BEAMS, DOUGLAS FIR DRIED TO A MOISTURE CONTENT 8 TO 12%. STRESS GRADE COMBINATION "A" OR BETTER.
GLUE SHALL BE CASEIN, WATER RESISTANT TYPE AND SHALL COMPLY WITH FEDERAL SPECIFICATION MMM-A-125, AND SHALL CONTAIN A MOLD INHIBITOR. SEE ARCHITECT'S SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
THE FABRICATOR SHALL BE APPROVED BY THE ARCHITECT AND SHALL BE AN APPROVED AITC MEMBER.

PILING

ALL PILES TO BE UNTREATED DOUGLAS FIR DRIVEN TO A CAPACITY OF 8 TON DETERMINED BY THE ENR FORMULA.

$$F = \frac{2WH}{P+0.1} \quad \text{FOR STEAM HAMMER}$$

$$F = \frac{2WH}{P+1} \quad \text{FOR DROP HAMMER}$$

F = SAFE LOAD IN LBS
W = WEIGHT OF HAMMER IN LBS
H = FALL IN FEET
P = PENETRATION UNDER EACH BLOW (INCHES)

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HOVIND · HAWTHORNE & SMITH ARCHITECTS
1500 WESTLAKE NORTH SEATTLE 9, WASH

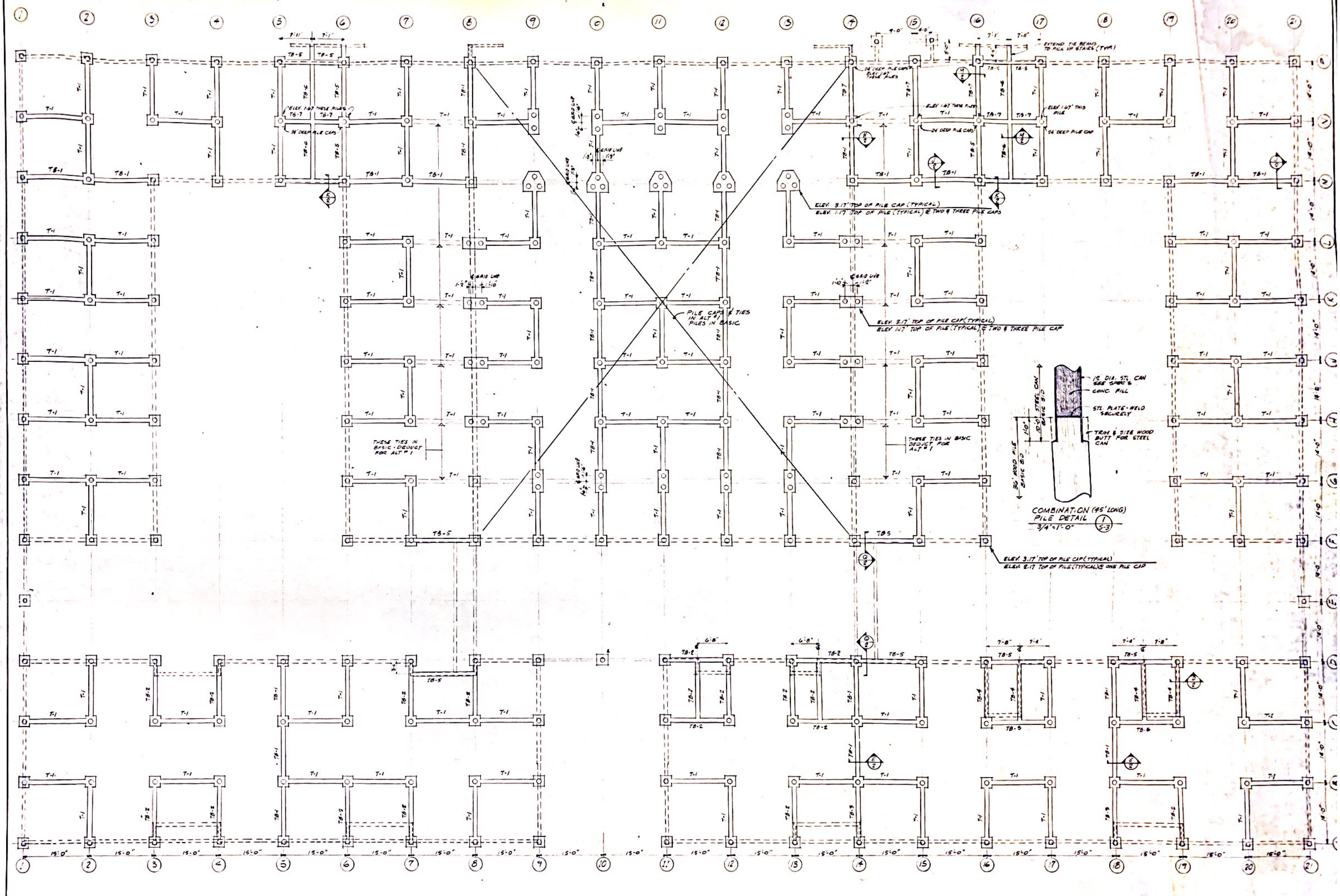
ADDITION TO SOUTH BEND HIGH SCHOOL

SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

STRUCTURAL DETAILS @ ¾" = 1'-0"
STRUCTURAL NOTES
BEAM & SLAB SCHEDULE

DATE DEC. '66
DRAWN BY A.C.
TRACED BY L.W.
CHECKED BY W.C.S.

SHEET S-2 OF 16 SHEETS
JOB NO. 66-2



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ADDITION TO SOUTH BEND HIGH SCHOOL
SOUTH BEND PUBLIC SCHOOL DISTRICT NO. 118
SOUTH BEND, PACIFIC COUNTY, WASHINGTON

PILING PLAN @ 1/8"=1'-0"

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SHEET S-

Appendix F: FEMA E-74 Nonstructural Seismic Bracing Excerpts

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Life Safety Systems

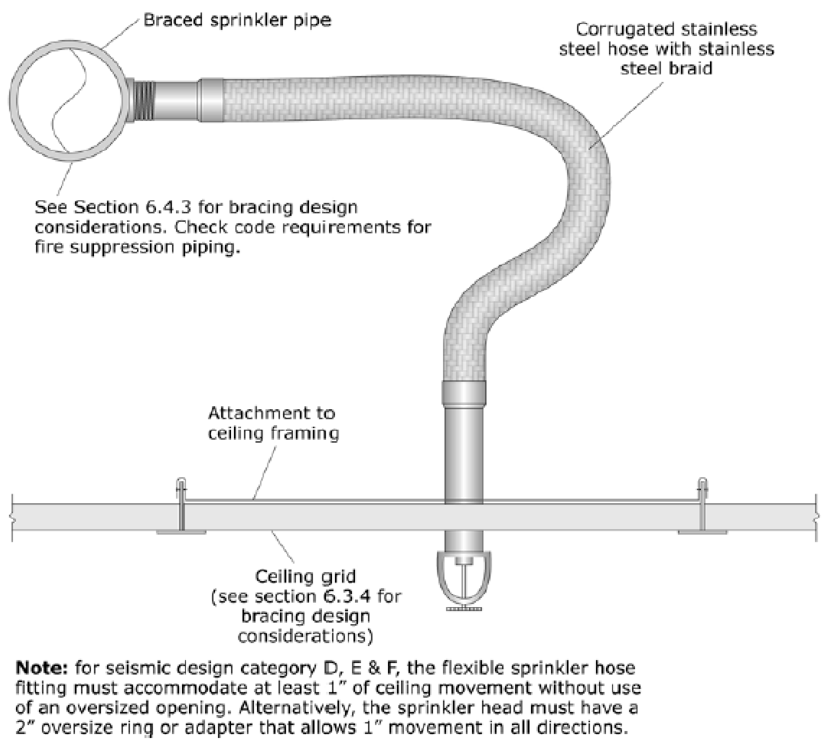


Figure G-1. Flexible Sprinkler Drop.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

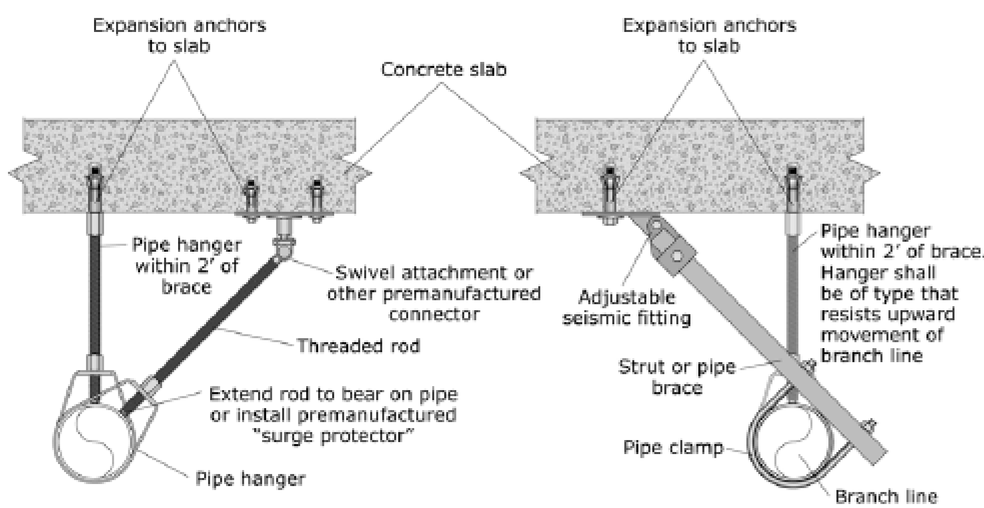


Figure G-2. End of Line Restraint.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

Partitions

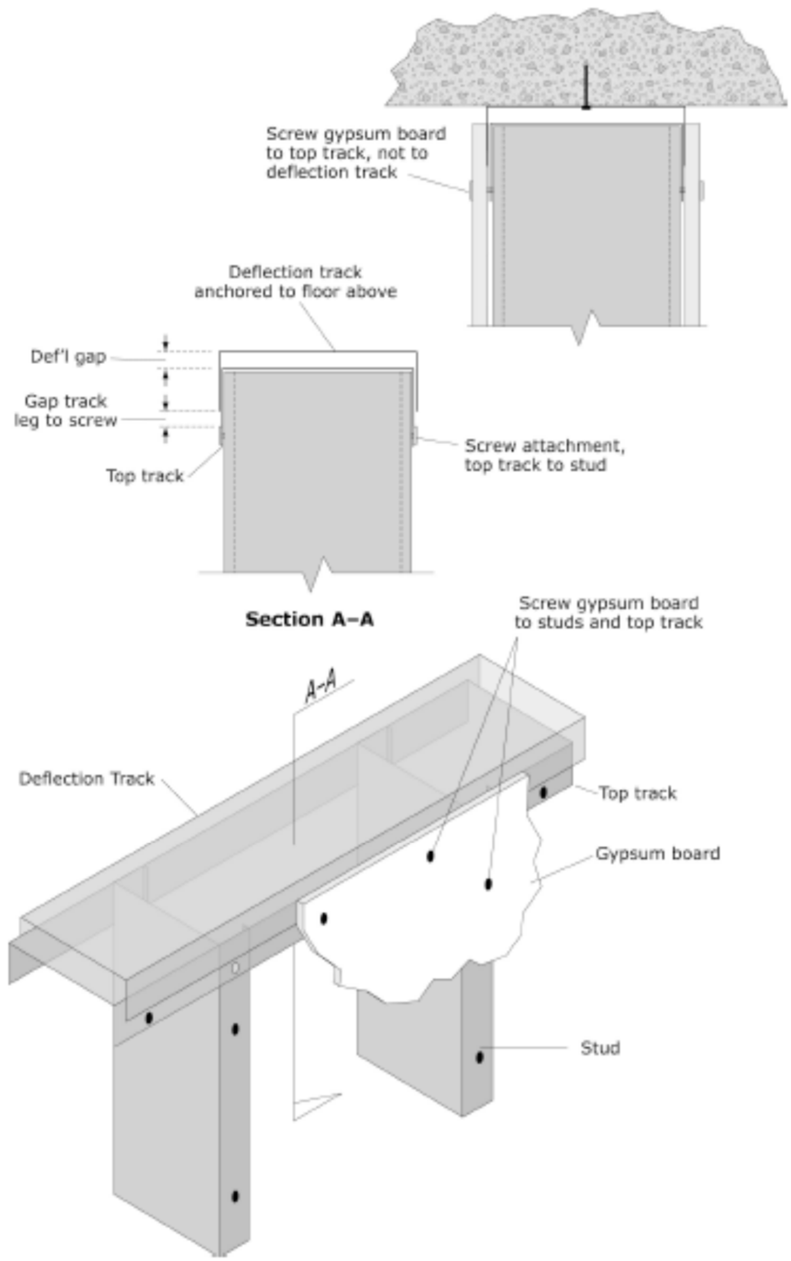


Figure G-3. Mitigation Schemes for Bracing the Tops of Metal Stud Partitions Walls.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

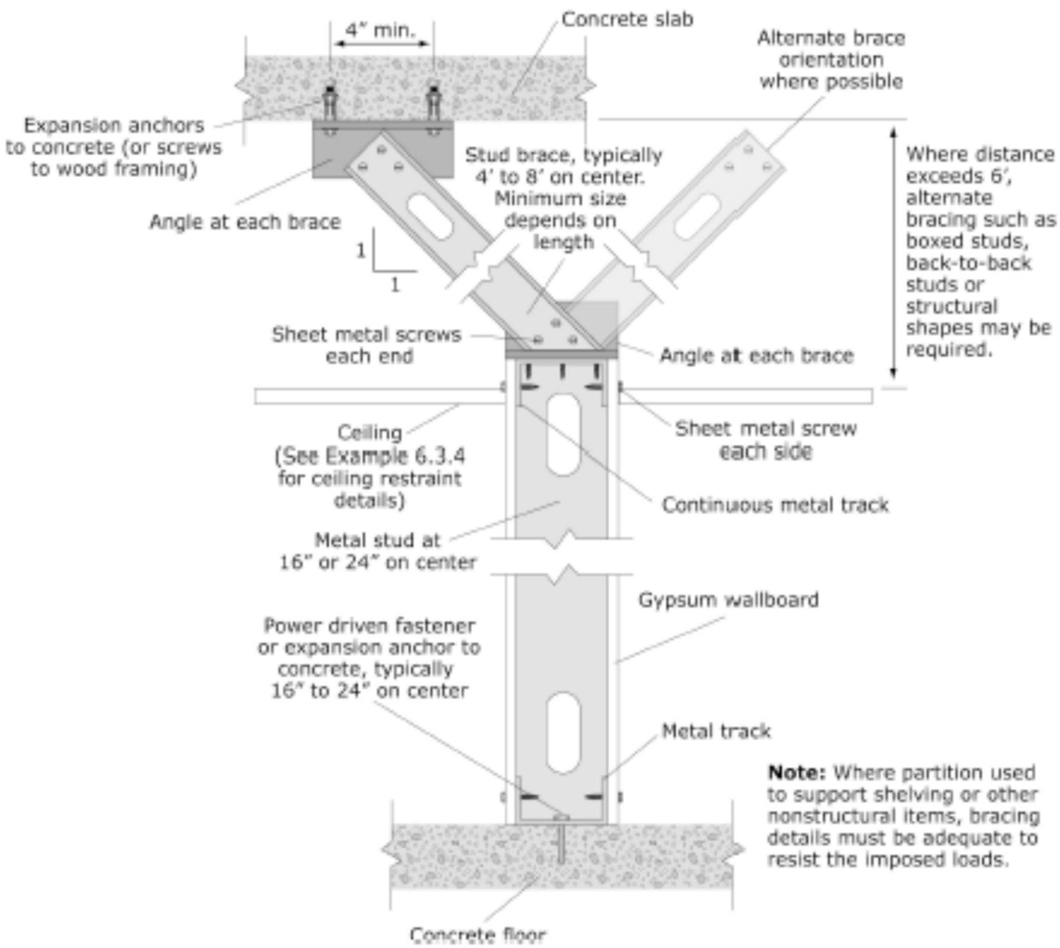


Figure G-4. Mitigation Schemes for Bracing the Tops of Metal Stud Partitions Walls.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

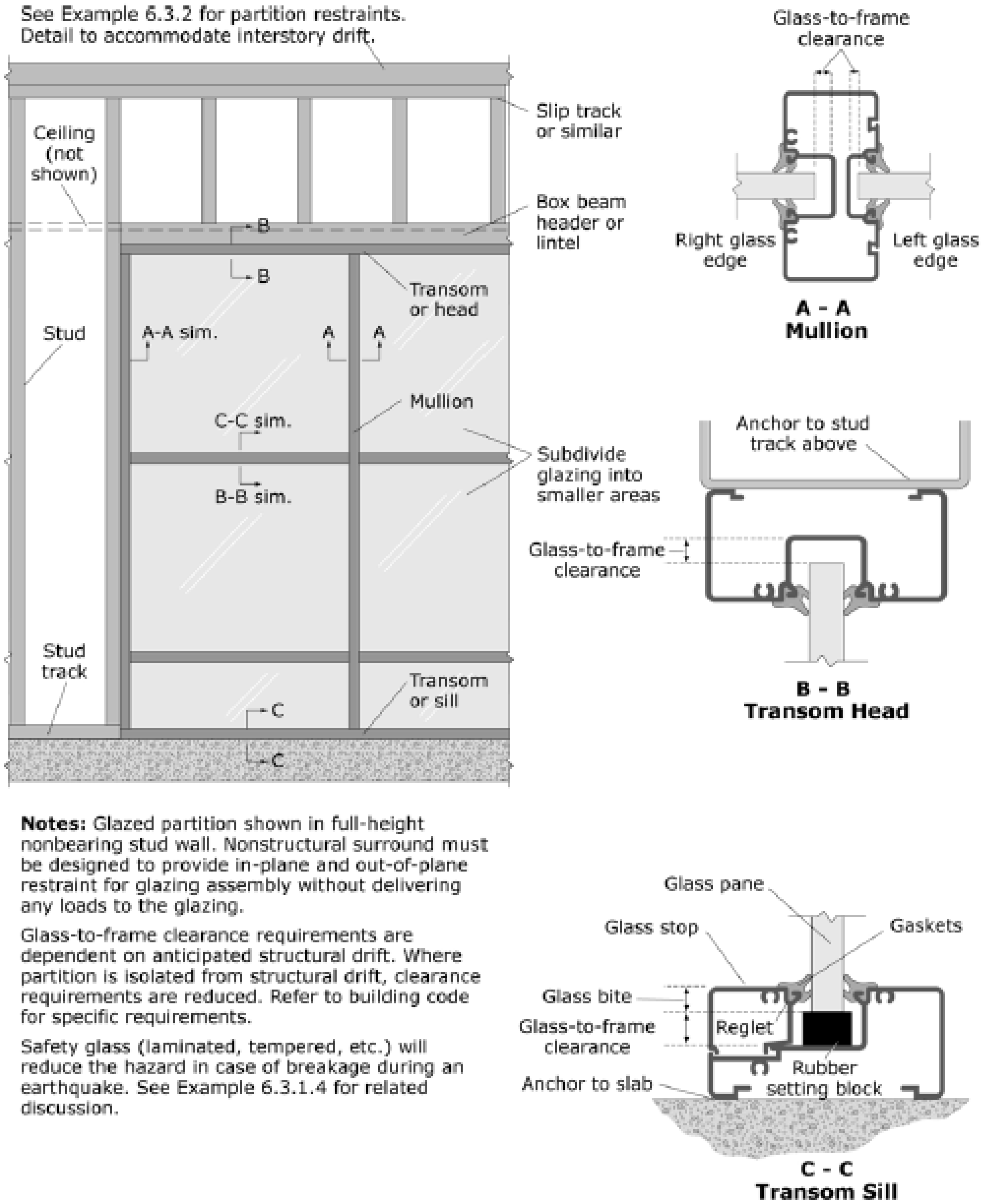


Figure G-5. Full-height Glazed Partition.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

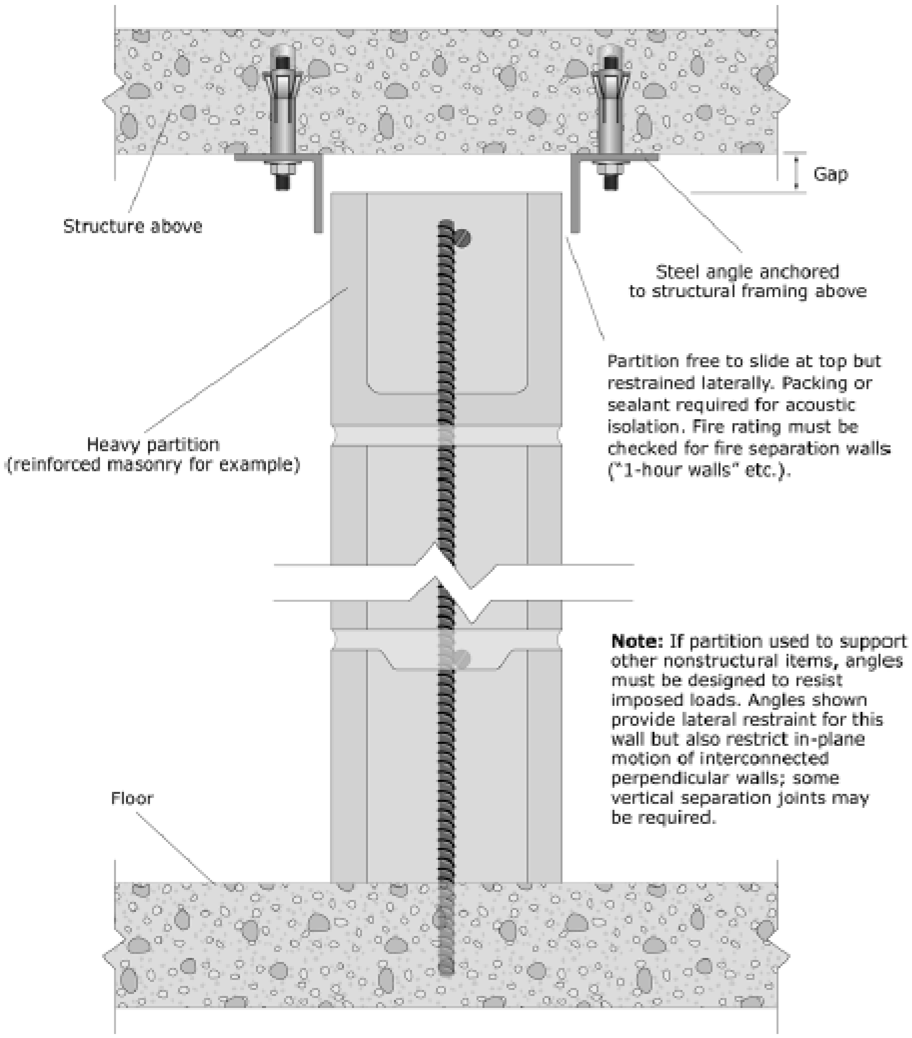


Figure G-6. Full-height Heavy Partition.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

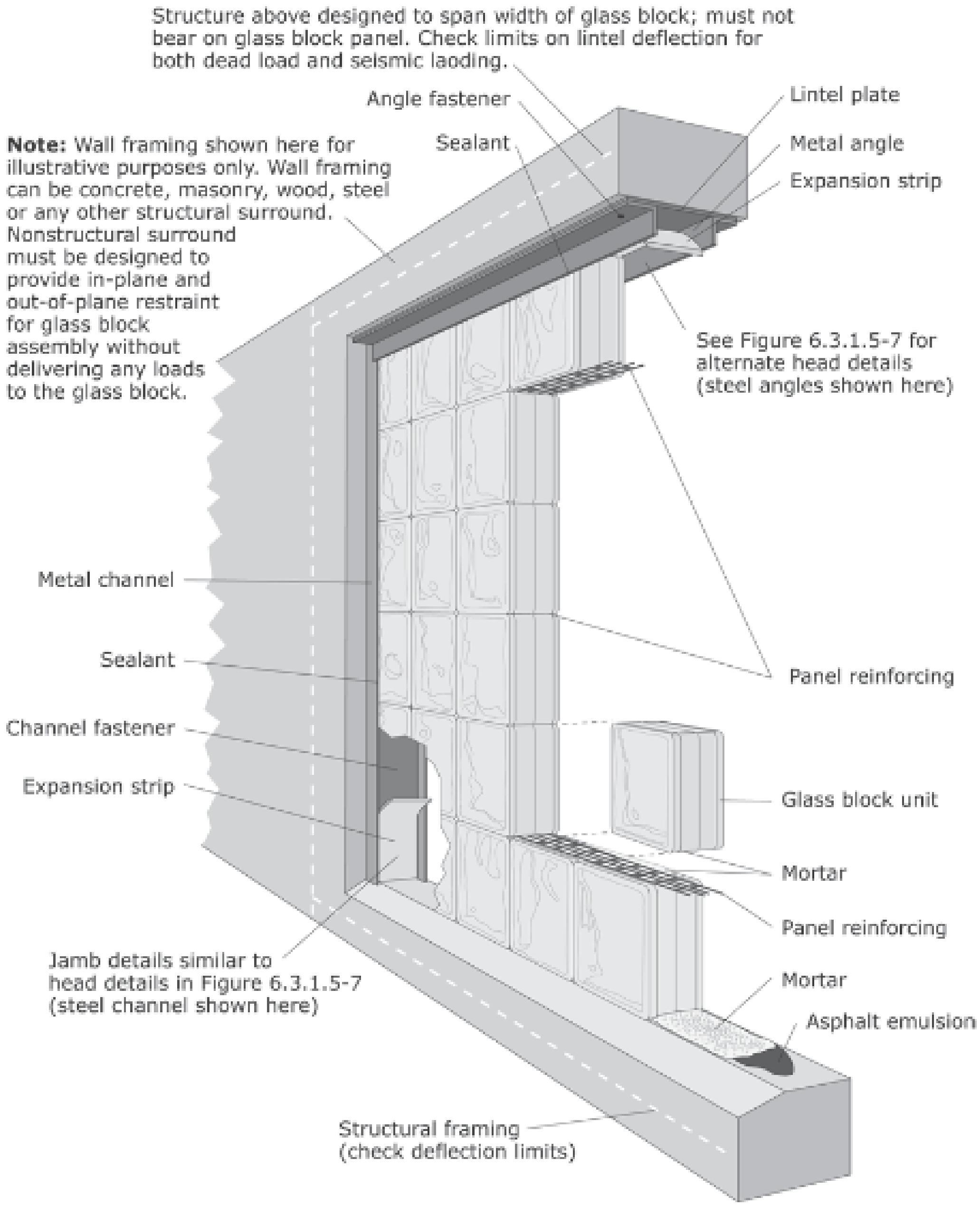


Figure G-7. Typical Glass Block Panel Details.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

Ceilings

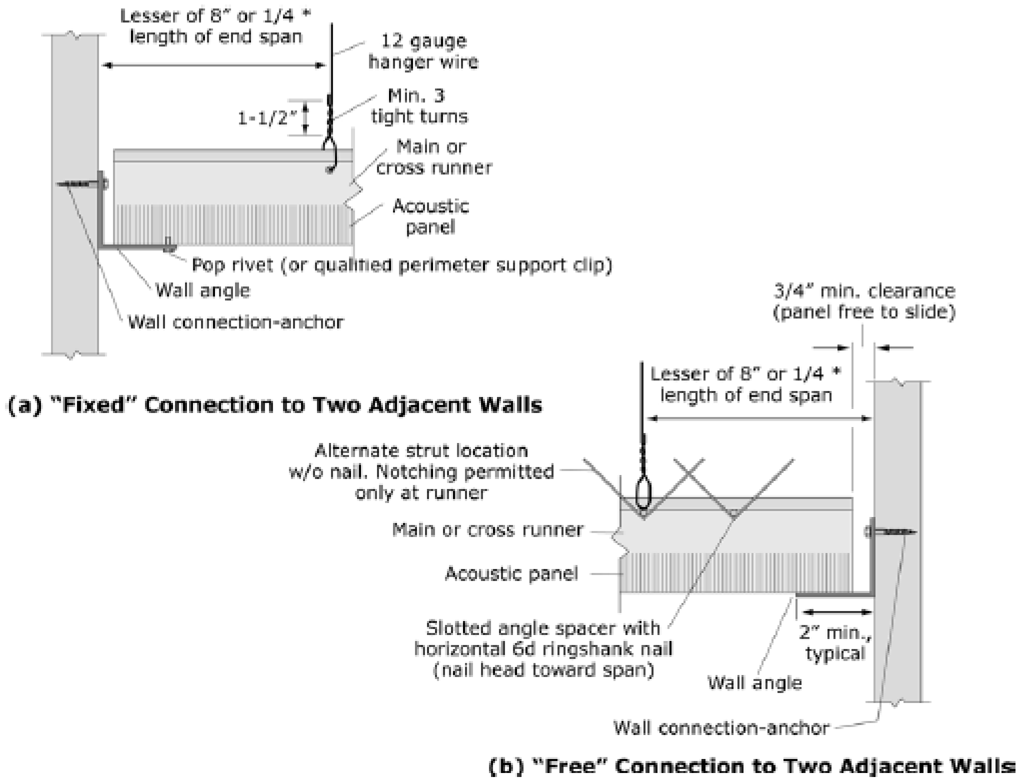
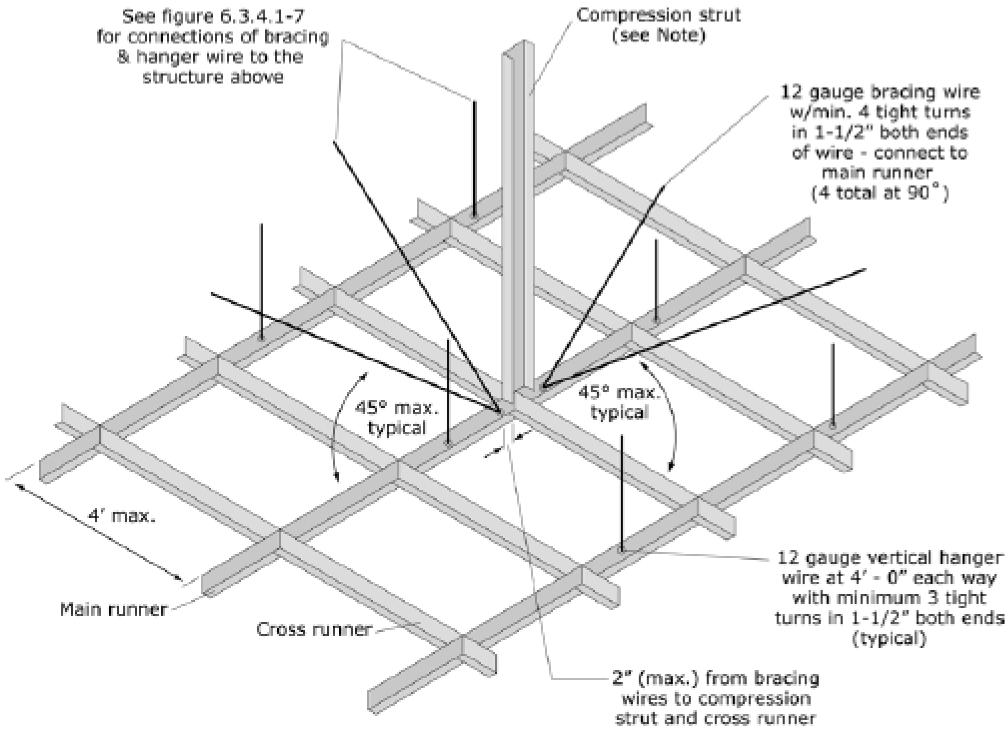


Figure G-8. Suspension System for Acoustic Lay-in Panel Ceilings – Edge Conditions.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)



Note: Compression strut shall not replace hanger wire. Compression strut consists of a steel section attached to main runner with 2 - #12 sheet metal screws and to structure with 2 - #12 screws to wood or 1/4" min. expansion anchor to structure. Size of strut is dependent on distance between ceiling and structure ($l/r \le 200$). A 1" diameter conduit can be used for up to 6', a 1-5/8" X 1-1/4" metal stud can be used for up to 10'

Per DSA IR 25-5, ceiling areas less than 144 sq. ft, or fire rated ceilings less than 96 sq. ft., surrounded by walls braced to the structure above do not require lateral bracing assemblies when they are attached to two adjacent walls. (ASTM E580 does not require lateral bracing assemblies for ceilings less than 1000 sq. ft.; see text.)

Figure G-9. Suspension System for Acoustic Lay-in Panel Ceilings – General Bracing Assembly.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

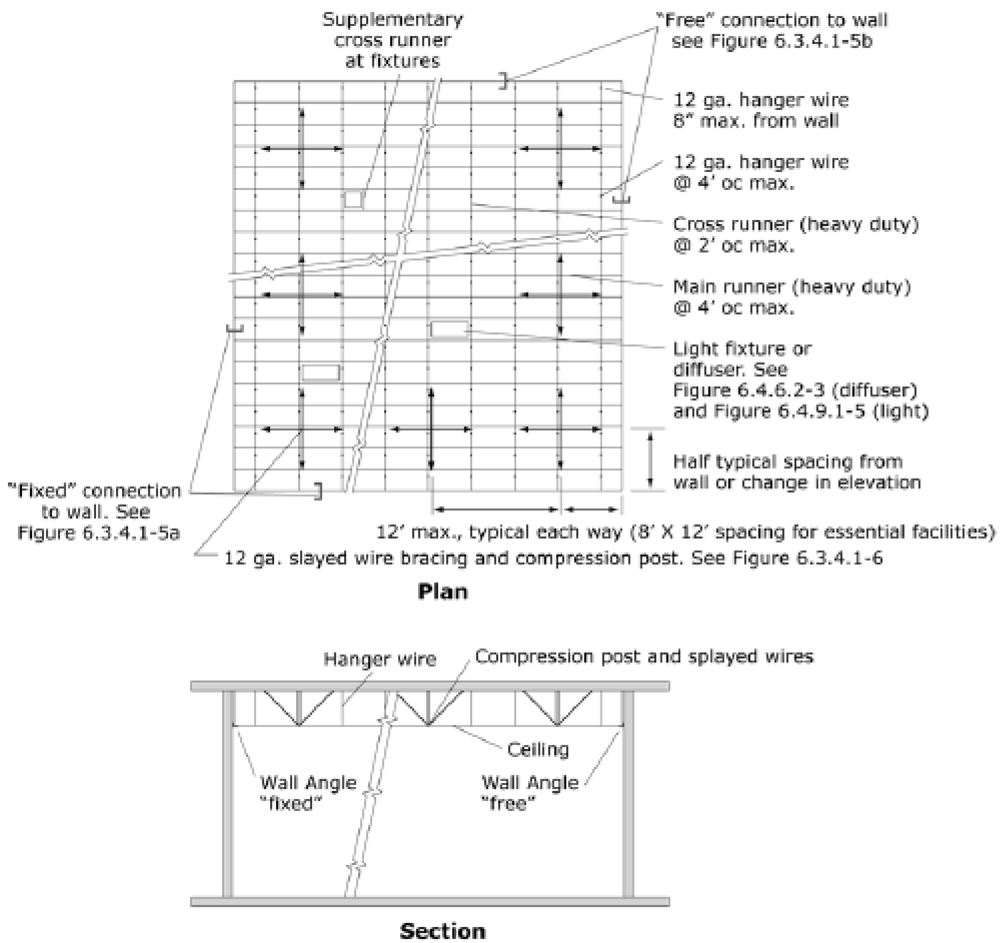


Figure G-10. Suspension System for Acoustic Lay-in Panel Ceilings – General Bracing Layout.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

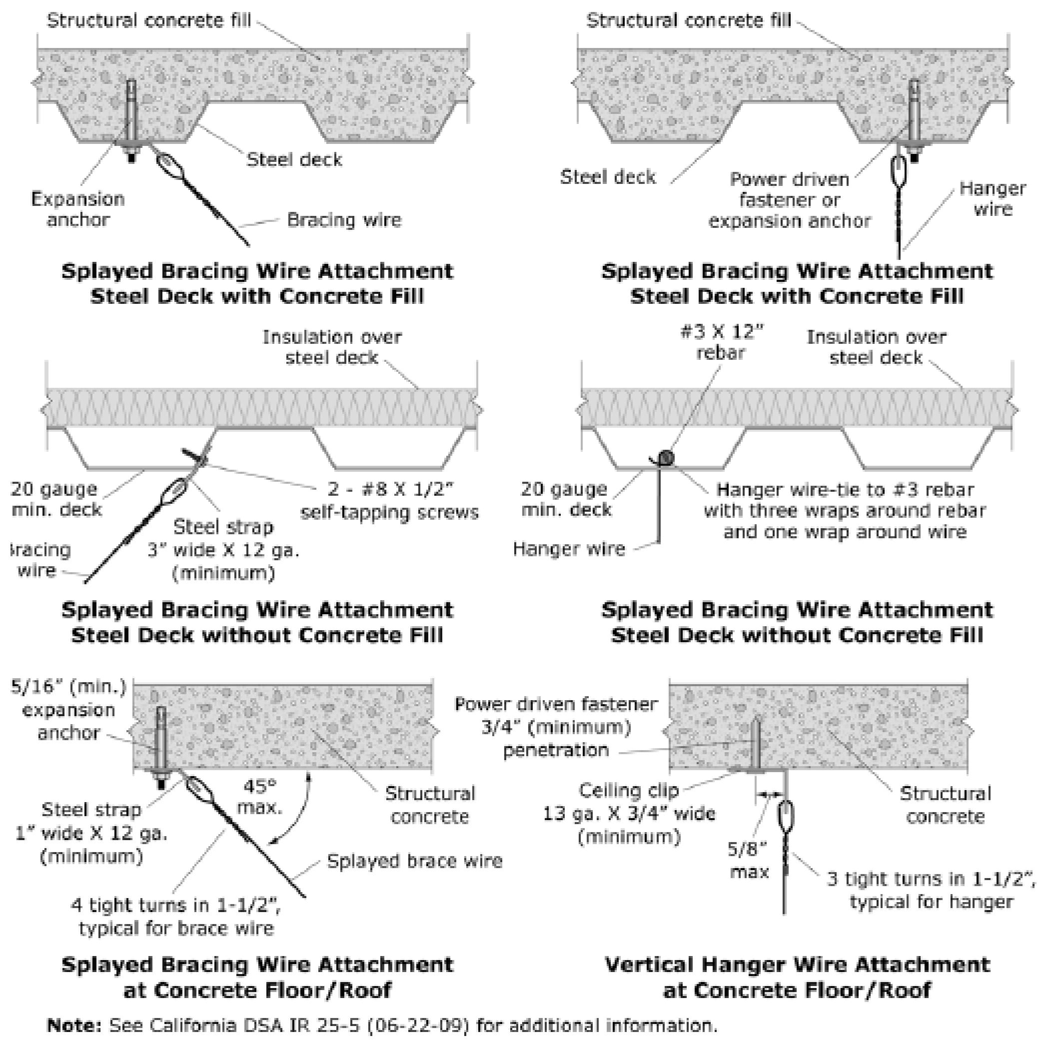


Figure G-11. Suspension System for Acoustic Lay-in Panel Ceilings – Overhead Attachment Details.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

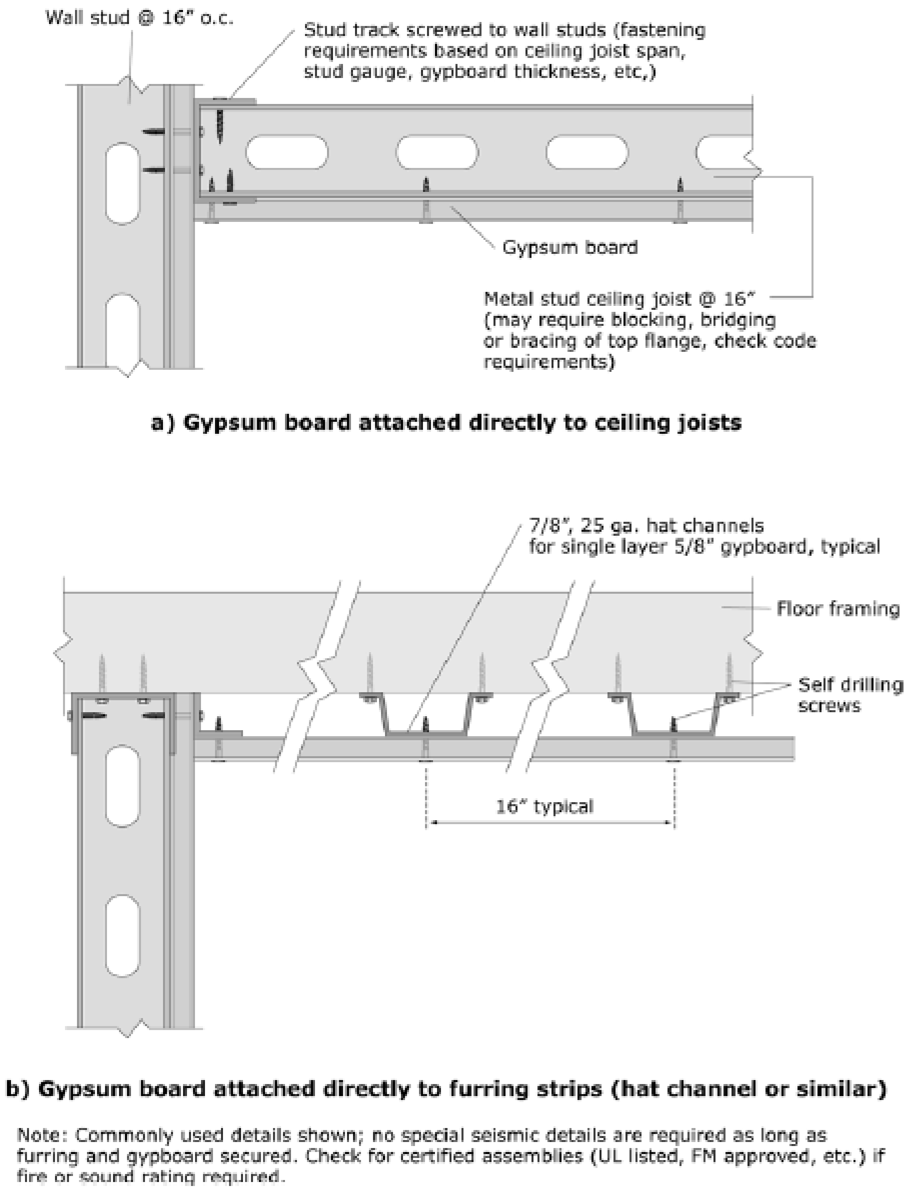


Figure G-12. Gypsum Board Ceiling Applied Directly to Structure.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

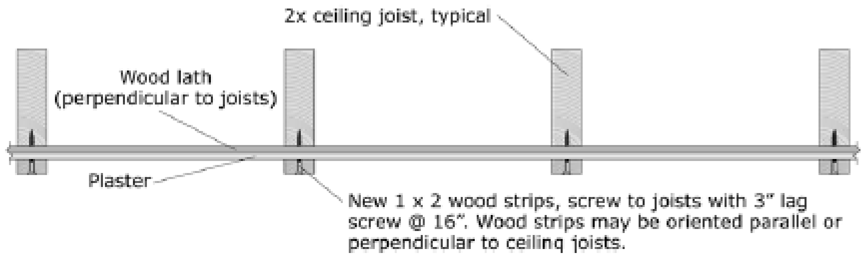


Figure G-13. Retrofit Detail for Existing Lath and Plaster.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

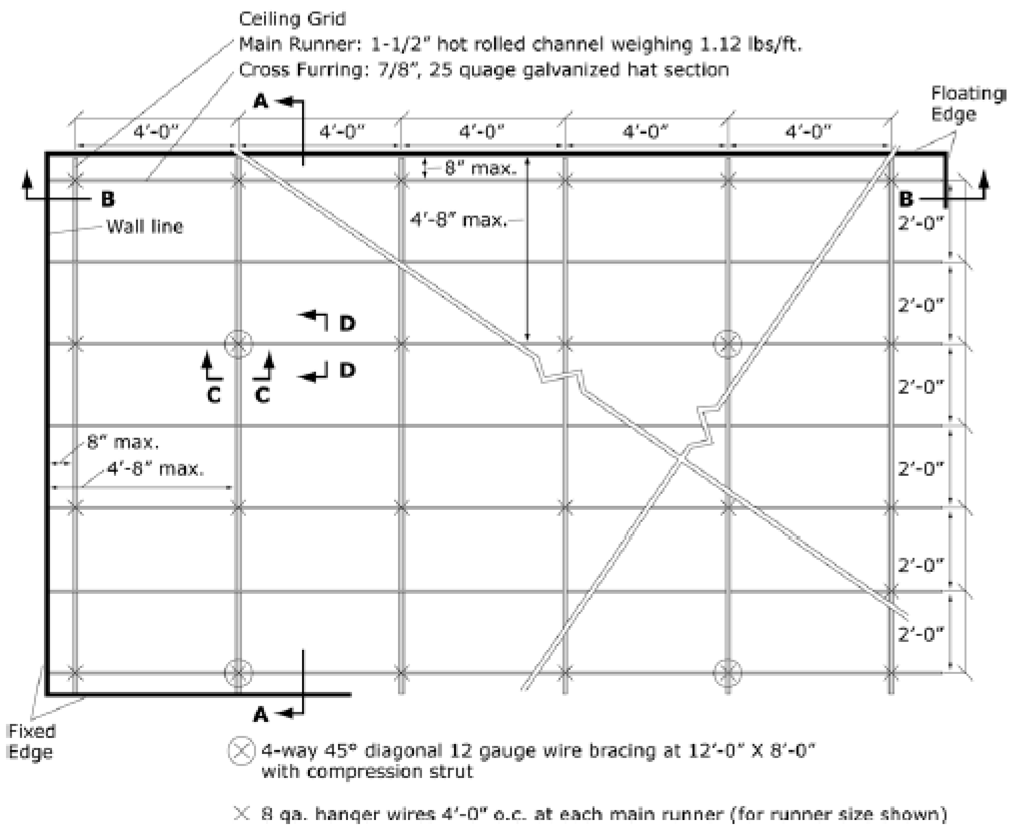


Figure G-14. Diagrammatic View of Suspended Heavy Ceiling Grid and Lateral Bracing.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

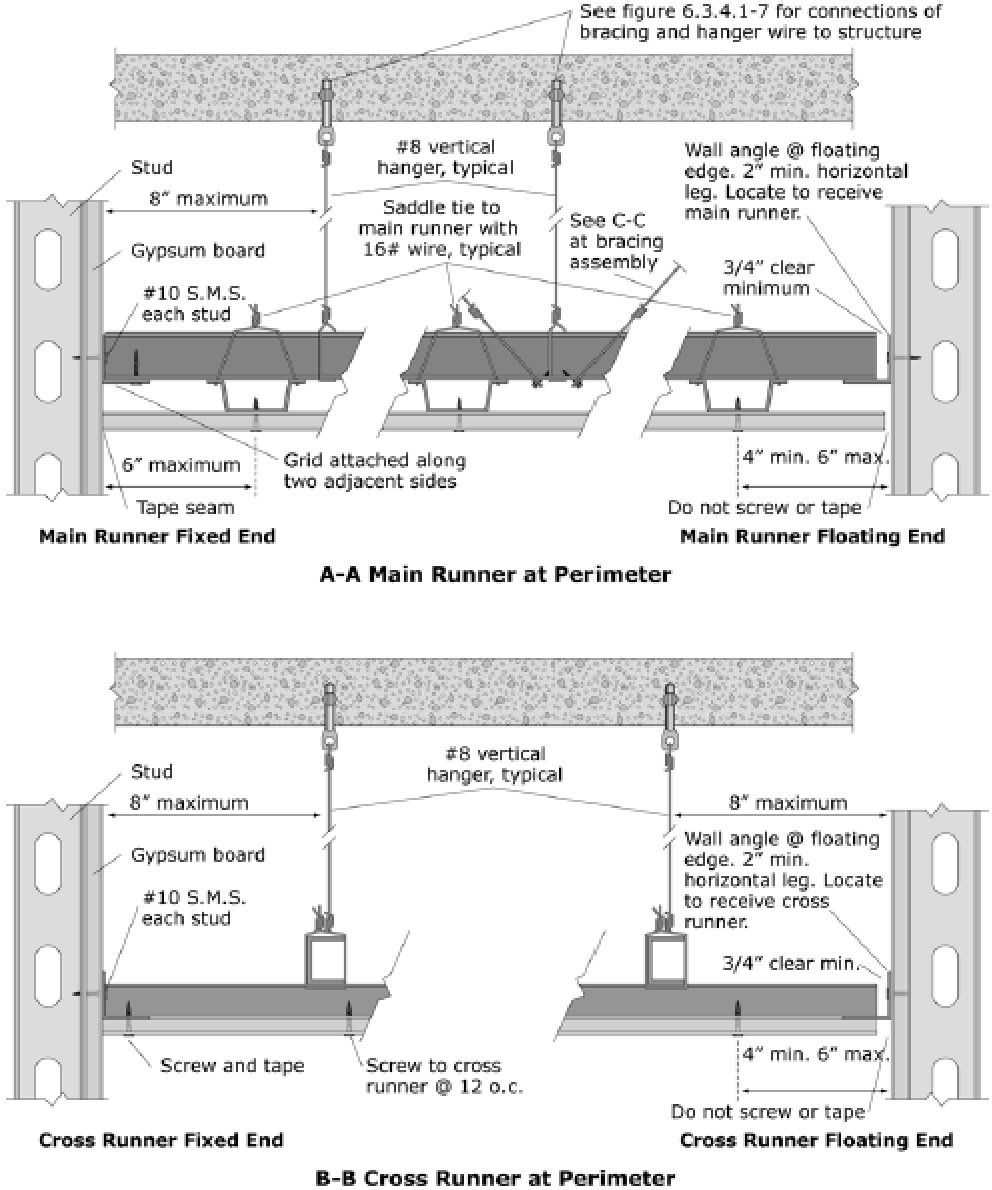
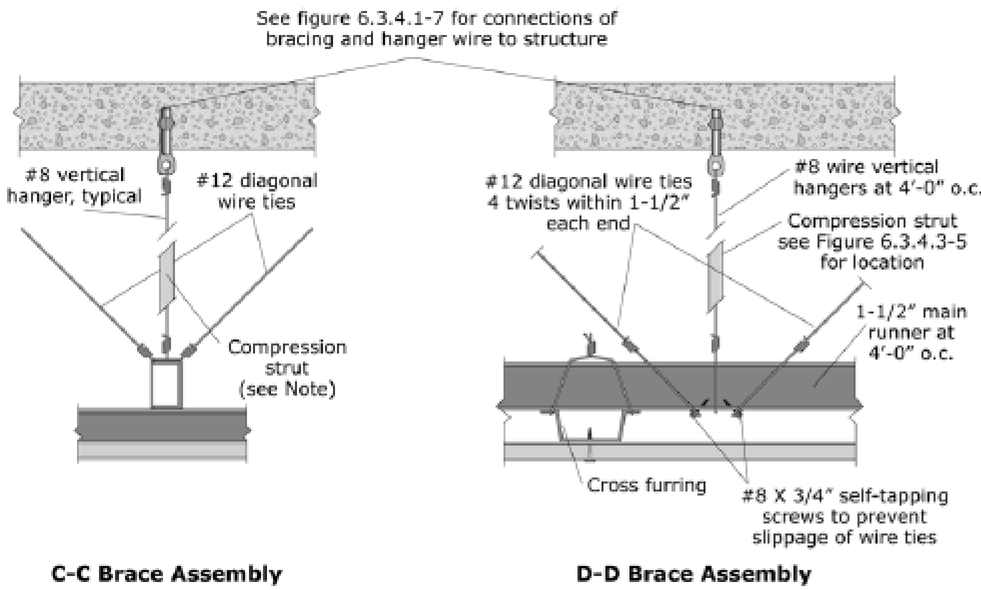


Figure G-15. Perimeter Details for Suspended Gypsum Board Ceiling.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)



Note: Compression strut shall not replace hanger wire. Compresion strut consists of a steel section attached to main runner with 2 - #12 sheet metal screws and to structure with 2 - #12 screws to wood or 1/4" min. expansion anchor to concrete. Size of strut is dependent on distance between ceiling and structure ($l/r \leq 200$). A 1" diameter conduit can be used for up to 6', a 1-5/8" X 1-1/4" metal stud can be used for up to 10'. See figure 6.3.4.1-6 for example of bracing assembly.

Figure G-16. Details for Lateral Bracing Assembly for Suspended Gypsum Board Ceiling.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

Light Fixtures

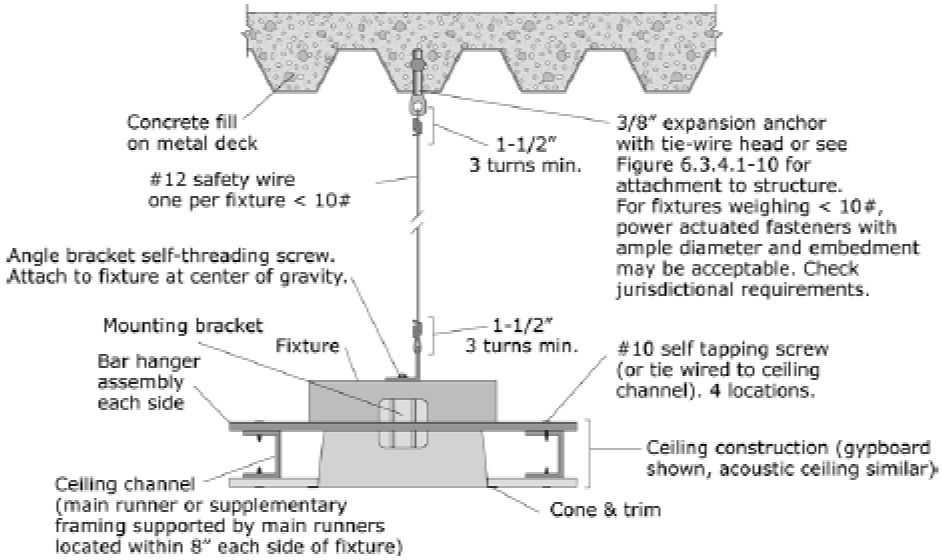


Figure G-17. Recessed Light Fixture in suspended Ceiling (Fixture Weight < 10 pounds).

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

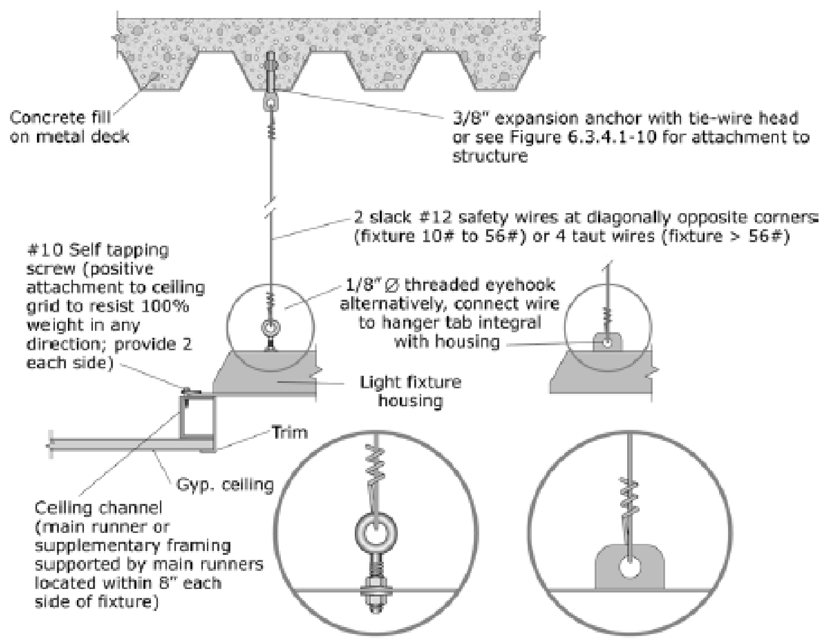


Figure G-18. Recessed Light Fixture in suspended Ceiling (Fixture Weight 10 to 56 pounds).

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

Contents and Furnishings

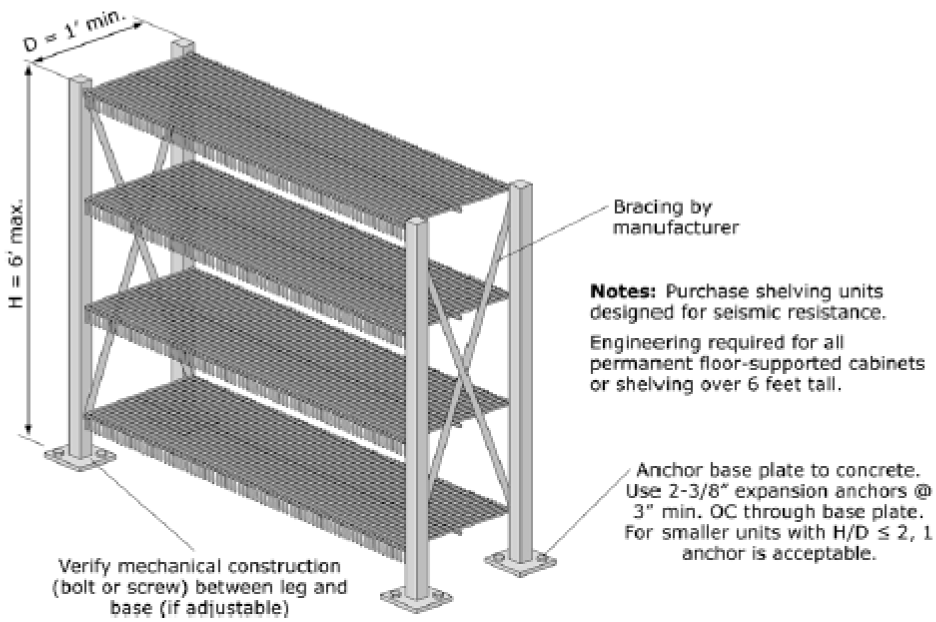


Figure G-19. Light Storage Racks.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

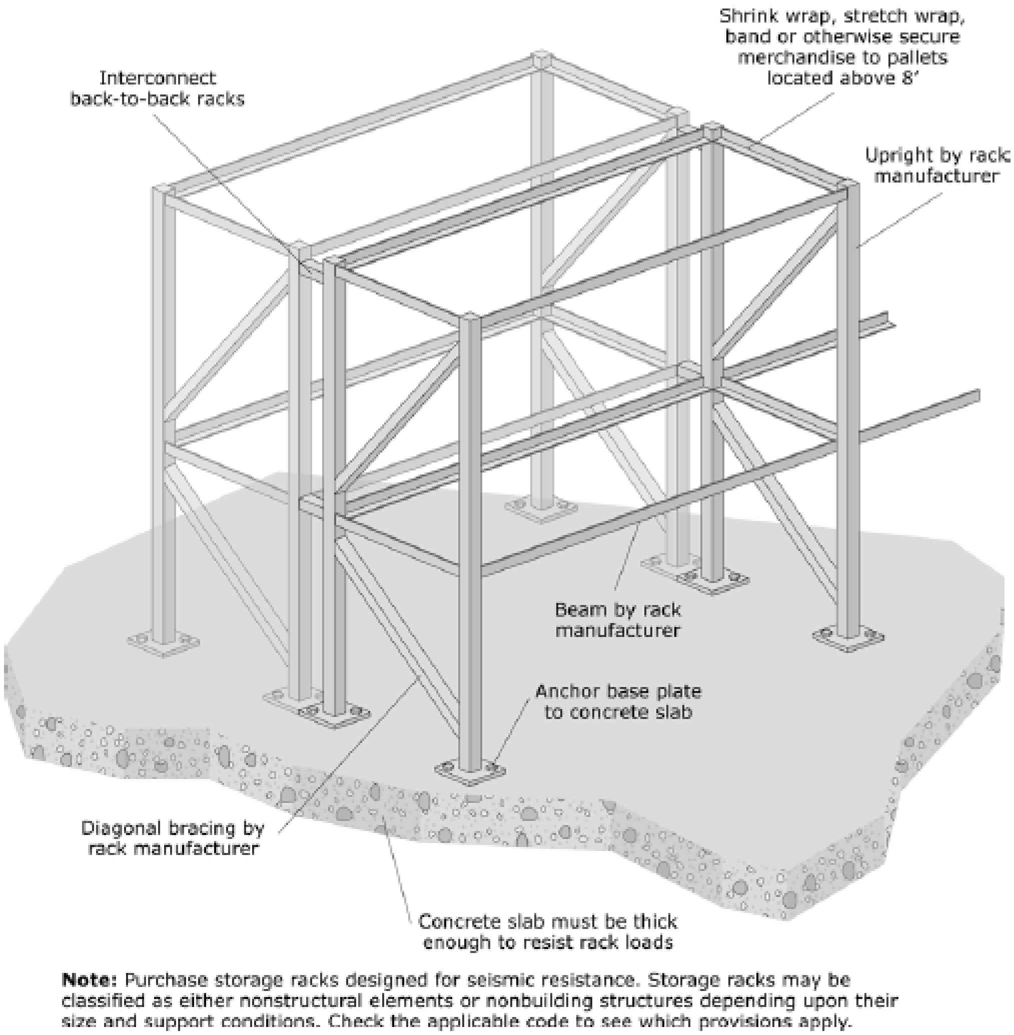


Figure G-20. Industrial Storage Racks.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

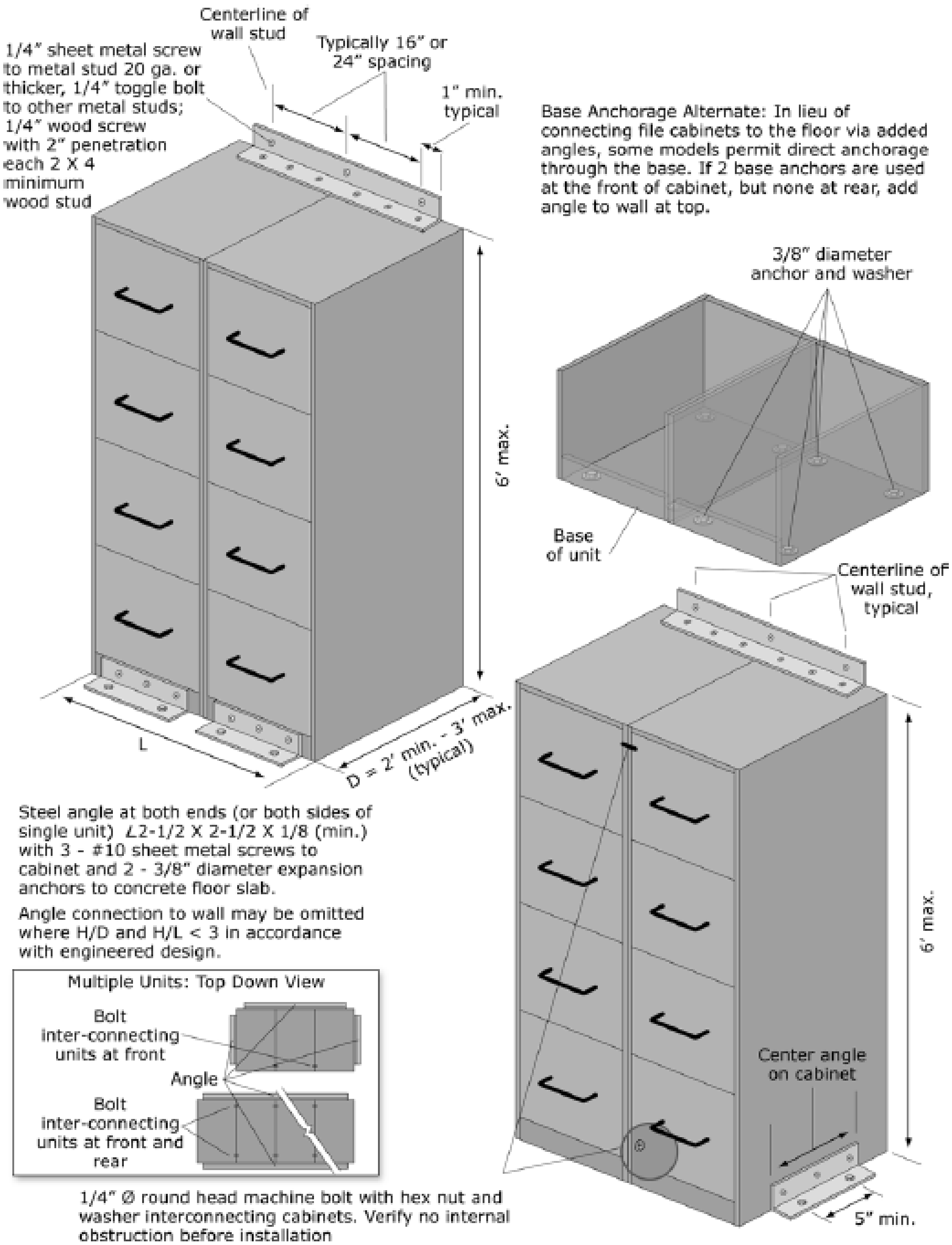


Figure G-21. Wall-mounted File Cabinets.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

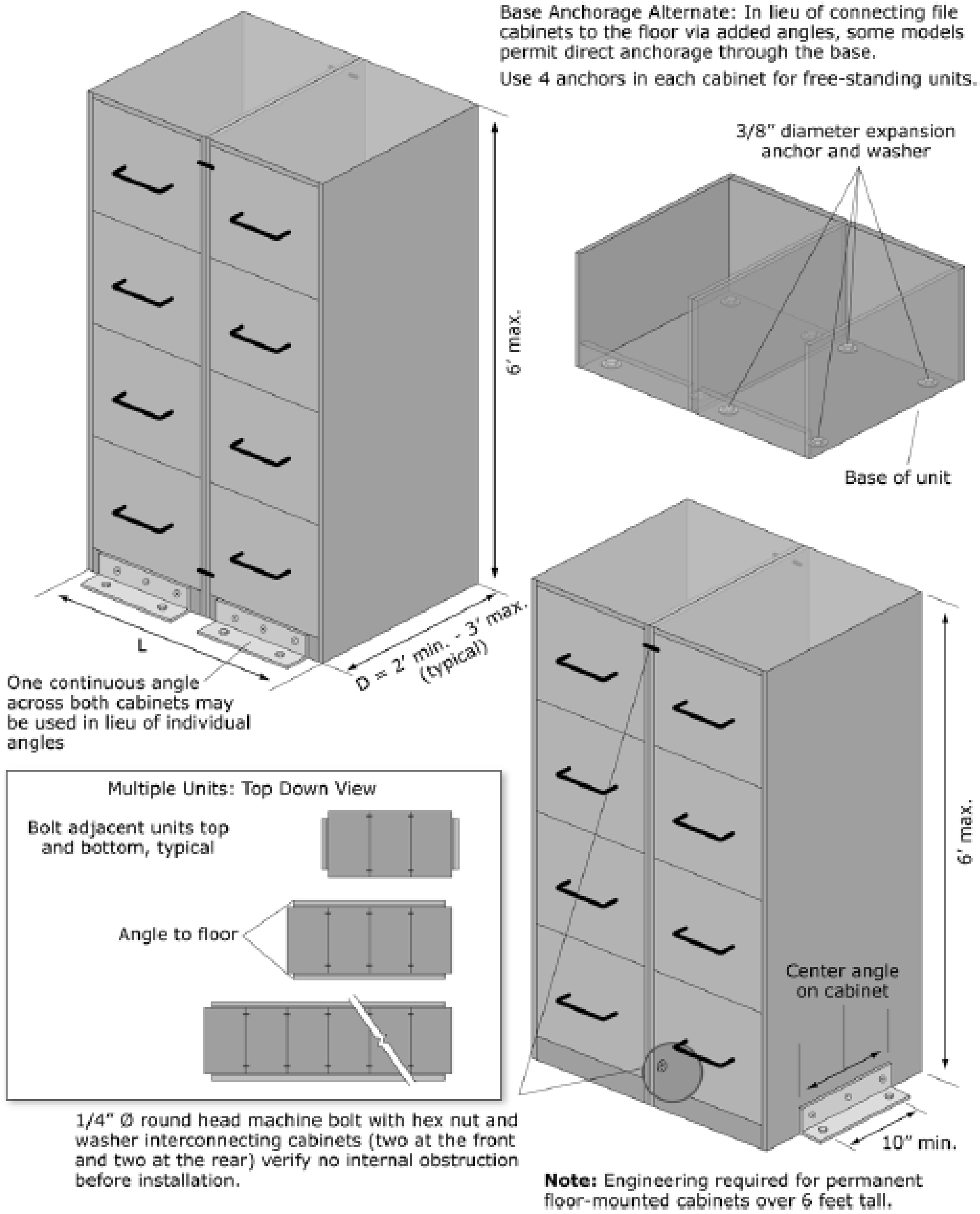


Figure G-22. Base Anchored File Cabinets.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

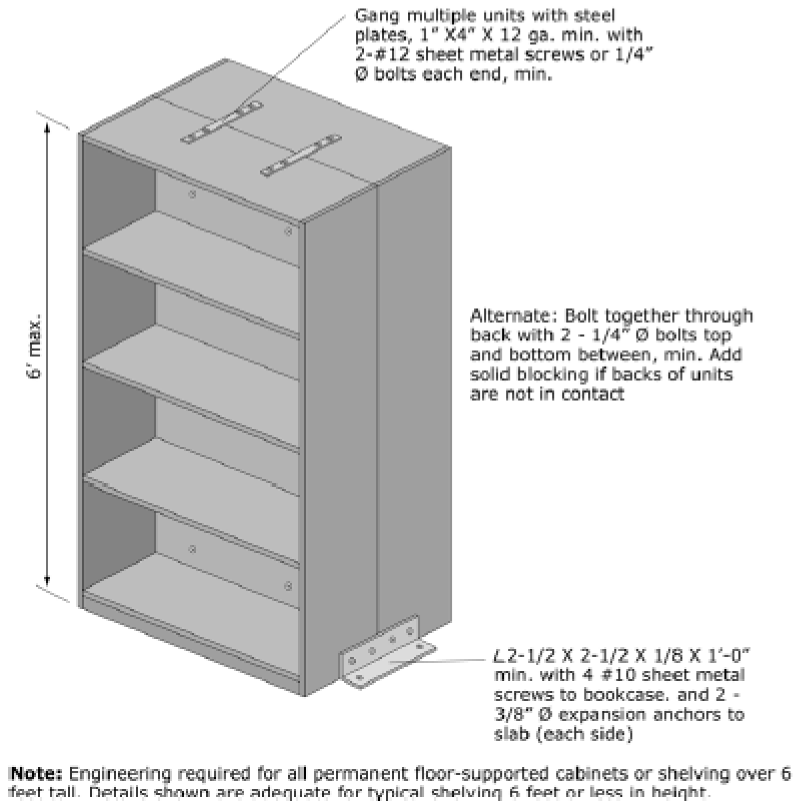


Figure G-23. Anchorage of Freestanding Book Cases Arranged Back to Back.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

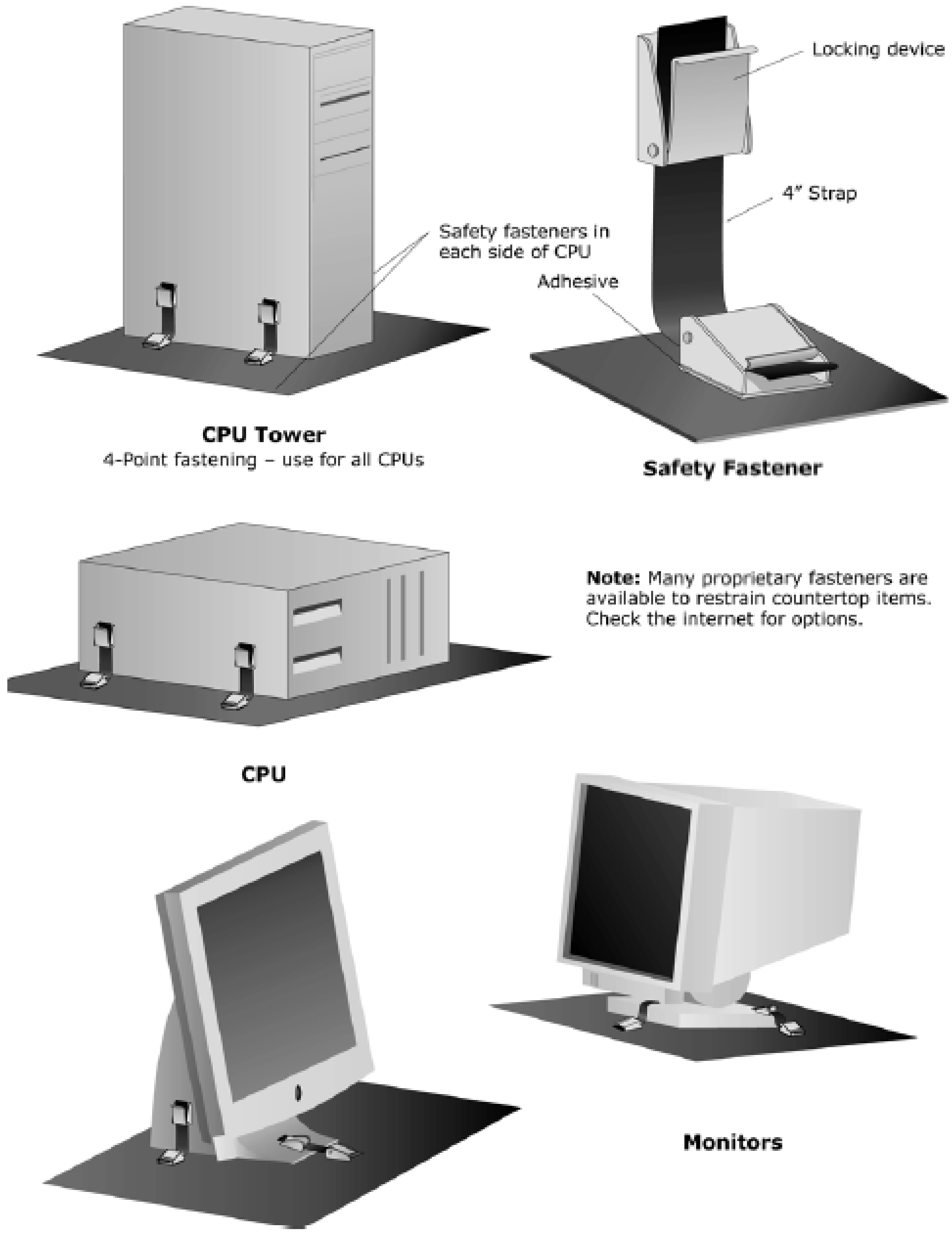
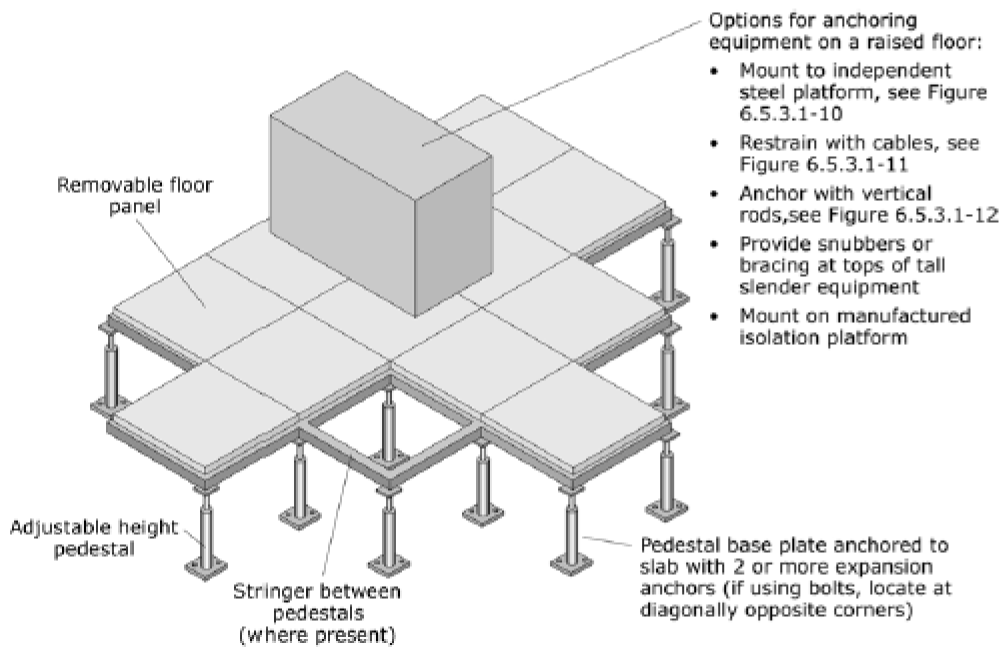
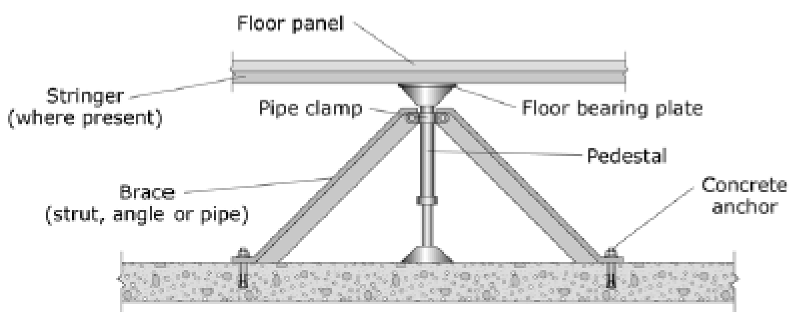


Figure G-24. Desktop Computers and Accessories.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)



Cantilevered Access Floor Pedestal



Braced Access Floor Pedestal
(use for tall floors or where pedestals are not strong enough to resist seismic forces)

Note: For new floors in areas of high seismicity, purchase and install systems that meet the applicable code provisions for "special access floors."

Figure G-25. Equipment Mounted on Access Floor.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

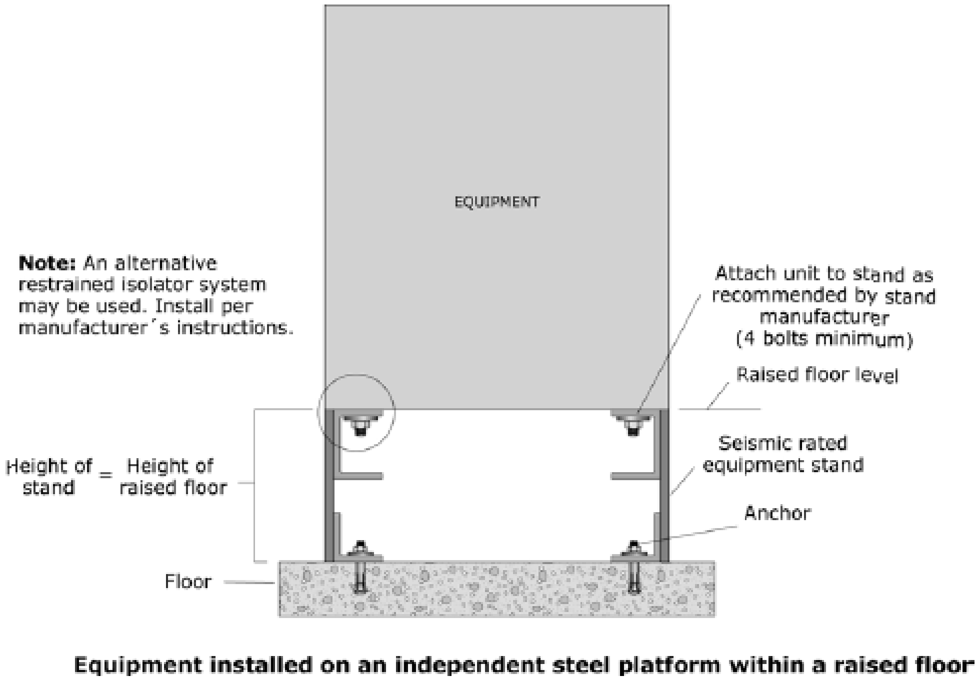


Figure G-26. Equipment Mounted on Access Floor – Independent Base.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

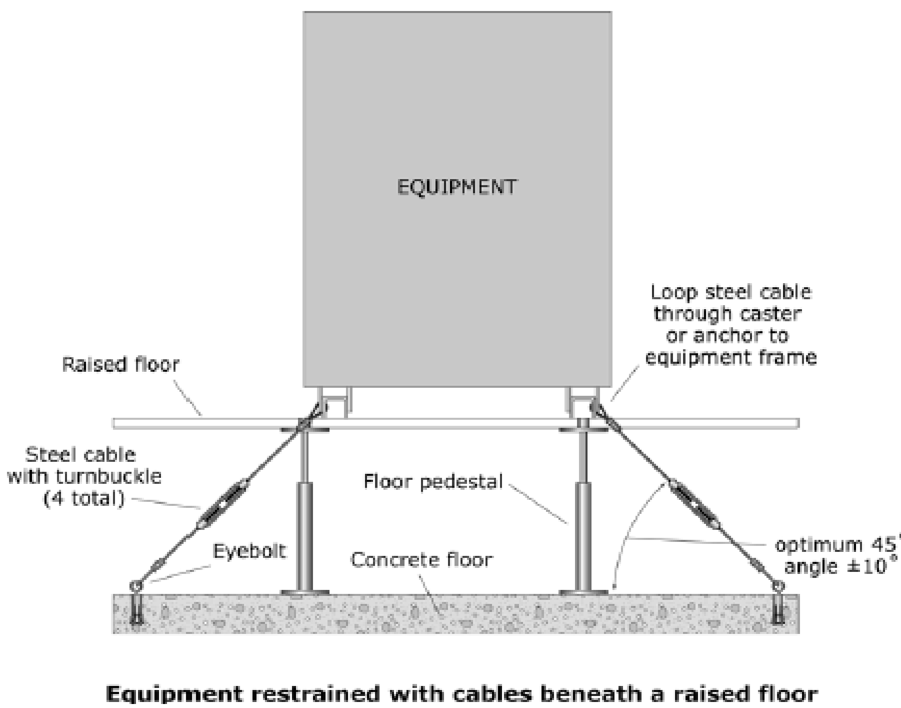
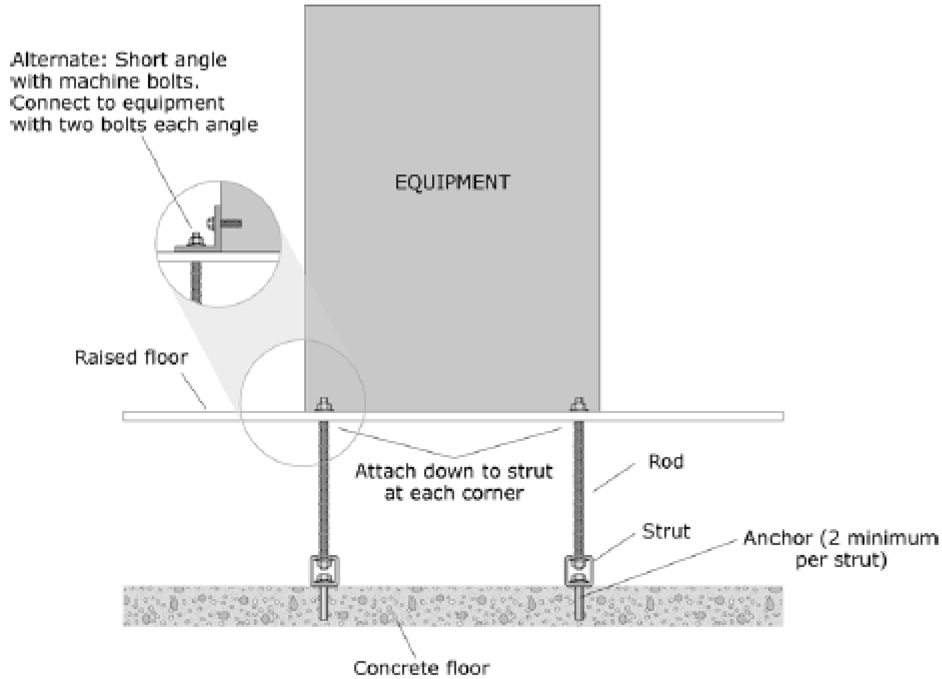


Figure G-27. Equipment Mounted on Access Floor – Cable Braced.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

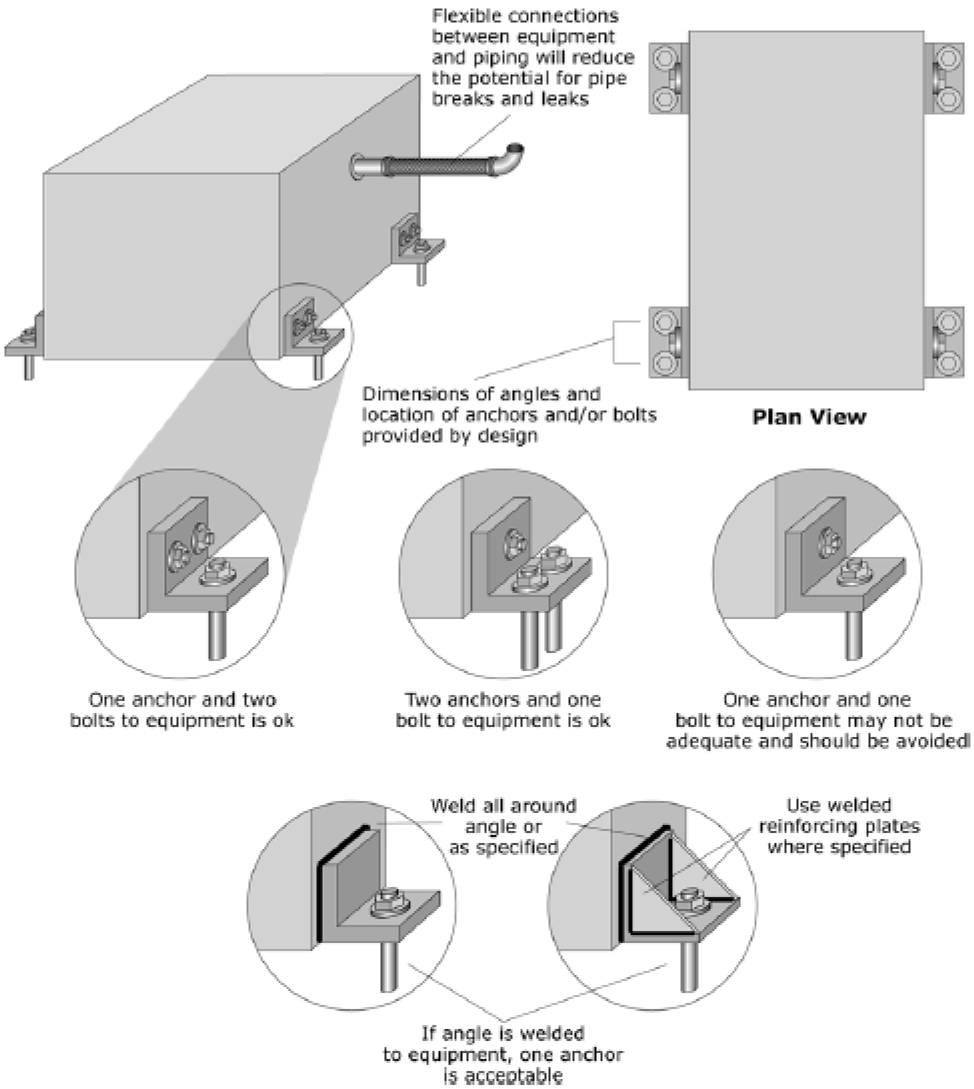


Equipment anchored with vertical rods beneath a raised floor

Figure G-28. Equipment Mounted on Access Floor – Tie-down Rods.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

Mechanical and Electrical Equipment



Note: Rigidly mounted equipment shall have flexible connections for the fuel lines and piping.

Figure G-29. Rigidly Floor-mounted Equipment with Added Angles.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

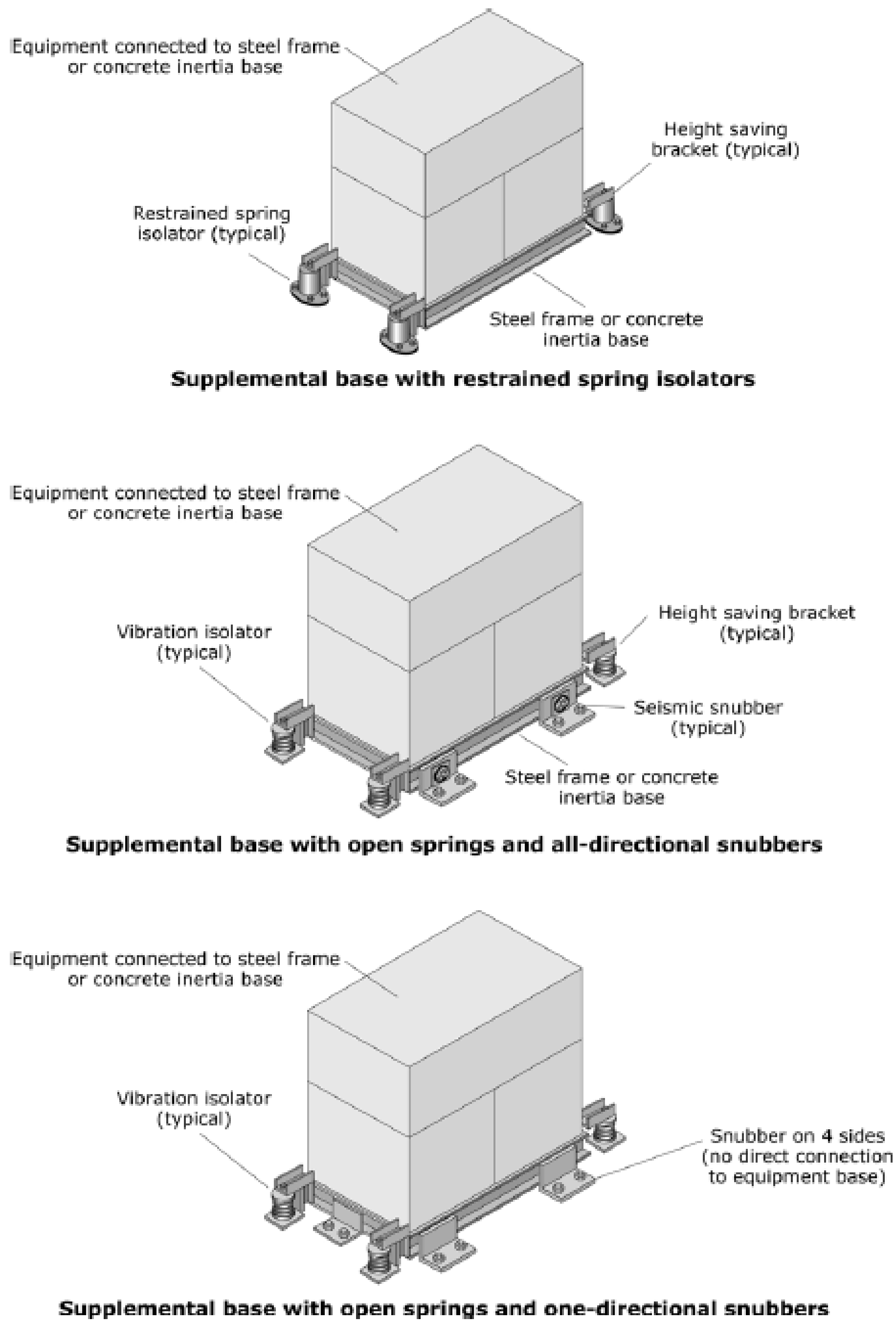


Figure G-30. HVAC Equipment with Vibration Isolation.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

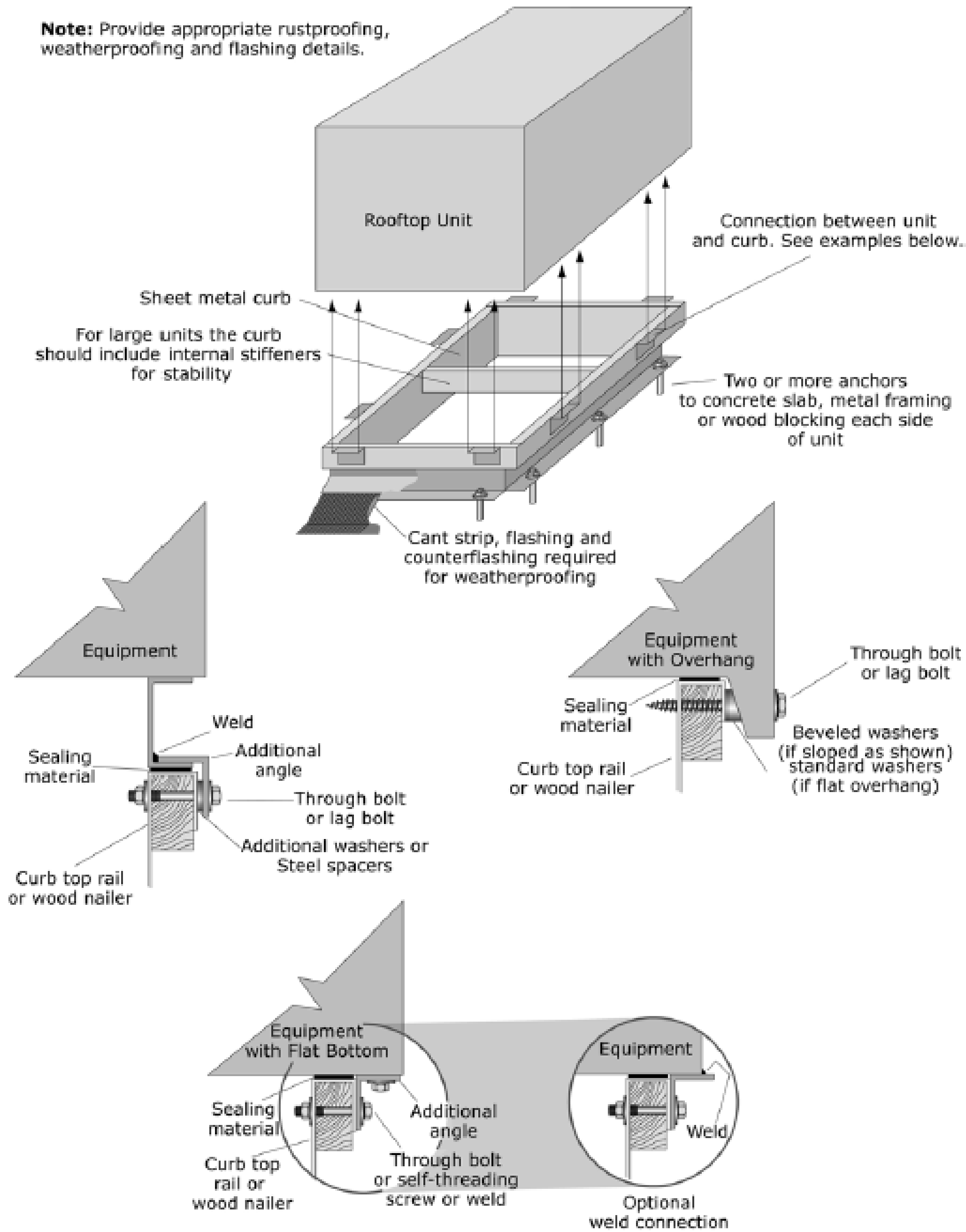


Figure G-31. Rooftop HVAC Equipment.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

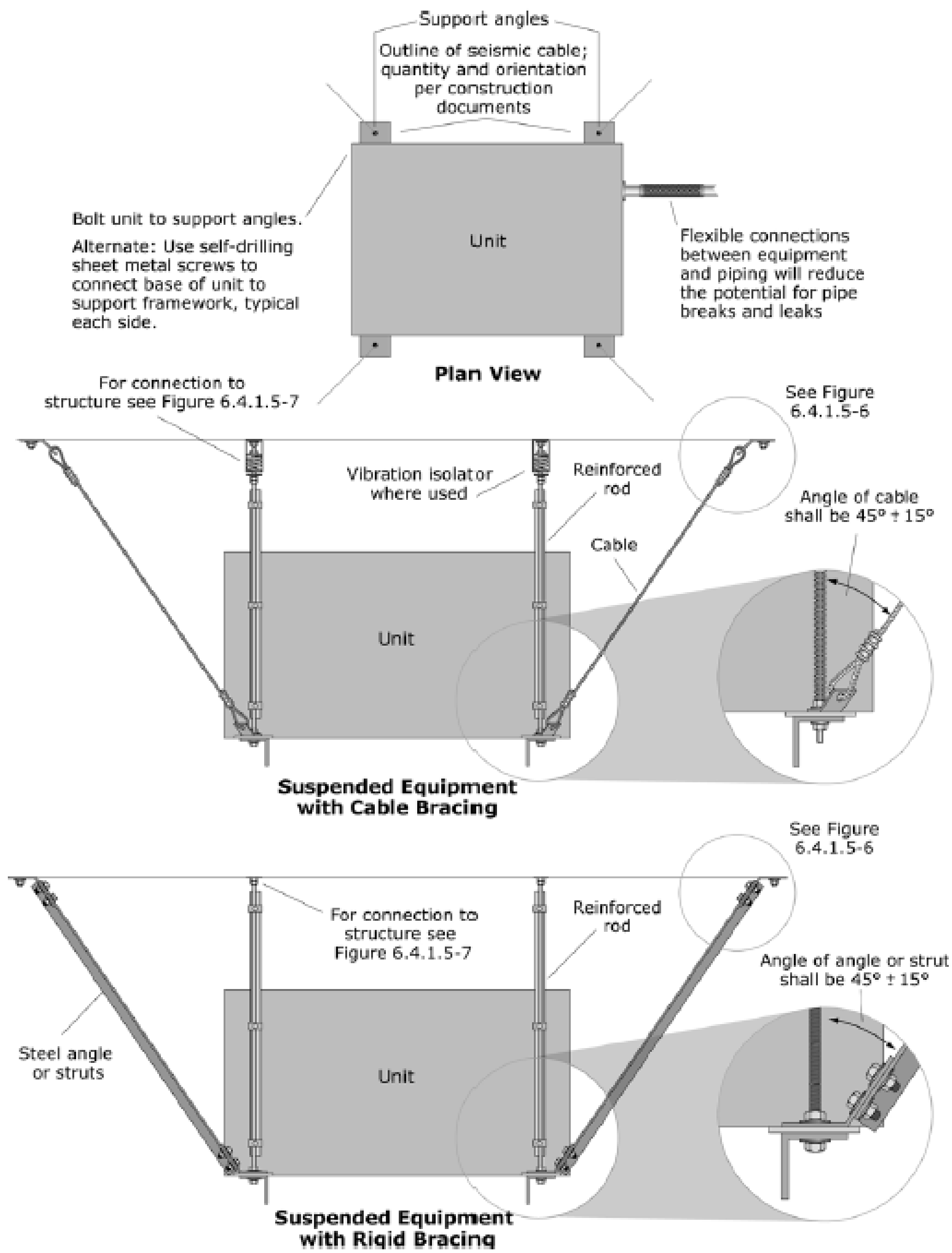


Figure G-32. Suspended Equipment.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

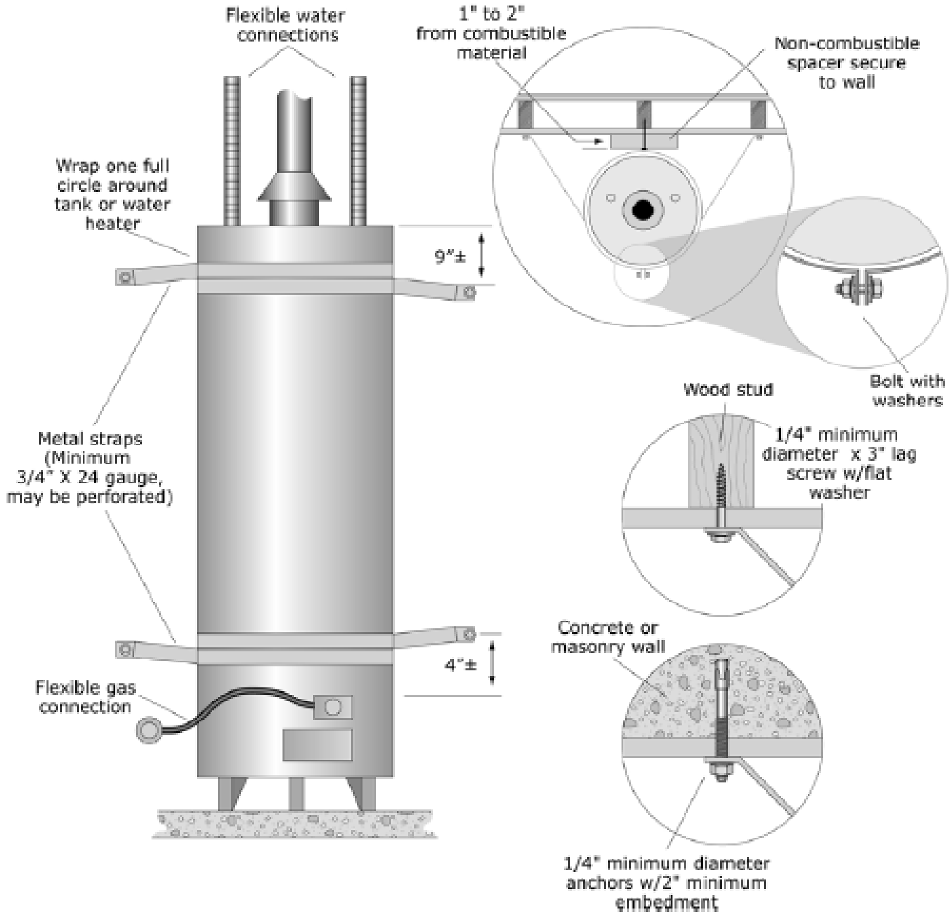


Figure G-33. Water Heater Strapping to Backing Wall.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

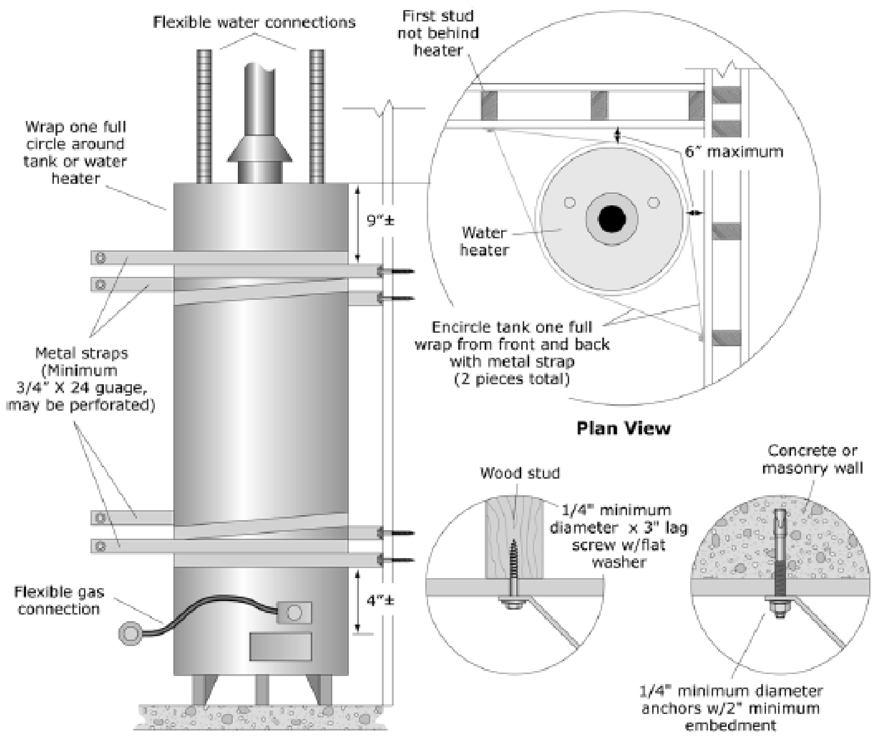


Figure G-34. Water Heater – Strapping at Corner Installation.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

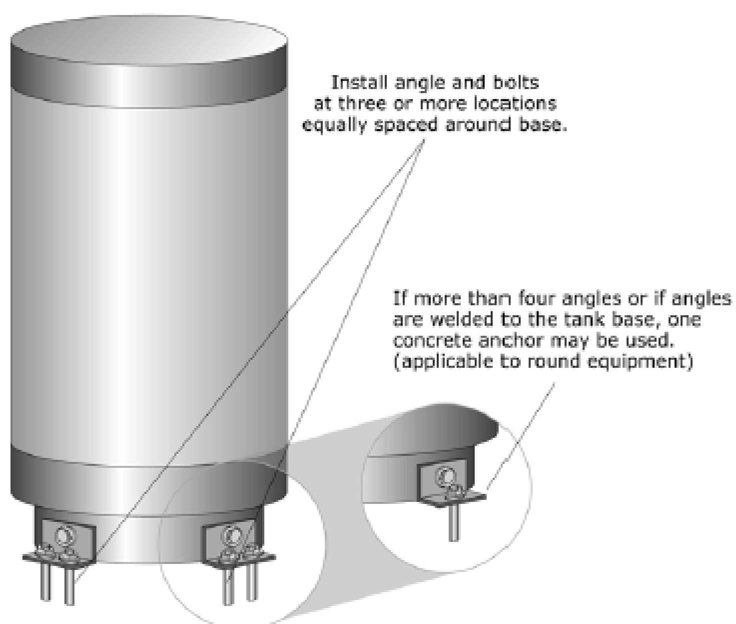


Figure G-35. Water Heater – Base Mounted.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

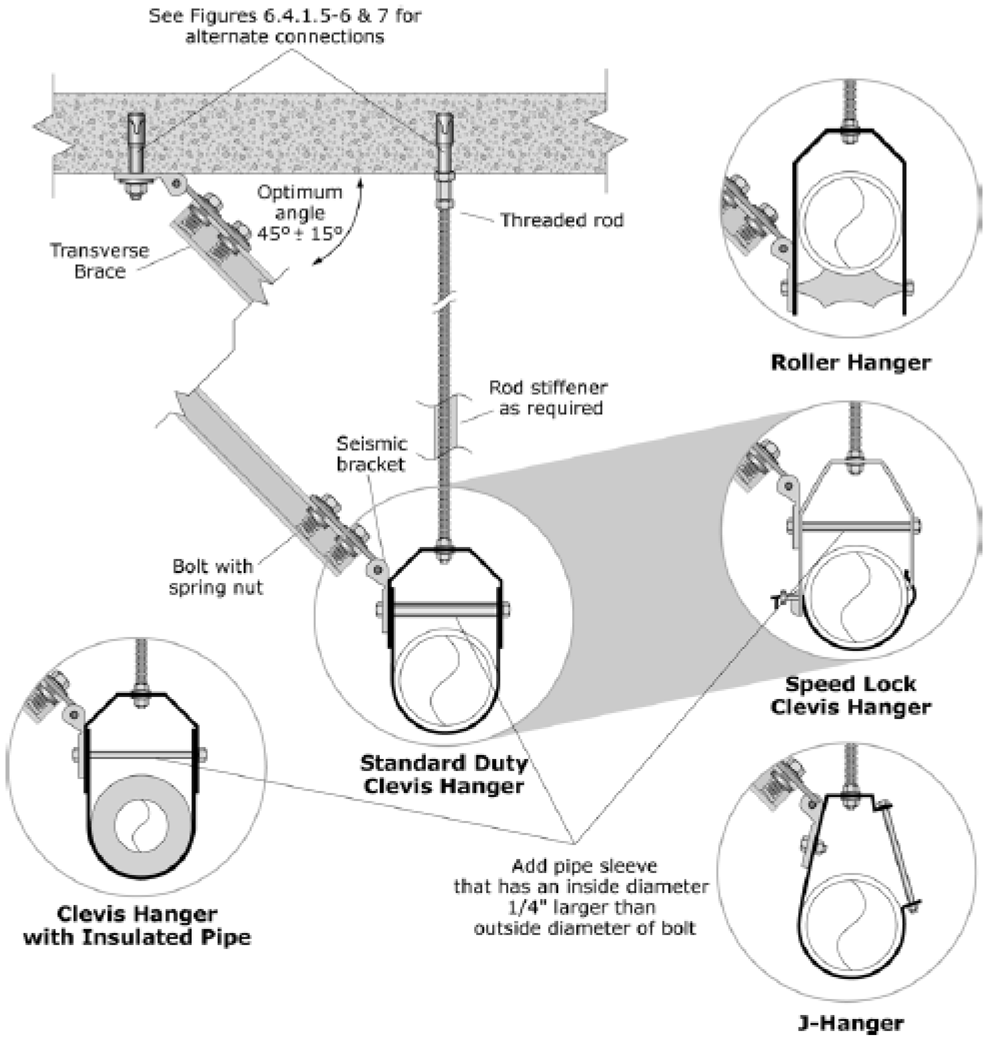


Figure G-36. Rigid Bracing – Single Pipe Transverse.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

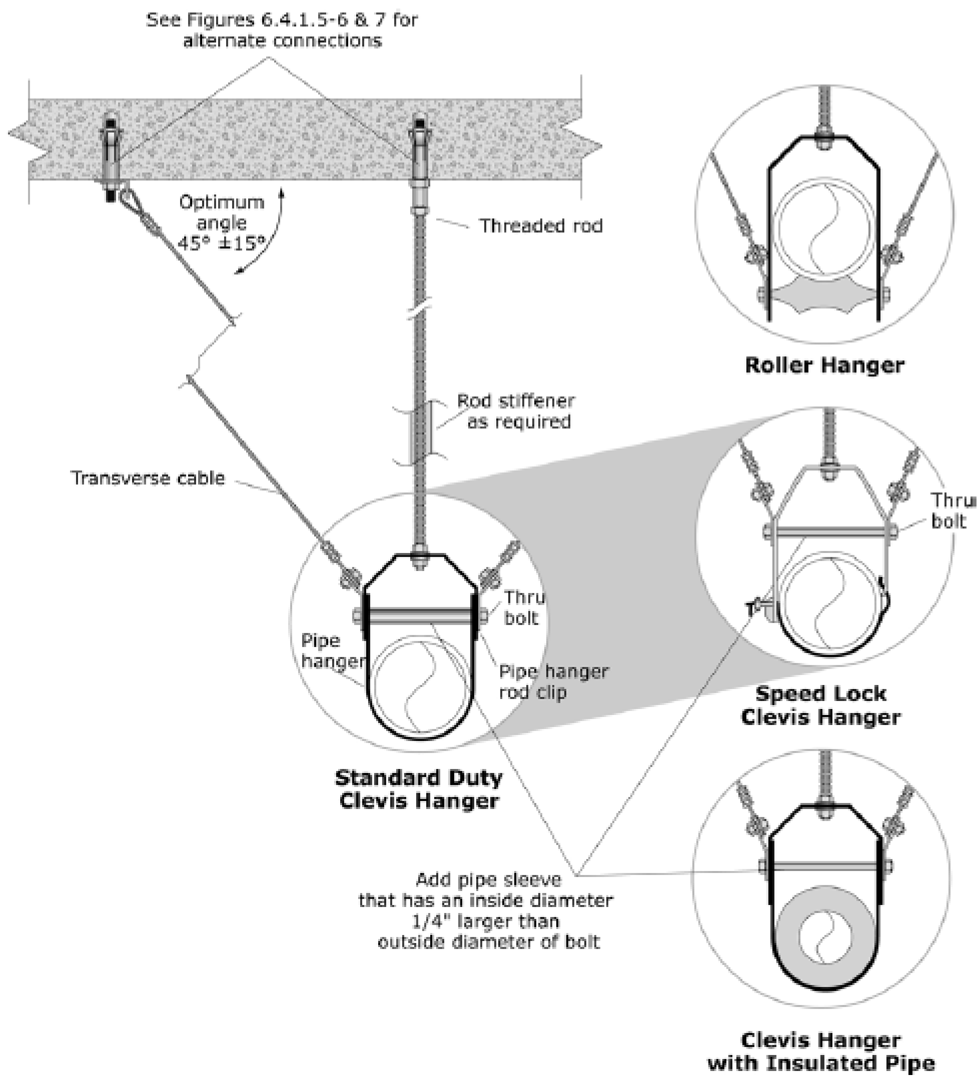


Figure G-37. Cable Bracing – Single Pipe Transverse.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

Electrical and Communications

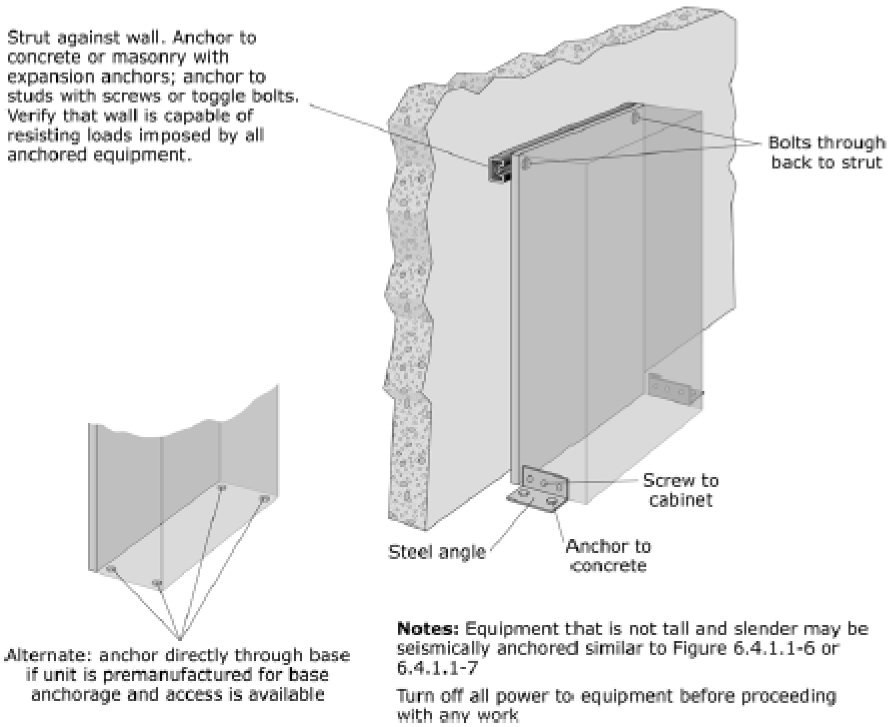


Figure G-38. Electrical Control Panels, Motor Controls Centers, or Switchgear.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

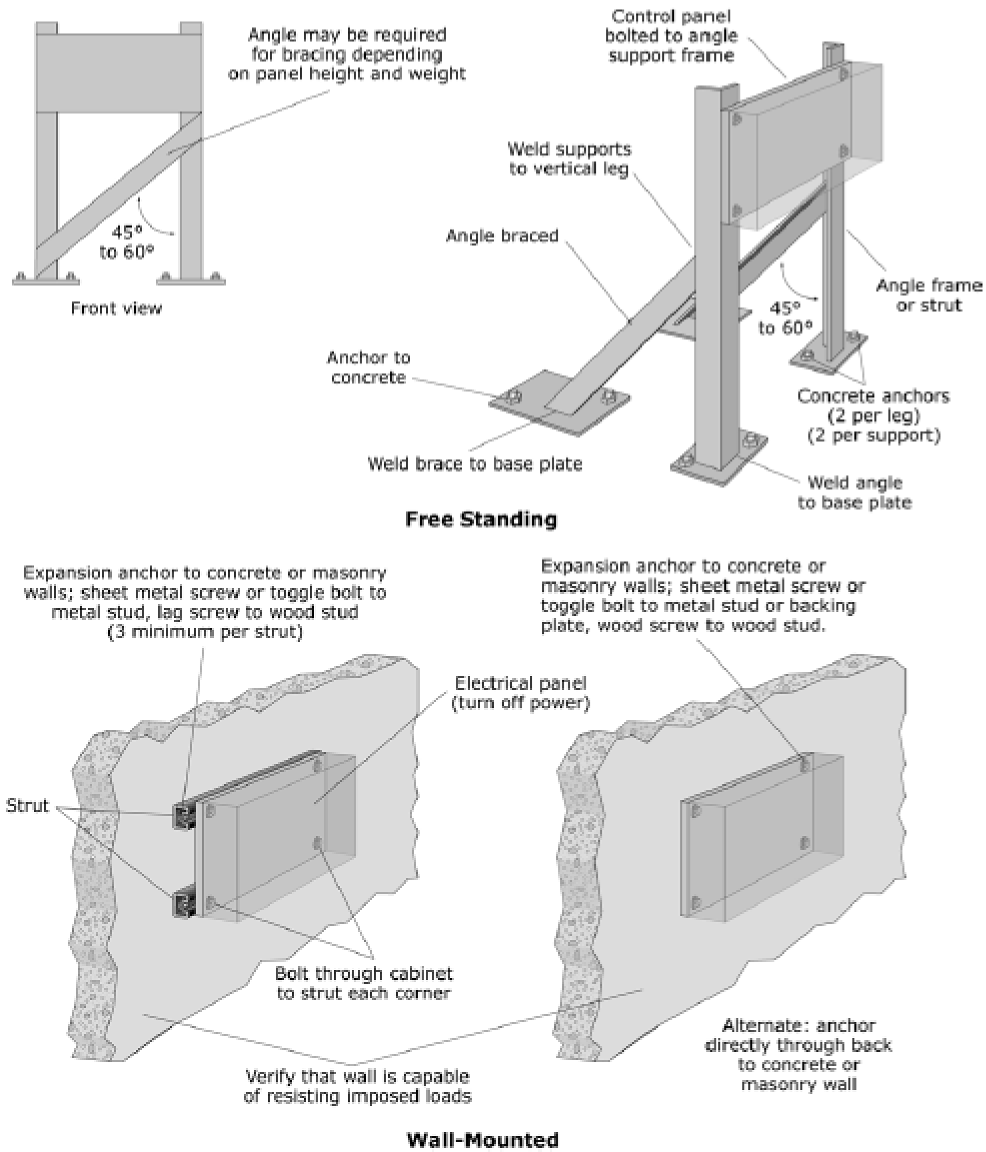


Figure G-39. Freestanding and Wall-mounted Electrical Control Panels, Motor Controls Centers, or Switchgear.

(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

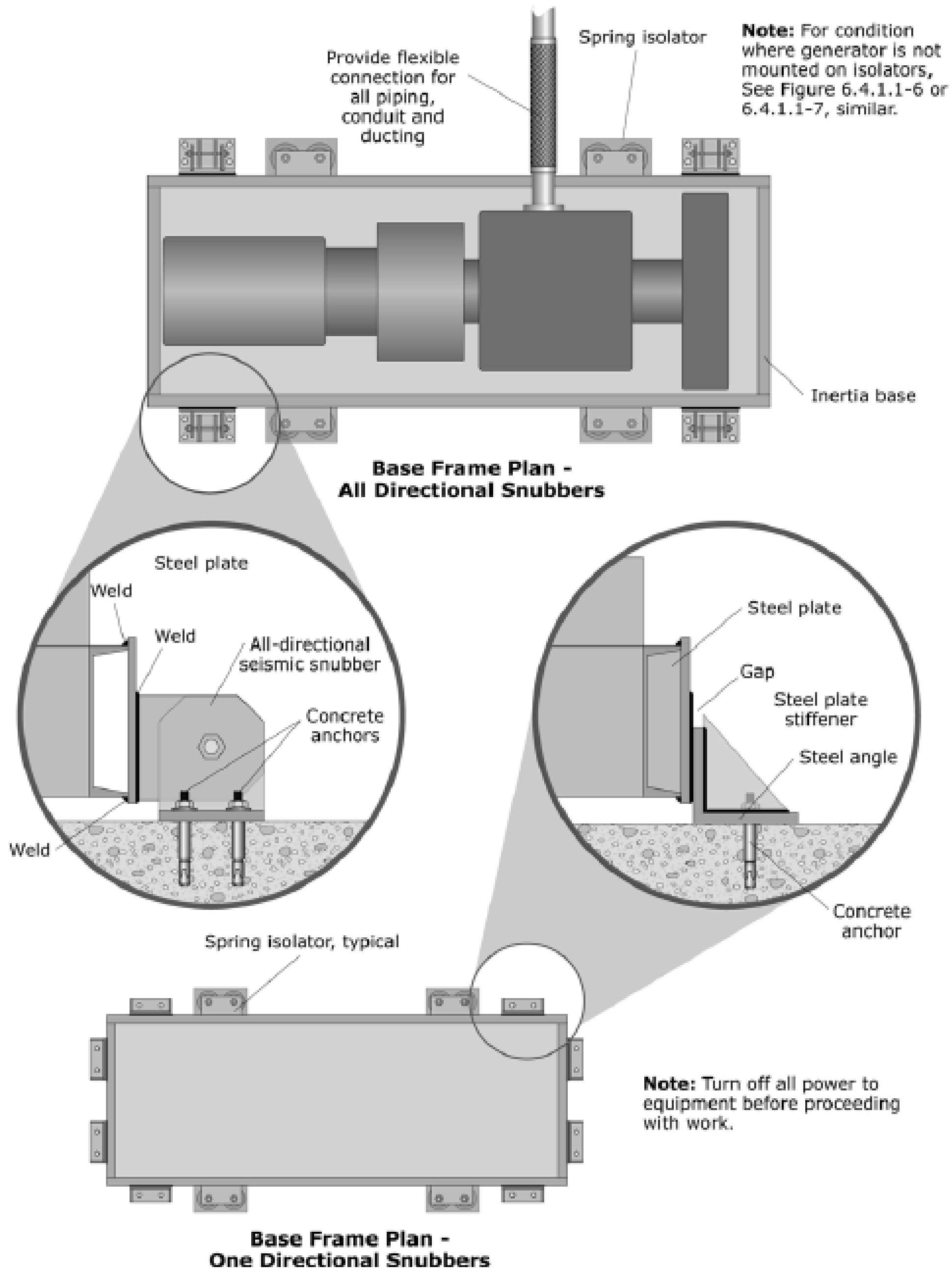


Figure G-40. Emergency Generator.
(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)