



TECH/NORTHWEST, INC.

ROOF CONSULTING, MOISTURE TESTING & ANALYSIS

ROOF SPECIFICATION

MODIFIED 2-PLY SYSTEM RE-ROOF

(2- ply + Modified with Insulation – Cold Process)

Project Number: 11091

PORTLAND STATE UNIVERSITY

BLACKSTONE BUILDING

Portland, Oregon

September 19, 2011



INDEX

REROOF SPECIFICATIONS:

SECTION 01010 -- GENERAL DESCRIPTION	Page	1 thru 10
SECTION 07520 -- SBS MODIFIED ROOFING & ROOF INSULATION	Page	1 thru 27
SECTION 07600 -- FLASHING & SHEET METAL	Page	1 thru 7
DETAILS.....	Page	1 thru 8
AS-BUILT REFERENCE DRAWINGS.....	Page	1 thru 1
ROOF CONSTRUCTION DATA.....	Page	1 thru 1
ASBESTOS LAB RESULTS.....	Page	1 thru 1
ROOFING SYSTEM CONTRACTOR'S GUARANTEE.....	Page	1 thru 2
SUBSTITUTION REQUEST FORM.....	Page	1 thru 1

APPENDIX "A"

MANUFACTURER'S SPECIFICATIONS – PAINTS & COATINGS.....	Page	1 thru 3
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GENERAL DESCRIPTION

PART 1 - GENERAL

1.01 GENERAL DESCRIPTION

A. Project Name:

1. This project shall be known as the "PSU – BLACKSTONE BUILDING – 2011 2-ply SBS Modified Cold Process Insulated Roof Assembly Reroof Project", with a project number of 11091.

B. Project Type:

1. Public:
 - a. All requirements associated with public bid process apply unless specifically noted.

C. Related Documents:

1. All sections within specification document.
2. Addenda as may be applicable during bid process.

1.02 QUALITY ASSURANCE

A. Bid Instructions:

1. Refer to "Bid Form" and "Instructions to Bidders" for specific bidding information

1.03 GENERAL SCOPE (by quote requirements)

A. General Scope Statement:

1. Built-up Roofs: (Roofs A & B)
2. This project includes the complete removal of the existing roof system and installation of new insulated SBS 2-ply cold process roof system/assembly including all incidentals to complete project to a warrantable level.

B. Reviewed by Quotes for project – In general, the work includes:

1. **"Quote 1"**: Base bid/quote of project as specified on specific roofs.
 - a. Roofs Included: A & B:
 - b. Removal of all built-up roofing, base flashing, all cants, internal drain flashing, sheet metal and incidentals prior to installing new specified system. Mechanically attach 1/2" perlite coverboard insulation; new cants, 2-ply SBS modified assembly with factory applied granules installed in cold-adhesive; SBS premium base flashing; rebuilding of internal drains; specified sheet metal; incidentals, etc. to complete a warrantable system.
 - c. Crickets upslope side of all equipment and in valleys between drains.
 - d. Incidentals: All incidentals to complete the system to a warrantable level.



2. No alternates will be accepted without pre-approval. No system alternates (*i.e. single-ply for built-up*) will be accepted on this project.
3. Quote shall include all fees, permits, taxes, etc. on appropriate lines.
4. Quoted cost/price shall be changed via change order only, as specified.

1.04 GENERAL SCOPE SUMMARY (*items included in project*)

A. General:

1. Refer to specific quote summary(s).
2. Refer to other sections of this document for further details.

B. Membrane System:

1. 2-ply SBS assembly installed in cold adhesive.
2. Note: The SBS modified system is written around the Malarkey 2-ply system; HOWEVER, Johns Manville and Soprema are considered acceptable manufacturers as long as the bidder submits on a true equal assembly (*components and assembly*).
3. 2-ply SBS modified (*603 base & 625 Paragon Cap*); SBS premium base flashing; all membrane installed in cold roofing adhesive (*727 adhesive*); Insulation – mechanically attached; red-rosin paper, incidentals.

C. Insulation – General as applicable to specific roof area:

1. ½" High Density Perlite cover-board.
 - a. Mechanically attached and pattern shall meet and/or exceed FM 1-90 wind up-lift system requirements.
2. Submittals on this project shall include fastener pattern layout for perimeter, field corners, etc. (*systems rating is applicable*).
3. Staggering of the insulation to offset the existing insulation pattern is required.
 - a. To be discussed at the mandatory pre-job meeting.

D. Crickets – Insulation:

1. Crickets at the up-slope side of all equipment, curbs (*large or small*), etc.
2. Crickets at valley areas between drains.
3. To be reviewed at the pre-bid meeting.

E. Sheet Metal - General:

1. Coping:
 - a. Salvage and reinstallation.
 - b. To be reviewed at the pre-bid meeting.

2. Equipment:
 - a. New counter-flashing of all equipment and proper flashing of base flashing membrane.
 3. Color and style to match the existing (*removed and/or salvaged*).
 - a. This issue shall be discussed at the pre-job meeting.
 4. All new sheet metal shall be installed to SMACNA standards when conflict occurs and finished assembly shall match the assembly removed.
 5. Refer to Section 07600 for further information.
 6. Attachment of the sheet metal shall meet and/or exceed all current SMACNA published guidelines.
 - a. Nails are not an acceptable attachment method. Screws, with appropriate (*specified*) washers, are required.
 7. A shop drawing approved by consultant, including gauge, style, color, and fastener pattern is required prior to the project start.
 8. All fabricated sheet metal work necessary to complete the project and not defined as salvage (*removed and reinstalled*) shall receive standing seams and shall employ double breaks with no exposed sharp edges.
- F. Miscellaneous - General:
1. Removal of any obsolete equipment.
 - a. Equipment noted on drawings and on the roof.
 - b. Equipment noted and discussed during the pre-job meeting.
 2. New roofing shall not be installed over dirty or otherwise unacceptable substrate.
 3. Completion of project in a professional manner to a warrantable level.
- G. Deck – Existing roof deck/substrate system repairs:
1. Inspect deck at tear-off areas and repair as required at complete tear-off and replacement areas in preparation for the installation of the new recover system components.
 2. All major deck/substrate repairs shall be considered a cost-plus item.
 - a. Immediate notification of problems to Owner's representative is required in order to process any applicable cost-plus billing.
 - b. Violation of this instruction and failure to submit a fully executed change order within twenty-four hours (*work days*) of the notification shall result in possible loss of and/or non-payment of any applicable repairs.
- H. Internal Drains & Scuppers: (*as applicable depending on drain type*)
1. Removal of all drain system components and rebuilding with new leads/sleeves, etc., and stainless steel bolts and nuts.
 - a. Existing clamping rings and strainers shall be salvages; but if broken, shall be replaced at the quoted cost-plus rate included within the Bid and as defined within the contract.

2. Drain Sumps:
 - a. Drains require sumped assembly with tapered insulation to the drain from the edge of the taper at the roof field.
 - b. Standard sump size is 24" from center of drain to outboard edge of sump in each direction.
 3. All roofing materials must be installed so as not to restrict the flow of water at the edge of the sump transition to the main roof field.
 4. Scupper:
 - a. Installation of new stainless steel sheet metal scupper insert or overall re-working of scuppers to provide a positive long-term seal of the assembly in compliance with membrane manufacturer's requirements for an approved system and as approved by Owner's representative.
 - b. Scupper shall be installed in such a manner (*sloped slightly to building interior*) so as to not result in condensation and incidental moisture (*rain, etc.*) from running/dripping to the exterior of the building.
 - c. Exterior of scupper shall be caulked and finished to match the building exterior.
 5. See SBS Modified Roof System-Section 07520 for further information.
- I. Penetrations:
1. Penetrations shall be detailed based on manufacturer's most recent printed instructions and/or the specification documents.
 2. General Notes / As approved by Manufacturer:
 - a. New flashing of all other roof penetrations including conduct, pipes, etc. to meet manufacturer's requirements.
 - b. Liquid applied flashing system of irregular penetrations is acceptable, as approved by manufacturer.
 - c. Chem-Curb system is an acceptable alternate to the metal flashing, as long as the installed detail meets the requirements for a warrantable roof system by the membrane manufacturer and the products used are not specifically restricted for use in the specified and approved system.
 - d. Additional penetration flashing option: Other manufacturer's flashing details will be approved; however, they require approval by roof system manufacturer for use within assembly as well as approval by consultant by addenda during bidding process.
- J. Miscellaneous incidentals:
1. Any wood replacement that may be necessary shall utilize treated wood during the course of this project.
 2. All Incidentals to complete the project to a warrantable level based on these specifications and the manufacturer's printed instructions.
 - a. Whenever a conflict occurs, the strictest interpretation shall be utilized.



1.05 SQUARE FOOTAGE

- A. The roofs within the scope of this project include an approximate total as follows:
1. Contractor is responsible for verification of all square footage. Owner and/or Roof Consultant shall not be responsible for the accuracy of any square footage information provided within this specification or mistakes and/or errors by the bidder and/or contractor.
 2. Applicable Roofs: 7,216 sq. ft. (approx.)
 3. The above figures are surface area only and do not include parapet, cants, etc.
- B. For individual square footage, please refer to "Roof Construction Data" section within specification.
- C. **NOTE:** The noted figures herein are approximate square footage only. Contractor is responsible for the verification of all square footage and components.

1.06 BIDDING PROCESS

- A. Refer to "Bid/Project Information", Oregon University System sections and "Instruction to Bidders" for further specific information.
- B. Pre-Job Meeting (mandatory)
1. A pre-job meeting will be conducted at the job site prior to start up. The Selected Roofing Contractor shall notify all parties involved with project including sub-contractors, Owner's representative and Roof Consultant a minimum of eight (8) working days prior to the scheduled meeting.
 2. Meeting will not be conducted until all applicable submittal requirements are met and approved.

PART 2 - PROJECT REQUIREMENTS & NOTES

2.01 COORDINATION

- A. Contractor (*Prime contractor*):
1. Coordination with designated Owner's representative is a requirement of this project.
- B. Coordination Statement:
1. Coordination with Owner's on-site representative for location of roof access, staging, etc., is required during the course of the project.
 - a. Coordination shall be discussed at pre-bid and pre-job meetings.
 - b. Deviation from the approved plan (*as agreed upon at pre-job meeting*) is not acceptable and may result in project delays at contractor's expense.
- C. Manufacturer's Participation:
1. This project required participation by the prime Manufacturer's local representative.
 - a. This participation includes being available on an "as-required" basis to provide technical assistance. In addition, the Final Inspection shall require manufacturer's participation if so requested by the Roof Consultant and/or Owner.



D. Other Trades:

1. Contractor (*prime*) shall coordinate all trades to complete this project unless noted at the mandatory pre-bid meeting.
 - a. Costs for other trades shall be included within the Bid for all items noted and discussed at the mandatory pre-bid and as noted via addenda prior to the bid date.
 - b. Costs that are not directly noted within the Specifications, but are required to complete the project, shall be billed per the Cost Plus figures supplied within the Bid Form after approval for the work has been issued by the Owner's representative in writing.

E. Owner's Representatives:

1. The project Owner's representative will be indicated at the pre-job meeting including but not limited to contact information (*if necessary*) as well as the Owner's project management structure, etc.

F. Roof Consultant:

1. The project roof consultant firm on this project is:
 - a. A-TECH/NORTHWEST, INC.
Mailing Address: 2501 NW Gerke Rd., Prineville, OR 97754
Regional Office: 266 NW 1st Avenue, Suite C, Canby, OR 97013
Phone: 503-628-2882 or 503-266-2425
Fax: 503-266-2428 or 541-447-7524
 - b. Project Representative:
 - (1) Doug Coddington or Alan Loftesness.
 - (2) Please direct all roofing related questions to his attention and reference specific facility name and project number to avoid confusion with other projects.

2.02 INSPECTIONS

A. Bid Process:

1. Inspection of the work area may be obtained by authorized Bidder's representatives.
2. Notification to Owner as noted during pre-bid is required before accessing roof.
 - a. Do not access roof without checking in with the designated on-site building representative, as the building is a secured facility.
 - b. Access procedures will be discussed at the pre-job meeting.

B. Work-in-Progress Inspections: (*during work*)

1. Project is subject to periodic and possibly full-time inspections by Owner's representative(s) and Roof Consultant during the course of the project.
2. Supplemental as required during course of project.

C. Close-out:

1. Substantial Completion Inspection
2. Final Inspection



3. Manufacturer's Warranty (*if NDL exercised*)
4. Notification to Owner is required before accessing roof.
 - a. Do not access roof without checking in with the designated on-site building representative, as the building is a secured facility.
 - b. Access procedures will be discussed at the pre-job meeting.

2.03 LICENSES – REGULATORY REQUIREMENTS

- A. Contractor's responsibility:
1. The Owner will submit drawings to the City of Portland to obtain a basic building permit through the City of Portland's facility permit process. The Contractor is responsible for all other permits required and their fees necessary to complete this project and shall have copies on the job site at all times during the project, including sub-contractors.
 2. Prime contractor is responsible for all fines, or other ramifications for not complying with this instruction.

2.04 SCHEDULE

- A. A written schedule is required to be submitted and approved before project start-up.
1. Refer to submittal requirements within this document.
- B. Completion of work is required based on approved schedule.
1. Refer to 2.07 "Weather..." for further information.
 - a. Schedule must include not only start and finish dates, but work patterns, staging areas, etc.
- C. Completion of the work, in its entirety, by the date indicated within the "Instructions to Bidders" and applicable contract documents is considered mandatory on this project.
1. Coordination with Roof Consultant on schedule, delays, etc. is required during the entire course of this project.
 2. Final surfacing may not be possible if extensive weather related delays occur during the project.
 - a. If this situation develops, a light glaze coat of the roof surface will be required to provide a weatherproof wearing surface during the winter and the final surfacing applied at the first opportunity during the following dry working season.

2.05 FACILITY OPERATIONS - and - SCHEDULING

- A. This facility is an operating commercial facility and contractor shall be required to meet all Owner's requirements for set up and storage of materials.
1. Blockage of building access doors and/or adjacent traffic areas is not acceptable without prior written approval.
 2. Inside access during the project is restricted unless otherwise pre-approved by Owners representative.
 - a. Contractor is responsible for any damage associated with inside access (*i.e. stains on floor, etc.*)

- B. This project is to be conducted while the normal day-to-day operations of the facility are being conducted. Contractor is required to take care to make as little interruption as possible of the day-to-day activities.
1. Early and/or late hours as well as weekends are acceptable, but the contractor shall be required to notify Owner's representative and Roof Consultant of work area and schedule at least two (2) days prior to work on a specific area.
 2. Schedule must comply with local zoning laws and requirements for noise, etc.
 3. Prior schedule approval, including non-acceptable work days (*periods*) is required by Owner and Owner's representative prior to project start.

2.06 BUILDING ACCESS; STAGING & LOADING:

- A. No building access is available to roofing crew other than that which is necessary to complete the project as specified.
1. Coordination with Owner's representative (*Consultant and on-site*) is required applicable to any work that is necessary on the inside of the building.
 2. This is a secured building and all Owner security requirements must be complied with at all times.
 3. The Contractor shall coordinate with the PSU Facilities and Planning office to request keys for access to the building and roof.
- B. Roof access via outdoor stairway is required
1. No interior access is acceptable without prior approval of building Owner representative.
- C. Contractor to work from sides and back of building whenever possible and under no circumstances shall the Main (*Front*) Entry(s), loading dock or other restricted areas be blocked.
1. Under certain circumstance, other building access or work areas may be blocked with prior approval by the Owner's representative.
- D. Location of access, staging, drop box, etc. shall be discussed at the mandatory pre-bid meeting and confirmed during pre-construction meeting.
1. Notification of selected applicable locations shall be provided to Owner's representative and Consultant prior to start up.

2.07 WEATHER RELATED REQUIREMENTS

- A. Weather:
1. This project is located in a region where weather is a very high consideration.
 2. Contractor is responsible for monitoring weather conditions and adjusting their project activities, coordination, and protection accordingly.
 3. All precautions and protections of building, building components/occupants, new roofing, storage, and work areas are required during the project due to any inclement weather conditions.



2.08 **ASBESTOS** -see attached report

- A. RESULTS: See attached Lab Results.
- B. As applicable, Contractor must comply with all local state and federal requirements for asbestos removal within the scope of a roof project.
 - 1. If, during the course of the project, asbestos conditions are identified that were not previously noted, the Contractor shall immediately notify the Roof Consultant and Owner's representative, **IN WRITING**, of the conditions.
 - 2. At that time, the Owner and Roof Consultant shall determine the best course of action and will notify the Contractor in a timely manner.
 - 3. At all times, the Contractor is required to meet minimum standards with regard to asbestos as it relates to roofing and retrofit roofing projects.
 - 4. The Owner reserves the right to contract with an Asbestos Abatement Contractor for removal and any and all asbestos if the successful bidder (*Contractor*) and Owner are unable to agree on a cost for such related work.
- C. Contractor shall submit their asbestos abatement plan prior to project start-up (*as applicable*). Refer to Submittals section within this specification document.
- D. Under no circumstances shall any materials containing asbestos be allowed with the scope of this project. This includes all mastics, plys, coatings, etc.
 - 1. Contractor shall be responsible for all costs, fines, labor, etc., as may be applicable for removal, via approved asbestos removal methods, for any materials installed in violation of this instruction.

PART 3 - SUBMITTALS

3.01 **SUBMITTALS** (*Refer to Oregon University System (PSU) requirements.*)

- A. PRIOR TO COMMENCEMENT:
 - 1. **INSURANCE**:
 - a. The contractor shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the contractor's operation(s) under the Contract, whether such operations be by himself or by any sub-contractor or by anyone for whose acts any of them may be liable.
 - b. Refer to Oregon University System (*PSU*) requirements.
 - c. ***NOTE***: Roof Consultant (*A-Tech/Northwest, Inc.*) **shall** be listed as an Additional Insured on the Contractor's liability insurance policy and listed as such on the required "Certificate of Insurance". Contractor shall submit a copy of the Certificate to the Roof Consultant a minimum of 5 working days prior to mobilization.
 - 2. **MANUFACTURER'S WARRANTY**:
 - a. Submit a sample of the Standard and Extended manufacturer's published warranty documents.

3. FACTORY MUTUAL SUBMITTAL REQUIREMENTS: *(Including the following, as applicable, as a summary to indicate that proposed roof system components comprise a Factory Mutual listed assembly as specified herein.)*
 - a. Factory Mutual Reference information;
 - (1) Copy of current listing information.
 - b. Manufacturer, type, and size of roof insulation;
 - c. Manufacturer, type, and size of roof decks;
 - d. Manufacturer, type, and specifications of the roof covering materials;
 - e. Manufacturer, type, and size of the insulation fasteners and plates;
 - f. Layout of the fasteners per board for the typical bay, perimeter bay, and in the corners;
 - g. Sectional view of the roof components;
 - h. Details of perimeter flashing;
 - i. Roof drain sizes.

- B. UPON COMPLETION: *(To Consultant for review within 5 days of Final Inspection)*
 1. GUARANTEE(S)/ WARRANTIES:
 - a. CONTRACTOR'S GUARANTEE: Submit fully executed copy of the Contractor's Guarantee of workmanship.
 - b. MANUFACTURER'S WARRANTY: Submit fully executed copy of any applicable Manufacturer's Warranty *(as applicable and if purchased by Owner)* to the Owner with a copy to Consultant for review.
 2. REFUSE RECEIPTS: Copies of all refuse and dumping receipts as proof of legal disposal of all materials associated with this project.
 3. ASBESTOS RELATED DOCUMENTS: All asbestos related records as may be applicable for asbestos related removal within the scope of this project.
 4. NOTE: The above items are required and must be approved prior to and in order to process any final billing requests.

- END OF SECTION -

SECTION 07520
SBS MODIFIED ROOFING and ROOF INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. TEAR-OFF:

- a. Complete tear-off and removal down to existing structural deck of all existing built-up roofing, insulation, cants, base flashing, counter-flashing, etc. over the entire roof area in preparation for the new specified roof assembly.

2. DECK:

- a. Inspection and preparation of structural deck, after tear-off of existing roof (*applicable to work area and keeping building watertight at the end of the work period*), in order to be the appropriate substrate for the new specified roof system.
 - (1) Deck system shall be inspected and repaired, as required. Immediately notify Roof Consultant, or designated Owner's representative, of any problems **prior** to completing work, and documentation of repairs are required.

3. NEW BUILT-UP ROOF SYSTEM:

- a. Over the cleaned and prepared substrate install the following systems:
 - (1) Red Rosin Paper: Install red rosin paper prior to the installation of any subsequent materials.
 - (2) Insulation: High density recover board -
 - (a) Attachment shall comply with published FM 1-90 attachment pattern requirements (*as applicable and available*).
 - (3) Membrane: Install 2-ply SBS modified Assembly in cold adhesive. System includes new premium SBS granulated surfaced base flashing system.
 - (a) Top SBS ply sheet shall be coated with factory applied white colored granules (*factory applied coloring*).
 - (b) Base flashing shall be same color as mineral cap sheet.
 - (c) Additional ply (*3 total*) at all waterway areas is required.

4. INSULATION - General:

- a. Mop ½" perlite recover board as top layer of insulation.
- b. Meet and/or exceed Factory Mutual 1-90 attachment published pattern as a listed and approved roof system.
 - (1) Comply with perimeter, corner and field attachment requirements also to meet FM 1-90 attachment.

- c. Crickets:
 - (1) Install crickets at up-slope side of all roof-mounted equipment to prevent ponding.
 - (2) Crickets shall be installed during the insulation process and cannot be phased after the membrane system (*all or part*) has been installed.
 - (3) Contractor shall review existing conditions and drawings and submit a cricket layout drawing for approval during the submittal process.
 - (4) Crickets shall be discussed at the pre-bid meeting.
- 5. BASE FLASHING MEMBRANE:
 - a. SBS granulated base flashing material.
 - b. Standard equal to or better than JM-Dynaflex DFE Series (*or Malarkey 650 series*).
 - c. Base flashing color must be the same as surface cap sheet membrane.
- 6. METAL:
 - a. Perimeters: Refer to other sections.
 - (1) Remove and replace with new pre-painted (*Kynar finish*) standing seam system.
 - b. As applicable; Install new stainless steel scupper system as noted herein, and as applicable to complete the project where scuppers are replaced and/or installed.
 - (1) New stainless steel scuppers set in solid layer of roofing grade plastic cement (*or mastic*) as approved/recommended by membrane manufacturer warrantable assembly.
 - c. Install new counter-flashing metal at all equipment that cannot be raised during the installation of the roof assembly.
 - d. New wall metal.
 - e. Sheet metal work shall be discussed at the pre-bid meeting.
 - f. Refer to "Flashing & Sheet Metal Section 07600".
- 7. MISCELLANEOUS:
 - a. New 4" cants. (*3" is acceptable with written approval from Roof Consultant, in writing, prior to installation.*)
 - b. Removal of any obsolete equipment as indicated on drawings and directed by Owner and/or Owner's representative.
 - c. As applicable: Scope of work includes disassembly and rebuilding of all existing internal drains (*as applicable*) and installation of new scupper to collector and downspout system as noted on drawings.
 - (1) All drains shall include new stainless steel bolts and nuts within the base bid.
 - (2) Broken and/or non-salvageable parts shall be replaced as a cost-plus item during project.
 - (3) Verification by Owner's representative (*Roof Consultant*) of affected parts is required prior to billing.
 - d. Fabrication & installation of new roofed in curb units at all areas where equipment is currently mounted on sleepers only.

- e. Replacement of damaged pressure treated wood pipe supports (*as applicable*) and installation of new oversized clips.
 - f. Roofing accessories and incidentals to complete the project.
 - g. Walk pads at perimeter of all large serviceable HVAC units (*as applicable*).
 - h. New pitch pans, field formed liquid membrane or Chem-curb system, at HVAC supports and other penetrations shall be utilized. (*Replace any/all existing*).
 - (1) Product must be prime membrane system manufacturer approved.
 - (2) To be discussed at the pre-bid meeting.
8. Refer to "General Description" section of this document for additional details and information.
9. FACTORY MUTUAL REQUIREMENTS:
- a. New roof system shall comply with the published standards within Factory Mutual with regard to the correct insulation fastening pattern. (*It is understood that the roof system is not specifically rated by "FM" because of the wood deck.*)
 - (1) Class A, or better, installed roof assembly.
 - (2) 1-90 wind listed/rated system or the equivalent.
- B. Related Work Specified Elsewhere:
- 1. Sheet Metal (*Section 07600*)
 - 2. All manufacturer's requirements including, but not necessarily limited to, pertinent portions of their Specifications and General Requirements and recommendations apply to the work of this section as fully as though repeated herein.

1.02 QUALITY ASSURANCE

- A. Acceptable Roofing Materials Manufacturer shall be:
- 1. Malarkey Roofing Company
 - 2. Johns Manville Roofing Systems (*formerly Schuller*)
 - 3. Soprema Roof Systems Company
 - 4. *or* Pre-Approved equal.

Special Note: *While the manufacturers are listed for the bidder's convenience, the system bid/quote must comply with Factory Mutual requirements as specified within this document. In addition, the Malarkey Roofing Company system listed within this document shall be considered the base/standard upon which any alternates shall be reviewed. The term "system" refers to all components that comprise the roof assembly including insulation, fasteners, membrane, base flashing, etc.*



B. Contractor shall:

1. Be considered the general (*primary*) contractor for this project and shall be responsible for all aspects as well as sub-contractors during the entire project duration as indicated by final payment by Owner.
2. The Contractor selected for this work must be capable of submitting to the Owner the Manufacturer's Unlimited Penal Sum Guarantee, with the option to purchase up to the Owner until completion and acceptance by Owner.
 - a. Refer to Guarantee and Warranty sections within this document for further information.
3. Be an "approved applicator" by roof primary roof system manufacturer.
4. Comply with Local, State and Federal Regulations, Safety Standards and Codes.
 - a. Use the strictest document when a conflict arises.
5. Be responsible for meeting all fire regulations.
6. Meet all Owner's requirements as may be dictated and/or defined within their contract documents and/or printed instructions.
7. Be entirely responsible for the proper installation of all components of the roofing system and repairs included within the scope of this project from the project start date until final approval, including all sub-contractors.
8. Immediately inform the Owner's representative (*Roof Consultant*), via telephone first and in writing, of any conditions detrimental to the quality of construction or long-term performance of the roofing system and shall not proceed with the work until the conditions are corrected to the satisfaction of the Owner's representative.

C. Fire regulations:

1. A certified fire extinguisher of adequate size shall be located at the asphalt kettle and elsewhere as required.
2. Mandatory three-hour fire watch is required after all torch work is completed.

D. Environmental:

1. Contractor shall be responsible for all environmental control during course of project. This includes but is not limited to:
 - a. Post copies of MSDS information at site (*copies on site with project supervisor*) and notify Owner's representative of location. This is the Contractor's responsibility entirely.
 - b. Notify Owner's representative in writing, with copy to Roof Consultant, of any potential danger to building and/or occupants, including process, procedures or materials prior to starting.
 - c. Notify Owner's representative, in writing, with copy to Roof Consultant, of methods of controlling entry of fumes into building interior.

E. Roofing Foreman shall have a copy of these Specifications on the job at all times during application and shall refer to it for proper application methods.



F. General:

1. Whenever specification items found herein are less stringent than Manufacturer's General Requirements, manufacturer's requirements shall be followed, including but not limited to, compliance with any and all guarantee requirements.
2. Fastener spacing shall conform to applicable Manufacturer's Requirements, Uniform Building Code, Factory Mutual, and/or wind uplift requirements for area where building is located and as indicated within these specifications.
3. All Owner and/or Owner's representative decisions are final.

G. Special precautions are necessary when installing the roof system at temperatures below 45^o F to insure satisfactory application and performance.

1. Meet and/or exceed all manufacturers' requirements and printed instructions.
2. Contractor to notify Owner and Roof Consultant if there is a potential for cold weather application.
3. Weather is a critical factor with this project and the contractor is required to supply a crew large enough and adequate procedures to meet the approved schedule.
 - a. If extensive weather delays are incurred during the project, all factors must be discussed with the Owner's representative (*Consultant*) within thirty days of any stopping of work for the winter.

H. Manufacturer:

1. The Manufacturer selected for this work must be willing to participate in all phases of the application process, with or without guarantee purchase by Owner.

I. APPROVED EQUALS:

1. All approved equals shall be based on the submittals submitted and shall be judged based on all material compliance with specification and, as applicable, Factory Mutual requirements, performance and net life cycle cost savings as can be demonstrated to the Owner in written form.
2. Submit requests for substitution on format per form included within the specification documents. Requests not submitted on approved format are unacceptable, and may not be reviewed.
3. Product may be approved provided all provisions of the Specifications are complied with and submittals are made and approved prior to bid date. (*Refer to OUS instructions.*)
4. Any approved substitutions will be identified via Addenda.
5. No unlisted product substitutions are acceptable and all substitutions must comply with the approved "system" requirements as defined within this document.
6. Substitution for material components with similar components that comprise an approved system will be reviewed; however, changes in system from the built-up roof assembly specified herein to a modified, single-ply, etc., will not be reviewed.
7. All Owner and/or Owner's representative decisions are final.

1.03 FIELD QUALITY CONTROL

A. PROJECT CONTRACT:

1. The project is a formal Contract between Owner and the Roofing Contractor.
2. Roofing Contractor is responsible for all sub-contractors, their work, activities and all safety instructions on this project, as is defined as the "General" and/or "Primary" contractor on this project for the entire duration unless agreed upon by Owner's representative, in writing, or as otherwise defined within the contract documents.

B. PROJECT COORDINATION:

1. The project shall be coordinated by Owner's representative(s) and Roofing Contractor and is subject to inspection by additional Owner's representatives they may choose.
 - a. Owner's independent representative responsibility shall include enforcement of Specified Requirements and the General Requirements of the Specifications stated herein, as well as documentation of deficient conditions, installation conditions, etc.
 - b. Owner's independent representative shall have the authority to recommend, to the Owner discontinuance of work in the event that requirements are not complied with and/or deviations or significant problems are not immediately resolved to the Owner and/or Owner's representative's satisfaction and as directed within the specifications.

C. PRE-JOB MEETING: *(aka: pre-construction and/or pre-application)*

1. Prior to beginning work, a Pre-job Meeting will be held at the job site. Those present will be: the Roofing Contractor's manager in charge of project, the Roofing Foreman, the Roof System Manufacturer's field representative, the Sheet Metal and other applicable Sub-contractors, Roof Consultant, and Owner's representative.
 - a. Contractor shall coordinate the date of the Pre-job Meeting with the Consultant so that all required parties are in attendance.
 - b. A minimum of eight (8) working days notification to Roof Consultant is required prior to the meeting.
2. Attendees shall review the facility and all pertinent details and Specifications, noting any potential problems and making any changes, deletions, or additions as deemed necessary. Also included in the discussion will be the following: nature and availability of roofing materials, guarantee and submittal requirements, scheduling and forecast of weather conditions, regulatory requirements, protection of building, building components, and completed roof system, proposed installation procedures, and any additional items related to the total roof system.
3. Attendees shall tour representative areas of roofing project and discuss substrate construction and general conditions, including slope, expansion joints, curb and penetration installation, drains, and drain locations, perimeter wall details and material compatibility, etc.
4. Discussion will be recorded. The Owner's Roof Consultant will furnish a copy of recorded discussions to all attendees.



5. No roofing work shall commence nor material delivered to the job site until after the Pre-job Meeting, unless previously approved, in writing, by Owner and/or Roof Consultant.
 - a. This instruction may be waived upon award of the contract, and agreement by all parties that a written Authorization-to-Proceed is acceptable, in order to expedite the delivery of materials to the job site on this project.

D. WORK-IN-PROGRESS INSPECTIONS:

1. Project shall be subject to periodic inspection by Owner's representative(s) on an as-required basis during the course of the project.

E. SUBSTANTIAL COMPLETION INSPECTION(S):

1. Prior to completion, the Roofing Contractor shall schedule a substantial completion inspection with the Owner and the Owner's representative for punch list development.
2. Inspection is intended as a pre-acceptance inspection to be conducted when Roofing Contractor feels project is substantially completed.
 - a. A "punch list" of all unfinished, deficient or unsatisfactory work will be developed by the Owner's representative and distributed to the Owner, Roofing Contractor and Manufacturer's representative (*as applicable*).

F. FINAL INSPECTION:

1. Upon completion of all specified work items, a final roof inspection shall be performed by the Owner and Owner's representative (*and if applicable, the Manufacturer's representative*). The Roofing Contractor will be notified of the date and time and may attend if they wish.
 - a. Any discrepancies or incomplete work shall be documented in a "punch list" which will be issued to the Contractor.
 - b. Any applicable Manufacturer's Guarantee will not be issued until completion and confirmation of all punch list items as well as all other guarantee requirements.

G. ROOF SAMPLES:

1. The Owner and/or Owner's representative reserve the right, at any time during the installation of the membrane roofing or thereafter, to order a sample or samples to be cut at random from the roof membrane.
 - a. Samples will be examined and evaluated as to standard ASTM testing criteria for material quality, lap adhesion, etc., utilizing manufacturer's nominal standards criteria per submittal requirements noted herein.
2. Test cuts, if required, shall be approximately 12" x 12", cut at right angles to the direction of the membrane and through (*across*) the field laps.
3. If the sample is immediately approved by the Owner and/or Owner's representative, Roofing Contractor shall patch the area(s) of such test cuts to whatever size and dimension as needed to properly ensure the specified longevity of the roof and comply with Manufacturer's requirements.

4. If for any reason the sample is not immediately approved by the Owner and/or Owner's representative, Roofing Contractor shall install all temporary protection necessary to prevent penetration of water through the roof membrane and into the roofing components until final repairs (*patches*) or new roofs are installed, and upon the decision of the Owner and/or Owner's representative, make all required patches and repairs/replacement.
5. All laboratory testing will be done by either an independent laboratory based upon the Owner and/or Owner's representative's directions. Copies of the lab results will be forwarded to Owner, Roofing Contractor, Owner's representative and Manufacturer's representative (*as applicable*).
6. If the samples meet the Manufacturer's Published General Requirements, the expense of cutting, patching, and testing, will be borne by the Owner. If the cuts fail to meet Manufacturer's Published General Requirements, the application shall be deemed defective and shall be removed, replaced, or corrected in a manner acceptable to the Owner, Owner's representative and the Manufacturer. Roofing Contractor will bear entire cost of such removal, replacement, repair, and cost of test cuts and testing. Repairs and/or replacements shall be done as per Manufacturer's Pre-published Specification and General Requirements.
7. Cut areas shall be replaced to avoid depression in the membrane. Patch shall be brought out onto field area a minimum of four inches (*4"*) beyond edge of cut or as Manufacturer's published instructions dictate. Four inches (*4"*) is the Owner's minimum lap for repair areas on this project.
8. Contractor is responsible for making repairs to any and all test cuts taken and for performing any recommended corrective work required by Manufacturer for issuance of his Guarantee, at no additional charge to Owner.

1.04 SUBMITTALS

- A. Refer to "General Description" section of this document and the Oregon University System (*PSU*) instructions.

1.05 REFERENCES

- A. American Society for Testing and Materials (*ASTM*):
 1. As listed on baseline spec manufactures most recently printed data sheet.
- B. Underwriters Laboratories (*U.L.*):
 1. U.L. Labeled products: G-1 (*ply sheets*) or G-2 (*base sheets*)
- C. Factory Mutual:
 1. Current system approval data.
 - a. Refer to specific requirements within specification.
- D. Manufacturer's Specifications Catalog:
 1. Built-up roofing system - SBS Modified assembly.

1.06 PRODUCT HANDLING

- A. Deliver materials to job site on pallets in original, unopened packaging with legible labels. Package labels shall indicate material name, products date and product code.
 - 1. Coordinate with designated Owner's representative for appropriate staging and storage areas.
- B. Store materials in dry, protected areas in an upright position. When stored outdoors, store on pallets above ground and cover with suitable protective sheet or tarpaulin. Shrink-wrap packaging is not intended for long-term job site storage and shall be removed upon arrival at job site and replaced with a watertight breathable covering.
 - 1. Contractor is responsible for all security applicable to storage of materials after award of contract and until acceptable by Owner.
- C. On packaged asphalt, all cartons shall be imprinted with Manufacturer's name, ASTM type, flash point, and EVT. For bulk asphalt, type, flash point, and EVT shall be included on bill of lading accessible at the job site.
- D. Any wet, damaged or defective material will be marked and removed from the job site by Contractor that same day. This material will promptly be replaced at no cost to Owner.
- E. Wet materials shall not be applied nor shall roofing application proceed during wet weather or when moisture is on roof surface.
- F. Select and handle materials and equipment in such a way as to avoid damage to materials, existing construction, or applied roofing.
- G. Do not load or permit any part of structure to be loaded with a weight that will endanger its safety or cause damage. Confine equipment, storage of materials and debris and the operations and movements of workmen within any limits as indicated or as directed by the Owner.
- H. Protection of existing membrane is required for any materials stored on roof during course of project.
- I. No materials may be stored on newly installed membrane.
- J. Contractor shall arrange work pattern(s) so as to avoid walking across installed roof membrane areas so much as is possible and practical during the course of the project.
 - 1. Contractor shall repair all damage caused as a result of a violation of this instruction, at no cost to Owner.
- K. Contractor must take every precaution to prevent interior leakage, materials falling into the interior, or other such occurrences.
 - 1. Contractor shall control all tear-off and installation activities in order to protect building, building occupants, and area surrounding project at all times.
 - 2. Installation of materials shall be accomplished in such a manner that adhesive/bitumen drippage does not occur.
 - 3. Contractor is responsible for all damage caused by any material entering the building including tear-off, roofing application, water, adhesive, bitumen, fumes, chemicals, etc.
 - a. Refer to Part I; 1.02 for further information.

1.07 GUARANTEE AND WARRANTY

A. CONTRACTOR'S GUARANTEE AGREEMENT: *(Mandatory)*

1. For a two (2) year period from the date of completion and Owner's written acceptance, Roofing Contractor agrees to inspect and make necessary repairs to defects of leaks in the roof and flashings.
 - a. Leakage will be attended to within twenty-four (24) hours from receipt of notice of problem from Owner.
 - b. As soon as weather permits, Contractor will restore affected areas to standards of this contract without voiding the Manufacturer's Guarantee and repair any damages from these leaks without cost to Owner, except for leaks caused by abuse to roof by others or by abnormal weather conditions such as lightning, severe hail, or other unusual climatic phenomena.
 - c. This Guarantee must be submitted to the Owner in writing before final payment is released for the project.
 - (1) Refer to "ROOFING SYSTEM CONTRACTOR'S GUARANTEE" included within this document.
 - (2) Form included within this document must be utilized *(fully filled out and submitted)*.

B. MANUFACTURER'S STANDARD WARRANTY: *(Option)*

1. This project requires the manufacturer's standard 10-year warranty as an option. The option to purchase this warranty will be exercised prior to the start of the project and shall be indicated within the applicable contract documents.
2. A sample of the document shall be included within submittal package.

C. MANUFACTURER'S EXTENDED NDL WARRANTY: *(Option)*

1. This project requires that the quoted system be capable of meeting the requirements for the manufacturer's full NDL manufacturer's warranty/guarantee.
 - a. The NDL is an option that may or may not be exercised on this project but the system bid/quoted must be able to meet the requirements to be warrantable upon completion.
2. It shall be the Owner's option to purchase or not purchase the Manufacturer's NDL Guarantee upon award of contract.
3. Submit to the Owner a Manufacturer's unlimited penal sum Guarantee covering any and all repairs and/or replacements to keep the roof, including the field and flashing, watertight for a period of X-years beginning at the time of the Owner's acceptance of final product. Cost of this Guarantee to be borne by the Owner upon notification of Contractor of option to purchase.
4. The Guarantee shall be executed by Manufacturer to cover any and all costs for repairs necessary to stop leaks which occur resultant of, but not limited to, the following:
 - a. Deterioration of the roofing membrane or base flashing system resulting from ordinary wear and tear by the elements.

- b. Workmanship on the part of the Approved Roofing Contractor in application of the roofing membrane or base flashing system.
 - c. Blisters, fishmouths, bare spots, ridges, delamination and/or wrinkles in the components associated with the roof system.
 - d. Splits or cracks in the roofing membrane not caused by structural movement.
 - e. Slippage of the roofing membrane or base flashing.
5. If, twenty-four (24) hours after notification of roof leakage Contractor has not responded, Owner shall have the right, without invalidating any Guarantees and at the expense of the Contractor, to make any emergency temporary repairs that are required in order to protect the building and its contents from damage due to roof leakage.
 6. Should roof samples be required by Manufacturer, and if for any reason deficiencies are found within the samples, Contractor will, at his expense, make repairs as necessary to correct deficiencies and satisfy Manufacturer's requirements.

1.08 MISCELLANEOUS

- A. Refer to "General Description" section of this specification for further information.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. ROOFING SYSTEM: *(General Review)*

1. The SBS asphalt-based 2-py modified roof assembly installed in roofing grade cold with premium SBS Modified Asphalt base flashing shall be comprised of the following major components and have a U.L. Class "A", or better, rating.
 - a. Membrane system shall extend over all perimeter areas including wood nailers, parapets, etc., prior to installation of flashing sheet and sheet metal.
2. Removal of all existing roofing down to structural deck.
 - a. Repair of any damaged structural deck.
 - (1) Inspections and repair *(as required)* of structural deck.
 - (a) Deck repairs, if necessary, shall be considered a Cost-Plus activity after approval.
 - b. Insulation: Mechanically attach Polyisocyanurate and ½" recover board insulation with approved fasteners to meet FM 1-90 configuration.
 - (1) Fastening of layers shall be conducted in such a manner so that installation meets FM and wind up-lift requirements.
 - (a) Define/indicate installation pattern and methods within submittal requirements as noted with this instruction and elsewhere within the specification documents.
 - (2) All mechanically attached insulation shall be attached to minimum Factory Mutual 1-90 published attachment pattern *(including field, perimeter and corners)* and approved fasteners.

- c. New crickets as noted on drawings, discussed at the pre-bid meeting, as well as crickets at the up-slope side of all HVAC equipment and roofed in supports.
 - d. Crickets:
 - (1) New crickets as noted on drawings, as well as crickets at the up-slope side of all HVAC equipment and roofed in supports.
 - (a) Crickets shall be installed as a part of the insulation system directly rather than as a "phased" assembly after the membrane waterproofing system has been installed.
(NO EXCEPTIONS)
 - e. Perimeter Sheet Metal:
 - (1) Refer to "Flashing & Sheet Metal" Section for specific perimeter information.
 - (2) Installation of counter-flashing at all equipment, as well as new leads (*drains & plumbing, etc.*) is all a part of this project. Refer to Sheet Metal section of this document.
3. Components shall not be substituted for other components within or out of the system. (*Example: ply sheet for base sheet, as applicable.*) All approved systems shall comply with these system component composition requirements.
- a. Installed roof system must comply with Factory Mutual 1-90 rated system and be listed within their published listings.
- B. BASE PLY – & -- INNER & STRIPPING PLY:**
- 1. Material:
 - a. Modified bitumen sheet incorporating medium weight fiber glass mat with a blend of SBS rubber.
 - 2. Manufacturer and Brand:
 - a. Malarkey / 603 Modified Superbase
 - b. As indicated by Manufacturer for use within their specified and approved system.
 - 3. Manufacturing Standard:
 - a. Factory Mutual: D 5147 standard test for modified bitumen sheet materials.
 - b. ASTM: D-46163 Type I, Grade S
 - 4. Thickness: 90 mils
 - 5. Nominal Weight: 75 lbs. per square --- (*0.75 lbs psf*) - (*75 lbs per roll*)
- C. TOP / FINISHING PLY:**
- 1. Material: A heavyweight fiberglass mat impregnated and coated with a heavy coat of SBS rubber modified asphalt and fire --retardant fillers and lightly bound together with a resinous binder and completely coated with a weathering grade asphalt with lightly surfaced mineral release agent/material:
 - a. High performance, modified bitumen finish ply designed for use in homogeneous multi-layer modified bitumen roof membrane systems.
 - b. Consists of a fiberglass mat composite impregnated and coated with high quality Styrene-Butadiene-Styrene (*SBS*) modified bitumen, and surface with ceramic granules.

2. Manufacturer and Brand:
 - a. Malarkey / 625 Paragon Modified Cap
 - b. As indicated by Manufacturer for use within their specified and approved system.
3. Manufacturing Standard:
 - a. ASTM: D 5147, D 3909-97b, D 6163-97 type 1
 - b. UL Tested as Class B or better or insulated combustible deck system.
 - c. Listed by FM and WH.
4. Thickness: 140 mils
5. Nominal Weight: 102 lbs. per square *(1.02 lbs per sq ft)*
6. Top Surfacing:
 - a. Ceramic granules.
 - (1) Color: White – Unless noted/changed by Owner during submittal process.
 - (2) Standard manufacturer's color.

D. MODIFIED BITUMEN FLASHING SHEET:

1. Material: A heavy polyester mat bonded together with a resinous binder and completely coated with SBS Modified Bitumen specifically designed for use as base flashing material.
 - a. Surface: Factory applied granules
 - b. Application: Adhesive
2. Manufacturer and Brand: As approved by Prime Manufacturer or Approved Equal.
3. Manufacturing Standard:
 - a. D-5147-91 Specification for modified bitumen products.
 - b. Comparison standard: Malarkey 650 *(equal or better)*
4. Nominal Weight: 100 lbs. per 100 sq. ft. minimum.
5. Surface: Surfaced with opaque, inert, non-combustible colored granules.
6. Color: White *(or to match membrane color...if available)*

E. PERLITE FIBER ROOF INSULATION:

1. Material: Asphalt impregnated, fungi-resistant perlite fiber intended for use as a recover board material within roofing applications.
2. Manufacturer and Brand: Prime Manufacturer approved.
3. Manufacturing Standard: ASTM C 728; Fed Spec. #HH-I-529B.
4. Maximum Thermal Conductance Value *(C)* = 0.76
5. Minimum Resistance Value *(R)* = 1.32
6. Thickness: .5" *(½")* MINIMUM

F. FIBERBOARD ROOF BOARD INSULATION: *(Recover Board)*

1. Material: Asphalt impregnated, pre-formed rigid wood fiber panel specifically designed as recover board in built-up roof applications.
2. Manufacturer and Brand: Prime Manufacturer approved.
3. Manufacturing Standard: ASTM C 208-72; LLL-I-535B
4. Minimum Resistance Value *(R)* = 1.39
5. Thickness: .5" *(½")* MINIMUM.

G. RED ROSIN PAPER:

(Slip sheet / @ all Tear-off to deck areas – as applicable to prevent drippage into building)

1. A coated paper specifically designed to be utilized within a built-up roof system as a bottom layer separating the wood deck from the bottom of the insulation.
2. Manufacturer and Brand: As approved by membrane system manufacturer for use within their approved system.

H. COLD ADHESIVE:

1. Material: Modified membrane adhesive rated as high strength heavy-duty asphaltic adhesive permanently cementing/adhering together layers of SBS modified roofing in the construction of a cold process built-up roof system.
2. Manufacturer and Brand:
 - a. Malarkey / 727 Modified Membrane Adhesive
 - b. As indicated by Manufacturer for use within their specified and approved system.
3. Manufacturing Standard:
 - a. ASTM: D 3019-85 Type III

I. MODIFIED FLASHING CEMENT:

1. Material: Is an asphalt based roofing materials specifically developed/formulated for use as a flashing cement for SBS rubber modified bituminous membrane in a vertical wall flashing detail.
2. Manufacturer and Brand:
 - a. Malarkey / 709 Modified Flashing Cement
 - b. As indicated by Manufacturer for use within their specified and approved system.
3. Manufacturing Standard:
 - a. ASTM: D 4586-93 Type I

J. ASPHALT PRIMER:

1. Material: A black, medium consistency asphalt cutback primer compound of select asphalt and penetrating petroleum solvents.
2. Manufacturer and Brand: Prime Manufacturer approved.
3. Manufacturing Standard: ASTM D 41.

K. FASTENERS FOR WOOD AND MASONRY FLASHINGS:

1. Type: Wood nails shall be 11 gauge, barber, galvanized with 5/8" head. Masonry nails shall be case hardened. One-inch diameter tin caps must be used.
2. Manufacturer: Prime Manufacturer approved.
3. Size: Sufficient length to penetrate full depth of nail strip or 3/4" minimum.

L. SCREW AND PLATE FASTENERS: (*Insulation as applicable and pre-approved*)

1. Type: Self-tapping screw with cap plate.
2. Manufacturer and Brand: Prime Manufacturer approved.
3. Cap Plate Material: Prime Manufacturer approved.
4. Screw Material: Carbon steel with corrosion-resistant finish.
5. Screw Head Type: Deep recessed Phillips or hex head.
6. Screw Length: Penetrate deck minimum ½ inch (*1/2"*).
7. Test Standards: Factory Mutual: 1-90; Wind up-lift (*minimum*)

M. CANT STRIPS:

1. Material: Wood Fiber, perlite or soft wood lumber.
2. Manufacturing Standard: ASTM C 208 or ASTM C 728.
3. Shape: Triangular.
4. Minimum size on Horizontal and Vertical Sides: Four inches (*4"*).

N. WALK PADS:

1. Material: Modified base flashing material or cap sheet is acceptable; however, compatible manufactured walk pads are acceptable also. (*Cannot mix types.*)
2. Manufacturer and Brand: Prime Manufacturer approved.
3. Surface: Granulated.
4. Size: As applicable with a minimum three foot (*3'*) width.
5. Color: White.

O. WOOD NAILERS:

1. Material: Wood nailers shall be new material treated with a water-based preservative only.
2. Grade: #2 or better
3. Attachment Standards: Conform to Factory Mutual's loss prevention data 1-49.

P. PLYWOOD:

1. Material: Size to match existing as applicable or as specified elsewhere.
2. Grade: Smooth surfaced exterior grade for use within new construction.

2.02 SUMMARY OF MATERIALS

A. 2-ply SBS modified roof membrane with factory applied granular surface, installed in cold-adhesive; premium SBS base flashing, rigid insulation; red rosin paper; installed over plywood deck with reference numbers as follows:

1. Malarkey Roofing Co: M2-WI-DXC-M (*Insulated wood deck*)
2. Johns Manville Roofing Systems: Equal system
3. Soprema Roofing Corporation: Equal system
4. or Pre-Approved equal.

- a. Special Note: For clarification purposes, the Malarkey system listed above is considered the base system standard and all other system references must match and/or exceed the standards and performance applied to this system and its components.



B. Refer to 2.01 for roof system description: *(General)*

1. Summary of materials per 100 square feet:

a. Red Rosin paper01 lbs psf
b. New ½" high density recover board insulation:.....	.63 lbs psf
c. Cold Adhesive:02 lbs psf
d. New 2-ply SBS modified system / cold.....	<u>1.76 lbs psf</u>
e. Total completed weight:	2.42 lbs psf
Weight per square (100 s.f.):	242 lbs (Nominal)

PART 3 - EXECUTION

3.01 PREPARATION FOR REROOFING

A. Removal of Existing built-up roofing and flashing:

1. All existing built-up roofing shall be completely removed including *(as applicable)* ballast/surfacing, membrane insulation, cants, perimeter metal, incidentals, etc. down to the structural deck. Do not remove more roofing in one work period than can be replaced in that same period or if there is any potential for damage to the building interior due to inclement weather *(see A-4 below)*.
2. Deck preparation shall meet and/or exceed manufacturer's requirements for an acceptable substrate upon which the new system is installed.
 - a. Strictest document applies when a conflict occurs.
 - b. General:
 - (1) Inspection and repair of the deck is required prior to installation of new roofing system.
 - (2) Repair of this type of damage shall be considered a "Cost-Plus" item within the scope of work of this project, when complying with approval process.
 - (3) Verification of the damage by Roof Consultant and/or designated Owner's representative is required in order to obtain approval for additional billing/repairs. If a problem is identified, immediately notify the Roof Consultant or designated On-site representative before proceeding.
3. All tear-off materials shall be removed from the roof on a daily basis and disposed of in accordance with applicable codes and ordinances.
 - a. Contractor shall comply with all current asbestos removal and disposal laws as they apply to roof system removal.
4. Contractor shall not remove more in one day than can be covered during that same workday *(work period)* or that can be protected from unforeseen rainstorms, etc.
 - a. Contractor is responsible for all damage caused as a result of violating this instruction.

B. DAMAGED DECKING/SUBSTRATE CRITERIA AND PROCEDURES:

1. If during the course of the project damaged or deteriorated decking and/or applicable substrate is identified, Contractor shall notify Owner's representative and/or Consultant immediately before proceeding.
2. Whenever deteriorated deck and/or substrate conditions are found or suspected, and as directed by Owner's representative and/or Roof Consultant, it shall be repaired or replaced with new, similar (*like*) material installed in accordance with the requirements for new construction.

C. Any obsolete equipment no longer required on the roof shall be removed and the deck installed level and smooth with the adjacent deck.

1. Refer to drawings for verification of equipment to be removed.

D. After removal of the entire specified roof system, the deck shall be swept free of all dust, dirt, grime, debris or other foreign material before installation of any component of the assembly.

1. Roof project shall be kept in a neat and orderly condition during the entire scope of the project.

E. Refer to and meet all Manufacturers' General Requirements for appropriate substrate requirements.

3.02 GENERAL APPLICATION REQUIREMENTS

A. Roofing work shall not be conducted when water in any form is present on deck, such as rain, dew, ice, frost, or snow.

1. Water should be limited to containers for human consumption.

B. Precautions shall be taken to keep materials clean, dry and free of damage at all times during the project.

1. Contractor shall replace any damaged or wet materials at no additional cost to Owner.

C. Do not start application of more materials each day than can be completed within the same day's work period or protected from unexpected inclement weather, etc.

D. Start roofing work in dry weather only and without threat of immediate inclement weather (*preferably 3 hr window*).

1. Keep the roofed area of the building watertight each day as the work progresses.

E. At the end of the workday, edge-seal the finished portion of the roofing system completed that day with fabric or felt set into cold adhesive or plastic cement to render it watertight. Completely remove edge seals prior to the start of the next day's work.

1. Contractor is responsible for replacement of any and all damaged roofing caused by defective edge-seal or working in inclement conditions at no additional cost to Owner. (*Refer to item "F" below.*)
 - a. Contractor is responsible for any interior damage and/or product loss for failure to comply with this instruction.

- F. All areas of opened roof system must be covered with the completed roof membrane system (*except surfacing*) at the end of each day's work. In addition, all roof terminations and openings shall be made waterproof at the end of each day's work.
1. Perimeter of newly installed system must be sealed at the end of each work period.
 2. All edge seals shall be completely removed before installation of finished roof assembly components.
- G. Coordinate installation of specified roof assembly so as not to interfere with the day-to-day operations of the building.
- H. Use only materials and procedures that are proper and suitable for the slopes and for the underlying materials to which they are attached. All materials are to be manufactured by or approved by Prime Membrane Manufacturer.
1. All substitutions must be approved, in writing, by Roof Consultant prior to the installation of the materials.
- I. Roofing shall not be applied unless correct asphalt application temperatures can be maintained to obtain proper embedment and adhesion.
1. Refer to NRCA published literature with regard to proper application rates and adhere to applicable temperature range requirements at all times. Strict adherence to this requirement is required. Removal and replacement is required of all areas where inadequate application temperatures and/or rates have occurred.
- J. To avoid displacement of asphalt and interply voids, ensure that no heavy objects are placed on the membrane.
1. Use all means necessary to protect the membrane before, during, and after installation including protection board, sleepers, etc.
 2. In the event of membrane damage or asphalt displacement, immediately make all repairs and/or replacements necessary to the satisfaction of the Owner and/or Roof Consultant at no additional cost.
 3. Work all felts from the upslope side. **Do not walk on/over felts freshly laid in adhesive.**
 - a. Repair all damage at no additional cost to Owner.
- K. Equipment caused displacement voids are not acceptable under any circumstances and shall be repaired immediately.
- L. Do not empty mop carts or other extra adhesive on new membrane, whether completed (*all*) or partial number of plies have been installed.
1. All excess adhesive must be removed and if this is not possible shall be covered with a minimum of two layers of new Type IV membrane (*at correct asphalt temperatures*). This work will be done at no additional cost to Owner.

- M. Interply applications of adhesive shall be continuous and applied at the specified rate and within required temperature range.
1. Application methods shall ensure that all plies are completely embedded in adhesive.
 2. Refer to Mfg and applicable NRCA bulletin for proper application requirements.
- N. Thoroughly clean and re-seal all exposed metal joints and penetrations to result in a watertight seal.
- O. Approved and operable fire extinguishers will be on hand at all times on the roof and near any heating equipment.
1. During any torch application work, an additional fire extinguisher will be required for each torch.
 - a. Torch work shall be limited to freeing up equipment ONLY.
 2. All additional requirements of OSHA Safety Regulations will be followed.
- P. Existing rooftop equipment shall be temporarily raised as needed to accommodate proper installation of new roofing and flashing materials. Resecurement of units through horizontal metal flashing surfaces shall utilize ¼" solid neoprene gaskets. Resecurement through vertical surfaces shall utilize appropriate screws through steel/neoprene washers placed at a maximum twelve inches (12") o.c. or a minimum of two (2) per side.
- Q. All existing equipment curbs, support sleepers, etc. shall be extended as needed to achieve a minimum eight inch (8") height above the roof deck for curbs and six inches (6") minimum for enclosed sleepers and platforms.
- R. CRICKETS:
1. Crickets shall be installed at the downslope perimeters as noted on the drawings, upslope side of all HVAC and roof mounted units, curbs, etc. to provide positive surface water flow around unit.
 2. Crickets shall be installed as a continuous system at the same time the underlying insulation system is installed. It is not acceptable to install crickets over the new membrane waterproofing system.
 - a. Violation of this instruction will result in rejection of cricket installation and a requirement that the cricket be re-installed correctly, at no additional cost to the Owner.
- S. All existing flanged components, which were incorporated into the membrane system, shall be replaced with new, with the exception of flanged curbs, which shall be constructed of lumber and installed according to Manufacturer's Specifications.
- T. New perlite or fiberboard cant strips shall be installed at all vertical junctures. Wood cants are permitted at outside perimeter edge as applicable based on details.
- U. All perimeter metal work associated with the course of this project shall be carefully removed, marked for location and reinstalled as a course of this project.
1. Whenever metal is to be replaced, it shall match existing color and style unless noted differently at the mandatory pre-bid meeting.

- V. Install proper width starter sheets to insure minimum specified coverage throughout. Stagger starter sheets as needed to offset joints between first ply and subsequent sheets.
- W. Phasing of roof membrane application or temporary membrane is not acceptable.
 - 1. Membrane, excluding surfacing, shall be installed in final form on a day-to-day basis.
- X. Adhesive heating equipment shall be thermostatically controlled and acceptable to manufacturer.
 - 1. Equipment must be clean and in good working condition.
- Y. All equipment shall be clean and in good working condition.
- Z. DRAINS:
 - 1. New scupper properly aligned with conductor and downspout system shall be installed to replace existing.
 - a. System design shall be discussed at the mandatory pre-bid meeting.
 - 2. As applicable at any internal drains:
 - a. All drains are to be disassembled, inspected repaired and reassembled as a course of this project.
 - b. Scope of project includes removing and discarding existing leads as well as removal of other components to provide a sumped drain assembly with a three-foot (3') minimum sump, which is eighteen inches (18") out from the center of the drains.
 - (1) Include the cost of replacing all drain bolts in base bid.
 - c. If during the course of this repair the parts are not salvageable, the cost for replacement shall be submitted via Change Order.
 - d. Broken and/or damaged drain parts are to be saved for Roof Consultant and/or Owner's representative review.
- AA. ADHESIVE:
 - 1. Apply adhesive as specified by manufactures most recent published instructions.
 - 2. Do not proceed with application if membrane cannot be installed within specified time requirements, with no exceptions to this instruction.
 - 3. Adhesive heating equipment shall be equipped with an accurate working thermostat and thermometer.
 - 4. Cold weather application requires approve from Owner Representative and Roof Consultant prior to starting with or proceeding with installation.
 - a. Violation of this instruction shall require removal of all installed components associated with violation and non-compliance with this requirement, at no additional cost to the Owner.

BB. PRIMER:

1. Material may be applied by brush, spray, or roller.
2. Materials shall not be diluted or adulterated.
3. Apply primer at the nominal rate of one gallon per 100 square feet. Allow to dry thoroughly prior to application of roofing materials.

CC. ROOF CEMENT:

1. Material may be applied either by trowel or by hand.
2. Material shall not be diluted or adulterated.
3. Material shall be maintained at the working temperatures recommended by the manufacturer.

3.03 RED ROSIN

A. GENERAL: *(As applicable)*

1. Install red rosin paper over all cleaned and prepared wood deck substrate prior to the installation of roof insulation.

3.04 ROOF INSULATION

A. GENERAL: *(As applicable)*

1. Insulation attachment: Mechanical fasteners (*polyisocyanurate - bottom*) and asphalt top layer
2. Insulation shall be laid with edges parallel to the roof edges.
 - a. Field insulation must be installed to meet Prime Membrane Manufacturer's tested and approved system.
 - b. Fasteners, Adhesive and Asphalt installation to meet NRCA, WSRCA and manufactures published requirements and as noted within these specification documents.
3. Crickets may be attached with mechanical fasteners or laid up in cold adhesive per manufacturer's printed requirements for particular system (*as applicable*).
 - a. Crickets required at all upslope sides of roof-mounted equipment.
4. Insulation boards shall be laid in an ashlar (*cross*) pattern (*joints staggered*) with the joints between the long dimensions of the boards continuous.
 - a. Joints must be broken between lower and upper levels where multiple levels of insulation occur (*either direction*).
5. Space roof insulation ¼" from all vertical flashings.
6. Insulation shall be neatly cut and fit around all through-roof projections.
7. No more insulation shall be laid than can be completely covered in a day's work.
8. Provide tapered roof insulation around roof drains and at cricket locations to provide positive drainage.
 - a. Drain sump shall be a minimum of 36" with taper at edges to transition to main field elevation.

9. No insulation material shall bridge expansion joints.
10. Remove and replace all insulation that gets wet during the application process. Roofing components (*any*) shall not be applied over wet insulation at any time.
11. Membrane shall not be applied over insulation joints in excess of ¼" width.

B. SPECIFIC:

1. Secure roof board insulation by the use of specified mechanical attachment / screws and plates in accordance with Factory Mutual published standards for the roof system and applicable substrate:
 - a. 1-90 securement pattern including perimeter, corners and field.
 - b. Refer to roof system published literature for application rate.

3.05 WATER CUT-OFF

- A. At the end of each day's work, Contractor shall provide temporary water cut-offs at the edge of the insulation and/or membrane to render the installation watertight.
- B. Install water cut-offs in cold adhesive or plastic cement.
 1. The felt shall be lapped a minimum of six inches (6").
- C. Remove water cut-offs, in their entirety, before proceeding with work. (*Mandatory*)

3.06 APPLICATION OF CANT STRIP

- A. Install four inch by four-inch (4" x 4") perlite or wood fiber cant strips at the juncture of all vertical surfaces and roof.
 1. Where four-inch (4") cant strips will not fit, use of a three-inch (3") cant is acceptable.
 2. Cant strips shall be nailed to nailable decks or nailable vertical surfaces using a maximum nail spacing of twelve inches (12") o.c.
 3. Where nailable surface does not occur, set into adhesive over the secured insulation.

3.07 MEMBRANE INSTALLATION - (General)

A. MEMBRANE APPLICATION:

1. Apply roofing in accordance with roofing system manufacturer's instructions and the following requirements.
 - a. Application of roofing membrane components shall immediately follow application of base sheet and/or insulation as a continuous operation.
2. Adhesive, mastics, roof cement and/or other application materials shall not be emptied onto the felt surface of the finished roof at any location.

B. AESTHETIC CONSIDERATIONS:

1. An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project.
2. Make necessary preparation, utilize recommended application techniques, apply the specified materials (*i.e. granules, metallic powder, etc.*) and exercise care in ensuring that the finished application is acceptable to the Project Manager.

C. PRIMING:

1. Prime all metal flanges (*jacks, edge metal, drain leads, etc.*) and concrete and masonry surfaces with a uniform coating of ASTM D 41 asphalt primer.

D. BASE, INNER (*as applicable*) and TOP PLY APPLICATION:

1. Install in solid layer of cold adhesive in compliance with manufacturers most recent printed instructions.
2. Applicable shall be "straight and true" and all fishmouths, wrinkles or other inconsistencies shall be repaired to meet both "industry standards" as well as the manufacturer's printed instructions.

E. MEMBRANE ADHESIVE APPLICATION:

1. Installation shall be in a consistent and solid layer of adhesive in strict compliance with the system manufactures most recent printed instructions.
 - a. The porosity of some substrates may require a heavier application to ensure full adhesion.
2. Adhesive Consistency:
 - a. Cutting (*thinning*) or alterations of mastics, cement, bitumen, adhesives, primer and sealants shall not be permitted on this project unless specifically noted/approved within primary roof membrane manufacturer's most recent printed literature.

3.08 MEMBRANE APPLICATION - (*Specific*)

A. General:

1. Apply all layers of roofing free of wrinkles, creases or fishmouths.
2. Exert sufficient pressure on the roof during the application to ensure prevention of air pockets.
3. Stagger the lap seams between the base ply layer and the finish ply layer. Stagger the courses to ensure this.
4. Apply membrane layers perpendicular to the slope of the deck starting at the lowest point (*i.e. drain, scupper, etc.*)

B. BASE PLY - 1st ply of 2-ply Membrane Assembly:

1. Install in a solid layer of cold adhesive in compliance with membrane system manufacturer's most recent printed requirements.
2. Lay the base sheet smooth and free of wrinkles, buckles, or fishmouths. Any deviations from specifications shall be repaired immediately.

3. Lap so water flows over or parallel to, but never against, the laps.
4. Fully bond base ply to the prepared substrate, utilizing minimum three-inch (3") side and end laps.
5. Apply each sheet directly behind the adhesive before adhesive flashes off. Follow manufacturer's printed instructions at all times.
6. Cut a dog-ear angle at the end laps on overlapping selvage edges.
7. Stagger end laps a minimum of three feet (3').
8. Cut and repair fishmouths, wrinkles, tears, buckles, dry laps and/or other damage in any ply on a ply-for-ply basis as they occur. Install additional plies set into cold adhesive over the cuts. Apply adhesive as a full width under each layer. No dry laps or voids shall be allowed. Feather felts two inches (2") over preceding layers.
 - a. Dry laps, voids, etc. must be repaired before the installation of subsequent ply(s).

C. FINISH (TOP) PLY:

1. Install in a solid layer of cold adhesive in compliance with membrane system manufacturer's most recent printed requirements.
2. Fully bond the finish ply to the intermediate ply, utilizing minimum three-inch (3") side and end laps.
3. Apply each sheet directly behind the adhesive before adhesive flashes off. Follow manufacturer's printed instructions at all times.
4. Stagger side laps of the finish ply a minimum three feet (3').
5. Cut a dog-ear angle at the end laps on overlapping selvage edges.
6. Stagger side laps of the finish ply a minimum of twelve-inches (12") from side laps in the underlying base ply.
7. Stagger end laps of the finish ply a minimum three feet (3') from end laps in the underlying base ply.
8. Cut and repair fishmouths, wrinkles, tears, buckles, dry laps and/or other damage in any ply on a ply-for-ply basis as they occur. Install additional plies set into cold adhesive over the cuts. Apply adhesive as a full width under each layer. No dry laps or voids shall be allowed. Feather felts two inches (2") over preceding layers.
 - a. Dry laps, voids, etc. must be repaired before the installation of subsequent ply(s).

D. TOP PLY - SPECIAL INSTRUCTIONS:

1. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof substrate slope exceeds ½" per foot.
2. The manufacturer shall be required to review and provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications on this project.

E. GRANULE EMBEDMENT:

1. Broadcast mineral granules over all adhesive overruns on the finish ply surface, while the adhesive/bitumen is still tacky enough to adhere and to ensure a monolithic surface color.

3.09 FLASHING INSTALLATION

A. GENERAL FLASHING SPECIFICATIONS:

1. Flashing shall not be applied until SBS modified Built-up Roofing has been laid in its final form.
 - a. Provide temporary seal at ply terminations until installation of flashing.
2. Install in a solid layer of cold adhesive in compliance with membrane system manufacturer's most recent printed requirements.
3. The flashing membrane shall be of sufficient width to extend from the top edge of the flashing surface to a minimum of four inches (4") past the toe of the cant strip for at least two inches (2") further onto the roof than the preceding ply.
4. Fasten the top edge of the base flashing approximately every six to eight inches on center (6" – 8" o.c.) with appropriate fasteners through one-inch (1") diameter metal discs.
5. Seal the top edge of the base flashing; including all nail heads, as well as all inside and outside corners with plastic roof cement. Under surface mounted counter-flashing, a "three-course" seal is required (woven glass fabric embedded into and covered with roof cement.)
6. Completely bond all flashings to the underlying surface without any looseness, bubbles, or voids. Remove and replace any loose flashing materials.
7. At walls less than twenty-four inches (24") high, extend base flashing over the top wall surface to the outside edge.

B. ROOF DRAIN FLASHING (As applicable):

1. Drain rings associated with retrofit and not at new drain installation area shall be removed prior to built-up roof application.
 - a. Do not leave this area unfinished at the end of a workday as significant moisture entry into the building, with subsequent damage, may occur.
2. Provide gradual taper to roof drains by the use of tapered perlite or fiberboard insulation.
3. Extend base ply into the drain and mop in the specified number of plies of membrane into the drain sump area.
4. Set a four-pound (4 lb.) lead sheet (primed both sides) into a solid coating of roof cement over the installed plies. The lead sheet shall extend at least six inches (6") beyond the outside of the drain bowl, but not outside of the sump area. Shape the sheet to conform snugly to the under-lying taper. Prime lead sheet and install an additional troweling of plastic cement and cover with four field plies.
5. Extend all plies, including field plies, underlayment plies and lead sheet, into the drain, under the clamping ring, and trim so as to not impede water flow at the drain or at the edge of the sump.
6. The drain ring shall be securely tightened. Strainer dome shall be reinstalled over roof drains.
 - a. Replace strainer if missing or damaged.

7. Replace or repair any and all missing, broken, or damaged drain parts to result in a functioning assembly.
 - a. Cost of drain repair parts (*other than item b. below*) will be a Cost-Plus item. Submit quote based on assumption that drain parts (*other than lead*) are salvageable.
 - b. Base bid shall include replacement, with new stainless steel, all existing bolts and nuts.
8. After complete installation of the roofing system, all roof drains should be inspected and tested to assure that no clogging of the drainage system is present. In addition, the roof drain leader should be in such condition that the full diameter of the drain leader is clear and that no leak or seepage is present.

C. FLANGED SLEEVES & ACCESSORIES:

1. Flanges will be set into plastic roof cement over the installed roof plies and fastened securely to the underlying deck or wood nailers. (*Fastening is not required for lead flanges.*)
2. All flanges, including pipe flashing sleeves, edge flashing (*gravel-stop*) flanged units, scuppers, etc., shall be primed on both sides and flashed into the roof with at least two (2) plies of ply sheet embedded into asphalt.
 - a. The first ply shall extend a minimum of four inches (4") beyond the flange onto the roof. The second ply shall extend a minimum of four inches (4") further onto the roof than the first ply.
3. Mop over the top stripping ply to ensure embedment. Seal cut edges of surfacing sheet with plastic roof cement.
4. At scuppers (*as applicable*), be sure not to build up materials with the resulting restriction of the free flow of water off the main field of the roof.

3.10 WALK PADS

A. GENERAL:

1. Walk pads shall be installed at hatch and around large serviced HVAC units.
 - a. Note: When in doubt, install walk pads.
2. Walk pads should be spaced approximately one to two inches (1" – 2") apart, to allow for water flow.
3. Location to be reviewed/noted at the mandatory pre-bid meeting.
4. Install in a solid layer of cold adhesive in compliance with membrane system manufacturer's most recent printed requirements.
5. Follow manufacturer's most recent printed instructions with the strictest document applying in the case of a conflict.
6. Walk-pad material must be approved by roof membrane system requirements for use within the specified system.

3.11 MISCELLANEOUS WORK ITEMS

A. PIPE & CONDUIT SUPPORTS:

1. Support all pipelines running along the roof surface, as well as any non-penetrating supports, using new treated wood sleepers set loosely over a spot-adhered section of base flashing material.
2. Base flashing material shall extend at least four inches (4") beyond the sleeper on all sides.
3. Secure pipes to sleepers using oversized galvanized clamps secured on both sides of pipe.
4. If additional height is required, sleepers shall be stacked and secured together to accommodate elevated pipes, substrate slope, etc.
5. Sleeper supports shall be spaced no more than six feet (6') apart and installed so as not to impede water flow.
6. *NOTE:* Salvage of existing wood blocking is acceptable if pressure treated material currently exists and is in good condition. If not, scope of work includes replacement and/or installation of new p/t wood supports.

3.12 CLEAN UP

A. Contractor shall:

1. Remove adhesive, bituminous or other markings from finished surfaces including equipment, perimeter metal and roof system.
2. Keep the roof and premises clean and free from accumulations of waste materials and rubbish at all times.
 - a. Remove all debris, scrap, and rubbish from the work area, including the roof and ground, on a daily basis or more frequently if required, or requested by Owner's representative.
 - b. Contractor is responsible for any material blown off, or dropped from the roof.
 - c. Surplus materials and all equipment shall be promptly removed from the site upon completion of work.
3. If Contractor fails to keep premises clean of debris, Owner reserves the right to contract for cleanup of the premises and charge the Contractor for the direct cost of this work.
 - a. Owner shall notify Contractor, in writing, of the intent to hire an independent clean-up firm or crew if a problem and/or situation develops.
 - b. Contractor has twenty-four (24) hours to rectify the condition before the Owner will proceed.
4. Prior to final acceptance, the Contractor shall restore all areas affected by his work to their original state of cleanliness and repair all damage done to the premises, by his workmen and equipment.
5. Contractor shall be responsible for repair (*and costs*) of any and all damage to building or surrounding area during the course of the project. All affected areas shall be returned to original condition (*prior to project*) to Owner's satisfaction. NO EXCEPTIONS.

- END OF SECTION -



SECTION 07600
FLASHING & SHEET METAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Provide Flashing and Sheet Metal not specifically described in other sections of these specifications and details, but is required to prevent penetration of water through the exterior shell of the building as it applies to the roof and parapet areas.
2. GENERAL REVIEW:
 - a. The intent is to:
 - (1) New:
 - (a) New counter-flashing at all equipment, hatches, penetrations, etc. (*Galvanized metal is acceptable rather than pre-painted for this item.*)
 - (2) Salvage:
 - (a) Coping metal to replace the existing.
 - (i) Pre-painted Kynar finish; factory color.
 - (b) Wall metal to replace existing.
 - (3) To be discussed at the mandatory pre-job meeting.
3. COPING METAL: *As applicable*
 - a. Salvage -- Remove and reinstall all coping metal.
4. WALL METAL: *As applicable*
 - a. Salvage wall metal included within the scope of work.
 - b. Walls (*as applicable*); require counter-flashing and reglets.
5. To be discussed at the mandatory pre-job meeting.
6. OTHER METAL:
 - a. Remove and replace with new unless specifically identified within the specification documents or during the pre-job meeting.
 - b. Counter-flashing required at all equipment.
 - (1) *Exception*: Not necessary at units that can be raised and roofed around and adequately re-installed over the base flashing membrane, where the existing flashing system will properly cover the new roofing installation. Where inadequate or damaged sheet metal flashing are present, the new system will require new metal.

7. General Work Summary on this project shall include the following:
 - a. Salvage and Reinstallation of existing perimeter metal.
 - b. Equipment counter-flashing/skirting.
 - c. As applicable; New scuppers at applicable drain locations to replace existing.
 - d. Miscellaneous details to meet the manufacturer's and "good roofing" practices for entire completed roof system.
8. Roofing accessories and incidentals as may be required during the project.
9. New pre-painted metal shall have a Kynar finish with color to be selected by Owner during submittal process.
10. All painted metal surfaces which must be removed to properly complete the project, shall be carefully removed, examined, cleaned, primed, painted and replaced to match existing colors as applicable and discussed at pre-job meeting.
 - a. Color shall match the existing perimeter metal where replacement requires painted metal.
 - b. Color shall be standard manufacturer's color. No special order color required on this project.

1.02 SYSTEM DESCRIPTION

- A. Work within this Section is to physically protect membrane roofing, base flashing, etc. from damage that would permit moisture entry into building interior.

1.03 QUALITY ASSURANCE

- A. In addition to complying with pertinent codes and regulations, all work shall comply with pertinent recommendations contained in current edition of "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
- B. Standard commercial items may be utilized for flashing trim, reglets and similar purposes provided such items meet or exceed the quality standards specified herein.
- C. All metal shall meet and/or exceed compliance with membrane manufacturer's warrantable system.
 1. Utilize membrane manufacturer's specific product with any specific application where the metal is considered a warrantable item under the manufacturer's warrantable system.

1.04 SUBMITTALS

- A. Submit shop drawings to describe all detail installations and compliance with scope of these Specifications and General Requirements where no detail drawing currently exists. This includes any proposed changes to detail drawings herein.
 1. The scope of the shop drawing details will be reviewed at the mandatory pre-job meeting.



1.05 REFERENCES

- A. American Society for Testing and Materials (ASTM) A525-Steel Sheet, Zinc Coated (*Galvanized*) by the Hot-Dip Process.
- B. SMACNA – Architectural Sheet Metal Manual.

1.06 PRODUCT HANDLING

- A. Store products under applicable provisions of Section 07520.
- B. Stack pre-formed material to prevent twisting, bending, or abrasion.
- C. Prevent contact with materials during storage, which may cause discoloration, staining or damage.
- D. Any material to be removed and replaced shall be marked for identification and carefully removed and stored until re-installation is completed.
 - 1. Items that cannot be removed and replaced without damage must be discussed and approved prior to the work at this area or the contractor shall be responsible for replacement of materials damaged during their operations.

1.07 PROTECTION

- A. Exercise care when working on or about roof surface to avoid damaging or puncturing membrane or other components.
- B. Immediately remove any screws, fasteners, trim, etc. from roof surface.
- C. All open roof areas exposed by the sheet metal removal shall be in a waterproof condition at the end of each day's work.
- D. Immediately notify Roofing Contractor (*if sheet metal contractor is a sub-contractor*) of any damage or punctures to newly installed or existing membrane waterproofing.

1.08 WARRANTY

- A. Work of this section shall be covered under Contractor's Warranty as specified in Section 07520.

PART 2 - PRODUCTS

2.01 MATERIALS AND GAUGE

- A. Where sheet metal is required, and no material or gauge is indicated on the drawings and details, provide the highest quality and gauge commensurate with the standards associated with this Specification with a minimum gauge of twenty-four (24).
- B. Utilize specified roofing system manufacturer's products as a first priority.
- C. Galvanized Steel: ASTM A-525, G-90; 24 gauge minimum.

- D. Pre-painted metal: Kynar - Factory finish; 24 gauge minimum.
- E. Sheet Lead Flashing: Hard type conforming to Federal Specification QQ-L-201; 4 lbs per square foot for drain flashing and pipe sleeves requiring field soldering, 2 ½ lbs minimum per square foot for pre-fabricated pipe sleeves.

2.02 ACCESSORIES

- A. Fasteners: Galvanized steel with steel neoprene washers at exposed fasteners and other appropriate products in other unspecified locations.
- B. Metal Primer: ASTM D-41
- C. Sealant: 1 part polyurethane
(As approved by prime membrane manufacturer for use and compatibility with specified assembly.)
- D. Plastic Cement: ASTM D-4586, Type I
- E. Solder: FS QQ-S-571; ANST/ANTM B3; 50/50 type
- F. Flux: FS O-F-506
- G. Pitch Pan Sealant: ASTM C-920, Type S, Grade P, Class 25
(As approved by prime membrane manufacturer for use and compatibility with specified assembly.)

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest practical lengths.
- C. Hem exposed edges on underside ½"; miter and seam corners.
- D. Form material with flat lock seam, unless otherwise specified or detailed.
- E. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.
- F. Fabricate corners from one piece with minimum 18" seam or solder for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward ¼" (6mm) and hemmed to form drip.
- H. Fabricate flanged flashings (*pitch pans*) to allow flanges to extend at least four inches (4") – (50mm) over roofing.
 - 1. Provide full soldered corners.
- I. All fabricated sheet metal work necessary to complete the project shall receive standing seams and shall employ double breaks with no exposed sharp edges.

2.04 FINISH

- A. Shop prepare and prime exposed ferrous metal surfaces.
- B. Back paint flashings with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.
- B. Refer to details and drawings for specific direction on various types of equipment.
- C. Coordinate with Roofing Contractor (*if sub-contractor to roofing contractor*) so that sheet metal work is completed in a timely manner following installation of roof membrane waterproofing systems. Roof shall remain watertight at all times.
 - 1. Do not install sheet metal until all roofing work is completed to an acceptable level at the area where sheet metal work is to proceed.
- D. Verify roof openings, curbs pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- E. Verify membrane termination and base flashings are in place, sealed, and secure.
- F. Beginning of installation of flashing metals means acceptance of existing conditions by the Sheet Metal Contractor (*if other than Roofing Contractor*).

3.02 WORKMANSHIP

- A. GENERAL METAL FABRICATION:
 - 1. Shop-fabricate work to greatest extent possible.
 - 2. Comply with details shown and with applicable requirement of SMACNA "Architectural Sheet Metal Manual" and other industry recognized practices.
 - 3. Fabricate for waterproof and weather-resistant performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work.
 - 4. Angle bottom edges of exposed vertical surfaces to form drips.
 - 5. Fabricate to profiles and sizes as to match existing installations.
 - 6. Form work to fit all substrates.
 - 7. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and level indicated, with exposed edges folded back to form hems.
- B. Form, fabricate and install sheet metal so as to adequately provide for expansion and contraction in the finished work.
- C. Installation process and finished work shall be installed in a manner that will not damage the surrounding surfaces and or waterproofing.
 - 1. Contractor shall repair and/or correct the defective workmanship at no additional cost to Owner.

3.03 INSTALLATION

- A. Embed metal in contact with roof assembly in a solid bed of sealant, using materials and methods approved by the prime roofing system Manufacturer as applicable and compatible with specified and/or installed system.
- B. Conform to standard Prime Manufacturer's and/or SMACNA details as applicable for the successful completion of project.
- C. Pipe Flashing:
 - 1. Open vent stacks shall be sealed using lead sleeves with the tip edge crimped carefully back down into the pipe at least one inch. Replace existing damaged lead flashings with two-piece fabrication to prevent future damage from building settlement and/or movement.
(Prime Manufacturer's pre-formed sleeves are acceptable as approved for use within specified system and applicable to existing conditions.)
 - 2. At electrical lines and pipes which cannot be disassembled, solder lead sleeve and flange together in the field, maintaining minimum six-inch (6") sleeve height and eight-inch (8") wherever possible.
(Prime Manufacturer's pre-formed sleeves are acceptable as approved for use within specified system and applicable to existing conditions.)
- D. Install and seal new metal-flanged sleeve flashing and drain flashing in accordance with Section 07520 and applicable details.

3.04 SOLDERING

- A. GENERAL:
 - 1. Thoroughly clean and tin the joint materials prior to soldering.
 - 2. Perform soldering slowly, with a well-heated copper *(or applicable component material)*, in order to heat the seams thoroughly and to completely fill them with solder.
 - 3. Perform soldering with a heavy soldering copper of blunt design, properly tinned for use.
 - 4. Make exposed soldering on finished surfaces neat, full flowing and smooth.
- B. After soldering, thoroughly wash acid flux with a soda solution.
- C. Safety:
 - 1. Care shall be taken during any soldering work so as not to damage the roofing membrane system and/or components.

3.05 TESTS

- A. Upon request of the Consultant and/or Owner, demonstrate by hose or running water that the system is completely watertight.

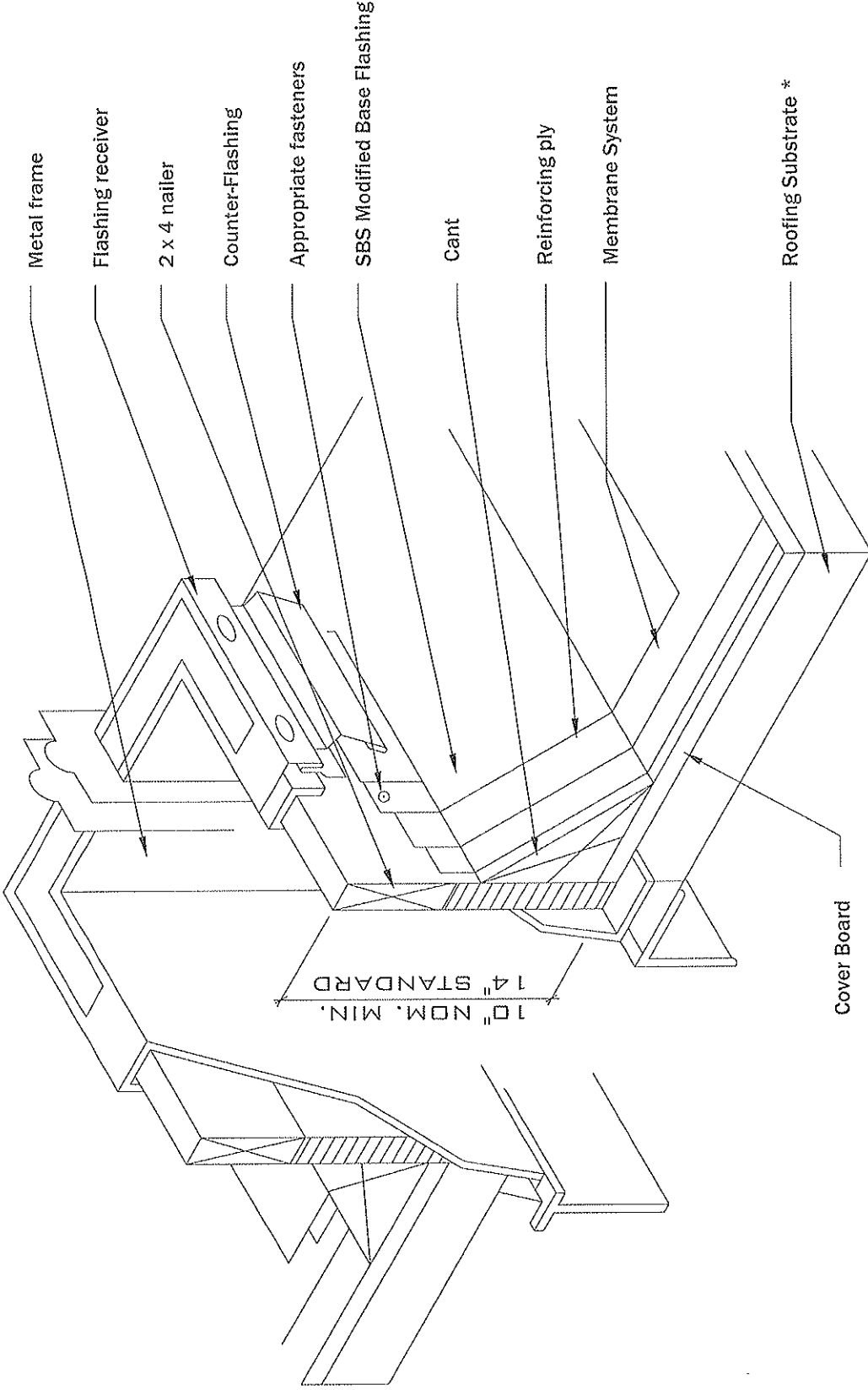
3.06 FINISH

- A. Finish to match existing style and color.
 - 1. Finish color shall be manufacturer's standard color.
 - 2. Color to be selected by Owner based on submittals provided by contractor after award of contract.
 - 3. Refer to specific instructions within specifications, addenda and/or drawings with regard to specific metal type and color requirements associated with various components.
- B. If painting is required, clean, prime and paint per Consultant's and/or Owner's recommendations to match existing color.

3.07 CLEAN UP

- A. Contractor shall:
 - 1. Remove all excess materials from finished surfaces and keep the roof and premises clean and free from accumulations of waste materials and rubbish at all times.
 - a. Remove all debris, scrap, and rubbish from the work area daily.
 - b. Surplus materials and all equipment shall be promptly removed from the site upon completion of the work.
 - 2. Prior to final acceptance, the Contractor shall restore all areas affected by his work to their original state of cleanliness and repair all damage done to the premises, by his workmen and equipment.

-- END OF SECTION --



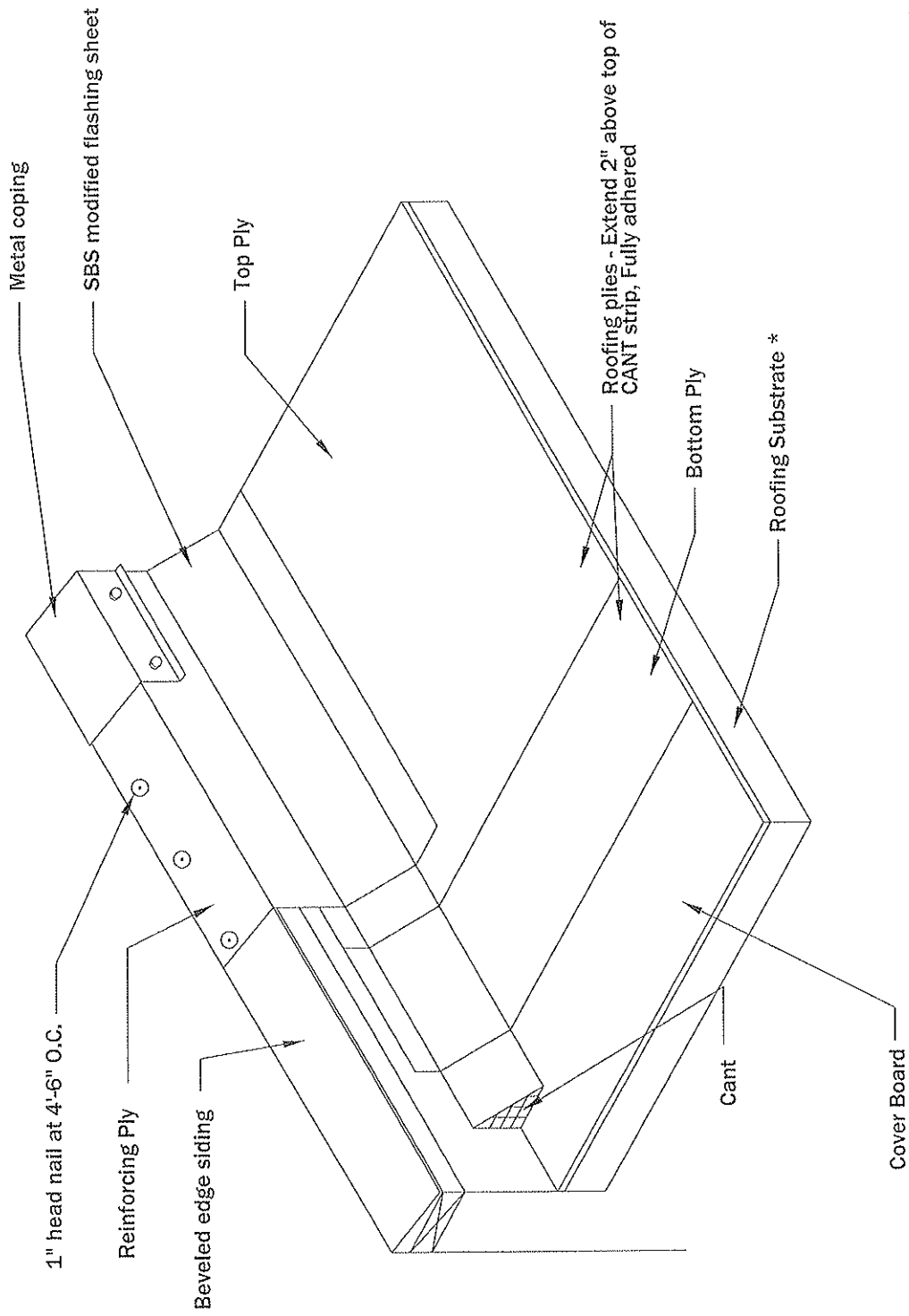
10" NOM. MIN.
14" STANDARD

- Metal frame
- Flashing receiver
- 2 x 4 nailer
- Counter-Flashing
- Appropriate fasteners
- SBS Modified Base Flashing
- Cant
- Reinforcing ply
- Membrane System
- Roofing Substrate *

Portland State University
Blackstone Bldg - Portland, Oregon

SCALE: NTS	1 of 8	DESIGNER: I.D.
DATE: 03/09/11		REVISOR:
A-TECH/NORTHWEST, INC.		
Portland & Prineville, Oregon 503-628-2882		
Hatch / Equipment Opening Detail		PROJECT NUMBER: 11091





Portland State University
 Blackstone Bldg - Portland, Oregon

SCALE: NS
 DATE: 02/09/11
 DRAWING: ID
 REVISED:

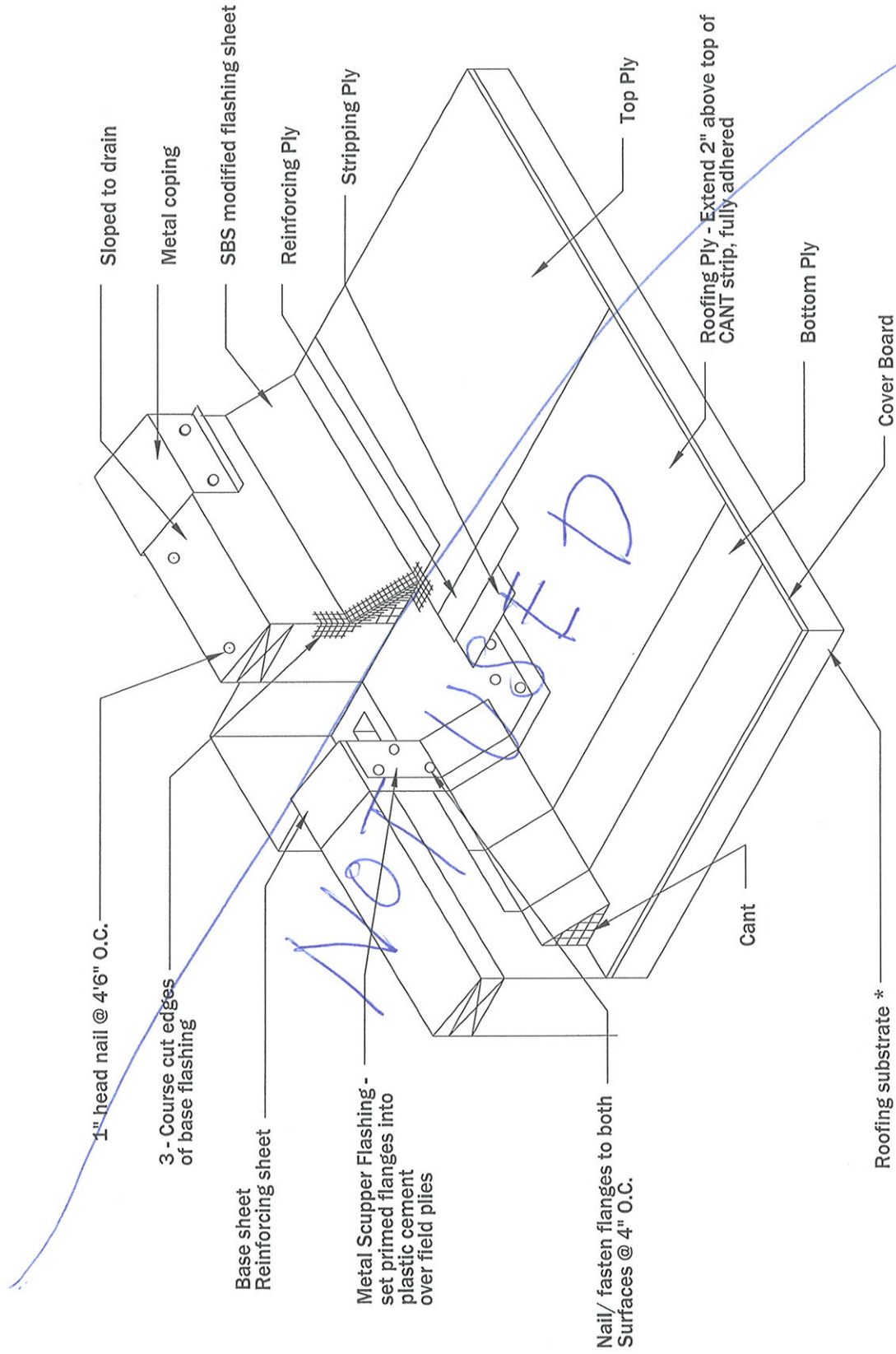
2 of 8

A-TECH/NORTHWEST, INC.
 Portland & Prineville, Oregon 503-628-2882



Parapet Detail

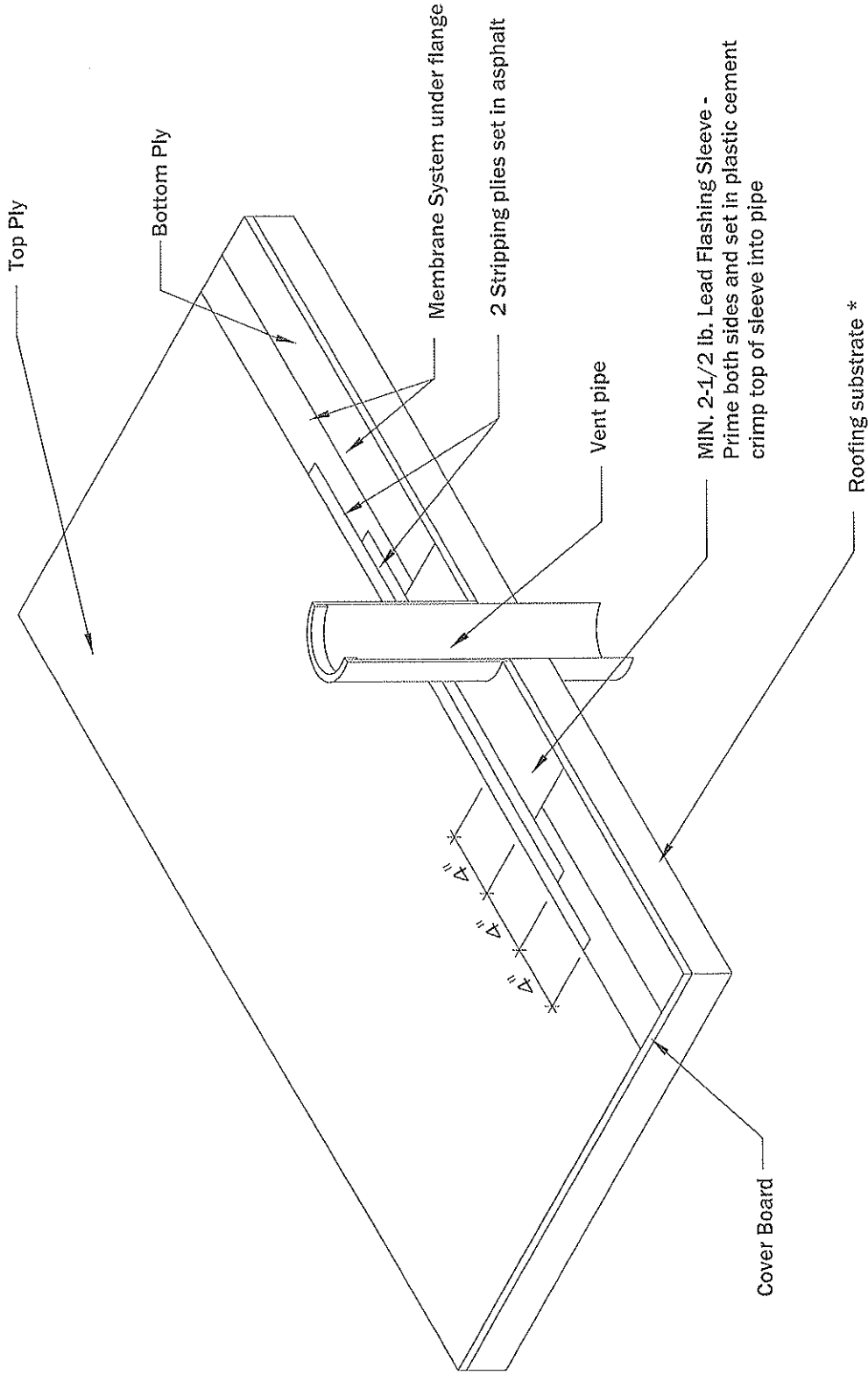
PROJECT NUMBER: 11091



Portland State University
 Blackstone Bldg - Portland, Oregon

SCALE: NIS	DRAWN BY: J.D.
DATE: 09/09/11	REVISED:
3 of 8	
A-TECH/NORTHWEST, INC. Portland & Prineville, Oregon 503 - 628 - 2882	
PROJECT NUMBER: 11091	

Scupper Detail



Portland State University
Blackstone Bldg - Portland, Oregon

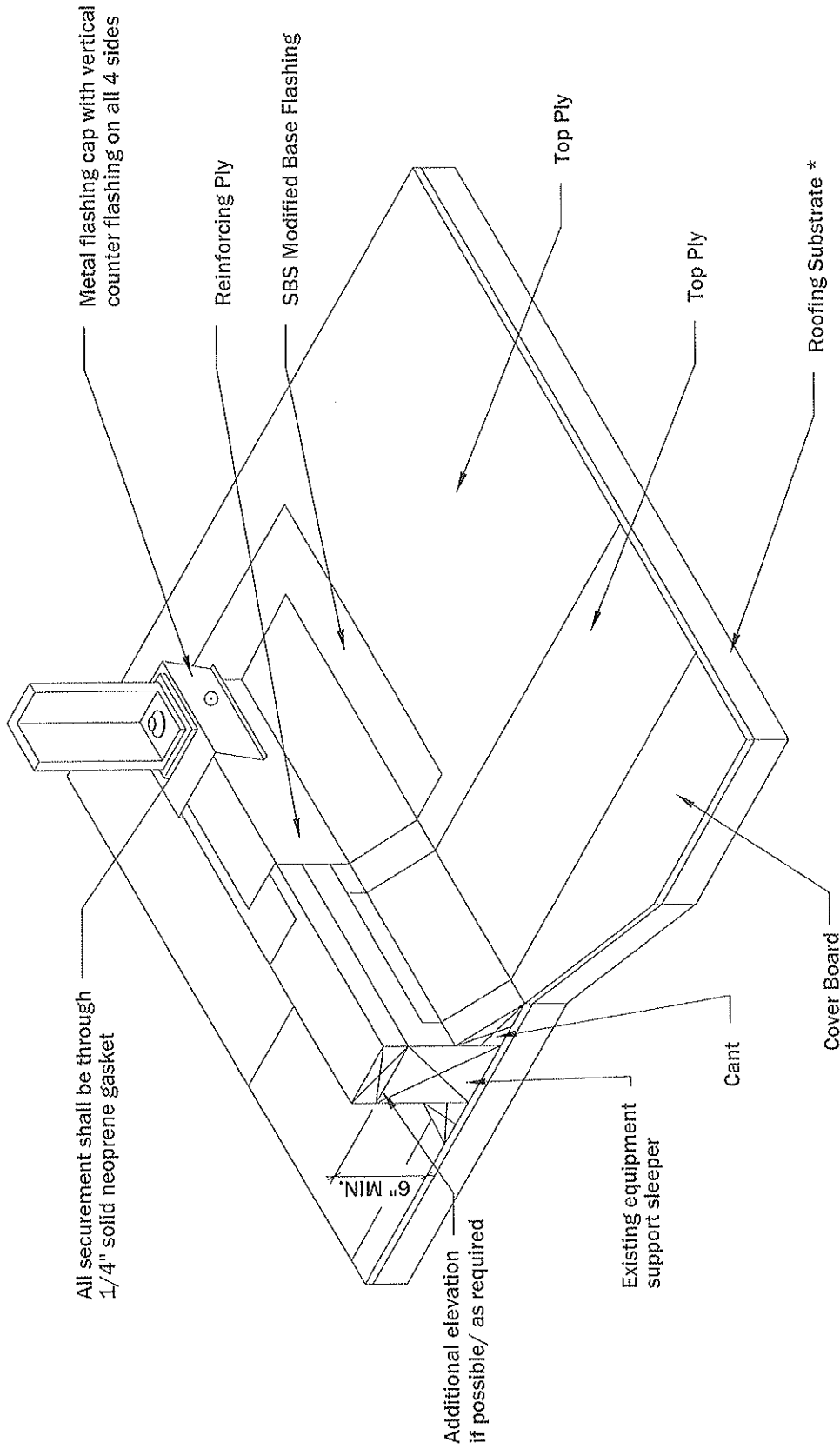
SCALE: NTS
DATE: 09/09/22
DRAWN BY: T.D.
REVISION: 4 of 8

A-TECH/NORTHWEST, INC.
Portland & Prineville, Oregon 503-628-2882



PROJECT NUMBER:
11091

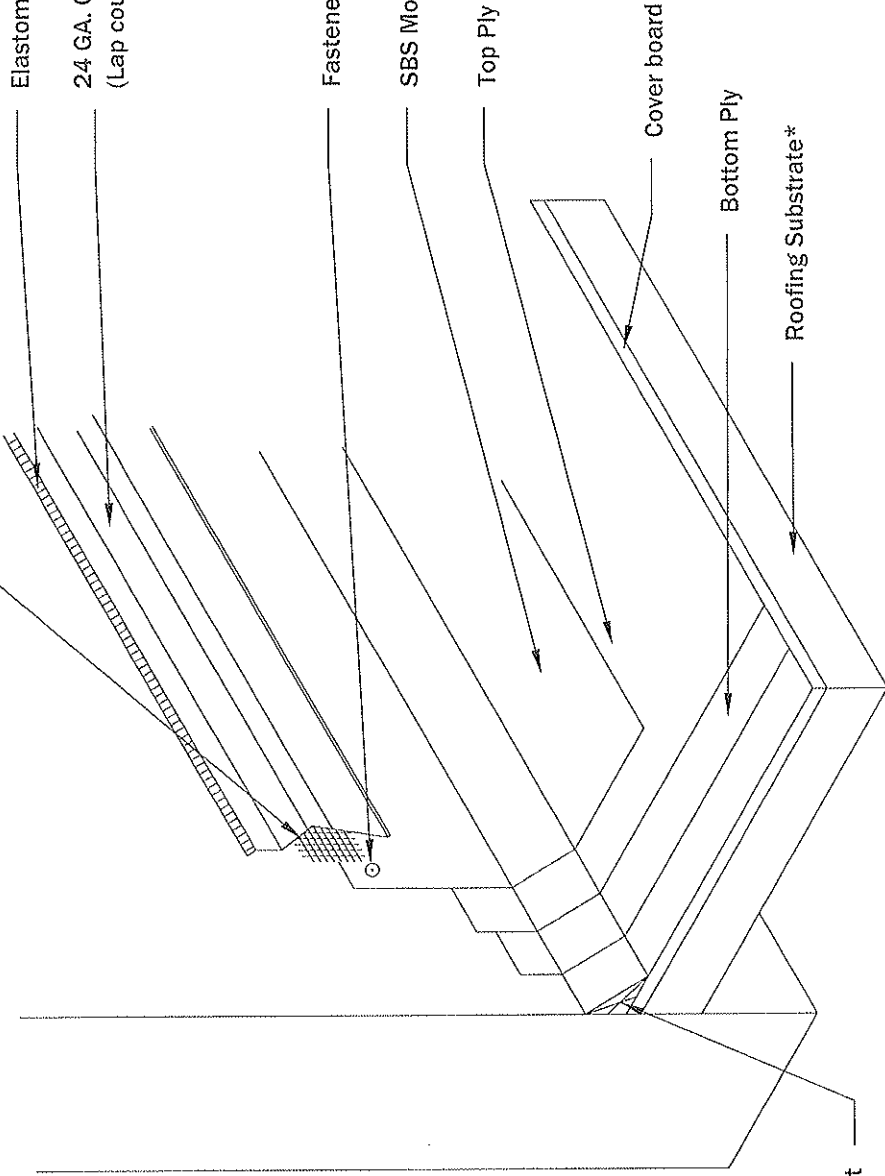
Vent Pipe Flashing Detail



Portland State University
 Blackstone Bldg - Portland, Oregon

SCALE: NTS	5 of 8	DRAWN BY: T.D.
DATE: 09/09/11		REVISED:
A-TECH/NORTHWEST, INC. Portland & Prineville, Oregon 503 - 628 - 2882		
Support Sleeper Detail PROJECT NUMBER: 11091		

Seal top of system w/ fabric tape and mastic



Elastomeric Urethane Sealant

24 GA. Counter Flashing Assembly
(Lap counter flashing to cover fasteners)

Fasteners @ Approx. 8" O.C.

SBS Modified Base Flashing

Top Ply

Cover board

Bottom Ply

Roofing Substrate*

Cant strip set in asphalt

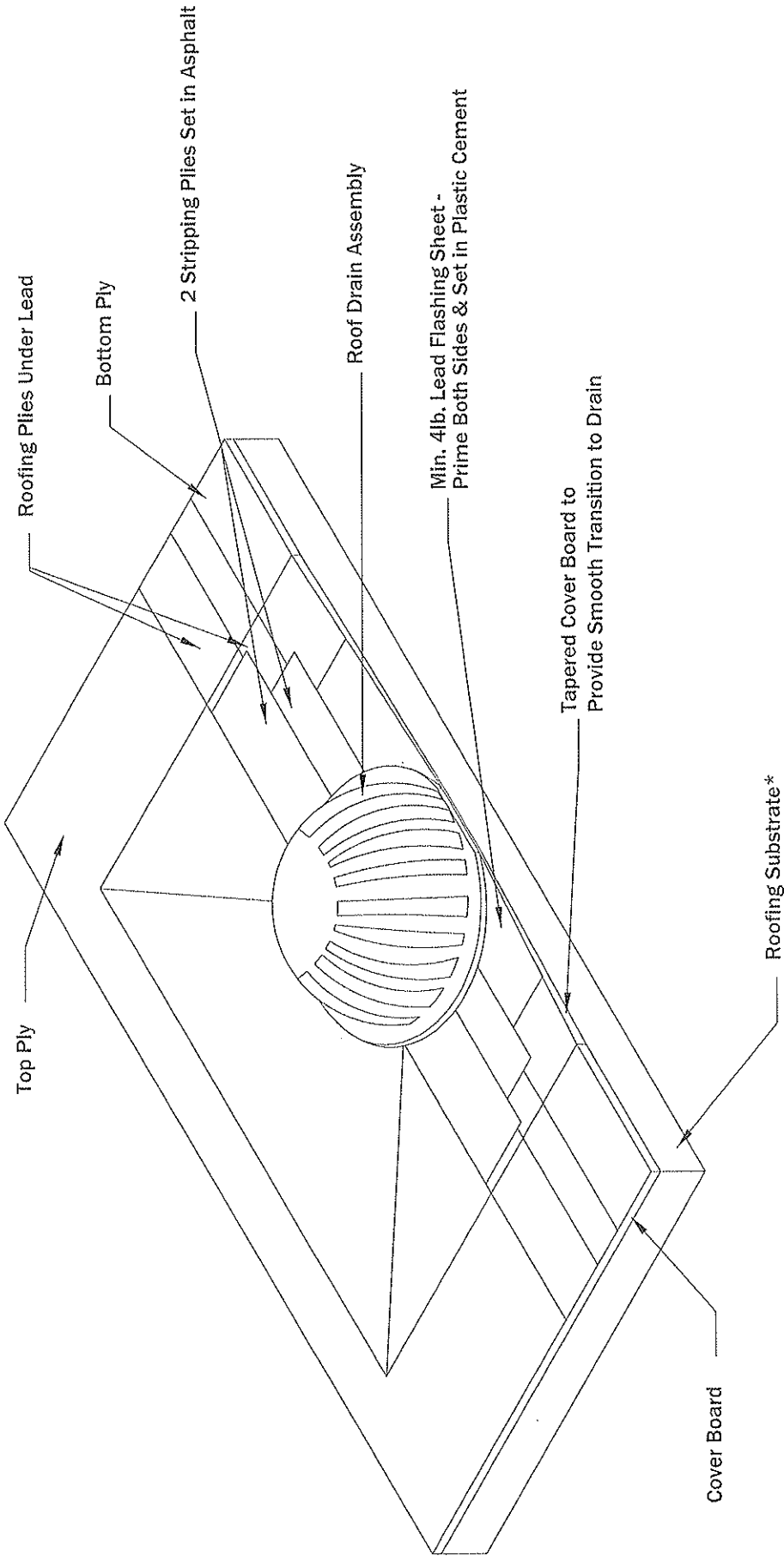
Portland State University
Blackstone Bldg - Portland, Oregon

SCALE: NTS
DATE: 09/09/11
DRAWN BY: TD
REVISED:
6 of 8

A-TECH/NORTHWEST, INC.
Portland & Prineville, Oregon 503-628-2882

Surface Mount Reglet Detail
PROJECT NUMBER:
11091



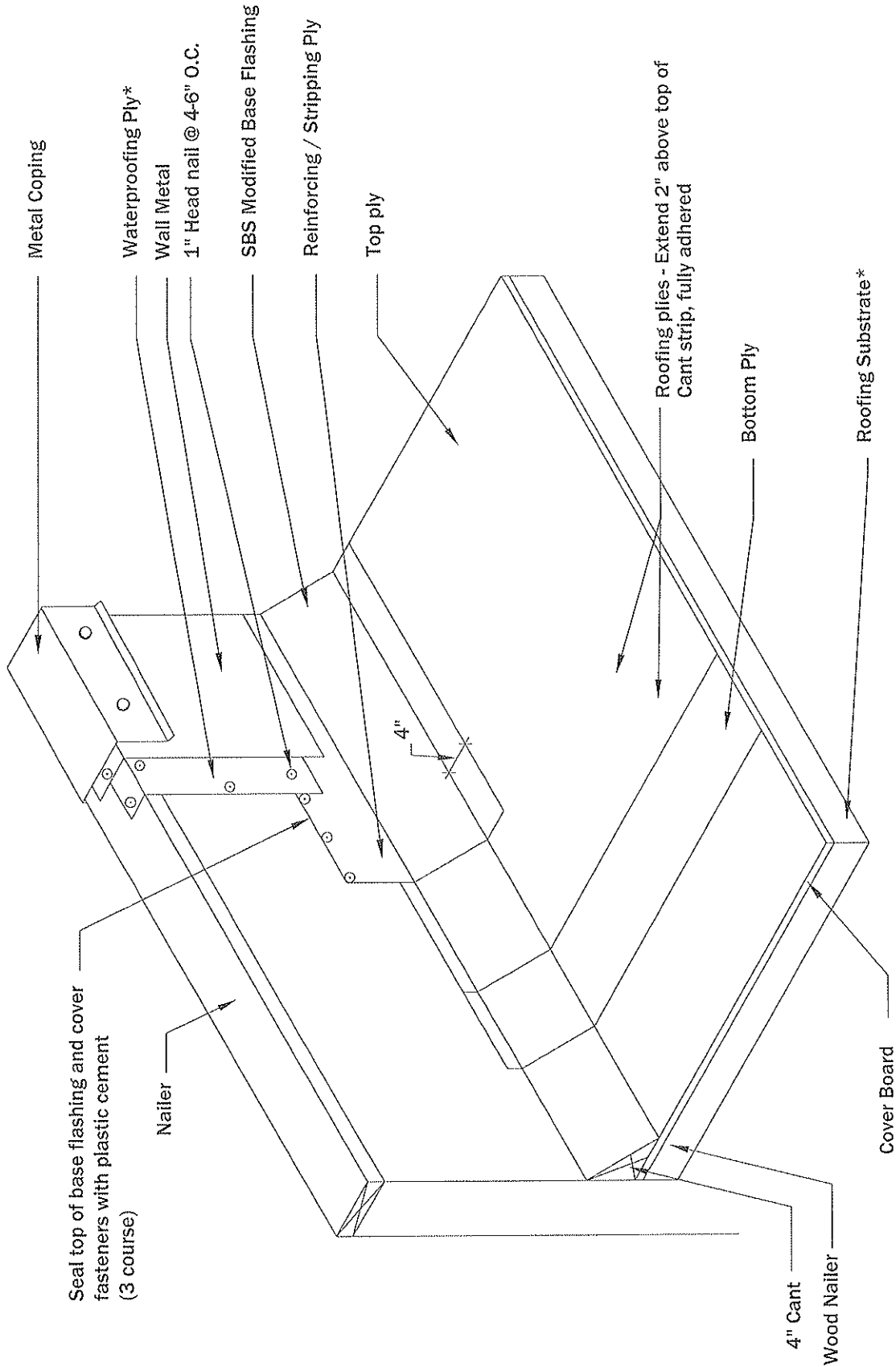


Portland State University
Blackstone Bldg - Portland, Oregon

SCALE: NTS	DATE: 06/09/11	7 of 8	DRAWN BY: LD
			REVISED:

A-TECH/NORTHWEST, INC.
Portland & Prineville, Oregon 503-628-2882

PROJECT NUMBER:
11091



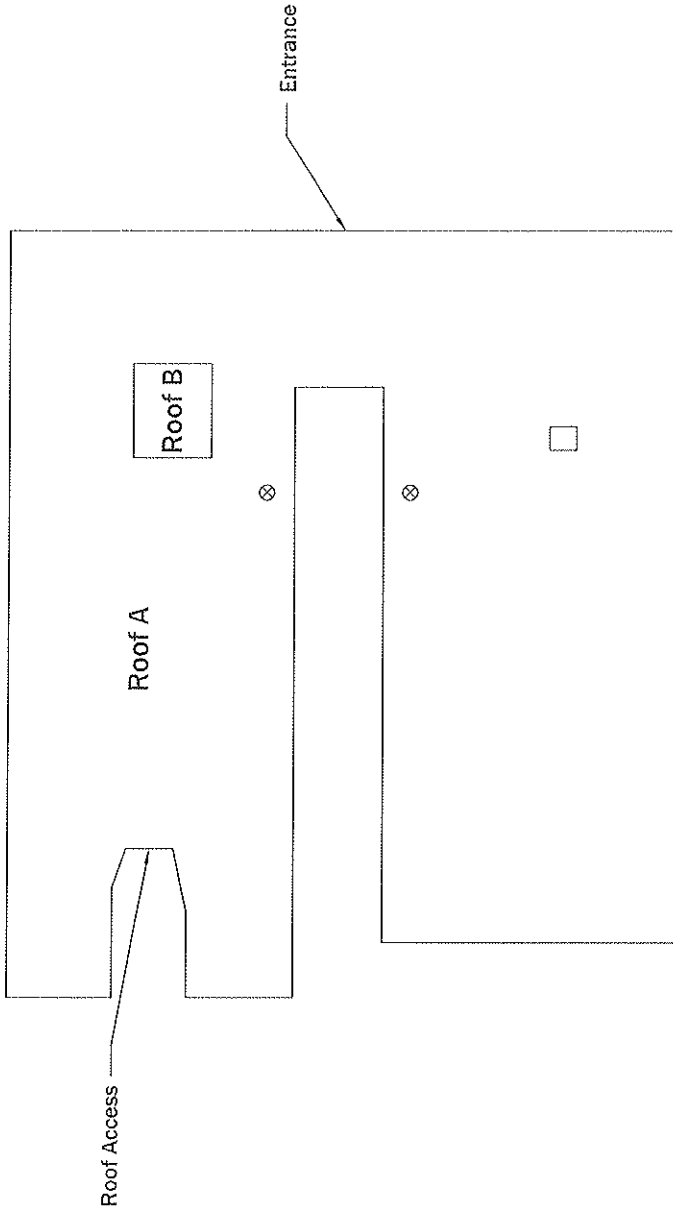
Portland State University
 Blackstone Bldg - Portland, Oregon

SCALE: N/S
 DATE: 09/05/11
 DRAWING: 1.0
 REVISED:
 8 of 8

A-TECH/NORTHWEST, INC.
 Portland & Prineville, Oregon 503-628-2882

Parapet w/ Wall Metal Detail

PROJECT NUMBER
 11091



ROOF AREA SQ.FT.
(Approximate)

Roof A:	7,096 sf
Roof B:	120 sf
Total:	7,216 sf



Portland State University
Blackstone Bldg - Portland, Oregon

SCALE: WS	DRAWN BY: ID
DATE: 09/09/11	REVISED:
i of 1	
A-TECH/NORTHWEST, INC.	
Portland & Prineville, Oregon 503-628-2882	
As-Built Drawing	
PROJECT NUMBER: 11091	



PORTLAND STATE UNIVERSITY
BLACKSTONE BUILDING

1831 SW Park Avenue
Portland, Oregon

ROOF CONSTRUCTION DATA

ROOFS A & B:

SURFACE: Smooth surface
MEMBRANE: 6/7 plies Built-up Roof
BITUMEN TYPE: Asphalt
INSULATION: None above structural deck
DECK: Wood

TOTAL ROOF AREA INCLUDED WITHIN THIS PROJECT 7,216 sq. ft.
Roof A: 7,096 sq. ft.
Roof B: 120 sq. ft.

Jones Stohosky Environmental Laboratory, Inc.
3325 SE Harrison Street, Milwaukie, Oregon 97222
Ph: 503-659-8338 Fax 503-659-7577
www.jselabs.com



Asbestos Analysis of Bulk Materials by Polarized Light Microscopy

A-Tech/Northwest, Inc.
Project: PSU-Blackstone Building

JSE Project: 08028
Analysis Date: 09/19/2011
Report Date: 09/19/2011

Sample	Layer	Description	Binder/Matrix	Other Non-Asbestos	Asbestos (% Type)
Roof A AB-1104929	LAYER 1	Silver surfacing	Metallic Paint Asphaltic		None Detected
	LAYER 2	3-ply black fibrous tar	Asphaltic	35% Fibrous Glass	None Detected
	LAYER 3	2-ply brown fibrous tar	Asphaltic	25% Cellulose	20 % Chrysotile
	LAYER 4	Brown fibrous paper	Misc. Misc. Binder	75% Cellulose	None Detected

Analyst: Michael McLeister
Approved Signatory Michael McLeister Date 09/19/2011

JSE is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos analysis by EPA-600/M4-82-020 Dec. 1982 polarized light microscopy (PLM) method. JSE Labs, Inc. uses components of both the 1982 and EPA/600/R-93/116 July 1993 PLM methods for analysis. The client may request that analysis be performed by the 1982 method only. Asbestos content for inhomogeneous samples is reported by layer when it is possible to subsample the discrete strata for individual analysis. Asbestos consists of the following minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, anthophyllite. Small diameter fibers may not be detected by this method. More in-depth analysis is recommended to determine asbestos content, especially for samples containing 10% or less asbestos. Analysis results are solely for the samples analyzed. Non-asbestos sample constituents may not be definite. Qualitative and quantitative TEM analysis may be recommended for difficult samples. Quantitative analysis by PLM point count or TEM is recommended for samples testing at < or = to 10% asbestos. "Matrix" is defined as non-asbestos, non-binder fibrous and non-fibrous components. "Binder" is defined as a component added for cohesiveness. "This report may not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government." If the NVLAP logo does not appear beneath the JSE logo of this report then, "This report contains data not covered by the NVLAP accreditation." (NIST Handbook 150, 2006).

RECEIVED
SEP 26 2011
A-Tech/Northwest, Inc.
Hard copy



ROOFING SYSTEM CONTRACTOR'S 2-Yr WORKMANSHIP GUARANTEE

DATE ISSUED: _____ OWNER: _____ ADDRESS: _____ _____ BLDG NAME: _____ ADDRESS: _____ _____ ROOF PROJECT #: _____ MISC COMMENTS: _____ _____ _____ _____	CONTRACTOR: _____ ADDRESS: _____ _____ _____ ROOF SPEC#: _____ MANUFACTURER: _____ ROOF AREA: _____ COMPLETION DATE: _____ ACCEPTANCE DATE: _____ MANUFACTURER'S WARRANTY: (y/h) _____ MANUFACTURER'S WARRANTY DATE: _____ MANUFACTURER'S WARRANTY LENGTH: _____ Note: <i>Attach Applicable Manufacturer's Warranty</i>
--	---

The above named Roofing contractor guarantees the roofing system installed as the above project reference number on the above identified facility for a period of **TWO (2) years** from the Date of Acceptance (*noted above*) and will pay all authorized material and labor costs of repair to the roof system necessary to stop leaks as described within this Guarantee and project Specifications which occur during the guarantee period, as a result of any of the following causes and as noted within the specification documents for this project:

1. Abnormal deterioration of the roofing membrane and/or base flashing system and/or other integral components of the installed system resulting from ordinary wear and tear by the elements.
2. Workmanship as it applies to the application of the roof system including any and all components.
3. Physical defects such as blisters, fishmouths, bare spots, delaminations, ridges, wrinkles, fastener problems and/or other defects that result in leakage into the roofing system and/or the building interior. (*As applicable to roof system installed.*)
4. Damage to the roof system not caused by structural movement of the building and/or structural deck.

EXCLUSIONS:

It is understood that leakage caused by any of the following are excluded from this guarantee:

1. Natural disasters including but not limited to floods, lightning, hail, ice, earthquakes, wind damage exceeding force seven on the Beaufort Scale, etc.
2. Damage to the roof assembly resulting from:
 - a. Traffic and/or damage by Owner or Owner's representative(s).
 - b. Movement and/or deterioration of metal not associated with this specific project and not under the control of the Roofing Contractor during the course of this project.
 - c. Chemical attacks on the roof assembly.
 - d. Changes to building or roof system after acceptance.



CONTRACTOR'S RESPONSIBILITY:

1. Roofing Contractor shall respond to leak calls within twenty-four (24) hours of notification by Owner and/or Owner's representative(s).
2. Temporary repairs may be made based on roof system manufacturer's recommendations for temporary repair techniques.
3. Permanent repairs (*restoring the roof to its original condition*) shall be completed within the thirty (30) day period after the first call from Owner and/Owner's representative.
4. Manufacturer's guidelines for repair of all problem(s) shall be strictly adhered to, and all techniques and products utilized during the repair must be approved by manufacturer.

OWNER'S RESPONSIBILITY:

In the event of a problem with the Roof System, the Owner's responsibilities under this guarantee are as follows:

1. Owner and/or Owner's representative will notify the Roofing Contractor via telephone followed by a written notification within thirty (30) days of the leak (*problem*).
2. Owner will notify Roofing Contractor in writing of any proposed modification, major repair, and/or addition on or through the roof system for each situation occurring after the "Date of Issue" of this guarantee.
 - a. Applicable drawings and plans showing the location of the proposed changes will be provided as may be available.

ACCEPTANCE:

OWNER SIGNATURE: _____ Date: _____

Printed Name: _____ Title: _____

ROOFING CONTRACTOR: _____ Date: _____

Printed Name: _____ Title: _____

DISTRIBUTION:

1. Original to Owner
2. Copy to Roofing Contractor

SUBSTITUTION REQUEST

TO _____

PROJECT _____

SPECIFIED ITEM _____

SECTION _____ PAGE _____ PARAGRAPH _____

DESCRIPTION _____

PROPOSED SUBSTITUTION _____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of request including identification of applicable data portions.

Attached data also includes description of changes to Contract Documents and proposed substitution requires for proper installation.

Undersigned certifies following items, unless modified by attachments, are correct:

1. Proposed substitution does not affect dimensions shown on drawings.
2. Undersigned pays for changes to building design, including engineering design, detailing, and construction costs caused by proposed substitution.
3. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.
4. Maintenance and service parts available locally or readily obtainable for proposed substitution.

Undersigned further certifies function, appearance, and quality of proposed substitutions are equivalent or superior to specified item.

Undersigned agrees to terms and conditions for substitutions found in Bidding Documents to this proposed substitution.

Submitted By:

Name (Printed or typed)

Signature

Firm Name

Address

City, State, Zip

Date

Tel:

General Contractor (if after award of Contract)	
For use by A/E	
___ Approved	___ Approved as noted
___ Not Approved	___ Received too late
By _____	
Date _____	
Remarks _____	

**The Construction Specifications Institute
Northwest Region**

September 1997

11091-S Substitution Request -PSU - BLACKSTONE -2-ply mod-cold



PAINTS AND COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation and field painting of exposed exterior items and surfaces.
- B. Surface preparation and field painting/sealing of Specialty Surfaces that do not have factory-applied final finish.

1.2 REFERENCES

- A. ANSI A13.1 - Scheme for the Identification of Piping Systems.
- B. ANSI Z535.1 - Safety Color Code.
- C. ASTM D 16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- D. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Test.
- E. ASTM D 1653 - Standard Test Methods for Water Vapor Transmission of Organic Coating Films.
- F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- G. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
- H. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings.
- I. Fed Spec - TT C-555B - Wind Driven Rain Test.
- J. ASTM D 16- Standard Terminology for Paint, Coatings, Materials, and Applications.
 - 1. SSPC, The Society for Protective Coatings
 - 2. SSPC-SP1 Solvent Cleaning.
 - 3. SSPC-SP2 Hand Tool Cleaning.
 - 4. SSPC-SP3 Power Tool Cleaning.
 - 5. SSPC-SP6 Commercial Blast Cleaning.
 - 6. SSPC-SP7 Brush-Off Blast Cleaning.
- K. PDCA Paint and Decorating Contractors of America - Web Site <http://www.pdca.org>:
 - 1. PDCA Standards P1 through P15.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Finish Schedule: Submit finish schedule including color information, gloss and model number for each type and color of finish specified.

APPENDIX "A"

- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years' experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing finishes and coatings of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Take special safety precautions against hazards from toxic and flammable materials.
- D. Place paint and solvent contaminated cloths and materials, subject to spontaneous combustion, in containers and remove from job site each day.
- E. Keep open flame, electrical and static spark, and other ignition sources from flammable vapors and materials at all times.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Post "WET PAINT" signs during application and curing of all coatings that may be accessed by other trades or the public.
- C. Post "NO SMOKING" signs during application and curing of solvent-based materials.

1.7 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

1.8 EXTRA MATERIALS

- A. At project closeout, provide to the owner or owners representative, two gallons (7.75L) of each finish coating material in sealed 1 gallon (3.875 L) containers, clearly marked with color and finish identification.
- B. Custom Colors: Provide a list of color formula and location for each finish specified.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Rodda Paint, Sherwin Williams, Glidden, Miller.
- B. Or approved equal

2.2 PAINT MATERIALS - GENERAL

- A. VOC : Provide materials to meet EPA 40 CFR Part 59 (AD-FRL-6149-71] RIN 2060
- National Volatile Organic Compound Emission Standards for Architectural Coatings, Final Rule, Federal Register / Vol. 63, No.176, September 11, 1998/Rules and Regulations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Ensure that surfaces to receive coatings are dry immediately prior to application.
- C. Ensure that moisture-retaining substrates to receive coatings have moisture content within tolerances allowed by coating manufacturer. Where exceeding the following values, promptly notify Architect and obtain direction before beginning work.
 - 1. Concrete and Masonry: 13 percent. Cure minimum 28 days.
 - 2. Exterior Wood: 17 percent.
 - 3. Interior Wood: 15 percent.
 - 4. Interior Finish Detail Woodwork, Including Trim, and Casework: 10 percent.
 - 5. Plaster and Gypsum: 15 percent.
 - 6. Concrete Slab-On-Grade: Perform calcium chloride test over 24 hour period or other acceptable test to manufacturer. Verify acceptable moisture transmission and pH levels.
- D. Examine surfaces to receive coatings for surface imperfections and contaminants that could impair performance or appearance of coatings, including but not limited to, loose primer, rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.
- E. Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

3.2 PREPARATION - GENERAL

- A. Clean surfaces thoroughly prior to coating application.
- B. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
- C. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; cover stains and marks which cannot be completely removed with isolating primer or sealer recommended by coating manufacturer to prevent bleed-through.
- D. Remove Mildew, Algae, and Fungus using materials and methods recommended by coating manufacturer.
- E. Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.
- F. Remove or protect adjacent hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings.
- G. Move or protect equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings.
- H. Protect adjacent surfaces not indicated to receive coatings.
- I. Prepare surfaces in accordance with manufacturer's instructions for specified coatings and indicated materials, using only methods and materials recommended by coating manufacturer.

3.3 SURFACE PREPARATION

- A. Asphalt - Pavement Markings on Bituminous Materials: Remove foreign materials that could impair coating performance or appearance; apply specified primer for maximum coating adhesion.
- B. Concrete and Concrete Masonry: Clean surfaces free of loose particles, sand, efflorescence, laitance, form oil, curing compounds, and other substances which could impair coating performance or appearance.
- C. Concrete Floors: Remove contaminants which could impair coating performance or appearance. Verify moisture transmission and alkaline-acid balance recommended by coating manufacturer; mechanically abrade surface SSPC SP6 or Blast Track, to achieve 80-100 grit medium-sandpaper texture.
- D. Existing Coatings:
 - 1. Remove surface irregularities by scraping or sanding to produce uniform substrate for coating application; apply one coat primer of type recommended by coating manufacturer for maximum coating adhesion.
 - 2. If presence of lead in existing coatings is suspected, cease surface preparation and notify Architect immediately.
- E. Gypsum Board: Repair cracks, holes and other surface defects with joint compound to produce surface flush with adjacent surfaces.
- F. Masonry Surfaces - Restored: Remove loose particles, sand, efflorescence, laitance, cleaning compounds and other substances that could impair coating performance or appearance.
- G. Metals - Aluminum, Mill-Finish: Clean and etch surfaces with a phosphoric acid-water solution or water based industrial cleaner. Scuff sand smooth surfaces to create profile for adhesion. Flush with clean water and allow to dry, before applying primer coat. Test adhesion of primer to ensure performance.
- H. Metals - Copper: Clean surfaces with pressurized steam, pressurized water, or solvent washing.
- I. Metals - Ferrous, Unprimed: Follow SSPC SP3 surface preparation. Remove rust or scale, if present, by wire brush cleaning, power tool cleaning, or sandblast cleaning; remove grease, oil, and other contaminants which could impair coating performance or appearance by solvent cleaning, with phosphoric-acid solution cleaning of welds, bolts and nuts; spot-prime repaired welds with specified primer.
- J. Metals - Ferrous, Shop-Primed: Follow SSPC SP3 surface preparation. Remove loose primer and rust, if present, by scraping and sanding, feathering edges of cleaned areas to produce uniform flat surface; solvent-clean surfaces and spot-prime bare metal with specified primer, feathering edges to produce uniform flat surface.
- K. Metals - Galvanized Steel (not passivated): Clean with a water-based industrial strength cleaner, apply GalvaPrep adhesion promoter followed by a clean water rinse; or wipe down surfaces using clean, lint-free cloths saturated with xylene or lacquer thinner; followed by wiping the surface dry using clean, lint-free cloths. Test adhesion of primer to ensure performance.

APPENDIX "A"

- L. Metals - Galvanized Steel, Passivated: Clean with water-based industrial strength cleaner, and/or "Brush Blast" in accordance with SSPC-SP7. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the "cross-hatch adhesion tape test" method in accordance with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.
- M. Metals - Stainless Steel: Clean surfaces with pressurized steam, pressurized water, or water-based industrial cleaner. Test adhesion of primer to ensure performance.
- N. Plaster: Repair cracks, holes and other surface defects as required to maintain proper surface adhesion. Apply patching plaster or Joint compound and sand to produce surface flush with adjacent undamaged surface. Allow a full cure prior to coating application as recommended by the patching compound manufacturer's recommendations.
- O. Polyvinyl Chloride (PVC) Pipe: remove contaminants and markings with denatured alcohol scuff sand and wipe with solvent for maximum adhesion. Test adhesion before starting the job.
- P. Fiberglass Doors - remove contaminants with cleaning solvent (alcohol) scuff sand and wipe. Test adhesion of primer before starting job.
- Q. Textiles - Insulated Coverings, Canvas or Cotton: Clean using high-pressure air and solvent of type recommended for material.
- R. Wood:
 - 1. Seal knots, pitch streaks, and sap areas with sealer recommended by coating manufacturer; fill nail recesses and cracks with filler recommended by coating manufacturer; sand surfaces smooth.
 - 2. Apply primer coat to back of wood trim and paneling.
- S. Wood Doors: Seal door tops and bottoms prior to finishing.
- T. Wood - Field-Glazed Frames and Sash: Prime or seal glazing channels prior to glazing.

3.4 APPLICATION - GENERAL

- A. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
- B. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
- C. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5 feet (1.5 m).
- D. Do not apply succeeding coat until Owner Representative has approved previous coat; only Owner Representative approved coats will be considered in determining number of coats applied.
- E. Remove dust and other foreign materials from substrate immediately prior to applying each coat.

APPENDIX "A"

- F. Where coating application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.
- G. Where color changes occur between adjoining spaces, through framed openings that are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.
- H. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.

3.5 CLEANING

- A. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
- B. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
- C. Reconnect equipment adjacent to surfaces indicated to receive coatings.
- D. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
- E. Remove protective materials.

3.6 PROTECTION

- A. Protect completed coating applications from damage by subsequent construction activities.
- B. Repair to Owner Representative's acceptance coatings damaged by subsequent construction activities. Where repairs cannot be made to Owner Representative's acceptance, re-apply finish coating to nearest adjacent change of surface plane, in both horizontal and vertical directions.

END OF SECTION

STRUCTURAL NOTES
PSU BLACKSTONE RESIDENCE HALL -- ROOF SEISMIC UPGRADE
VLMK JOB #20120068

DIVISION 1 -- GENERAL

- A. GENERAL
- A.1. THESE NOTES SET MINIMUM STANDARDS FOR CONSTRUCTION. THE DRAWINGS GOVERN OVER THE GENERAL NOTES TO THE EXTENT SHOWN.
- A.2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS ON DRAWINGS AND IN FIELD. COORDINATE LOCATIONS OF OPENINGS THROUGH FLOORS, ROOFS AND WALLS WITH ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS. NOTIFY VLMK CONSULTING ENGINEERS (VLMK) OF ANY DISCREPANCIES OR IF ACTUAL CONDITIONS DIFFER FROM THOSE SHOWN OR NOTED.
- A.3. CONTRACTOR SHALL PROVIDE ALL NECESSARY TEMPORARY SUPPORT PRIOR TO COMPLETION OF VERTICAL AND LATERAL LOAD SYSTEMS. VLMK HAS NOT BEEN RETAINED TO PROVIDE ANY SERVICES RELATED TO JOB SITE SAFETY PRECAUTIONS, OR TO REVIEW THE MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES FOR THE CONTRACTOR TO PERFORM WORK. UNLESS WE ARE SPECIFICALLY RETAINED AND COMPENSATED TO DO OTHERWISE, OUR WORK IS LIMITED TO THE DESIGN OF WORK DESCRIBED ON OUR DRAWINGS FOR THIS PROJECT.
- A.4. WHERE REFERENCE IS MADE TO ASTM, AISC, ACI OR OTHER STANDARDS, THE LATEST ISSUE SHALL APPLY.
- A.5. INSPECTION AND/OR JOB SUPERVISION IS NOT PROVIDED BY VLMK.
- A.6. ALL WORK SHALL BE IN STRICT COMPLIANCE WITH THE 2009 INTERNATIONAL BUILDING CODE (IBC) AS AMENDED BY THE STATE OF OREGON (2010 OREGON STRUCTURAL SPECIALTY CODE) AND ALL OTHER STATE AND LOCAL BUILDING REQUIREMENTS THAT APPLY.
- A.7. DESIGN CRITERIA:
- A.7.a. ROOF LIVE LOADS (PER IBC 1603.1.2)
- | | |
|---------|--------|
| MINIMUM | 25 PSF |
|---------|--------|
- A.7.b. ROOF SNOW LOAD (PER IBC 1603.1.3)
- | | | |
|-----------------------------|------|--------|
| ELAT-ROOF SNOW LOAD | (Pf) | 25 PSF |
| SNOW EXPOSURE FACTOR | (Ce) | 1.0 |
| SNOW LOAD IMPORTANCE FACTOR | (Is) | 1.0 |
| THERMAL FACTOR | (Cl) | 1.0 |
- A.7.c. WIND LOAD (PER IBC 1603.1.4)
- | | | |
|----------------------------------|--------|-------|
| BASIC WIND SPEED (3-SECOND GUST) | 95 MPH | |
| WIND IMPORTANCE FACTOR | (Iw) | 1.0 |
| OCCUPANCY CATEGORY | II | |
| WIND EXPOSURE | B | |
| INTERNAL PRESSURE COEFFICIENT | (GCp1) | +0.18 |
- A.7.e. EARTHQUAKE DESIGN DATA (PER IBC 1603.1.5)
- SEISMIC UPGRADE CRITERIA (VOLUNTARY UPGRADE)
- | | |
|--|------------------------------------|
| BUILDING LATERAL LOADS AND DIAPHRAGM | ASCE - 41 |
| LIFE-SAFETY PERFORMANCE OBJECTIVE | |
| MAPPED SPECTRAL RESPONSE ACCELERATIONS | Sg = 98.6%, Sd = 34.7% |
| MODIFICATION FACTORS | C1 = C2 = 1.0 |
| RESPONSE SPECTRUM ACCELERATION | Sa = 0.9 |
| EFFECTIVE MASS FACTOR | Cm = 0.8 |
| ANALYSIS PROCEDURE USED | LINEAR STATIC PSEUDO-LATERAL FORCE |
- OUT-OF-PLANE WALL ANCHORAGE AND CROSS-TIES ASCE - 7
- | | | |
|--------------------------------|--------------------------|-----|
| SEISMIC IMPORTANCE FACTOR | (Ie) | 1.0 |
| OCCUPANCY CATEGORY | II | |
| SITE CLASS | D | |
| SPECTRAL RESPONSE COEFFICIENTS | Sds = 72.7%, Sdi = 39.4% | |
| SEISMIC DESIGN CATEGORY | D | |
- A.8. THESE DRAWINGS HAVE BEEN PREPARED SOLELY FOR USE IN THE CONSTRUCTION OF THE PSU BLACKSTONE ROOF SEISMIC UPGRADE. PROJECT LOCATED IN PORTLAND, OREGON. POSSESSION OF THESE DRAWINGS DOES NOT GRANT A LICENSE TO CONSTRUCT OR FABRICATE THE WHOLE, OR PARTS OF THIS PROJECT IN OTHER LOCATIONS.
- A.9. PROVIDE SHOP DRAWINGS FOR ALL STRUCTURAL PRODUCTS DELIVERED TO THE PROJECT. VLMK WILL REVIEW AND MARK-UP A MAXIMUM OF THREE COPIES OF SUBMITTALS OR WILL ACCEPT ELECTRONIC SUBMITTALS IN PDF FORMAT. SUBMITTALS WILL BE STAMPED AND RETURNED TO THE GENERAL CONTRACTOR WITHIN TWO WEEKS. FAX SUBMITTALS WILL NOT BE ACCEPTED WITHOUT PRIOR APPROVAL. ALL SUBMITTALS SHALL BE REVIEWED AND STAMPED BY THE CONTRACTOR PRIOR TO SUBMITTAL TO THE ENGINEER. UNLESS OTHERWISE INDICATED, SHOP DRAWINGS SHALL BE PROVIDED ON THE FOLLOWING:
- A.9.a. STRUCTURAL STEEL AND MISCELLANEOUS STEEL.

DIVISION 2 -- SITE WORK: NOT USED

DIVISION 3 -- CONCRETE AND REINFORCING: NOT USED

DIVISION 4 -- MASONRY: NOT USED

DIVISION 5 -- METAL

- A. GENERAL
- A.1. ALL STRUCTURAL MEMBERS TO BE DETAILED, FABRICATED AND ERRECTED IN ACCORDANCE WITH THE LATEST EDITION OF AISC STANDARDS.
- A.2. ALL BIDDER DESIGN STRUCTURAL SYSTEMS TO INCLUDE PLANS AND CALCULATIONS STAMPED BY AN ENGINEER REGISTERED IN THE GOVERNING JURISDICTION.
- A.3. UNLESS OTHERWISE NOTED, CONTRACTOR WILL BE REQUIRED TO PROVIDE A SEPARATE PERMIT FOR BIDDER DESIGN STRUCTURAL SYSTEMS.
- B. MATERIALS
- B.1. ALL STEEL W SECTIONS TO BE ASTM A992 TYPICAL UNLESS OTHERWISE NOTED.
- B.2. ALL STEEL PLATE, ANGLES, CHANNELS, ETC. TO BE ASTM A36 TYPICAL UNLESS OTHERWISE NOTED.
- B.3. STRUCTURAL TUBING TO BE ASTM A500 GRADE B (Fy = 46 KSI RECTANGULAR, Fy = 42 KSI ROUND).
- B.4. UNLESS OTHERWISE NOTED, BOLTS TO BE A325N FOR STEEL TO STEEL CONNECTIONS.
- B.5. ANCHOR BOLTS AND WOOD CONNECTIONS TO BE A307. PROVIDE STANDARD PLATE WASHERS UNDER ALL BOLT HEADS AND NUTS IN CONTACT WITH WOOD.
- B.6. ANCHOR RODS TO BE ASTM 1554, GRADE 36 UNLESS OTHERWISE NOTED.
- B.7. LAG BOLTS IN WOOD TO BE SAE J429 GRADE 1 WITH MINIMUM DIMENSIONS MEETING ANSI/ASME B.18.2.1.

- C. DRILLED ANCHOR BOLTS:
- | BASE MATERIAL | PRODUCT | I.C.C.# |
|---------------|---|----------|
| CONCRETE | SIMPSON SET-XP ADHESIVE ANCHOR | ESR-2508 |
| CONCRETE | HILTI HIT-RE 500-SD ADHESIVE ANCHOR | ESR-2372 |
| CONCRETE | HILTI HIT-HY 150 MAX-SD ADHESIVE ANCHOR | ESR-3013 |
| CONCRETE | POWERS PFI1000+ EPOXY ADHESIVE ANCHOR | ESR-2583 |
- | URM (AT CHIMNEY) | SIMPSON ET ADHESIVE ANCHOR | ESR-4945 |
|------------------|---------------------------------|----------|
| URM (AT CHIMNEY) | HILTI HIT-HY 20 ADHESIVE ANCHOR | ESR-2659 |
- C.1. OTHER ANCHORS ARE ACCEPTABLE ONLY WITH PRIOR WRITTEN APPROVAL OF ENGINEER. INSTALL ALL ANCHORS PER MANUFACTURER'S INSTRUCTIONS. PROVIDE MINIMUM EMBEDMENT AND SPACING UNLESS NOTED OTHERWISE ON DRAWINGS. SPECIAL INSPECTION OF ANCHOR INSTALLATION IS REQUIRED UNLESS SPECIFICALLY NOTED OTHERWISE ON DRAWINGS. ALSO NOTE ADDITIONAL TESTING REQUIREMENTS IN SPECIAL INSPECTION PROGRAM.
- D. WELDING
- D.1. ALL WELDS TO BE MADE BY CERTIFIED WELDERS TO AWS STANDARDS WITH E70XX ELECTRODES. CONTRACTOR SHALL PAY SPECIAL ATTENTION TO THE MEANS AND METHODS OF CONSTRUCTION THEY ANTICIPATE EMPLOYING ON THE PROJECT. SOME WELDS SHOWN AS SHOP WELDS MAY NEED TO BE FIELD WELDS TO AID ERECTION.

DIVISION 6 -- WOOD

- A. ROUGH CARPENTRY
- A.1. LUMBER SPECIES AND GRADES TO BE AS FOLLOWS UNLESS OTHERWISE SHOWN ON DRAWINGS:
- | | |
|---|-----------------------------|
| JOISTS, BEAMS & STRINGERS: | DOUGLAS FIR #2 |
| 6 INCH NOMINAL AND GREATER: | DOUGLAS FIR #1 |
| BLOCKING, BRIDGING AND MISCELLANEOUS: | DOUGLAS FIR #2 |
| 2x STUDS: | DOUGLAS FIR #2 |
| LEDGERS, PLATES, ETC. IN CONTACT WITH CONCRETE, AND WOOD CURBS: | PRESSURE TREATED HEM FIR #2 |
| POSTS, COLUMNS (SAWN): | DOUGLAS FIR #1 |
- ROOF SHEATHING:
- APA RATED SHEATHING, EXPOSURE 1, CONFORMING TO APA PERFORMANCE STANDARD PS 1-95 AND EXCEPT NER-108. SEE DRAWINGS FOR REQUIRED THICKNESS OF SHEATHING AND/OR SPAN RATING. INSTALL ROOF SHEATHING WITH LONG DIMENSION PERPENDICULAR TO SUPPORTS UNLESS OTHERWISE NOTED. USE SPACERS TO PROVIDE 1/8 INCH END AND EDGE JOINTS (1/4 INCH FOR JUMBO PANELS) WHENEVER SHEATHING IS EXPOSED TO WET WEATHER. FILL ANY JOINT SPACING OVER 3/8 INCH UNLESS OTHERWISE APPROVED BY ENGINEER. BLOCK ROOF SHEATHING WHERE NOTED ON DRAWINGS.
- TIMBERSTRAND (LSL):
- ALL LSL SHALL BE MANUFACTURED BY ILEVEL.
- COLUMNS/HEADERS/RIM/STUDS:
- Fb = 1700 PSI, E = 1,300,000 PSI, FcH = 1400 PSI, Fv = 400 PSI
- A.2. CONNECTORS:
- A.2.a. TIE STRAPS, FRAMING ANCHORS, HANGERS, STIRRUPS, COLUMN CAPS, COLUMN BASES, ETC., TO BE SIMPSON AS DETAILED, OR AS APPROVED.
- A.2.b. FULLY FASTEN ACCORDING TO MANUFACTURER'S SCHEDULE USING LARGEST SIZE SHOWN.
- A.2.c. ALL BEAMS AND JOISTS NOT BEARING ON ANOTHER MEMBER TO CONNECT WITH 'U' TYPE HANGERS UNLESS OTHERWISE NOTED ON DRAWINGS.
- A.2.d. NAILING: ALL NAILS SPECIFIED IN THE DRAWINGS TO BE "COMMON" NAILS UNLESS OTHERWISE NOTED. ALL NAILING SHALL COMPLY WITH IBC TABLE 2304.9.1, NAILING SCHEDULE. OBTAIN ENGINEER'S APPROVAL OF ALL PROPRIETARY NAILING SYSTEMS.
- A.2.e. NAILS AT ROOF AND WALL DIAPHRAGMS TO BE DRIVEN SO THAT THEIR HEAD OR CROWN IS FLUSH WITH THE SURFACE OF THE SHEATHING. CHECK AND RESINK IF NEEDED, IMMEDIATELY BEFORE ROOFING.
- A.2.f. CORROSION PROTECTION:
- A.2.f.a. CONFIRM REQUIRED CORROSION PROTECTION FOR HARDWARE AND FASTENERS WITH SPECIFIC RECOMMENDATIONS FROM PRESSURE TREATING MANUFACTURER OR HANGER MANUFACTURER (USE MOST CONSERVATIVE) FOR SPECIFIC WOOD TREATMENTS USED.
- A.2.f.b. MINIMUM CORROSION PROTECTION ON METAL CONNECTORS EXPOSED TO THE ENVIRONMENT OR PRESSURE TREATED LUMBER TO BE PER ASTM A653 CLASS 185 (SIMPSON ZMAX) OR ASTM A123.
- A.2.f.c. FASTENERS FOR PRESSURE TREATED LUMBER MUST BE MINIMUM HOT-DIP GALVANIZED, STAINLESS STEEL, SILICON BRONZE OR COPPER.
- A.2.f.d. HOT-DIP GALVANIZED HARDWARE AND FASTENERS MUST COMPLY WITH ASTM A153, STAINLESS STEEL FASTENERS TO BE TYPE 304 OR TYPE 316.
- A.2.f.e. HARDWARE AND FASTENERS USED TOGETHER MUST BE THE SAME TYPE (E.G. HOT-DIP GALVANIZED NAILS WITH HOT-DIP GALVANIZED HANGERS).
- A.3. DELIVERY AND STORAGE: ALL LUMBER AND SHEATHING DELIVERED TO THE SITE, SHALL BE STACKED OR STORED OFF THE GROUND AND PROPERLY PROTECTED AGAINST WEATHER.
- A.4. NOTIFY ENGINEER FOR OBSERVATION OF ROOF SHEATHING NAILING. OBTAIN ENGINEER'S APPROVAL PRIOR TO STARTING ROOF INSTALLATION. SEE STRUCTURAL OBSERVATION NOTES FOR ADDITIONAL REQUIREMENTS.
- A.5. CUTTING AND NOTCHING OF JOISTS NOT ALLOWED, EXCEPT AS SPECIFICALLY DETAILED IN DRAWINGS.

CONCRETE:	COMMENTS	DURATION	INSPECTION AGENCY
REINFORCING IN EXISTING CONCRETE WALLS	SEE NOTE 6A		
EXISTING CONCRETE STRENGTH	SEE NOTE 6B		
DRILLED-IN ADHESIVE ANCHORS, RODS AND DOWELS SHALL BE CONTINUOUSLY INSPECTED DURING INSTALLATION	PER ICC EVALUATION REPORT. SEE NOTE 7 FOR ADDL. TESTING	C	TESTING LAB

STRUCTURAL WELDING AND HIGH-STRENGTH BOLTING:

MATERIAL VERIFICATION OF STRUCTURAL STEEL, DECKING, HIGH STRENGTH BOLTS, NUTS AND WASHERS, ANCHOR RODS, AND WELD FILLER MATERIALS		P	TESTING LAB
SINGLE PASS FILLET WELDS 5/16" AND SMALLER		P	TESTING LAB
HIGH STRENGTH A325N AND A490N BOLT INSTALLATION	VERIFY ALL BOLTS INSTALLED TO 'SNUG TIGHT' CONDITION	P	TESTING LAB

WOOD:

ROOF DIAPHRAGM SHEATHING, NAIL SPACING AND BLOCKING		P	TESTING LAB
WALL ANCHORAGE AND STRAPPING		P	TESTING LAB

APPROVED FABRICATORS:

CERTIFICATE OF COMPLIANCE MUST BE SUBMITTED TO THE ARCHITECT OR ENGINEER OF RECORD, FOR ALL OFF SITE FABRICATION SUCH AS STRUCTURAL STEEL, OPEN-WEB STEEL JOISTS AND GIRDERS, GLU-LAMS, AND PRE-CAST CONCRETE		P	TESTING LAB

STRUCTURAL OBSERVATION:

EXTERIOR WALL ANCHORAGE AND DIAPHRAGM BLOCKING (APPROX. MIDWAY THROUGH COMPLETION)	P	ENGINEER
AT COMPLETION OF ROOF DIAPHRAGM NAILING, INCLUDING PARAPET BRACING (PRIOR TO ROOFING COVER)	P	ENGINEER

STRUCTURAL OBSERVATION NOTES:

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE ENGINEER OF RECORD A MINIMUM OF 24 HOURS IN ADVANCE OF REQUIRED OBSERVATION(S). APPROVAL BY THE MUNICIPAL INSPECTOR DOES NOT PRECLUDE OBSERVATION BY THE ENGINEER OF RECORD AND APPROVAL BY THE ENGINEER OF RECORD DOES NOT PRECLUDE THE INSPECTION PROCESS BY THE MUNICIPAL INSPECTOR AND ANY OTHER CODE REQUIREMENTS FOR INSPECTION.
 - UPON COMPLETION OF WORK THE STRUCTURAL OBSERVER SHALL SUBMIT A REPORT TO OWNER AND BUILDING OFFICIAL WITH WET STAMP AND SIGNATURE ATTESTING TO THE VISUAL OBSERVATIONS MADE. THE REPORT SHALL IDENTIFY ANY REPORTED DEFICIENCIES WHICH HAVE NOT BEEN RESOLVED.
- SPECIAL INSPECTION PROGRAM NOTES:**
- DURATION REFERS TO TIME AND FREQUENCY OF INSPECTION FOR THE PORTIONS OF WORK INDICATED.
C = CONTINUOUS INSPECTION IN WHICH THE SPECIAL INSPECTOR IS ON SITE AT ALL TIMES, OBSERVING THE WORK REQUIRING SPECIAL INSPECTION.
P = PERIODIC INSPECTION IN WHICH THE SPECIAL INSPECTOR IS ON SITE AT TIME INTERVALS NECESSARY TO CONFIRM THAT THE WORK REQUIRING SPECIAL INSPECTION IS IN CONFORMANCE WITH APPROVED PERMIT DRAWINGS AND SPECIFICATIONS.
 - THE INSPECTION AGENCIES ARE AS FOLLOWS:
ENGINEER: VLMK ENGINEERS
TESTING LAB: TO BE DETERMINED
- TESTING LAB SHALL PERFORM INSPECTIONS OF ALL PORTIONS OF WORK DESIGNATED IN THE PROGRAM. THE SELECTED INSPECTION AGENCY SHALL BE AN ACCREDITED, APPROVED SPECIAL INSPECTION AGENCY EMPLOYED BY THE OWNER OR OWNER'S AGENT, NOT THE CONTRACTOR OR SUB CONTRACTOR, PER I.B.C. SECTION 1704.1. THE SPECIAL INSPECTOR'S DUTIES REGARDING THE PORTIONS OF WORK ARE DESCRIBED IN CHAPTER 17 OF THE I.B.C. THE SPECIAL INSPECTOR SHALL BE A QUALIFIED PERSON WHO SHALL DEMONSTRATE COMPETENCE, TO THE SATISFACTION OF THE BUILDING OFFICIAL, FOR INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION REQUIRING SPECIAL INSPECTION.
- PRIOR TO THE BEGINNING OF CONSTRUCTION, THE ARCHITECT (OR ENGINEER) SHALL CALL A PRE-CONSTRUCTION MEETING WITH THE ARCHITECT, ENGINEER OF RECORD, THE CONTRACTOR AND SPECIAL INSPECTOR TO REVIEW THE SPECIAL INSPECTION REQUIREMENTS. THE STRUCTURAL OBSERVATION REQUIREMENTS SHALL ALSO BE DISCUSSED DURING THIS MEETING.
 - DUTIES OF THE SPECIAL INSPECTOR TO INCLUDE, BUT ARE NOT LIMITED TO:
 - ACKNOWLEDGE THE SPECIAL INSPECTION PROGRAM AND THE SPECIAL INSPECTION AND TESTING AGREEMENT, PROVIDED BY THE LOCAL JURISDICTION.
 - THE SPECIAL INSPECTOR SHALL OBSERVE THE WORK FOR CONFORMANCE WITH THE APPROVED PERMIT DRAWINGS AND SPECIFICATIONS. ALL DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION, THEN, IF UNCORRECTED, TO THE ENGINEER AND TO THE BUILDING OFFICIAL.
 - THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS FOR EACH INSPECTION TO THE BUILDING OFFICIAL, ARCHITECT, ENGINEER, CONTRACTOR AND (OTHER DESIGNATED PARTIES), IN A TIMELY MANNER, AS ESTABLISHED AT THE PRE-CONSTRUCTION MEETING.
 - THE SPECIAL INSPECTOR SHALL SUBMIT A FINAL REPORT STATING WHETHER THE WORK REQUIRING SPECIAL INSPECTION WAS INSPECTED, AND WHETHER THE WORK IS IN GENERAL CONFORMANCE WITH THE APPROVED PERMIT DRAWINGS AND SPECIFICATIONS AND THE APPLICABLE WORKMANSHIP PROVISIONS OF THE INTERNATIONAL BUILDING CODE.
 - DUTIES OF THE CONTRACTOR INCLUDE, BUT ARE NOT LIMITED TO:
 - NOTIFY THE SPECIAL INSPECTOR THAT THE WORK IS READY FOR INSPECTION AT LEAST 24 HOURS BEFORE SUCH INSPECTION.
 - ALL WORK REQUIRING SPECIAL INSPECTION SHALL REMAIN ACCESSIBLE AND EXPOSED UNTIL IT HAS BEEN OBSERVED AND INDICATED TO BE IN CONFORMANCE BY THE SPECIAL INSPECTOR AND APPROVED BY THE BUILDING OFFICIAL.
 - PROVIDE THE SPECIAL INSPECTOR WITH ACCESS TO APPROVED PERMIT DRAWINGS AND SPECIFICATIONS AT THE JOB SITE.
 - MAINTAIN AT THE JOB SITE, COPIES OF ALL REPORTS SUBMITTED BY THE SPECIAL INSPECTOR.
 - TESTS OF EXISTING CONCRETE WALLS:
 - DETERMINE TYPICAL EXISTING CONCRETE WALL REINFORCING USING NON-DESTRUCTIVE METHODS. NOTE THAT WALLS WERE BOARD FORMED AND HAVE EMBEDDED FORM TIES.
 - PARAPET WALLS. TYPICAL BAR SPACING AND APPROXIMATE SIZE (IF PRESENT). TEST AT (3) LOCATIONS MINIMUM, INCLUDING TALL FRONT PARAPET.
 - GROUND LEVEL COURTYARD WALLS. TYPICAL BAR SPACING AND APPROXIMATE SIZE (IF PRESENT). ALSO DETERMINE TYPICAL REINFORCING AT WINDOW JAMBS, HEAD AND SILLS. TEST AT (2) LOCATIONS MINIMUM.
 - ESTIMATE EXISTING CONCRETE STRENGTH USING NON-DESTRUCTIVE METHODS.
 - PARAPET WALLS, (3) LOCATIONS MINIMUM.
 - GROUND LEVEL COURTYARD WALLS, (2) LOCATIONS MINIMUM.
 - ADHESIVE ANCHORS INSTALLED IN CONCRETE AND MASONRY TO BE TESTED AS FOLLOWS:
 - FIVE PERCENT OF ANCHORS TO BE TESTED IN TENSION TO A LOAD OF 4000# (CONCRETE) AND 3000# (MASONRY). HOLD LOAD FOR 5 MINUTES. TEST REPORT TO INCLUDE:
 - TEST LOCATIONS
 - BOLT MOVEMENT/ELONGATION
 - EMBEDMENT DEPTH
 - APPLIED LOAD
 - IF FAILURES OCCUR, ADDITIONAL TESTS, OF MULTIPLE SUCCESSIVE ANCHORS, WILL BE REQUIRED AT CONTRACTOR'S EXPENSE.

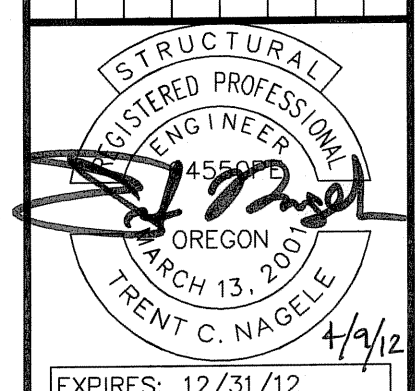
SEISMIC UPGRADE SUMMARY

THESE DRAWINGS AND ATTACHED STRUCTURAL CALCULATIONS ARE PROVIDED FOR A VOLUNTARY SEISMIC UPGRADE OF THE ROOF DIAPHRAGM AND ASSOCIATED WALL ANCHORAGE FOR PSU'S BLACKSTONE RESIDENCE HALL.

ORIGINAL DRAWINGS FOR THE STRUCTURE COULD NOT BE LOCATED, THOUGH WE UNDERSTAND THAT THE BUILDING WAS BUILT IN 1931. BASED ON OUR OBSERVATIONS AND LIMITED INVESTIGATION OF THE STRUCTURE, AS-BUILT ROOF FRAMING PLANS HAVE BEEN CREATED FOR THIS UPGRADE. BUILDING CONSTRUCTION IS UNDERSTOOD TO INCLUDE THE FOLLOWING: CAST-IN-PLACE, BOARD FORMED EXTERIOR CONCRETE WALLS. BRICK VENEER IS PRESENT ON (3) SIDES. INTERIOR FRAMING HAS WOOD FLOORS WITH SHEATHING OVER 2X JOISTS, AND TIMBER BEAMS AND POSTS. THE ROOF IS FRAMED WITH 2X CEILING JOISTS SUPPORTING INTERMEDIATE 2X PONY WALLS, ADDITIONAL 2X JOISTS AND STRAIGHT SHEATHING. THE BUILDING IS 'U' SHAPED WITH A LONG NARROW COURTYARD.

VLMK HAS PROVIDED STRUCTURAL CALCULATIONS AND DRAWINGS TO UPGRADE STRUCTURAL DEFICIENCIES FOR THE FOLLOWING ELEMENTS USING A LIFE-SAFETY PERFORMANCE OBJECTIVE WITH THE NOTED DESIGN CRITERIA.

- STRENGTHEN THE EXISTING STRAIGHT SHEATHED DIAPHRAGM BY PROVIDING A PLYWOOD DIAPHRAGM OVERLAY AND NEW DIAPHRAGM CHORDS. (ASCE 41-06 DESIGN CRITERIA)
- ANCHOR EXTERIOR WALLS TO THE ROOF DIAPHRAGM WITH CONTINUOUS BUILDING CROSS TIES AND DEVELOPMENT OF SUB-DIAPHRAGMS. (ASCE 7-05 DESIGN CRITERIA)
- BRACE TALL PARAPET WALLS WHERE REQUIRED (ASCE 7-05 DESIGN CRITERIA)

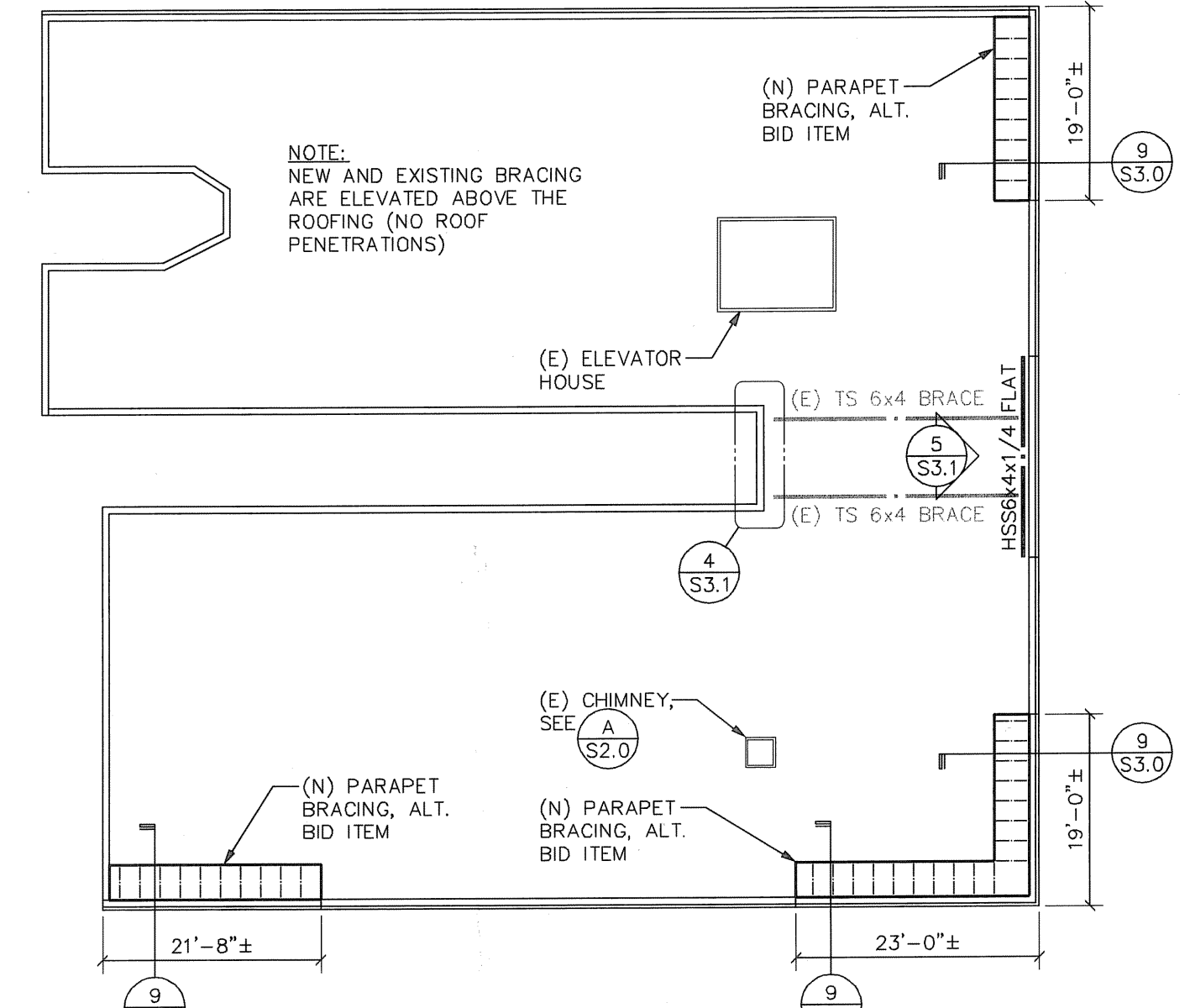
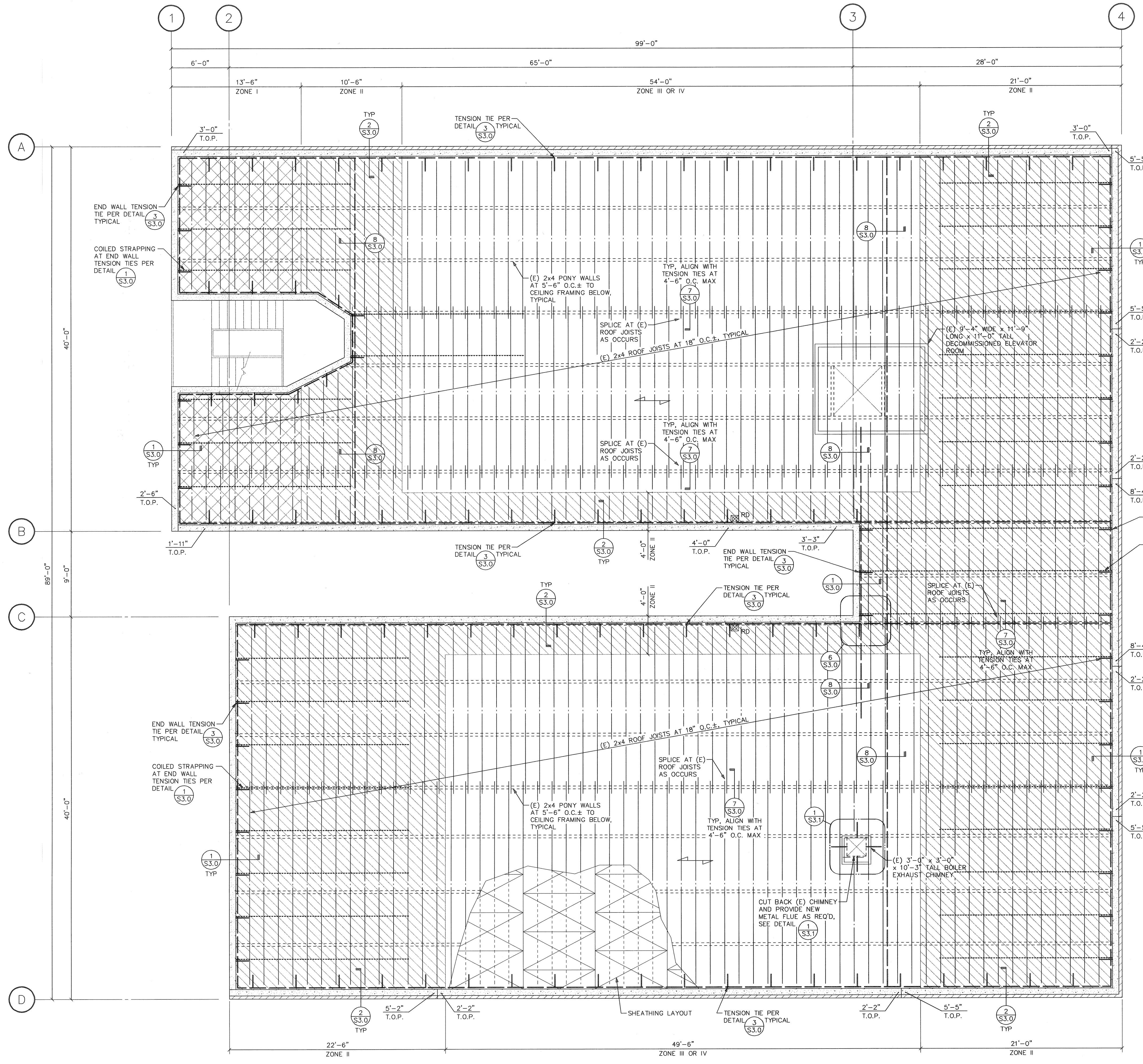


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**PSU BLACKSTONE RESIDENCE HALL
ROOF SEISMIC UPGRADE**
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STRUCT. NOTES & SPECIAL INSP.

DATE	MARCH 2012
SCALE	PROJ. NO.
NOTED	20120068
DRAWN	CHECKED
M, JL	TCN
SHEET NO.	
S1.0	



PARAPET AND CHIMNEY BRACING PLAN
1/16" = 1'-0"

ROOF FRAMING LEGEND:

- (E) EXISTING CONDITION
- (N) NEW CONDITION
- EXISTING 8" CONCRETE WALL
- EXISTING 8" CONCRETE WALL WITH BRICK VENEER
- EXISTING STRUCTURAL BEARING PONY WALL BELOW
- (N) LEDGER AND/OR CHORD PER DETAILS (S3.0) AND (S3.0)
- SPAN OF EXISTING 1" x 8" STRAIGHT SHEATHING
- RD LOCATION OF EXISTING ROOF DRAIN (VERIFY)
- X-XX TOP OF EXISTING PARAPET ELEVATION ABOVE ROOFING
- (N) COILED STRAPPING, SEE (S3.0) FOR ADDITIONAL INFORMATION
- (N) TENSION TIE, SEE (S3.0) FOR ADDITIONAL INFORMATION

ROOF FRAMING NOTES:

1. DIMENSIONS SHOWN FOR THE EXISTING BUILDING ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY DIMENSIONS BEFORE RELYING ON THEM.
2. CONTRACTOR TO VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK. NOTIFY ENGINEER OF ANY DISCREPANCIES BEFORE PROCEEDING.
3. PLACE NEW PLYWOOD SHEATHING OVER EXISTING STRAIGHT SHEATHING AS FOLLOWS:
PROVIDE APA RATED EXPOSURE 1 PLYWOOD WITH A MINIMUM THICKNESS OF 15/32 AND A MINIMUM SPAN RATING OF S2/16. ORIENT STRONG AXIS OF SHEATHING PERPENDICULAR TO EXISTING 2x JOIST SUPPORT BELOW.
4. RIP SHEATHING TO ACCOMMODATE (E) JOIST SPACING OR PROVIDE 2x FLAT BLOCKING AT SHEATHING EDGES AS REQ'D.
5. SEE ROOF DIAPHRAGM FASTENER SCHEDULE FOR ATTACHMENT REQUIREMENTS. SOLID BLOCK ALL DIAPHRAGMS AS INDICATED.

ZONE	BOUNDARY EDGES	CONTINUOUS PANEL EDGES	OTHER PANEL EDGES	FIELD	SYMBOL	BLOCKING	SCHEDULE NOTES
I	3" (FHSD)	2 1/2" DOUBLE ROW	3" DOUBLE ROW	12"	[Symbol]	2x4 FLAT LSL SEE NOTE 2	A & B
II	3" (FHSD)	2"	3"	12"	[Symbol]	2x4 FLAT	A
III	4" (FHSD)	4"	6"	12"	[Symbol]	2x4 FLAT	A
IV	4" (FHSD)	2 1/2" STAPLES	4" STAPLES	12"	[Symbol]	(E) STRAIGHT SHEATHING	A

SCHEDULE NOTES:

- A. FASTENERS:
SHEATHING TO WOOD: (TYPICAL) 10d COMMON OR GALVANIZED BOX NAILS. MINIMUM FASTENER PENETRATION OF 1 1/2" INTO THE FRAMING MEMBER AND BLOCKING IS REQUIRED.
-OR- SIMPSON "SNS1L" COLLATED WOOD SCREWS (ESR-1472) MINIMUM FASTENER PENETRATION OF 1 1/4" INTO THE FRAMING MEMBER AND BLOCKING IS REQUIRED.
- SHEATHING TO WOOD: (ZONE IV ONLY) 1 1/2" 16 GA STAPLES WITH A MINIMUM CROWN WIDTH OF 7/16". INSTALL WITH CROWNS PARALLEL TO THE LONG DIMENSION OF THE FRAMING MEMBERS.
- SHEATHING TO STEEL: (BOUNDARY LEDGER ANGLE) SIMPSON "FHSD" COLLATED SELF-DRILLING SCREWS, #8 SHANK DIA x 1 1/4" LONG (FHSD114S0818).
- B. MINIMUM 3" NOMINAL WIDTH OF NAILED FACE AT ADJOINING PANEL EDGES AND BOUNDARIES. PROVIDE ADDITIONAL 3x FRAMING PARALLEL TO (E) 2x JOISTS AT PANEL EDGES AND 1 1/2" x 3 1/2" FLAT LSL BLOCKING PERPENDICULAR TO (E) JOISTS AT PANEL EDGES.

ROOF FRAMING PLAN
3/16" = 1'-0"

NO.
DATE

REVISIONS

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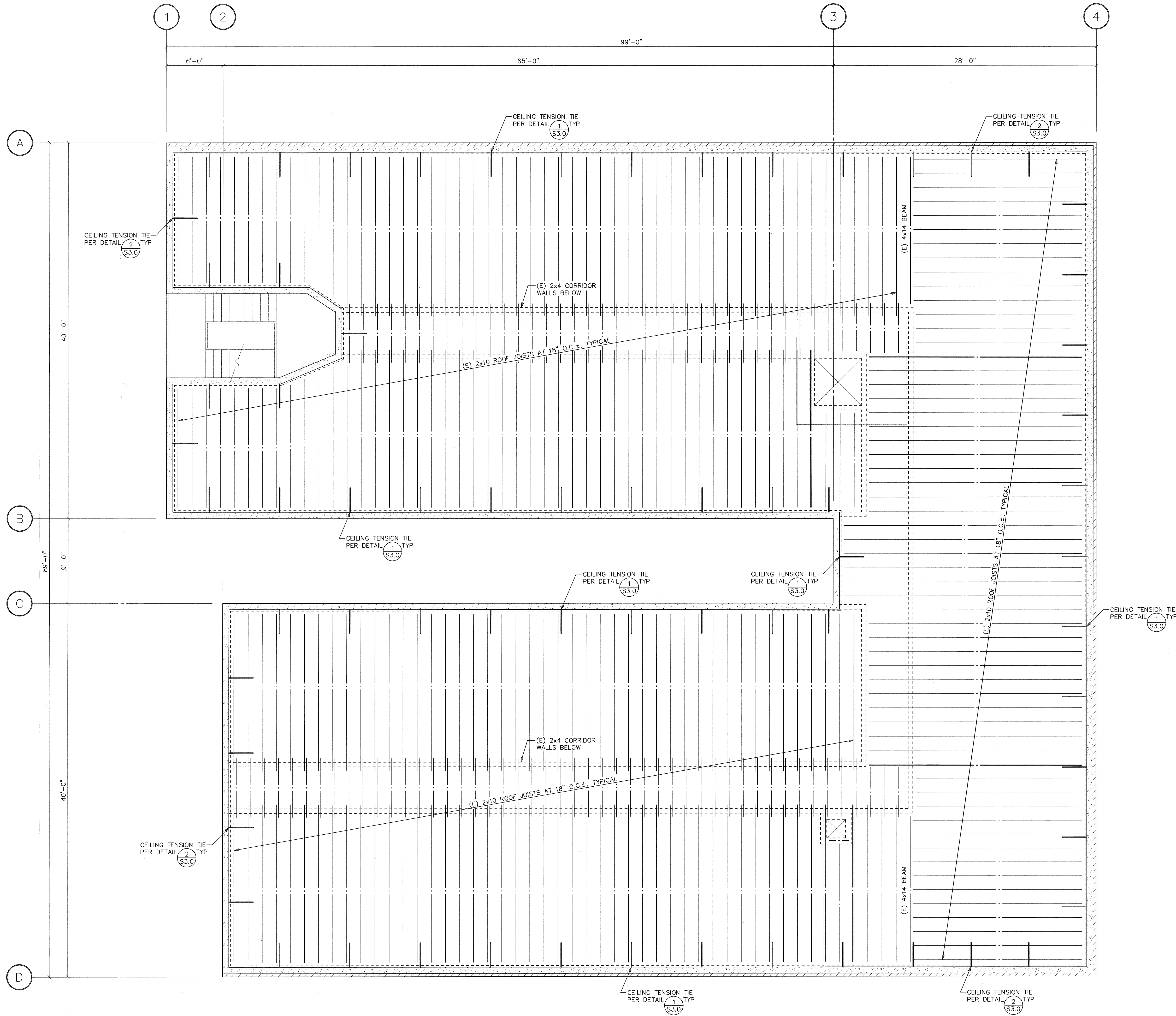
ROOF FRAMING PLAN

DATE: MARCH 2012
SCALE: PROJ. NO. 20120068

NOTED
CHECKED

MJL
TCN

SHEET NO.
S2.0

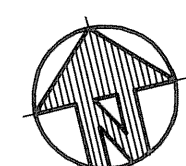


CEILING FRAMING LEGEND:

- (E) EXISTING CONDITION
- (N) NEW CONDITION
- EXISTING 8" CONCRETE WALL
- EXISTING 8" CONCRETE WALL WITH BRICK VENEER
- EXISTING STRUCTURAL BEARING WALL OR BEAM BELOW
- (N) TENSION TIE, SEE (1) AND (2) ADDITIONAL INFORMATION

CEILING FRAMING NOTES:

1. DIMENSIONS SHOWN FOR THE EXISTING BUILDING ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY DIMENSIONS BEFORE RELYING ON THEM.
2. CONTRACTOR TO VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK. NOTIFY ENGINEER OF ANY DISCREPANCIES BEFORE PROCEEDING.



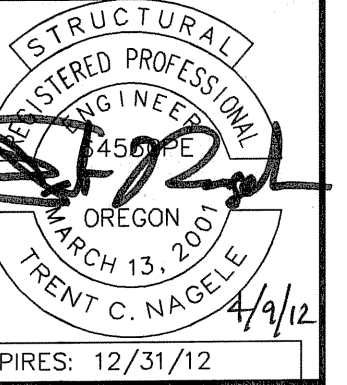
A
S2.1

CEILING FRAMING PLAN AT ROOF

3/16" = 1'-0"

REVISIONS

NO. DATE



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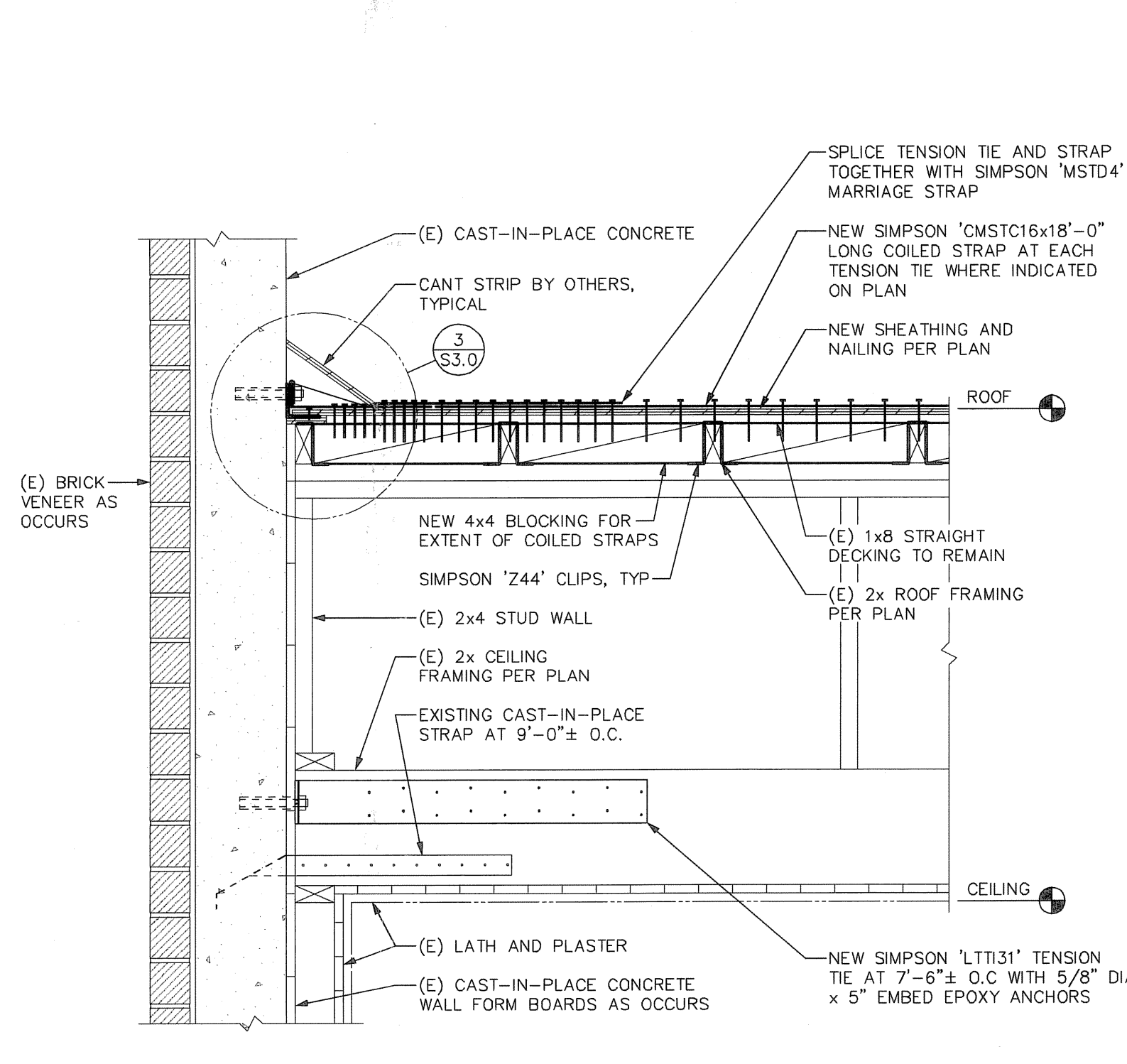
**PSU BLACKSTONE RESIDENCE HALL
 ROOF SEISMIC UPGRADE**

1831 SW PARK AVENUE
 PORTLAND, OREGON 97201

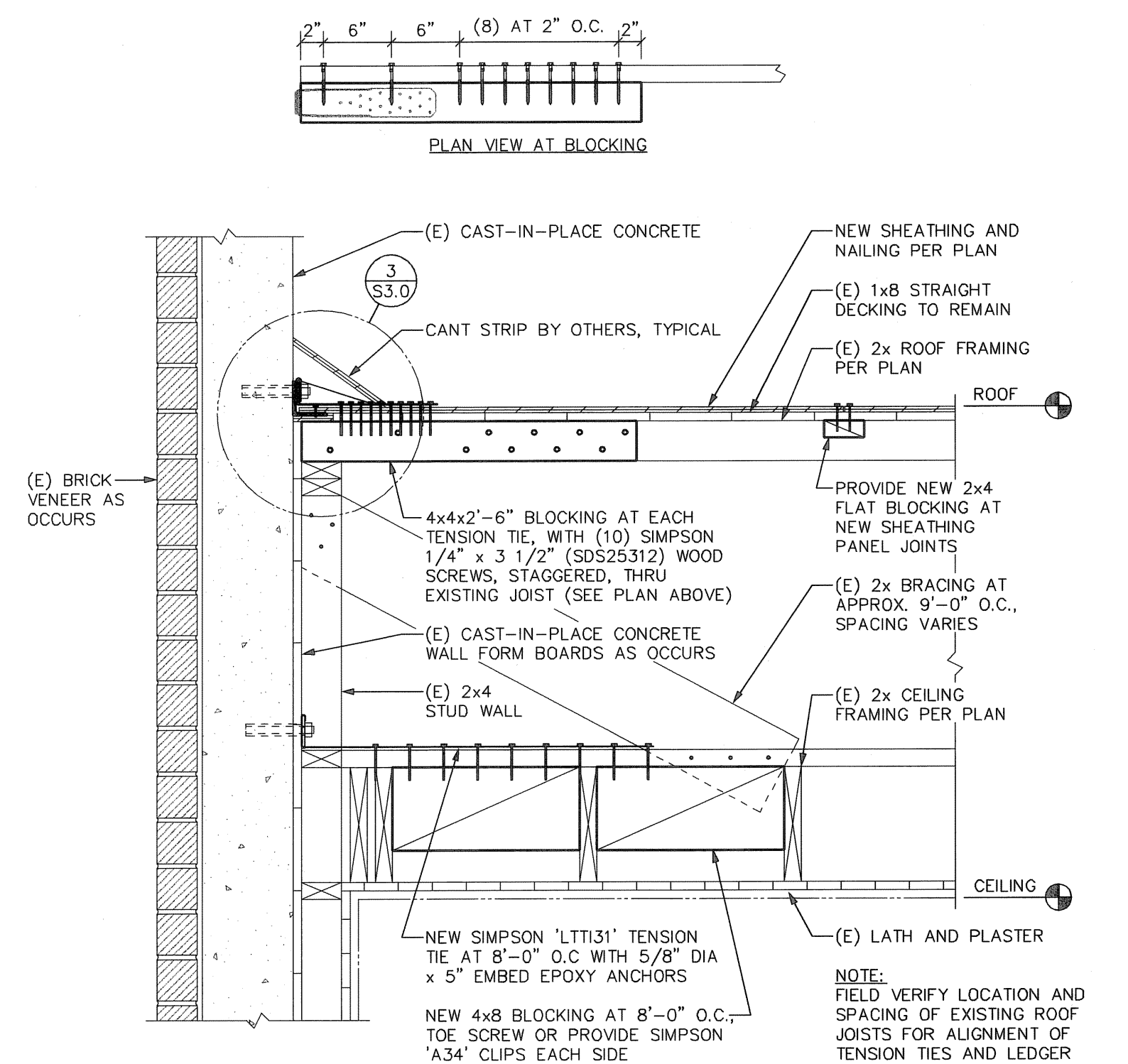
ROOF FRAMING PLAN

DATE	MARCH 2012
SCALE	PROJ. NO.
NOTED	20120068
DRAWN	CHECKED
M.JL	TCN

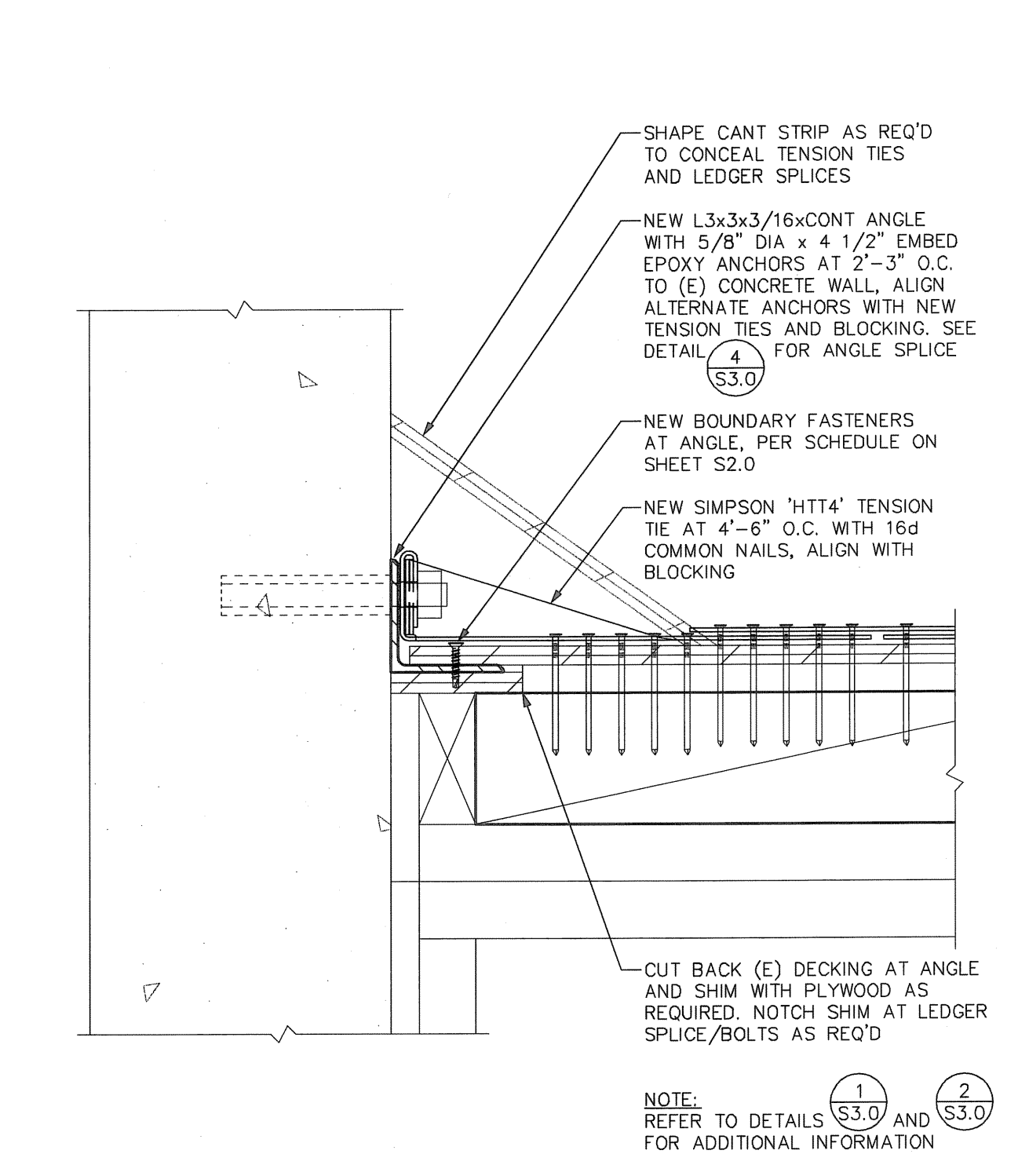
SHEET NO
S2.1
 OF



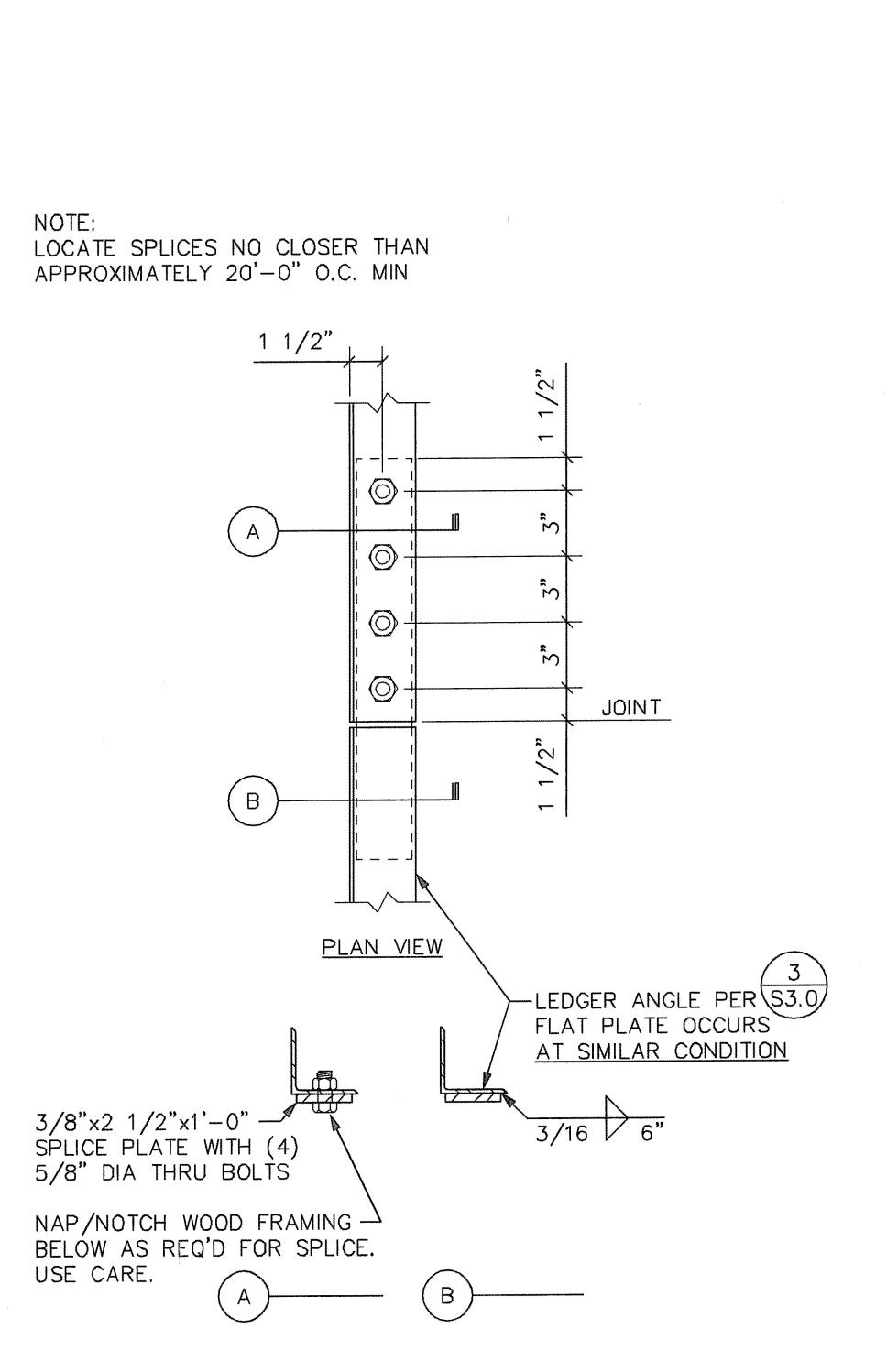
1 ROOF FRAMING DETAIL - PARALLEL
S3.0 S30-01.dwg 1" = 1'-0"



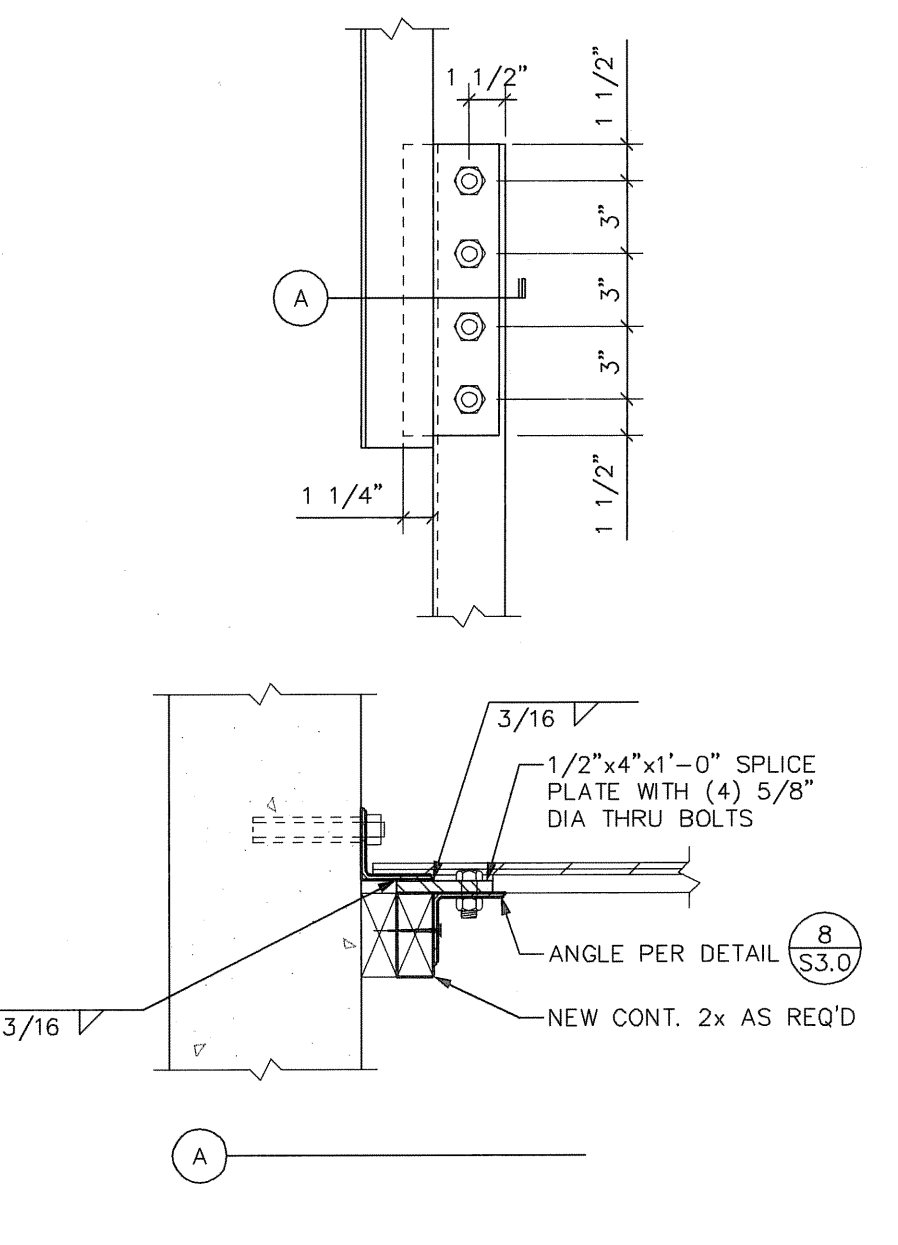
2 ROOF FRAMING DETAIL - PERPENDICULAR
S3.0 S30-02.dwg 1" = 1'-0"



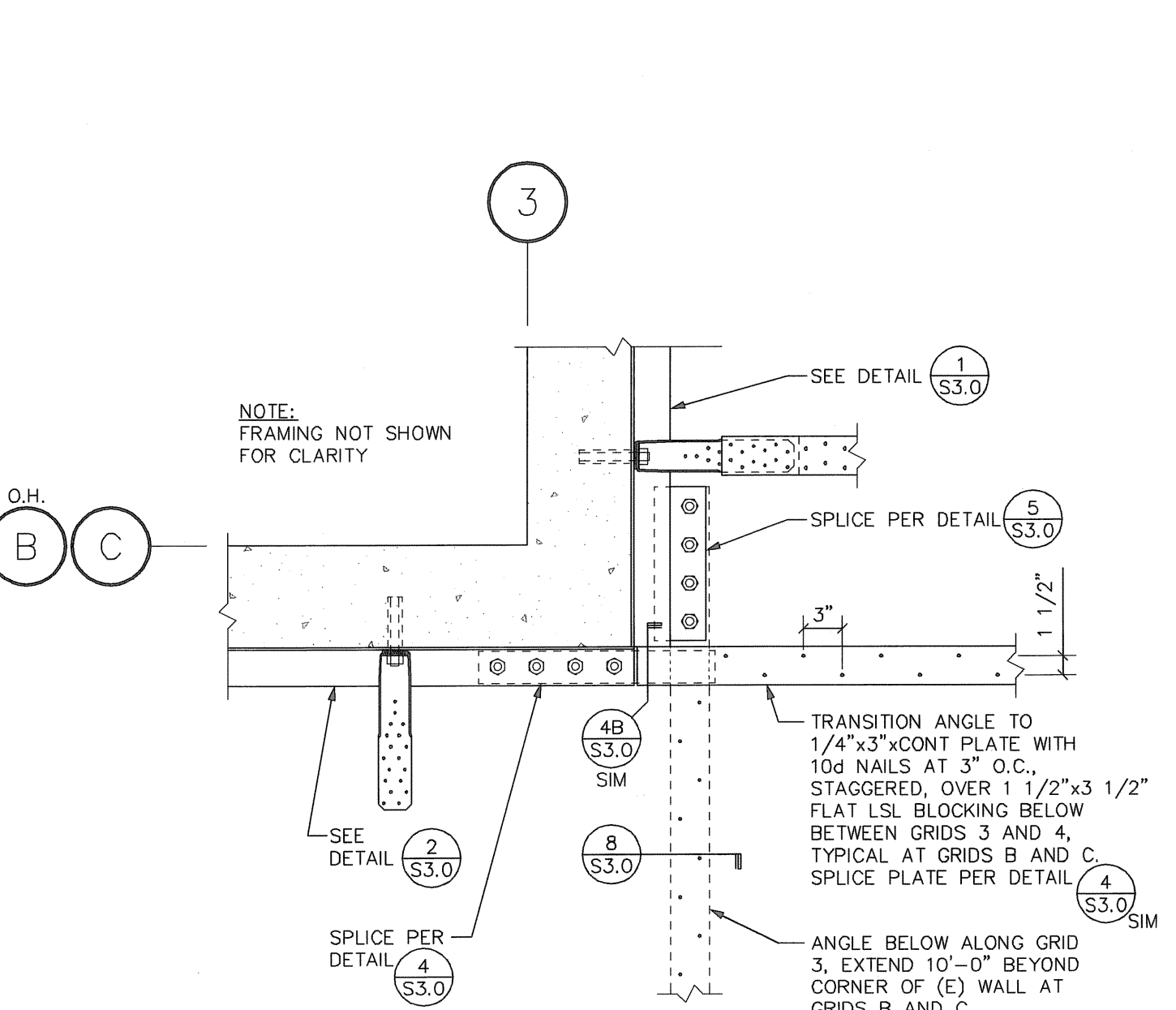
3 ROOF FRAMING DETAIL
S3.0 S30-03.dwg 3" = 1'-0"



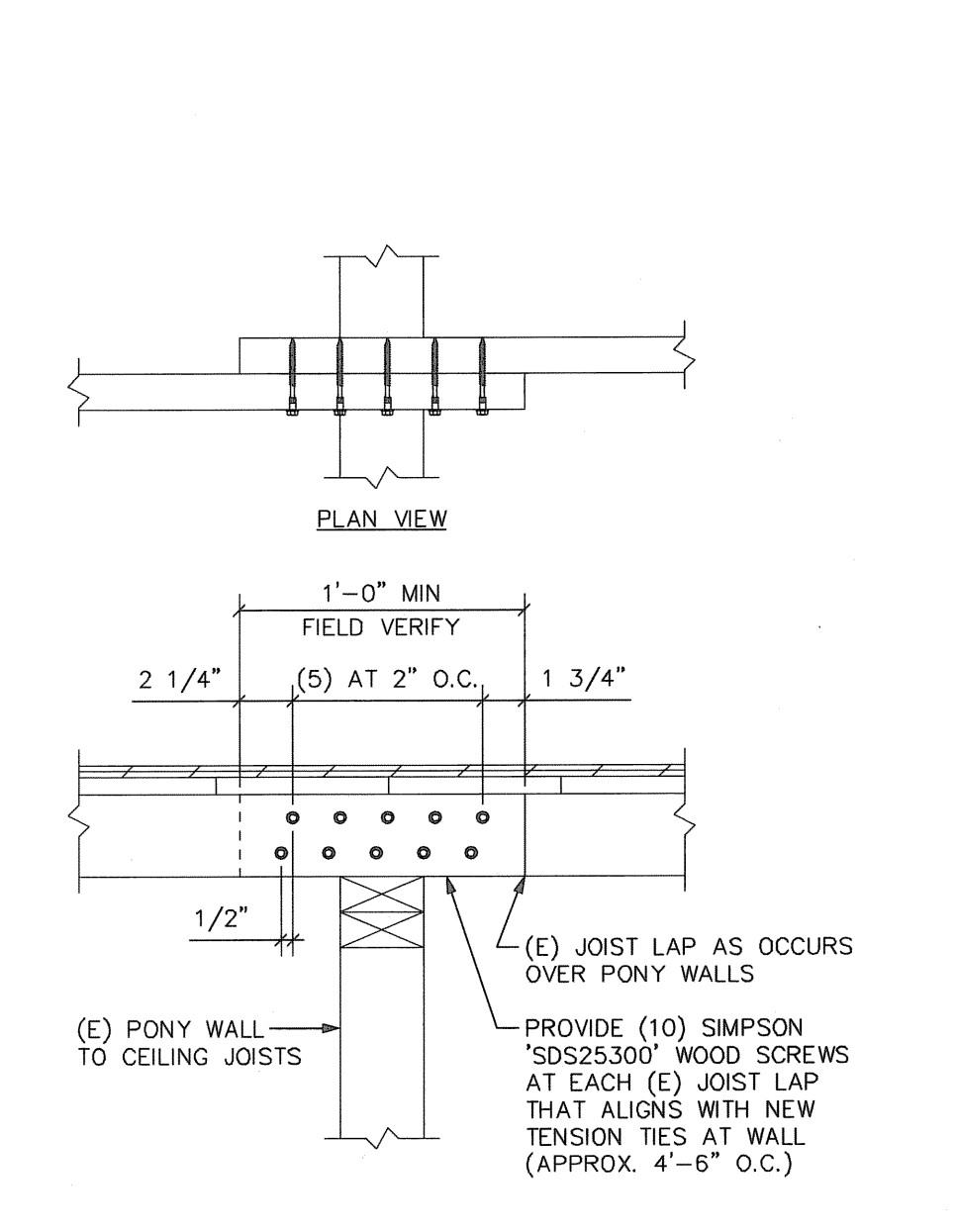
4 CHORD SPLICE DETAIL
S3.0 S30-04.dwg 1 1/2" = 1'-0"



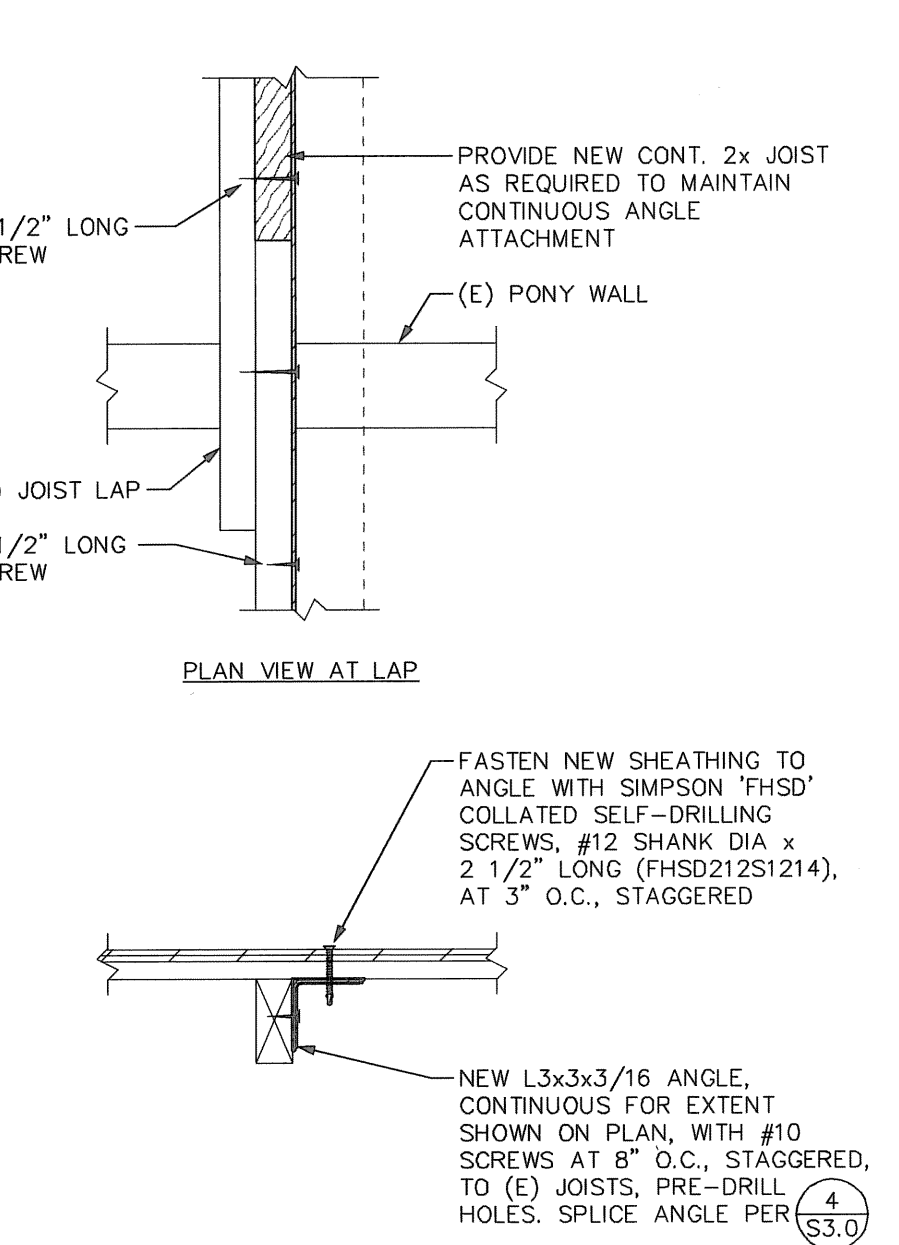
5 CHORD SPLICE DETAIL
S3.0 S30-05.dwg 1 1/2" = 1'-0"



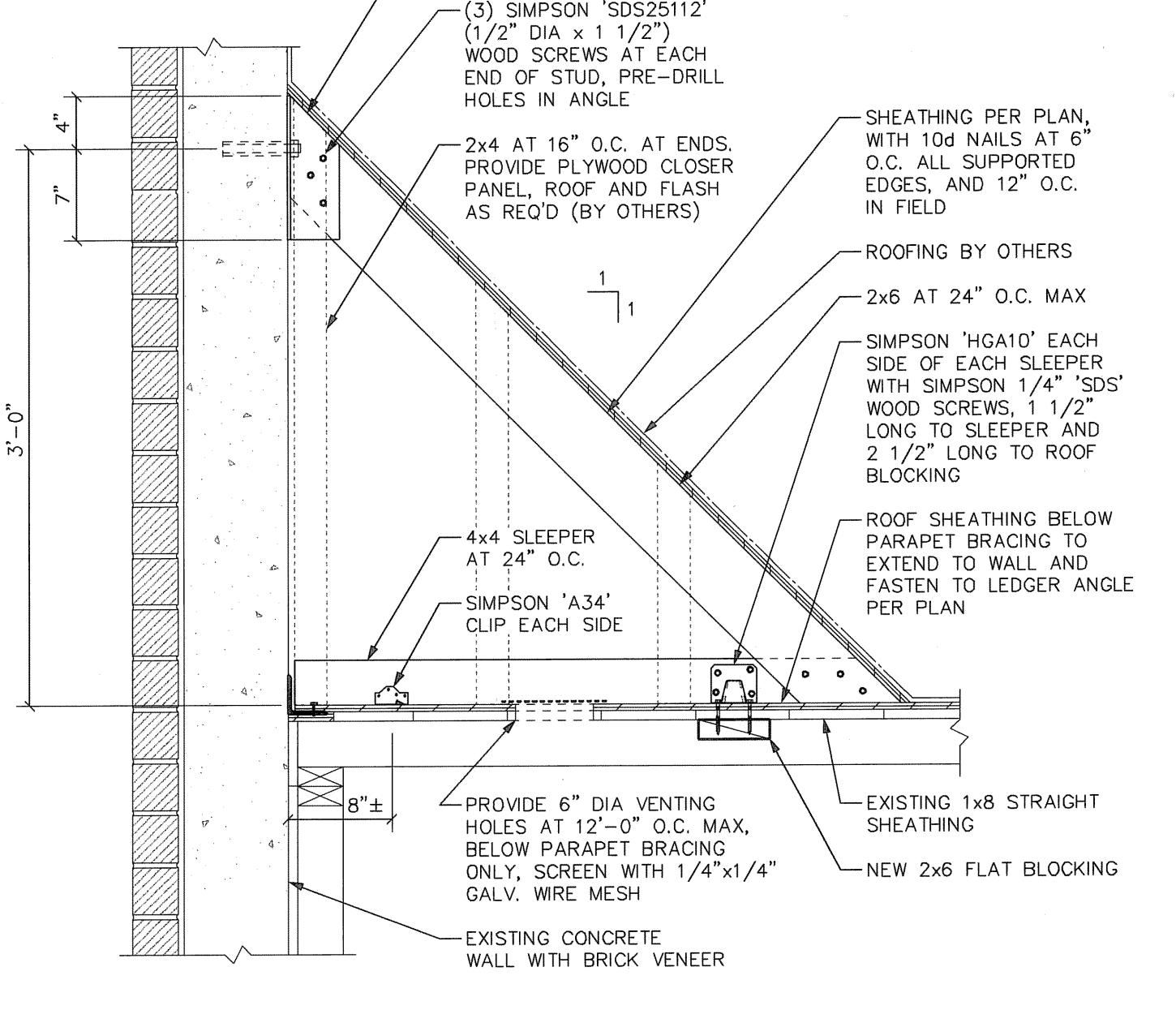
6 CHORD DETAIL - PLAN VIEW
S3.0 S30-06.dwg 1" = 1'-0"



7 CROSS TIE DETAIL
S3.0 S30-07.dwg 1 1/2" = 1'-0"



8 CHORD DETAIL
S3.0 S30-08.dwg 1 1/2" = 1'-0"



9 PARAPET BRACING DETAIL
S3.0 S30-09.dwg 1" = 1'-0"

ALTERNATE BID ITEM

REVISIONS

NO. DATE

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER OREGON STATE BOARD OF PROFESSIONAL ENGINEERS MARCH 13, 2008 TRENT C. NAGLE 4/4/12 EXPIRES: 12/31/12

503.222.4453 503.248.9263 vlmk@vlmk.com www.vlmk.com

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3933 SW Kelly Avenue • Portland • Oregon 97239-4393

PSU BLACKSTONE RESIDENCE HALL ROOF SEISMIC UPGRADE 1831 SW PARK AVENUE PORTLAND, OREGON 97201

ROOF FRAMING DETAILS

DATE MARCH 2012

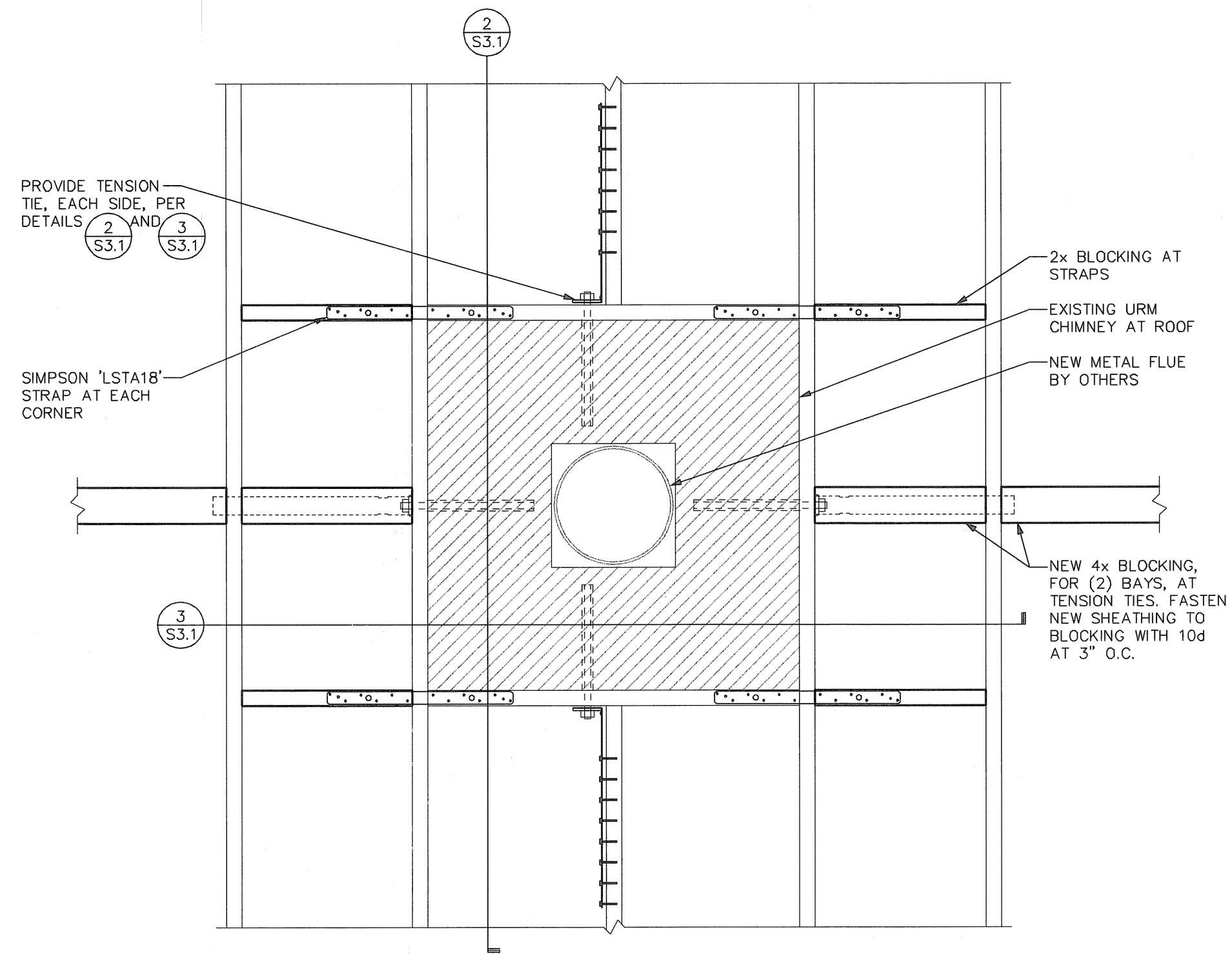
SCALE PROJ. NO. 20120068

NOTED

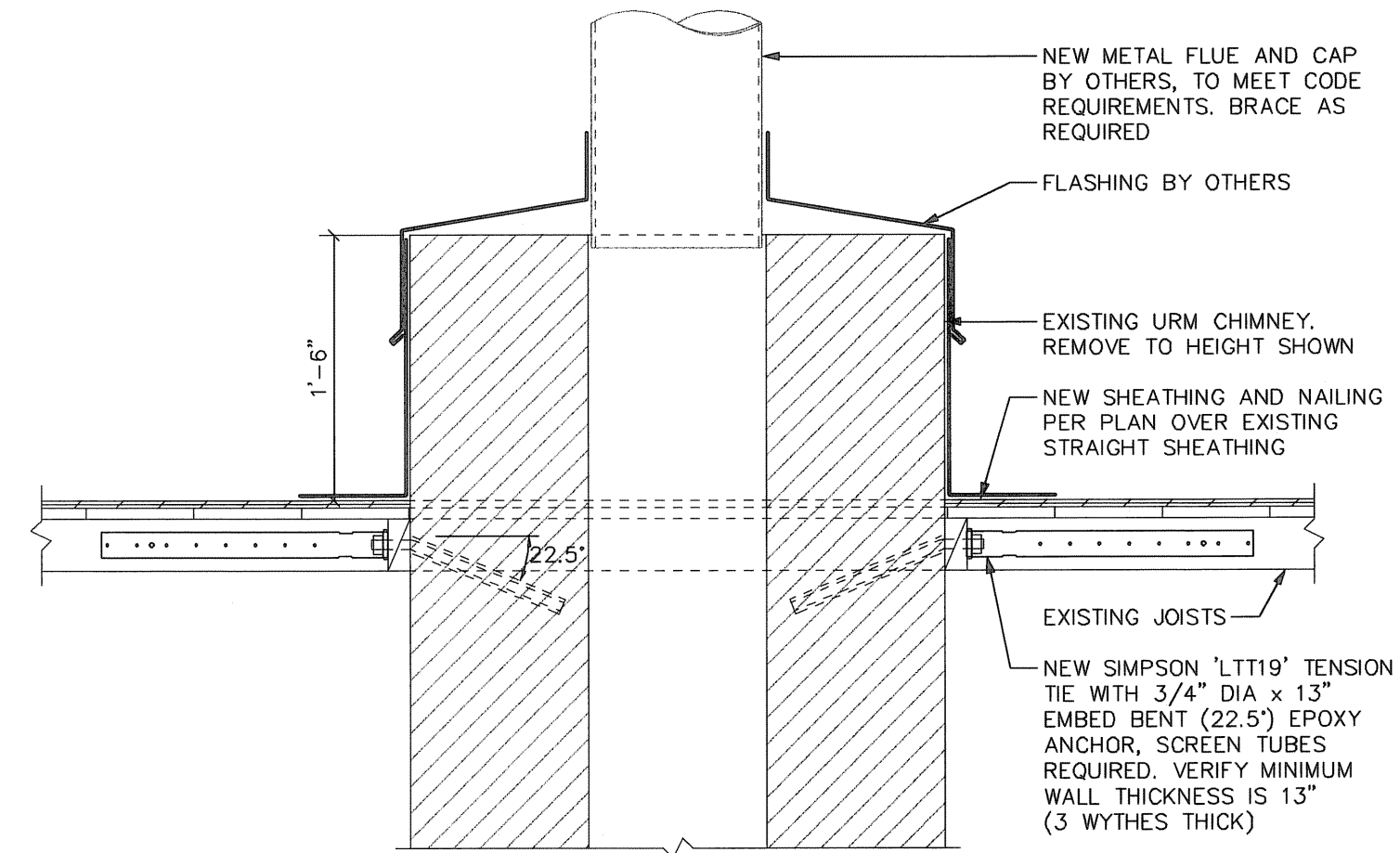
DRAWN M.J.L. CHECKED TCN

SHEET NO. S3.0

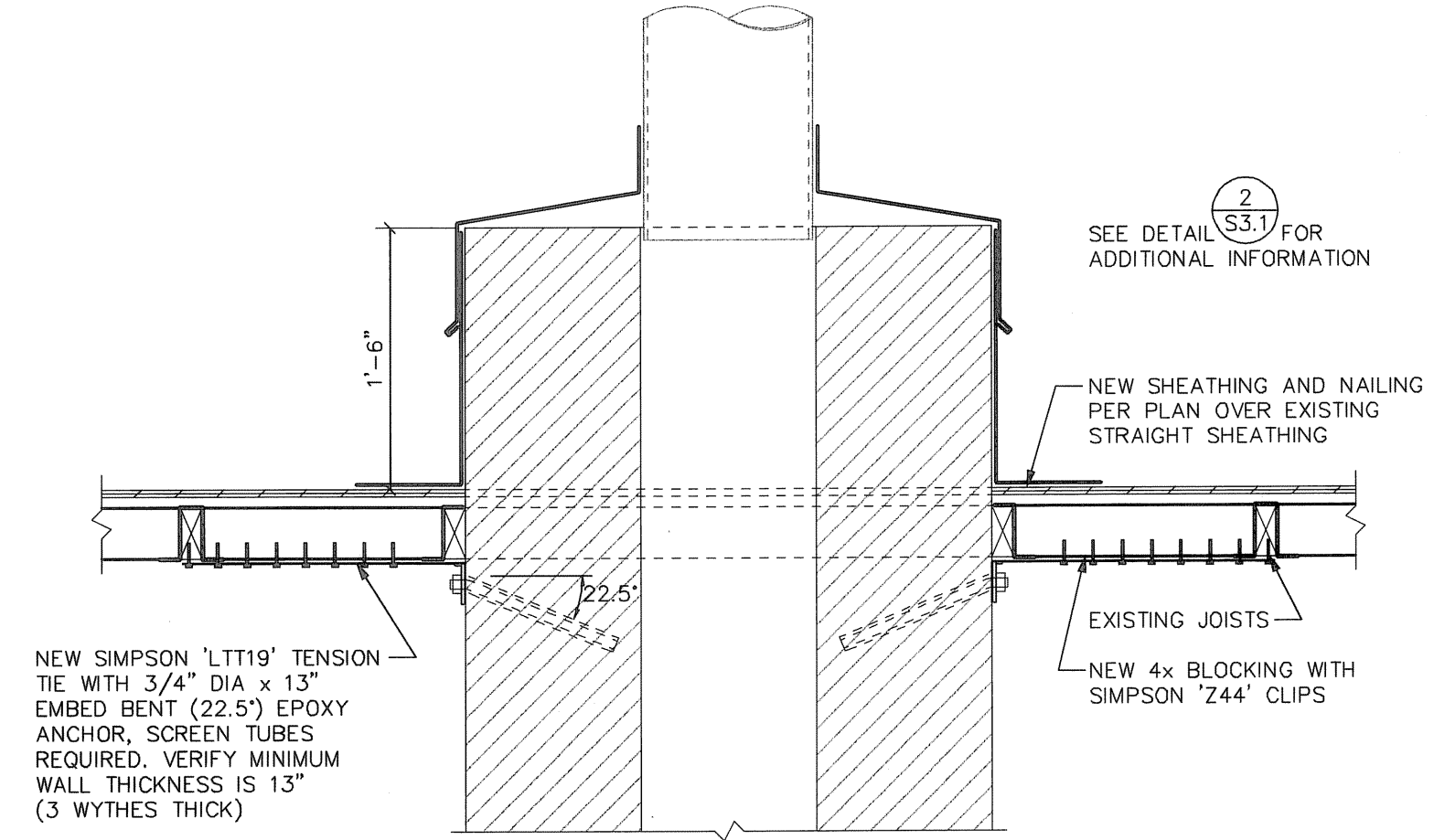
20120068 20120068-S30.dwg 09 Apr 2012 - 10:56 am mikel



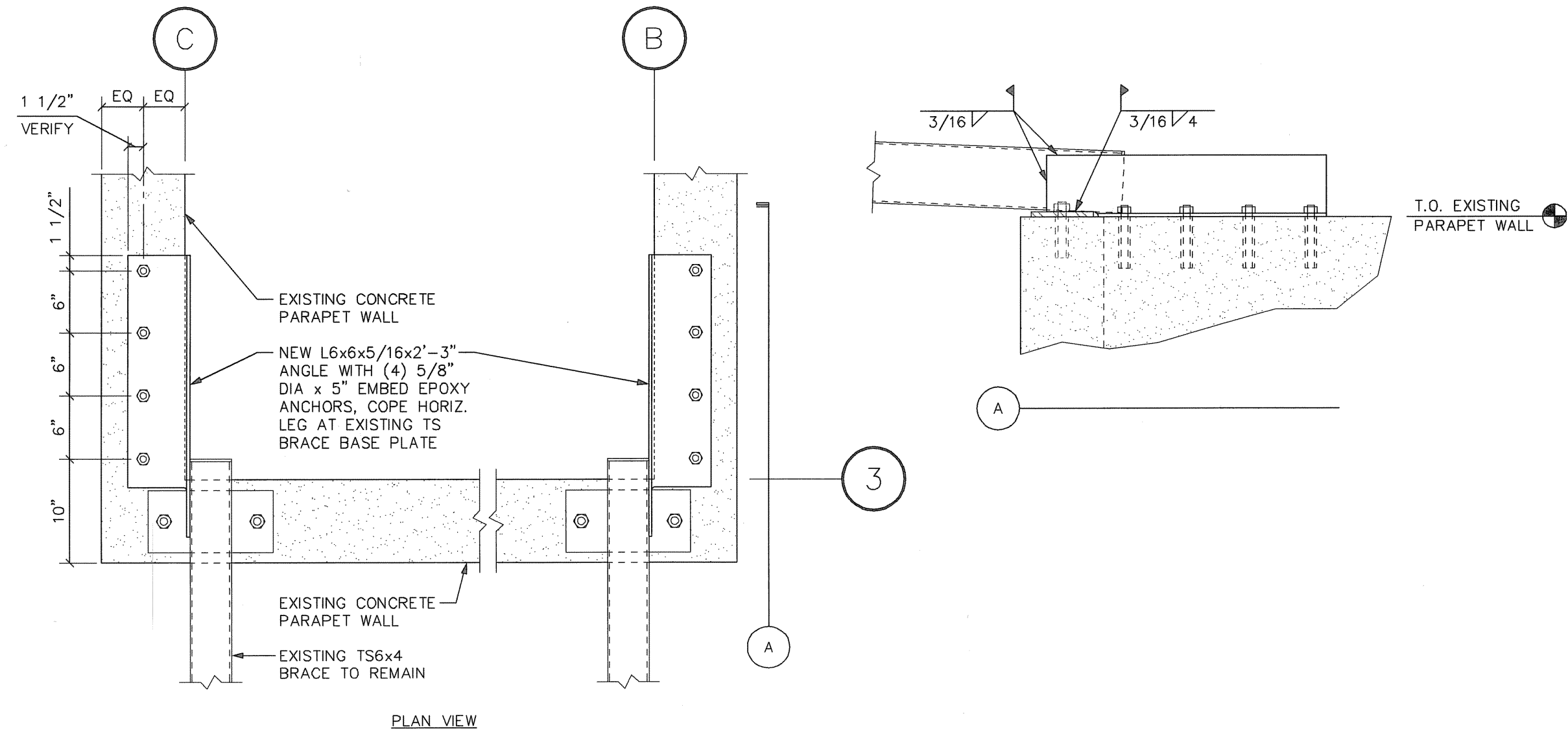
1 CHIMNEY SUPPORT DETAIL - PLAN VIEW
S3.1 S31-01.dwg 1" = 1'-0"



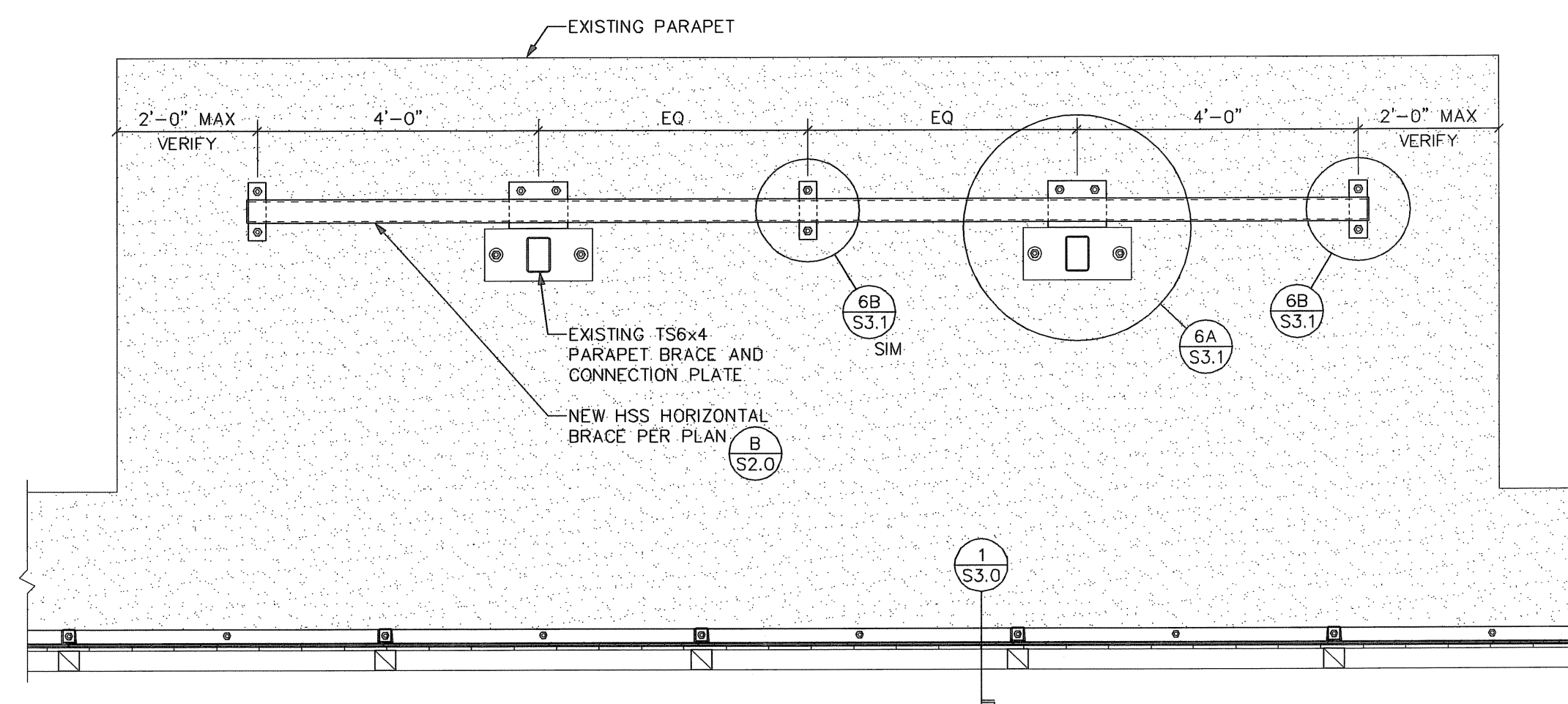
2 CHIMNEY SUPPORT DETAIL
S3.1 S31-02.dwg 1" = 1'-0"



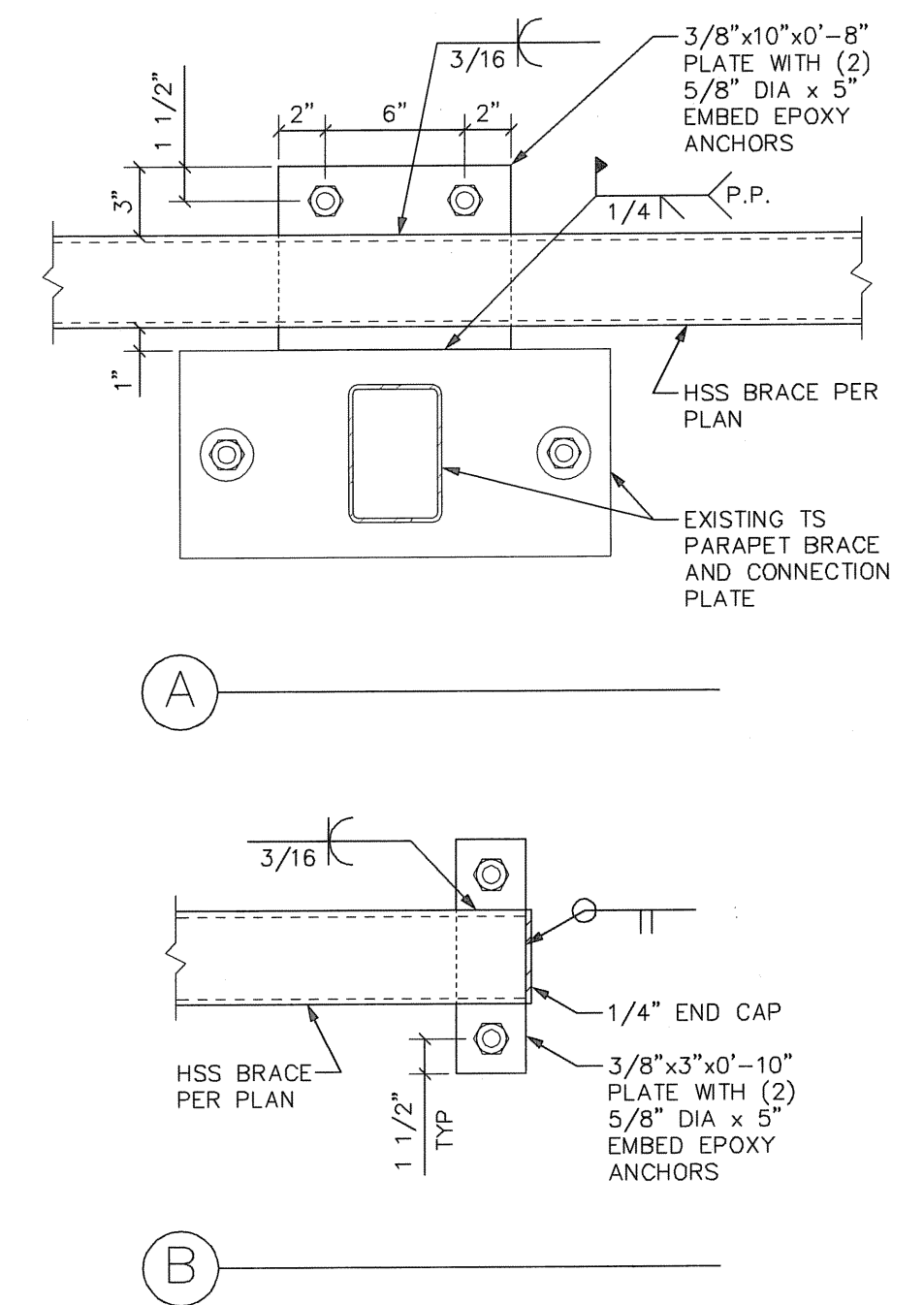
3 CHIMNEY SUPPORT DETAIL
S3.1 S31-03.dwg 1" = 1'-0"



4 BRACE CONNECTION DETAIL
S3.1 S31-04.dwg 1" = 1'-0"



5 PARAPET BRACE DETAIL
S3.1 S31-05.dwg 1/2" = 1'-0"



6 PARAPET BRACE DETAIL
S3.1 S31-06.dwg 1 1/2" = 1'-0"

NO.	DATE	REVISIONS

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER
 OREGON
 MARCH 13, 2006
 TRENT C. NAGELLE
 4/9/12
 EXPIRES: 12/31/12

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ROOF FRAMING DETAILS

DATE	MARCH 2012
SCALE	PROJ. NO.
NOTED	20120068
DRAWN	CHECKED
M.JL	TCN
SHEET NO.	S3.1