Washington State School Seismic Safety Assessments Project

SEISMIC UPGRADES CONCEPT DESIGN REPORT

South Bend High School – Koplitz Field House

South Bend Public Schools

June 2019

PREPARED FOR

Washington Department of Natural Resources
Superintendent of Public Instruction Washington

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EXECUTIVE SUMMARY

This report documents the findings of a preliminary seismic evaluation of the South Bend Junior/Senior High School Koplitz Field House in South Bend, Washington. The school is a junior and senior high school serving more than 220 students in grades 7 through 12. The field house is a 16,254-square-foot, one-story building containing a gymnasium, locker rooms, administrative offices, storage, and a spectator mezzanine. The building was originally constructed in 1953, and a subsequent architectural modernization and building addition was done in 1995. The Koplitz Field House is a reinforced masonry structure with a wood-framed addition at the south end. The gymnasium roof system consists of plywood sheathing spanning between glulam arches. The wood-framed addition roof system consists of plywood sheathing over TJI joists. The glulam arches span east to west and are supported on each end by concrete buttresses located outside the building. The TJI joists and glulam beams in the locker rooms span between exterior and interior bearing walls. Glulam beams are supported by steel columns. The foundation system for the building is composed of shallow continuous wall footings under the exterior and interior bearing walls and shallow spread footings below steel columns. The concrete buttresses are supported by concrete grade beams and 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, including inadequate horizontal and vertical reinforcement at the reinforced masonry walls and an incomplete load path. Other deficient items include insufficient wall anchorage to transfer wall out-of-plane loading and in-plane loading.

Conceptual seismic upgrade recommendations for structural systems are provided to improve the performance of the building to meet the Immediate Occupancy structural performance objective criteria of ASCE 41-17. Sketches for the concept-level seismic upgrades are provided in Appendix B. The structural upgrades include installing supplemental concrete shotcrete shear walls, providing foundation system upgrades at supplemental shotcrete walls and existing concrete buttresses, and increasing the out-of-plane strength of existing masonry walls. Strengthening of existing masonry walls includes adding HSS strongbacks, blocking, strapping, and hold-downs at the roof diaphragm. The recommendations for nonstructural upgrades include laminating overhead glazing to prevent glass from shattering, and providing seismic bracing for all mechanical equipment.

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Acronyms

ADA	Americans with Disabilities Act
ASCE	American Society of Civil Engineers
BPOE	Basic Performance Objective for Existing Buildings
BSE	Basic Safety Earthquake
BU	Built-Up
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
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 the 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
USGS	United States Geological Survey
WF	Wide Flange
WGS	Washington Geological Survey

Reference List

Codes and References

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Drawings

Charles A. Baylon Architect, February 1953, existing drawings titled "Physical Education Unit," South Bend School District No. 118, South Bend, Washington.

John Graham Associates Architects and Engineers, June 1994, existing drawings titled "Gymnasium Renovation & Addition," South Bend School District No. 118, South Bend, Washington.

1.0 Introduction

1.1 Background

The Washington Geological Survey (WGS), a division of the Department of Natural Resources (DNR), is conducting a seismic assessment of 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. The two main components of this 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.

Fifteen school buildings were selected in consultation with WGS and the School Seismic Safety Steering Committee (SSSSC) 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 fifteen 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, property records, 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 and Worker Safety: Field observations at each site were typically performed by an individual engineer. 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, lathe 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 checklist items that were not documented due to access limitations are noted.

1.2.3 Seismic Evaluations

1. Preliminary Seismic Evaluations: Preliminary 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. Concept-Level Designs: 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. Cost Estimating: Through the concept-level seismic upgrades design process, ProDims 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. Project Reports: A preliminary seismic evaluation report on the overall Tier 1 seismic assessment of the schools will be provided to DNR/WGS and OSPI. The Tier 1 seismic evaluation of each building was documented by a standard report format that provides a summary of the structural systems of the building, Tier 1 checklist, building sketches/plans (if available), and site photographs. The reports will summarize the seismic evaluation, with concept-level seismic upgrade sketches and opinions of probable construction costs for seismic upgrades for each school building.

2. Building Photography: Photos and videos were taken of each building during on-site walkthroughs to document the existing building configurations, conditions, and structural systems.

3. Record Drawings: Record drawings and other information that was collected during the evaluation process are available for DNR/WGS, OSPI, and the school districts.

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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

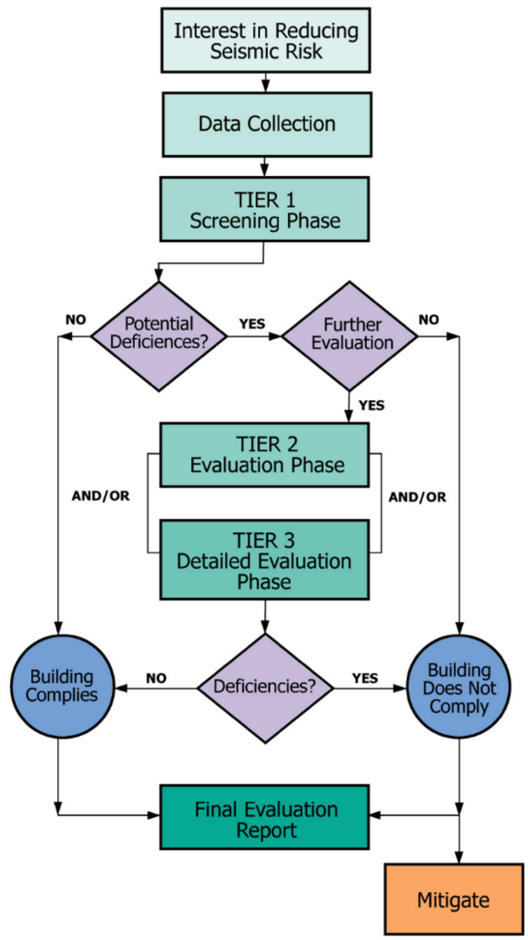

Figure 2-1. Flow Chart and Description of ASCE 41 Seismic Evaluation Procedure.

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: in this building's case, the shear walls. 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 Koplitz Field House 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 0.825 g, and the design 1-second period spectral acceleration, S_{D1}, is 1.09 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 Koplitz Field House that are considered in this study.

Table 2.2.1-1 Spectral Acceleration Parameters (Not Site-Modified).

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	0.33 g	0.2 Seconds	0.92 g	0.2 Seconds	0.94 g	0.2 Seconds	1.38 g
1.0 Seconds	0.14 g	1.0 Seconds	0.45 g	1.0 Seconds	0.46 g	1.0 Seconds	0.68 g

2.2.2 Koplitz Field House Structural Performance Objective

The school building is an Assembly Group A-4 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 **Immediate Occupancy** structural performance level at the **BSE-2E** seismic hazard level in accordance with DNR direction, the project scope of work, and the project legislative language.

At the Immediate Occupancy performance level, the structure remains safe to occupy and essentially retains its pre-earthquake strength and stiffness. Nonstructural components might be damaged to the extent that they cannot immediately function but are secured in place so that damage caused by falling, toppling, or breaking of utility connections is avoided. Life safety systems, including doors, stairways, emergency lighting, and fire alarms, generally remain available and operable, provided that power and utility services are available.

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). In-situ testing of building materials and removal of architectural finishes are outside of the scope of this study. Material properties and existing construction information were assumed since existing structural drawings were not available. 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 Reinforced Masonry Bearing Wall Building with Flexible Diaphragms, RM1. Reinforced Masonry Bearing Wall (RM1) buildings include those that have bearing walls constructed out of reinforced brick or concrete masonry. The floor and roof framing consists of plywood sheathing, wood beams, and girders supported by steel, wood, or masonry columns. The building uses concrete shear walls in the E-W (transverse) direction, (C2a) building type. The addition at the south end is a wood shear wall addition (W2).

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: 1953
Building Code: Original: Unknown
Addition: 1991 UBC
Architectural Modernization Year: 1995

Number of Stories: 1
Floor Area: 16,254 SF

FEMA Building Type: RM1
ASCE 41 Level of Seismicity: High
Site Class: E

The building is a one-story, 1950s-era gymnasium building with a one-story 1995 addition at the south end of the building. The building has a mostly rectangular floor plan of 90 feet by 148 feet, with a maximum roof height of around 24 feet. The building has a spectator mezzanine level at the south end of the gymnasium.

The structural system consists of a reinforced concrete masonry structure and a wood-framed addition constructed on level ground. The roof system consists of plywood sheathing over 4x10 purlins spanning between glulam arches. The glulam arches span east to west and are supported at the ends by concrete buttresses located on the exterior of the building. The lateral-force-resisting system of the building is a mixture of reinforced masonry shear walls, wood stud shear walls, and concrete shear walls (i.e., buttresses). The roof is a flexible plywood diaphragm.

The foundation system for the building is composed of shallow continuous wall footings under the exterior and interior masonry walls and wood-stud bearing walls and shallow spread footings below steel columns. The concrete buttresses are supported by concrete grade beams and piles.

3.1.2 Building Use

The Koplitz Field House is a physical education building for the South Bend Jr./Sr. High School, serving more than 220 students in grades 7 through 12. The building consists of a gymnasium, locker rooms, administration offices, storage, and a mezzanine, and shares the site with the Jr./Sr. High School, the music building, and the vocational building.

3.1.3 Structural System

Table 3.1.3-1. Structural System Descriptions.

Structural System	Description
Main Roof	The roof system consists of 3/8-inch plywood sheathing over the existing gymnasium and 1/2-inch plywood sheathing over the wood-framed addition. The plywood is supported by 4x10 purlins spanning between glulam arches. The glulam arches are spaced at roughly 18 feet on center in the gymnasium. The plywood in the addition is supported by TJI joists spaced at 24-inches on center.
First Floor	The main floor consists of a 4-inch concrete slab on grade.
Foundation	Foundations consist of cast-in-place reinforced concrete shallow spread footings supporting columns and concrete strip footings supporting reinforced masonry and wood-stud bearing walls. The concrete buttresses are supported by concrete grade beams.
Gravity System	The gravity system consists of a wood-framed roof consisting of 4x purlins in the gymnasium, 6x purlins in the locker rooms, and TJI joists in the addition. The wood-framed roof is supported by glulam arches and beams. The glulam arches span east to west in the gymnasium and are supported by concrete buttresses. The locker room and addition framing spans between reinforced masonry and wood-stud bearing walls. Glulam beams are supported by steel columns.
Lateral System	The lateral system consists of a flexible plywood diaphragm laterally supported by a mixture of reinforced masonry shear walls, wood stud shear walls, and concrete shear walls. Sliding and overturning forces from lateral loads are resisted by the concrete footings and piles.

3.1.4 Structural System Visual Condition

Table 3.1.4-1. Structural System Condition Descriptions.

Structural System	Description
Roof	The roof appeared to be in good condition.
Foundations Condition	The foundation was not observable.
Gravity System Condition	The condition of the gravity system appears to be functional and intact.
Lateral System Condition	The condition of the lateral system appeared to be intact. However, considering the building's age and the lack of as-built information on

Table 3.1.4-1. Structural System Condition Descriptions.

Structural System	Description
	the concrete shear walls, there are concerns about the lateral system performance.

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	There is no clear connection between the diaphragm and the reinforced masonry shear walls. There is not a well-defined load path between the locker room roof diaphragm and the masonry walls due to the presence of windows running the length of the wall.
Shear Stress Check	Shear stress in masonry shear walls is compliant. However, corresponding shear stress check in wood shear wall addition is noncompliant. The building will likely need wood shear wall strengthening. Further investigation is required.
Liquefaction and Slope Failure	Geotechnical investigation should be performed to determine the geological hazard to the building during an earthquake.
Reinforcing Steel	The reinforcing steel size and spacing in the concrete buttresses is unknown in both the vertical and horizontal directions based on the available as-built information and is assumed to be insufficient. The reinforcing steel spacing for the CMU walls is insufficient. Reinforcing steel behaves in a nonductile manner and has limited capacity in resisting seismic forces. Tier 1 requirements indicate that lightly reinforced CMU walls, such as these, will behave as unreinforced masonry walls.
Wood Ledgers	Connections that induce cross-grain bending in wood ledgers are present. Strengthening of connections may be appropriate to mitigate seismic risk.
Wall Anchorage at Flexible Diaphragms	There is no wall anchorage between the exterior reinforced masonry walls and the roof diaphragm to resist out-of-plan forces.

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

Deficiency	Description
Transfer to Shear Walls	The roof diaphragm to reinforced masonry wall connection types and extent are unknown. Based on the age of the building, it is assumed that the wall anchorage connections are insufficient.
Cross Ties	There are no continuous cross ties between diaphragm chords.
Diagonally Sheathed and Unblocked Diaphragms	Diaphragm is unblocked. Diaphragm strengthening may be appropriate to mitigate seismic risk.
Stiffness of Wall Anchors	This evaluation item is likely noncompliant due to the building's age, but could not be visually verified. This item requires further investigation to make a final determination and develop a mitigation recommendation, if necessary.

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	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.
Surface Fault Rupture	Requires further investigation by a licensed geotechnical engineer to determine whether site is near locations of expected surface fault ruptures.

3.2.3 Nonstructural Seismic Deficiencies

The nonstructural seismic deficiencies identified during the Tier 1 evaluation are summarized below. Commentary for each deficiency is provided based on this 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 3.2.3-1. Identified Nonstructural Seismic Deficiencies based on Tier 1 Checklists.

Deficiency	Description
CG-8 Overhead Glazing	Based on the age of the building, the glazing panes do not appear to be laminated annealed or laminated heat-strengthened glass.
ME-1 Fall-Prone Equipment	Mechanical units on top of the roof at the west and north sides of the building do not appear to be braced or restrained. Mechanical equipment with a center of mass more than 4 feet off the ground should be restrained to prevent falling.

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
CG-8 Overhead Glazing	Further investigation is required to verify detailing of glazing panes.

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4.0 Conclusion and Recommendations

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 are described below.

4.1.1 Concrete Shotcrete Walls

Concrete shotcrete walls are recommended at select locations along the exterior walls. The proposed shotcrete walls are recommended to dowel into the existing masonry walls at the locations of concrete-filled voids to provide out-of-plane strength to the existing walls. Openings in the existing masonry walls should be infilled with CMU at shotcrete wall locations. Blocking with hold-downs should be provided at select wall lines to transfer diaphragm loading into the new shotcrete shear walls.

4.1.2 Foundation Systems

At select supplemental concrete shotcrete wall locations, foundations should be upgraded to support the lateral load-carry capacity of the new concrete shear walls. The existing foundation system consists of shallow continuous wall footings at these locations. Based on the design of the existing shallow foundation system, the foundation upgrades should be shallow concrete continuous wall footings to match the existing foundation system. At the existing concrete buttresses, a new grade beam should be added along the exterior masonry wall, with micro piles on each side of the concrete buttresses to provide uplift resistance.

4.1.3 FRP Strengthening

FRP wrap should be added to select existing masonry walls to provide additional in-plane shear capacity and to provide shear transfer to the existing foundation.

4.1.4 HSS Strongbacks

Existing masonry walls should be strengthened for out-of-plane forces by adding HSS strongbacks at locations of concrete-filled voids. Strongbacks should be fastened to existing masonry walls with 5/8-inch-diameter adhesive anchors at 4 feet on center maximum.

4.1.5 Wall Anchorage at Roof

Exterior masonry walls should be anchored to the roof diaphragm at locations of strongbacks with full-depth blocking and Simpson hold-downs. New shotcrete shear walls should also be anchored to the roof diaphragm.

4.2 Nonstructural Upgrade Recommendations

4.2.1 Architectural Considerations

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

For existing building remodel projects, the International Existing Building Code is 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. Elements of the exterior building envelope being affected by the seismic work would also be required to be brought up to the current Washington State Energy Code per Chapter 5, where applicable.

It should also be noted that as a part of any upgrade to existing buildings, the International Existing Building Code (IEBC) will require that any altered primary function spaces (classrooms, gyms, entrances, offices) and routes to these spaces, be made accessible to current accessibility standards per the American 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, fire alarm system, etc. 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 would be recommended to determine the extent to which an existing facility needs to be improved to be in compliance with the ADA.

Interior Shear Walls

Existing interior masonry shear walls are to be strengthened with bi-directional FRP.

Interior CMU walls separating the gym from the storage rooms are to be braced with HSS Vertical Strongbacks. These will also be installed in the lobby areas; impact on traffic flow and ADA requirements must be carefully evaluated.

Existing shear wall thickness may differ from proposed CMU shear wall thickness, depending on finishes proposed.

Storage and office areas may be impacted by any additional wall width. Doors to office and storage areas may need to be removed and replaced.

Openings for items such as electrical outlets and switches in the CMU shear walls to get bi-directional FRP will need to be coordinated with existing conditions. Floor and ceiling finishes could be impacted.

HSS Strongbacks Over Existing Masonry Walls

Interior CMU walls separating the gym from the storage rooms are to be braced with HSS Vertical Strongbacks. These frames will also be installed in the lobby areas and on walls with bleacher seating. The bleacher seating systems may need to be altered to accommodate the HSS framework; seating count could be reduced. The bleachers should not be moved away from the existing walls, as required activity and ADA clearances could be affected.

Upper level bleachers at the south end of the gym could be impacted by through-wall fasteners.

The impact on traffic flow and ADA requirements must be carefully evaluated where these frames are to be installed on the building interior.

The impact on existing finishes will need to be addressed on a case-by-case basis, depending on location of the proposed work.

Where installed on the exterior, the visual impact of the frames could be significant; ways to minimize their impact on the building's character will need to be studied.

Foundation Work

The proposed exterior shear walls will require 24-inch-wide by 24-inch-deep concrete grade beams the entire length of the east and west exterior walls, with micropiles into the footings at select locations. This work takes place primarily on the building exterior. Ensure foundation drains, buried utilities, and other items will not be impacted by this work. Landscaping will be affected by the work, and should be restored to pre-construction condition after completion of the work.

Roof Diaphragm Blocking/Nailing, and Wall-Roof Anchorage

Roof diaphragm upgrades require the removal of finishes above and below the roof deck for access to install new work. If existing insulation is above the roof deck, it will need to be replaced with additional insulation to meet current energy code requirements (R-38). Existing plywood ceilings will need to be removed and replaced to allow access to the underside of the deck to install blocking and perimeter roof/wall connections.

This work takes place mainly above the gym and the lobby, with generally unhindered access to the underside of the roof deck. Access may be complicated above perimeter spaces, such as the boys' and girls' locker rooms and the office and storage spaces. These rooms may need to be completely demolished and rebuilt with all new finishes. If this is the case, current ADA requirements may require relocation of plumbing fixtures and waste and water lines.

Ceilings

Removal of the existing plaster and acoustic ceiling tiles above the lobby, locker rooms, and storage rooms would be required to gain access to the underside of the roof deck for installation of blocking. Repair plaster ceilings; finish to match adjacent. Replace damaged ceiling tiles with new tiles to match. Another option would be to replace the plaster and acoustic tiles with Tectum acoustic panels suspended below the roof structure.

Tectum acoustic panels can also be attached to the underside of the gym roof decking, both over existing plywood to remain, and in areas where plywood is removed for structural access.

Existing suspended T-bar ceilings would need to be removed and reinstalled with new seismically-braced T-bar in order to gain access to the underside of the roof and floor diaphragms for blocking installation.

The existing ceiling-mounted light fixtures in the gym and elsewhere appear to be substandard and could become dangerous in an earthquake. Lighting should be updated to current lightweight LED fixtures with seismic bracing.

Exterior Clerestory Window Infill for Load Transfer

Select clerestory windows in existing CMU walls are to be replaced with CMU infill, and FRP wrap added in select locations. The existing interior and exterior finishes need to continue over new CMU seamlessly, as does the existing insulation and vapor barrier. The impact of reduced window area on lighting and ventilation needs to be taken into consideration.

Shotcrete Shear Walls

At proposed exterior shotcrete shear wall locations, the impact of through-wall fasteners on existing wall finishes needs to be considered, as does the impact on the wall insulation and vapor barrier.

Overhead Glazing

For interior and exterior glazing panes more than 16 square feet in area, provide laminated annealed or laminated heat-strengthened glass that is detailed to remain in the frame when cracked. Non-laminated glazing that shatters during an earthquake can pose a severe life safety threat to occupants. Shattered exterior windows also compromise the exterior weather barrier, which can become disruptive to the operation of the building after an earthquake.

4.2.2 Mechanical/Electrical/Plumbing (MEP) Systems

The main seismic concerns for mechanical equipment, ducting, and piping are sliding, swinging, and overturning. Inadequate lateral restraint or anchorage can shift equipment off its supports or topple equipment to the ground or onto other equipment. Inadequate bracing of piping and ducting, or the inability for piping to tolerate differential movement from the equipment it is attached to, can damage or dislodge connections. Such damage in fluid piping can potentially lead to major leaks or loss and disruption by damaging contents. The recommended seismic mitigation for MEP systems is:

- Provide seismic bracing for equipment that weighs more than 20 pounds, has a center of mass more than 4 feet above the adjacent floor level, and is not in-line equipment.

4.3 Opinion of Conceptual Construction Costs

A preliminary opinion of probable construction costs to perform the concept-level seismic upgrade recommendations provided in this report is included in Appendix C. The input for these preliminary probable costs are 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 that this 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. Consequently, the costs presented in this concept-level design report are very preliminary in nature and are only intended to be utilized in their aggregate form with the entire statewide school seismic safety assessments study.

For this preliminary opinion of probable construction costs, an estimate of the current year (2019) construction costs of the probable scope of work was developed. These costs were developed based on the Tier 1 checklist, concept-level seismic upgrade design sketches, and project narratives. Then a -20 percent (low) to +50 percent (high) range variance was used to develop the construction cost estimate range for the concept-level scope of work. The -20 percent to +50 percent range variance guidance is from Table 1 of the AACE International Recommended Practice 56R-08, *Cost Estimate Classification System for Class 5 Estimates*. The variable cost range of a Class 5 estimate is due to the limited design completeness and is defined as 0 percent to 2 percent Project Definition Deliverables.

The estimated structural and nonstructural construction cost to mitigate the deficiencies identified in the Tier 1 checklists of the Koplitz Field House ranges between approximately $1.0M and $1.9M (-20 percent/+50 percent). The estimated construction cost to seismically upgrade this building is approximately $1.3M. On a per-square-foot basis, the seismic upgrade construction cost is estimated to be approximately $79 per square foot in 2019 dollars, with a variance range between $63 per square foot and $119 per square foot.

This preliminary opinion of construction cost includes labor, materials, equipment, and general contractor general conditions (mobilization), 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 project costs not included in the construction cost estimate are building permits, design fees, change order contingencies, escalation at a recommended 4.1 percent* per year to the midpoint of construction (currently unknown), materials testing/inspection, project planning and design schedule delay contingencies, and owner's overall project contingency. Additional owner's project costs would likely include owner's general overhead costs, including project management, financing/bond costs, administration/contract/accounting costs, review of plans, value engineering studies, equipment, fixtures, furnishings and technology, and relocation of the school staff and students during construction. These additional costs are not included in this preliminary concept-level design construction cost estimate.

Costs of all types excluded from the construction costs are site work, construction of replacement facilities, and mitigation of seismic risks for existing facilities and building code changes that occur over time after this report. Future planning budgets should not be set on the basis of the preliminary construction costs estimate based on the concept-level design ideas presented in this report. For budget planning purposes, it is highly recommended that a seismic upgrade budget be determined after the owner defines the scope of work and obtains the services of an A/E design team to study the proposed seismic mitigation strategies and to refine the concept-level seismic upgrades design approach contained in this report.

*-4.1%/year escalation rate for planning purposes should be compounded annually to the midpoint of construction and is sourced from *Engineering News Record (ENR),* November, 2017, the most recent rate representative of the escalation of construction costs throughout the state of Washington.

Table 4.3.1. 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 Jr/Sr HS, Koplitz Field House	RM1	High / E	**Structural**			
			Immediate Occupancy	16,254 SF	$48 ($779K) - $90 ($1.46M)	$60 ($974K)
			Nonstructural			
			Life Safety	16,254 SF	$15 ($251K) - $29 ($472K)	$19 ($315K)
			Total			
				16,254 SF	$63 ($1.03M) - $119 ($1.93M)	$79 ($1.29M)

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

Appendix A: Field Investigation Report and Tier 1 Checklists

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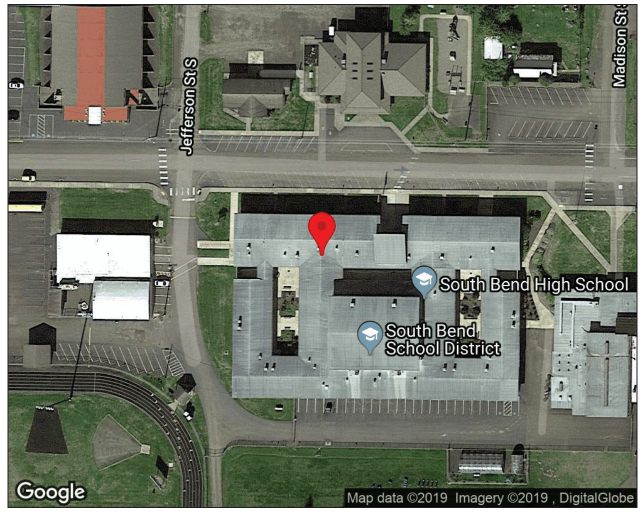
1. South Bend, South Bend Jr/Sr High School, Koplitz Field House

1.1 Building Description

Building Name:	Koplitz Field House
Facility Name:	South Bend Jr/Sr High School
District Name:	South Bend
ICOS Latitude:	46.662
ICOS Longitude:	-123.792
ICOS County/District ID:	25118
ICOS Building ID:	11955
ASCE 41 Bldg Type:	RM1
Enrollment:	225
Gross Sq. Ft. :	16254
Year Built:	1950
Number of Stories:	1
$S_{XS\ BSE\text{-}2E}$:	0.914
$S_{X1\ BSE\text{-}2E}$:	1.106
ASCE 41 Level of Seismicity:	High
Site Class:	E
V_{S30}(m/s):	109
Liquefaction Potential:	Moderate to High
Tsunami Risk:	Very High
Structural Drawings Available:	Yes
Evaluating Firm:	WRK Engineers



The South Bend Junior Senior High School Koplitz Field House is a one-story reinforced masonry structure with a one-story wood-framed addition at the south end of the building. The building is constructed on level ground and is located in South Bend, Washington. The 1953 building is rectangular in plan, 90 feet by 148 feet, with a maximum roof height of around 24 feet. Building construction consists of reinforced expanded shale block walls. The roof system is a wood-framed system with 2x decking and plywood sheathing. The roof system in the addition is TJI framing with plywood sheathing. The glulam arches of the gymnasium are supported by concrete buttresses. There is a wood-framed balcony in the gymnasium. Concrete braces were added along the east and west walls. The building shares a site with the junior senior high school music building.

1.1.1 Building Use

The Koplitz Field House includes a gymnasium, locker rooms, and a seating balcony. The junior senior high school has over 220 student occupants.

1.1.2 Structural System

Table 1.1-1. Structural System Description of South Bend Jr/Sr High School

Structural System	Description
Structural Roof	The roof system is composed of glulam arches, wood purlins, and plywood sheathing. In the new building addition, TJI joists are used with plywood sheathing.
Structural Floor(s)	The ground level is a concrete floor slab.
Foundations	The load bearing walls are supported by continuous wall footings. Columns are supported by spread footings. Glulam arches are supported by concrete piles.
Gravity System	The gravity system is composed of glulam arches and concrete buttresses at the arched roof as well as reinforced masonry walls, steel columns, and wood beams and columns. The new addition consists of wood stud bearing walls.
Lateral System	Masonry walls resist the forces in the longitudinal and transverse directions. The new addition at the south uses wood shear walls. The concrete buttresses help to resist forces in the east-west direction.

1.1.3 Structural System Visual Condition

Table 1.1-2. 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.

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 1-3. Identified Structural Seismic Deficiencies for South Bend South Bend Jr/Sr High School Koplitz Field House

Deficiency	Description
Load Path	There is no clear connection between the diaphragm and the reinforced masonry shear walls. There is not a well-defined load path between the locker room roof diaphragm and the masonry walls due to the presence of windows running the length of the wall. The addition of post-installed structural connections, infill of windows in the locker room, or the addition of a shotcrete shear wall may be appropriate to provide a complete load path.
Shear Stress Check	Shear stress in masonry shear walls is compliant. However, corresponding shear stress check in wood shear wall addition is non-compliant. The building will likely need wood shear wall strengthening or the addition of new shear walls. Further investigation is required.
Reinforcing Steel	The masonry wall is under-reinforced and likely will need to be strengthened for in-plane and out-of-plane seismic forces. The reinforcement in the concrete buttresses is unknown. Further investigation is required. The addition of FRP to strengthen in-plane capacity or the addition of new shear walls to reduce demand may be appropriate. The addition of a steel strongback system may be appropriate to strengthen out-of-plane capacity.
Wall Anchorage	Out-of-plane wall anchorage is not present. Tension ties, blocking, strapping, and diaphragm nailing are required along masonry walls.
Wood Ledgers	Connections that induce cross-grain bending in wood ledgers are present. Strengthening of connections through the addition of blocking and anchor straps may be appropriate to mitigate seismic risk.
Transfer to Shear Walls	This evaluation item is likely non-compliant due to the building's age, but could not be visually verified. This item requires further field investigation to make a final determination on its compliance and to develop a mitigation recommendation, if necessary. The addition of post-installed anchors between diaphragm and shear walls may be appropriate.
Cross Ties	There are no continuous cross ties between diaphragm chords. The addition of new cross ties between diaphragm chords or the addition of strap plates to connect existing framing members together may be appropriate.
Diagonally Sheathed and Unblocked Diaphragms	Diaphragm is unblocked. Diaphragm strengthening through the addition of blocking and additional diaphragm nailing may be appropriate to mitigate seismic risk.
Stiffness of Wall Anchors	This evaluation item is likely non-compliant due to the building's age, but could not be visually verified. This item requires further investigation to make a final determination and to develop a mitigation recommendation, if necessary. Replacement of anchors or the addition of new post-installed anchors may be appropriate.

1.2.2 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 also provided based on the evaluation.

Table 1-4. Identified Structural Checklist Items Marked as Unknown for South Bend South Bend Jr/Sr High School Koplitz Field House

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.
Surface Fault Rupture	Requires further investigation by a licensed geotechnical engineer to determine whether site is near locations of expected surface fault ruptures.

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 1-5. Identified Nonstructural Seismic Deficiencies for South Bend South Bend Jr/Sr High School Koplitz Field House

Deficiency	Description
ME-1 Fall-Prone Equipment. HR-not required; LS-H; PR-H.	Anchorage is required for fall-prone equipment. Equipment unbraced on top of roof at new addition and on west side of gym.

1.3.2 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 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 1-6. Identified Nonstructural Checklist Items Marked as Unknown for South Bend South Bend Jr/Sr High School Koplitz Field House

Unknown Item	Description
CG-8 Overhead Glazing. HR-not required; LS-MH; PR-MH.	Further investigation is required to verify detailing of glazing panes.

Photos:

Figure 1-1. South Bend Field House - South Exterior

Figure 1-2. South Bend Field House - West Exterior

Figure 1-3. South Bend Field House - Northeast Exterior

Figure 1-4. Mechanical Equipment on North Roof

Figure 1-5. Concrete Braced Frame with No Connection to Diaphragm or Shear Walls

Figure 1-6. Lower Roof at East Entrance

Figure 1-7. Gymnasium with Glulam Arches

Figure 1-8. CMU Wall at North End of Gymnasium with Wood-Framed Wall Above

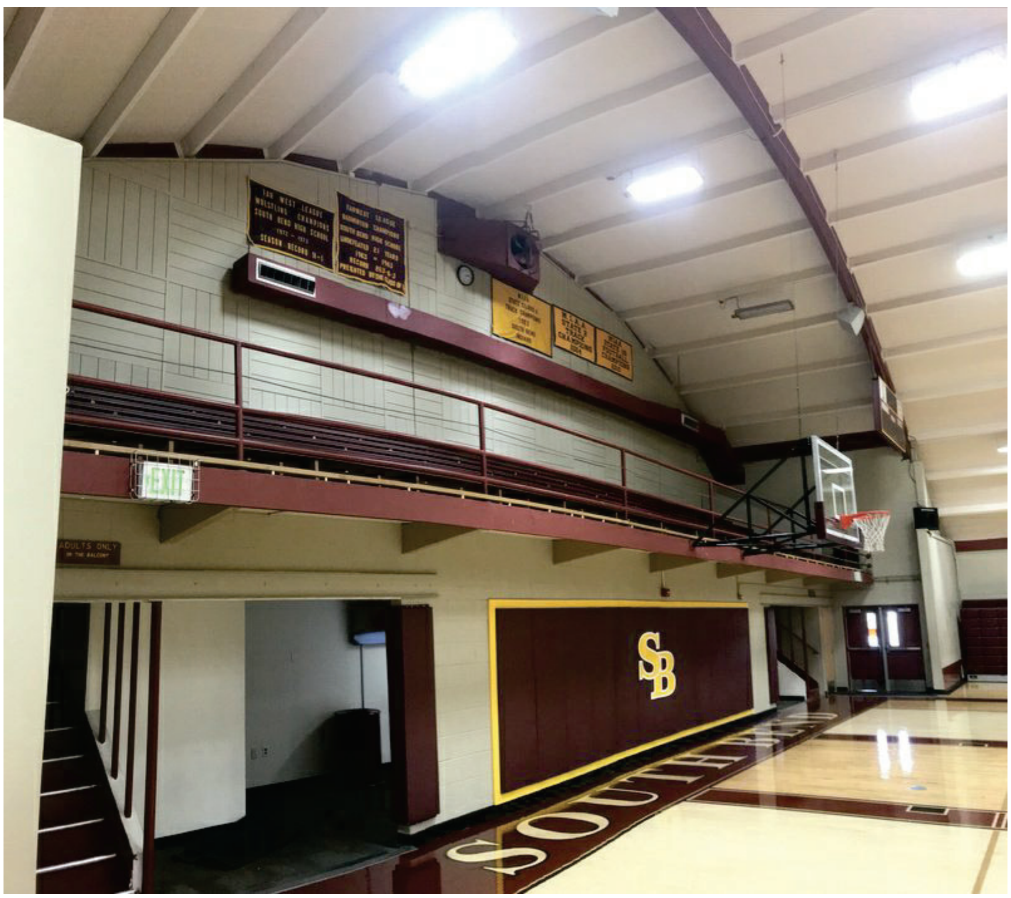


Figure 1-9. Mezzanine at South End of Gymnasium

South Bend, South Bend Jr/Sr High School, Koplitz Field House

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			There is no clear connection between the diaphragm and the reinforced masonry shear walls. There is not a well-defined load path between the locker room roof diaphragm and the masonry walls due to the presence of windows running the length of the wall. The addition of post-installed structural connections, infill of windows in the locker room, or the addition of a shotcrete shear wall may be appropriate to provide a complete load path.
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				
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				

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		

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		
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				
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		
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		
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				

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.

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				
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		

17-34 Collapse Prevention Structural Checklist for Building Types RM1 and RM2

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				
Shear Stress Check	The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 70 lb/in.2 (0.48 MPa). (Tier 2: Sec. 5.5.3.1.1; Commentary: Sec. A.3.2.4.1)		X			Shear stress in masonry shear walls is compliant. However, corresponding shear stress check in wood shear wall addition is non-compliant. The building will likely need wood shear wall strengthening or the addition of new shear walls. Further investigation is required.
Reinforcing Steel	The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in. (1220 mm), and all vertical bars extend to the top of the walls. (Tier 2: Sec. 5.5.3.1.3; Commentary: Sec. A.3.2.4.2)		X			The masonry wall is under-reinforced and likely will need to be strengthened for in-plane and out-of-plane seismic forces. The reinforcement in the concrete buttresses is unknown. Further investigation is required. The addition of FRP to strengthen in-plane capacity or the addition of new shear walls to reduce demand may be appropriate. The addition of a steel strongback system may be appropriate to strengthen out-of-plane capacity.

Stiff Diaphragms

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Topping Slab	Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab. (Tier 2: Sec. 5.6.4; Commentary: Sec. A.4.5.1)			X		

Connections

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Wall Anchorage	Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7. (Tier 2: Sec. 5.7.1.1; Commentary: Sec. A.5.1.1)		X			Out-of-plane wall anchorage is not present. Tension ties, blocking, strapping, and diaphragm nailing are required along masonry walls.
Wood Ledgers	The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers. (Tier 2: Sec. 5.7.1.3; Commentary: Sec. A.5.1.2)		X			Connections that induce cross-grain bending in wood ledgers are present. Strengthening of connections through the addition of blocking and anchor straps may be appropriate to mitigate seismic risk.
Transfer to Shear Walls	Diaphragms are connected for transfer of seismic forces to the shear walls. (Tier 2: Sec. 5.7.2; Commentary: Sec. A.5.2.1)		X			This evaluation item is likely non-compliant due to the building's age, but could not be visually verified. This item requires further field investigation to make a final determination on its compliance and to develop a mitigation recommendation, if necessary. The addition of post-installed anchors between diaphragm and shear walls may be appropriate.
Topping Slab to Walls or Frames	Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements are doweled for transfer of forces into the shear wall or frame elements. (Tier 2: Sec. 5.7.2; Commentary: Sec. A.5.2.)			X		
Foundation Dowels	Wall reinforcement is doweled into the foundation. (Tier 2: Sec. 5.7.3.4; Commentary: Sec. A.5.3.5)	X				
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				

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

Stiff Diaphragms

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Openings at Shear Walls	Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length. (Tier 2: Sec. 5.6.1.3; Commentary: Sec. A.4.1.4)			X		
Openings at Exterior Masonry Shear Walls	Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 8 ft (2.4 m) long. (Tier 2: Sec. 5.6.1.3; Commentary: Sec. A.4.1.6)			X		

Flexible Diaphragms

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Cross Ties	There are continuous cross ties between diaphragm chords. (Tier 2: Sec. 5.6.1.2; Commentary: Sec. A.4.1.2)		X			There are no continuous cross ties between diaphragm chords. The addition of new cross ties between diaphragm chords or the addition of strap plates to connect existing framing members together may be appropriate.
Openings at Shear Walls	Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length. (Tier 2: Sec. 5.6.1.3; Commentary: Sec. A.4.1.4)			X		
Openings at Exterior Masonry Shear Walls	Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 8 ft (2.4 m) long. (Tier 2: Sec. 5.6.1.3; Commentary: Sec. A.4.1.6)			X		
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		
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				
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 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. Diaphragm strengthening through the addition of blocking and additional diaphragm nailing may be appropriate to mitigate seismic risk.
Other Diaphragms	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				

Connections

EVALUATION ITEM	EVALUATION STATEMENT	C	NC	N/A	U	COMMENT
Stiffness of Wall Anchors	Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. (3 mm) before engagement of the anchors. (Tier 2: Sec. 5.7.1.2; Commentary: Sec. A.5.1.4)		X			This evaluation item is likely non-compliant due to the building's age, but could not be visually verified. This item requires further investigation to make a final determination and to develop a mitigation recommendation, if necessary. Replacement of anchors or the addition of new post-installed anchors may be appropriate.

South Bend, South Bend Jr/Sr High School, Koplitz Field House

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		
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		
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		
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		
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		
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		
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		
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		

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		
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		
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		

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		
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		
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		
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		
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		
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		
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		

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		
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		
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		
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		
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		
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	Further investigation is required to verify detailing of glazing panes.

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		No 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		No masonry veneer
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		No 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		No masonry veneer
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		No masonry veneer
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		No 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		No masonry veneer
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		No masonry veneer

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		

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		
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		
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		

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		
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		

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		

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		

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		
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		None observed
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		
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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			Anchorage is required for fall-prone equipment. Equipment unbraced on top of roof at new addition and on west side of gym.

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		
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		
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"
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		Non-applicable due to ASCE 41 Performance Level: "Life Safety (LS)"

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		No 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		No 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		No elevators
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		No elevators

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		No elevators
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		No elevators
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		No elevators
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		No elevators
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		No elevators

Appendix B: Concept-Level Seismic Upgrade Figures

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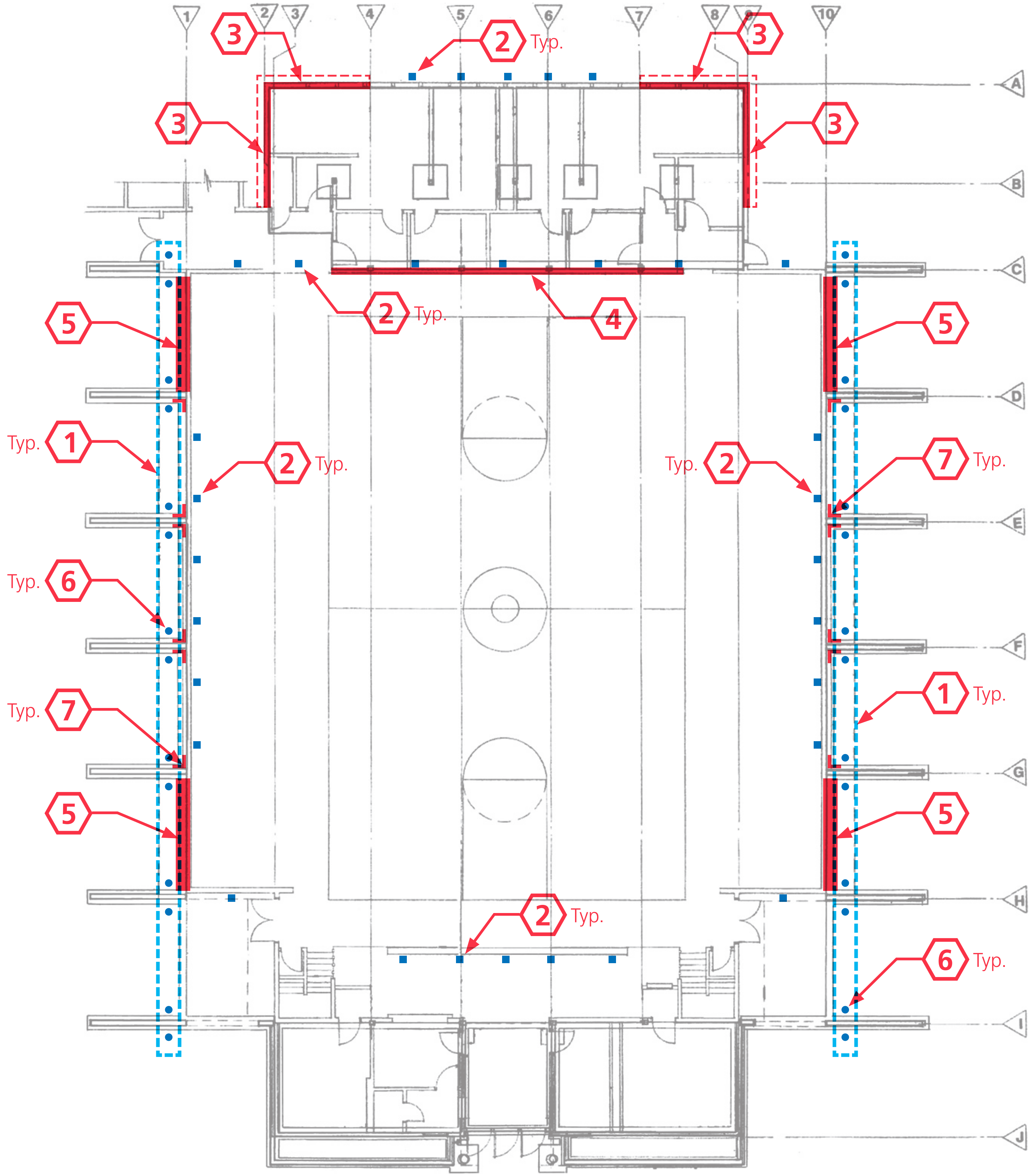
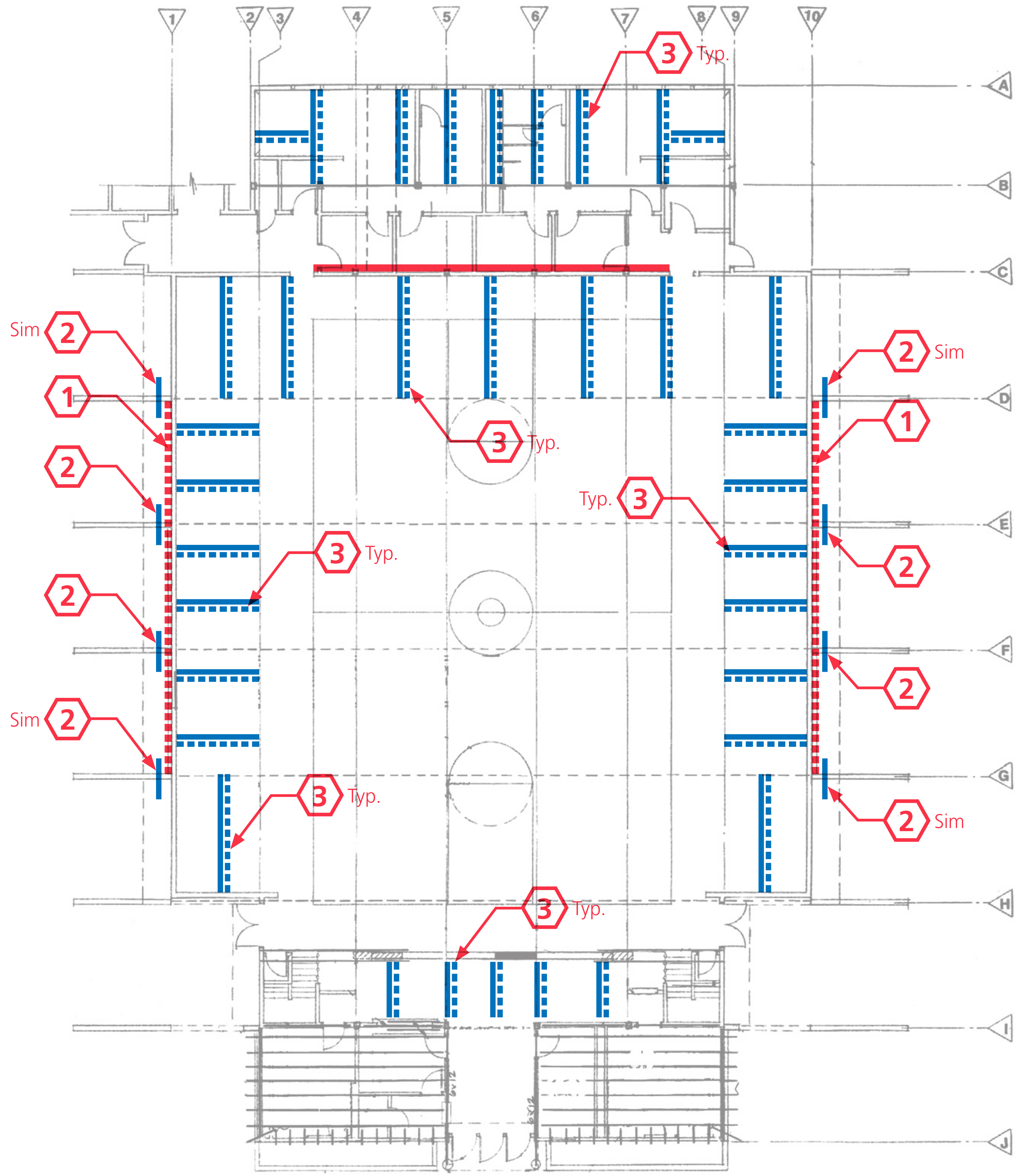


1. Provide 2'-0" Wide x 2'-0" Deep Concrete Grade Beam
2. Provide HSS 6x6x3/8 Vertical Strongback w/ 5/8" Dia Adh Anchors @ 4'-0" OC into (E) Masonry Wall, Locate Strongbacks @ Concrete Filled Voids In (E) Wall Where Possible
3. Infill (E) Windows with 6" Cmu & Provide (2) Layers of Frp Wrap On One Side of (E) Masonry Wall & @ Interface Between (E) Masonry Wall & (E) Footing, Add 1'-0" By (E) Depth Footing Extension
4. Provide (2) Layers Bi-Directional Frp Over One Side of (E) Masonry Wall Over Full Length & @ Interface Between (E) Masonry Wall & (E) Footing
5. Add 8" Shotconcrete Shear Wall w/ #5 @ 2'-0" OC, Dowel into (E) Masonry Wall @ 2'-0" OC @ Locations of Grout-Filled Voids, Provide Ripped Top Plate with 3/4" Dia Ab @ 1'-0" OC with 6" Embedment, Fasten Top Plate To Diaphragm w/ 10D @ 6" OC
6. Provide Micropiles Each Side of (E) Concrete Buttress, Typical @ All (E) Concrete Buttresses
7. Add Frp Vertical Strips Each Side of (E) Concrete Wall & (E) Cmu Wall To Provide Interconnectivity, Typical @ All (E) Concrete Buttresses To (E) CMU Wall Connection

Notes:

1. Repair & Replace Wall & Floor Finishes in Kind as Required

Figure 1 - Floor Plan



1 Provide Pt Blocking, Width to Match Shotcrete Wall, Attach to Diaphragm With 10D @ 6" OC

2 Provide HDU-8 Each Side of (E) Glulam W/ 7/8" Dia Thru-Bolt, Provide (2) HDU-8 Each Side of (E) Glulam @ Sim

3 Full Depth 3X Blocking W/ (S) HDU-4 Holddown Through (E) Masonry Wall to Connect HSS Strongbacks to Diaphragm

Notes:

1. Repair & Replace Ceiling & Roofing As Required

Figure 2 - Roof Plan

Appendix C: Opinion of Probable Construction Costs

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PRODIMS PROJECT MANAGEMENT SERVICES

520 Kirkland Way, Suite 301
Kirkland, WA 98033
tel: (425) 828-0500
fax: (425) 828-0700
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Name:	**Wa State School Seismic Safety Assessment**
Second Name:	**South Bend High School Gym**
Location:	**State of Washington**
Design Phase:	**ROM Cost Estimates**
Date of Estimate:	**April 2, 2019**
Date of Revision:	
Month of Cost Basis:	**1Q, 2019**

South Bend High School Gym

Master Estimate Summary

Project Name		Total Estimated Construction Cost
South Bend High School Gym	Structural Costs	$973,966
South Bend High School Gym	Non-Structural Costs	$314,547
TOTAL ESTIMATED CONSTRUCTION COST		**$1,288,513**

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 month of Cost Basis noted Above

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 are not included in the estimates. Soft costs can include design fees, sales tax, permits, owner's contingency and FF+E.
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.

PRODIMS

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

Structural Costs

Name: Wa State School Seismic Safety Assessment
Second Name: South Bend High School Gym
Location: South Bend, WA
Design Phase: ROM Cost Estimates
Date of Estimate: April 2, 2019
Date of Revision:
Month of Cost Basis: 4Q, 2018, 1Q, 2019

Areas	sqft
Building Area	16,254
Total Areas	16,254

South Bend High School Gym

Construction Cost Estimate

Subtotal Direct Cost From the Estimate Detail Below $ 743,486

	Percentage of Previous Subtotal	Amount	Running Subtotal
Scope Contingency	10.0%	$ 74,349	$ 817,834
General Conditions	10.0%	$ 74,349	$ 892,183
Home Office Overhead	5.0%	$ 37,174	$ 929,357
Profit	6.0%	$ 44,609	$ 973,966
Escalation Not Included-Costs in 4Q, 2018 Dollars	0.0%	$ -	$ 973,966
Washington State Sales Tax	0.0%	$ -	$ 973,966

Total Markups Applied to the Direct Cost 31.00%
Markups are multiplied from each subtotal- They are not multiplied from the direct cost

		$/sqft
TOTAL ESTIMATED CONSTRUCTION COST--	**$ 973,966**	**$ 59.92**
-20% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --	**$ 779,173**	**$ 47.94**
+50% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --	**$ 1,460,949**	**$ 89.88**

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											
	Note 1 and 3:										
	Grade Beam and Footing Extension System- Excavation, Backfill, Formwork, Concrete, Reinforcing and detailing.	26.4	cuyd	$ 416.00	$ 10,970.07	$ 234.00	$ 6,170.67	$ 39.00	$ 1,028.44	$ 689.00	$ 18,169.19
	Note 6:										
	Micropile, Allow 30 lnft	28.0	each	$ 1,408.00	$ 39,424.00	$ 792.00	$ 22,176.00	$ 132.00	$ 3,696.00	$ 2,332.00	$ 65,296.00
Substructure											
	Note 4:										
	Remove and Reinstall Slab on Grade System with Reinforcing, New Flooring System at FRP Install on Grid C	110.0	sqft	$ 13.20	$ 1,452.00	$ 10.80	$ 1,188.00	$ 1.44	$ 158.40	$ 25.44	$ 2,798.40
Superstructure											
Upper Floor Systems											
	Note 2:										
	6x6x3/8 Strongback, Painted with 5/8" Adhesive Anchor Bolts at 48" o.c.	520	lnft	$ 115.12	$ 59,859.80	$ 61.99	$ 32,232.20	$ 10.63	$ 5,525.52	$ 187.73	$ 97,617.52
	Note 3:										
	Demo Clerestory Window and infill with New 6" CMU Wall System	14	each	$ 346.50	$ 4,851.00	$ 283.50	$ 3,969.00	$ 37.80	$ 529.20	$ 667.80	$ 9,349.20
	2 Layers of FRP on Masonry Walls at Window Infill Walls	816	sqft	$ 16.64	$ 13,578.24	$ 9.36	$ 7,637.76	$ 1.56	$ 1,272.96	$ 27.56	$ 22,488.96
	Note 4:										
	2 Layers of FRP on Masonry Walls down to footing on Grid C	1,050	sqft	$ 16.64	$ 17,472.00	$ 9.36	$ 9,828.00	$ 1.56	$ 1,638.00	$ 27.56	$ 28,938.00
	Note 5:										
	8" Thick Shotcrete Wall System on Grids 1 and Grid 10	706	sqft	$ 19.25	$ 13,590.50	$ 15.75	$ 11,119.50	$ 2.10	$ 1,482.60	$ 37.10	$ 26,192.60
	Ripped Top Plate with 3/4" Anchor Bolt at 1' o.c. embeeded 6" in shotcrete wall and nailed to dipharam	71	lnft	$ 18.48	$ 1,312.08	$ 25.52	$ 1,811.92	$ 2.64	$ 187.44	$ 46.64	$ 3,311.44
	Note 7:										
	FRP Vertical Strips to Connect Concrete Buttress Wall and CMU Walls Approx 10 feet long	20	each	$ 233.60	$ 4,672.00	$ 131.40	$ 2,628.00	$ 21.90	$ 438.00	$ 386.90	$ 7,738.00

WBS	Description	Quantity	U of M	Labor	Labor Total	Material	Material Total	Equipment	Equipment Total	Total $/U of M	Direct Cost
	Roofing Systems										
	Remove Existing Roofing System	18,115	sqft	$ 2.02	$ 36,519.84	$ 0.08	$ 1,521.66	$ 0.13	$ 2,282.49	$ 2.23	$ 40,323.99
	Note 1:										
	PROVIDE PT BLOCKING, WIDTH TO MATCH SHOTCRETE WALL. ATTACH TO DIAPHRAGM WITH 10d AT 6" OC.	71	lnft	$ 18.48	$ 1,312.08	$ 25.52	$ 1,811.92	$ 2.64	$ 187.44	$ 46.64	$ 3,311.44
	Note 2:										
	PROVIDE HDU-8 EACH SIDE (2 TOTAL0 OF (E) GLULAM W/ 7/8" DIA THRU-BOLT.	4	each	$ 507.50	$ 2,030.00	$ 367.50	$ 1,470.00	$ 52.50	$ 210.00	$ 927.50	$ 3,710.00
	PROVIDE (2) HDU-8 EACH SIDE (4 TOTAL) OF (E) GLULAM AT SIMILAR	4	each	$ 938.88	$ 3,755.50	$ 679.88	$ 2,719.50	$ 97.13	$ 388.50	$ 1,715.88	$ 6,863.50
	Note 3:										
	FULL DEPTH 3x BLOCKING W/ (S) HDU-4 HOLDDOWN (~1 HOLDDOWN PER 12 LNFT) THROUGH (E) MASONRY WALL TO CONNECT HSS STRONGBACKS TO DIAPHRAGM.	444	lnft	$ 76.13	$ 33,799.50	$ 32.63	$ 14,485.50	$ 6.53	$ 2,897.10	$ 115.28	$ 51,182.10
	Install New Roofing System - Including Roof Membrane, New Insulation, Coverboard and Flashing and Trim for a Complete System	18,115	sqft	$ 10.02	$ 181,457.96	$ 8.53	$ 154,575.30	$ 1.11	$ 20,162.00	$ 19.66	$ 356,195.25
Subtotal of the Direct Cost of Construction				**South Bend High School Gym**							**$ 743,486**

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
Second Name: South Bend High School Gym
Location: South Bend, WA
Design Phase: ROM Cost Estimates
Date of Estimate: April 2, 2019
Date of Revision:
Month of Cost Basis: 4Q, 2018, 1Q, 2019

Areas	sqft
Building Area	16,254
Total Areas	16,254

South Bend High School Gym

Construction Cost Estimate

Subtotal Direct Cost From the Estimate Detail Below $ 240,112

	Percentage of Previous Subtotal	Amount	Running Subtotal
Scope Contingency	10.0%	$ 24,011	$ 264,124
General Conditions	10.0%	$ 24,011	$ 288,135
Home Office Overhead	5.0%	$ 12,006	$ 300,140
Profit	6.0%	$ 14,407	$ 314,547
Escalation Not Included-Costs in 4Q, 2018 Dollars	0.0%	$ -	$ 314,547
Washington State Sales Tax	0.0%	$ -	$ 314,547

Total Markups Applied to the Direct Cost 31.00%
Markups are multiplied from each subtotal- They are not multiplied from the direct cost

		$/sqft
TOTAL ESTIMATED CONSTRUCTION COST--→	**$ 314,547**	**$ 19.35**
-20% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --→	**$ 251,638**	**$ 15.48**
+50% TOTAL ESTIMATED CONSTRUCTION COST VARIANCE --→	**$ 471,821**	**$ 29.03**

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*										
	Interiors and M/E/P/FP systems										
	New Ceilings and Finishes for Installation of Seismic Work	16,254	sqft	$ 0.54	$ 8,855.36	$ 0.45	$ 7,245.30	$ 0.06	$ 966.04	$ 1.05	$ 17,066.70

WBS	Description	Quantity	U of M	Labor	Labor Total	Material	Material Total	Equipment	Equipment Total	Total $/U of M	Direct Cost
	Mechanical/Electrical/Fire Protection Systems	16,254	sqft	$ 7.12	$ 115,731.25	$ 5.83	$ 94,689.20	$ 0.78	$ 12,625.23	$ 13.72	$ 223,045.67
*Allows 30 percent of existing nonstructural systems M/E/P/FP require upgrades/replacement.											
Subtotal of the Direct Cost of Construction				**South Bend High School Gym**							**$ 240,112**

Appendix D: Earthquake Performance Assessment Tool (EPAT) Worksheet

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Washington Schools Earthquake Performance Assessment Tool (EPAT)
MAIN PAGE

Full District Name	South Bend		
Point of Contact	Gary Wilson		
Telephone	360-942-7626		
E-Mail	gwilson@southbendschools.org		
File Name	South Bend, South Bend High School, Koplitz Field House EPAT.xlsm	**File Date:**	7/24/2018

District	South Bend
Facility Name	South Bend High School
Building Part Name	Koplitz Field House

Earthquake Ground Motion (% g)		**Earthquake Hazards**	
20% in 50 year PGA	29.4%	**Site Class**	E
10% in 50 year PGA	35.3%	**Ground Shaking Hazard**	Very High
2% in 50 year PGA	59.5%	**Liquefaction Potential**	Moderate to High
Percentile S_s *Among all WA Campuses*	90%	**Combined Earthquake Hazard Level**	Extremely High

Total Building Part Area (Square Feet)	**Building Evaluated By**	**Input Data by Person(s)**
16,254	DNR, Reid Middleton	Tim Green, Reid Middleton

The Earthquake Ground Motion and Earthquake Hazard Hazards data shown above are primarily for use and interpretation by engineers.

Refer to the EPAT User Guide for technical explanations of the Earthquake Ground Motion and the Earthquake Hazards information.

Washington Schools Earthquake Performance Assessment Tool (EPAT)
BUILDING DATA PAGE

Facility Name	South Bend High School
Building Name	Koplitz Field House
Building Use	Assembly

Data Entry Item	User Entered Values	Default Values	Used for BCA
Seismic Data			
Decimal Latitude	46.661829	46.661829	46.661829
Decimal Longitude	-123.792475	-123.792475	-123.792475
Site Class (Soil/Rock Type)	E	D-E	E
Liquefaction Potential	Moderate to High	Moderate to High	Moderate to High
Geographic Region for Seismic Zones	Coastal	Coastal	Coastal
Building Structural Data			
HAZUS Building Type***	RM1	Reinforced Masonry Bearing Walls w/ Wood or Metal Diaphragms	RM1
Number of Stories (Excluding Basement)***	1		1
Year Built***	1950		1950
Code for Building Design (if known)	UBC	**Use the Drop-Down menus to Select Data Entries for the Bright Green Shaded data cells.**	UBC
Design Code Year (if known)	<1973		<1973
Severe Vertical Irregularity***	No		No
Moderate Vertical Irregularity***	No		No
Plan (Horizontal) Irregularity***	No		No

***** Mandatory Data Entry**

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	Koplitz Field House	Very High

Building Data		
HAZUS Building Type	RM1	Reinforced Masonry Bearing Walls w/ Wood or Metal Diaphragms
Year Built	1950	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	77%	78%	Very High	Red
Life Safety Retrofit Building	20%	12%	Low	Green/Yellow
Current Code Building	16%	8.6%	Very Low	Green/Yellow

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:	DNR, Reid Middleton
Person(s) Who Entered Data in EPAT:	Tim Green, Reid Middleton
User Overrides of Default Parameters:	Building Design Code Year, Latitude, Longitude, Site Class, Liquefaction, Geographic Region

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Appendix E: Koplitz Field House Existing Drawings

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GYMNASIUM

RENOVATION & ADDITION

FOR

SOUTH BEND SCHOOL DISTRICT NO. 118

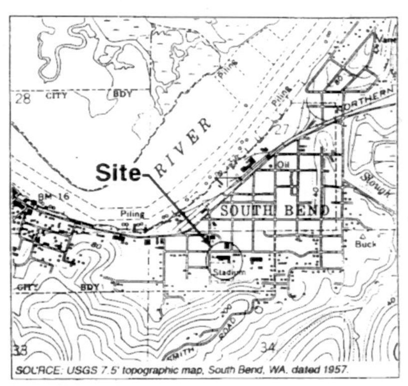
PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

GENERAL NOTES

GENERAL NOTES:

1. GENERAL NOTES APPLY TO ALL DRAWINGS.
2. ALL DIMENSIONS ARE ACTUAL AND ARE TO FACE OF STUDS, FACE OF CONCRETE WALLS, OR CENTERLINE OF COLUMNS, UNLESS NOTED OTHERWISE.
3. FLOOR SPOT ELEVATIONS ARE SHOWN THUS 100'-0".
4. ARCHITECTURAL FINISH FLOOR ELEVATIONS 100'-0" MATCHES EXISTING FINISH FLOOR ELEVATION AND EQUALS ACTUAL SITE REFERENCE ELEVATION OF FINISH FLOOR 9.6 FEET.
5. CEILING HEIGHTS AS NOTED IN ROOM FINISH SCHEDULE ARE MEASURED FROM FINISH FLOOR OF SCHEDULED ROOM.
6. DIMENSIONS FOR DOOR OPENINGS SHOWN NOMINAL ARE TO ALLOW FOR 1/2 - INCH SHIMMING AND SEALANT.
7. ALL INTERIOR WALLS AND PARTITIONS EXTEND TO UNDERSIDE OF THE DECK ABOVE UNLESS NOTED OTHERWISE.
8. EXTEND GYPSUM BOARD UP THE ENTIRE HEIGHT OF WALL.
9. PLAN SYMBOL INDICATES SIZE OF INTERIOR PARTITION STUDS. REFER TO FLOOR PLANS FOR STUD SIZES FOR INTERIOR PARTITIONS. ALL INTERIOR PARTITIONS SHALL USE 2X4 STUDS IN THE LOCKER ROOM AREA AND 2X6 STUDS IN THE NEW ADDITION UNLESS SHOWN OTHERWISE.
10. SCRIBE GYPSUM BOARD OF WALLS AND PARTITIONS TO IRREGULARITIES OF STRUCTURE AND DECK ABOVE. SEAL TIGHTLY AROUND ANY PENETRATIONS.
11. ALL FLOOR AND WALL PENETRATIONS REQUIRED FOR PIPES, CONDUIT, ETC. SHALL BE SEALED TO STOP THE PASSAGE OF FIRE AND/OR SMOKE.
12. GENERAL CONTRACTOR SHALL FURNISH AND INSTALL 2 x 8 CONTINUOUS WOOD BLOCKING IN STUD PARTITIONS FOR ANCHORAGE OF ALL WALL ATTACHED ITEMS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING : GRAB BARS, VANITY UNITS, TOILET ACCESSORIES, HANDRAIL BRACKETS, WALL CABINETS, ETC.
13. GENERAL CONTRACTOR SHALL COORDINATE ALL MECHANICAL CHASE SIZES WITH MECHANICAL SUBCONTRACTOR.
14. CONSTRUCTION SHALL BE TYPE V-1 HR.
15. ALL PERMANENT PARTITIONS TO BE 1 HOUR FIRE RESISTIVE CONSTRUCTION.
16. LOCATE MASONRY CONTROL JOINTS WHERE SHOWN ON THE DRAWINGS.
17. WATER RESISTANT GYPSUM WALLBOARD TO BE USED BEHIND AND 5'-0" TO EACH SIDE OF ALL FLOOR SINKS AND IN THE CONCESSION AREA.
18. DOOR JAMBS SHALL BE LOCATED 4" FROM PERPENDICULAR WALL, UNLESS NOTED OTHERWISE.

VICINITY MAP



SOURCE: USGS 7.5' topographic map, South Bend, WA, dated 1957.

SHEET INDEX

CODE INFO.

CODE ANALYSIS

Code: 1991 Uniform Building Code (UBC); and corresponding editions of the Uniform Fire Code (UFC); Uniform Mechanical Code (UML); Uniform Plumbing Code (UPC); and the 1990 edition of the National Electric Code (NEC).

Occupancy Type (per UBC Table 5-A):

Gymnasium: Primary Use: A-2.1. (Assembly Area)

Construction Type:

Gymnasium: Existing Type V 1 hour (assumed)
New Type V 1 hour

Basic Allowable Area (UBC Table 5-C)

Type V - 1 Hour Gymnasium

Basic Allowable (A2.1): 10,500 SF

Area Increase Allowance:

Separation on three sides: 2½% x 20 - 50% increase allowed. (Per UBC 506(a) 2)

Combined Area Increase Allowance: 10,500 SF + 50% = 15,750 SF

Proposed Square Footage:

1st Floor Existing (includes balcony as a mezzanine): 11,740 SF

New Addition: 1,002 SF
12,740 SF Total

12,740 SF < 15,750 SF; Remodeled Building is within allowable area

Fire Rating Requirements For Building Elements (Per UBC Table 17A, Chapters 19 & 22)

Type V - One Hour (Gymnasium)

All new building elements (roof and floor assemblies, interior and exterior bearing wall, structural frame and permanent partitions) one hour.

(NOTE: Existing gym roof assembly not rated as allowed per UBC 602(a))

Exiting

Gymnasium existing occupant load.

Occupant Load exist's bleachers at 1'-6" ft. Bleacher/Occupant (Per UBC 3322 (e) C.3) — 780 1st Floor, 230 2nd Floor

Occupant Load Gymnasium Floor with/ Bleachers Out (Per UBC table 33-A)

5,700 SF ÷ SF/Occ.: 380 Occupants

Exit Load For New Main Entry

1st Floor + 50% 2nd Floor: 780 Occ. + 380 Occ. + (50% 230 Occ.) = 1,275 Occ.

1,275 Occ. x 0.2 = 255" total exit provided (new and existing) = 344"
1/2 Exit through main entry = 255" ÷ 2 = 128" width required at new main entry (Per UBC 3317(a))

Structural Criteria

Seismic zone 2B (per UBC figure 23-2).

Basic air speed 100 mph, exposure C-open terrain (per UBC figure 2301).

Pacific County snow load: 25 lbs. per square foot.

Plumbing Facilities: Gymnasium (per 1991 UPC/Appendix C) 1390 Occupants Total, 695 Male; 695 Female:

Male: 5 Toilets, 6 Urinals, 3 Lavatories — Female: 13 Toilets, 3 Lavatories

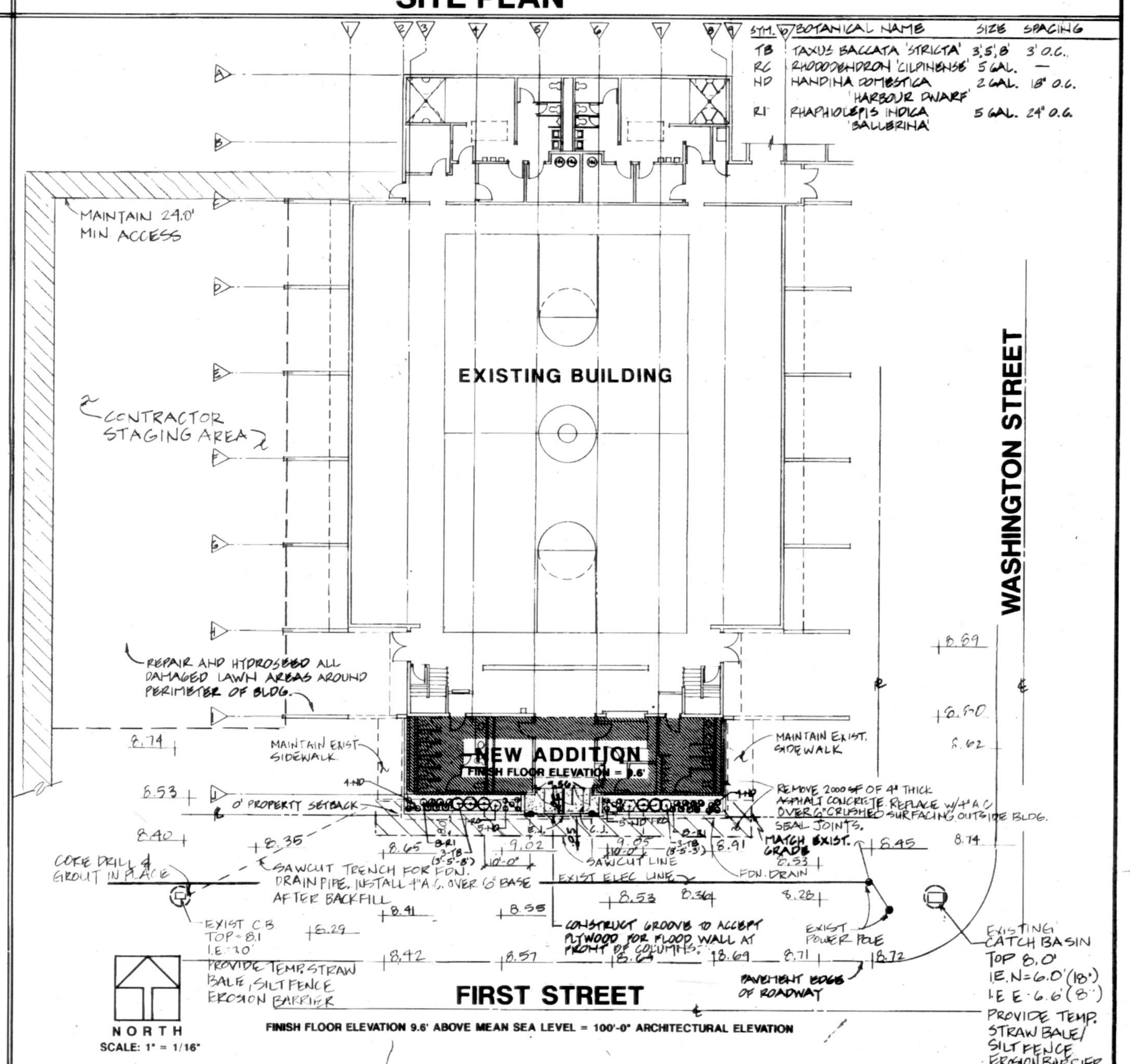
For usual large crowd basketball 600 occupants 300 Male; 300 Female:

Male: 3 Toilets, 3 Urinals, 2 Lavatories — Female: 11 Toilets, 2 Lavatories

Provided in Building Total:

Male: 5 Toilets, 5 Urinals, 4 Lavatories — Female: 11 Toilets, 4 Lavatories

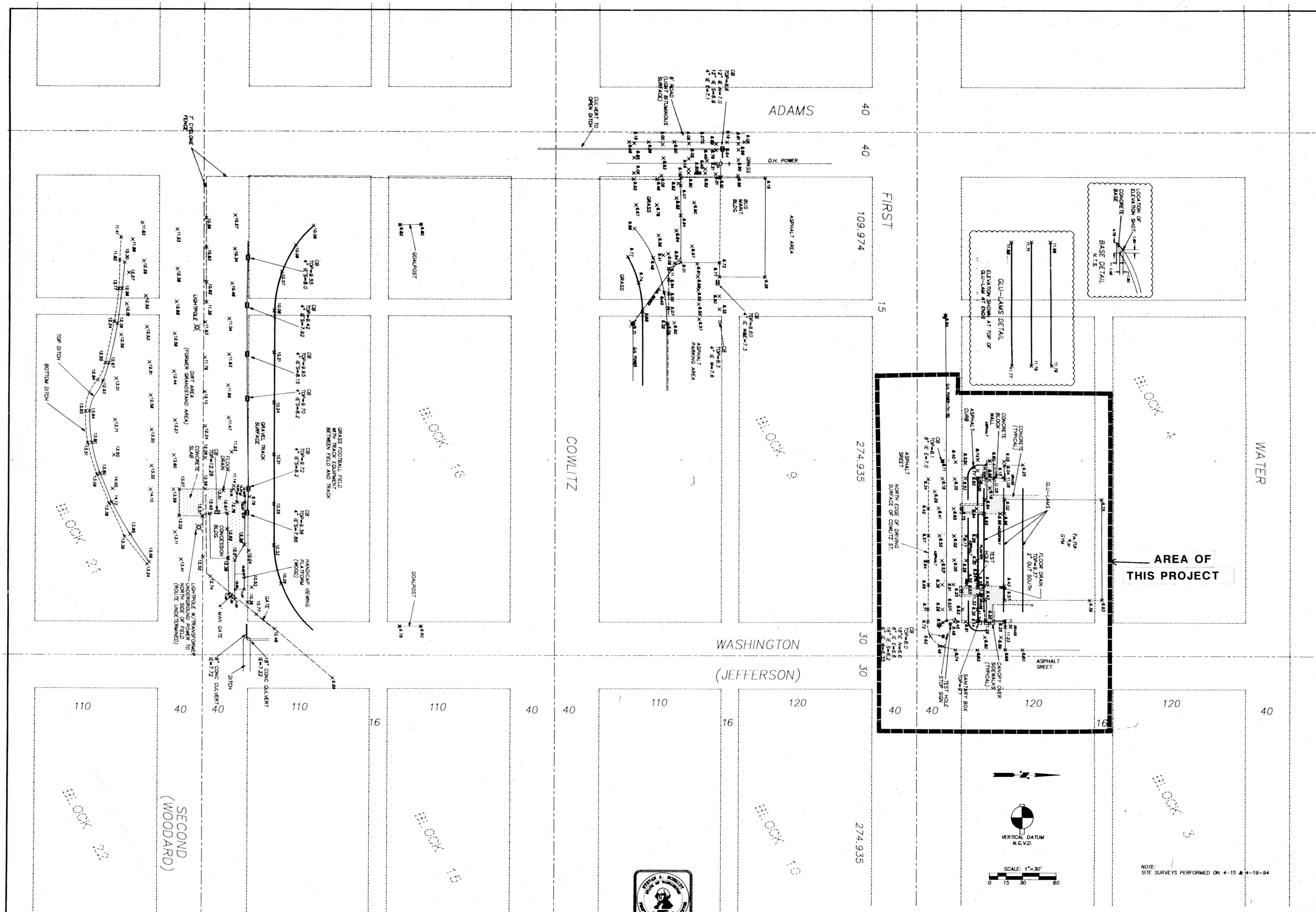
SITE PLAN



SCALE: 1" = 1/16"

FINISH FLOOR ELEVATION 9.6' ABOVE MEAN SEA LEVEL = 100'-0" ARCHITECTURAL ELEVATION

COVER SHEET/SITE PLAN
GYMNASIUM RENOVATIONS
SOUTH BEND SCHOOL DISTRICT NO. 118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS
DLR Group
73 94 125 00
JUNE 14, 1994
CS



BERGLUND, SCHMIDT & ASSOC., INC.
PROFESSIONAL ENGINEERS AND LAND SURVEYORS
216 EAST FIRST STREET ABERDEEN, WA. 98520 (206)532-7630

BSA

SOUTH BEND SCHOOL DIST. NO. 118
SITE TOPOGRAPHY

NO.	REVISIONS	BY	APPR.	DATE		SCALE	JOB NUMBER
					DESIGNED		
					DRAWN MLS	HOR. 1"=30'	94086
					CHECKED SAS	VERT.	DATE
					APPROVED	FIELD BOOK	4-26-94

DRAWING NUMBER SU
SHEET OF

DEMOLITION NOTES

AREA "A"

ARCHITECTURAL-
1. REMOVE AND DISPOSE OF ALL WALLS SHOWN AS FULL TONE; PATCH ADJACENT WALLS AS REQUIRED.
2. REMOVE AND DISPOSE OF GLAZED TILE ON SHOWER WALLS NOT BEING REMOVE; PATCH AS REQUIRED.
3. REMOVE AND DISPOSE OF FLOOR SLAB IN THIS AREA.
4. REMOVE CLERESTORY WINDOWS, PREP FOR REPLACEMENT.
5. REMOVE AND DISPOSE OF COLUMNS, BEAMS, AND FOOTINGS AS INDICATED ON THE STRUCTURAL DRAWINGS.
6. REMOVE EXISTING ROOF DOWN TO DECKING.
7. REMOVE EXISTING FASCIA.

MECHANICAL-
1. REMOVE AND DISPOSE OF ALL PLUMBING FIXTURES AND TRIM IN THIS AREA.
2. REMOVE ALL BELOW FLOOR PIPING TO BELOW NEW SLAB LEVEL
3. REMOVE ADDITIONAL BELOW FLOOR PIPING AS REQUIRED TO INSTALL NEW WORK.
4. CAP ALL PIPE ENDS BELOW SLAB.
5. REMOVE AND DISPOSE OF INSTANTANEOUS WATER HEATER AND STORAGE TANKS. REMOVE HEATER VENT PIPE AND REPAIR ROOF.
6. REMOVE AND DISPOSE OF ALL EXPOSED PIPING.
7. REMOVE AND DISPOSE OF ALL PLUMBING VENTS THROUGH ROOF AND REPAIR ROOF.
8. REMOVE AND DISPOSE OF ALL WALL MOUNTED EXHAUST FANS AND UNIT HEATERS.

ELECTRICAL-
1. REMOVE AND DISPOSE OF ALL LIGHT FIXTURES INCLUDING EXIT SIGN IN THIS AREA. REMOVE AND DISPOSE OF ALL FIXTURE CONDUIT AND WIRING, SWITCHES, JUNCTION BOXES, ETC. HOMERUN CONDUIT AND WIRING, ETC. BACK TO EXISTING PANEL SHALL ALSO BE REMOVED AND DISPOSED OF.
2. REMOVE AND DISPOSE OF EXISTING OUTLET, CONDUIT AND WIRE, ON WEST GIRLS LOCKER ROOM WALL.
3. REMOVE AND DISPOSE OF CONDUIT, WIRING, ETC. TO ALL WALL MOUNTED EXHAUST FANS AND UNIT HEATERS; ALSO TO INSTANTANEOUS WATER HEATER.

AREA "B"

ELECTRICAL-
1. REMOVE AND DISPOSE OF ALL ELECTRICAL EQUIPMENT ON THIS WALL. ITEMS INCLUDE ALLEN BRADLEY PANEL, 30 CKT LTG PANEL, EXIT LIGHT ON-OFF AND DISCONNECT SWITCHES, 200 AMP CKT BKR SERVING LTG PANEL, INTERMATIC 2-POLE SWITCHES, 4-204, 2P BKRS SERVING BOYS AND GIRLS SHOWER ROOM HEATERS, HEATER RELAY NOS. 1-4, ELECTRIC PANEL FOR HEATING AND HOT WATER TANK, G.E. METER BOX AND ASSOCIATED CONDUIT, WIRING AND WIREWAYS.
2. CONDUIT AND WIRING FROM FOLLOWING CKT NOS. IN EXISTING 30 CKT LTG PANEL SHALL REMAIN AND BE RECONNECTED TO SAME CKT NOS, IN NEW PANEL "A": CKT NOS. 1, 3, 5, 7, 11, 19, 2, 6, 8, 10, 12, 16, 26, 28, 30. EXISTING EXIT LIGHT TO REMAIN SHALL BE WIRED TO CKT 17 IN NEW PANEL "A".
3. GYM EXHAUST FAN ON-OFF SWITCH SHALL REMAIN; WIRING SHALL BE RECONNECTED TO CKT 4 OF NEW PANEL "A".

AREA "C"

ELECTRICAL-
1. REMOVE AND DISPOSE OF CANOPY LIGHT AND ASSOCIATED CONDUIT, WIRING, ETC.

AREA "D"

ELECTRICAL-
1. VERIFY IF EXISTING EXIT SIGN IN THIS AREA; IF IT DOES, REMOVE AND DISPOSE OF SIGN, CONDUIT AND WIRING.

AREA "E"

ELECTRICAL-
1. SEE NEW POWER PLAN FOR REMOVAL OF EXISTING XFMR.

AREA "F"

CIVIL-
1. REMOVE AND DISPOSE OF ASPHALT PAVING AS SHOWN ON SITE PLAN.
2. REMOVE AND DISPOSE OF TWO PLANTERS AT FRONT WALL.

ARCHITECTURAL-
1. REMOVE AND DISPOSE OF ALL WALLS SHOWN AS FULL TONE; PATCH ADJACENT WALLS AS REQUIRED.
2. CREATE NEW OPENINGS IN EXISTING CMU FOR PASS-THROUGH WINDOWS, DOORS AND ENTRIES AS INDICATED ON THE FLOOR PLAN, PATCH AS REQUIRED.
3. REMOVE AND DISPOSE OF CANOPIES AS INDICATED; PATCH SOFFITS, FASCIAS, ETC. TO MATCH EXISTING.

MECHANICAL-
1. REMOVE AND DISPOSE OF ALL PLUMBING FIXTURES AND TRIM IN THIS AREA. CAP ALL PIPES BELOW SLAB OR BELOW WALLS.
2. REMOVE AND DISPOSE OF ALL EXPOSED PIPING.
3. REMOVE AND DISPOSE OF WATER HEATER AND TWO EXHAUST FANS.

ELECTRICAL-
1. FOR DEMO OF OUTLETS IN THIS AREA, SEE NEW POWER PLAN.
2. REMOVE AND DISPOSE OF ALL LIGHT FIXTURES IN THIS AREA INCLUDING ASSOCIATED JUNCTION BOXES, SWITCHES, CONDUIT, WIRING, ETC. HOMERUN CONDUIT AND WIRING BACK TO EXISTING PANEL SHALL ALSO BE REMOVED AND DISPOSED OF.
3. REMOVE AND DISPOSE OF CONDUIT, WIRING, ETC. TO TWO (2) WALL MOUNTED EXHAUST FANS AND TO THE WATER HEATER.

AREA "G"

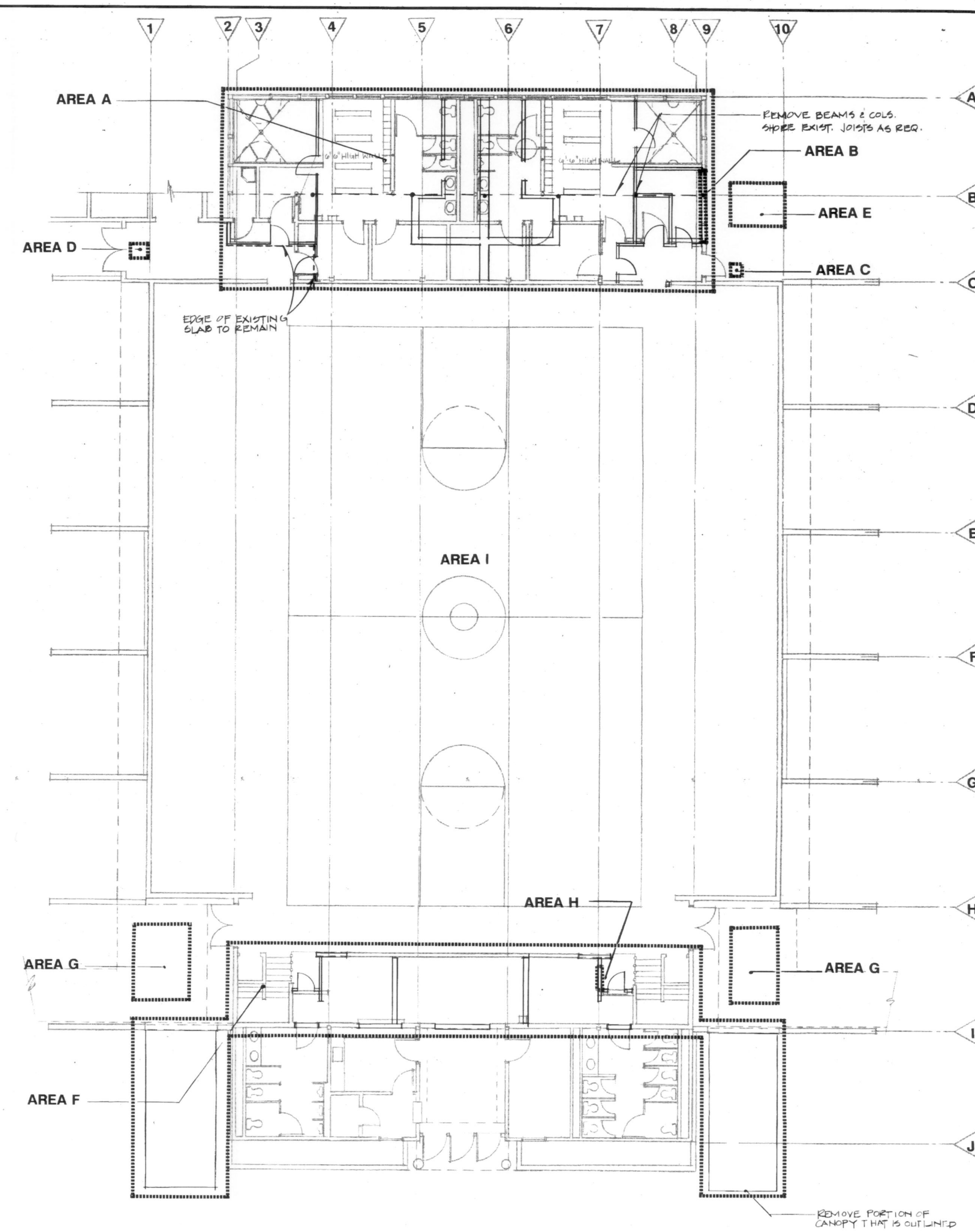
ELECTRICAL-
1. REMOVE AND DISPOSE OF CANOPY LIGHTS AND ASSOCIATED WIRING.

AREA "H"

MECHANICAL-
1. REMOVE FIREHOSE CABINET AND RELOCATE PER PLAN.

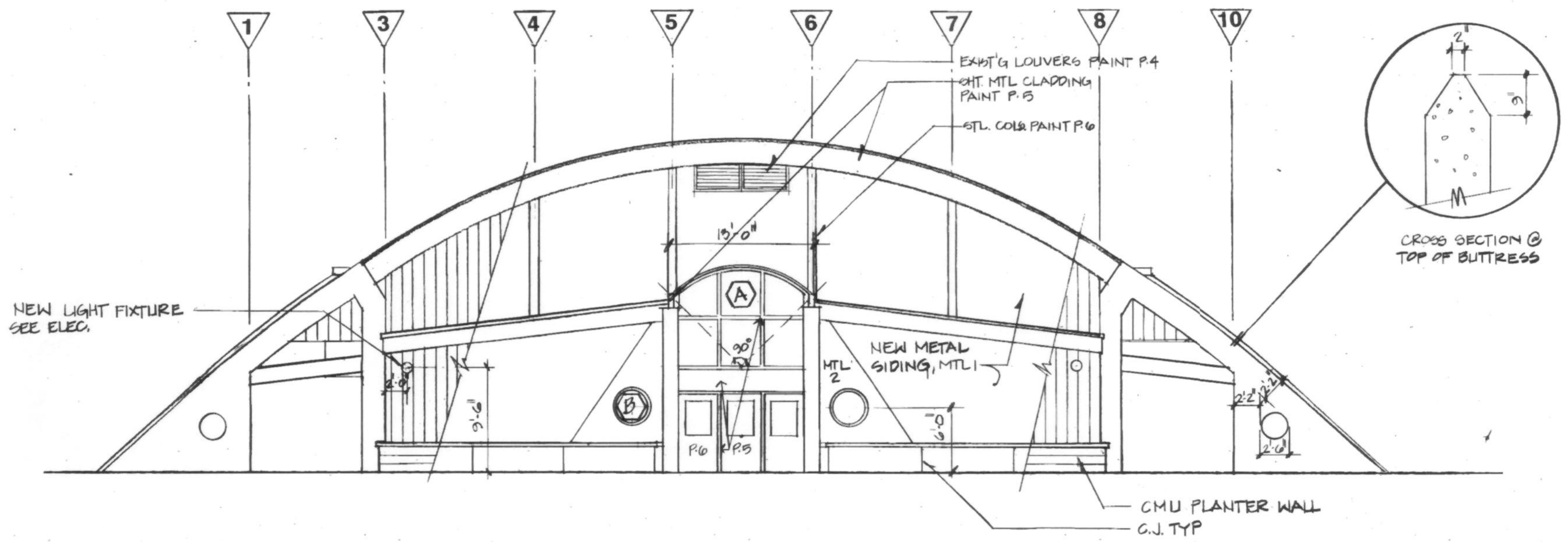
AREA "I"

ARCHITECTURAL-
1. REMOVE ROOF DOWN TO DECKING.
2. REMOVE GUTTERS.
3. REMOVE ENDS OF ARCHED BEAMS AS REQUIRED FOR NEW CONCRETE BUTTRESSES. SHORE AS REQ.

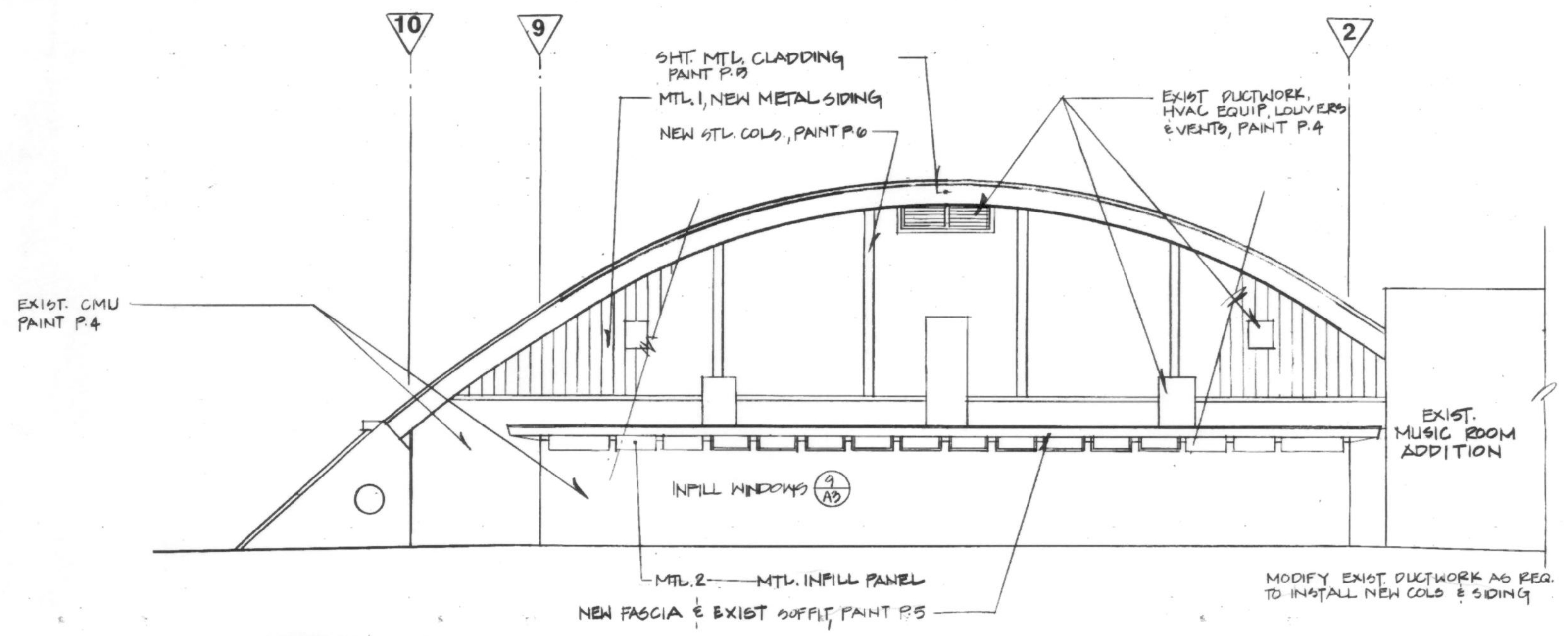


PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

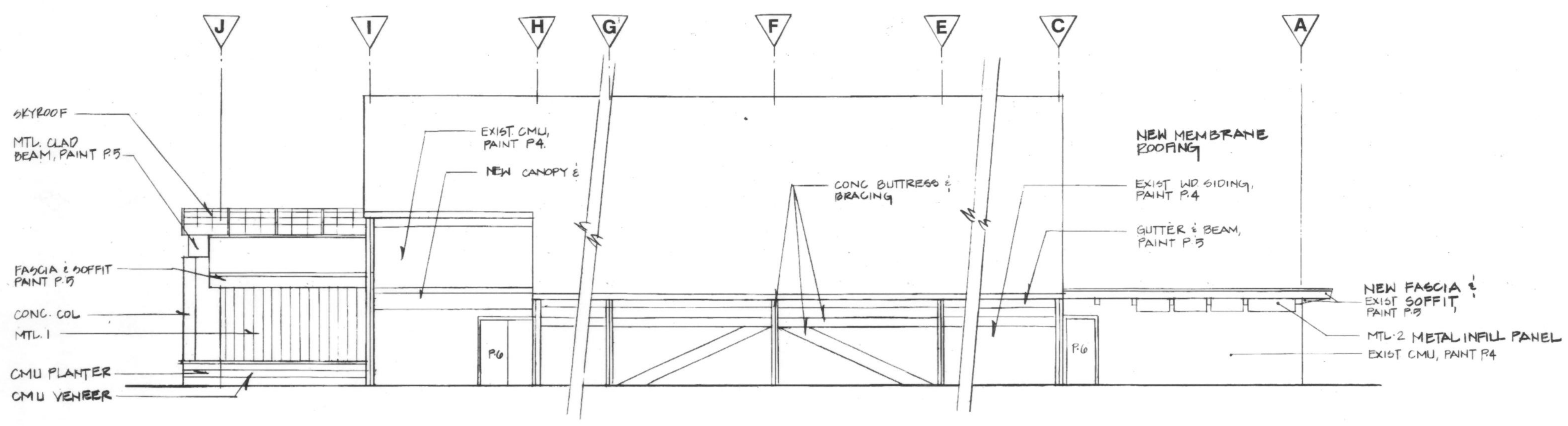
DEMOLITION PLAN
GYMNASIUM RENOVATIONS
SOUTH BEND SCHOOL DISTRICT NO.118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS
73 94 125 00
JUNE 14, 1994
DLR Group
D1



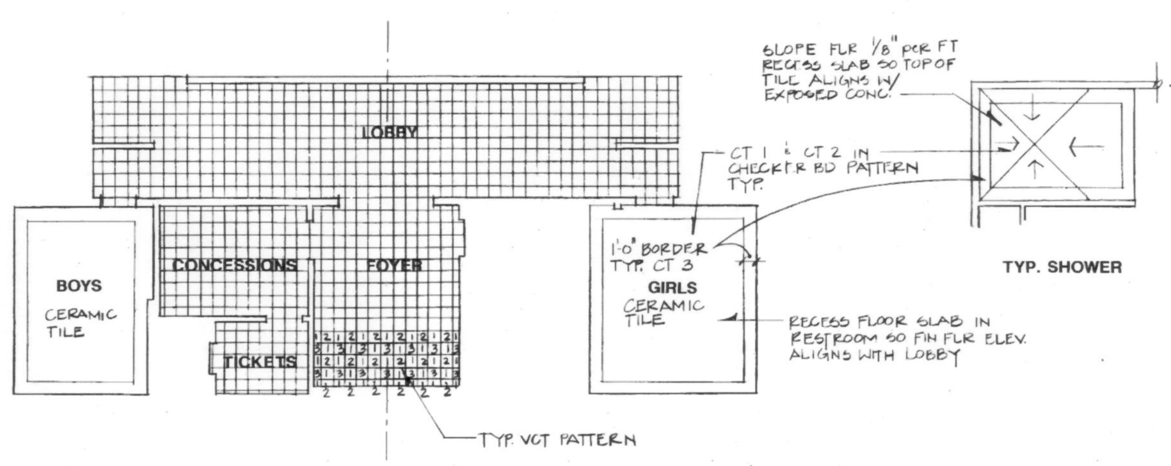
SOUTH ELEVATION
1/8"=1'-0"



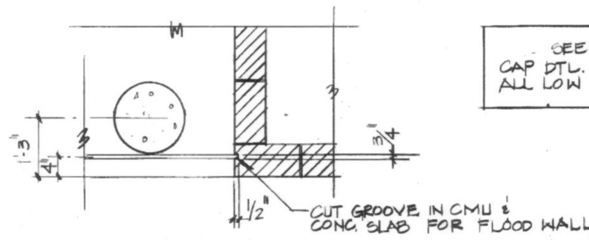
NORTH ELEVATION
1/8"=1'-0"



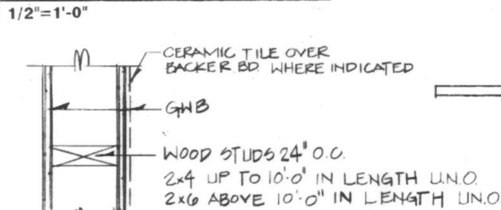
EAST ELEVATION (WEST ELEVATIOM SIM.)
1/8"=1'-0"



FLOOR PATTERN LAYOUT
1/8"=1'-0"

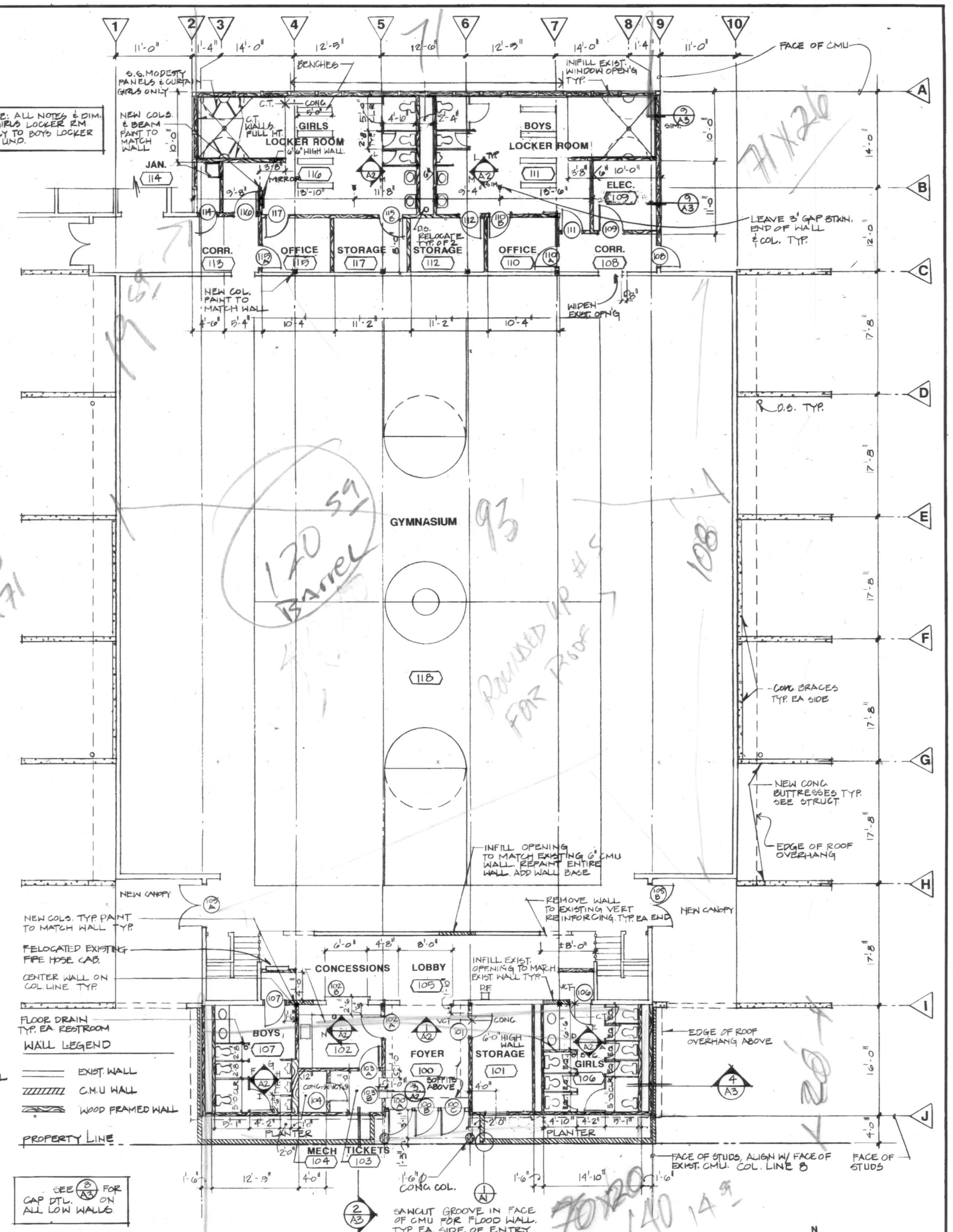


1 FLOOD WALL DETAIL
1/2"=1'-0"

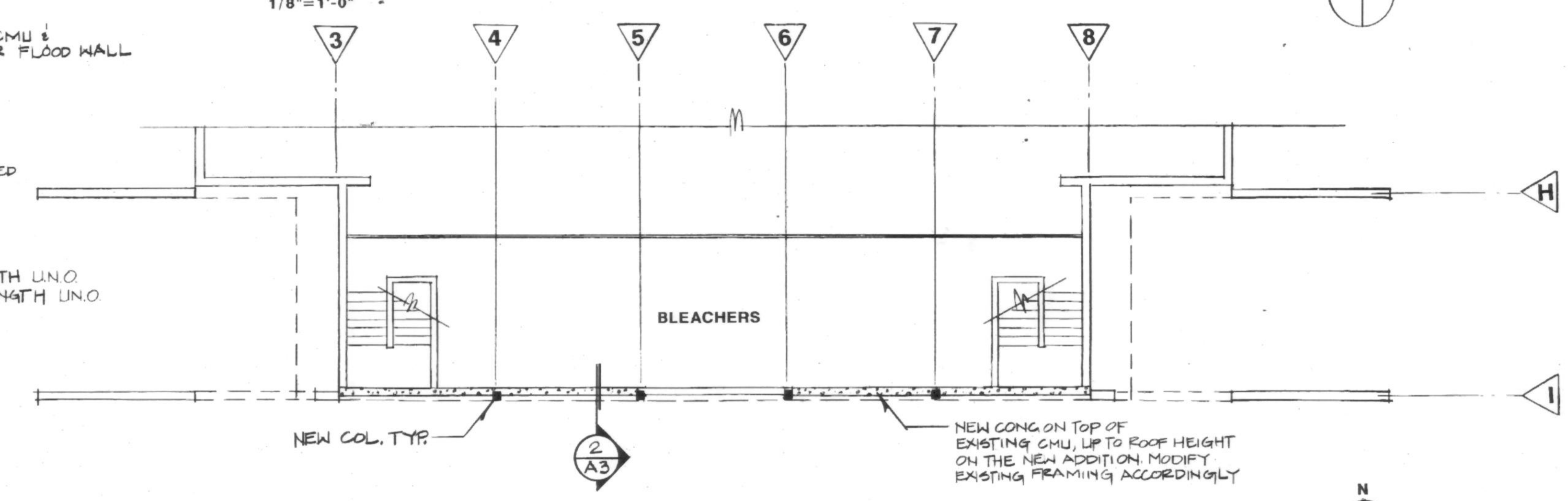


NOTE: SEE WALL SECTIONS FOR EXTERIOR WALL CONSTRUCTION

TYP. INTERIOR WALL TYPE
1"=1'-0"



MAIN LEVEL FLOOR PLAN
1/8"=1'-0"



BALCONY LEVEL FLOOR PLAN
1/8"=1'-0"

PROJECT RECORD DOCUMENT
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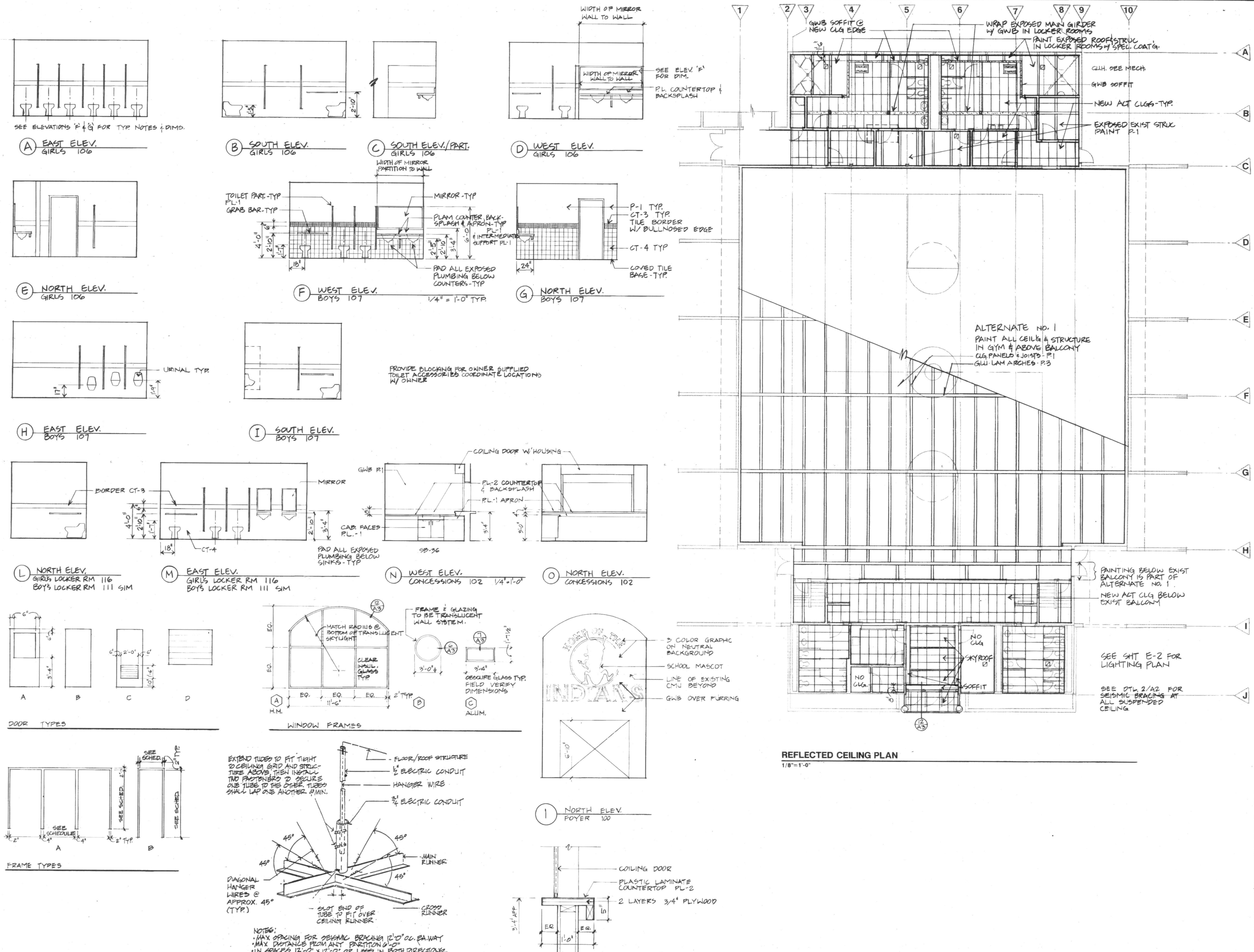
FLOOR PLANS, ELEVATIONS
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO.118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS
73 94 125 00
JUNE 14, 1994
DLR Group
A1



PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

REFLECTED CEILING PLAN / INTERIOR ELEVATIONS / DOOR AND WINDOW TYPES / DETAILS
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO.118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS

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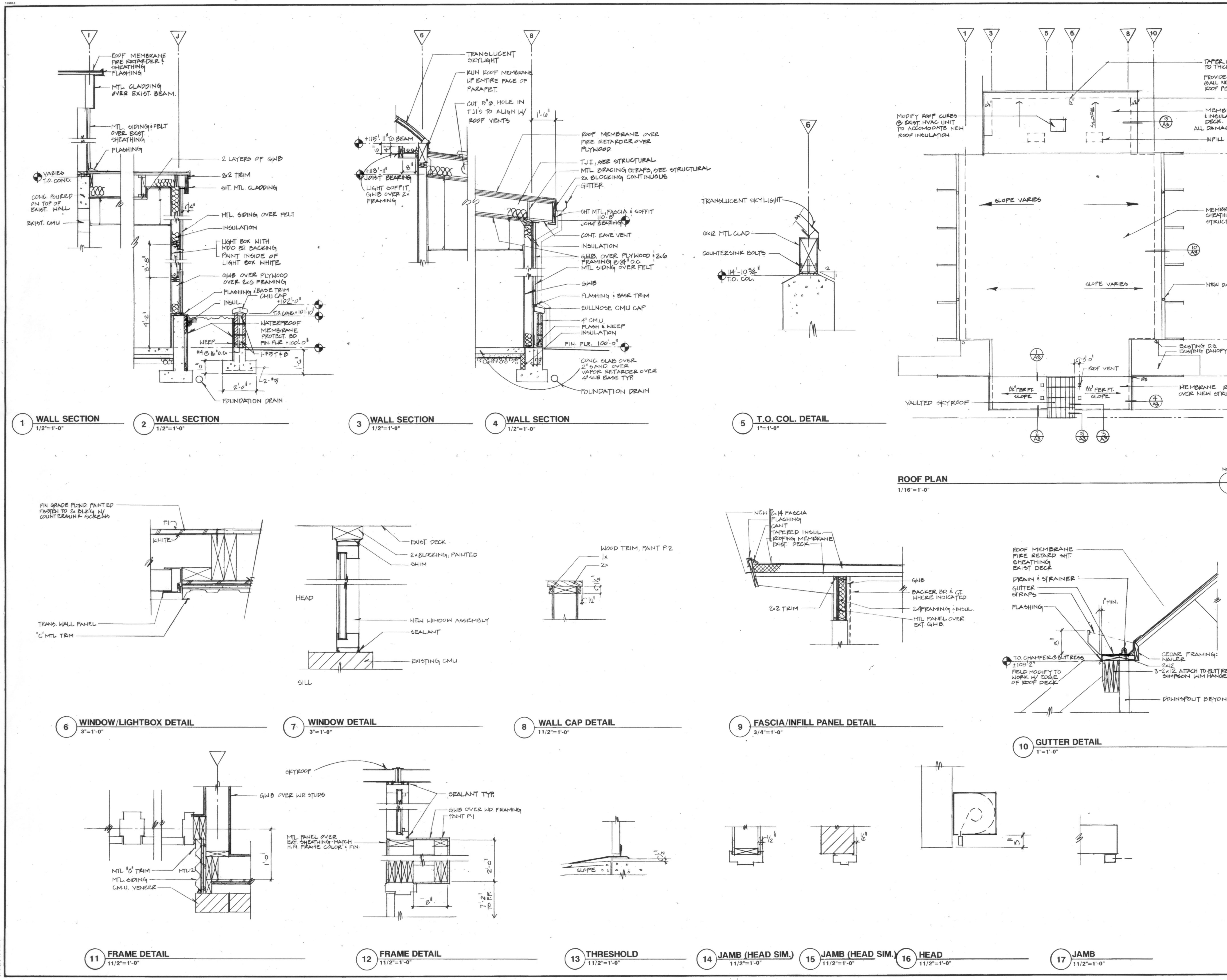

REGISTERED ARCHITECT

JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS

SOUTH BEND SCHOOL DISTRICT NO.118 GYMNASIUM RENOVATIONS

ROOF PLAN, WALL SECTIONS

PROJECT RECORD DOCUMENT
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JUNE 14, 1994

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A3

GENERAL STRUCTURAL NOTES

CODES

STRUCTURAL DESIGN IS IN ACCORDANCE WITH THE 1991 EDITION OF THE UNIFORM BUILDING CODE. CONCRETE DESIGN IS IN ACCORDANCE WITH ACI STANDARD 318-89. STRUCTURAL STEEL IS IN ACCORDANCE WITH THE 1989 EDITION OF THE AISC "SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."

ALL CONSTRUCTION SHALL BE SUPERVISED CONSTRUCTION.

DESIGN LOADS

EARTHQUAKE LOADS:

PER 1991 UNIFORM BUILDING CODE, ZONE 2B. Z = 0.20; I = 1.00;
C = 2.75; R_w = 8.0

WIND LOADS:

BUILDINGS UP TO 400 FEET IN HEIGHT SHALL BE DESIGNED IN ACCORDANCE WITH THE 1991 UNIFORM CODE.

BASIC WIND SPEED	100 MPH
EXPOSURE	C
IMPORTANCE FACTOR	1.0

LIVE LOADS:

ROOF, SNOW LOAD (+DRIFT, SEE BELOW) . . . . 25 PSF + DRIFT

ROOF FRAMING MEMBERS ADJACENT TO PARAPETS, WALLS, AND CANOPIES: IN ADDITION TO THE ABOVE, SUPPORT DRIFTING SNOW LOADS.

LIVE LOADS REDUCED WHERE PERMITTED BY AND IN ACCORDANCE WITH THE 1991 UNIFORM BUILDING CODE.

FOUNDATIONS

FOUNDATION DESIGN IN ACCORDANCE WITH REPORT OF GEOTECHNICAL INVESTIGATION BY DAMES & MOORE DATED APRIL 26, 1994.

ALLOWABLE SOIL BEARING PRESSURE = 1000 PSF
SEE SOILS REPORT FOR EXCAVATION AND COMPACTION REQUIREMENTS.

CONCRETE

ALL STRUCTURAL CONCRETE SHALL ATTAIN A 28-DAY STRENGTH OF 4,000 PSI.

ALL CONCRETE SHALL BE STONE-AGGREGATE CONCRETE HAVING A UNIT WEIGHT OF APPROXIMATELY 150 POUNDS PER CUBIC FOOT UNLESS NOTED OTHERWISE ON PLANS, SCHEDULES, OR DETAILS.

MASONRY

MASONRY UNITS SHALL BE GRADE A UNITS CONFORMING TO ASTM C90 (fm = 1,500 PSI).
MORTAR SHALL BE TYPE S, MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS, 1800 PSI.
GROUT SHALL BE MINIMUM 28-DAY STRENGTH, 2000 PSI.

WOOD

	Glue-Laminated Combination 24F-V4 (Beams)	Douglas Fir-Larch No. 2 (2x's and 3x's joists and studs, repetitive use)	Douglas Fir-Larch No. 1 (Beams and stringers)	Douglas Fir-Larch Dense No. 1 Posts
F_b	2400 PSI	1450 PSI	1350 PSI	1400 PSI
F_v	165 PSI	95 PSI	85 PSI	85 PSI
F_c	650 PSI	625 PSI	625 PSI	730 PSI
$F_c\perp$	1650 PSI	1050 PSI	925 PSI	1200 PSI
F_t	1150 PSI	825 PSI	675 PSI	950 PSI
$\bar{E}$	1.8 x 10^6 PSI	1.7 x 10^6 PSI	1.6 x 10^6 PSI	1.7 x 10^6 PSI

ALL CONNECTIONS SHALL BE "SIMPSON" OR APPROVED EQUAL.

PLYWOOD

STANDARD GRADE WITH EXTERIOR GLUE

C-D STRUCTURAL II, F_b = 1200 PSI

TJI

PRE-ENGINEERED WOOD TJI SHALL BE DESIGNED AND STAMPED BY A LICENSED STRUCTURAL ENGINEER REGISTERED IN THE STATE OF WASHINGTON.

REINFORCING STEEL

REINFORCING STEEL, ASTM A615 GRADE 60 . . . (FY = 60,000 PSI)
UNLESS NOTED OTHERWISE

WELDED WIRE FABRIC, ASTM A185
UNDER W1.4 . . . . (FY = 56,000 PSI)
W1.4 AND OVER . . . . (FY = 65,000 PSI)

STRUCTURAL STEEL

EXCEPT AS OTHERWISE SHOWN ON STRUCTURAL DRAWINGS, ALL STRUCTURAL STEEL SHALL CONFORM TO ASTM SPECIFICATION A36 (FY = 36,000 PSI).

ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A 500 GRADE B (FY = 46,000 PSI).

ALL FASTENERS FOR BOLTED CONNECTIONS SHALL BE 3/4-INCH DIAMETER MACHINE BOLTS CONFORMING TO ASTM SPECIFICATION A307 EXCEPT WHERE OTHERWISE INDICATED ON STRUCTURAL DRAWINGS.

WELDING

ALL WELDING SHALL CONFORM TO THE PROVISIONS OF THE AMERICAN WELDING SOCIETY CODE AWS D1.1-90, "WELDING IN BUILDING CONSTRUCTION", UNLESS OTHERWISE INDICATED ON THE STRUCTURAL DRAWINGS OR IN THE SPECIFICATIONS, ELECTRODES SHALL MATCH BASE METALS AS SPECIFIED IN AISC TABLE 1.5.3.

ALL WELDING SHALL BE PERFORMED BY WELDERS CERTIFIED IN ACCORDANCE WITH WABO.

NOTES ON BUILDING ERECTION

THE SEQUENCE OF CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND HE SHALL BE RESPONSIBLE FOR PROVIDING ALL TEMPORARY GUYS, BRACING, AND OTHER SUPPORTS AS NEEDED TO SAFELY RESIST ALL LOADS TO WHICH THE STRUCTURE MAY BE SUBJECTED, INCLUDING LOADS FROM ERECTION EQUIPMENT AND ERECTION OPERATIONS, AND WIND OR SEISMIC FORCES COMPARABLE IN INTENSITY FOR WHICH THE STRUCTURE WAS DESIGNED.

ALL ERECTION AND CONSTRUCTION PROCEDURES SHALL MEET THE REQUIREMENTS OF ALL APPLICABLE CODES AND ORDINANCES, INCLUDING THE PROVISIONS OF THE AISC "SPECIFICATIONS FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDING," NINTH EDITION.

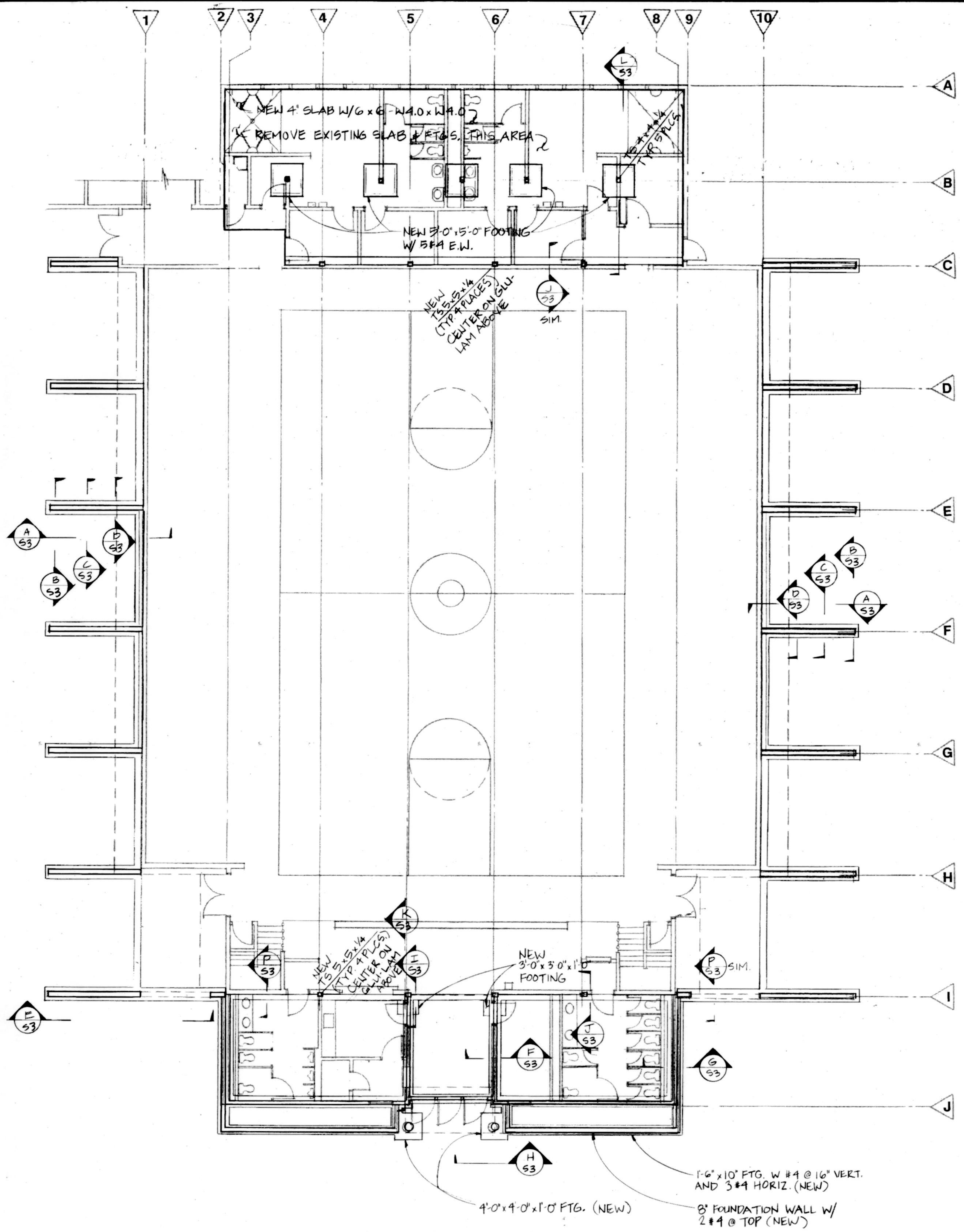
DISCREPANCIES

COMPARE STRUCTURAL, ARCHITECTURAL, CIVIL, ELECTRICAL AND MECHANICAL DRAWINGS. IF ANY DISCREPANCY IS FOUND, NOTIFY ARCHITECT BEFORE PROCEEDING.

CONTRACTOR SHALL VERIFY ALL DIMENSION IN THE FIELD AND SHALL NOTIFY THE ARCHITECT OF ALL FIELD VARIATIONS AND CHANGES PRIOR TO INSTALLATION OR FABRICATION.

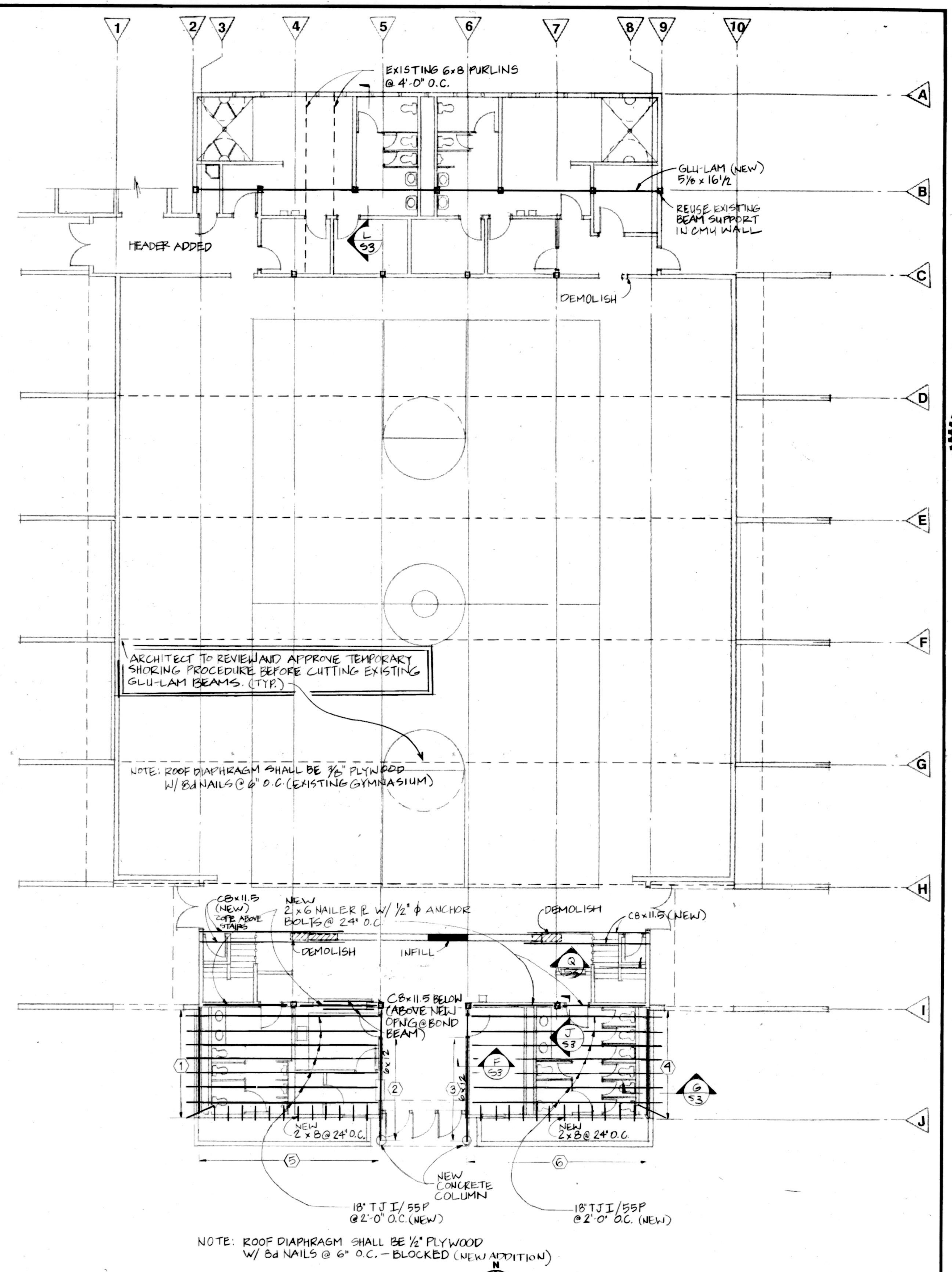
PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

STRUCTURAL GENERAL NOTES
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO. 118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS
DLR Group
73 94 125 00
JUNE 14, 1994
S1



FOUNDATION PLAN

1/8"=1'-0"



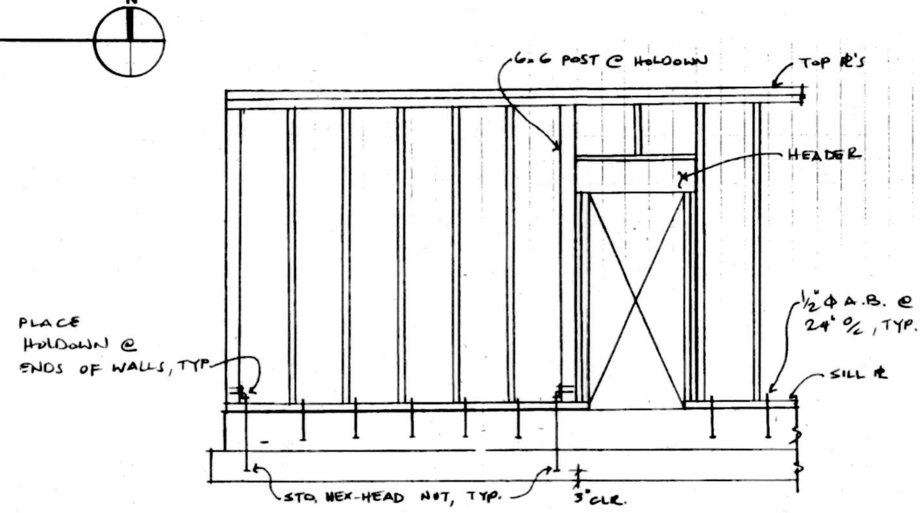
NOTE: ROOF DIAPHRAGM SHALL BE 1/2" PLYWOOD W/ 8d NAILS @ 6" O.C. — BLOCKED (NEW ADDITION)

FRAMING PLAN

1/8"=1'-0"

SHEAR WALL SCHEDULE - "BLOCKED"

SHEARWALL	FRAMING	PLYWOOD	PANEL EDGE NAILING	NAILING @ OTHER EDGES	FOUNDATION TIE DOWN
1	2 x 6	1/2	8d @ 4"	8d @ 12"	HD2A W/ 6x6 POST
2	3 x 6	1/2	8d @ 2" STAGGERED		2-HD10A W/ 6x6 POST
3	3 x 6	1/2	8d @ 2" STAGGERED		HD10A W/ 6x6 POST
4	2 x 6	1/2	8d @ 4"		HD2A
5	2 x 6	1/2	8d @ 6"		HD2A
6	2 x 6	1/2	8d @ 6"	8d @ 12"	HD2A



TYPICAL SHEAR WALL

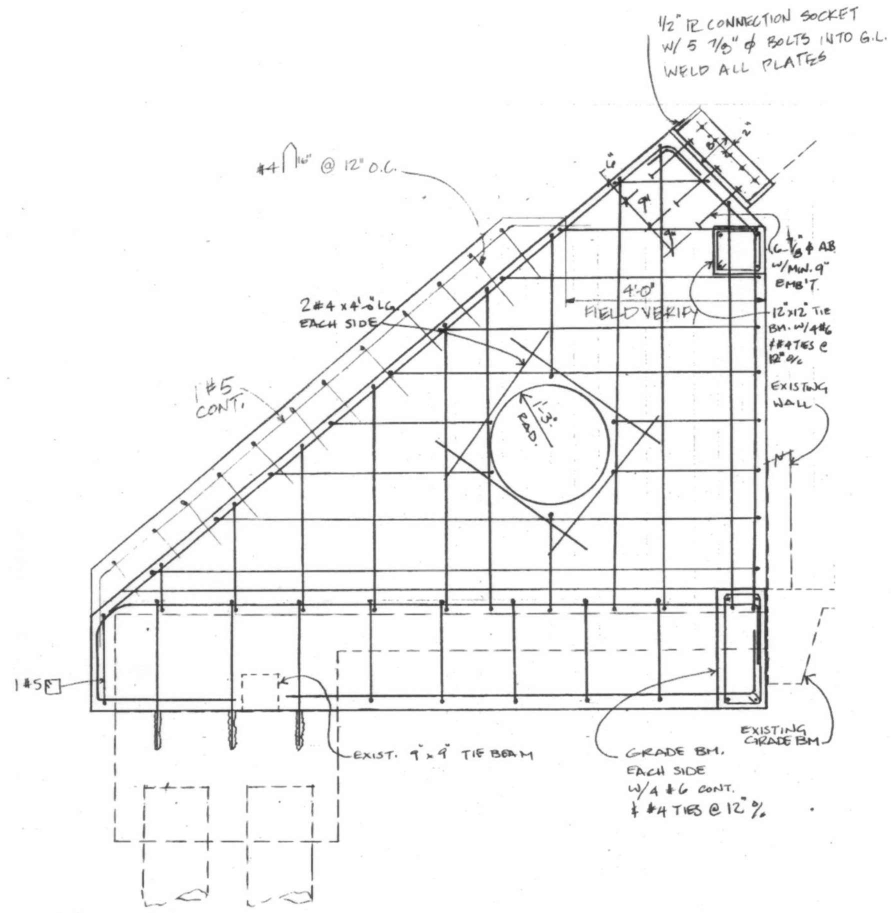
3/8"=1'-0"

PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

S2
DLR Group

73 94 125 00
JUNE 14, 1994

FOUNDATION & FRAMING PLANS
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO. 118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS



(A) **SECTION**
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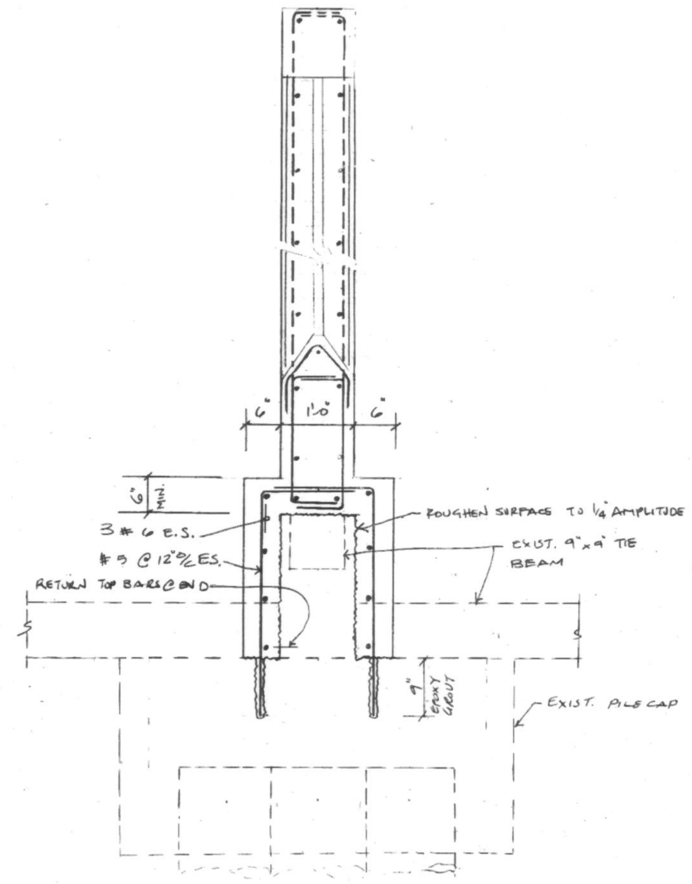
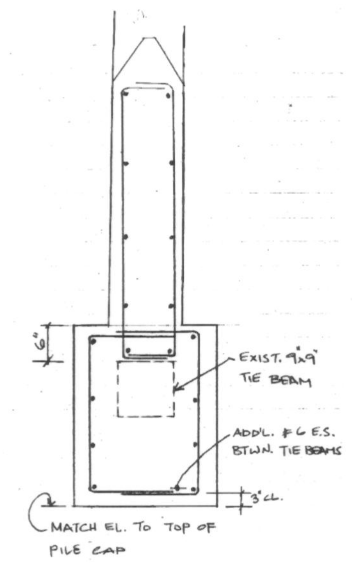


(B) **SECTION**
3/4"=1'-0"



(C) **SECTION**
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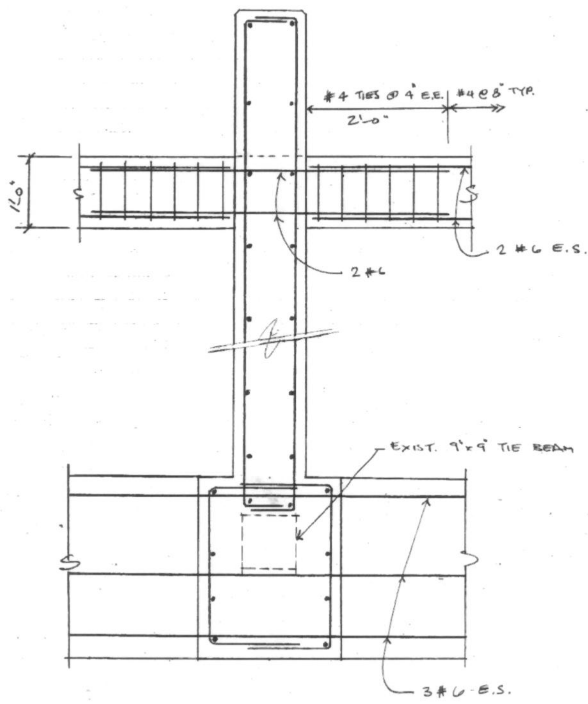

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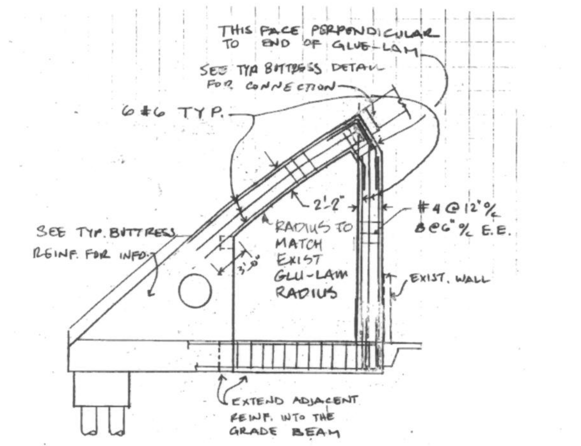

(E) **SECTION**
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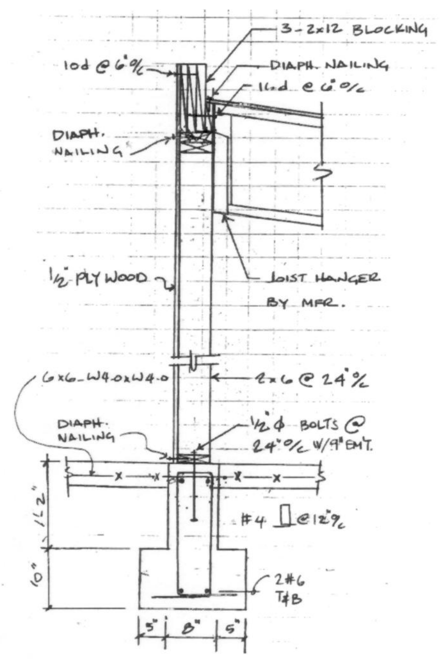

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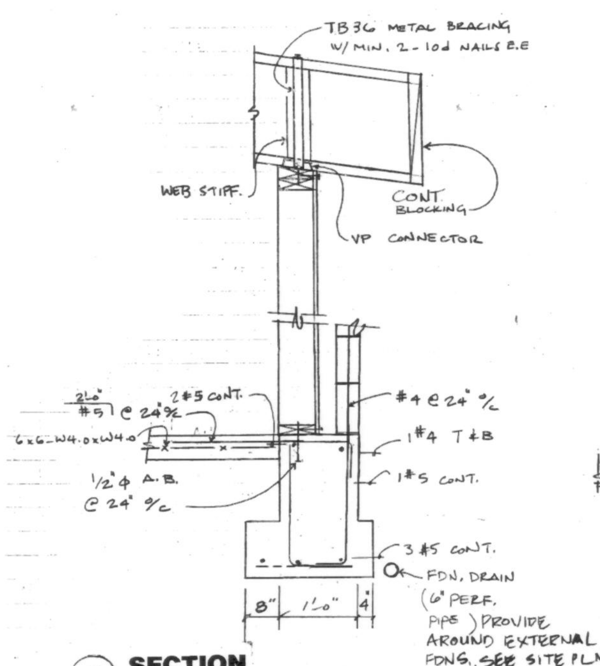

(G) **SECTION**
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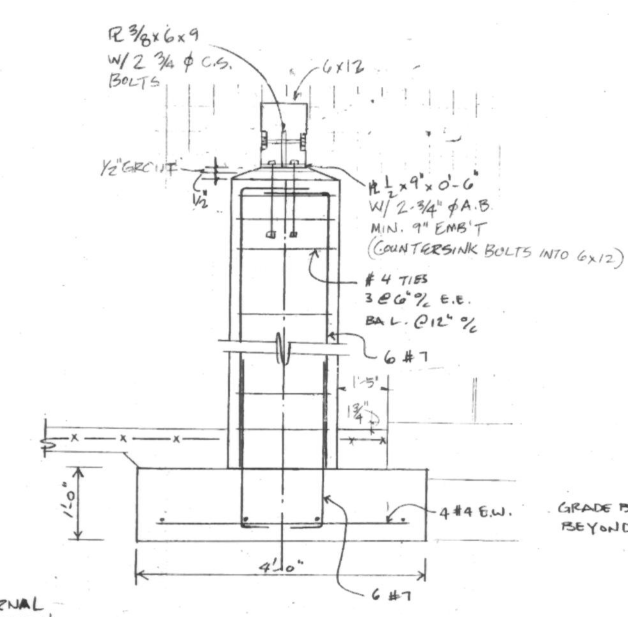

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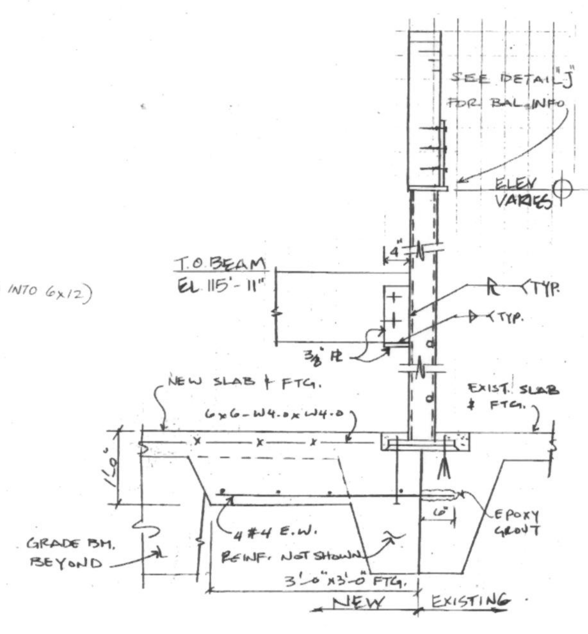
3/4"=1'-0"



(I) **SECTION**
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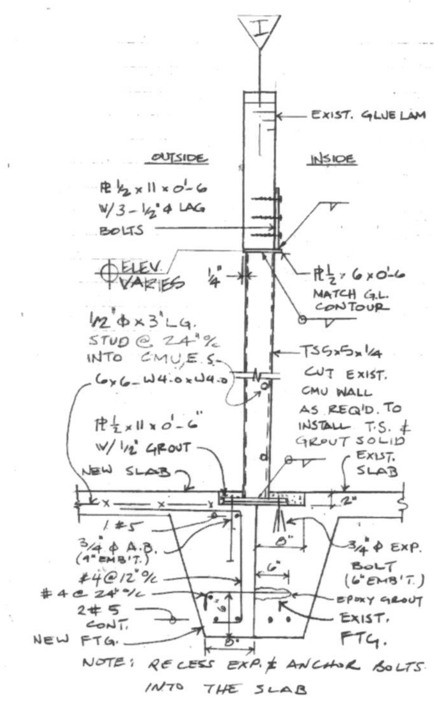

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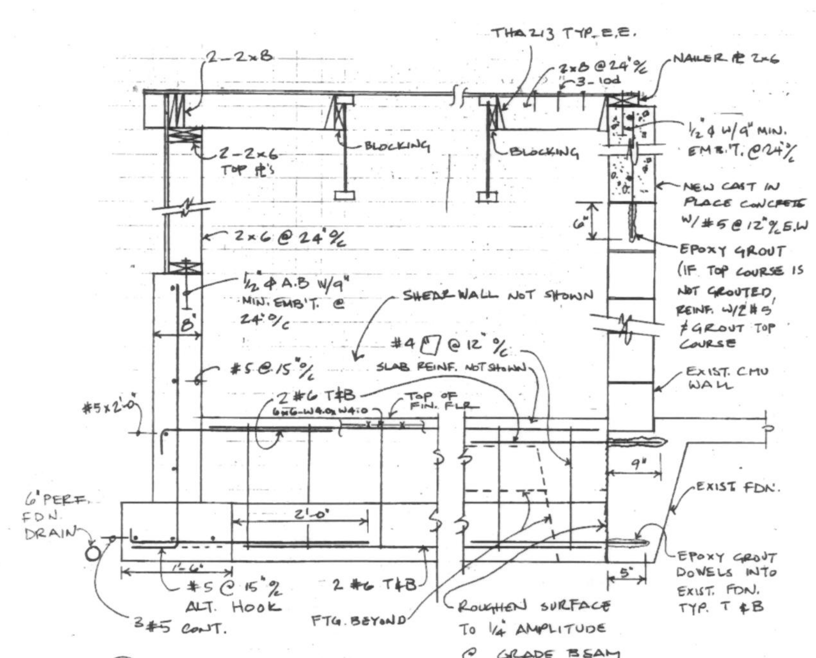

(K) **SECTION**
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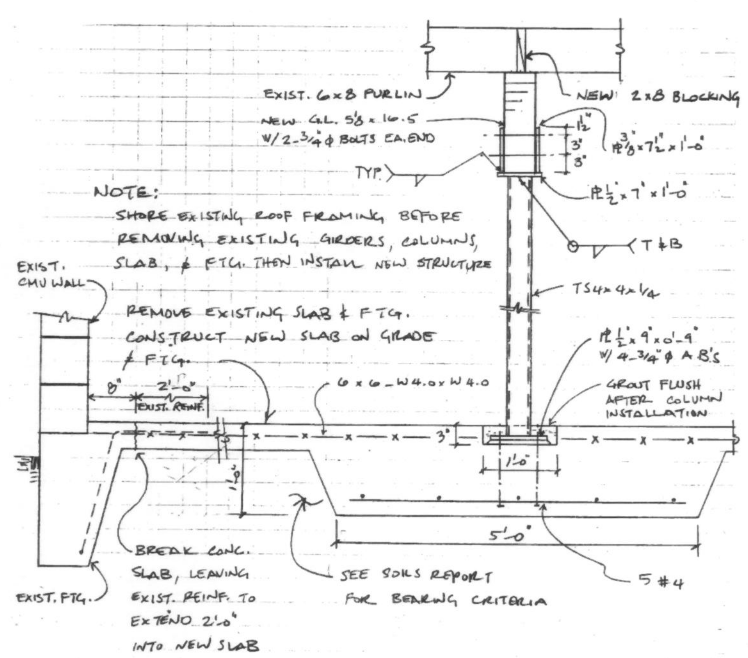

(L) **SECTION**
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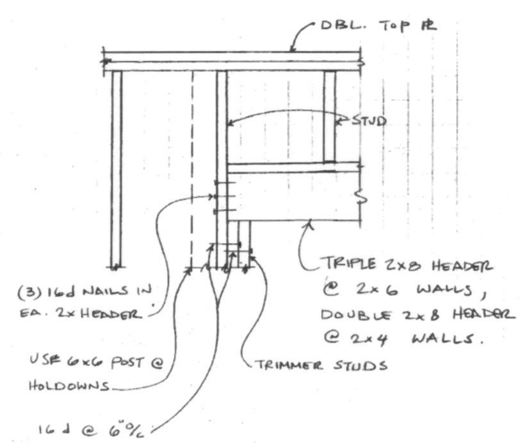
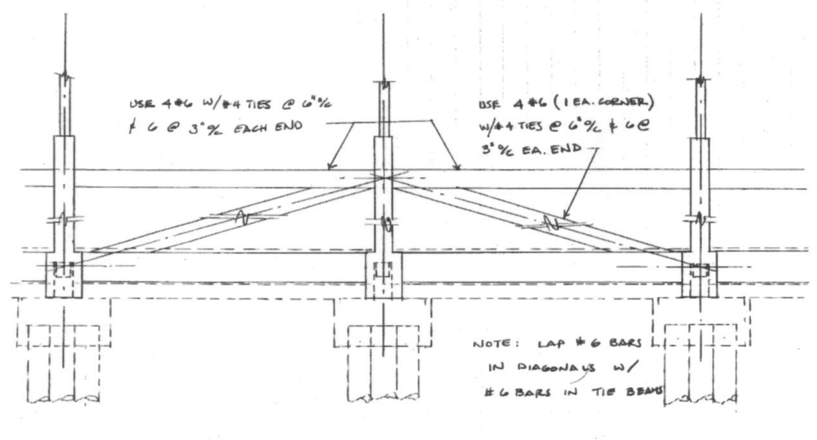
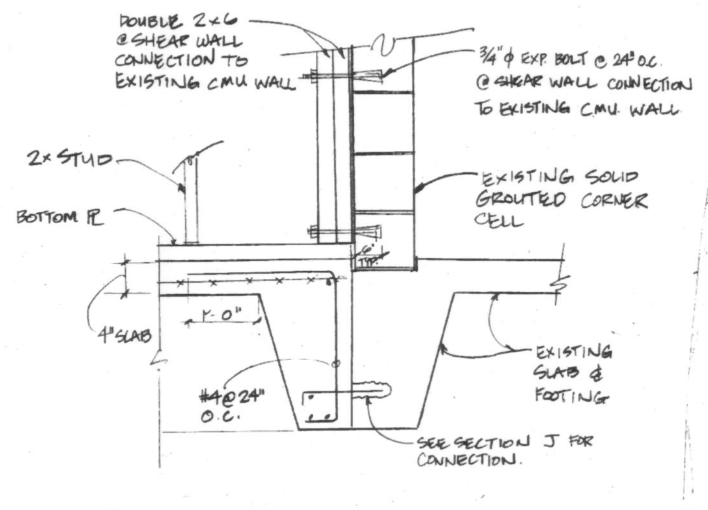


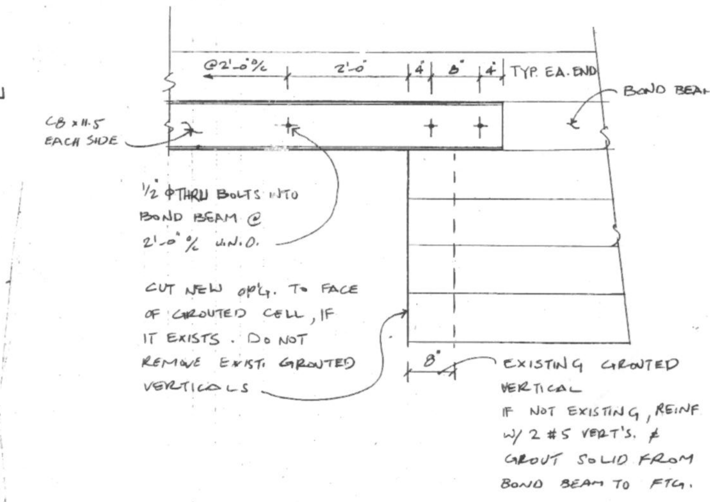
TYPICAL SECTION
3/4"=1'-0"



(N) **SECTION**
3/16"=1'-0"



(P) **SECTION**
3/4"=1'-0"



(Q) **SECTION**
3/4"=1'-0"

PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

DETAILS
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO. 118

JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS

73 94 125 00
JUNE 14, 1994

S3
DLR Group

MECHANICAL SHEET NOTES

1) 3/4" CW, 3/4" HW, 2" W, 2" V.

2) 3/4" CW, 3/4" HW, 2" V. CONNECT 2" W DN TO 4" W BELOW SLAB.

3) 3/4" HW, 2" CW DN IN CHASE.

4) TRAP PRIMER BEHIND ACCESS DOOR.

5) 1" CW DN, 2" W, 1½" V.

6) 2" W, 1½" V.

7) WH-1.

8) NEW 2" CW SERVICE. COORDINATE SERVICE AND METER INSTALLATION WITH SOUTH BEND PUBLIC WORKS DEPARTMENT (206) 875-5571.

9) NEW 2" FIRE TO RELOCATED FIRE HOSE CABINET.

10) 3/4" CW, 3/4" HW, 2" W, 2" V.

11) 1½" CW, 3/4" HW DN IN CHASE.

12) SHUT-OFF VALVE (TYP).

13) 2" CW HEADER, 2½" V HEADER IN CHASE.

14) 2" CW TO NORTH END OF BUILDING. DROP IN CHASE.

15) REMOVE EXISTING WASTE PIPES AS REQUIRED FLOWING INTO THE SANITARY BOX. CONNECT NEW WASTE PIPES TO SANITARY BOX AT EXISTING OPENINGS. INVERT ELEVATION APPROXIMATELY 6.2 FEET. VERIFY INVERT BEFORE PROCEEDING WITH WORK. CAP EXISTING WASTE PIPES AND ABANDON IN PLACE.

16) RELOCATE EXISTING FIRE HOSE CABINET.

17) 1" CW, 1" HW.

18) 2" CW UP FROM BELOW SLAB. INSTALL SHUT-OFF VALVE IN THE VERTICAL.

19) WH-2 SEE DETAIL (THIS SHEET).

20) 5" TYPE B GAS VENT THROUGH ROOF.

21) 7" COMBUSTION AIR INTAKE THROUGH ROOF.

22) MIXING VALVE MV-1, 1¼" CW IN, 1¼" 140° HW IN, 1½" 110° HW OUT.

23) CUT AND CAP EXISTING PIPES BELOW GRADE.

24) CONNECT NEW 3" STORM TO EXISTING ROOF DRAIN. RUN DRAIN HIGH AS POSSIBLE. DROP TO BELOW SLAB IN CHASE.

25) 3/4" HW, 2" CW DN IN CHASE.

26) 2½" VENT HEADER, 2" CW HEADER, 2" WASTE.

27) 2½" WASTE TO 4" WASTE BELOW SLAB.

28) 2½" VENT THROUGH ROOF.

29) CONNECT VENTS IN WALL MINIMUM 6" ABOVE GRADE.

30) 10 X 10 CEG-1, 330 CFM, CONNECT TO 12 X 8 DUCT.

31) 6 X 4 CEG-1, 50 CFM.

32) 10 X 12 EACH DUCT UP TO ROOF CAP.

33) 10 X 12 CEG-1, 450 CFM, CONNECT TO 12 X 8 DUCT.

34) 12 X 10 WEG-1 325 CFM, CONNECT TO 12 X 6" DUCT. BOTTOM OF WEG @ 7'-0" AFF. DUCT RISES IN CHASE TO BE TIGHT AGAINST ROOF DECK.

35) 10 X 10 CEG-1 325 CFM, CONNECT TO 12 X 6 DUCT.

36) 12 X 12 DUCT UP TO EF-3 ON ROOF.

37) 8 X 8 CEG IN BOTTOM OF 10 X 10 DUCT UP TO EF.

38) 6 X 5 WEG-1 50 CFM (4 TYP).

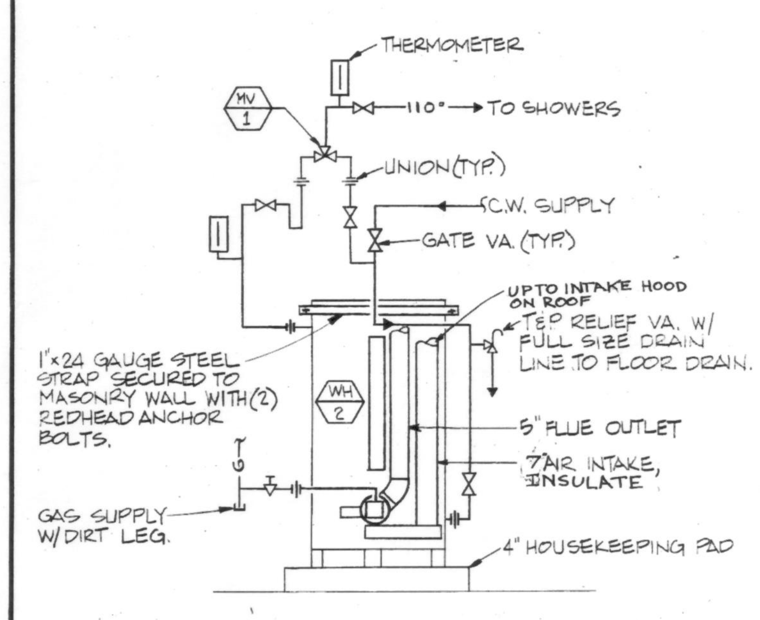
39) 8 X 8 DUCT UP TO ROOF CAP.

40) 1½" VTR, CONNECT VENTS IN WALL MINIMUM 6" AFF.

41) CONNECT NEW 3" STORM TO EXISTING 6" STORM THIS LOCATION.

42) EXTENDED EXIST. 4" SD BELOW GRADE TO POINT SHOWN. PROVIDE CONNECTION TO NEW 3" DS.

43) CONNECT NEW 4" DS TO EXIST. 4" SD BELOW GRADE. OPEN PIPE AT GRADE IS EXISTING.



WATER HEATER DETAIL
NO SCALE

FAN SCHEDULE

MARK	LOCATION	FAN DATA: FAN TYPE	WHEEL TYPE	WHEEL DIA (IN)	BLADE TYPE	CFM	ESP (IN WG)	FAN RPM	MOTOR: DRIVE TYPE	HP (AMPS)	V	PH	SONES	BASIS OF DESIGN	NOTES
EF-1	CONCESS.	CAB.	CENT.	-	FC	380	.25	1140	DIRECT	(2.8)	115	1	1.9	CSP-152	1,5,6
EF-2	STORAGE	CAB.	CENT.	-	FC	500	.25	1374	DIRECT	(2.8)	115	1	4.2	CSP-158	1,4,5,6
EF-3	RESTROOMS	ROOF	CENT.	9.5	FC	680	.20	1300	DIRECT	1/12	115	1	6.6	G-95-G	3,7,8
EF-4	SHOWERS	ROOF	CENT.	7	FC	200	.20	1300	DIRECT	1/60	115	1	3.2	G-70-G	3,6,8
EF-5	SHOWERS	ROOF	CENT.	7	FC	200	.20	1300	DIRECT	1/60	115	1	3.2	G-70-G	3,6,8
EF-6	OFFICES	CAB.	CENT.	-	FC	200	.25	1680	DIRECT	(2.5)	115	1	2.9	CSP-127	2,5,7

NOTES:
BASIS OF DESIGN FOR FANS IS GREENHECK

1. PROVIDE WITH ROOF CAP, GREENHECK MODEL RC60.
2. PROVIDE WITH ROOF CAP, GREENHECK MODEL RDSP.
3. PROVIDE WITH BACKDRAFT DAMPER.
4. PROVIDE WITH SPEED CONTROL.
5. PROVIDE WITH VIBRATION ISOLATORS.
6. PROVIDE WITH TIME DELAY SWITCH. CONNECT TIME DELAY SWITCH TO RESTROOM LIGHTS SO FAN STARTS WHEN LIGHT IS SWITCHED ON. FAN SHALL CONTINUE TO OPERATE FOR 15 MINUTES AFTER LIGHT IS SWITCHED OFF.
7. CONNECT TO TIME CLOCK CONTROL TO OPERATE FANS DURING OCCUPIED HOURS.
8. PROVIDE WITH PREFABRICATED ROOF CURB.

GRILLE SCHEDULE

MARK	MAX STATIC PD (IN WG)	MAX NC (DECIBELS)	MATERIAL	DAMPER (Y/N)	FRAME TYPE	FINISH	BASIS OF DESIGN	NOTES
CEG-1	.07	30	ALUMINUM	N	SURFACE	ANODIZED	TITUS 50F	
WEG-1	.07	30	ALUMINUM	N	SURFACE	ANODIZED	TITUS 4FL	

NOTES:
GENERAL: CONTRACTOR SHALL COORDINATE MOUNTING AND SURFACE CONSTRUCTION PRIOR TO FURNISHING MATERIAL. SEE PLANS FOR LOCATION AND CFM.

CABINET UNIT HEATER SCHEDULE-ELECTRIC

MARK	ELECTRIC COIL DATA: CFM (NOM)	KW	E.A.T. DB (DEG.	L.A.T. DB (DEG.	MOTOR DATA: HP	V	PH	CABINET DATA: CONFIGURATION	SIZE H x L x D (INCHES)	FINISH TYPE	BASIS OF DESIGN	NOTES
CUH-1	300	5.62	65	124	1/30	115	1	SEMI-RECESSED	25X39 1/2X9	FACTORY	TRANE B42 E003	1,3,4
CUH-2	300	5.62	65	124	1/30	115	1	SEMI-RECESSED	9X25X39 1/2	FACTORY	TRANE D46 E003	1,2,3
CUH-3	300	5.62	65	124	1/30	115	1	SEMI-RECESSED	9X25X39 1/2	FACTORY	TRANE D46 E003	1,2,3

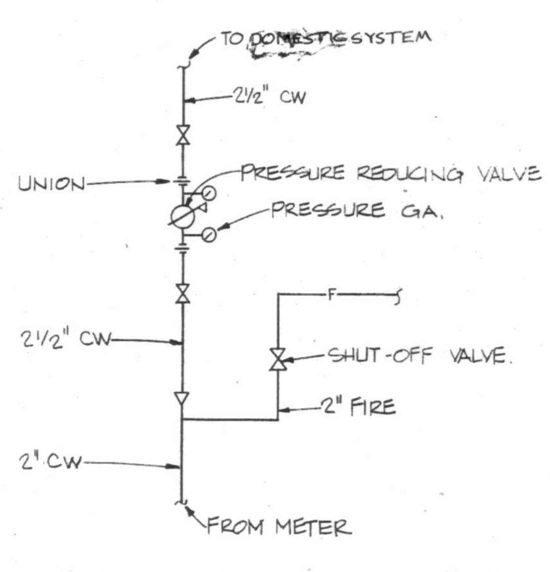
NOTES:
1. PROVIDE WITH DUAL HEAT 208V, 3PH COILS, 15.6 AMPS.
2. PROVIDE WITH 24V THERMOSTAT CONTROL.
3. PROVIDE WITH RECESSING FLANGE.
4. PROVIDE WITH INTEGRAL THERMOSTAT.

ELECTRIC BASEBOARD HEATER SCHEDULE

MARK	BASE BOARD DATA: FINNED LENGTH (IN)	KW	EAT DB (DEG. F)	VOLTS	PHASE	BASIS OF DESIGN	NOTES
BB-1	48	1	65	208	1	EBBA 7142 HA	1
BB-2	28	.375	65	208	1	EBBA 7124 HA	1
BB-3	28	.375	65	208	1	EBBA 7124 HA	1
BB-4	28	.5	65	208	1	EBBA 7122 HA	1
BB-5	48	1	65	208	1	EBBA 7142 HA	1
BB-6	72	1.5	65	208	1	EBBA 7162 HA	2
BB-7	72	1.5	65	208	1	EBBA 7162 HA	2
BB-8	28	.375	65	208	1	EBBA 7124 HA	3
BB-9	28	.5	65	208	1	EBBA 7122 HA	1
BB-10	28	.5	65	208	1	EBBA 7122 HA	1
BB-11	28	.5	65	208	1	EBBA 7122 HA	1
BB-12	28	.5	65	208	1	EBBA 7122 HA	1

NOTES:
GENERAL: BASIS OF DESIGN IS TRANE ELECTRIC HEAVY DUTY BASEBOARD HEATERS.

1. PROVIDE WITH LINE VOLTAGE THERMOSTAT.
2. PROVIDE RELAY TRANSFORMER SECTION. CONTROL ON SAME THERMOSTAT AS CUH.
3. PROVIDE WITH INTEGRAL THERMOSTAT.



SERVICE ENTRANCE DETAIL
NO SCALE

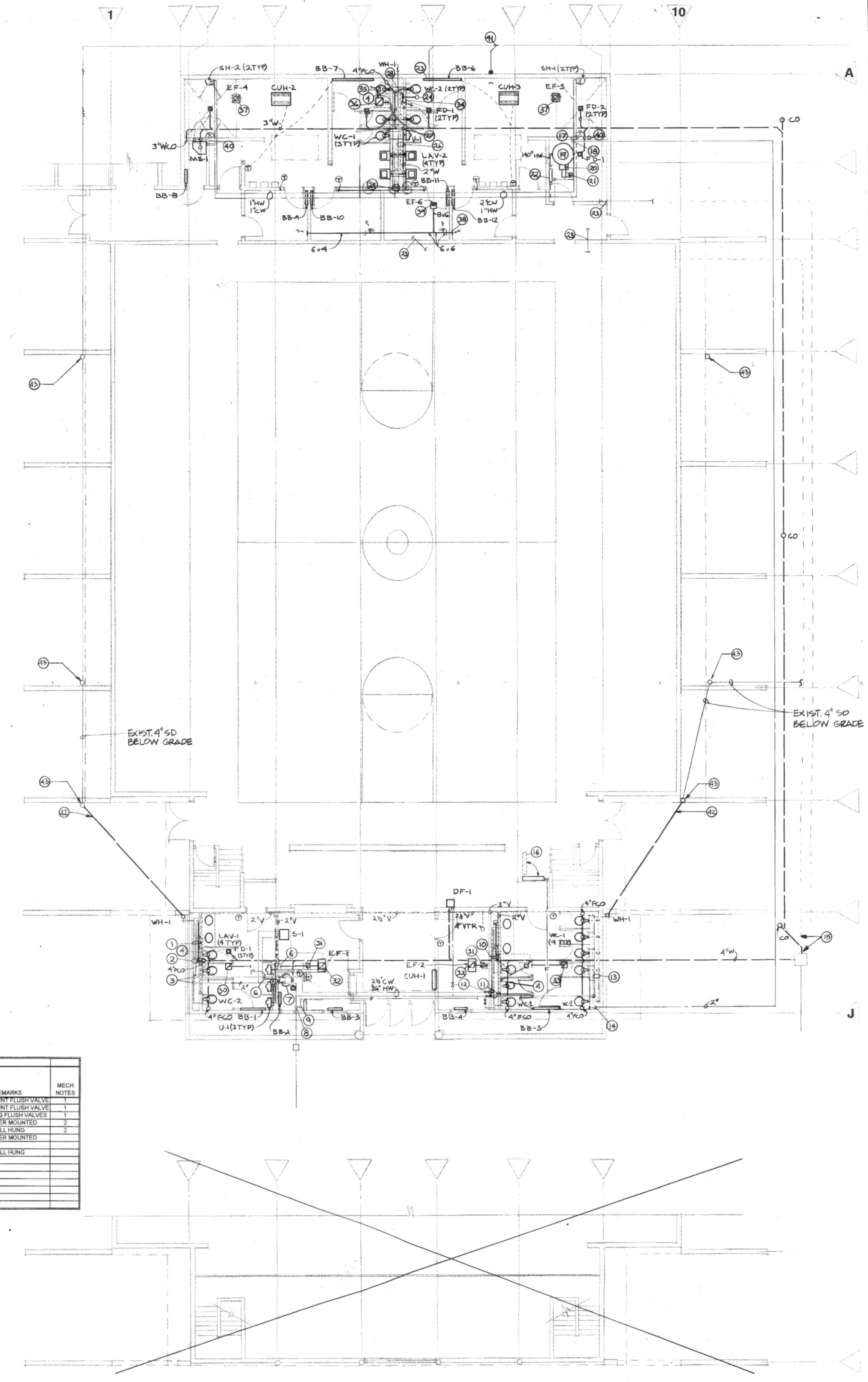
PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE	LOCAL CONNECTIONS (INCH): CW	HW	WASTE	TRAP	VENT	REMARKS	MECH NOTES
WC-1	WATER CLOSET	1	-	4	-	2	FLOOR MOUNT FLUSH VALVE	1
WC-2	WATER CLOSET	1	-	4	-	2	FLOOR MOUNT FLUSH VALVE	1
U-1	URINAL	1	-	2	-	1 1/2	WALL HUNG FLUSH VALVES	1
LAV-1	LAVATORY	1/2	1/2	1 1/2	1 1/2	1 1/2	COUNTER MOUNTED	2
LAV-2	LAVATORY	1/2	1/2	1 1/2	1 1/2	1 1/2	WALL HUNG	2
S-1	SINK	1/2	1/2	2	1 1/2	1 1/2	COUNTER MOUNTED	
MB-1	MOP BASIN	3/4	3/4	3	3	2		
DF-1	DRINK. FTN.	1/2	-	1 1/2	1 1/4	1 1/2	WALL HUNG	
SH-1	GROUP SHOWER	3/4	3/4	-	-	-		
SH-2	GROUP SHOWER	3/4	3/4	-	-	-		
FD-1	FLOOR DRAIN	-	-	2	2	1 1/2		
FD-2	SHOWER DRAIN	-	-	2	2	2		

MECHANICAL NOTES:

GENERAL: COLD WATER SUPPLY TO FLUSH VALVE FOR ITEM WC-1 AND WC-2 TO BE ON RIGHT SIDE OF CENTER WHEN FACING WALL. PIPE SIZES LISTED ARE THE REQUIRED SERVICE SIZE. THE ACTUAL CONNECTED SIZE TO THE ITEM SHALL BE AS REQUIRED BY THE MANUFACTURER OF THE FIXTURES AND EQUIPMENT SUPPLIED.

1. WHERE NOTED IN SCHEDULE, FIXTURE WILL HAVE INTEGRAL TRAP.
2. INSULATE HOT WATER SUPPLY AND TAILPIECE AND TRAP TO COMPLY WITH ADA.



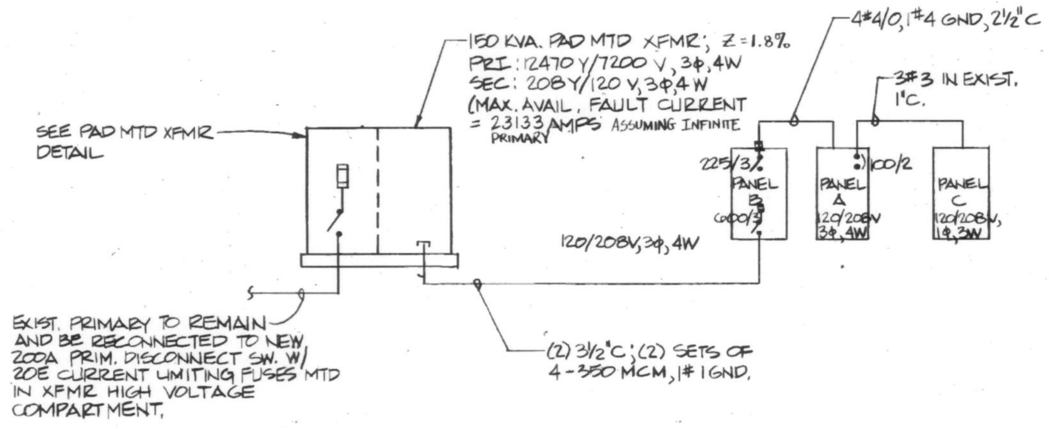
L. THOMAS WARREN, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER
EXPIRES 5/30/96

HVAC, PLUMBING PLANS
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO.118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS
73 94 125 00
JUNE 14, 1994
MP1

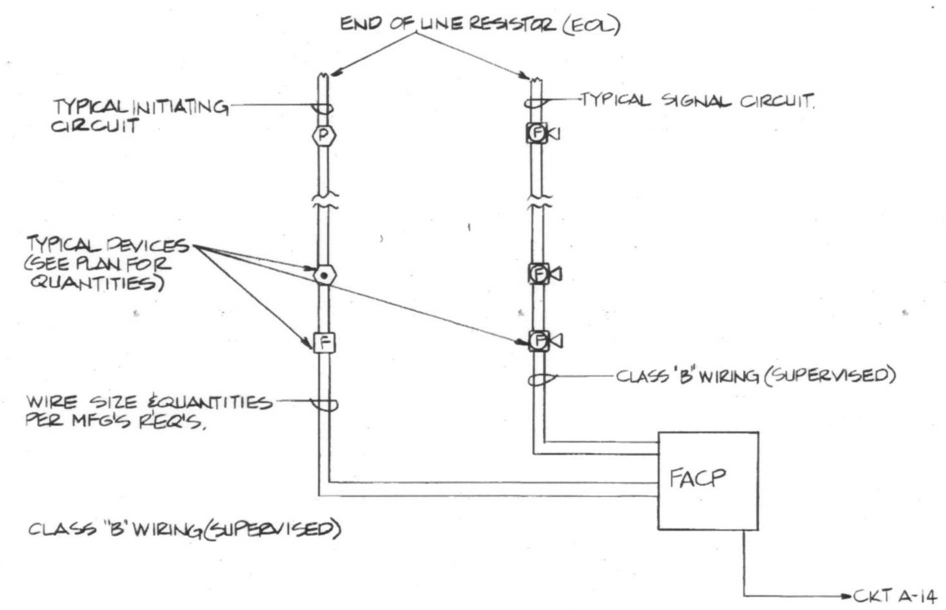
PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

ELECTRICAL LEGEND

- FLUORESCENT LIGHTING FIXTURE SEE FIXTURE SCHEDULE (OPTIONAL RECESS MOUNTED)
- FLUORESCENT LIGHTING FIXTURE SEE FIXTURE SCHEDULE (OPTIONAL SURFACE MOUNTED)
- LIGHTING FIXTURE ON EMERGENCY SYSTEM
- FLOURESCENT STRIP LIGHTING FIXTURE, SIZE PER FIXTURE SCHEDULE
- WALL FIXTURE, BRACKET MOUNTED, SEE FIXTURE SCHEDULE
- EXIT SIGN, CEILING MOUNTED, DIRECTIONAL ARROW AS INDICATED
- EXIT SIGN, WALL MOUNTED, DIRECTIONAL ARROW AS INDICATED
- WALL MOUNTED AREA LIGHT
- S — SWITCH, SINGLE POLE
- S_3 — SWITCH, 3-WAY
- S_{MC} — SWITCH, MOMENTARY CONTACT
- TC — TIME CLOCK
- PC — PHOTOELECTRIC CELL
- C — LIGHTING CONTACTOR
- CONDUIT CONCEALED IN CEILING OR WALLS, POWER
- CONDUIT CONCEALED IN FLOOR OR UNDERGROUND, POWER
- NUMBER OF MARKS SHOWS NUMBER OF #12 WIRES (UON). NO MARKS = 2#12 (UON). RUN WIRE IN 1/2" CONDUIT (UON). LONG SLASH DENOTES A NEUTRAL CONDUCTOR
- CIRCUIT HOME RUN
- SINGLE RECEPTACLE
- DUPLEX RECEPTACLE
- RANGE RECEPTACLE
- J — FLUSH JUNCTION BOX, CEILING MOUNTED
- SUBSCRIPTS:
  - AC = ABOVE COUNTER
  - WP = WEATHERPROOF
  - GFI = GROUND FAULT INTERUPTER
  - D = DEDICATED
- T — TRANSFORMER
- BRANCH CIRCUIT PANEL BOARD
- DISTRIBUTION PANEL BOARD
- SYSTEM GROUND ELECTRODE
- FACP — FILE ALARM CONTROL PANEL
- F — MANUAL FIRE ALARM PULL STATION
- FIRE ALARM HORN WITH VISUAL ALARM SIGNAL
- P — SMOKE DETECTOR – PHOTOELECTRIC TYPE
- HEAT DETECTOR, FIXED TEMPERATURE ONLY, 135 F
- TELEPHONE OUTLET, WALL
- PAY TELEPHONE OUTLET, +60 "A.F.F

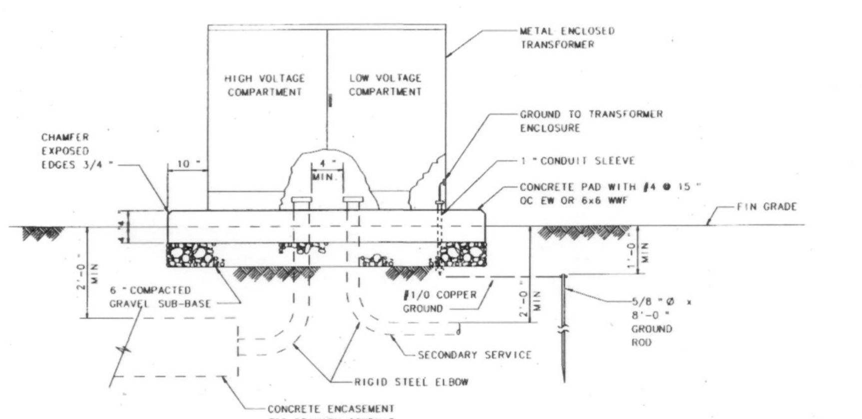


ELECTRICAL DISTRIBUTION RISER DIAGRAM
NO SCALE

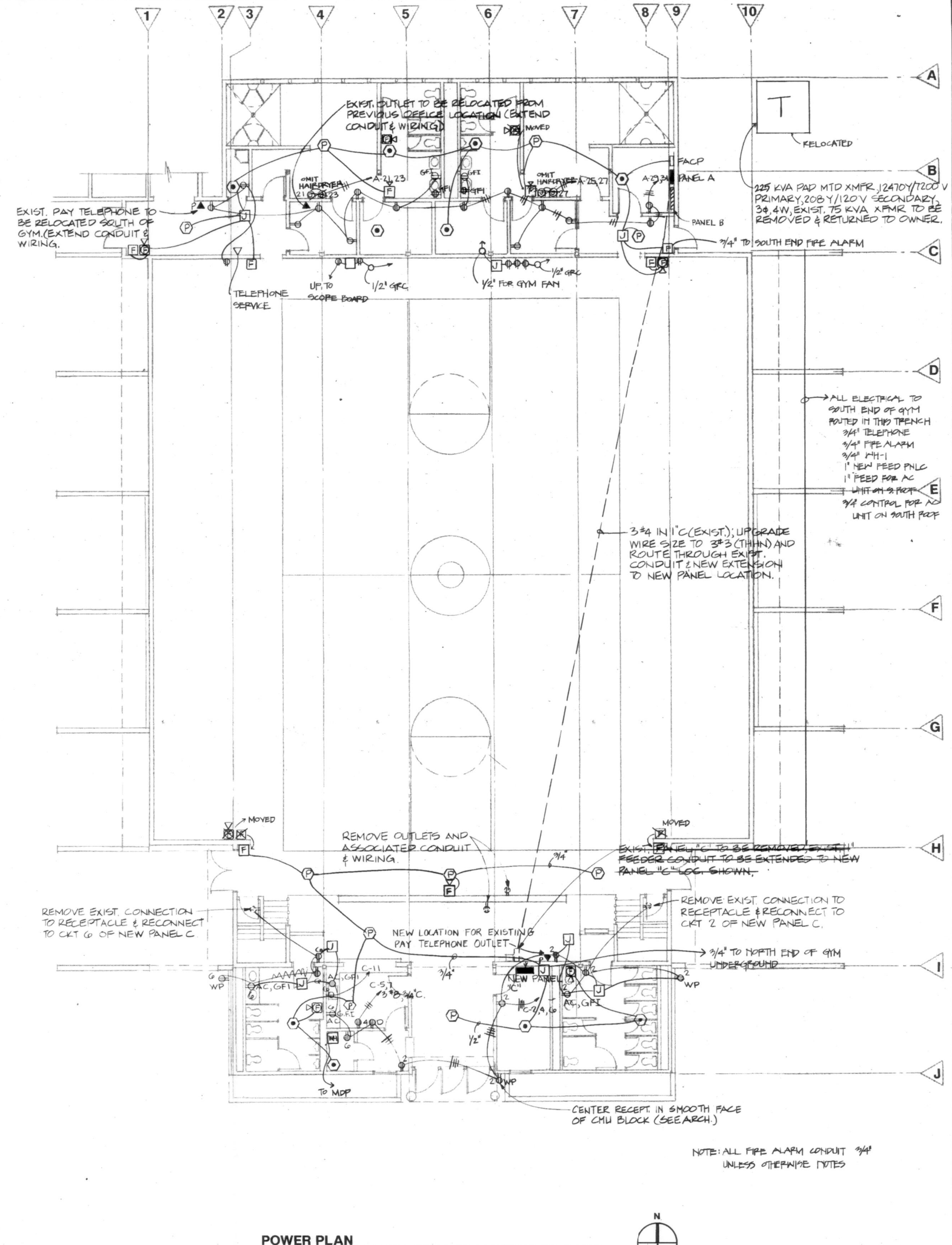


FIRE ALARM RISER DIAGRAM
NO SCALE

VERIFY ALL REQ'S WITH SYSTEM MFG - WIRE QUANTITIES, SIZES, BACKBOXES ADA REQ'S, ETC. SUBMIT DWG'S TO FIRE MARSHALL & RECIEVE APPROVAL PRIOR TO ROUGH-IN.



TRANSFORMER PAD
NO SCALE (REMARK)



POWER PLAN
1/8" = 1'-0"

PROJECT RECORD DOCUMENT
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POWER PLAN
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO. 118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS
DLR Group
73 94 125 00
JUNE 14, 1994
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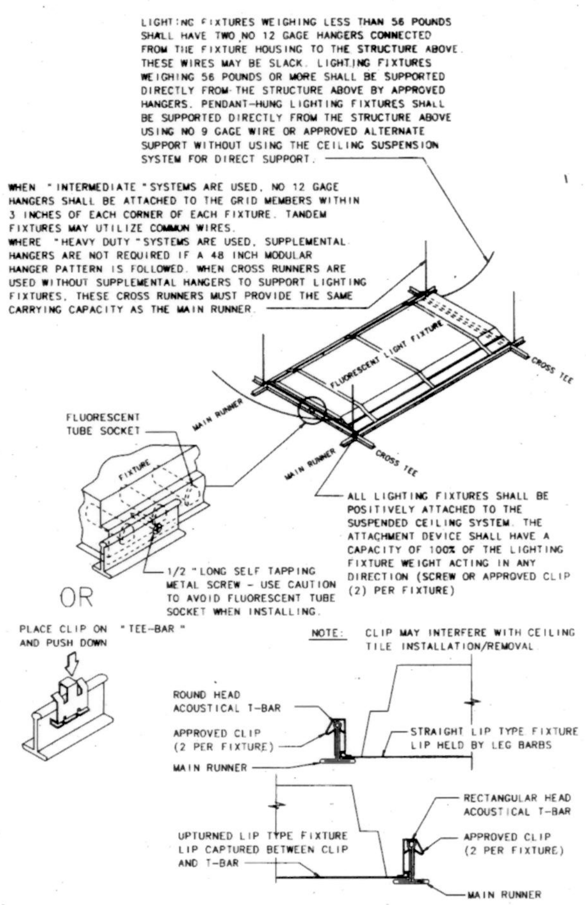
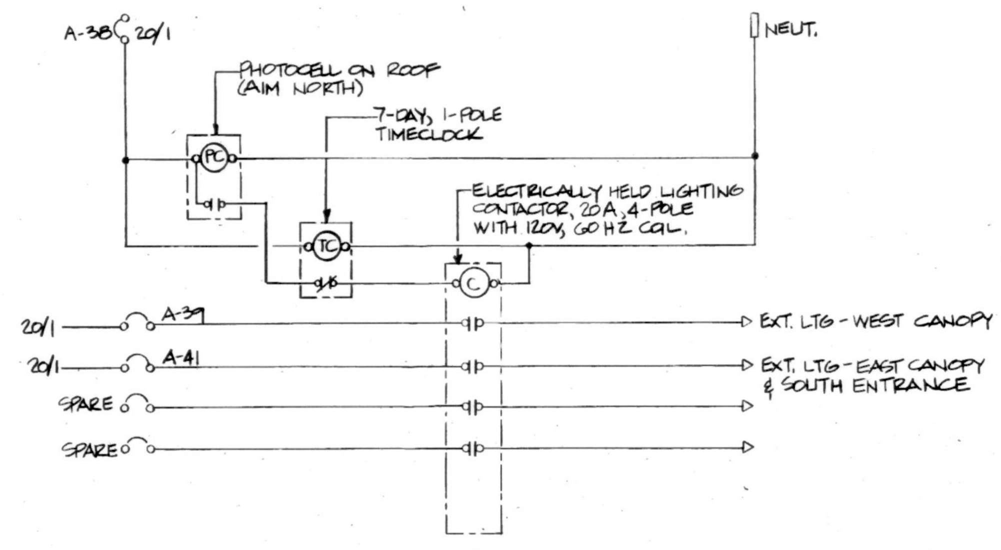


SEISMIC FASTENING OF LAY-IN TYPE LIGHTING FIXTURE

NO SCALE

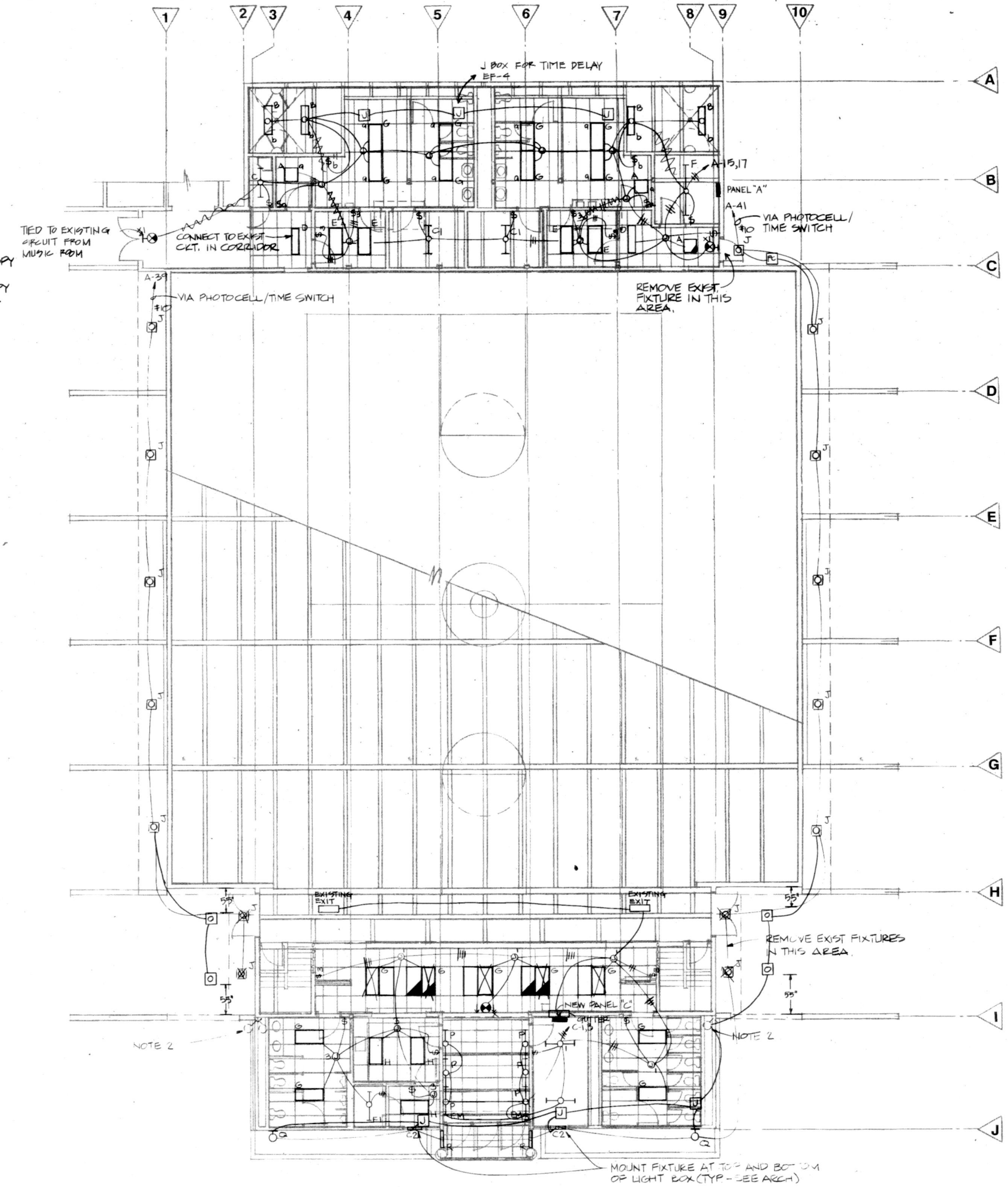


LIGHTING CONTROL SCHEMATIC

NO SCALE

LIGHTING FIXTURE SCHEDULE						
TYPE	MANUFACTURER	CATALOG NO.	LAMP NO.	LAMP TYPE	DESCRIPTION	NOTE
A	COLUMBIA	T8 UJ231 EXA 120	2	F031/41K	2x2 RECESSED FLUORESCENT FIXTURE, HEAVY GAUGE STEEL HOUSING, HIGH GLOSS BAKED WHITE ENAMEL FINISH, 100% ACRYLIC PRISMATIC LENS	1,2
B	COLUMBIA	T8 LUN232-WL 120	2	F032/41K	7-9/16" W x 4' L, FIBERGLASS FLUORESCENT FIXTURE, NEOPRENE GASKETING, U.L. WET LOCATION, SURFACE MTD., IMPACT RESISTANT MOLDED ACRYLIC DIFFUSER	1,2
C	COLUMBIA	T8 CS132 120	1	F032/41K	4-7/16" W x 4' L, STRIP FLUORESCENT FIXTURE, DIE FORMED STEEL HOUSING, BAKED WHITE ENAMEL FINISH, SURFACE MTD.	1,2
C1	COLUMBIA	T8 CS232 120	2	F032/41K	SAME AS TYPE "C" EXCEPT 2 LAMPS	1,2
C2	COLUMBIA	T8 CS117 120	1	F017/41K	SAME AS TYPE "C" EXCEPT 2' LONG	1,2
D	COLUMBIA	T8 J240-EXA 120	2	F032/41K	1x4 RECESSED FLUORESCENT FIXTURE, HEAVY GAUGE STEEL HOUSING, HIGH GLOSS BAKED WHITE ENAMEL FINISH, 100% ACRYLIC PRISMATIC LENS	1,2
E	COLUMBIA	T8 6112-52-243-120	3	F032/41K	2' x 4' SURFACE MTD. FLUORESCENT FIXTURE, STEEL HOUSING, MITERED CORNERS, 100% ACRYLIC PATTERN 12 LENS, BAKED WHITE ENAMEL FINISH.	1,2
F	COLUMBIA	T8 KL232-8-120	2	F032/41K	13-3/8" W x 8' L, TANDEM INDUSTRIAL FLUORESCENT FIXTURE, HEAVY STEEL HOUSING, DIE EMBOSSED REFLECTOR WITH TRANSVERSE RIBS, 15% UPLIGHT.	1,2
F1	COLUMBIA	T8 KL232 120	2	F032/41K	SAME AS TYPE "F" EXCEPT 4' LONG AND NOT TANDEM WIRED	1,2
G	COLUMBIA	T8 2J240 EXA 120	2	F032/41K	2' x 4' RECESSED FLUORESCENT FIXTURE, HEAVY GAUGE STEEL HOUSING, HIGH GLOSS BAKED WHITE ENAMEL FINISH, 100% ACRYLIC PRISMATIC LENS.	1,2
H	COLUMBIA	T8 2J340 EXA 120	3	F032/41K	SAME AS TYPE "G" EXCEPT 3 LAMPS.	1,2
J	RUUD	MRC0410-1	1	100 WATT METAL HALIDE	12" W x 12" L X 5" D, RECESSED CANOPY FIXTURE, DIE CAST ALUMINUM HOUSING, WHITE ACRYLIC POWDER FINISH, TEMPERED GLASS LENS, U.L. WET LOCATION	
P	PEERLESS	ECX-020002-T8	2	F032/41K	RECESSED FLUORESCENT COVE FIXTURE, INTEGRAL BALLAST, 7-1/4" W x 3-3/4" D COVE, ONE PIECE CR SHEET STEEL HOUSING, 4' LENGTHS	1,2
C2	QUALITY	DL-10-S-PLC22-120	1	PLC 15MM/ F017/41K	WALL MOUNTED COMPACT FLUORESCENT FIXTURE, DIE CAST SAME AS TYPE "C" EXCEPT 2' LONG RESISTANT LENS, U.L. WET LOCATION	3
R	GAMMALUX	GD63WU-240RS-120VESB-4WM-APL-BZ	2	F40CW/SS	FLUORESCENT UPLIGHT, ACRYLIC LENS, ENERGY-SAVING ELECTROMAGNETIC COLD WEATHER BALLAST, 6" X 3" X 4' L, WHITE PAINTED FINISH, 120V, BEAM MOUNTED.	
X	DUAL-LITE	CDGWW-LED		LED	L.E.D. EXIT SIGN WITH DIFFUSER LENS, WHITE WITH GREEN LETTERS, CEILING MTD., DOUBLE FACE, WITH EMERGENCY BATTERY.	
X1	DUAL-LITE	CDGWW-LED		LED	SAME AS TYPE "X" EXCEPT SINGLE FACE AND WALL MTD.	

NOTES:
1. ELECTRONIC BALLASTS SHALL BE INSTALLED TO SERVE LIGHT FIXTURE
2. ALL LAMPS SHALL BE RAPID START TYPE, 265 MILLIAMPS.
3. NORMAL POWER FACTOR MAGNETIC BALLAST SHALL BE INSTALLED TO SERVE LIGHT FIXTURE.



GENERAL NOTES:
1. ALL EXIT SIGNS AND EMERGENCY LIGHTS SHALL HAVE AN UNSWITCHED HOT WIRE.
2. REMOVE EXIST. FIXTURES, CONDUIT, WIRING ETC. SOUTH BUILDING FACADE.

LIGHTING PLAN

1/8" = 1'-0"

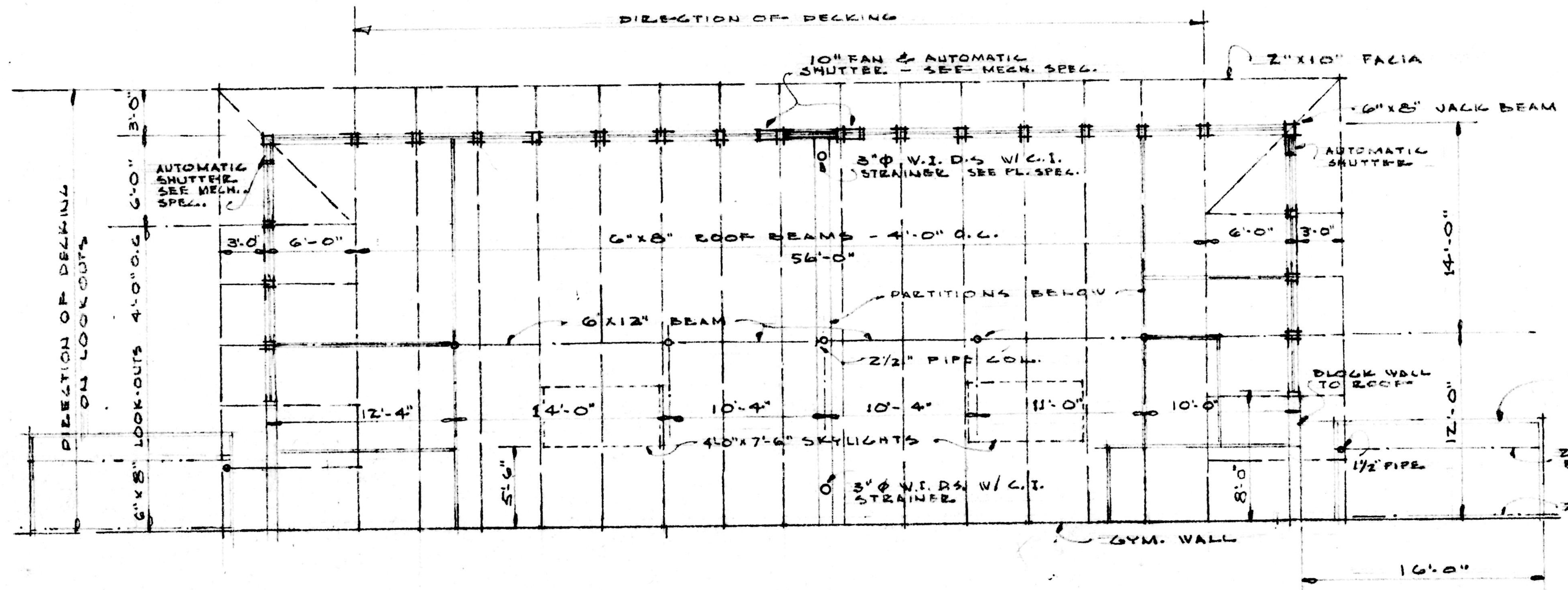
N

PROJECT RECORD DOCUMENT
REVISIONS TO THESE DOCUMENTS HAVE BEEN MADE FROM INFORMATION PROVIDED BY THE CONTRACTOR

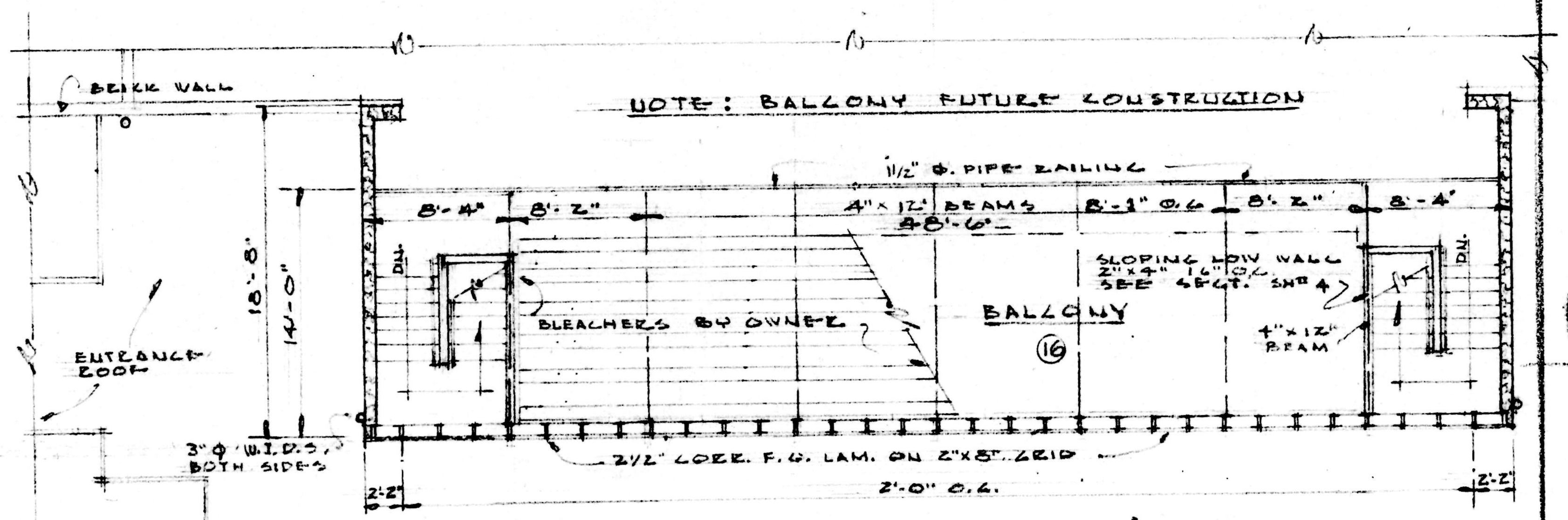
LIGHTING PLAN
GYMNASIUM RENOVATIONS SOUTH BEND SCHOOL DISTRICT NO. 118
JOHN GRAHAM ASSOCIATES ARCHITECTS AND ENGINEERS
E2
DLR Group
73 94 125 00
JUNE 14, 1994


WATER ST.
8" SEWER
M.H.
TRANSFORMER
275'-0"
PROPERTY LINE
FIN. GRADE AT PROP. LINE 8.6' ELEV.
GIRLS' PLAY AREA
PARKING AREA
CROWN TO 9.0' ELEV. & SLOPE TO PROP. LINE
LOTS 12-21
OWNED BY OTHERS
ALLEY (UNIMPROVED)
ADAMS ST.
ELEV. FIN. FL. 9.6'
FIN. GRADE AT PROP. LINE TO 8.6' ELEV.
FUTURE SIDEWALK
6" WOOD WATER MAIN
FIRST ST.
8" SEWER
FUTURE SIDEWALK
JEFFERSON ST.
SHOP
HIGH SCHOOL B'LD'G.
NORTH
OMIT
GROUT
CAULKING
ASPHALT SAT. PAPER
EXPANSION JOINT FOR BLOCK WALL
SLAB CONSTRUCTION JOINT
LEGEND
PROPERTY LINE
ELECTRIC SERVICE
SEWER LINE
WATER LINE
DRAIN PIPE
FIN. GRADE ELEVATION
EXISTING GRADE ELEVATION
1" I.P. LOCATED 0.28' N, 0.15' E. OF S.E. CORNER.
GENERAL NOTES
1. PLAN DIMENSIONS ARE TO OUTSIDE FOR BLOCK WALLS & TO ℄ OF INTERIOR NON-BEARING PARTITIONS.
2. LIVE LOAD ON FLOOR - GYM & BALCONY 100 PSI - OTHER 40 PSI.
3.(a) LAP ENDS OF REINF. ST. IN CONT. RUNS 10" OR WEL
(b) IMBED ENDS AT SUPPORT 10 DIA. OR HOOK.
4 (a) BLOCK WALLS - FILL 3 ADJ. VOIDS W/ CONC. AT CORNERS & INTERMEDIATE POINTS SHOWN ON PLANS & REINF. W/ 3-1/2"
(b) STUB UP 3-1/2" Φ X 36" ST. DOWELS W/ 18" EXPOSED FROM FOUNDATION & WELD TO VOID REINF. W/ 6" LAP
(c) LAY K-WEB REINF. EVERY 3RD. COURSE.
(d) REINF. BOND BEAM W/ 2-1/2" Φ THRU-OUT.
5. MAXIMUM LOAD FOR 30' PILES, 10 T./PILE. RECORD SHALL BE KEPT FOR PILE.
6. ALL PIPE DIM. INDICATE INSIDE DIAMETER.
7. NUMBERED SECTIONS ON ANY SHEET ARE DETAILED ON SAME SHEET.
8. ALLOW SLEEVE-THRU FOR ALL PLUMBING PIPES & ELECT. CONDUITS.
DISCRIPTION
LOTS 1-11, 22-32 - BLOCK 4 - LANDS COMPANY SECOND ADDITION WITH VACATED ALLEY.
SCALE 1" = 20'-0"
PLOT PLAN
PHYSICAL ED. UNIT
- FOR -
SCHOOL DIST. #118
SOUTH BEND WASHINGTON
CHARLES A. BAYLON
ARCHITECT
ABERDEEN, WASHINGTON
CHARLES A. BAYLON
LICENSE RENEWED TO JUNE
1953
TL 469
STATE OF WASHINGTON
REGISTERED ARCHITECT
DATE 31 DEC. 1952
REVISIONS 5/14/53
12.1
1

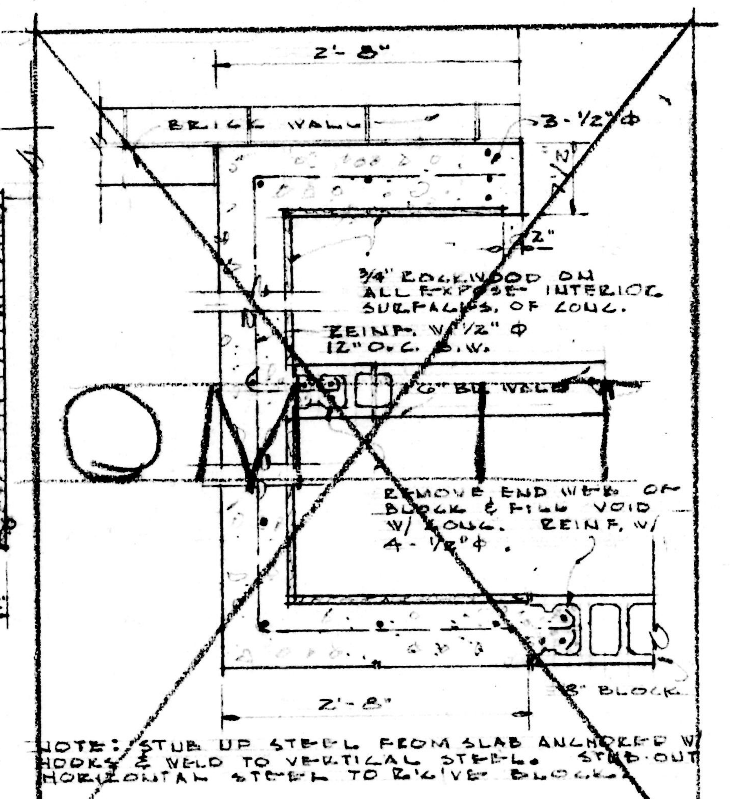

SECTION ① ①
SECTION ③ ③
SECTION ⑤ ⑤
SECTION ② ②
SCALE 3/4" = 1'-0"
HINGE DETAIL
SCALE 1 1/2" = 1'-0"
ELEVATIONS
SCALE 1/2" = 1'-0"
PLAN
SCALE 3/8" = 1'-0"
ARCH FOOTING DETAIL
SECTION ② ②
SECTION ③ ③
PLANT BOX DET.
SCALE 3/4" = 1'-0"
SECTION ④ ④
PARTITIONS
SHOWER ROOM DET.
SHOWER HEAD DET.
SCALE 3/4" = 1'-0"
FOUNDATION PLAN
SCALE 1/8" = 1'-0"
LEGEND
GLAZED BLOCK
CONCRETE
EXPANDED SHALE BLOCK - 8"x8"x16" UNLESS NOTED OTHERWISE - SHOWING CONC. FILLED VOIDS.
BRICK
STUD WALL - 2"x4" - 16" O.C. UNLESS NOTED OTHERWISE.
BLANKET INSULATION
CHARLES A. BAYLON
LICENSE RENEWED TO JUNE 1953
TL 469
STATE OF WASHINGTON
REGISTERED ARCHITECT
FOUNDATION PLAN
PHYSICAL ED. UNIT
FOR
SCHOOL DIST. #118
SOUTH BEND WASHINGTON
CHARLES A. BAYLON
ARCHITECT
209 W. WISHKAH ABERDEEN, WASHINGTON
DATE 27 FEB 1953
COM. NO. 121
REVISIONS 5/14/53



SHOWER UNIT ROOF PLAN



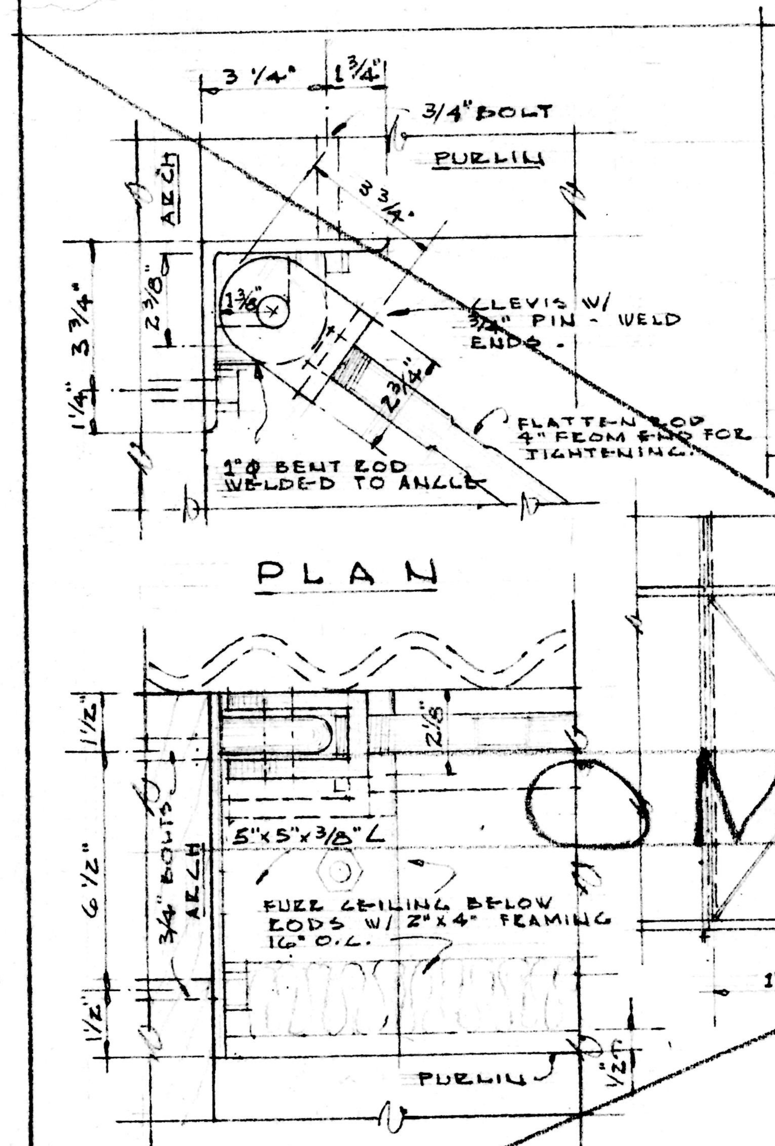
BALCONY FLOOR PLAN



CONC. WALL JOINT DET.
SCALE 3/4" = 1'-0"

ROOM FINISH SCHEDULE

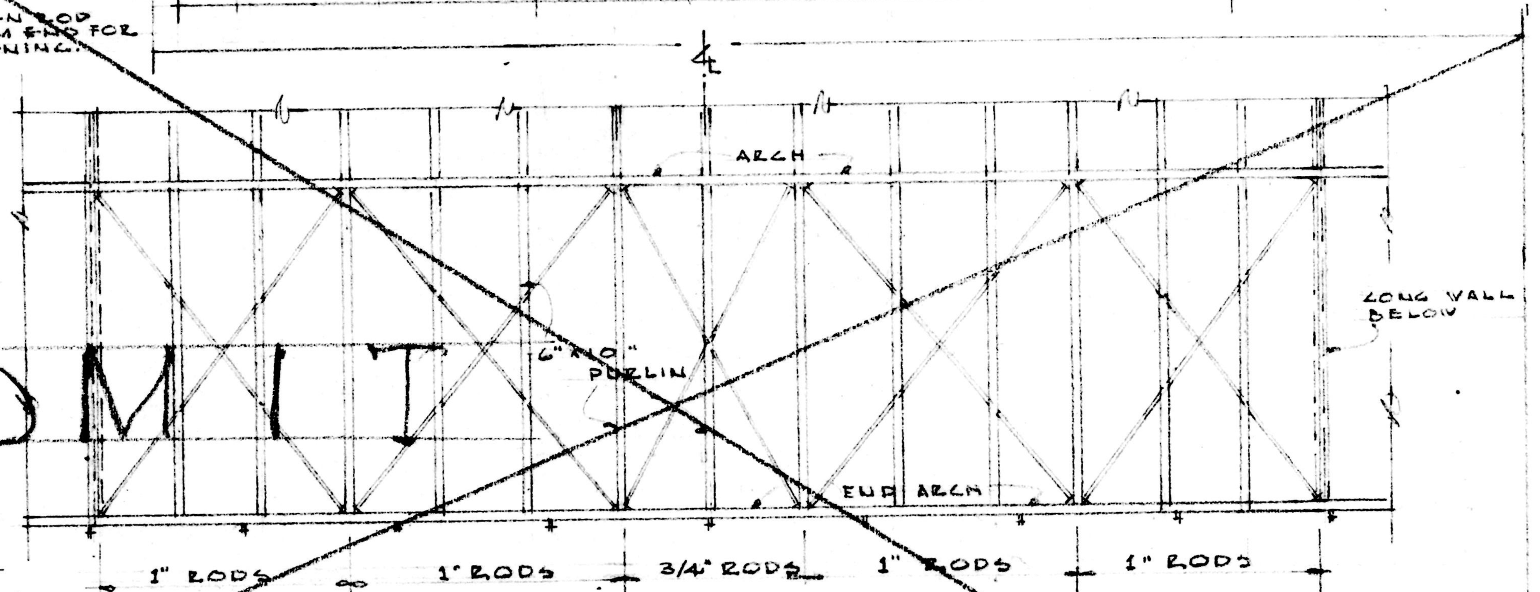
NO.	SPACE	FLOOR	FINISH	WALL	FINISH	CEILING	FINISH	TRIM	FINISH	BASE	FINISH	REMARKS
1	GYMNASIUM	CONC. SLAB	MAPLE T&G	EXP. SHALE BLOCK	FUTURE	FIR T&G DECKING	FUTURE	FIR	ENAMEL	METAL COVE	NONE	
2&3	TICKET BOOTHS	"	CEMENT	E.S. BLOCK & MASONITE	"	"	"	"	"	4" VINYL	"	FUTURE CONSTRUCTION
4&5	TOILETS	"	"	"	"	"	"	"	"	"	"	FUTURE CONSTRUCTION
6	STORAGE RM.	"		"	"	"	"	"	"	"	"	FUTURE CONSTRUCTION
7&8	HALLS	"	"	"	"	"	"	"	"	"	"	
9&10	INSTRUCTOR'S RM.	"	"	"	"	"	"	"	"	"	"	
11&12	EQUIPMENT STOR.	"	"	"	"	"	"	"	"	"	"	
13	JANITOR & TANK RM.	"	"	"	"	"	"	"	"	"	"	
14&15	SHOWER RM.	"	"	"	ENAMEL	2" ULTRA-LITE INS.	NONE	"	"	"	"	ULTRA-LITE INSUL. TO HAVE VINYL FACE.
16	BALCONY	FUTURE		EXP. SHALE BLOCK	FUTURE			"	"	"	"	FUTURE CONSTRUCTION



END JOINT DETAIL
SCALE 3" = 1'-0"

DOOR SCHEDULE

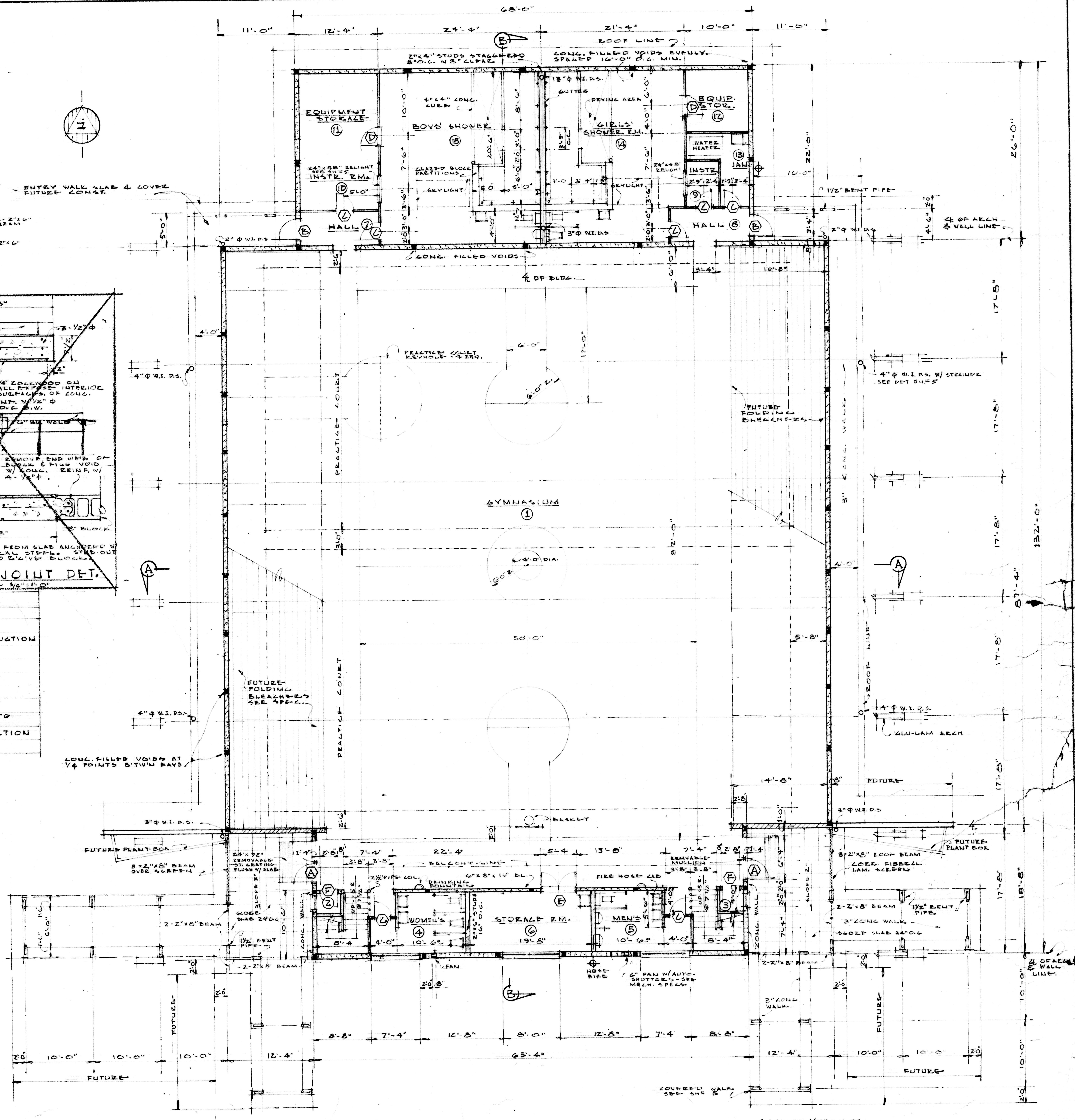
SYM.	SIZE	TYPE	REMARKS
A	3'-0" x 6'-8" x 1 3/4"	FLUSH SOLID CORE	EXTERIOR - DOUBLE W/ REMOVABLE MULLION
B	3'-0" x 6'-8" x 1 3/4"	" " "	EXTERIOR.
C	2'-8" x 6'-8" x 1 3/4"	FLUSH HOLLOW CORE	INTERIOR - TOP & BOTTOM LOUVRES IN RM. # 9, 10 & 13
D	2'-8" x 6'-8" x 1 3/4"	" " "	DUTCH W/ 12" COUNTER. TOP 3'-0" ABOVE FIN. FL.
E	2'-6" x 6'-8" x 1 3/4	" " "	" " "
F	2'-4" x 6'-8" x 1 3/4"	" " "	INTERIOR - TOP & BOTTOM LOUVRES.



NOTE: TRUSS SOUTH END BAY (OVER BALCONY) ONLY. DRILL PURLINS TO RECEIVE RODS. RODS TO HAVE RT. HAND THREAD ON ONE END & LT. HAND THREAD ON OTHER.

ROOF PLAN
SCALE 1/8" = 1'-0"

SOUTH ROOF BAY DET.



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

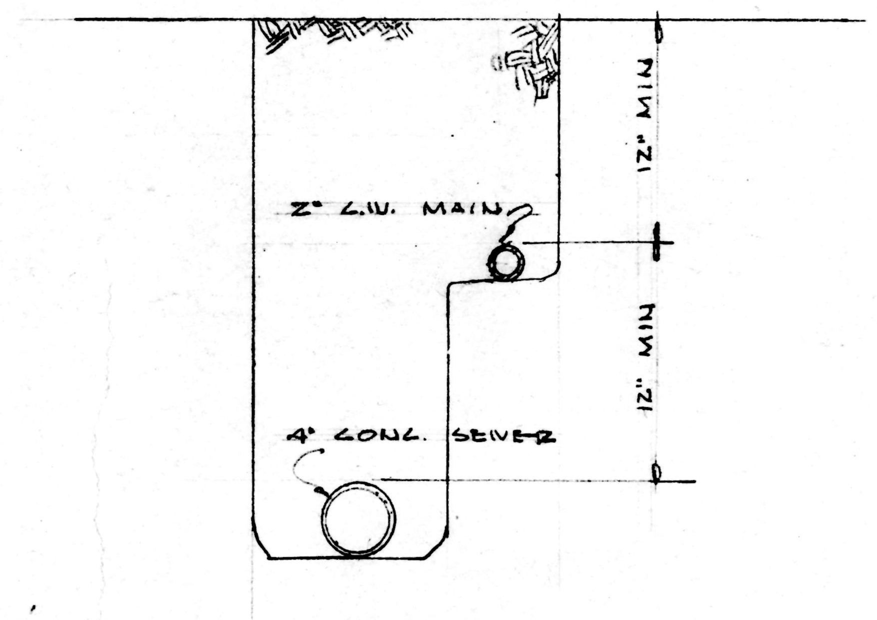
FLOOR PLAN
PHYSICAL ED. UNIT
FOR
SCHOOL DIST. #118
SOUTH BEND WASHINGTON

CHARLES A. BAYLON
ARCHITECT
209 W. WISHKAH · ABERDEEN, WASHINGTON

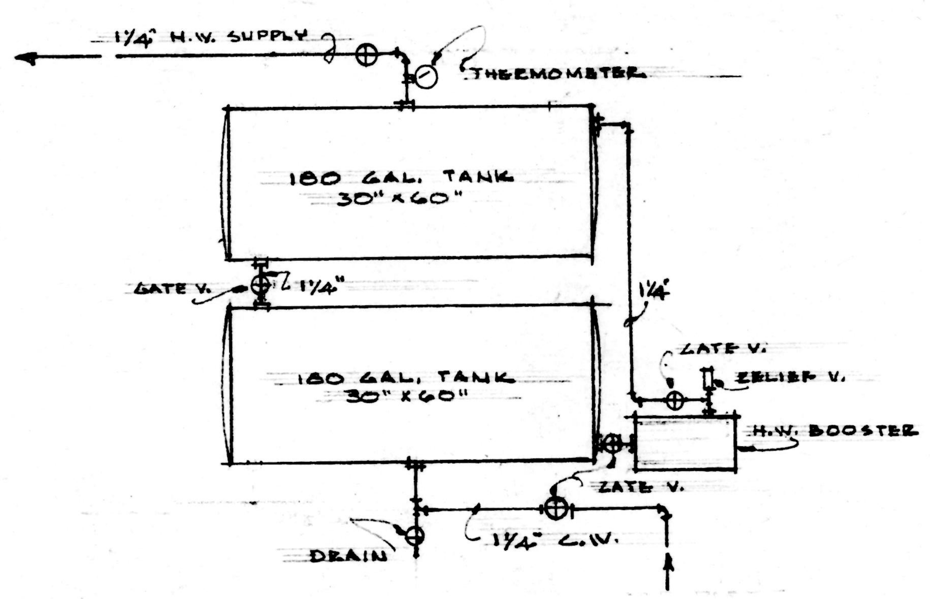
DRAWN | DATE 27 FEB 1953 | 121
TRACED | REVISIONS 5/14/53
CHECKED


WEST ELEVATION
(EAST ELEVATION SAME)
SOUTH ELEVATION
SKYLIGHT DET.
(SEE MAIN ROOF DET. SH. #5)
TICKET WINDOW DET.
ELEVATION
HEAD
SILL
SECTION A-A
NORTH ELEVATION
SECTION B-B
HALF ELEVATION
GLUE-LAM ARCH DET.
NOTE: GROOVE SOFFIT OF NORTH & SOUTH END ARCHES ONLY.
ARCH SECTION
SCALE 1/8"=1'-0" (ELEV. & SECT.)
ELEVATIONS & SECTIONS
PHYSICAL ED. UNIT FOR SCHOOL DIST. #118
SOUTH BEND WASHINGTON
CHARLES A. BAYLON
ARCHITECT
ABERDEEN, WASHINGTON
CHARLES A. BAYLON
LICENSE RENEWED TO JUNE 1, 1953
TL 469
STATE OF WASHINGTON
REGISTERED ARCHITECT
DATE 27 FEB 1953
REVISIONS: 5/14/53
121
4

HEAD
FIXED SASH
SILL
VENT SASH
NOTE: JAMBS SIMILAR. VENT HARDWARE - WHITCO - SEE SPEC.
for REAR UNIT
HEAD
BLOCK JAMB SIMILAR
JAMB
AT WALL TRUSS
SILL
for SOUTH WALL
FENESTRATION DET.
HEAD
JAMB SIMILAR
SILL
EXTERIOR DOOR DET.
SECTION 3 3
REAR UNIT ROOF DET.
SKYLIGHT DET.
for SHOWER RM.
BALCONY DET.
FUTURE
NOTE: SECTION AT STAIRS - CONSTRUCTION TYPICAL.
SECTION 2 2
SECTION 1 1
OVERHANG & SKYLIGHT DET.
GUTTER AT BRICK WALL
MAIN ROOF DETAILS
DOOR JAMB
CEILING ANCHOR
WALL & FLOOR ANCHOR
COLUMN ANCHOR
JAMB, HEAD, & SILL
RELIGHT & PANEL DET.
PARTITION BOARD
JOINT DET.
SECTION 5 5
SECTION 6 6
WALL TRUSS DET.
WING WALL
LIGHT DET.
HAND RAIL
HAND-RAIL &
STAIR DET.
FUTURE
AT REAR EXIT
FUTURE
SECTION 4 4
AT MAIN ENTRANCE
COVERED PORCH DET.
TYPICAL PLAN
ELEVATION (AT SOUTH END)
NORTH WALL
SIDE WALLS
SOUTH END
JOINTS
ELEVATION
(AT EAST, WEST & NORTH WALL)
BACKSTOP DET.
CHARLES A. BAYLON
REGISTERED ARCHITECT
STATE OF WASHINGTON
TL 469
DETAILS
PHYSICAL ED. UNIT
FOR
SCHOOL DIST. #118
SOUTH BEND WASHINGTON
CHARLES A. BAYLON
ARCHITECT
DATE 27 FEB 1953
5/14/53



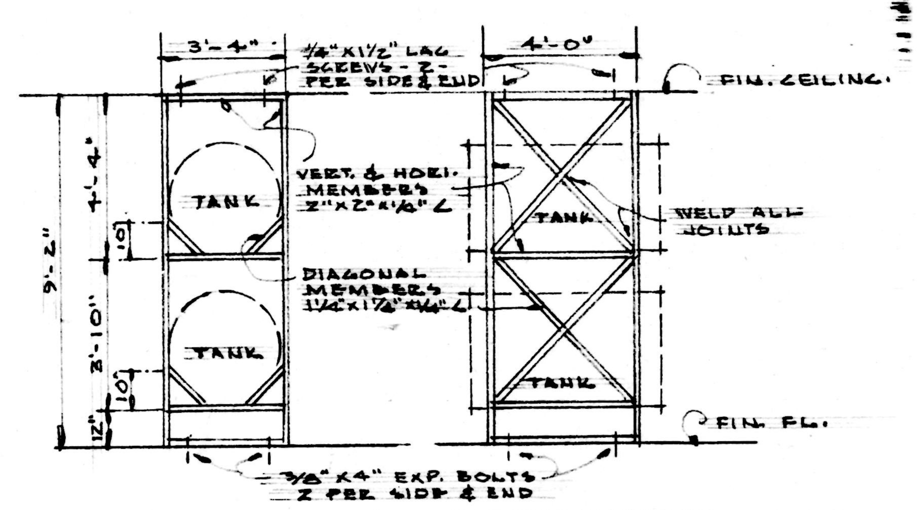
SEWER TRENCH DET.
(W/ C.W. MAIN)



WATER HEATER DIAGRAM
NO SCALE

LEGEND

- CAST IRON SOIL OR WASTE PIPE
- —S— SEWER PIPE, CONC. W/ HUB-END
- —D— DRAIN " " " "
- COLD WATER LINE
- HOT " "
- C.O. CLEAN OUT.
- V.T.R. VENT THRU ROOF.
- F.D. FLOOR DRAIN
- HOSE BIBB.
- PLUMBING FIXTURE SYMBOL.
- —F— FIRE LINE

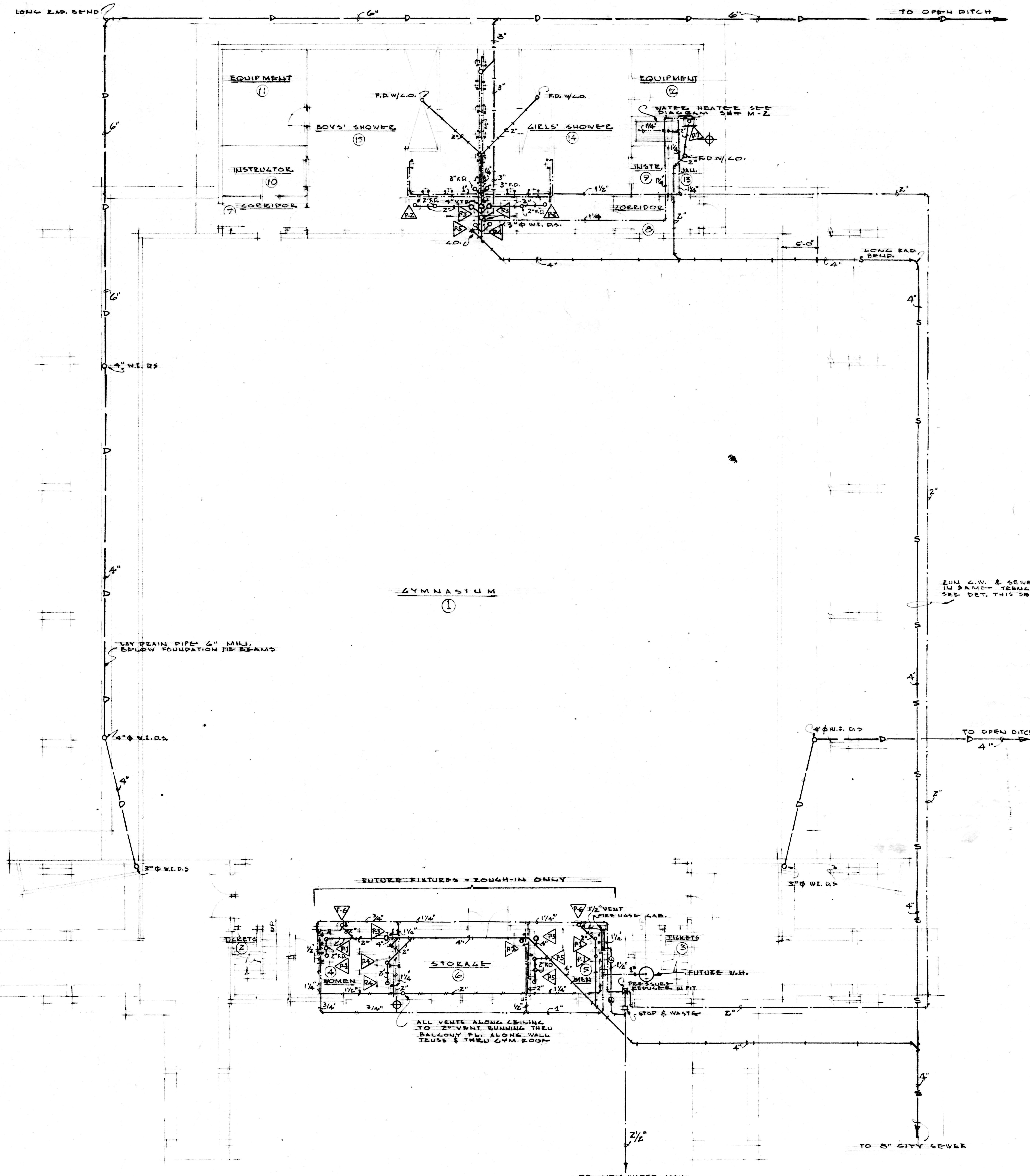


END VIEW SIDE VIEW

WATER TANK RACK DET.
SCALE 1/4"=1'-0"

NOTES

1. HOSE BIBBS -- NON-FREEZE TYPE WALL HYDRANT (SEE SPEC.). STUB UP PIPE THRU FLOOR 6" FROM INSIDE WALL LINE & SLEEVE THRU WALL 12" ABOVE FIN. FL.
2. RUN H.W. MAIN IN STEAM TRENCH - SEE DET. SH# M-2
3. SLOPE DRAIN & SEWER MAINS 1/8"/FOOT.
4. ALL D.S SHALL BE WROUGHT IRON W/ STRAINER - SEE SPEC.
5. SLEEVE THRU CONC. SLAB FOR PIPES.



FLOOR PLAN

PLUMBING
PHYSICAL ED. UNIT
FOR
SCHOOL DIST. #118
SOUTH BEND WASHINGTON

CHARLES A. BAYLON

27 FEB 1953
5/14/53
2 M-1

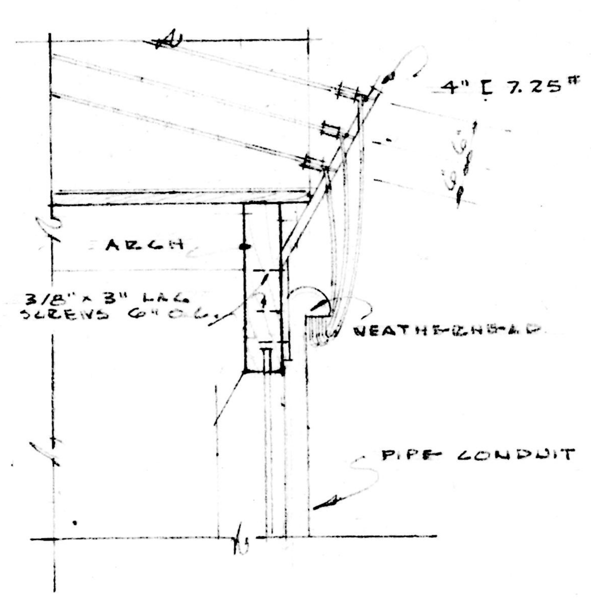
CIRCUIT SCHEDULE

NO.	POLE	FUSE AMP	TYPE	WIRE*	COND
			PANEL A		
A-1	1	20	LIGHTING	2-#12	1/2"
A-2	1	20	"	2-#10	3/4"
A-3	2	30	"	3-#10	3/4"
A-4	2	30	"	3-#8	3/4"
A-5	2	30	"	3-#8	3/4"
A-6	2	20	"	3 #6	1"
A-7	2	20	"	3 #10	3/4"
A-8	2	30	"	3-#6	1"
A-9	1	30	DUPLEX & SCORE B'RD	2-#10	3/4"
A-10	1	20	FANS	2-#12	1/2"
			PANEL B		
B-1	2	100	UNIT HEATERS (MT. HT. 16'-0")	3-#2	1 1/4"
B-2	2	100	"	3-#2	1 1/4"
B-3	2	100	"	3-#1	1 1/2"
B-4	2	100	"	3-#2	1 1/4"
B-5	2	35	"	3-#8	3/4
B-6	2	35	"	3-#8	3/4"
B-7	2	120	WATER HEATER	3-1/0	2"
	1	20	EXIT LIGHTS	2-#12	1/2"
	1	20	FIRE ALARM	2-#12	1/2"

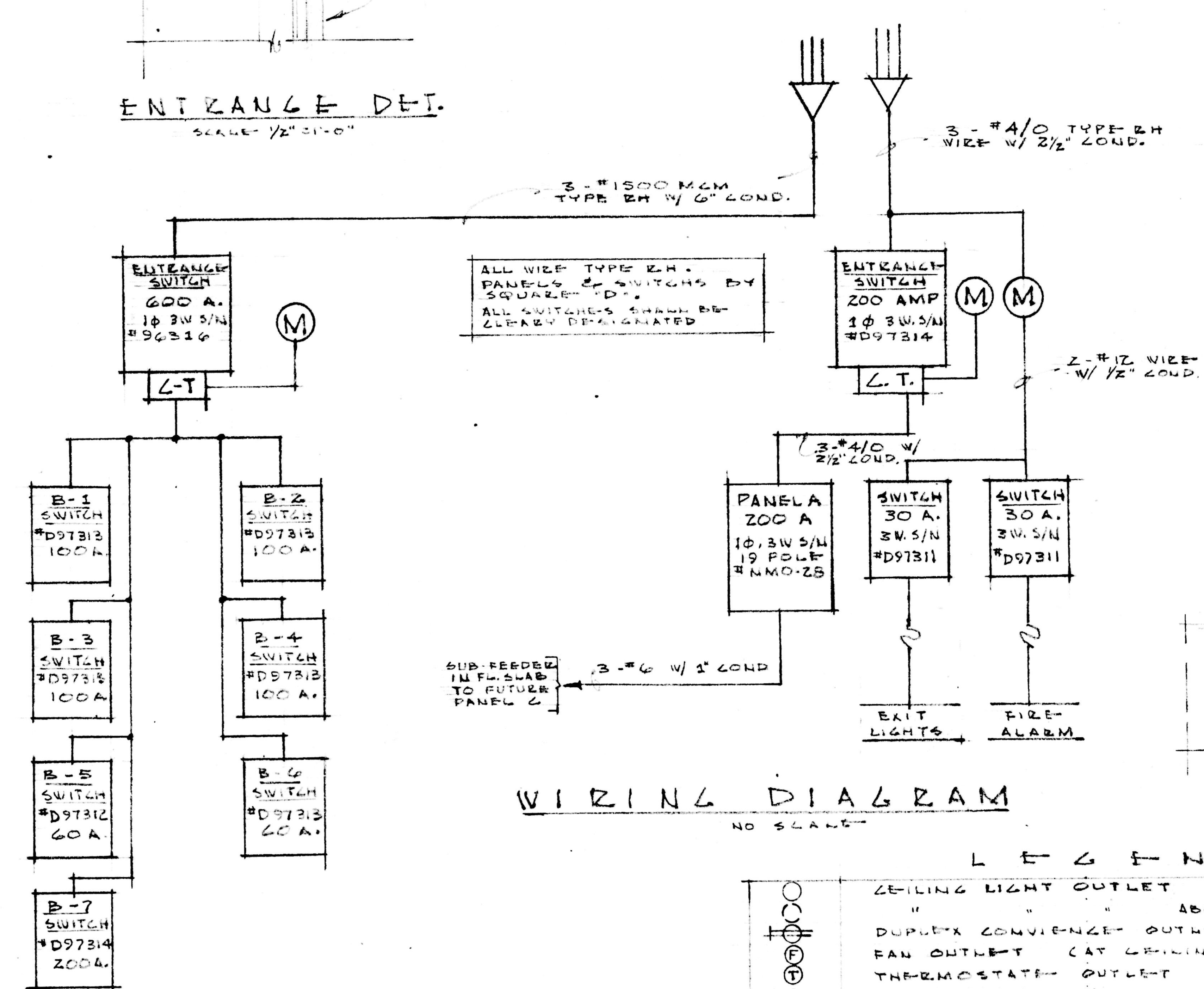
* SIZE OF WIRE TO NEAREST OUTLET. CONTINUE WITH SMALLER WIRE ACCORDING TO CODE BUT NOT SMALLER THAN #12, ALL WIRE TYPE RH.

HEATING UNITS

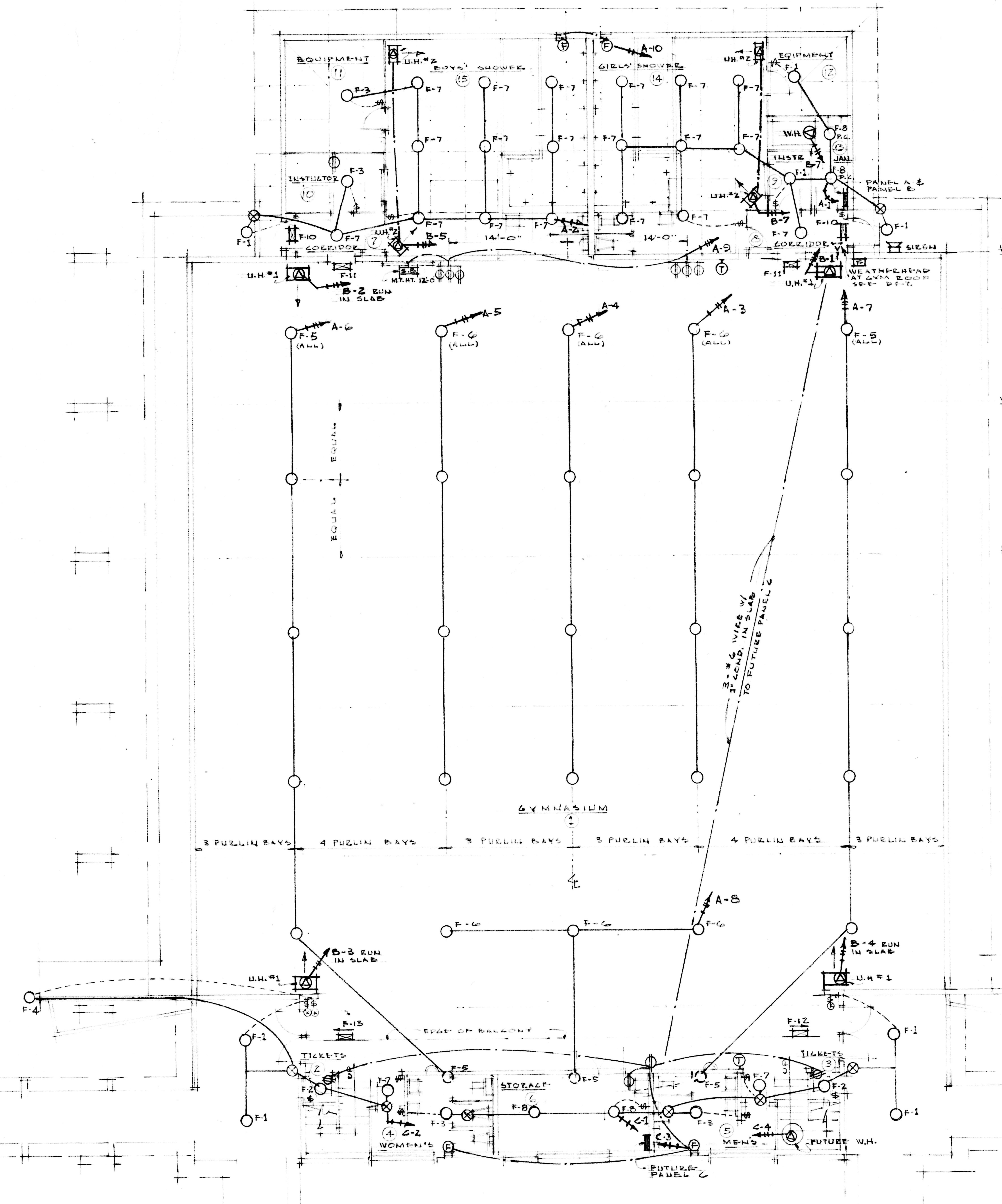
U.H #1 - WESSEX 20 K.W. #20CU18 UNIT HEATER
U.H #2 - I.L.G. 4 K.W. #410 H.T. UNIT HEATER
WATER HEATER COIL - COATES 28 KW #12228K



ENTRANCE DET.
SCALE 1/2" = 1'-0"



WIRING DIAGRAM
NO SCALE



NOTE: ROOMS W/ ONE LIGHT - CENTER FIXTURE; ROOMS W/ TWO OR MORE LIGHTS - SPACE EQUALLY EACH WAY W/ 1/2 OF SPACE FROM WALLS UNLESS OTHERWISE DIMENSIONED.

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

LEGEND

- CEILING LIGHT OUTLET
- " " " ABOVE BALCONY
- DUPLEX CONVIENCE OUTLET (12" ABOVE FIN. FL.)
- FAN OUTLET (AT CEILING)
- THERMOSTATE OUTLET
- JUNCTION BOX (TO LIGHT FIXTURE)
- METER
- FIRE SIREN (8'-0" ABOVE FIN. FL.)
- BREAK-GLASS STATION (5'-0" ABOVE FIN. FL.)
- SCORE-BOARD OUTLET (12'-0" ABOVE FIN. FL.)
- EXIT LIGHT "
- " " " W/ ARROW
- SWITCH (3'-0" ABOVE FIN. FL.)
- " , KEY " " "
- PANEL BOARD
- LIGHTING CIRCUIT
- DUPLEX "
- SWITCH LINE
- WEATHERHEAD
- SPECIAL PURPOSE O.L.

CHARLES A. BAYLON
REGISTERED ARCHITECT
LICENSE RENEWED TO JUNE 1953
TL 469
STATE OF WASHINGTON

ELECTRICAL
PHYSICAL ED. UNIT
FOR
SCHOOL DIST. #118
SOUTH BEND WASHINGTON

CHARLES A. BAYLON
300 W. WISHKAM ABERDEEN, WASHINGTON

DRAWN: [signature] DATE: 27 FEB 1953
REVISIONS: 5/14/53
SHEET 1 121 E-1

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Appendix F: FEMA E-74 Nonstructural Seismic Bracing Excerpts

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Life Safety Systems

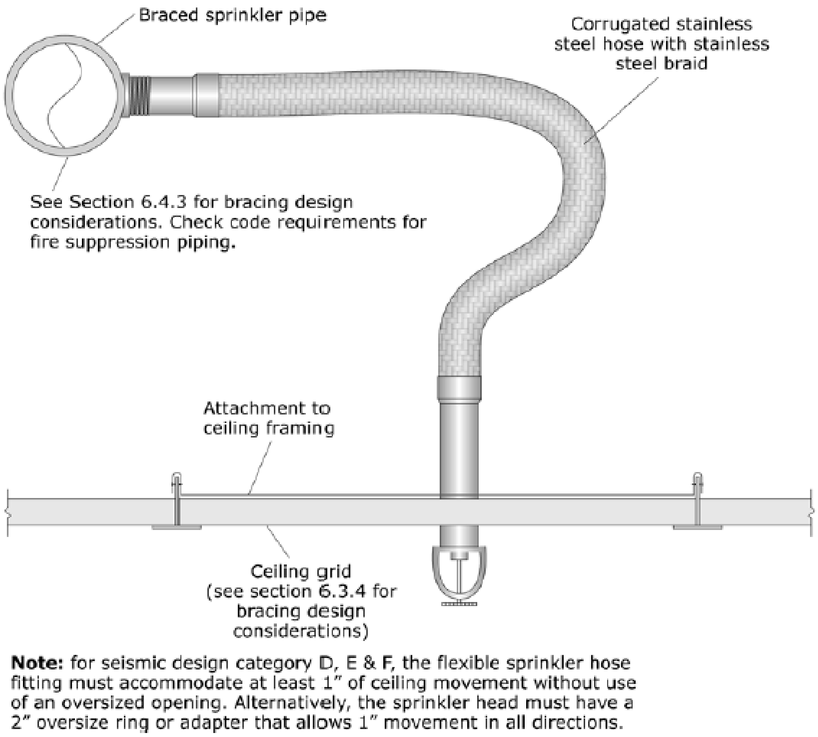


Figure G-1. Flexible Sprinkler Drop.

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

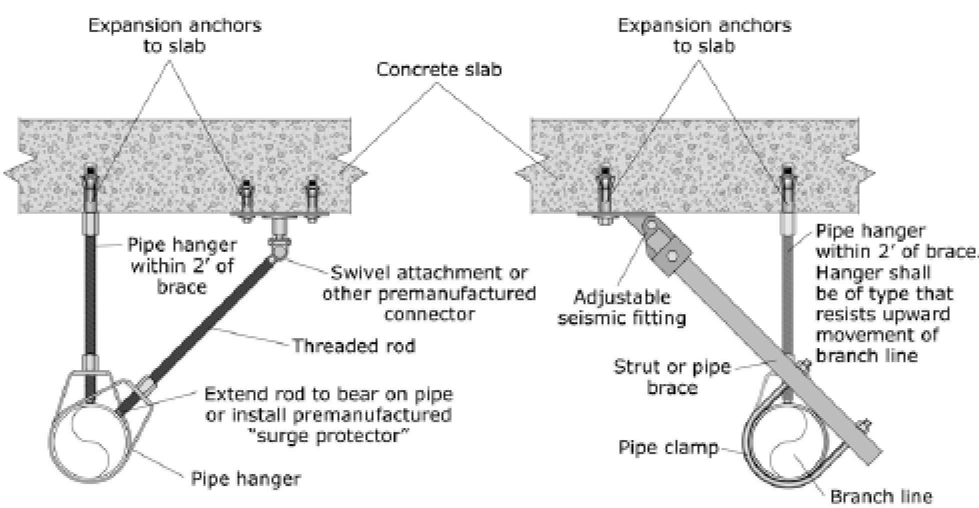


Figure G-2. End of Line Restraint.

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

Partitions

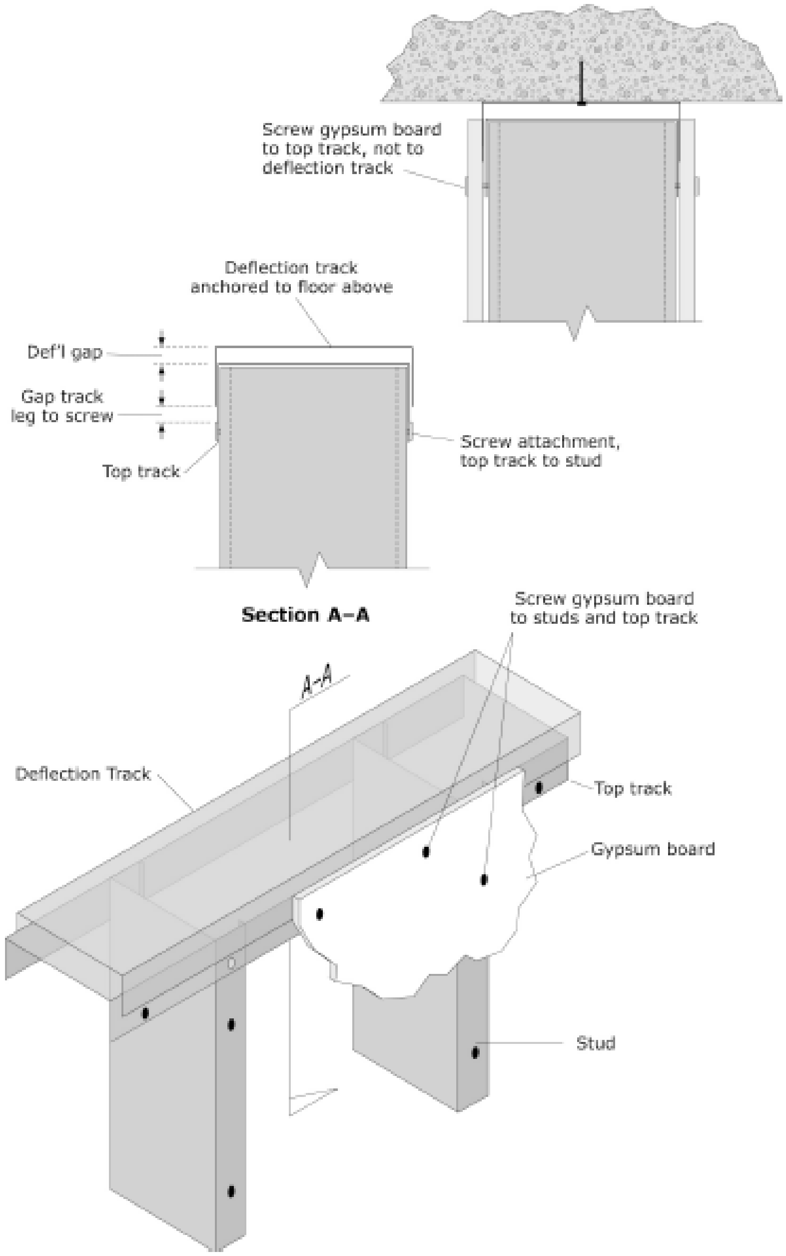


Figure G-3. Mitigation Schemes for Bracing the Tops of Metal Stud Partitions Walls.

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

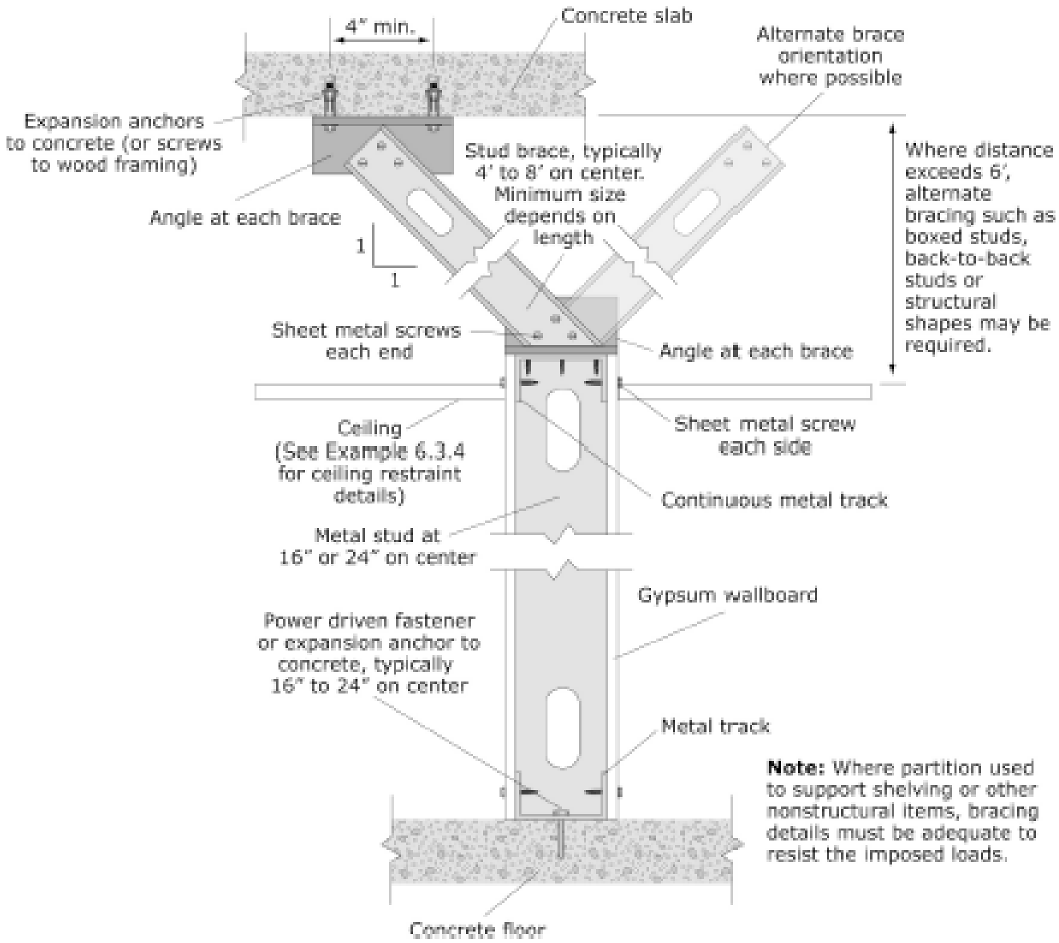


Figure G-4. Mitigation Schemes for Bracing the Tops of Metal Stud Partitions Walls.

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

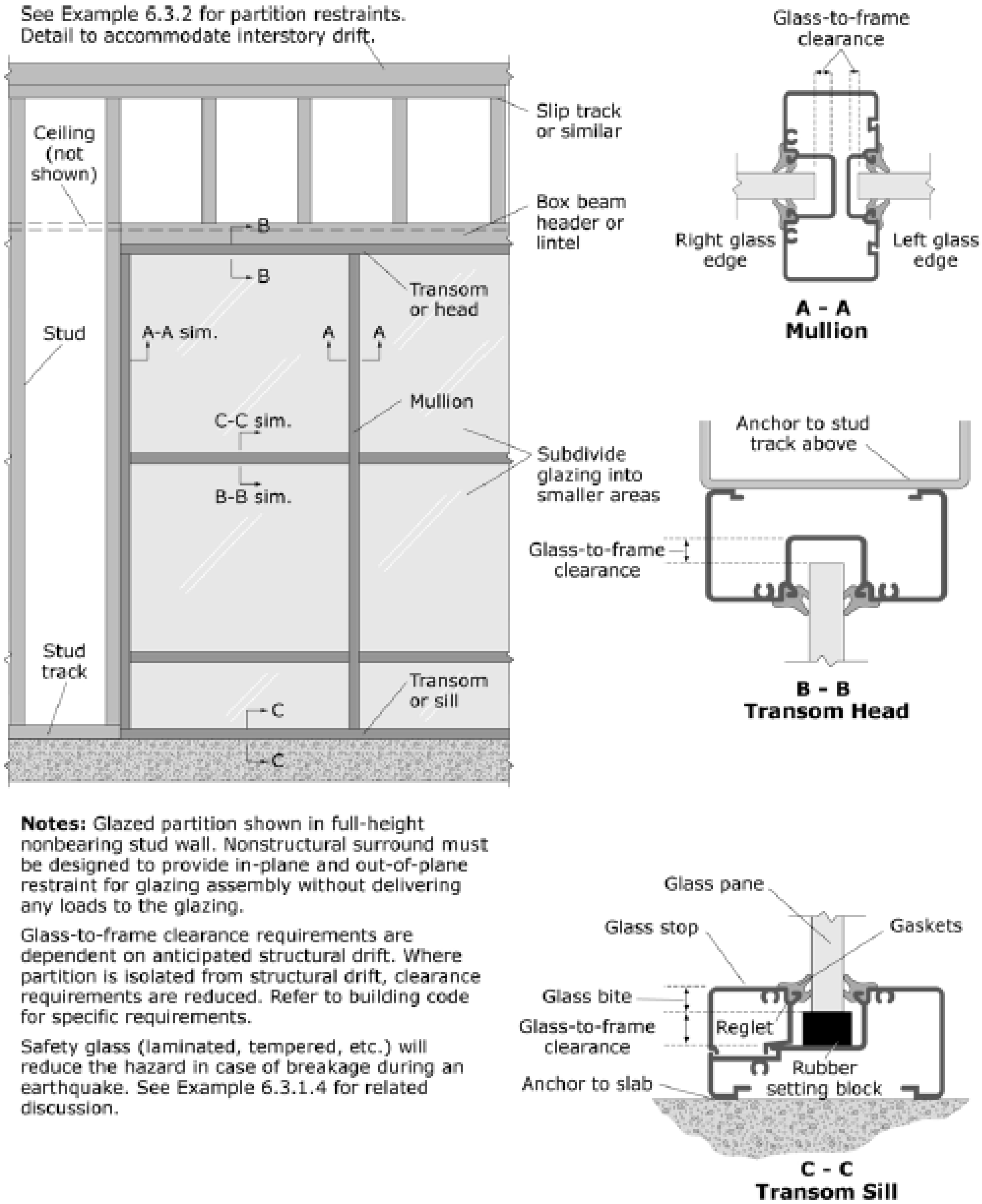


Figure G-5. Full-height Glazed Partition.

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

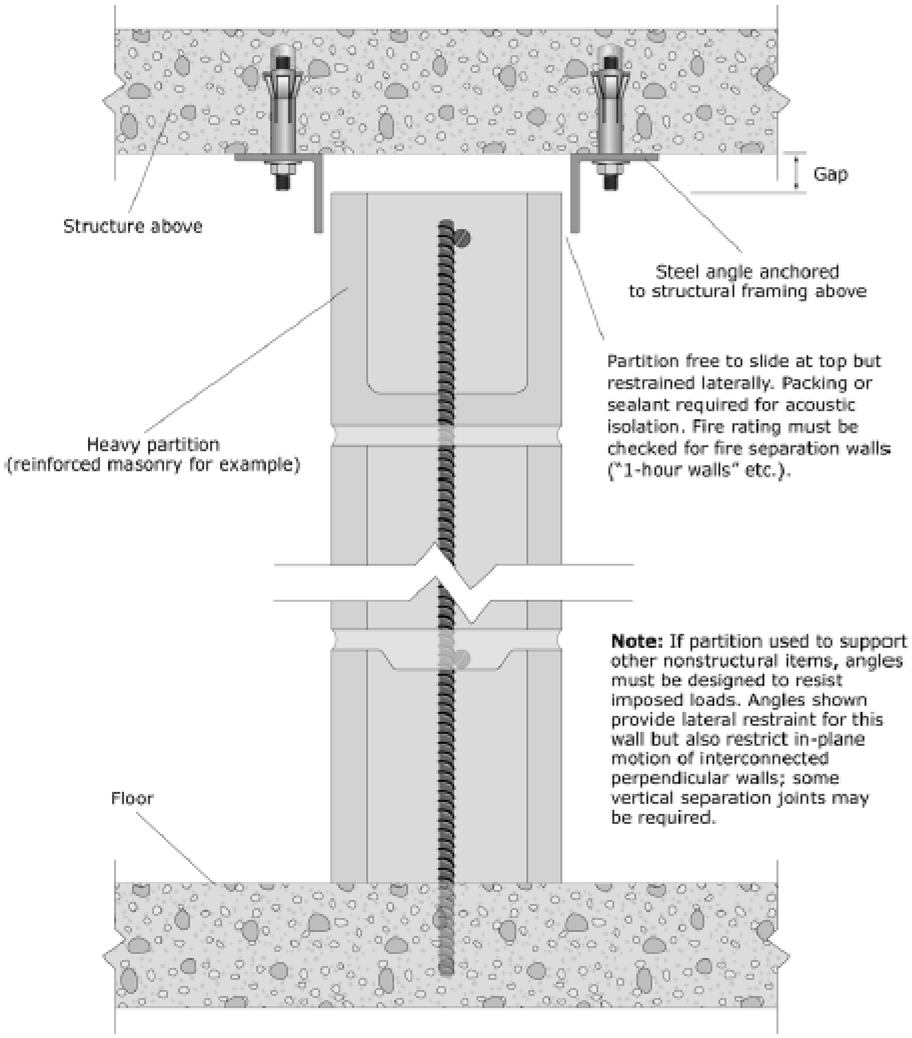


Figure G-6. Full-height Heavy Partition.

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

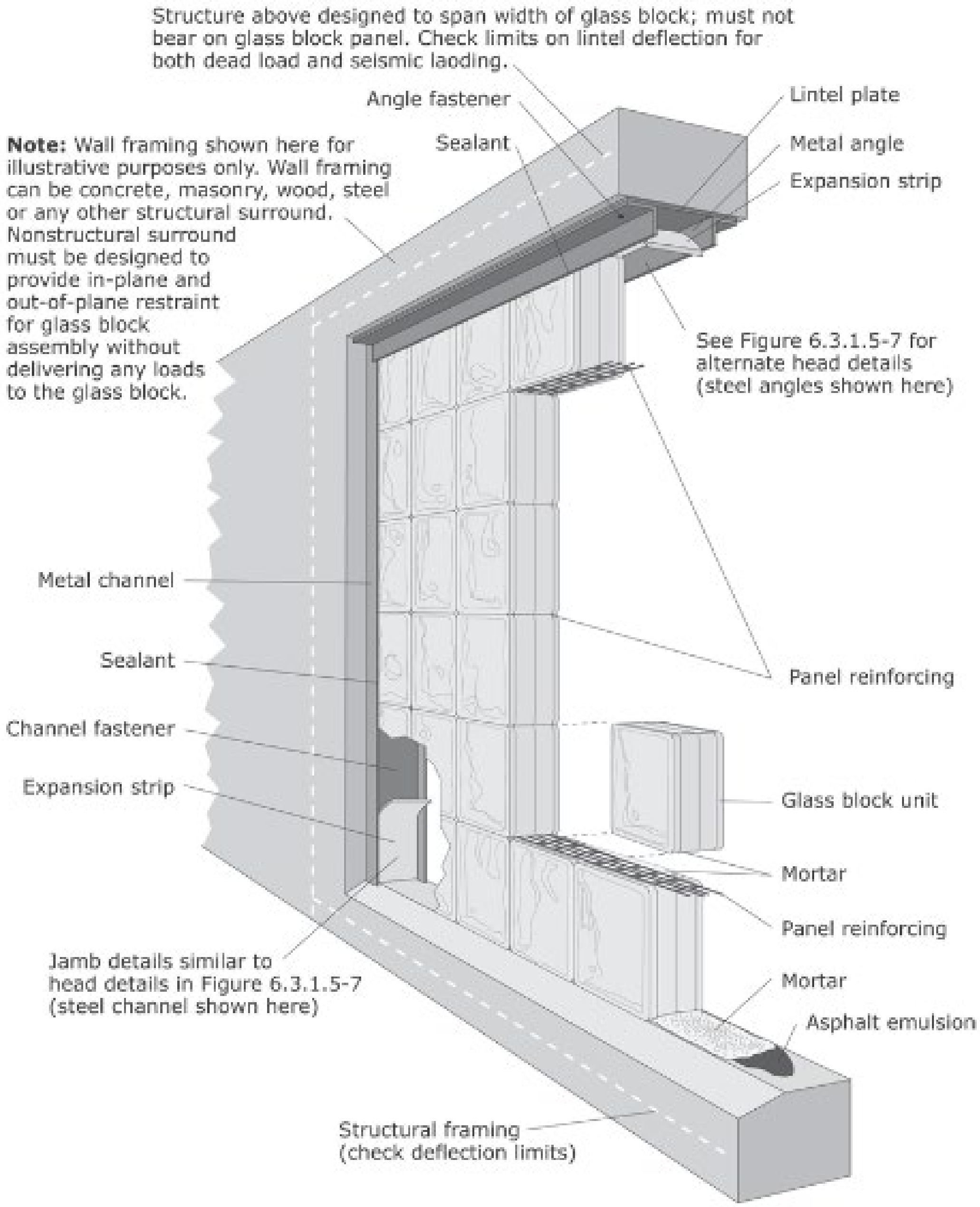


Figure G-7. Typical Glass Block Panel Details.

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

Ceilings

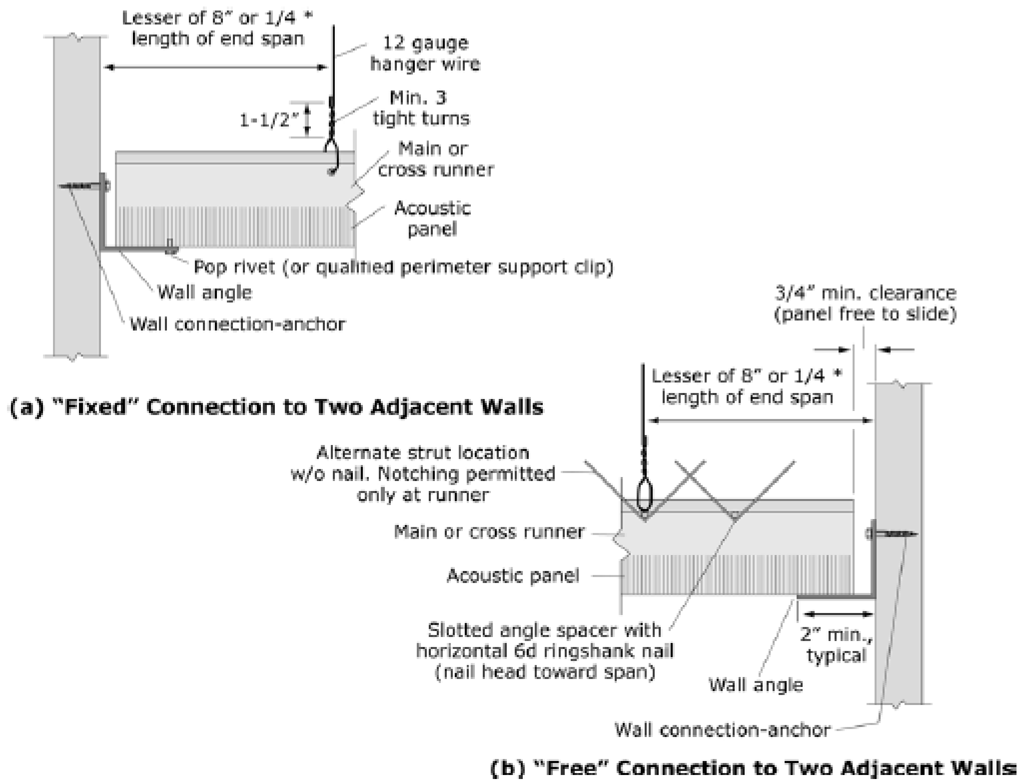
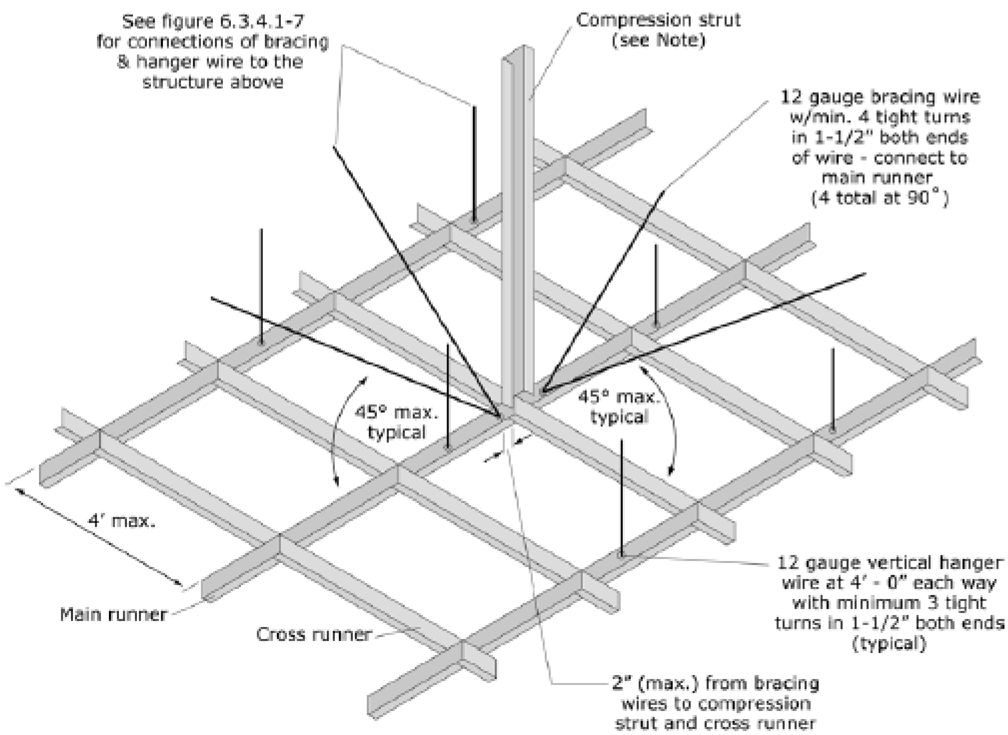


Figure G-8. Suspension System for Acoustic Lay-in Panel Ceilings – Edge Conditions.

(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 ($l/r \leq 200$). 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'

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)

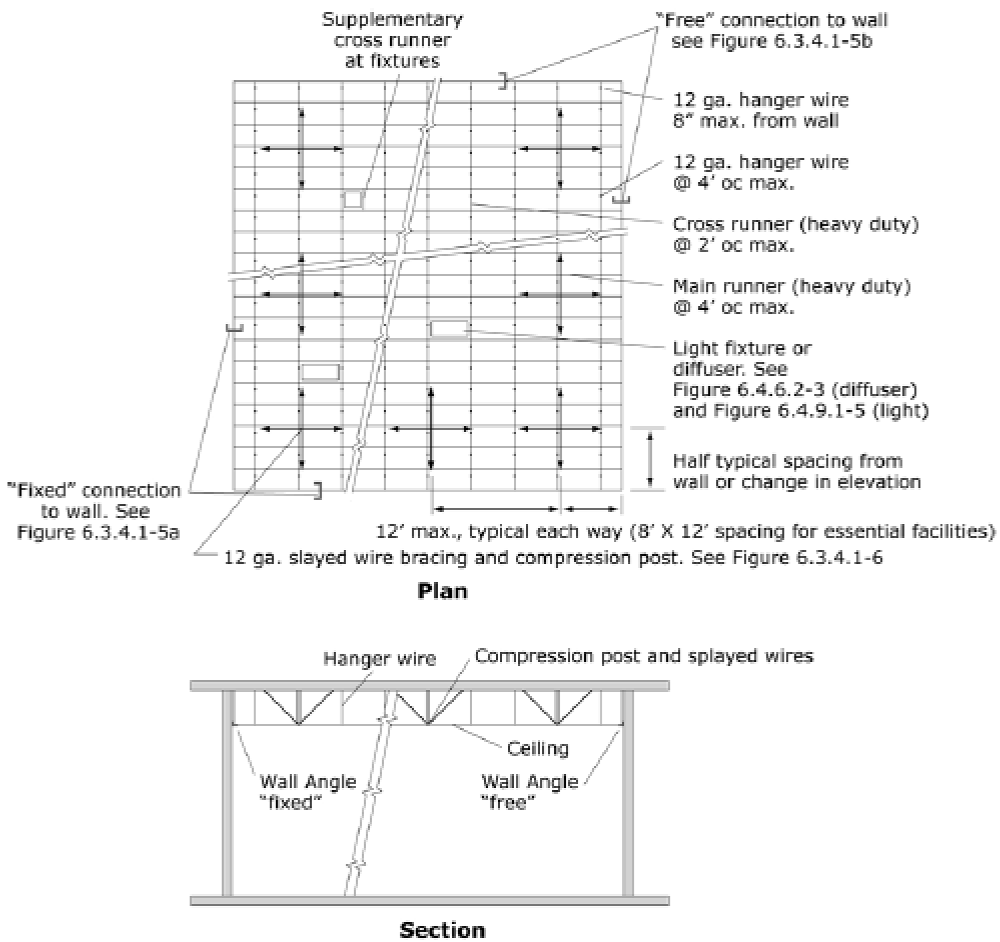


Figure G-10. Suspension System for Acoustic Lay-in Panel Ceilings – General Bracing Layout.

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

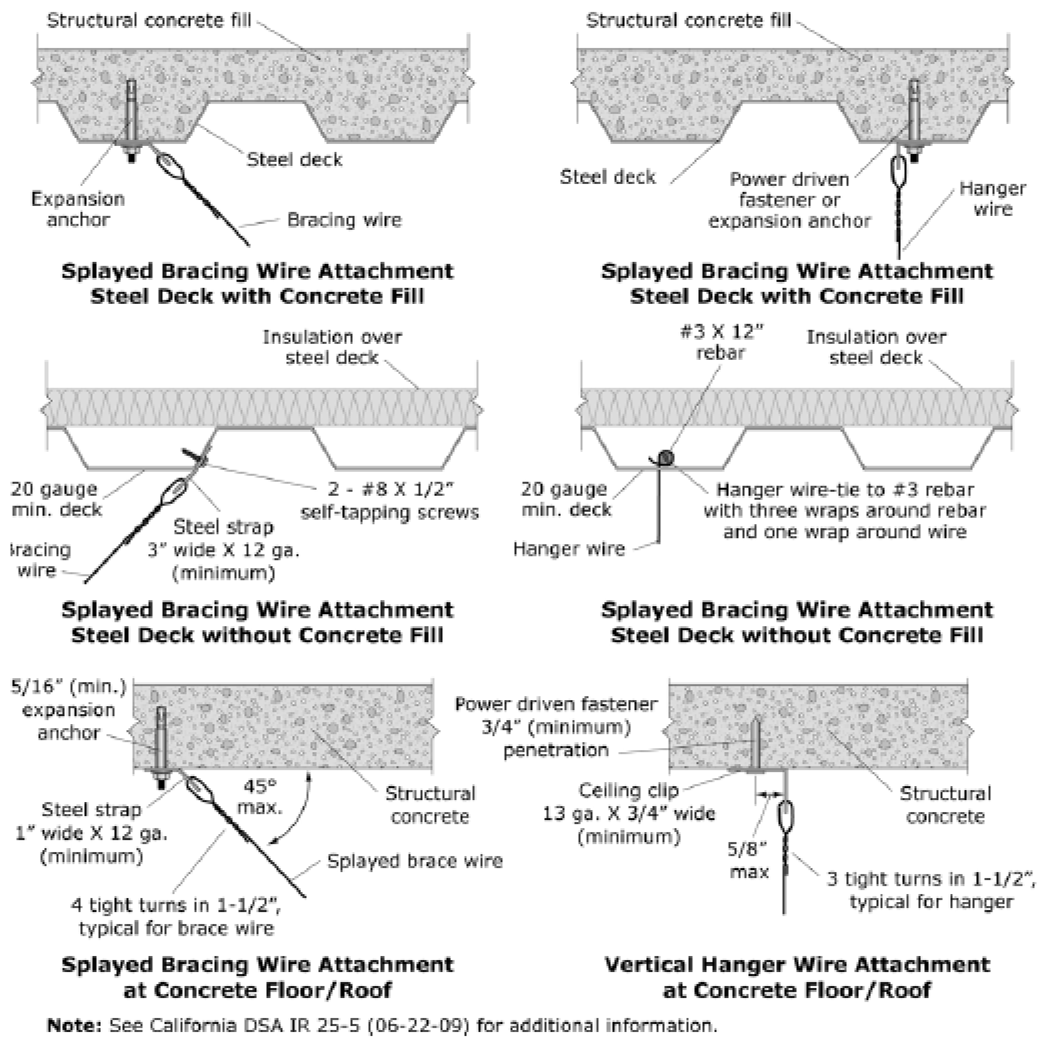
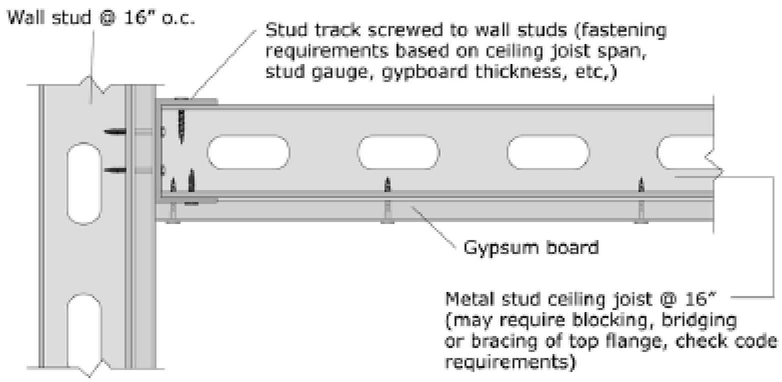
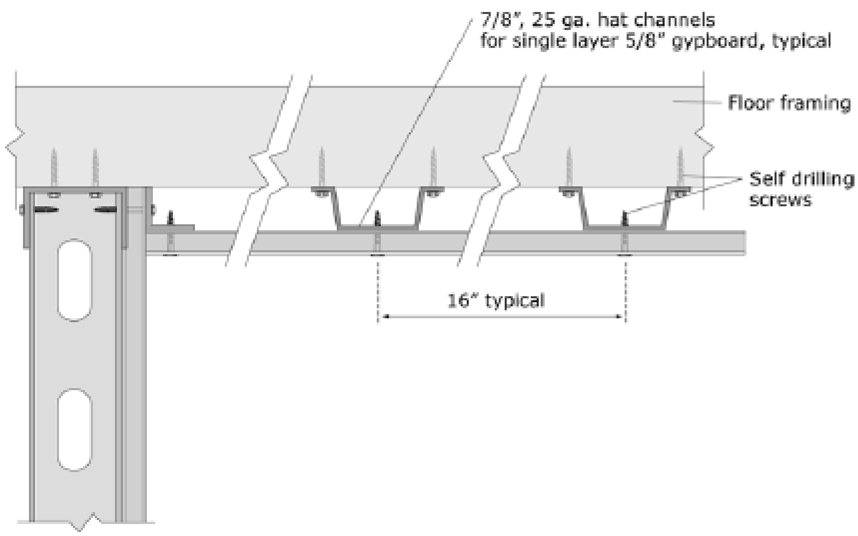


Figure G-11. Suspension System for Acoustic Lay-in Panel Ceilings – Overhead Attachment Details.

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



a) Gypsum board attached directly to ceiling joists



b) Gypsum board attached directly to furring strips (hat channel or similar)

Note: Commonly used details shown; no special seismic details are required as long as furring and gypboard secured. Check for certified assemblies (UL listed, FM approved, etc.) if fire or sound rating required.

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

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

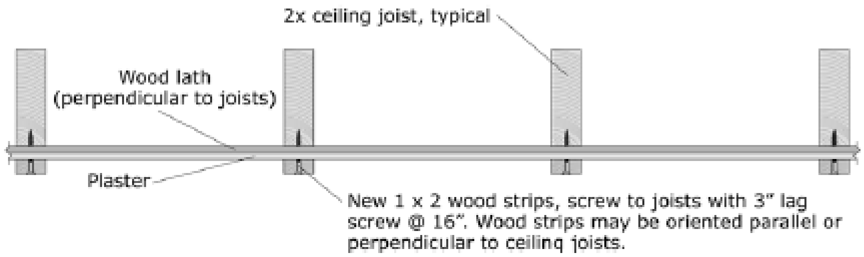


Figure G-13. Retrofit Detail for Existing Lath and Plaster.

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

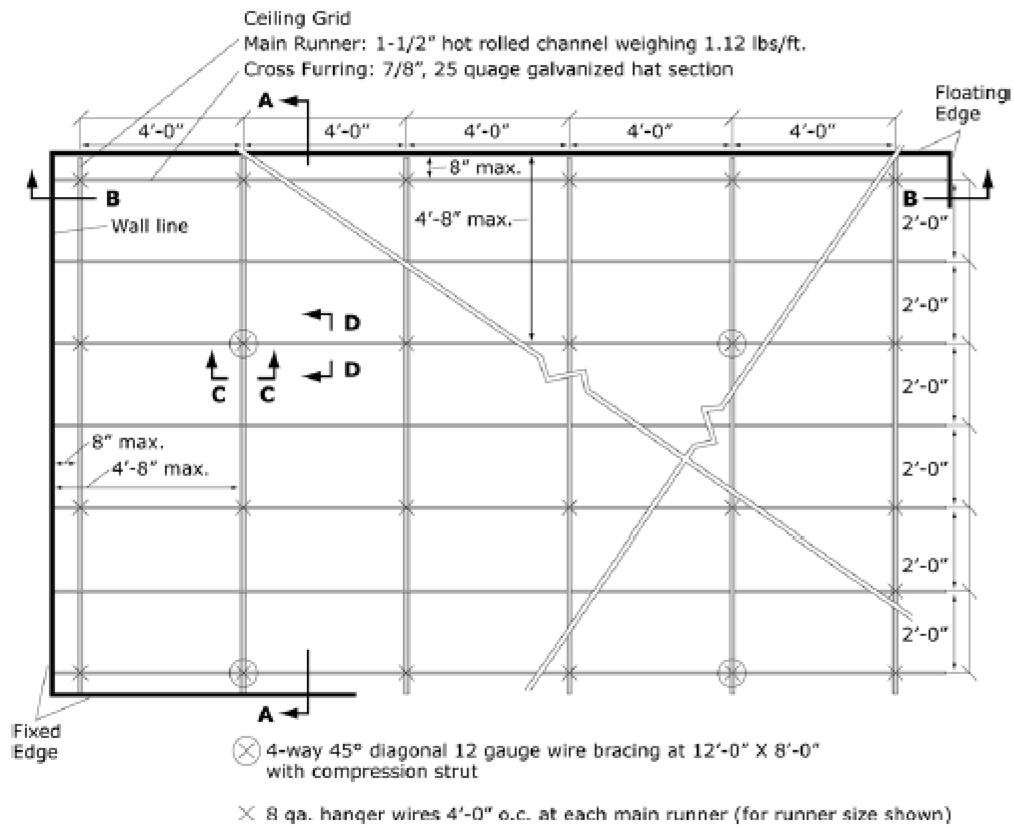


Figure G-14. Diagrammatic View of Suspended Heavy Ceiling Grid and Lateral Bracing.

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

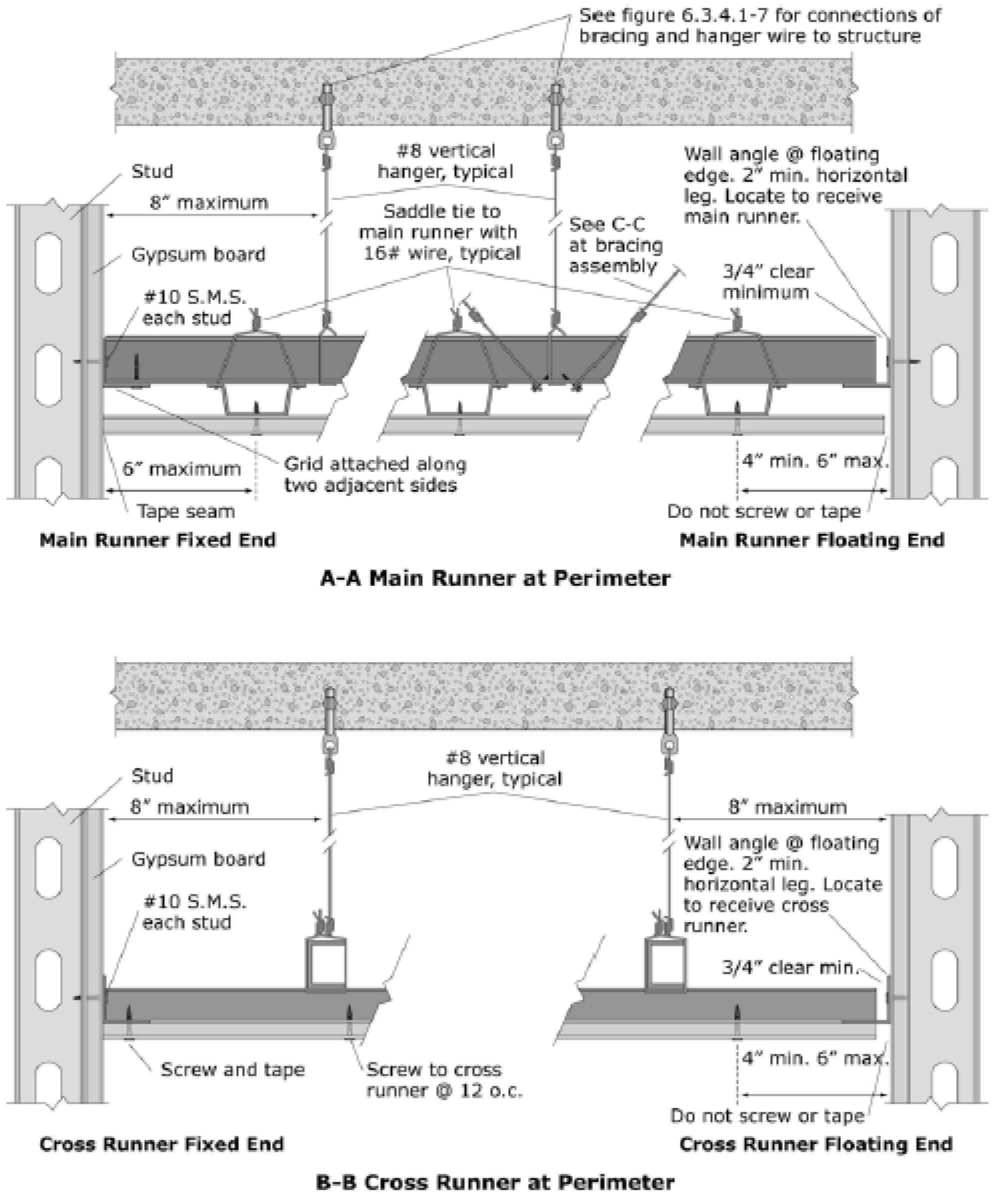


Figure G-15. Perimeter Details for Suspended Gypsum Board Ceiling.

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

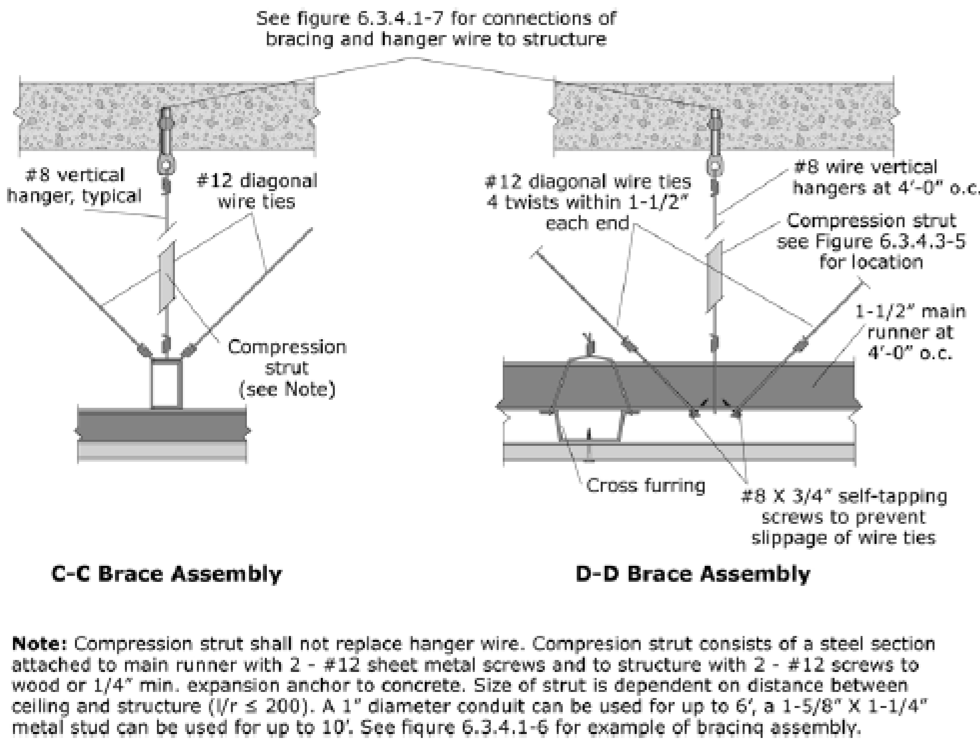


Figure G-16. Details for Lateral Bracing Assembly for Suspended Gypsum Board Ceiling.

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

Light Fixtures

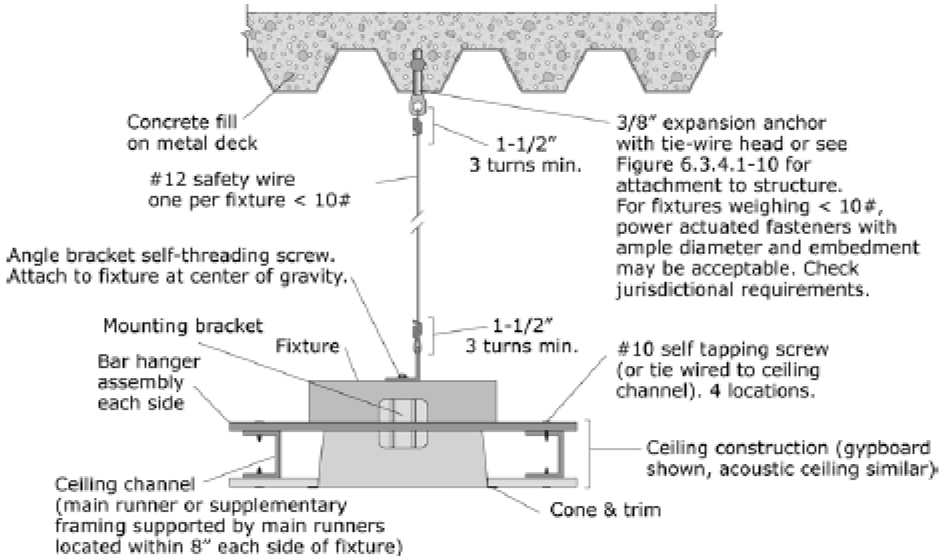


Figure G-17. Recessed Light Fixture in suspended Ceiling (Fixture Weight < 10 pounds).

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

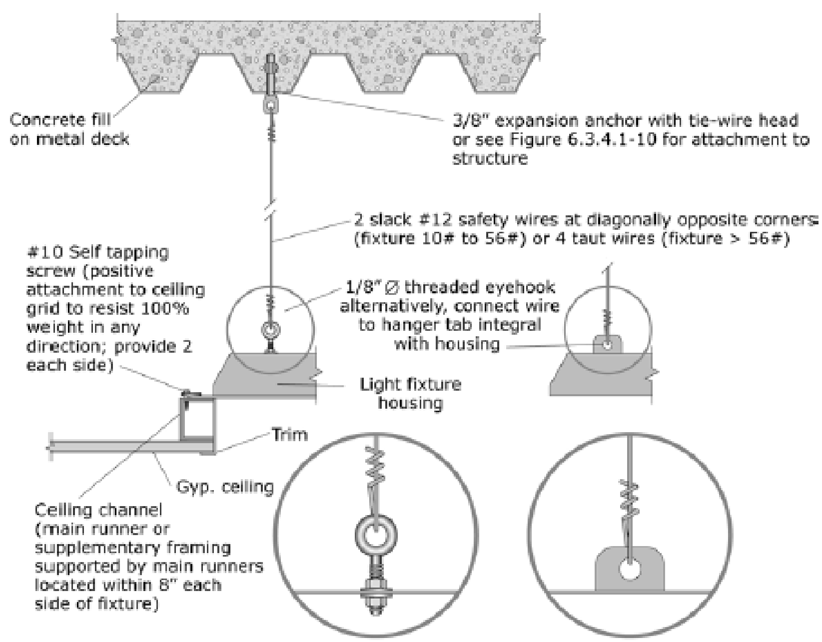


Figure G-18. Recessed Light Fixture in suspended Ceiling (Fixture Weight 10 to 56 pounds).

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

Contents and Furnishings

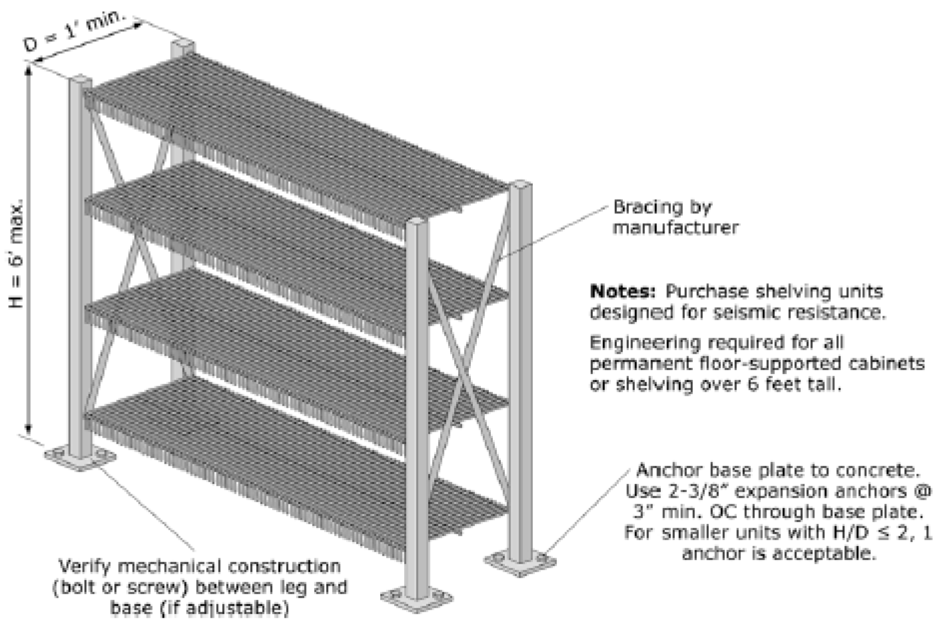
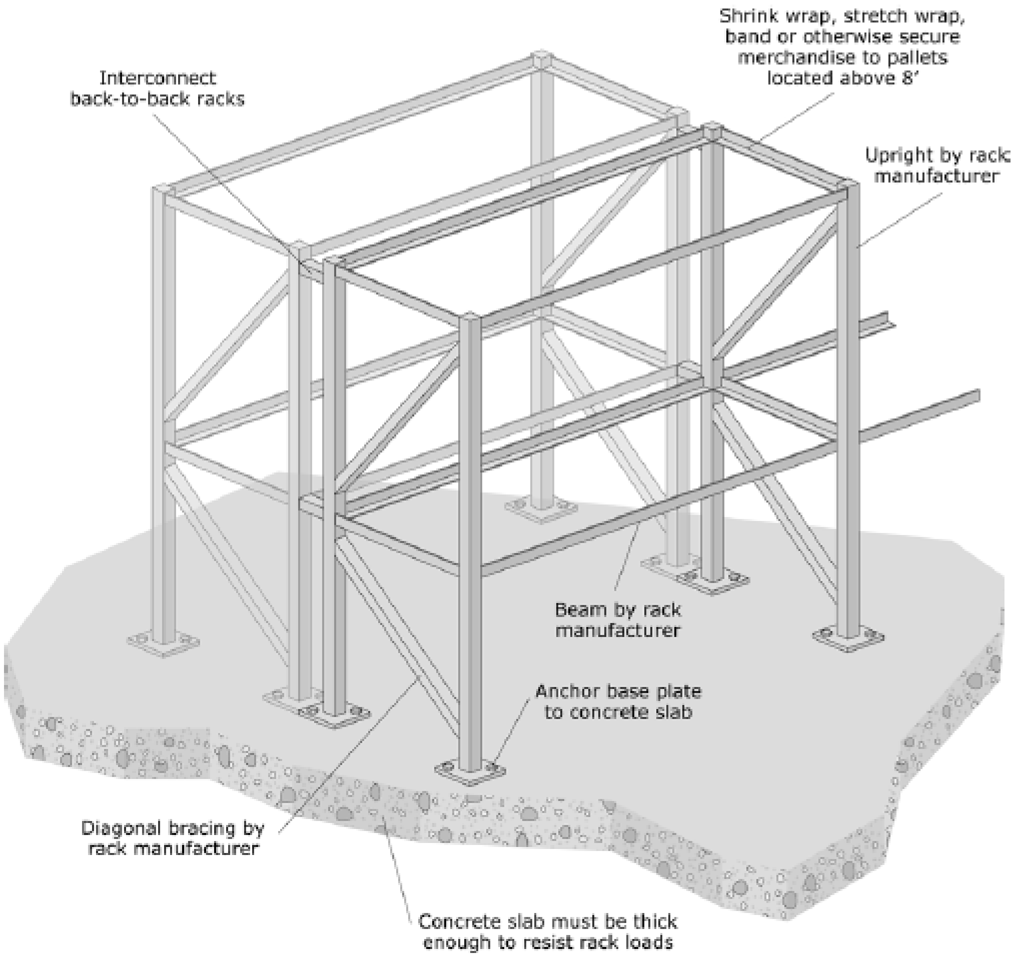


Figure G-19. Light Storage Racks.

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



Note: Purchase storage racks designed for seismic resistance. Storage racks may be classified as either nonstructural elements or nonbuilding structures depending upon their size and support conditions. Check the applicable code to see which provisions apply.

Figure G-20. Industrial Storage Racks.

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

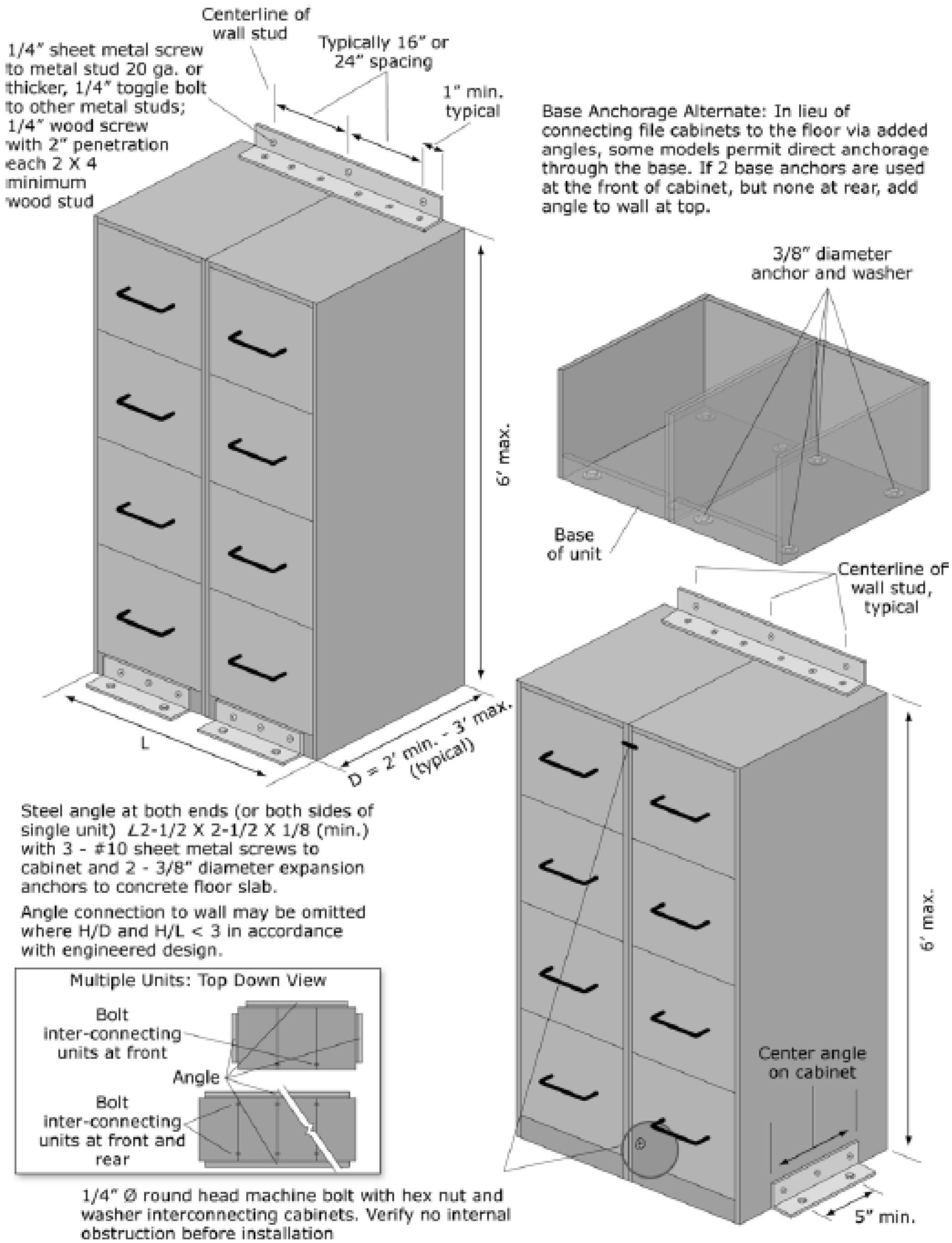


Figure G-21. Wall-mounted File Cabinets.

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

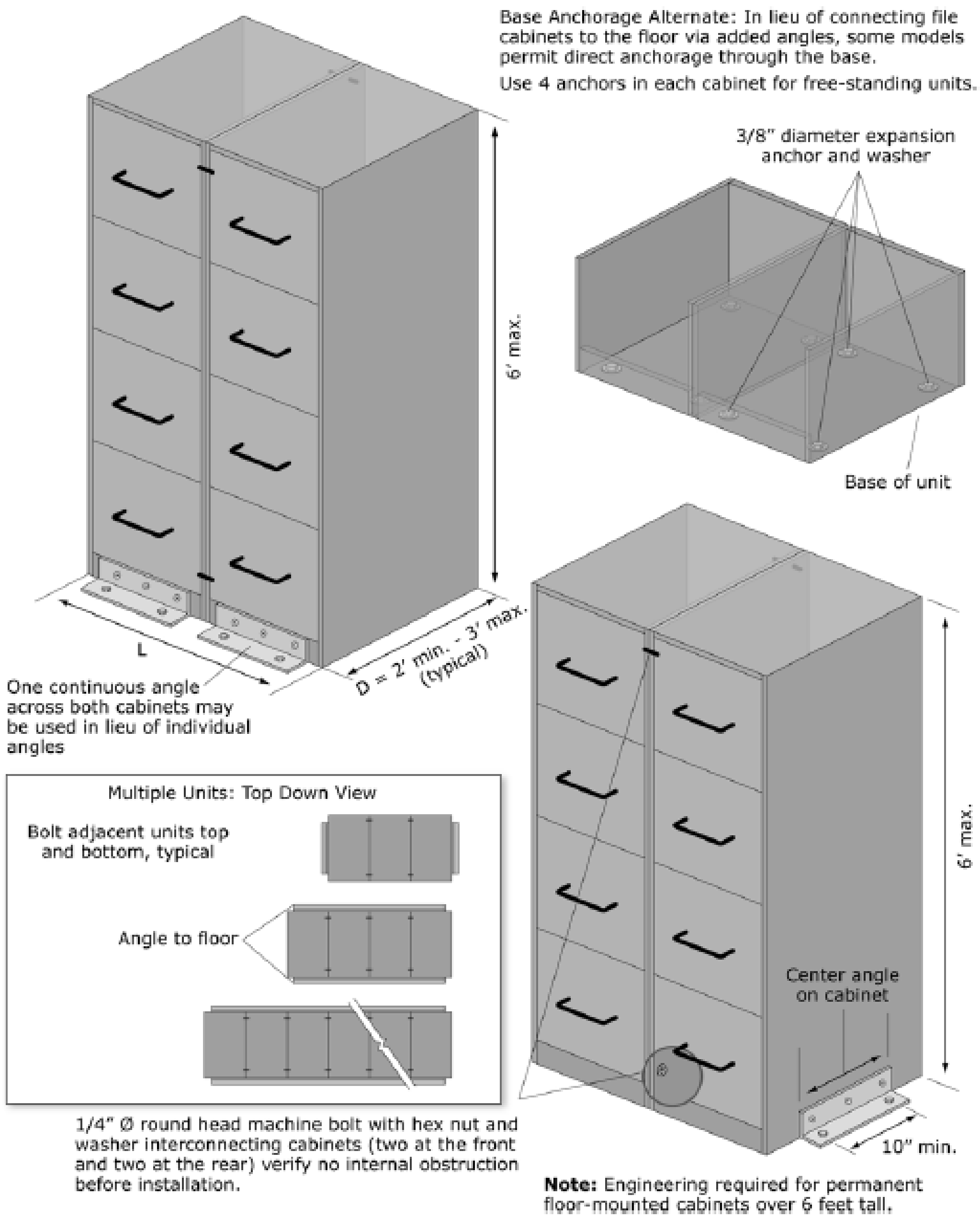


Figure G-22. Base Anchored File Cabinets.

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

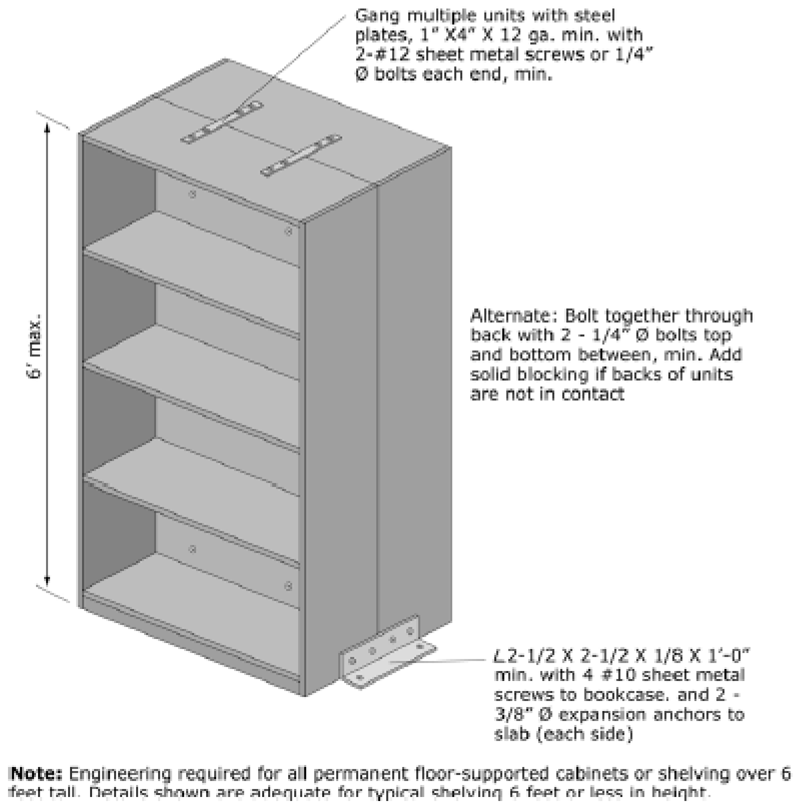


Figure G-23. Anchorage of Freestanding Book Cases Arranged Back to Back.

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

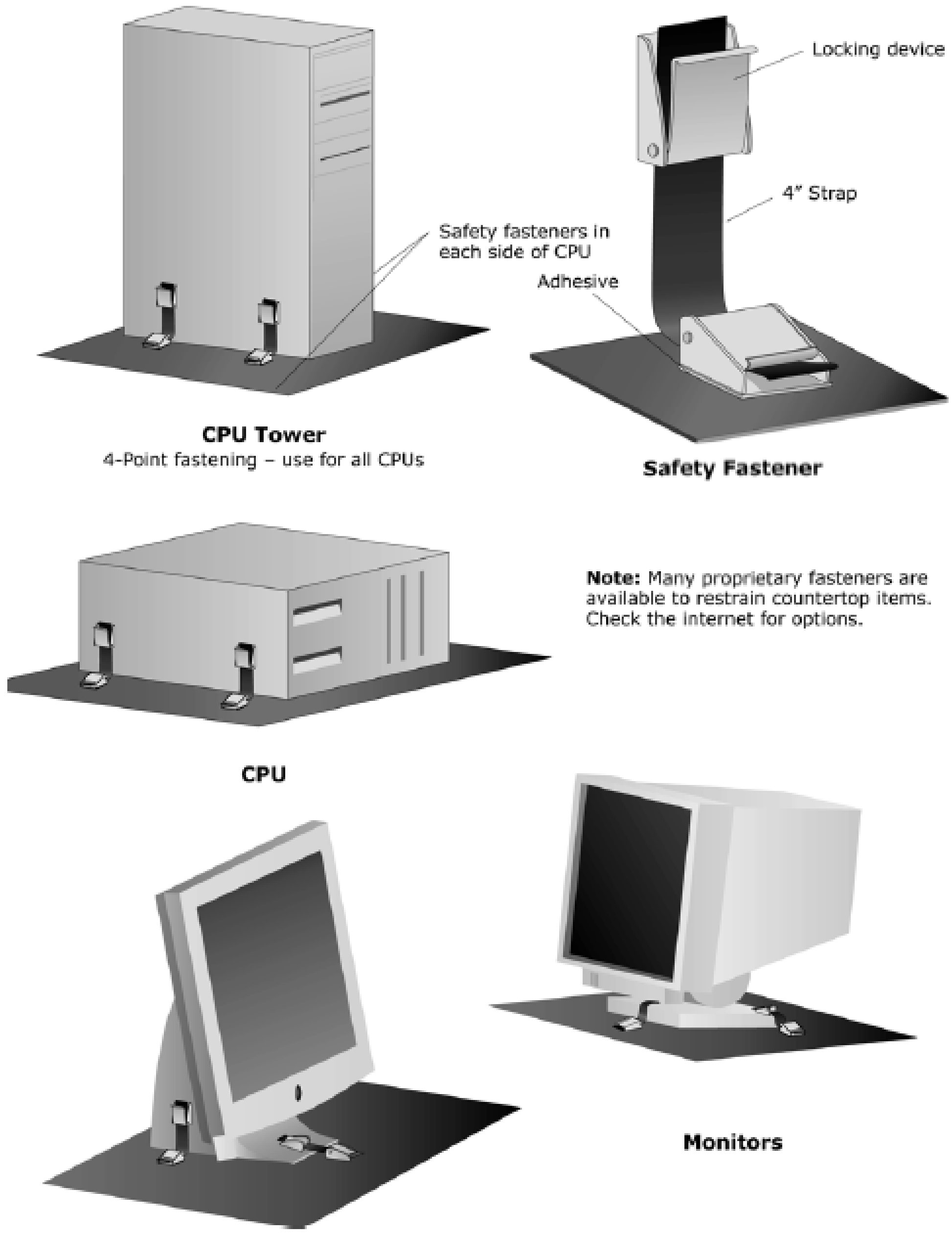


Figure G-24. Desktop Computers and Accessories.

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

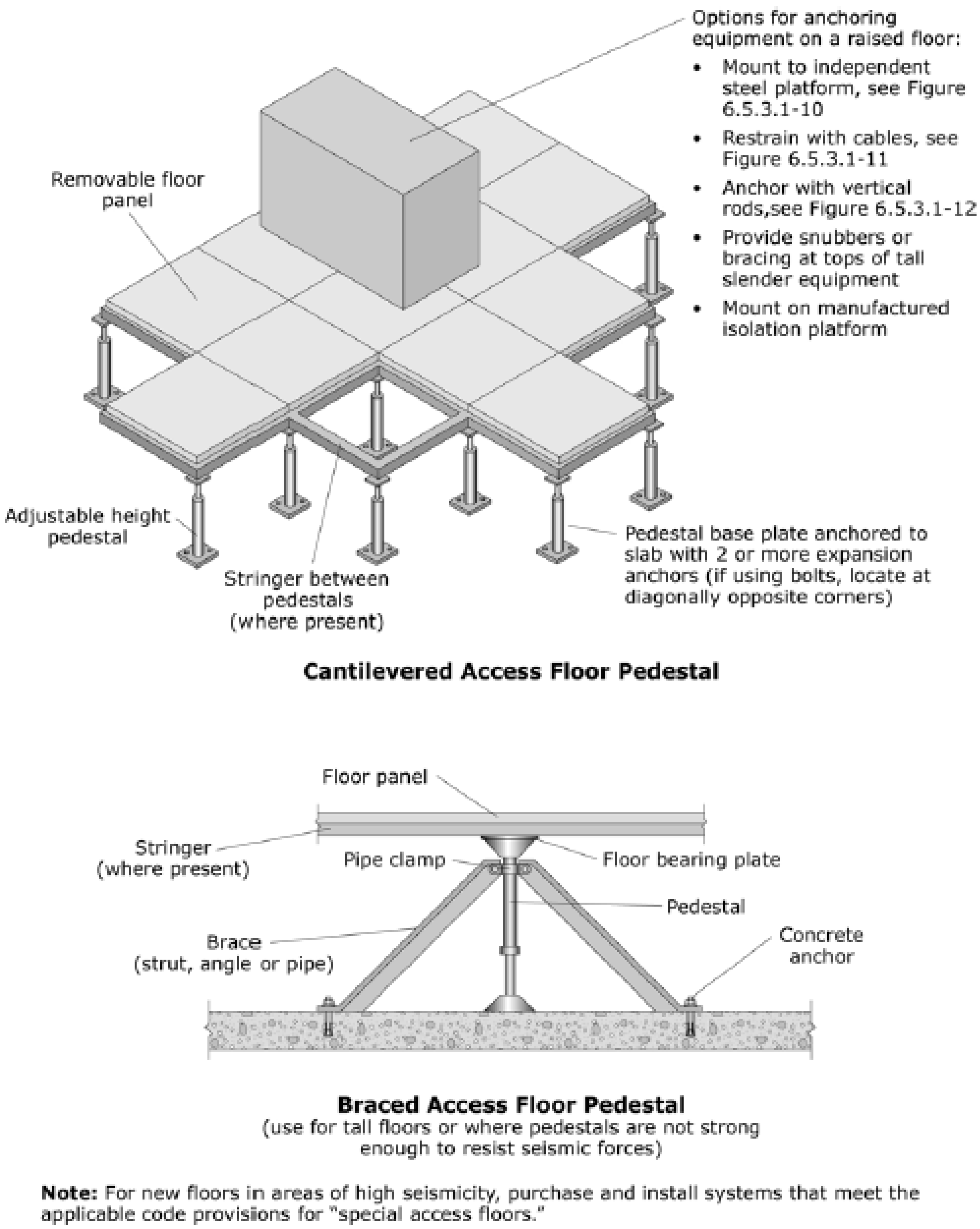


Figure G-25. Equipment Mounted on Access Floor.

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

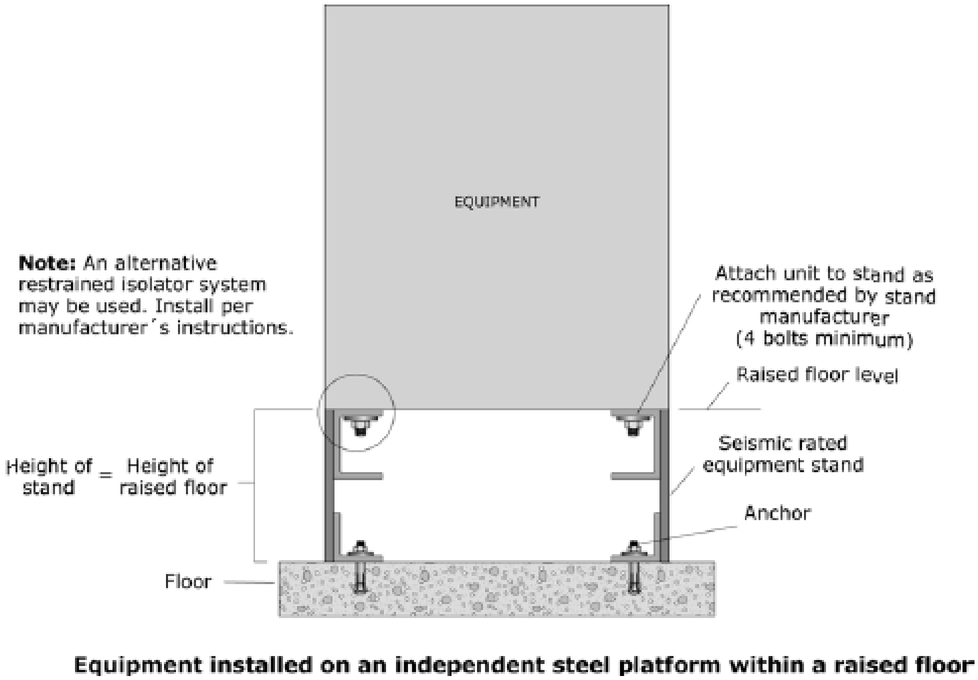


Figure G-26. Equipment Mounted on Access Floor – Independent Base.

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

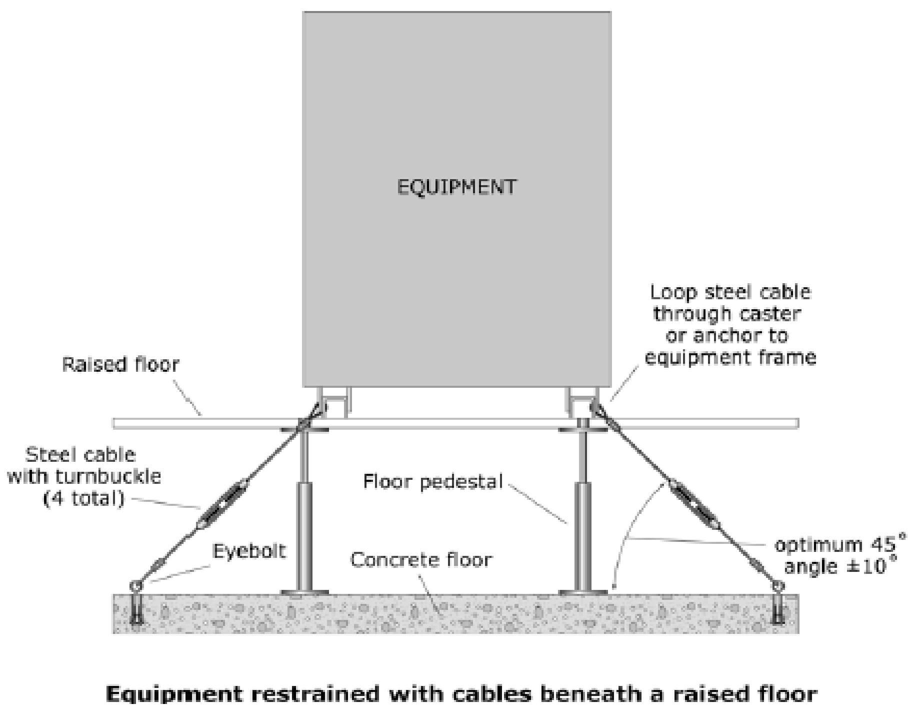
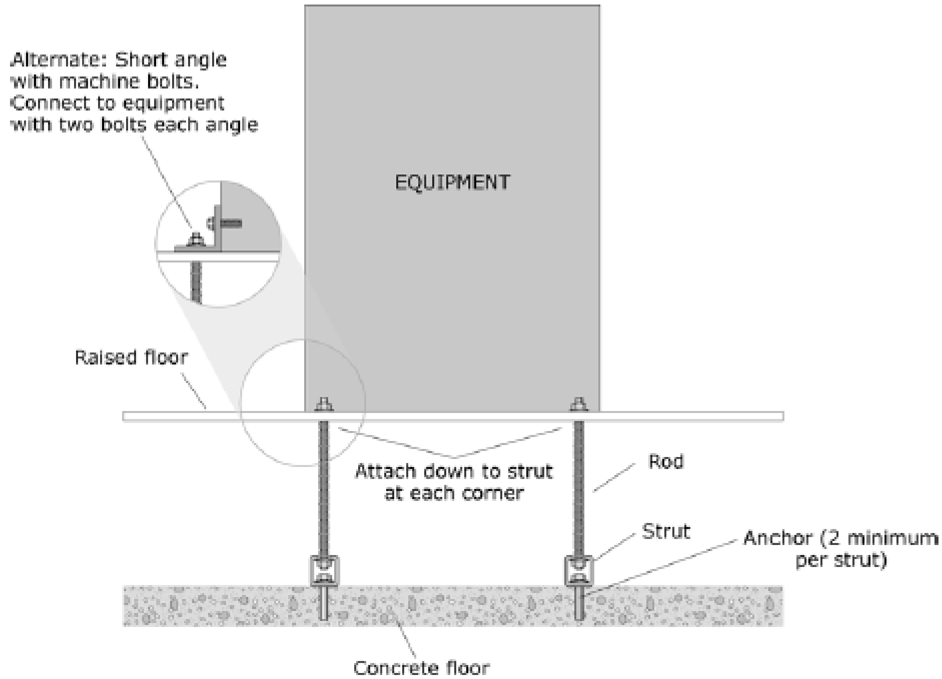


Figure G-27. Equipment Mounted on Access Floor – Cable Braced.

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

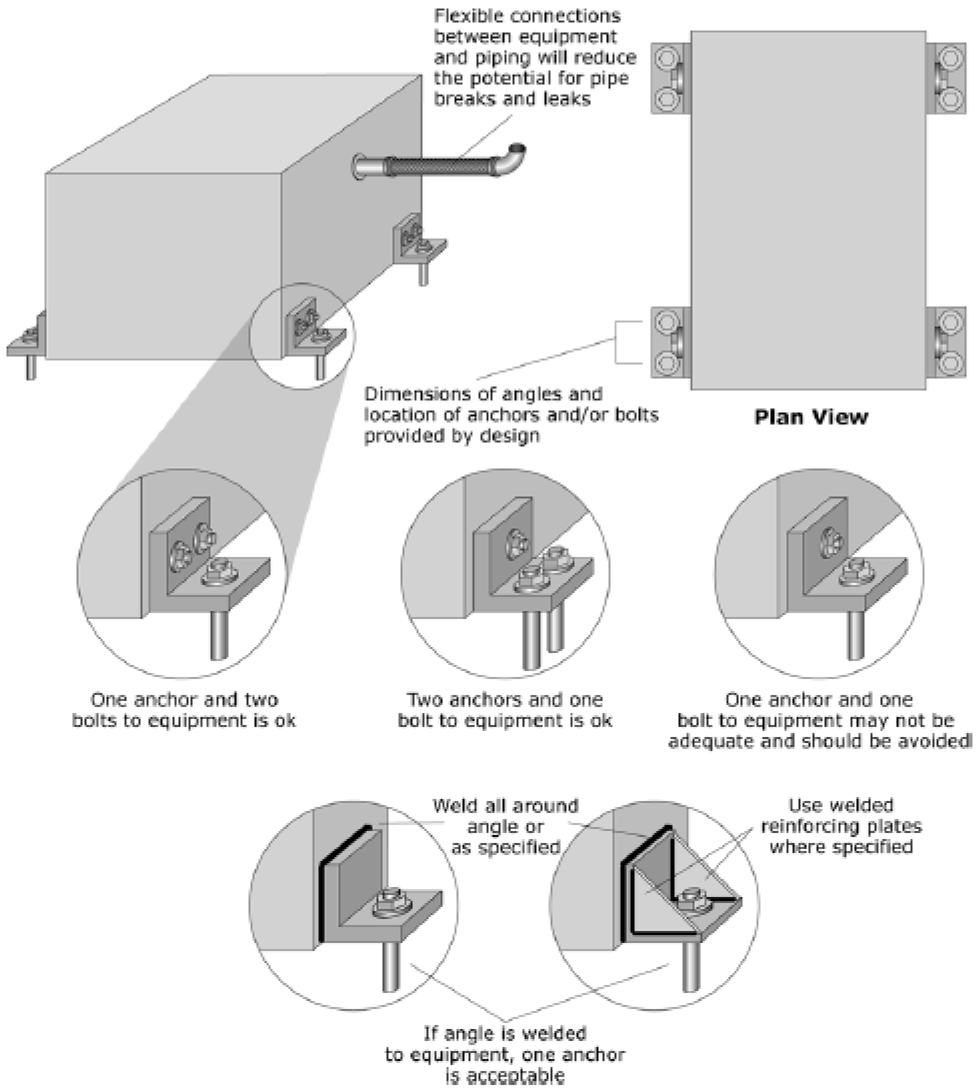


Equipment anchored with vertical rods beneath a raised floor

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)

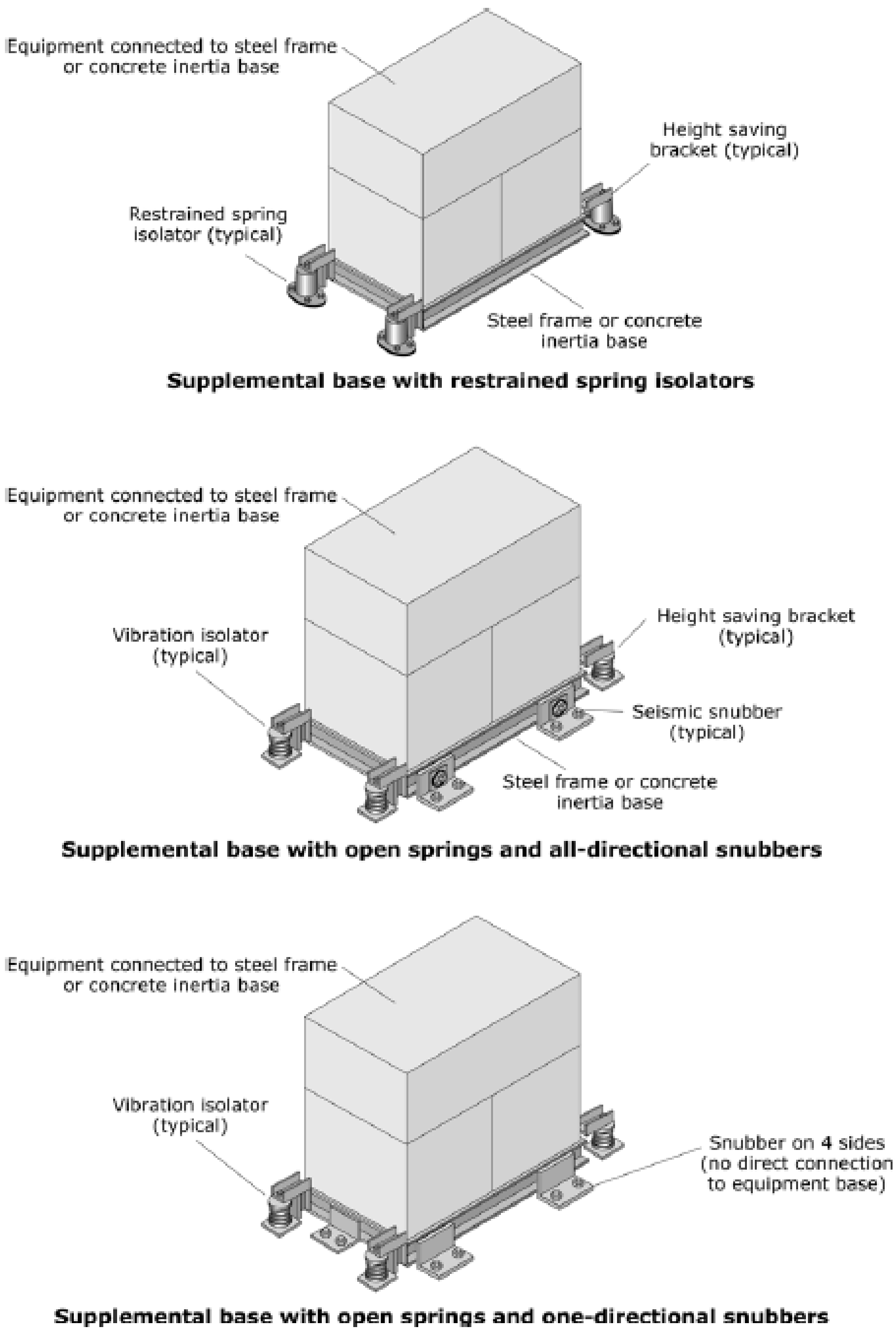


Figure G-30. HVAC Equipment with Vibration Isolation.

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

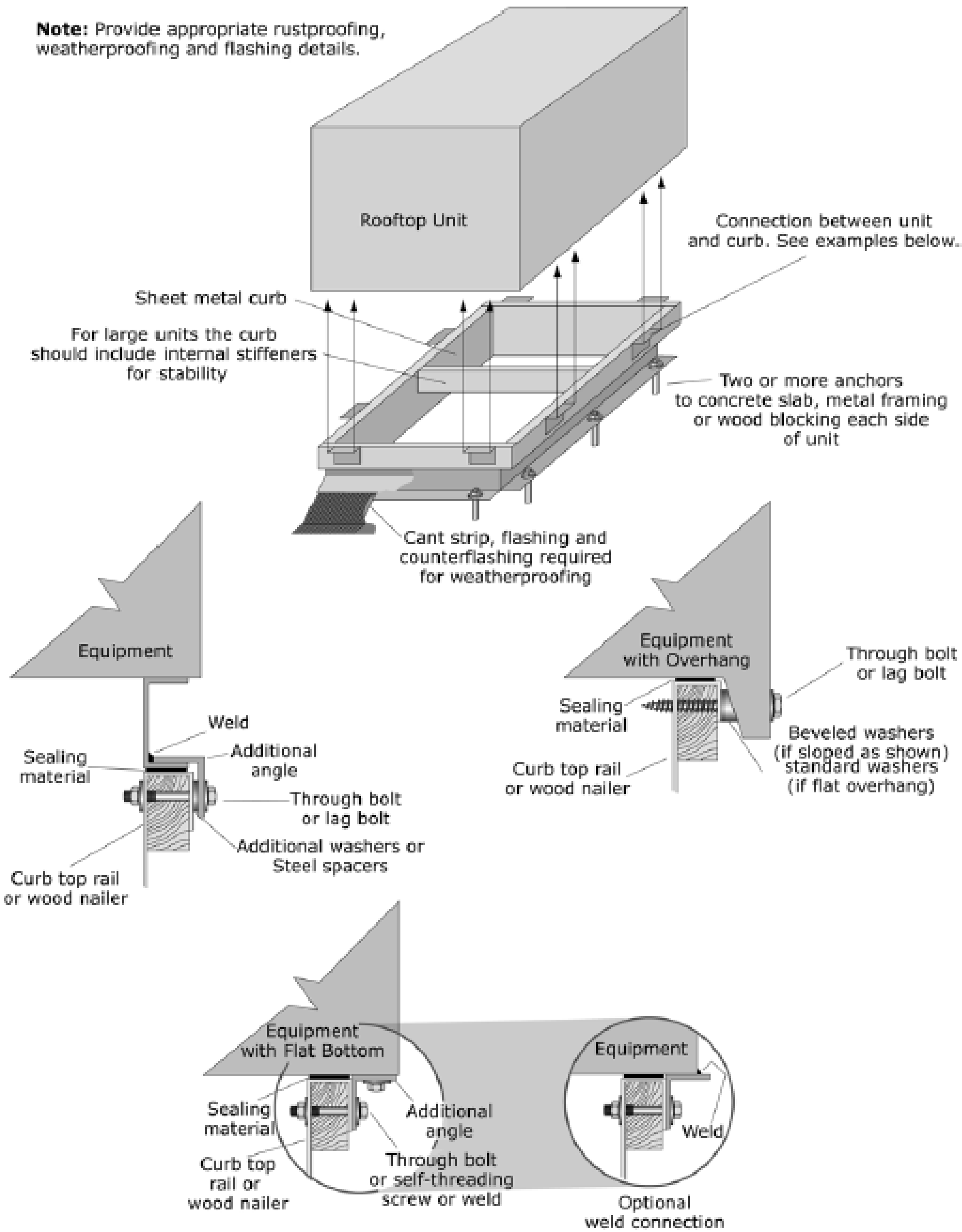


Figure G-31. Rooftop HVAC Equipment.

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

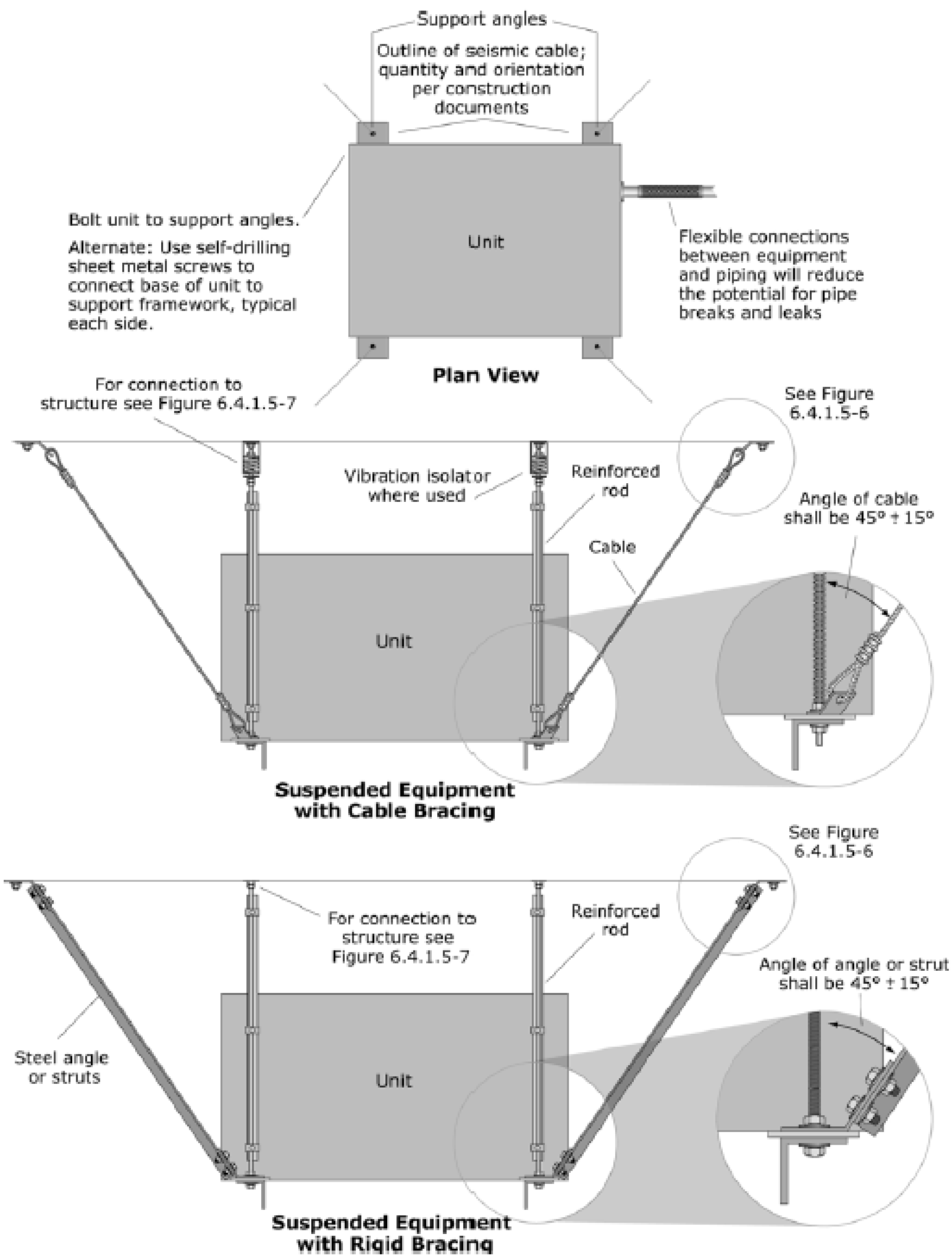


Figure G-32. Suspended Equipment.

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

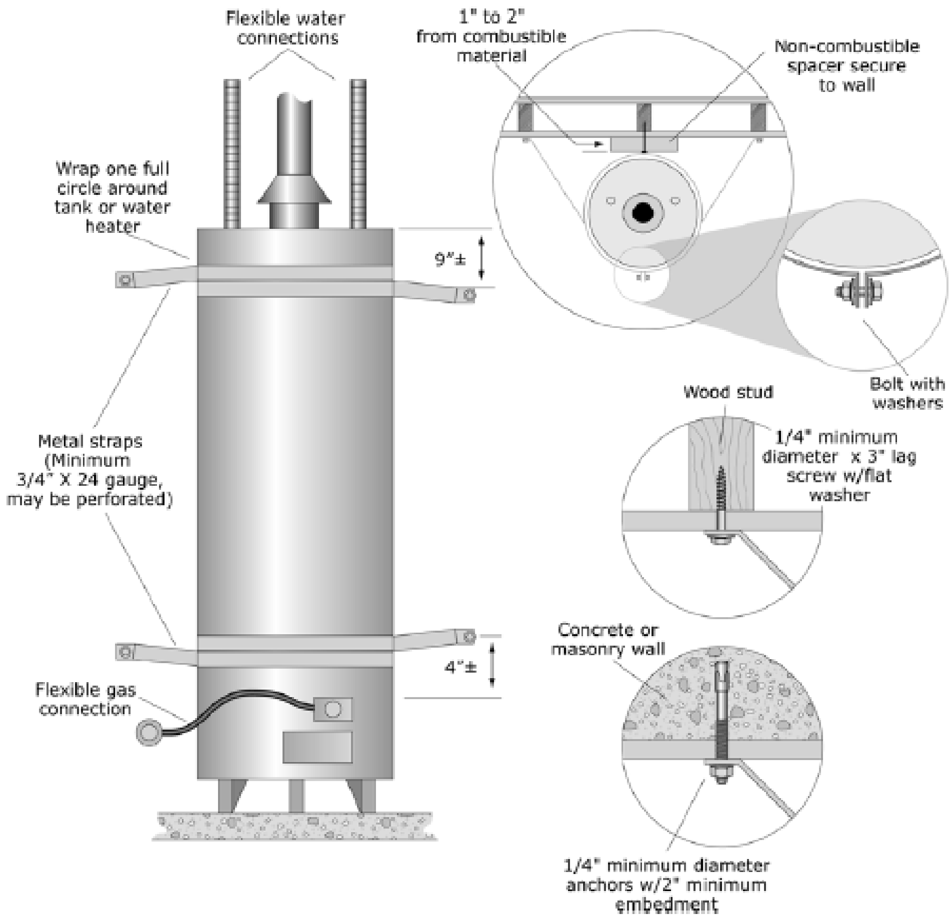


Figure G-33. Water Heater Strapping to Backing Wall.

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

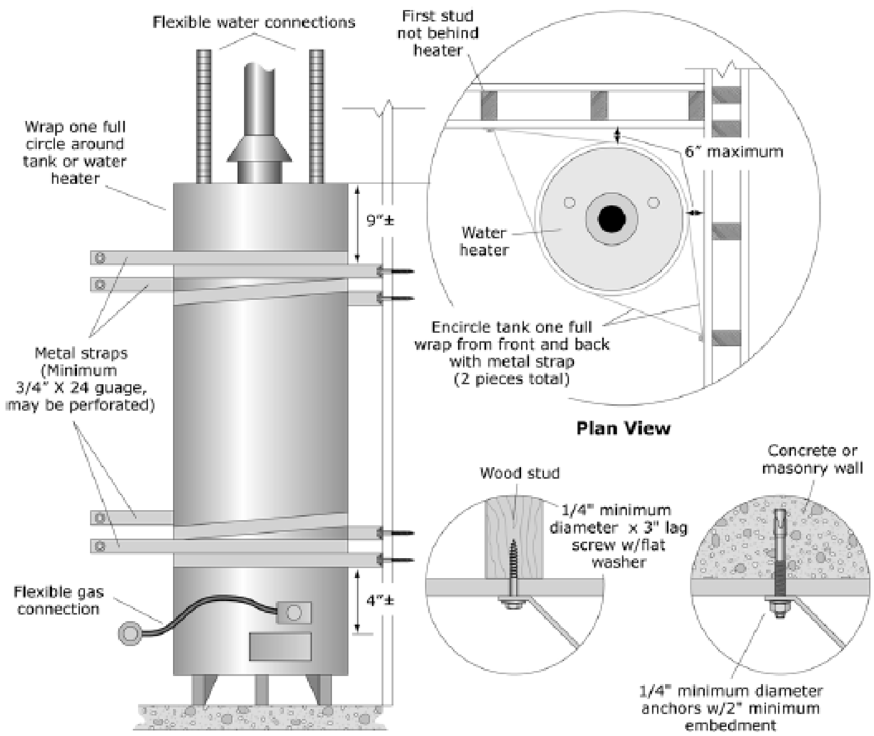


Figure G-34. Water Heater – Strapping at Corner Installation.

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

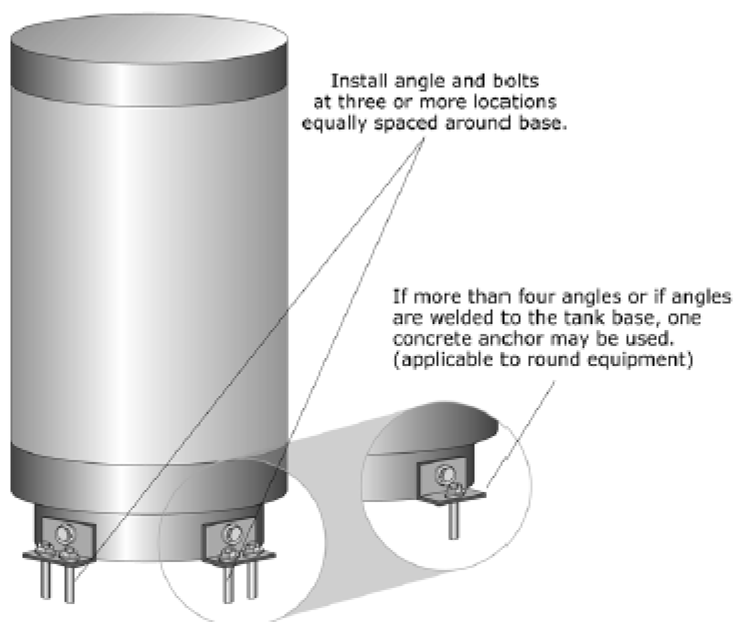


Figure G-35. Water Heater – Base Mounted.

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

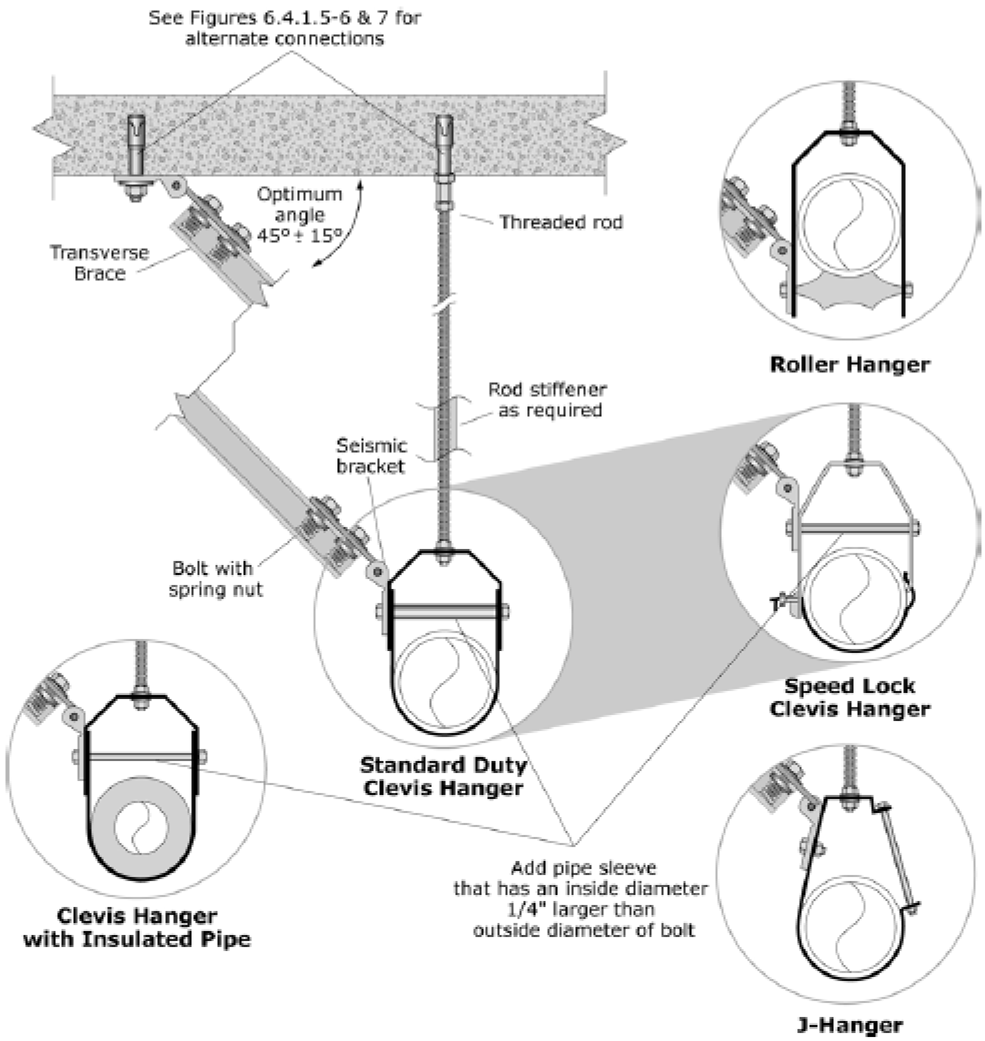


Figure G-36. Rigid Bracing – Single Pipe Transverse.

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

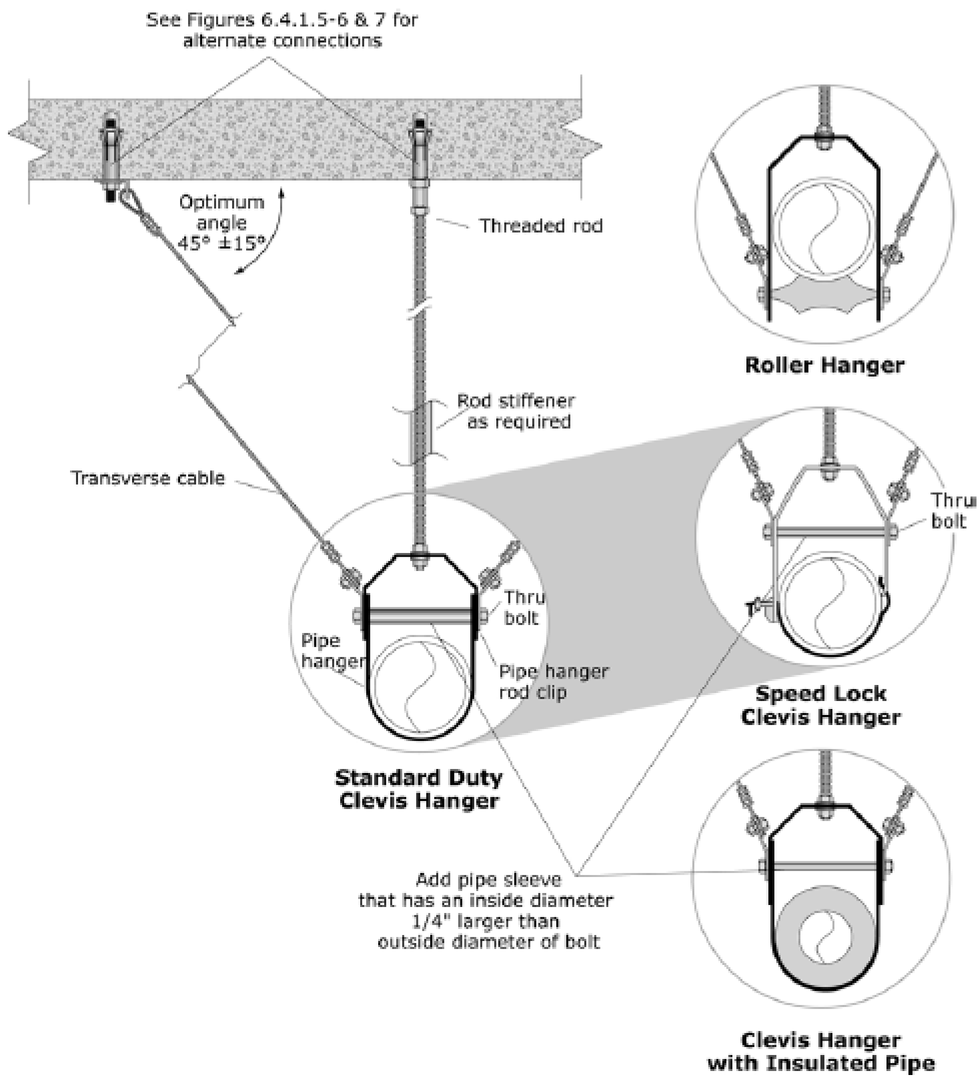


Figure G-37. Cable Bracing – Single Pipe Transverse.

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

Electrical and Communications

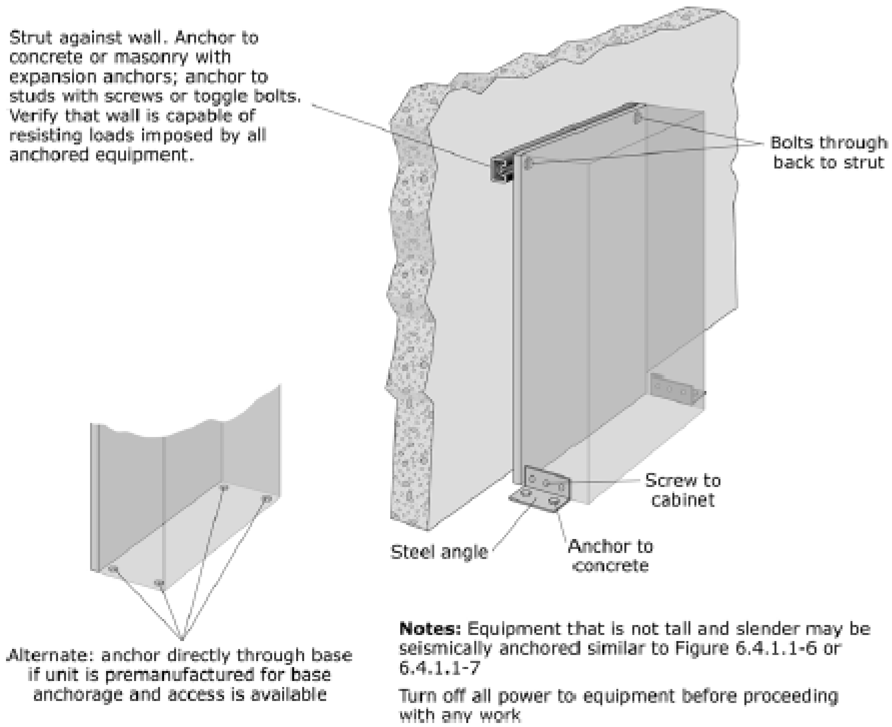


Figure G-38. Electrical Control Panels, Motor Controls Centers, or Switchgear.

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

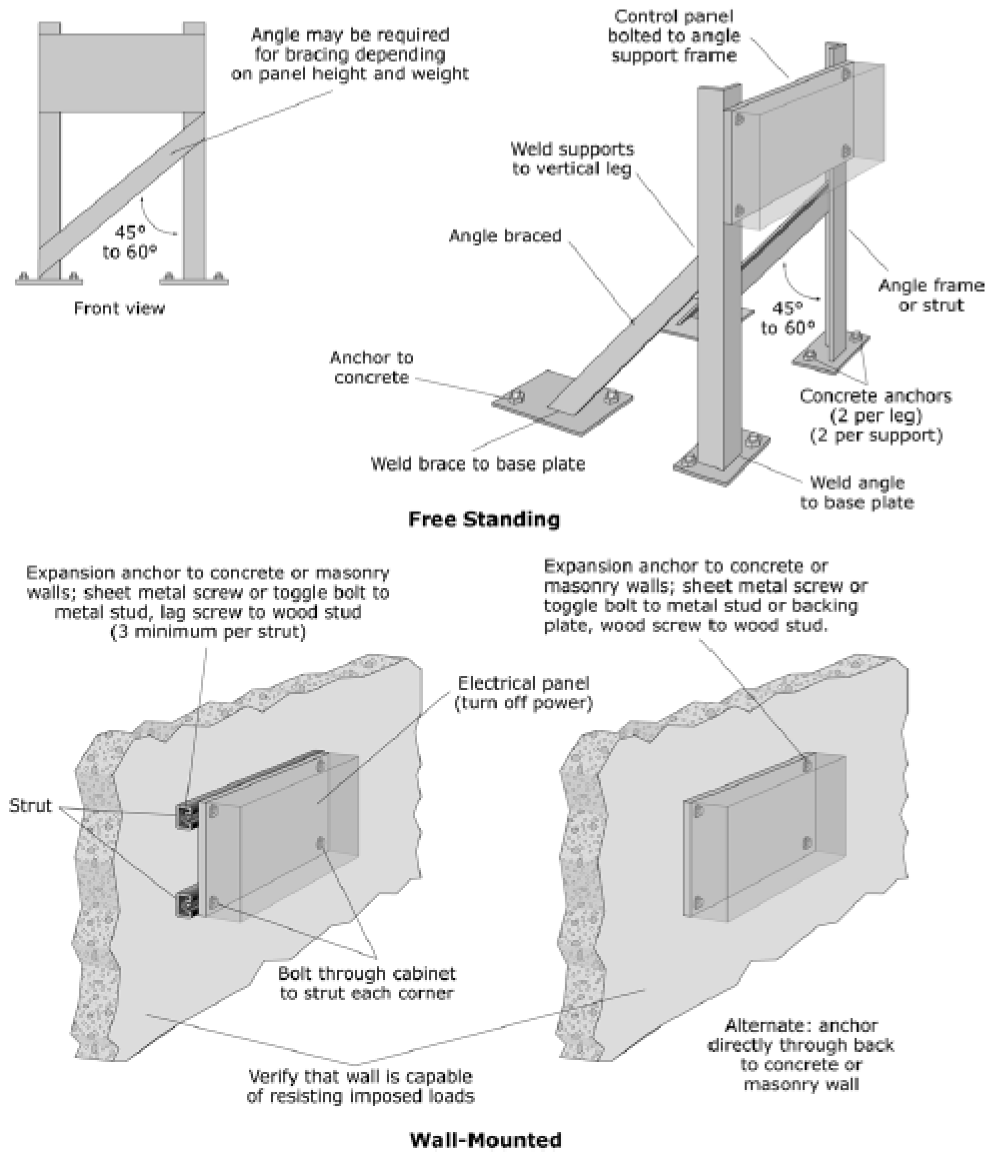


Figure G-39. Freestanding and Wall-mounted Electrical Control Panels, Motor Controls Centers, or Switchgear.

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

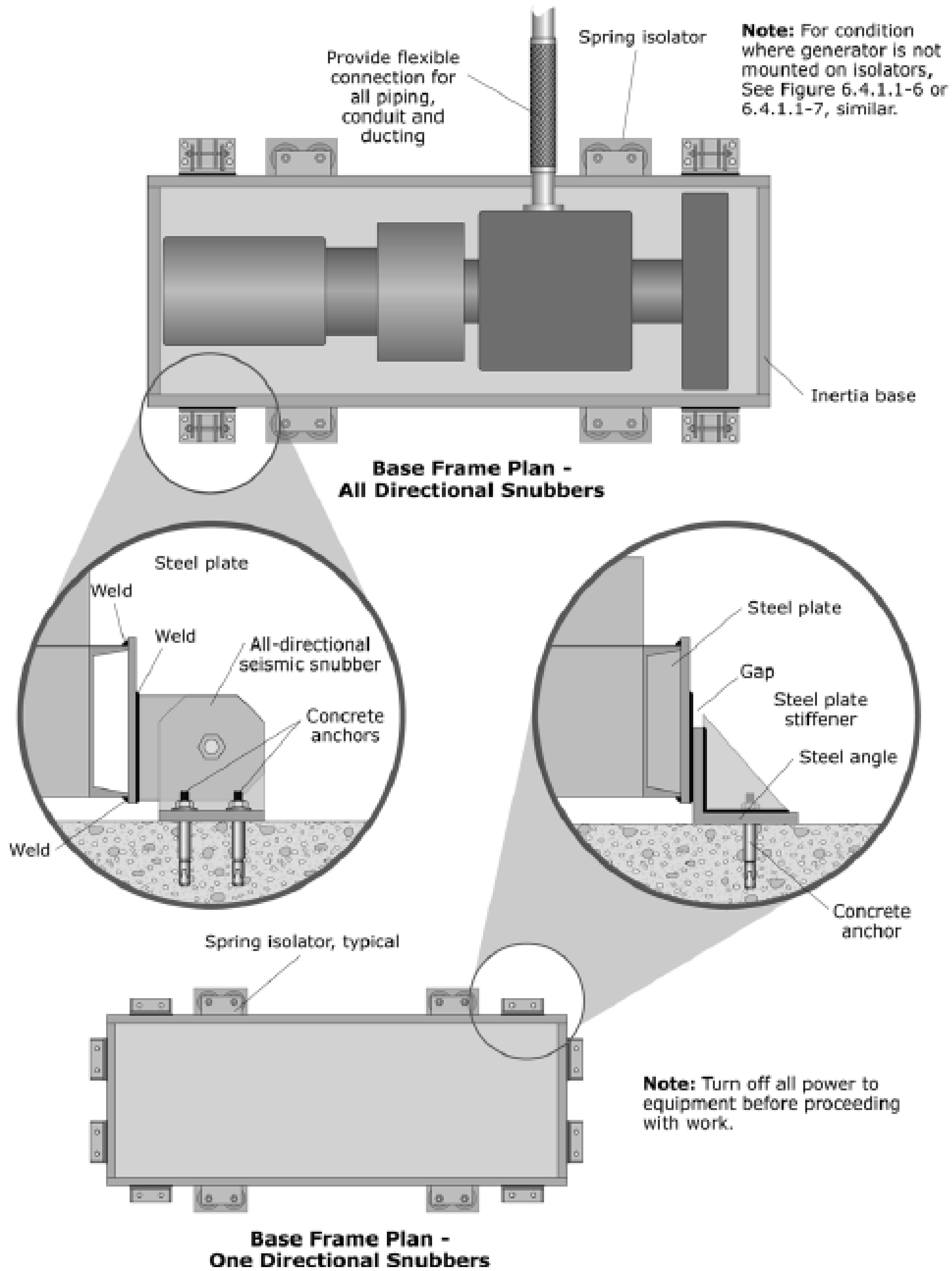


Figure G-40. Emergency Generator.
(FEMA E-74, 2012, Reducing the Risks of Nonstructural Earthquake Damage)

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