Addendum 3

Project No	**5437**	Date	**January 26, 2016**
Project	**Centre for Aquaculture and Environmental Research ROOF REPLACEMENT** 4160 Marine Drive West Vancouver, BC Department of Fisheries and Oceans - West Vancouver Laboratory		

The following supplements and/or supersedes the bid documents issued on January 15, 2016.

This Addendum forms part of the contract documents and is to be read, interpreted and co-ordinated with all other parts. The cost of all contained herein is to be included in the contract sum. The following revisions supersede the information contained in the original drawings and specifications issued for the above-named project to the extent referenced and shall become part thereof. Acknowledge receipt of this Addendum by inserting its number and date on the Tender Form. Failure to do so may subject the Bidder to disqualification.

Previous addendum:

- Addendum 2 dated January 21, 2016

Enclosure:

- Architectural & Structural Drawings
- Architectural Specifications
- Questions and Answers

Note: Architectural & Structural drawings included in this Addendum # 3.
No revisions/changes.

ARCHITECTURAL SPECIFICATIONS

07410 METAL ROOFING

2.2 Roofing Membranes and Underlayments:

Revise: .1 Self-adhesive air/vapour barrier under insulation:
Lastobond ~~Shield HT~~ 240 or 195 by Soprema, or approved alternate.

07530 EPDM ROOFING MEMBRANE

Issued: See attached "ONLY" for Roof 3.10 / Perimeter Gutter Repair

07540 SBS MODIFIED BITUMEN MEMBRANE

2.1 Insulation

Revise: .3 Tapered slope package as required.

.1 Description: Tapered insulation package made of Type IV extruded polystyrene insulation designed to create a two percent (2%) slope to the roof system.

REQUEST FOR ALTERNATES

1. Securock Gypsum Fiber Roof Board: Accepted (see Addendum # 2)
2. IKO Roofing Products: Not Accepted
3. Skylite Glazing Solution 400 Series: Not Accepted

Questions & Answers

Project No	**5437**	Date	**January 26, 2016**
Project	**Centre for Aquaculture and Environmental Research** **ROOF REPLACEMENT** 4160 Marine Drive West Vancouver, BC Department of Fisheries and Oceans - West Vancouver Laboratory		

1. **For Roof 3.10 - perimeter gutter repair:**

   1.1. **Are this targeted repairs or are they a complete removal of existing EPDM gutters and replacement with Alsan RS 230**
   It is not a targeted repair. Existing EPDM is to be removed and replaced/repaired all along its perimeter. Issued EPDM specification attached. Alsan RS 230, refers only to SBS Modified Bitumen Membrane gutters if applicable.

   1.2. **Detail 4/A302 indicates the metal to be properly reinstalled, these includes fascia and cap flashing, so there is no new metal to replace existing.**
   The intent is to reuse the existing gutter, fascia and cap flashing. New EPDM membrane is to run up roof/parapet/gutter to under flashing. If flashing is damaged when removing existing one to install new EPDM membrane, new ones should be provided.

2. **Roofing**

   2.1. **Are there records available that verify & confirm the existing roof assemblies?**
   All information required is included in the tender documents.

   2.2. **Have any cut tests been done to verify and confirm the existing conditions?**
   A roof audit and Inspection Report was made on March 24, 2015 by Tremco. As per the report, cut tests have been done for some roofs but cannot confirm they were done to verify all roofs.

   2.3. **The Modified Bitumen Membrane section under 3.6 Preparation Work Concrete Deck states that a concrete surface profile (CSP) of 3 to 6 is required. 3 being a light shot to 6 which is a heavy shot blast. Typically, grinding which is CSP 2 would be required if the existing membrane is an asphalt modified polyurethane or if fully glued EPDM is present, and or, subpar concrete conditions. Is it possible to get further clarification on what is required for surface preparation. We are of the opinion that the surface preparation requirements are too broad. For your convenience we have attached the following chart from the**

International Concrete Repair Institute listing the varied surface profiles.
Contact manufacturer for their recommended Concrete Surface Profile.

2.4. Are the roof access hatches to be replaced?
No, existing roof access hatches are to be re-used.

2.5. Scupper overflows were not specified, nor indicated on the drawings. Is your intent to allow new overflows? RCABC requires 3" per minimum standards. Coring would be required to increase the diameter should 2" overflows be present, and or, additional overflow holes to be added if none are present.
If existing, overflow scuppers were not identified / located. For bidding purposes, assume new 3" overflow scuppers to be provided per roof as per RCABC Standards. Location is to be determined during construction phase.

2.6. Please clarify on what type of tapered insulation is required?
See attached Addendum 3 for revised Specification Section 07540 SBS Modified Bitumen Membrane

3. Canopy

3.1. Can we have confirmation that the east side canopy is part of the scope.
No. See Addendum # 2 - Questions & Answers No. 20

3.2. Assuming that the east side canopy is in the scope, the specification asks for "Clear anodized aluminum". Can silver coloured powder coating be used as an alternate finish?
N/A

4. On Page 2 of Addendum 2 it states that the existing planter is to be removed and relocated as per DFO's directions. If I am not mistaken, the planter continues around the front of the building so my question is how much of the planter do we remove and will the relocation be done as an extra for the contract. "Relocated as per DFO's direction on-site" is a pretty vague statement to put a dollar value to.
Existing planter on top of Roof 3.8 should be removed up to Grid Line "A".

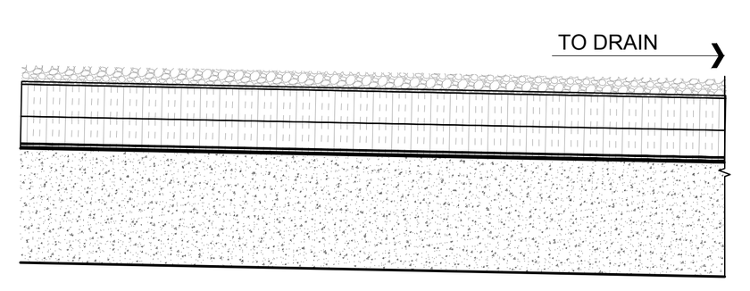
FISHERIES AND OCEANS CANADA
WEST VANCOUVER LABORATORY, BC
ROOF REPLACEMENT
MAIN LABORATORY, PUMP HOUSE

ISSUED FOR TENDER
Addendum #3
2016.01.26

DNA
project managers
planners
engineers
architects
David Nairne + Associates Ltd
Suite 250
171 West Esplanade
North Vancouver BC
CANADA V7M 3J9
T 604.984.3503
F 604.984.0627
E dna@davidnairne.com
W davidnairne.com

ROOF TYPE 1

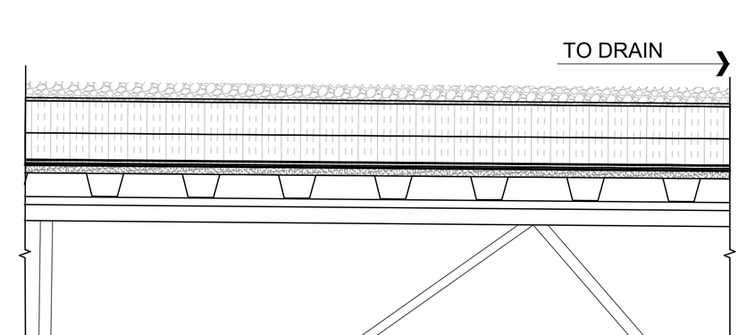
GRAVEL BALLAST ON
1 PLY DRAIN MAT ON
2 Layer LOOS LAID 2" XPS INSULATION (R-20 c.i.) ON
2 PLY SBS SYSTEM ON
EXISTING SLOPING CONCRETE SLAB



R1 ROOF ASSEMBLY
REQUIRED RATING FIRE: N/A STC: N/A

ROOF TYPE 2

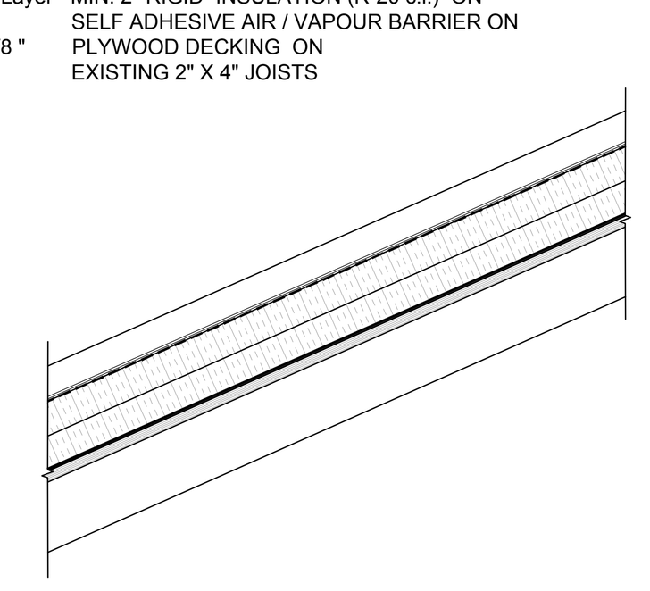
GRAVEL BALLAST
(LIMIT THE MAXIMUM WEIGHT TO 0.5 KPA (10 PSF)) ON (3)
1 PLY DRAIN MAT ON
2 Layer LOOSE LAID 2" XPS INSULATION (R-20 c.i.) /
TAPERED SLOPE PACKAGE AS REQUIRED TO PROVIDE
SLOPE OF MIN 2% ON (3)
2 PLY SBS MEMBRANE SYSTEM ON
1/2 " SUPPORT PANEL ON
EXISTING STEEL DECK ON
EXISTING STEEL JOISTS SLOPED TO DRAIN



R2 ROOF ASSEMBLY
REQUIRED RATING FIRE: N/A STC: N/A

ROOF TYPE 3

1 Layer PREFINISHED METAL ROOFING ON
1 Layer SLIP SHEET
2 Layer MIN. 2" RIGID INSULATION (R-20 c.i.) ON
SELF ADHESIVE AIR / VAPOUR BARRIER ON
5/8 " PLYWOOD DECKING ON
EXISTING 2" X 4" JOISTS

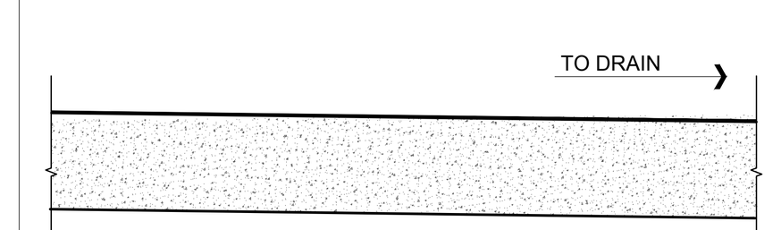


R3 ROOF ASSEMBLY
REQUIRED RATING FIRE: N/A STC: N/A

ROOF TYPE 4

WATERPROOFING ONE COMPONENT POLYURETHANE / BITUMEN RESIN WITH REINFORCEMENT MESH AT CRACKS

EXISTING SLOPING CONCRETE CANOPY



R4 ROOF ASSEMBLY
REQUIRED RATING FIRE: N/A STC: N/A

INSULATION REQUIREMENTS

ASHRAE STANDARD 90.1-2010
West Vanc., BC: Zone 5
HDD65 = 6054 | CDD50 = 1469

	REQUIRED			PROPOSED		
	NONRESIDENTIAL			NONRESIDENTIAL		
	Assembly Max.	R-Value	RSI-Value	Assembly Max.	R-Value	RSI-Value
Roof Insulation: Above Deck:	U-0.048	20 c.i.	3.52 c.i.	U-0.048	20 c.i.	3.52 c.i.

MATERIAL / FINISH SCHEDULE

1. FLASHING TO BE PREFINISHED METAL TO MATCH EXISTING COLOR.
2. CONTRACTOR TO PROVIDE COLOR / FINISH SAMPLES OF MATERIALS TO OWNER FOR APPROVAL BEFORE INSTALLATION. OWNER TO PROVIDE APPROVAL FOR COLOR / FINISH MATERIALS IN WRITING TO CONTRACTOR BEFORE INSTALLATION.
3. OWNER/TENANT TO SIGN-OFF/APPROVE MATERIALS, FINISHES AND SPECIFICATIONS BEFORE INSTALLATION.

GENERAL NOTES

1. ALL LABOUR, MATERIALS, AND PRODUCTS TO COMPLY WITH THE REQUIREMENTS OF BCBC 2012, THE LOCAL BYLAWS AND ALL OTHER APPLICABLE CODES, STANDARDS AND REGULATIONS.
2. ALL DIMENSIONS ARE TO FACE OF CONCRETE, FACE OR CENTRE OF STUDS FOR EXTERIOR WALLS, OR CENTER OF STUDS FOR GWB FACED WALLS UNLESS NOTED OTHERWISE.
3. PROVIDE CLASS A, B, OR C ROOFING AS REQUIRED, TO RCABC STANDARDS.
4. BUILDING CODE, SAFETY STANDARDS, AND REGULATORY STATUTE REFERENCES ON DRAWINGS ARE FOR AUTHORITY REVIEW PURPOSES ONLY. THE PRESENCE OF THE AFOREMENTIONED NOTES DOES NOT RELEASE THE CONTRACTOR AND ALL OTHERS INVOLVED IN THE CONSTRUCTION OF THE PROJECT FROM THEIR LEGAL AND STATUTORY RESPONSIBILITY TO CONFORM TO THE LAW OF THE LAND IN CONSTRUCTING AND THE CONSTRUCTION OF THE BUILDING.
5. NOTES "SEE STRUCTURAL", "SEE MECHANICAL", "SEE ELECTRICAL" ON DRAWINGS ARE NOT MEANT TO IMPLY COORDINATION OR DELEGATE RESPONSIBILITY FOR AN ITEM TO A SPECIFIC TRADE OR SUPPLIER. THESE NOTES REFER ONLY TO OTHER DRAWINGS WHERE MORE INFORMATION ON THE ITEM MAY BE OBTAINED. COORDINATION AND DELEGATION OF SUPPLYING AND INSTALLING A MATERIAL OR PRODUCT IS THE PEROGATIVE OF THE CONTRACTOR (CONSTRUCTION MANAGER) OR A LOCAL UNION JURISDICTION.
6. CONTRACTOR IS TO BE RESPONSIBLE FOR CORRECT LOCATION AND SITING OF ALL PROPOSED STRUCTURES, EQUIPMENT AND FACILITIES. ALL FORM LOCATIONS ARE TO BE VERIFIED BY A BCLS BEFORE CASTING CONCRETE. CONTRACTOR IS TO NOTIFY DNA OF ANY CONFLICTS OR DISCREPANCIES ENCOUNTERED ON THE PLANS IN REGARDS TO ACTUAL SITE CONDITIONS.
7. ALL BASE INFORMATION ON THE ROOF PLAN HAS BEEN OBTAINED FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. DNA ASSUMES NO RESPONSIBILITY FOR ANY ERRORS OR OMISSIONS IN ANY DATA SHOWN.
8. STRUCTURAL AND NON-STRUCTURAL ELEMENTS:
   - 8.1. DNA IS NOT RESPONSIBLE FOR STRUCTURAL DESIGN AND THE DESIGN OF NON STRUCTURAL OR SECONDARY STRUCTURAL ELEMENTS AND THEIR CONNECTIONS TO THE PRIMARY STRUCTURAL ELEMENTS. THESE ELEMENTS INCLUDE BUT ARE NOT LIMITED TO:
     - 8.1.1. ALL GLAZED COMPONENT SYSTEMS INCLUDING WINDOW & SKYLIGHT UNITS, STOREFRONT AND CURTAINWALL SYSTEMS, CANOPIES AND GUARDRAILS.

GENERAL NOTES

     - 8.1.2. ATTACHED AND FREE-STANDING SIGNAGE STRUCTURES.
     - 8.1.3. ROOFING, INSULATION & WALL CLADDING SYSTEMS.
     - 8.1.4. INTERIOR NON-LOADBEARING PARTITIONS.
     - 8.1.5. LOUVERS & GRILLES.
     - 8.1.6. PROPRIETARY GUARD, ROOF ACCESS LADDERS & SCUTTLES.
   - 8.2. STRUCTURAL DESIGN OF NON-STRUCTURAL ELEMENTS IS TO BE CARRIED OUT BY THE SPECIALITY STRUCTURAL ENGINEER(S) RETAINED BY THE CONTRACTOR AND/OR SUPPLIER(S) OF THE NON-STRUCTURAL ELEMENTS IN ACCORDANCE WITH PART 4 OF THE BCBC 2012 FOR GRAVITY & LATERAL LOADS.
   - 8.3. SHOP DRAWINGS:
     - 8.3.1. SUBMIT TO DNA A COMPLETE SET OF SHOP DRAWINGS AT LEAST THREE WEEKS PRIOR TO FABRICATION.
     - 8.3.2. SHOP DRAWINGS TO INDICATE ALL DESIGN ASSUMPTIONS, DESIGN LOADS, LOADS IMPOSED TO BUILDING STRUCTURE AND CONNECTION DETAILS.
     - 8.3.3. SHOP DRAWINGS MUST BE SIGNED & SEALED BY BC PROFESSIONAL ENGINEER FOR STRUCTURAL DESIGN.
   - 8.4. SPECIALITY ENGINEERS TO SUBMIT LETTERS OF ASSURANCE B1, B2 & C-B TO DNA, AND PERFORM THE NECESSARY FIELD REVIEWS.
   - 8.5. STRUCTURAL DESIGN OF THE SUPPORT AND SEISMIC RESTRAINT OF MECHANICAL, PLUMBING & ELECTRICAL EQUIPMENT AND SYSTEMS TO BE CARRIED OUT BY THE SPECIALITY ENGINEER(S) RETAINED BY THE CONTRACTOR AND/OR SUPPLIER(S) IN ACCORDANCE WITH PART 4 OF THE BCBC 2012. SUBMIT SHOP DRAWINGS AND LETTERS OF ASSURANCE B1, B2 AND C-B TO RESPECTIVE MECHANICAL & ELECTRICAL ENGINEERS OF RECORD FOR REVIEW.
   - 8.6. DESIGN CONNECTIONS TO MINIMIZE TORSION AND/OR TORSION LOADING TO PRIMARY STRUCTURE.

	7
	6
ISSUED FOR ADDENDUM #3 2016.01.26	5
ISSUED FOR ADDENDUM #2 2016.01.21	4
ISSUED FOR ADDENDUM #1 2016.01.15	3
ISSUED FOR TENDER 2015.12.22	2
ISSUED FOR TENDER PRELIMINARY REVIEW 2015.12.18	1

REVISIONS

DESIGNED BY: DNA
CHECKED BY: DM
DRAWN BY: JT / TJ
DRAWING DATE: 2016.01.26
SCALE: NTS
CONSULTANT:

PROJECT NAME
Centre for Aquaculture and Environmental Research
ROOF REPLACEMENT

CLIENT
DEPARTMENT OF FISHERIES AND OCEANS
West Vancouver Laboratory

PROJECT ADDRESS
4160 Marine Drive
WEST VANCOUVER, BC

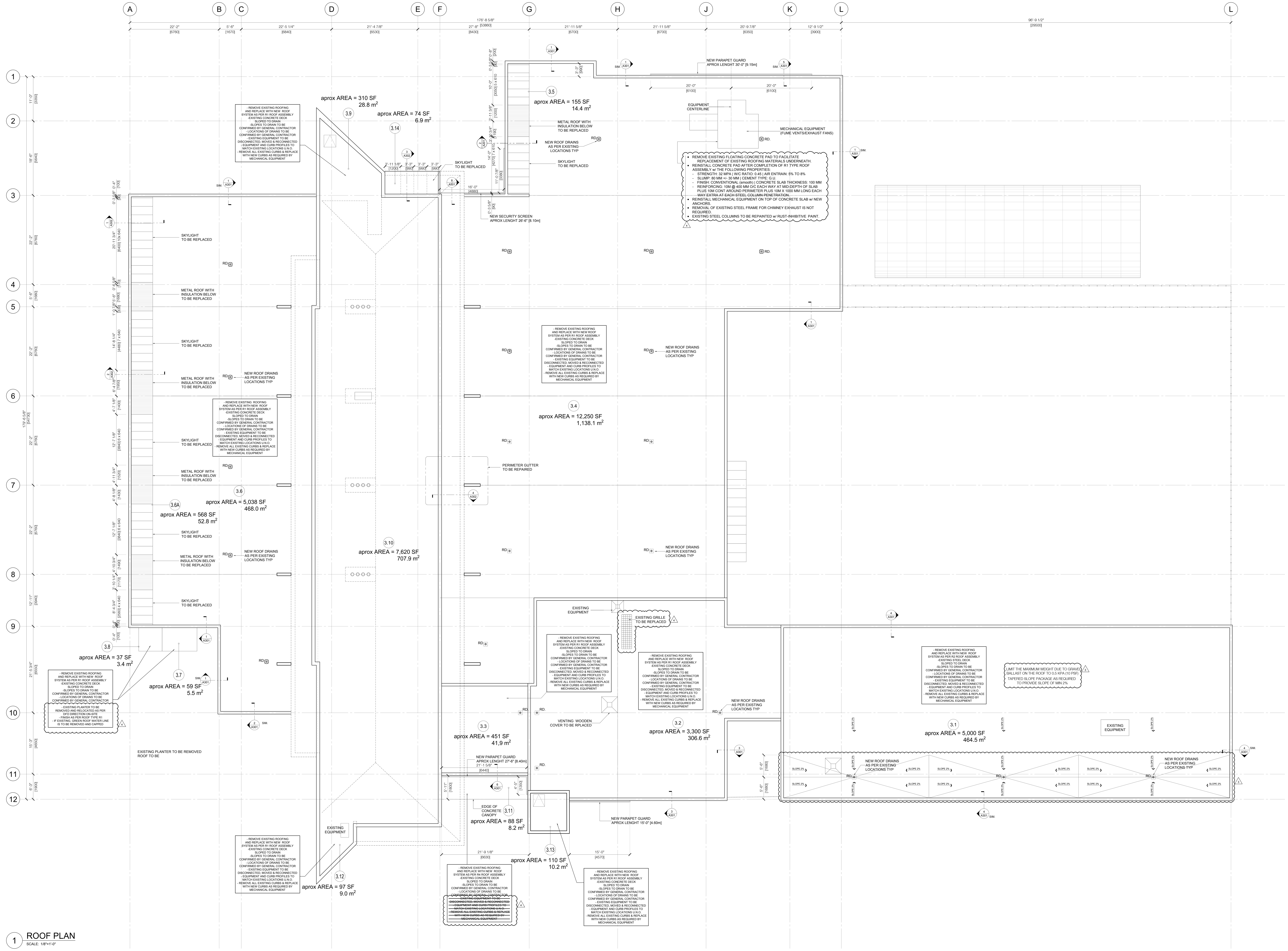
DRAWING TITLE
GENERAL NOTES AND ASSEMBLIES

REVISION No. 4

PROJECT NUMBER 5437

A101

DNA
project managers
planners
engineers
architects
David Nairne + Associates Ltd
Suite 250
171 West Esplanade
North Vancouver BC
CANADA V7M 3J9
T 604.984.3503
F 604.984.0627
E dna@davidnairne.com
W davidnairne.com



	7
	6
ISSUED FOR ADDENDUM #3 2016.01.26	5
ISSUED FOR ADDENDUM #2 2016.01.21	4
ISSUED FOR ADDENDUM #1 2016.01.15	3
ISSUED FOR TENDER 2015.12.22	2
ISSUED FOR TENDER PRELIMINARY REVIEW 2015.12.18	1

REVISIONS

DESIGNED BY:
DNA
CHECKED BY:
DM
DRAWN BY:
JT / TJ
DRAWING DATE:
2016.01.26
SCALE:
AS NOTED
CONSULTANT:

PROJECT NAME
Centre for Aquaculture and Environmental Research
ROOF REPLACEMENT

CLIENT
DEPARTMENT OF FISHERIES AND OCEANS
West Vancouver Laboratory

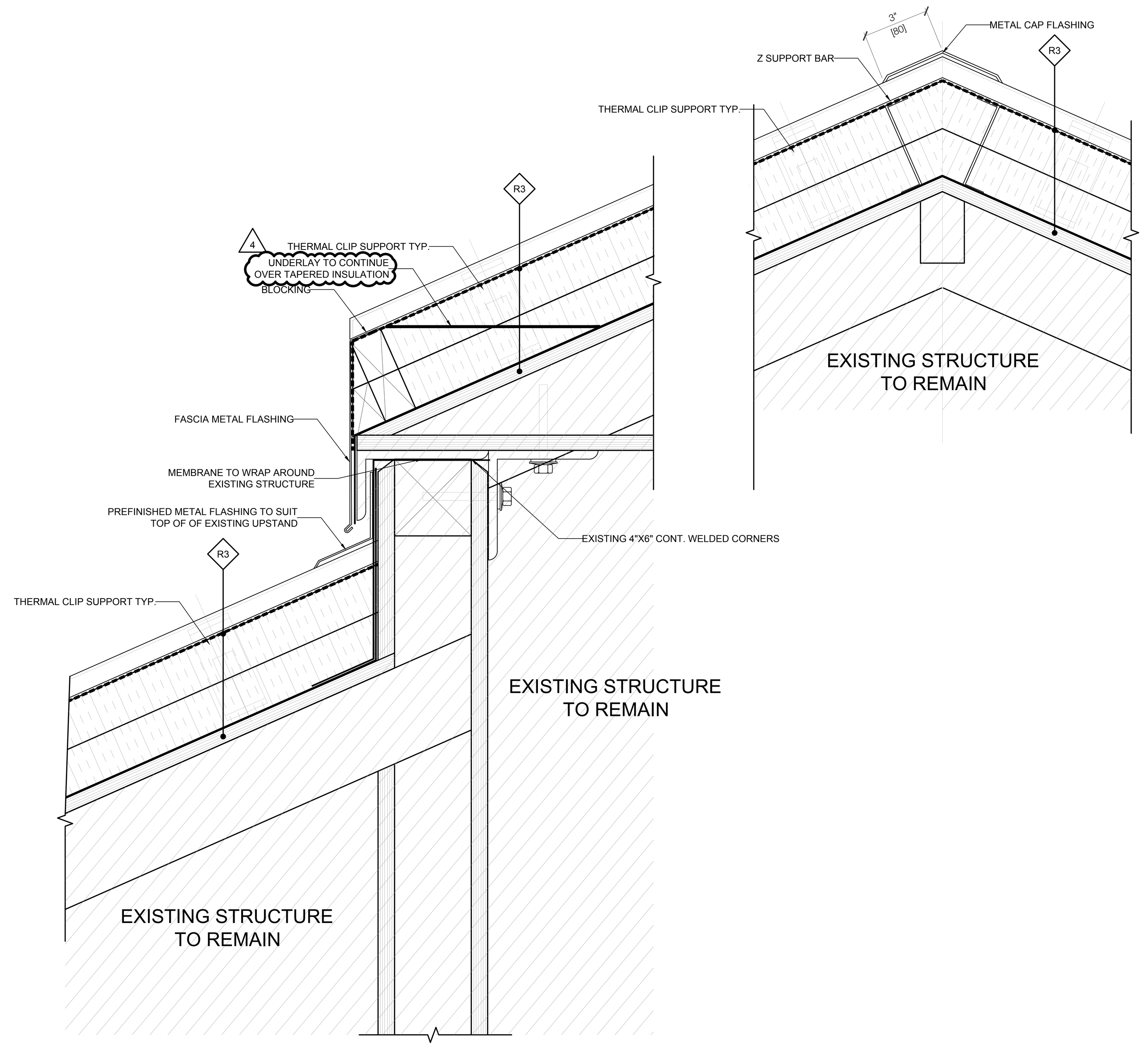
PROJECT ADDRESS
4160 Marine Drive
WEST VANCOUVER, BC

DRAWING TITLE
MAIN LABORATORY
ROOF PLAN

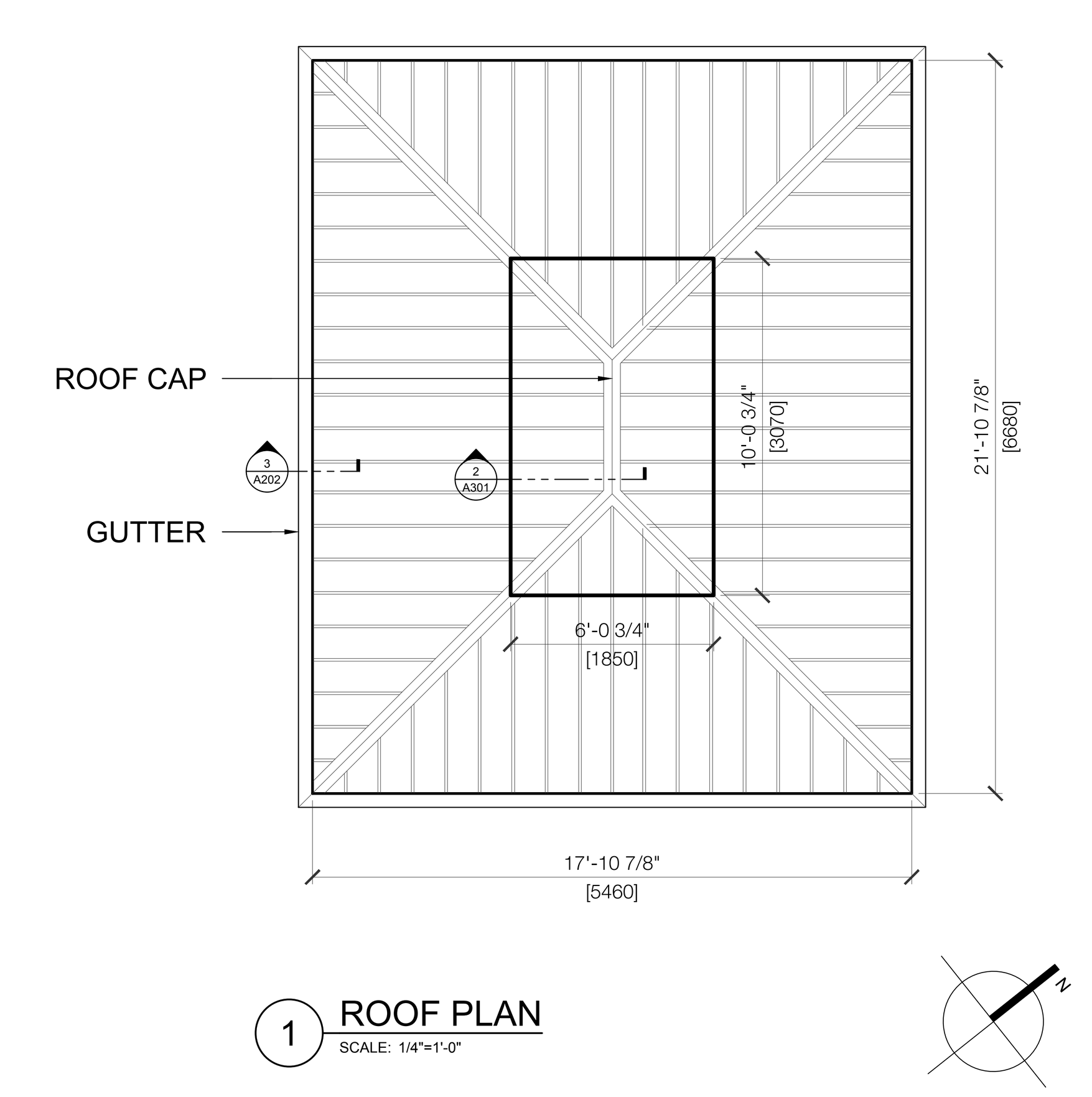
REVISION No.
4

PROJECT NUMBER 5437

A201



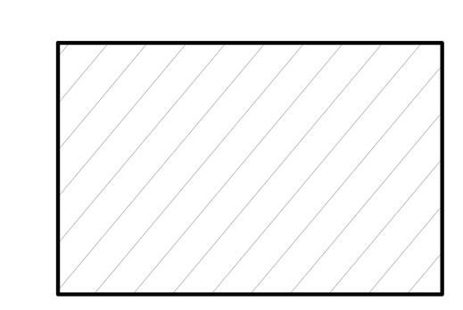
2 ROOF DETAILS
SCALE: 3"=1'-0"



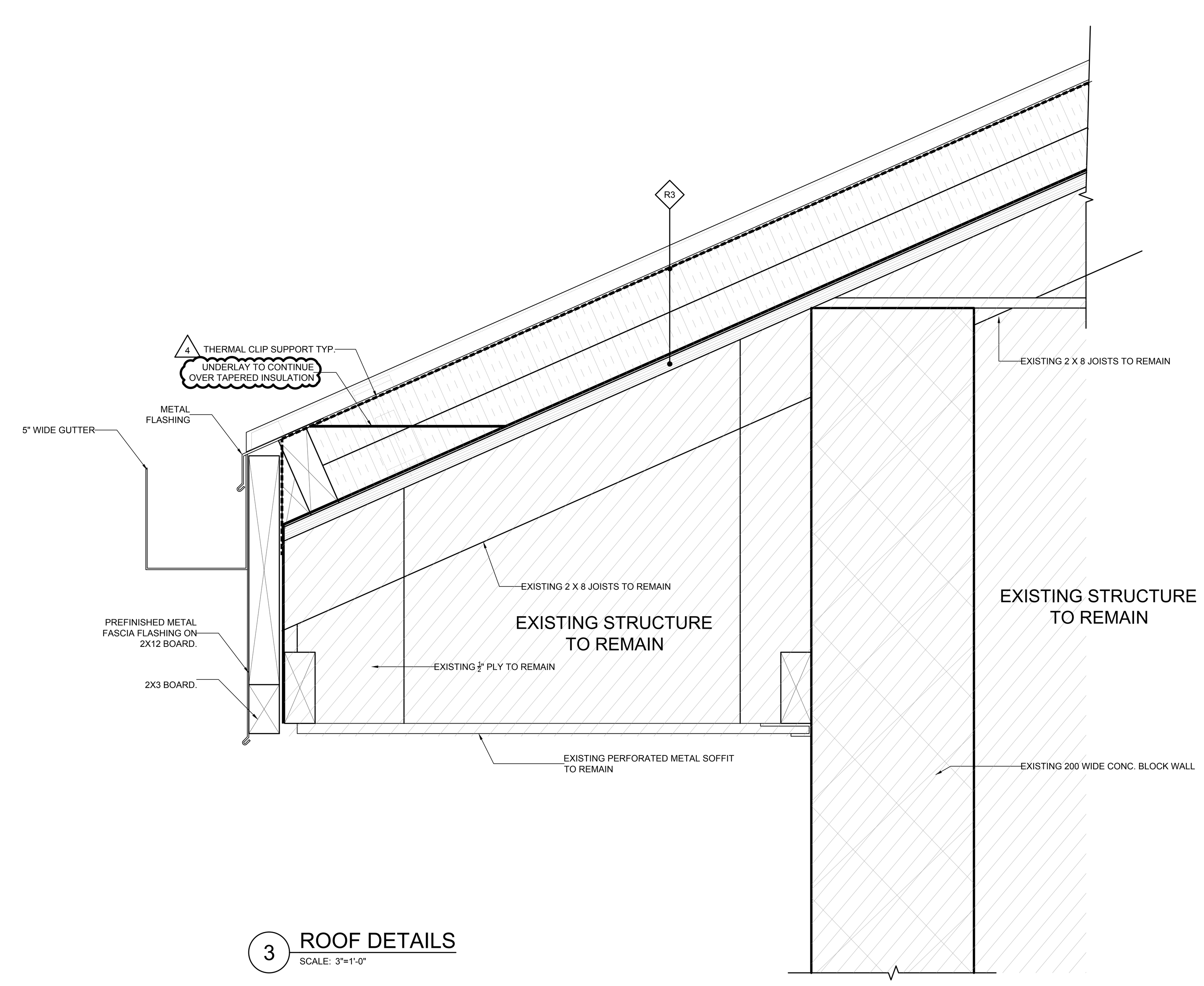
1 ROOF PLAN
SCALE: 1/4"=1'-0"

- REMOVE EXISTING ROOFING
AND REPLACE WITH NEW ROOF
SYSTEM AS PER R3 ROOF ASSEMBLY
-SLOPES TO BE
CONFIRMED BY GENERAL CONTRACTOR

aprox AREA = 400 SF
37.2 m^2



EXISTING STRUCTURE
TO REMAIN



3 ROOF DETAILS
SCALE: 3"=1'-0"

DNA
project managers
planners
engineers
architects
David Nairne + Associates Ltd
Suite 250
171 West Esplanade
North Vancouver BC
CANADA V7M 3J9
T 604.984.3503
F 604.984.0627
E dna@davidnairne.com
W davidnairne.com

	7
	6
ISSUED FOR ADDENDUM #3 2016.01.26	5
ISSUED FOR ADDENDUM #2 2016.01.21	4
ISSUED FOR ADDENDUM #1 2016.01.15	3
ISSUED FOR TENDER 2015.12.22	2
ISSUED FOR TENDER PRELIMINARY REVIEW 2015.12.18	1

REVISIONS

DESIGNED BY:
DNA
CHECKED BY:
DM
DRAWN BY:
JT / TJ
DRAWING DATE:
2016.01.26
SCALE:
AS NOTED
CONSULTANT:

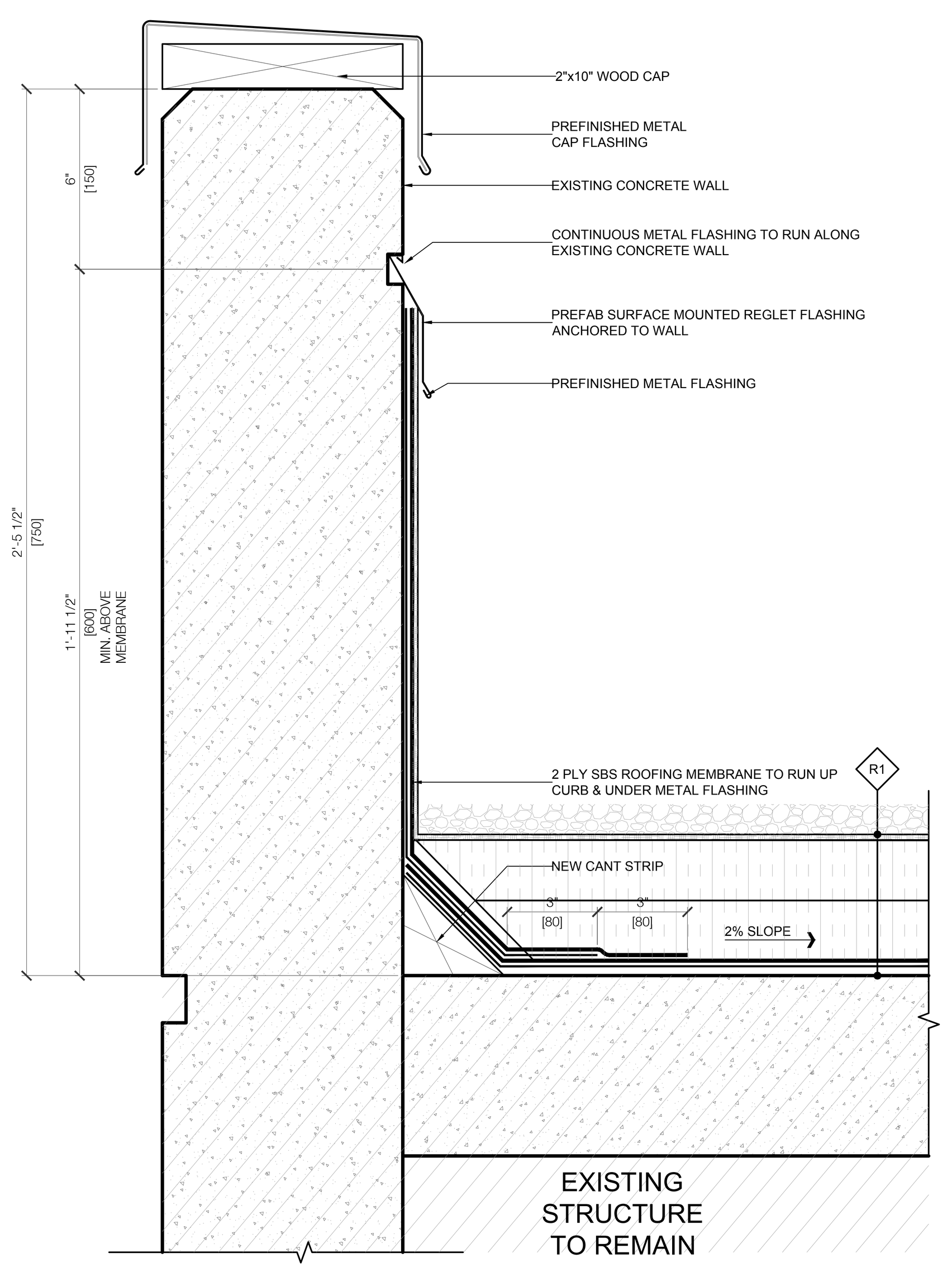
PROJECT NAME:
Centre for Aquaculture and
Environmental Research
ROOF REPLACEMENT
CLIENT:
DEPARTMENT OF
FISHERIES AND OCEANS
West Vancouver Laboratory
PROJECT ADDRESS:
4160 Marine Drive
WEST VANCOUVER, BC

DRAWING TITLE:
PUMP HOUSE
ROOF PLAN, DETAILS
REVISION No.
4

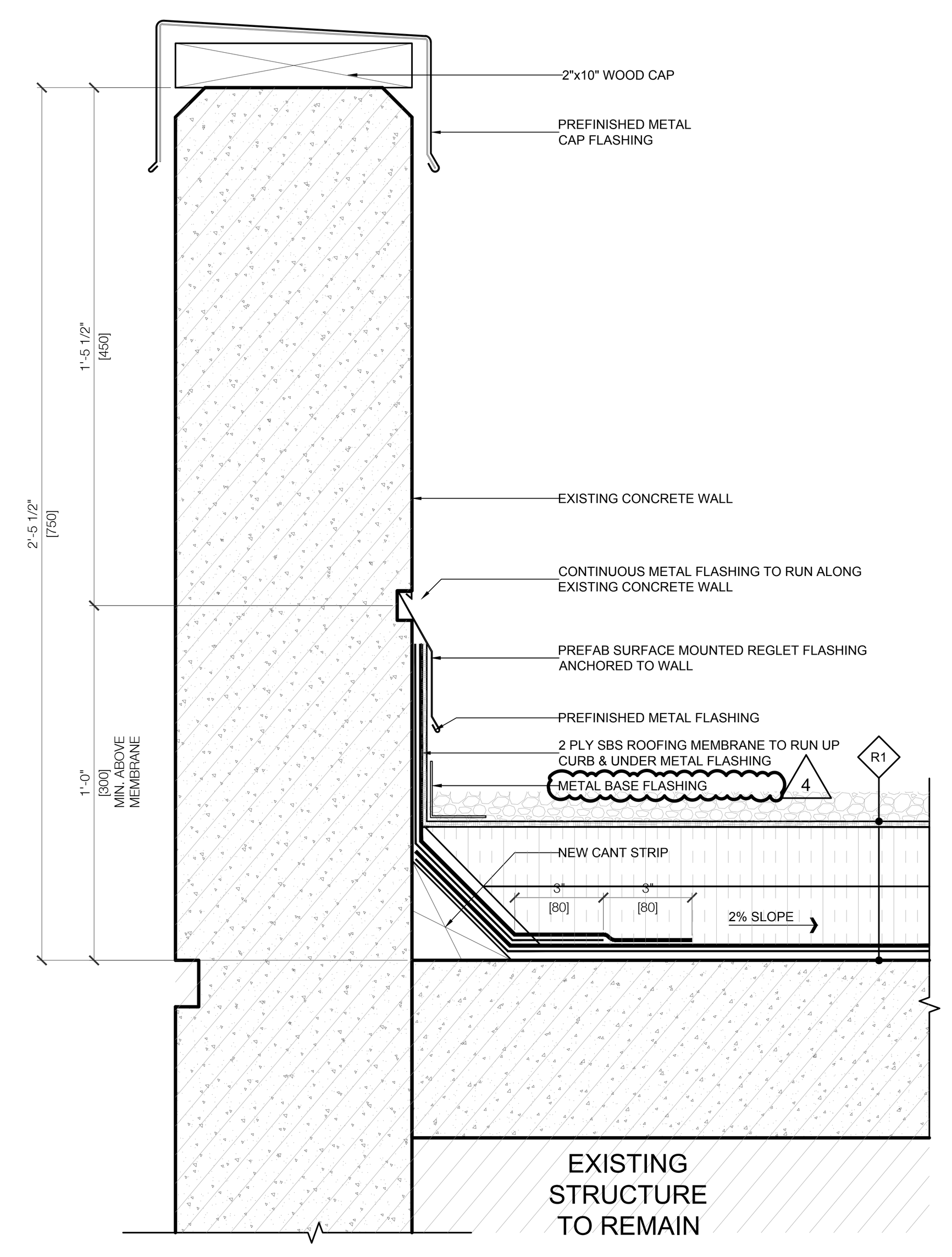
PROJECT NUMBER 5437

A202

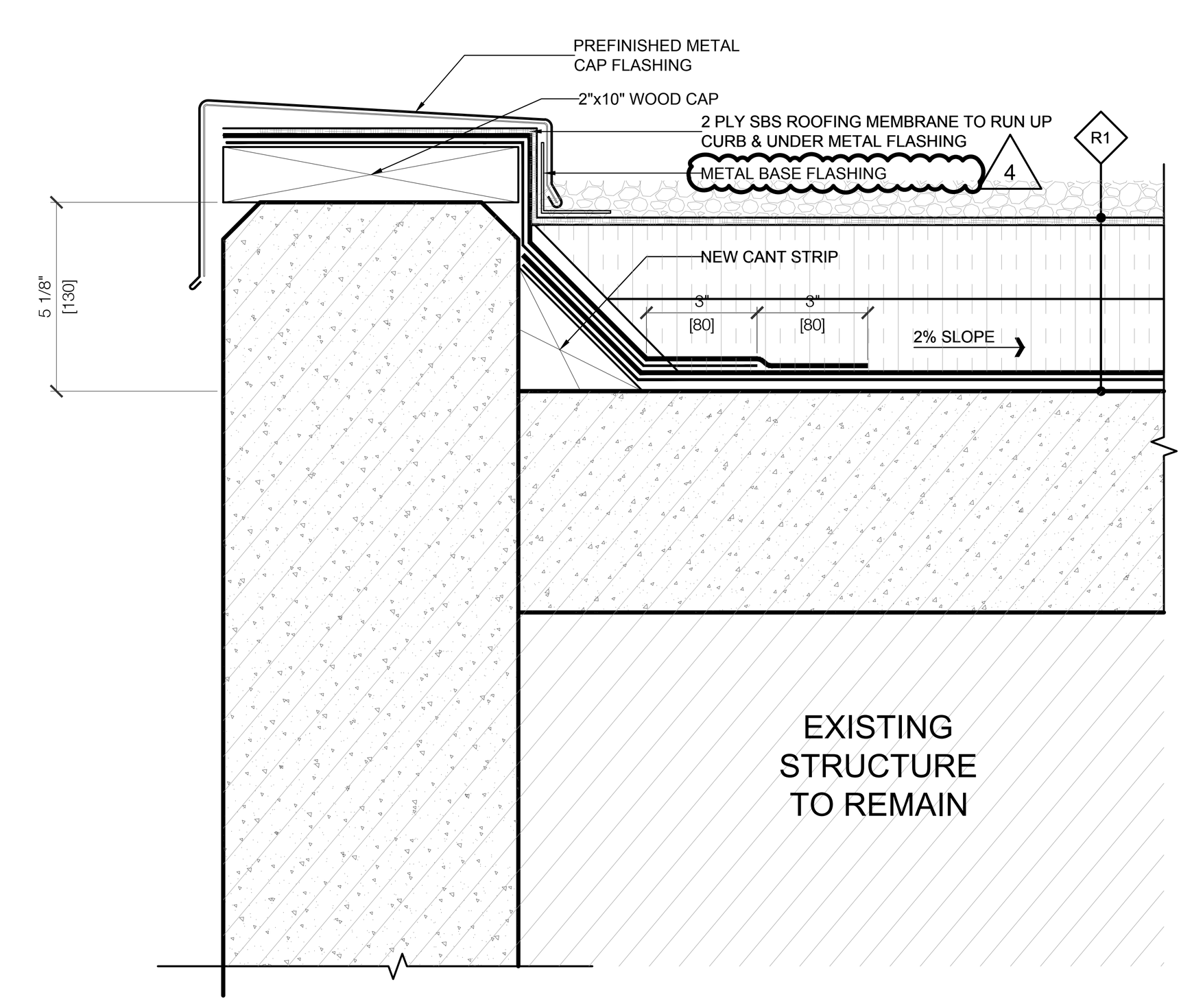
DNA
project managers
planners
engineers
architects
David Nairne + Associates Ltd
Suite 250
171 West Esplanade
North Vancouver BC
CANADA V7M 3J9
T 604.984.3503
F 604.984.0627
E dna@davidnairne.com
W davidnairne.com



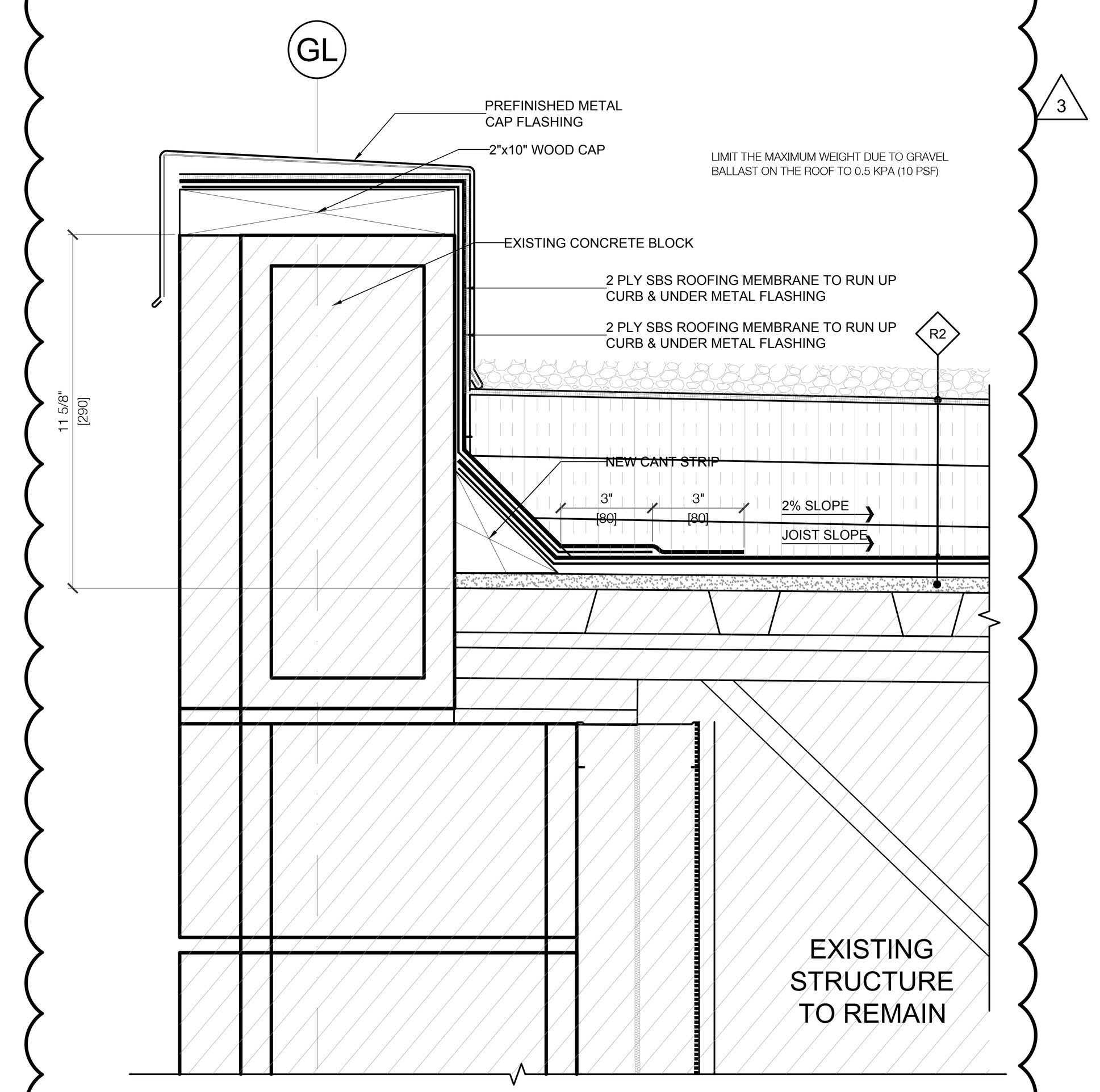
1 PARAPET DETAIL
SCALE: 3"=1'-0"



2 PARAPET DETAIL
SCALE: 3"=1'-0"



3 PARAPET DETAIL
SCALE: 3"=1'-0"



4 PARAPET DETAIL
SCALE: 3"=1'-0"

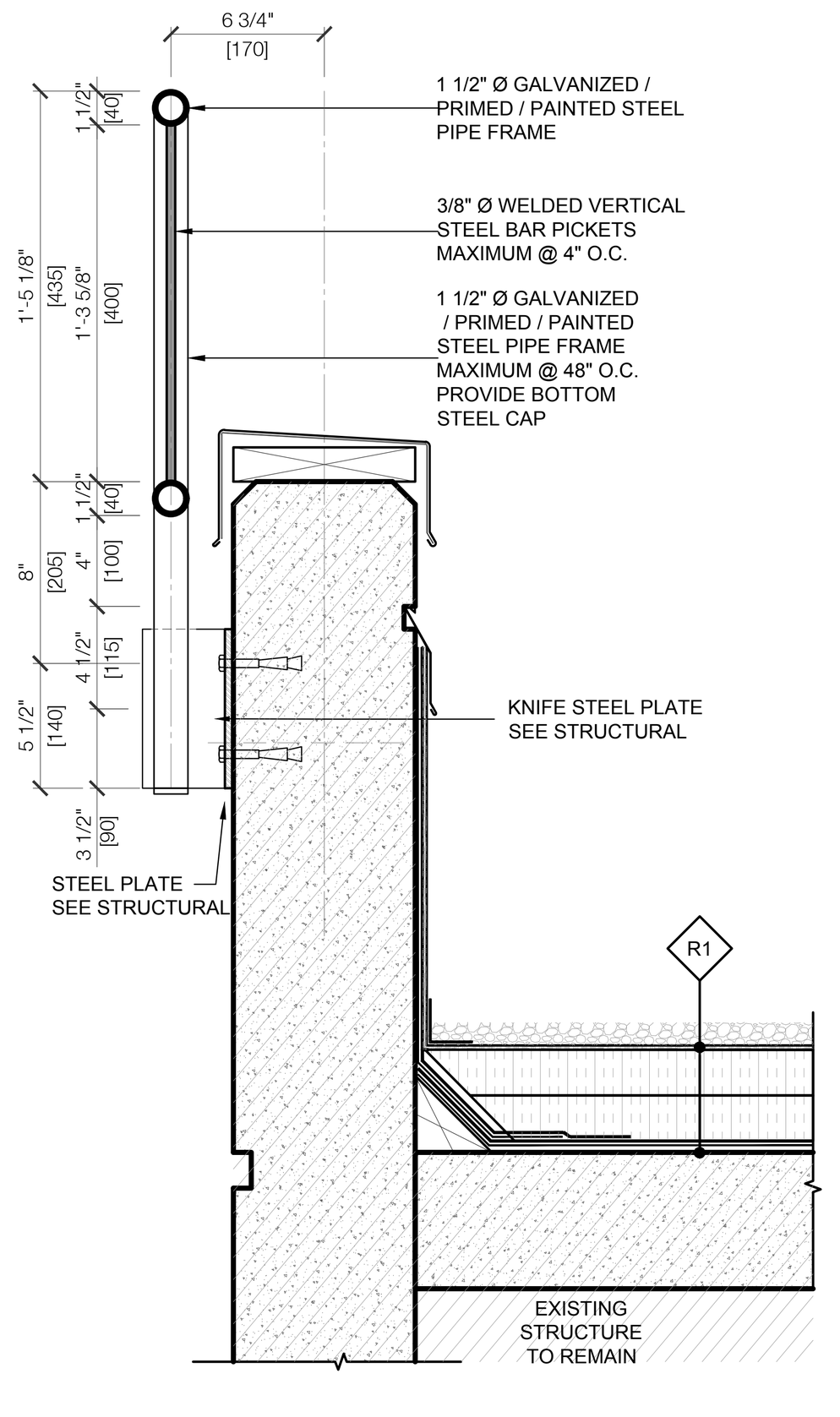
COPYRIGHT AND USE OF DOCUMENTS:

NOTE:
- VERIFY AND CONFIRM ALL DIMENSIONS/HEIGHT ON SITE.
- SUBMIT SHOP DRAWINGS OF GUARDS, FENCE & ALL COMPONENTS TO ARCHITECT FOR APPROVAL BEFORE STARTING FABRICATION.
- GUARD & FENCE DESIGN, SUPPORTS & FASTENINGS BY SUPPORTING REGISTERED PROFESSIONAL RETAINED BY CONTRACTOR.
- GUARDS TO CONFORM WITH 2012 BCBC REQUIREMENTS.

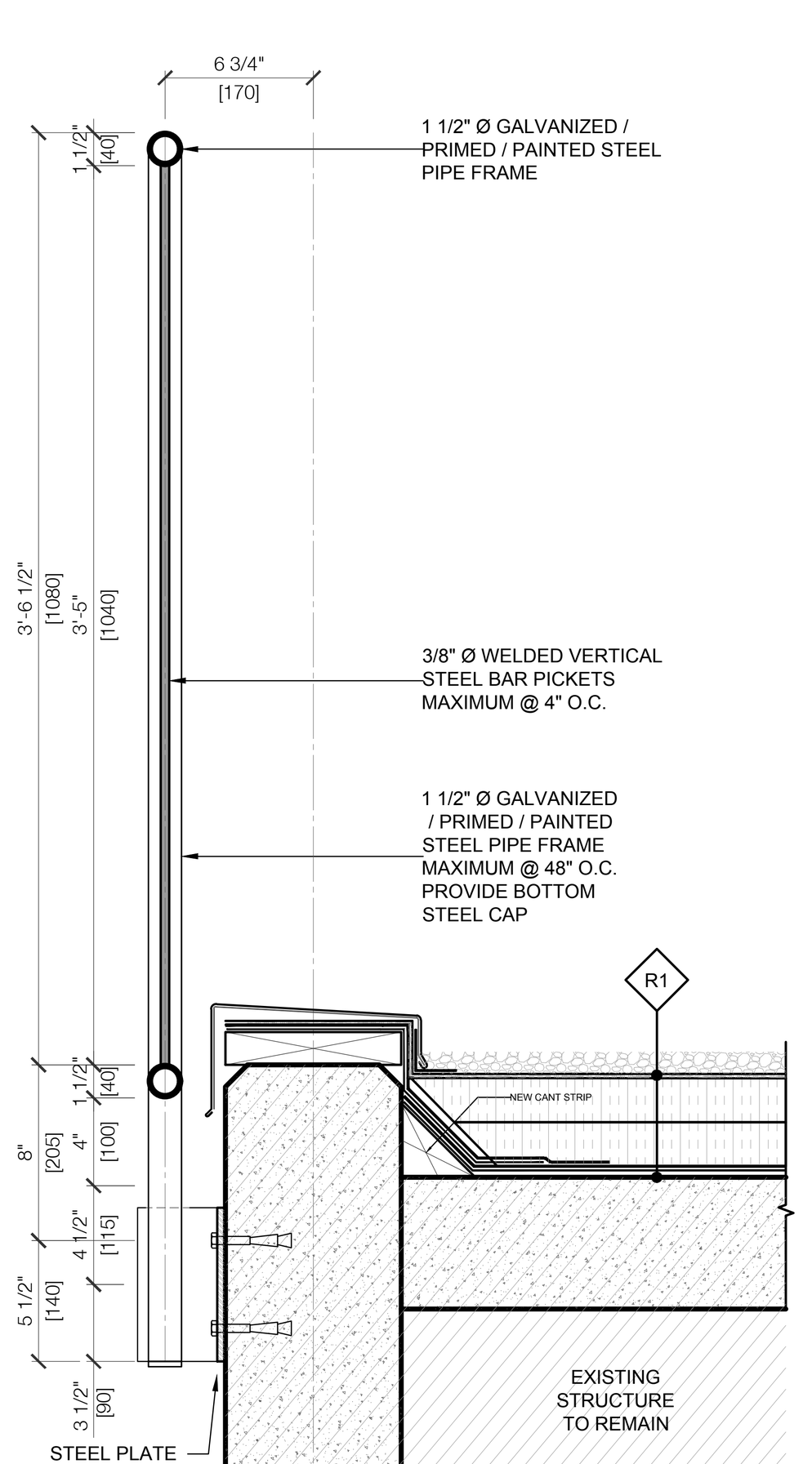
EXISTING STRUCTURE TO REMAIN

	7
	6
ISSUED FOR ADDENDUM #3 2016.01.26	5
ISSUED FOR ADDENDUM #2 2016.01.21	4
ISSUED FOR ADDENDUM #1 2016.01.15	3
ISSUED FOR TENDER 2015.12.22	2
ISSUED FOR TENDER PRELIMINARY REVIEW 2015.12.18	1

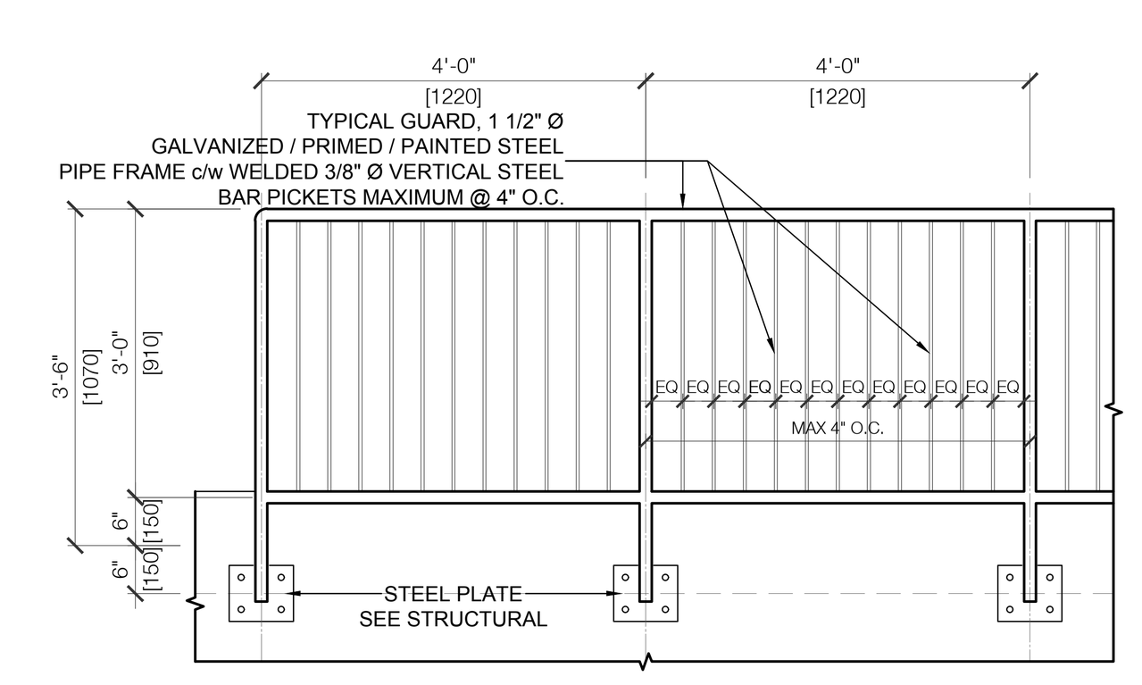
REVISIONS



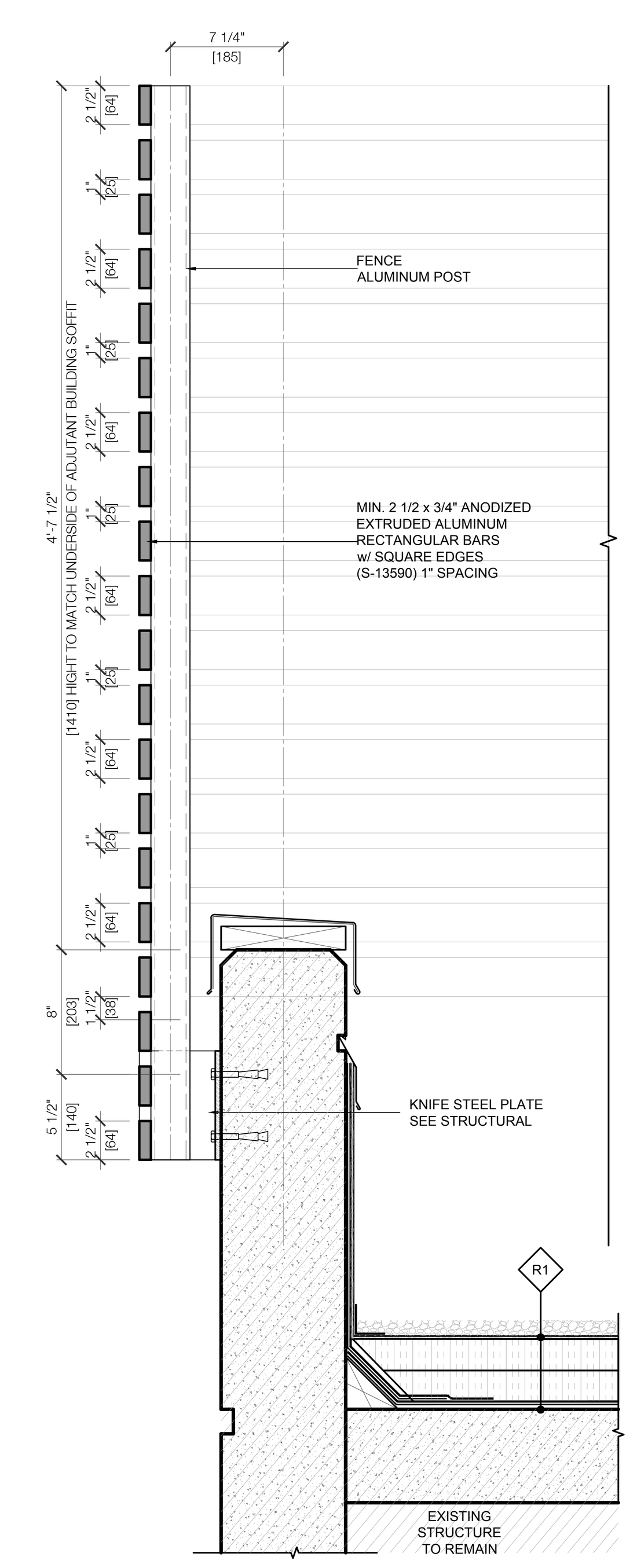
5 CUSTOM SYSTEM GUARD DETAIL SECTION
SCALE: 1 1/2"=1'-0"



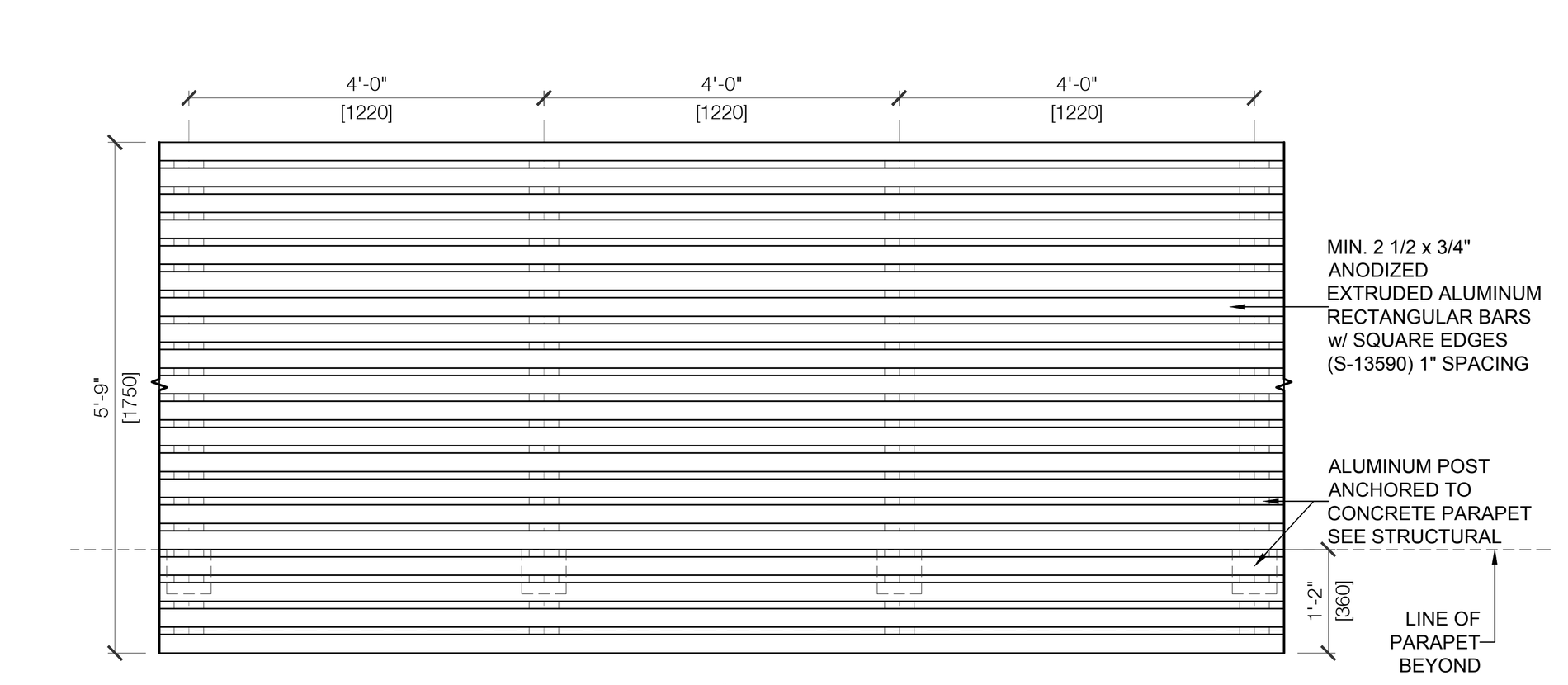
6 CUSTOM SYSTEM GUARD DETAIL SECTION
SCALE: 1 1/2"=1'-0"



7 CUSTOM SYSTEM GUARD ELEVATION
SCALE: 1/2"=1'-0"



8 SECURITY SCREEN DETAIL SECTION
SCALE: 1 1/2"=1'-0"



9 SECURITY SCREEN DETAIL ELEVATION
SCALE: 1/2"=1'-0"

DESIGNED BY: DNA
CHECKED BY: DM
DRAWN BY: JT / TJ
DRAWING DATE: 2016.01.26
SCALE: AS NOTED
CONSULTANT:

PROJECT NAME
Centre for Aquaculture and Environmental Research
ROOF REPLACEMENT

CLIENT
DEPARTMENT OF FISHERIES AND OCEANS
West Vancouver Laboratory

PROJECT ADDRESS
4160 Marine Drive
WEST VANCOUVER, BC

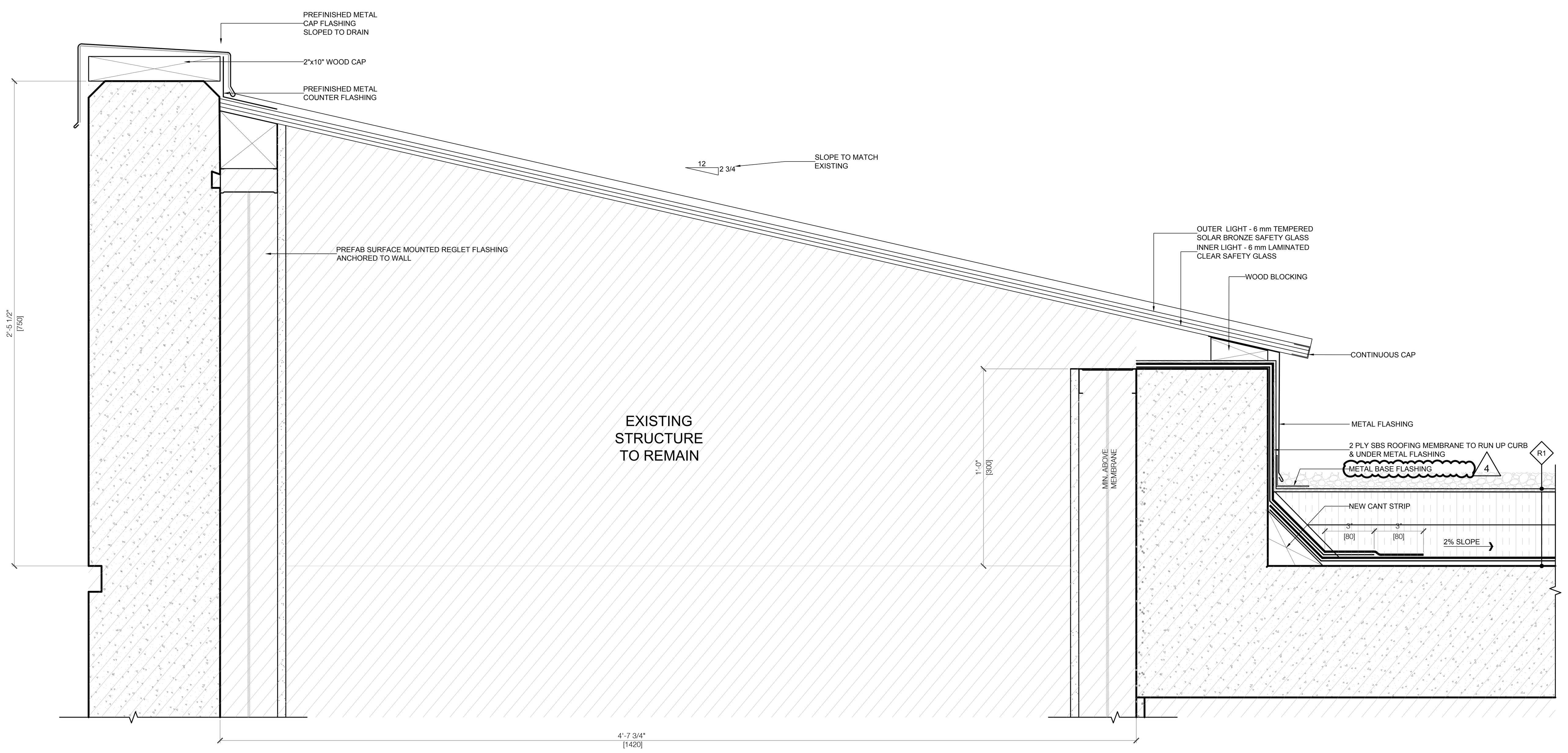
DRAWING TITLE
MAIN LABORATORY DETAILS

REVISION No. 4

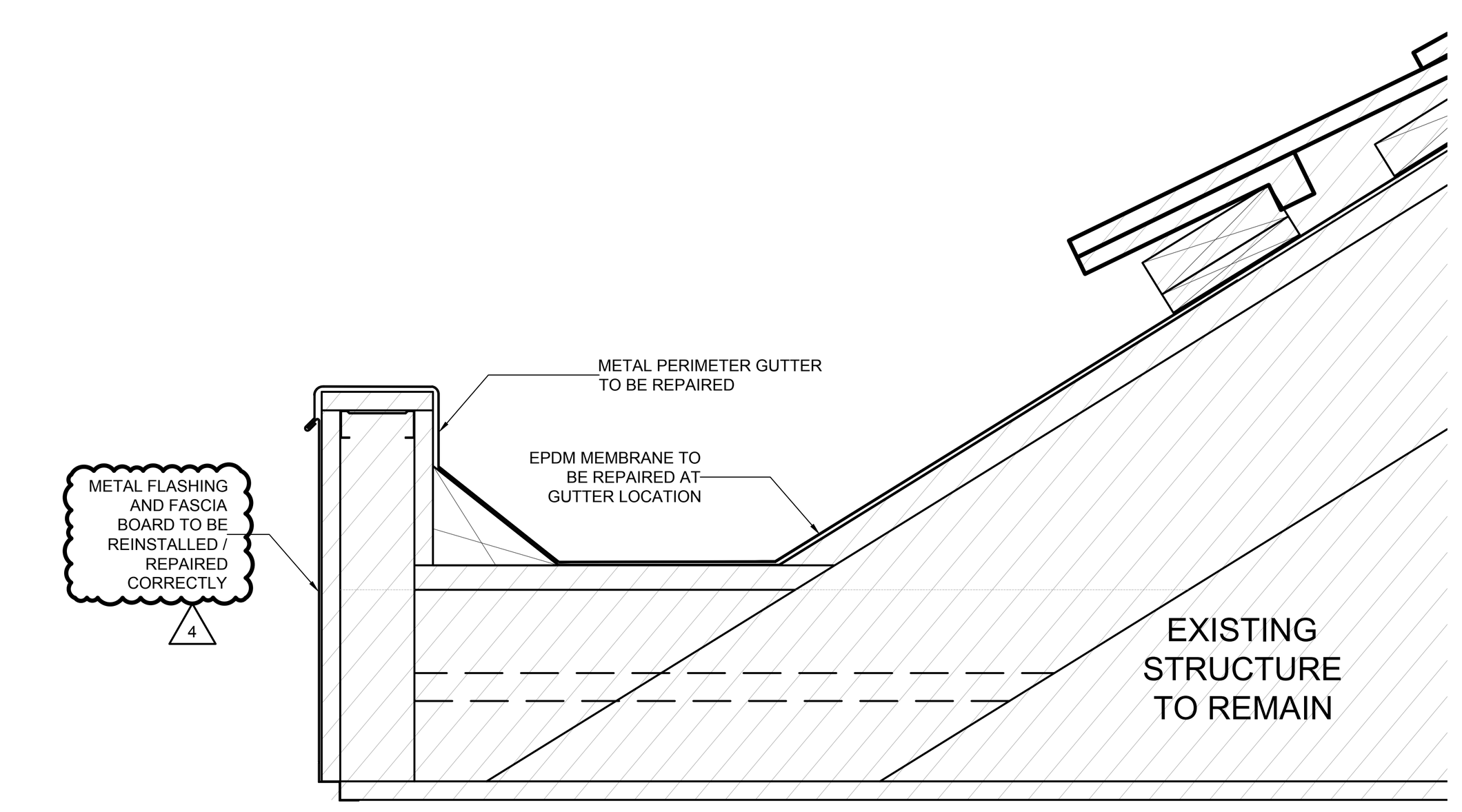
PROJECT NUMBER 5437

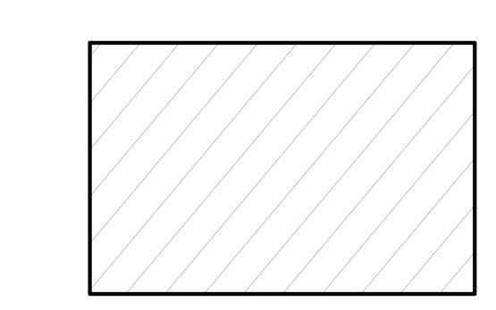
A301

DNA
project managers
planners
engineers
architects
David Nairne + Associates Ltd
Suite 250
171 West Esplanade
North Vancouver BC
CANADA V7M 3J9
T 604.984.3503
F 604.984.0627
E dna@davidnairne.com
W davidnairne.com

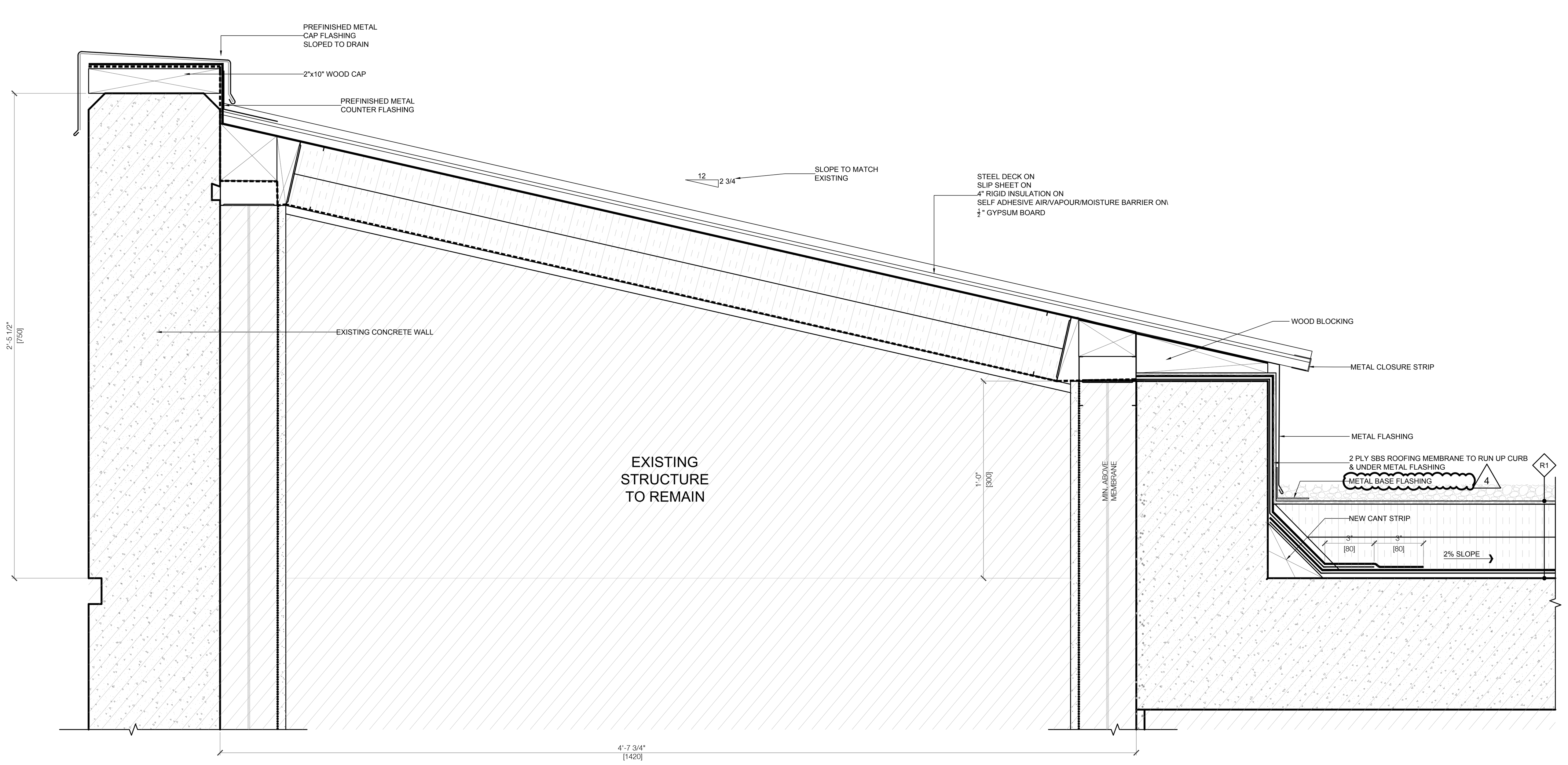


1 SKYLIGHT DETAIL
SCALE: 3"=1'-0"

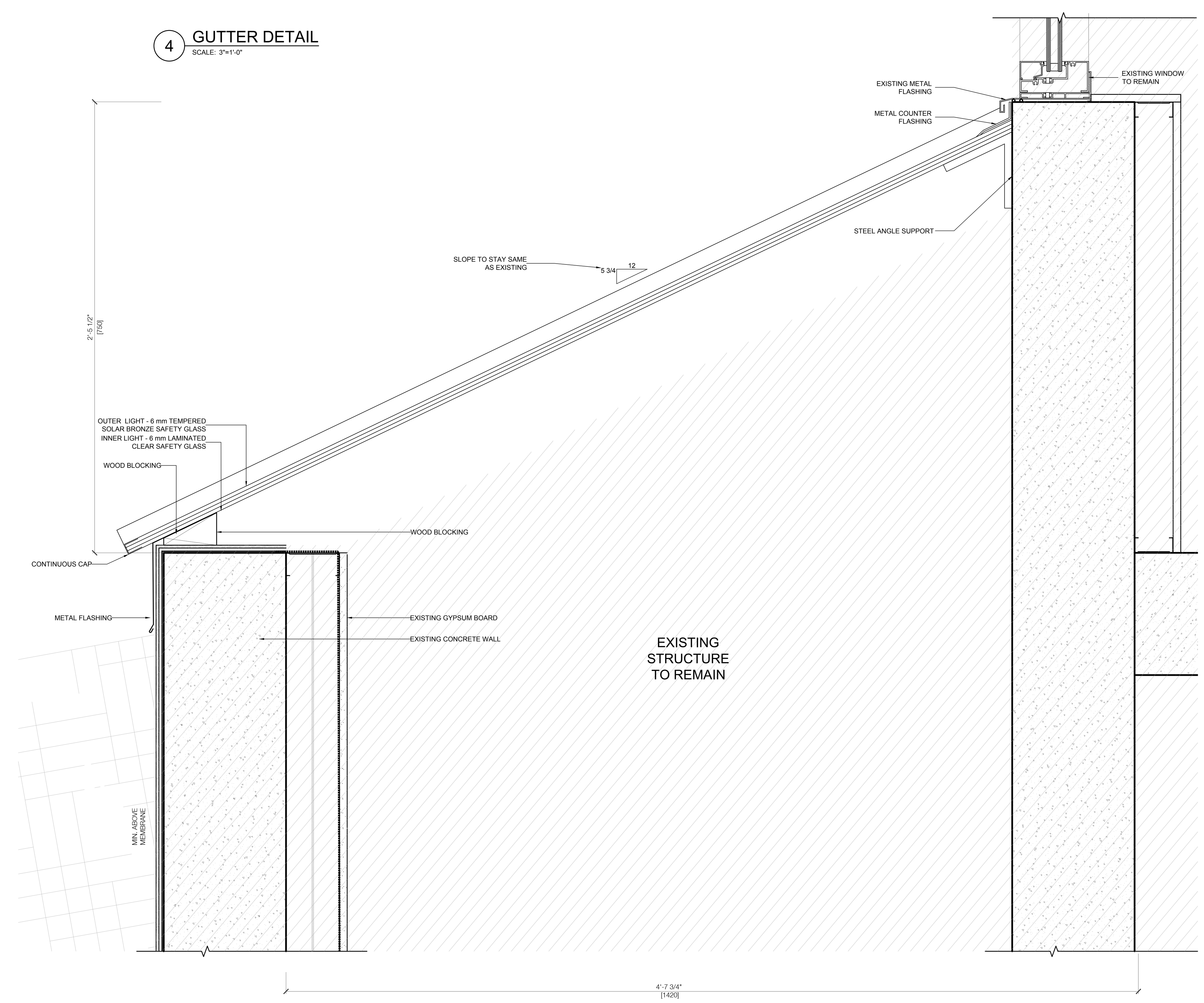




4 GUTTER DETAIL
SCALE: 3"=1'-0"



2 SKYLIGHT DETAIL
SCALE: 3"=1'-0"



3 SKYLIGHT DETAIL
SCALE: 3"=1'-0"

REVISIONS	
	7
	6
ISSUED FOR ADDENDUM #3 2016.01.26	5
ISSUED FOR ADDENDUM #2 2016.01.21	4
ISSUED FOR ADDENDUM #1 2016.01.15	3
ISSUED FOR TENDER 2015.12.22	2
ISSUED FOR TENDER PRELIMINARY REVIEW 2015.12.18	1

DESIGNED BY: DNA
CHECKED BY: DM
DRAWN BY: JT / TJ
DRAWING DATE: 2016.01.26
SCALE: AS NOTED
CONSULTANT:

PROJECT NAME
Centre for Aquaculture and Environmental Research
ROOF REPLACEMENT

CLIENT
DEPARTMENT OF FISHERIES AND OCEANS
West Vancouver Laboratory

PROJECT ADDRESS
4160 Marine Drive
WEST VANCOUVER, BC

DRAWING TITLE
MAIN LABORATORY DETAILS

REVISION No. 4

PROJECT NUMBER 5437

A302

GENERAL STRUCTURAL NOTES

GENERAL

1. The following notes are minimum requirements unless noted otherwise on the structural drawings prepared by DAVID NAIRNE & ASSOCIATES LTD [DNA].
2. Read structural drawings in conjunction with all other consultants' drawings, contract documents and specifications.
3. Check and verify all dimensions, quantities and site conditions with architectural drawings before commencing with any work. Notify architect of any discrepancies.
4. The latest edition of the standards and codes referenced in these notes and on the Structural Drawings shall apply.
5. Do not construct from these drawings unless marked "Issued for Construction".
6. In the event of discrepancies in the specifications, drawings or contract documents, the more stringent requirement shall apply.
7. Notes and details specified on the plans and details take precedence over those in General Structural Notes, except for minimum requirements.
8. For conditions not explicitly shown, Contractor shall immediately request clarifications from the Structural Engineer.
9. Contractor to submit to DNA in writing all proposed alternate products, materials and structural systems for review at least 4 weeks prior to the start of construction.

FIELD REVIEW

1. Contractor is responsible for pre-inspecting the work and confirming completeness and conformity with the Structural Contract Documents prior to field review by DNA.
2. Notify DNA at least 72 hours in advance for field review of the following:
   a) Structural steel: Prior to concealment
3. Work found to be incomplete or deficient may require additional field reviews at additional cost to the Contractor.
4. Our field review consists of a periodic review of the structural work only. It is not carried out for the Contractor's benefit, and it does not make DNA guarantors of the Contractor's work. The Contractor is responsible for his own quality control and shall perform the work with good workmanship in the conformance with the Contract Documents.

SUBMITTALS AND SHOP DRAWINGS

1. Contractor is responsible for overall coordination of sub-trades.
2. Submittals are items required by the Contract Documents to be submitted by the General Contractor, such as (but not limited to) request for payment, progress reports, shop drawings, manufacturer's literature on equipment, concrete mix designs, concrete test results, aggregate gradation reports, schedules, etc.
3. Suppliers shall prepare for DNA and submit to the General Contractor 4 complete sets of Shop Drawings for general compliance review prior to fabrication. Each sheet sheet shall be sealed and signed by a Professional Engineer registered in the Province of British Columbia, who will be the Specialty Structural Engineer responsible for the integrity of his/her design.
4. DNA will NOT review or assume responsibility for such matters as dimensions or quantities or the Contractor's safety measures or methods of construction.
5. Incomplete sets of Shop Drawings, or Shop Drawings prepared using reproductions of DNA Structural Drawings will NOT be accepted,
6. Shop drawings and other submittals of pre-engineered or proprietary structural elements shall clearly indicate type, position, and connection to elements of the Primary Structural System as well as the criteria and loads used for the design.
7. Submittals must be reviewed by the General Contractor prior to DNA's review.
8. Where required by the following sections of these General Structural Notes, proprietary products, connections and other structural elements which have been designed by Specialty Structural Engineers shall be inspected by those engineers at the appropriate stage of construction, at which time observations and deficiencies in the work shall be reported in writing to the SER (DNA).
9. Where required by the following sections of these General Structural Notes, each Specialty Structural Engineer shall submit to DNA Letters of Assurance Schedules B and C-B, or S-B and S-C, sealed and signed, clearly outlining areas of responsibility.
10. Refer to the following sections for specific Shop Drawing requirements:

CONSTRUCTION

1. Drawings show completed structures only. Contractor is responsible for temporary bracing for all building elements against construction loading conditions and for construction erection procedures. Temporary support to be designed by a Professional Engineer registered in the Province of British Columbia in accordance with WorkSafeBC regulations and as required by local building authorities.
2. It is the sole responsibility of the Contractor to ensure that no part of the work is subjected to a load which will endanger the safety of the building or workers.
3. Protect structural work from adverse weather conditions and moisture prior to, during and after installation.
4. Contractor to compare all design drawings, dimensions and site conditions and notify DNA of any discrepancies prior to proceeding with the work.
5. Contractor to submit to DNA in writing all proposed alternate products and structural systems, including technical specifications where required, for review and approval.
6. Contractor shall review the concrete pour plan with DNA prior to construction.

STRUCTURAL DESIGN

1. The guardrails have been designed by DNA in accordance with:
   Part 4 of the 2010 National Building Code of Canada [NBC].
2. See drawings for specific loads and loading conditions. Specialty Engineers to be responsible for identifying specific loading conditions within their scopes of work.

STRUCTURAL STEEL, MISCELLANEOUS STEEL & CONNECTIONS

1. Fabricate and erect structural steel to CSA S-16 Division 2 certification or better.
2. Structural steel shall conform to CSA G40.21 with the following grades:
   a) W Shapes: Grade 350W
   b) Angles & Channels: Grade 300W
   c) HSS: Grade 350W Class C
   d) Plates & Miscellaneous steel: Grade 300W
   e) Connection Bolts:
      i) Steel to steel connections: ASTM A325
      ii) Steel to foundation anchor bolts: ASTM A307 or A325 per drawings
      iii) Wood connections: (interior – not exposed to moisture): ASTM A307 hot dipped galvanized to CAN/CSA – G164
   f) Finish: One coat shop primer except embedded items, See specifications.
   g) Pipes: ASTM A53 Grade B
3. All welding shall conform to CSA W59, W55.3 and W186 – Reinforcing Bars and shall be performed by fabricators fully certified by the Canadian Welding Bureau to the requirements of CSA W47.1.
4. Connection Design:
   a) Code Compliance: Supplier shall design structural steel connections on the basis of "Simple Construction" in accordance with CSA S-16 and S-136 for the design loads indicated on the drawings and in accordance with Part 4 of the Building Code.
   b) Beams: Design beam reaction for 60% of the load given in the beam load tables in Part 5 of the Commentary on CSA S-16, or for design loads indicated.
   c) Beam Stiffeners: Provide minimum 9.5mm (3/8") thick full height stiffeners each side of web at bearing supports, brace work points, beam and column connections and as indicated/required.
   d) Bolts: Minimum 19mm (3/4") diameter A325 or as indicated. Minimum 2 bolts per connection.
   e) Shear Connections: Provide double side plates for all shear connections.
5. Supplier to confirm all dimensions and site conditions of structure prior to fabrication.
6. Erection Tolerances:
   a) Columns: Location shall be zero inches at base and 6mm (1/4") max. out of plumb at top.
   b) Exterior girts to be accurately aligned with columns.
9. All edges and corners of connections shall be ground smooth.
10. Any steel subject to corrosion shall be hot dip galvanized or coated with a corrosion resistant finish to the approval of DNA. All hot dip galvanizing to be in accordance with CAN/CSA G164 U.N.O.
11. All HSS sections shall be provided with 6mm (1/4") thick caps.
12. Submittals: Supplier shall provide the following submittals (refer to the Submittals section):
    a) Shop Drawings sealed and signed by Supplier's Specialty Structural Engineer indication design capacity of all connections.
    b) Letters of Assurance B and C-B, or Schedules S-B and S-C.
    c) Certificates showing that the fabricator is fully certified by the Canadian Welding Bureau.

POST INSTALLED CONCRETE ANCHORAGES

1. Provide adhesive at all drilled anchor and reinforcing steel locations indicated on structural drawings to depths of embedment indicated on drawings.
2. Products
   a) Adhesive used to install reinforcing steel and threaded rods in existing concrete shall be:
      i) Hilti HIT-HY 200-R Adhesive System, U.N.O. or,
      ii) Hilti HIT-RE 500-SD Adhesive System.
   b) Mechanical anchors to be as specified on drawings.
   c) A written request for the use of alternate products, with applicable technical specifications, must be submitted to, and approved by DNA prior to construction.
   d) Reinforcing steel and threaded rod anchors shall be as specified in the reinforcing steel notes.
3. Documentation & Training
   a) The Contractor shall have copies of product literature and installation guides on site.
   b) Prior to construction, the Contractor shall arrange for on-site training of all installers for all post-installed anchor types to be used.
4. Execution
   a) Installation shall be in strict accordance with manufacturer's recommendations. Special attention is drawn to the minimum temperature requirements.
   b) Anchor capacity is dependant upon spacing between adjacent anchors and proximity of anchors to edge of concrete. Install anchors in accordance with spacing and edge clearances indicated on the drawings.
   c) Drilling of holes through existing reinforced steel in concrete is prohibited. If encountered, abandon hole location and start a new hole away from reinforcing steel locations. Patch all unused holes.
5. Testing
   a) On site load testing of 10% of all post-installed anchor shall be carried out by an independent testing laboratory, retained by the Contractor, in conjunction with the manufacturer's representative.
   b) If more than 10% of all post-installed anchors fail to achieve the specified torque or proof load, all anchors of the same diameter and type shall be tested, unless otherwise instructed by Engineer.
   c) As an alternative to anchor testing, the Contractor may retain a Material Consultant to carry out field reviews of all post-installed anchor installations.
6. Submittals
   a) Submit to DNA copies of all installers' training certificates prior to installation of post-installed anchors.
   b) Where testing is required, submit to DNA certified test reports, showing compliance with specified performance characteristics and physical properties.
   c) Where the Contractor retains a Material Consultant to perform field reviews of anchor installations instead of testing, submit to DNA Schedules S-B and S-C.

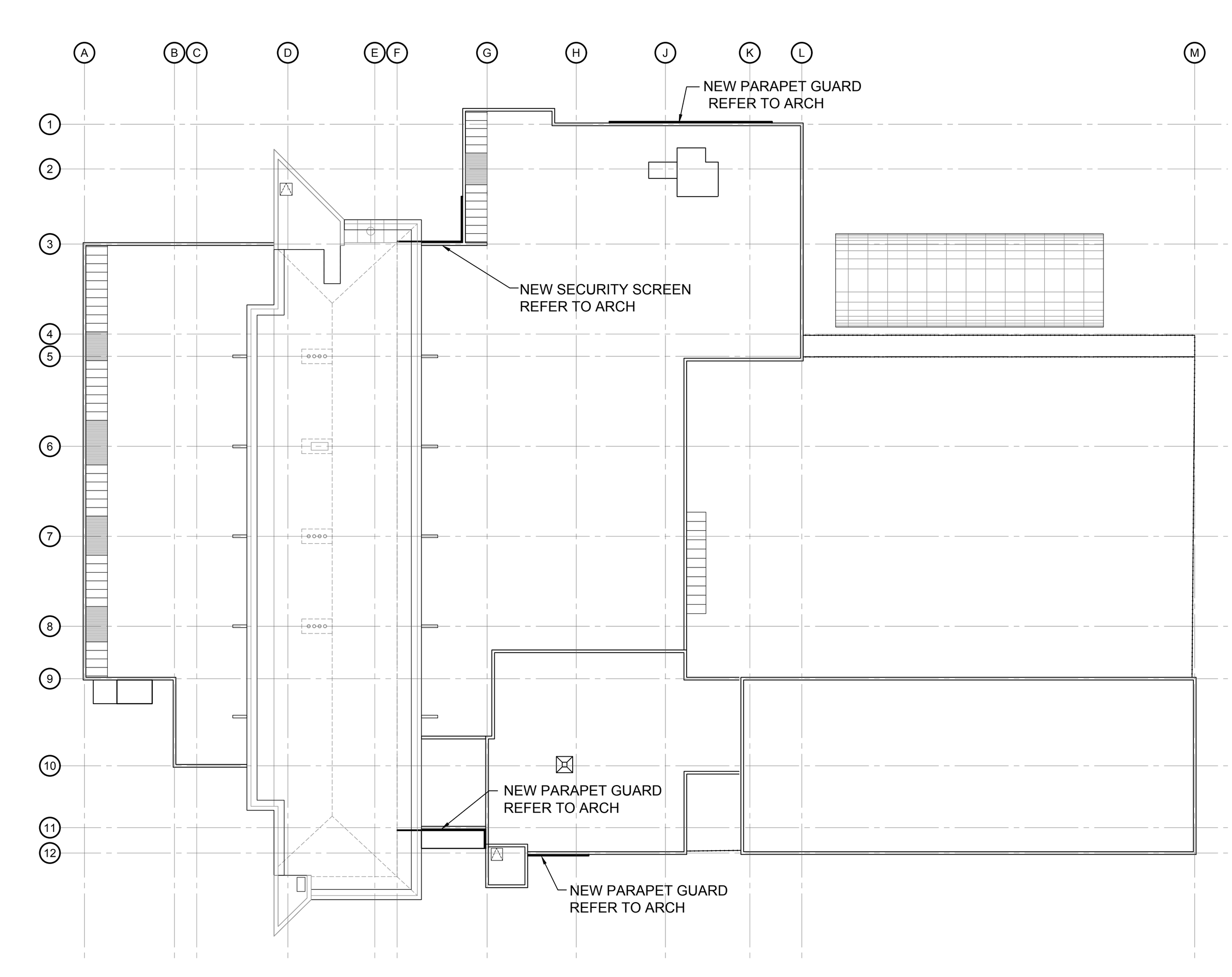
NON-STRUCTURAL ELEMENTS

1. DNA is not responsible for the structural design and/or seismic restraint of non-structural and secondary structural elements and their connection to the primary structural elements. These elements include but are not limited to:
   a) All glazed component systems including windows, storefronts, curtain walls, skylights, canopies and guard railing.
   b) Elevators, escalators, lifts and dock levellers.
   c) Attached and free-standing signage structures.
   d) Roofing systems and wall cladding systems.
   e) Interior non-load bearing walls.
   f) Ceiling systems
   g) Movable curtain/door systems.
   h) Storage shelving and racking systems.
   i) Proprietary Roof Guard and guard railing.
   j) Gymnasium equipment.
2. Structural design of non-structural elements to be carried out by Specialty Structural Engineers retained by the Contractor and/or Supplier of the non-structural elements in accordance with Part 4 of the Building Code for gravity and lateral loads.
3. Shop Drawings
   a) Submit to DNA four complete sets of shop drawings at least three weeks prior to fabrication.
   b) Shop drawings to indicate all design assumptions, design loads, loads imposed on building structure and connection details.
   c) Shop drawings must be signed and sealed by a British Columbia registered Professional Engineer for Structural design.
4. Specialty Engineers to submit schedules S-B and S-C and perform the necessary field reviews. See Submittals Section.
5. Structural design of the support and seismic restraint of electrical mechanical and plumbing equipment and systems shall be carried out by Specialty Engineers retained by the Contractor and/or supplier in accordance with Part 4 of the Building Code. Submit shop drawings, Letters of Assurance Schedules B and C-B to respective Electrical and Mechanical Engineer of Record for review.
6. Design connections to minimize torsion and/or torsion loading to the primary structure.

ABBREVIATIONS

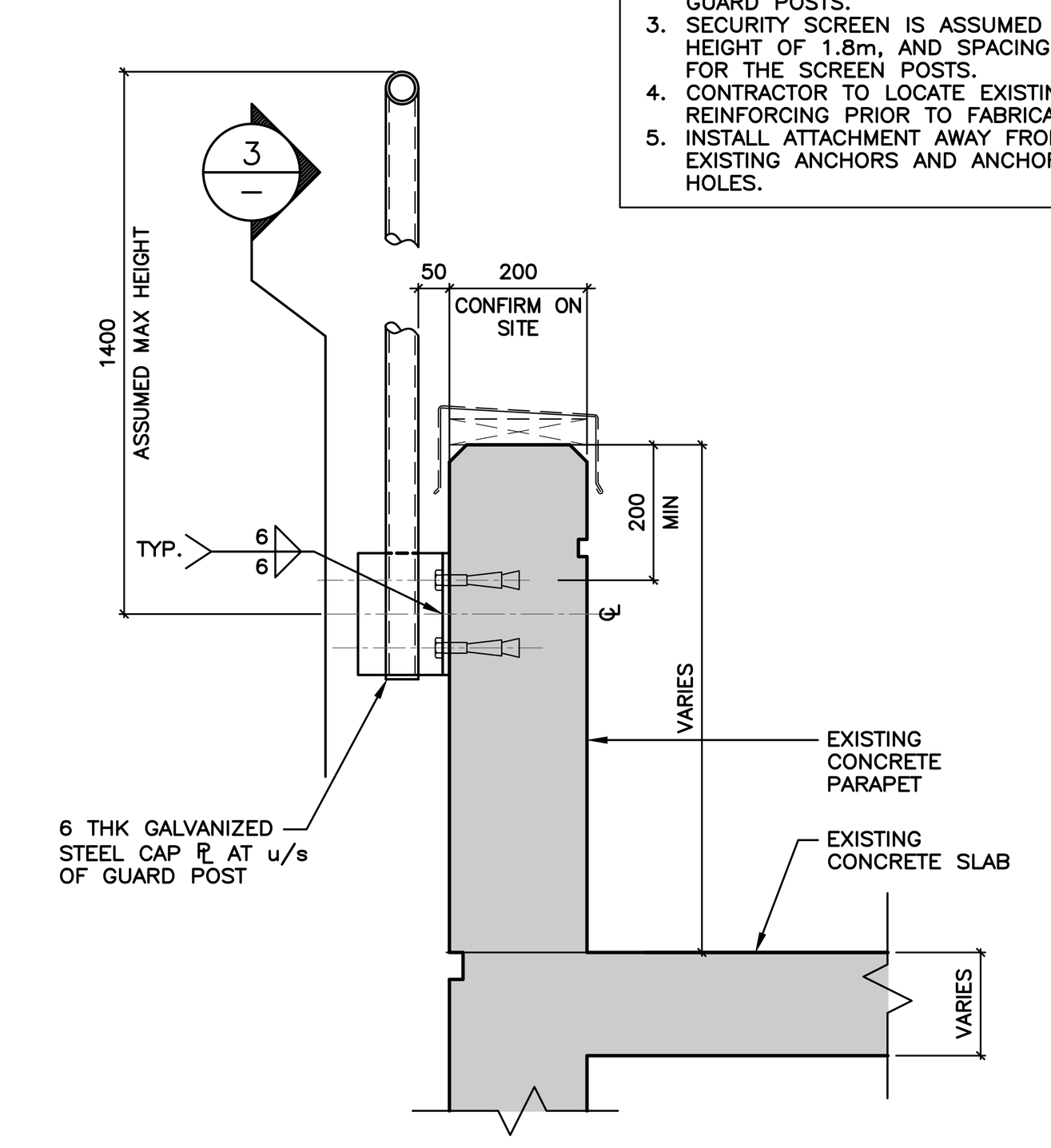
ABBREV.	DENOTES
ø	DIAMETER
±	PLUS OR MINUS
>	'GREATER THAN'
<	'LESS THAN'
#	'NUMBER'
AB	'ANCHOR BOLTS'
ALT	'ALTERNATE'
ARCH	'ARCHITECT(URAL)'
BCE	'BOTTOM CHORD EXTENSION'
BL or ℄	'BAY LINE'
BLDG	'BUILDING'
BLK	'BLOCK(ING)'
BLL	'BOTTOM LOWER LAYER'
BOT	'BOTTOM'
BP or BPL	'BASE PLATE'
BRG	'BEARING'
B/S	'BOTH SIDES'
BTWN	'BETWEEN'
B/U	'BUILT UP'
BUL	'BOTTOM UPPER LAYER'
B/W	'BOTH WAYS'
CANT	'CANTILEVER(ED)'
c/c	'CENTRE TO CENTRE'
C.J.	SLAB 'CONTROL/ /CONSTRUCTION JOINT'
CL	'CLEAR(ANCE)'
℄	'CENTRELINE'
COL	'COLUMN'
CONC	'CONCRETE'
CONT	'CONTINUOUS'
C/S	'COUNTERSINK'
c/w	'COMPLETE WITH'
DBL	'DOUBLE'
DET	'DETAIL'
DIAG	'DIAGONAL'
DIM	'DIMENSION'
DL	'DEAD LOAD'
DP	'DEEP'
DS	'DRAG STRUT'
DWG	'DRAWING(S)'
EA	'EACH'
E/E	'EACH END'
E/F	'EACH FACE'
EL	'ELEVATION'
EQ	'EQUAL(LY)'
E/S	'EACH SIDE'
E/W	'EACH WAY'
EXIST	'EXISTING'
EXT	'EXTERIOR'
FD	'FLOOR DRAIN'
FDN	'FOUNDATION'
F/F	'FAR FACE'
F/H	'FULL HEIGHT'
F/S	'FAR SIDE'
FT	'FEET'
FTG	'FOOTING(S)'
GA	'GAUGE'
GALV	'GALVANIZE(D)'
GC	'GENERAL CONTRACTOR'
GL	'GLULAM' or 'GLUE LAMINATED'
GRID	'GRIDLINE'
H	'HIGH'
H1E	REINFORCING BAR WITH 90° BEND ONE END
H2E	REINFORCING BAR WITH 90° BEND BOTH ENDS
HD	'HOLDOWN(S)'
HORIZ	'HORIZONTAL'
HSS	'HOLLOW STEEL SECTION'
HT	'HEIGHT'
IF	'INSIDE FACE'
ID	'INSIDE DIAMETER'
INT	'INTERIOR'
KD	'KILN DRIED'
LAT	'LATERAL'
LG	'LONG'
LL	'LIVE LOAD'
LLH	STEEL ANGLE 'LONG LEG HORIZONTAL'

ABBREV.	DENOTES
LLV	STEEL ANGLE 'LONG LEG VERTICAL'
LONGIT	'LONGITUDINAL'
LS	'LEFT SIDE'
LSL	'LAMINATED STRAND LUMBER'
LVL	'LAMINATED VENEER LUMBER'
LW	'LONG WAY'
M	'METRE(S)'
MECH	'MECHANICAL'
MEZZ	'MEZZANINE'
mm	'MILLIMETRE(S)'
N/F	'NEAR FACE'
N/S	'NEAR SIDE'
NTS	'NOT TO SCALE'
o/c	'ON CENTER'
OD	'OUTSIDE DIAMETER'
OF	'OUTSIDE FACE'
O.H.	'OPPOSITE HAND'
OSB	'ORIENTED STRAND BOARD'
OPP	'OPPOSITE'
OWSJ	'OPEN WEB STEEL JOIST'
PERP	'PERPENDICULAR'
PL or ℘	'PLATE'
PLL	'PARALLEL'
PLY	'PLYWOOD'
PSL	'PARALLEL STRAND LUMBER'
P.T.	'PRESSURE TREATED'
RD	'ROOF DRAIN'
REINF	'REINFORCE(MENT)' or 'REINFORCING'
REQ'D	'REQUIRED'
REV	'REVISION'
RS	'RIGHT SIDE'
r/w	'REINFORCED WITH'
RWL	'RAIN WATER LEADER'
SIM	'SIMILAR'
S.O.G.	'SLAB-ON-GRADE'
SQ	'SQUARE'
STAG	'STAGGERED'
STD	'STANDARD'
STIFF	'STIFFENER'
STIRR	'STIRRUP(S)'
SW	'SHORT WAY'
SYM	'SYMMETRY' or 'SYMMETRICAL'
T&B	'TOP AND BOTTOM'
T&G	'TONGUE AND GROOVE'
TEMP	'TEMPORARY'
THK	'THICK'
TL	'TOTAL LOAD'
TLL	'TOP LOWER LAYER'
T.O.	'TOP OF'
TRANS	'TRANSVERSE'
THRU	'THROUGH'
TUL	'TOP UPPER LAYER'
TYP	'TYPICAL'
UNO	'UNLESS NOTED OTHERWISE'
U/S	'UNDERSIDE OF'
VERT	'VERTICAL'
W	'WIDE'
w/	'WITH'
w/o	'WITHOUT'
WWM	'WELDED WIRE MESH'

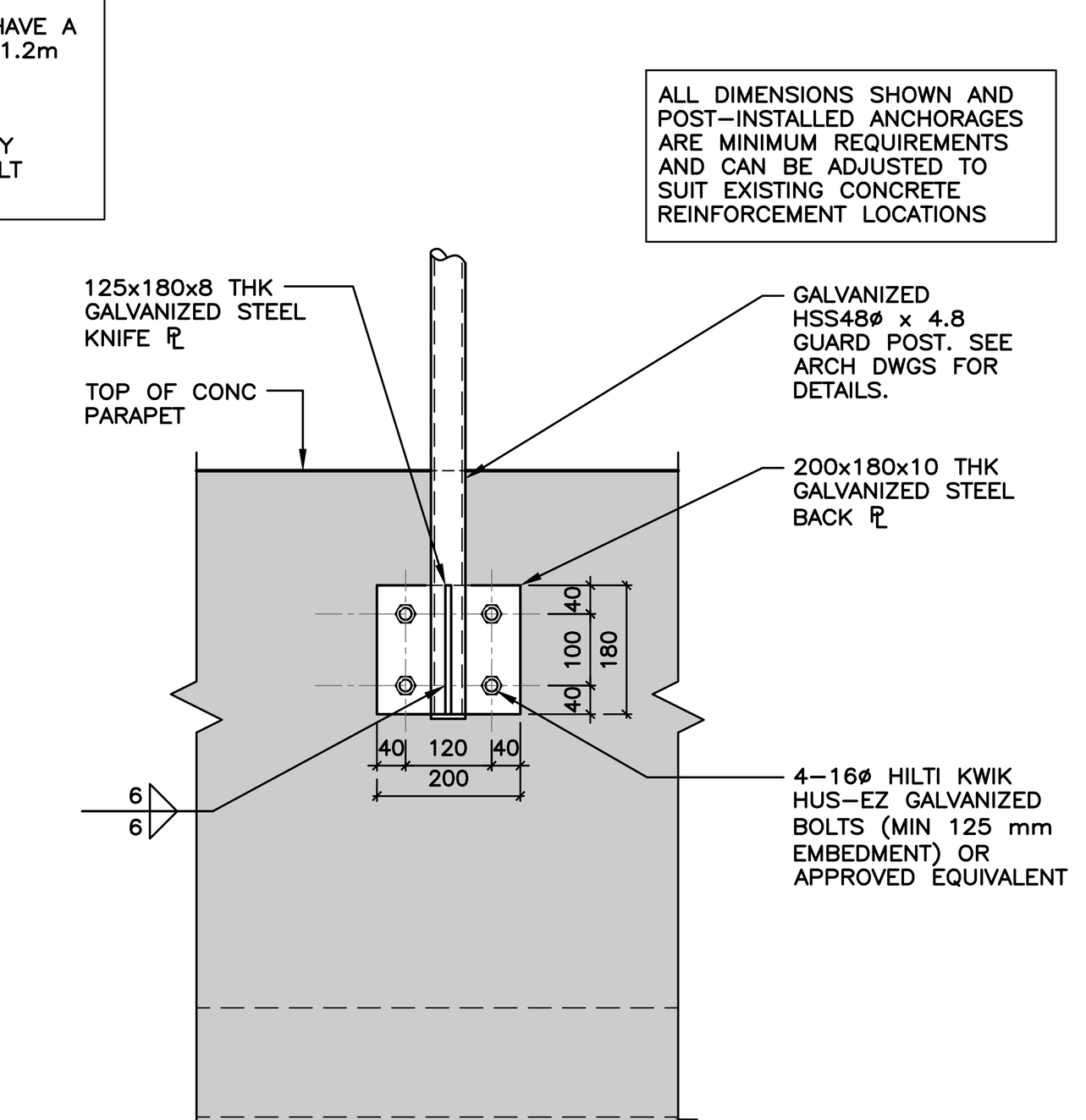


1 KEY PLAN
SCALE 1 : 100

NOTES:
1. CONTRACTOR TO VERIFY DIMENSIONS, DETAILS AND DEPTH OF EXISTING CONCRETE PRIOR TO FABRICATION. NOTIFY DNA OF ANY DISCREPANCIES WITH THE DETAILS SHOWN AS REVISIONS MAY BE REQUIRED.
2. PARAPET GUARD HAS BEEN DESIGNED WITH AN ASSUMED HEIGHT OF 1.4m, AND ASSUMED SPACING OF 1.2m FOR THE GUARD POSTS.
3. SECURITY SCREEN IS ASSUMED TO HAVE A HEIGHT OF 1.8m, AND SPACING OF 1.2m FOR THE SCREEN POSTS.
4. CONTRACTOR TO LOCATE EXISTING REINFORCING PRIOR TO FABRICATION.
5. INSTALL ATTACHMENT AWAY FROM ANY EXISTING ANCHORS AND ANCHOR BOLT HOLES.

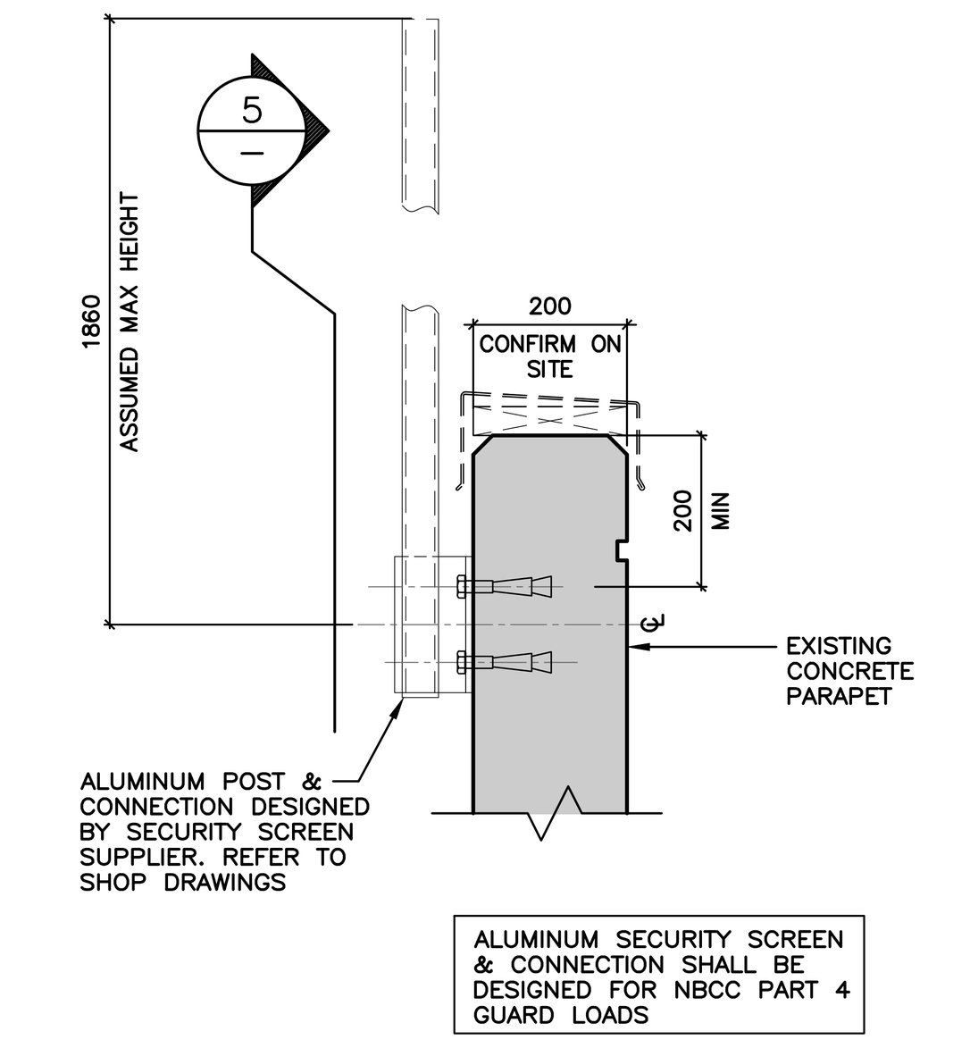


2 PARAPET GUARD SECTION
SCALE 1 : 10



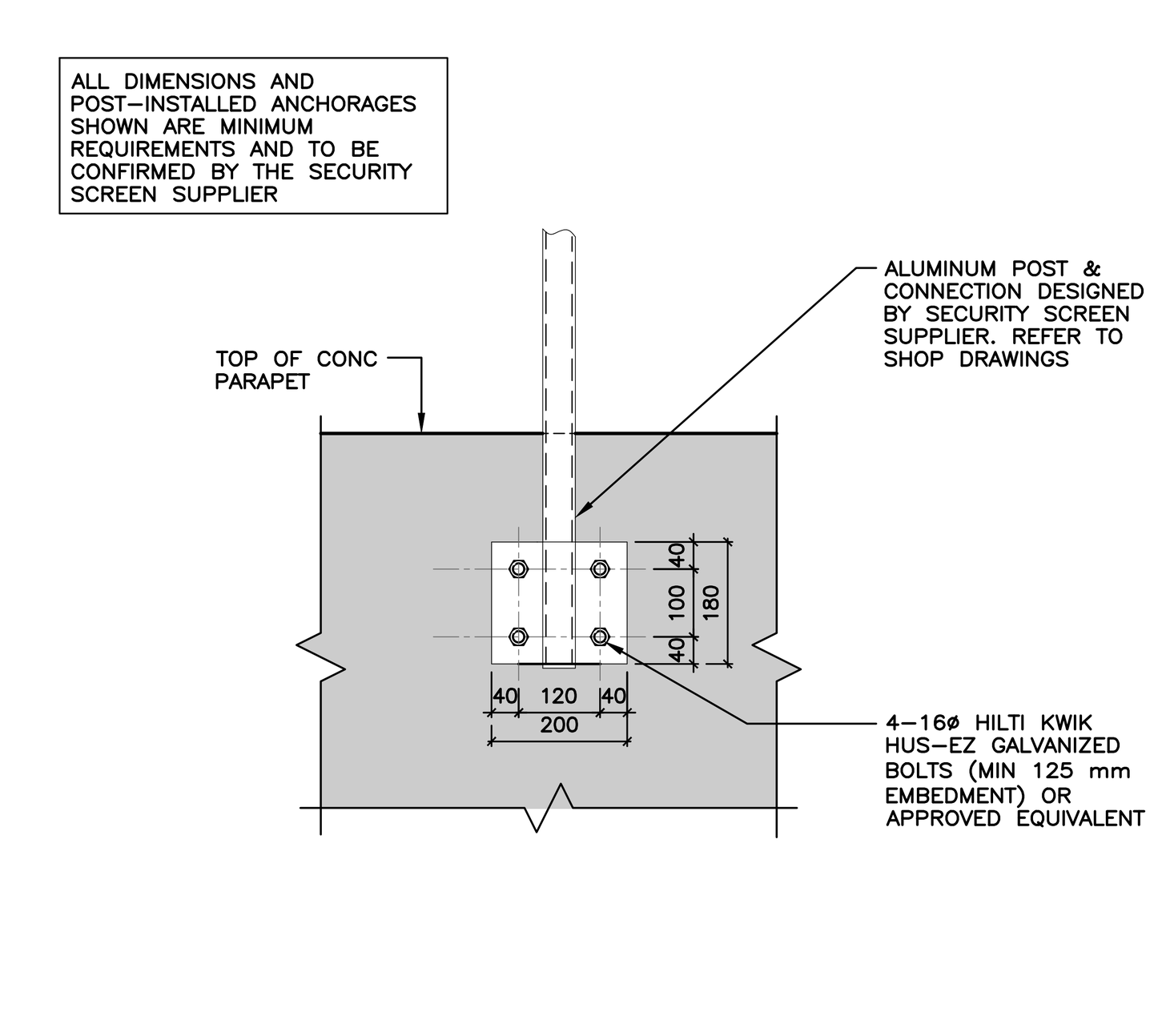
ALL DIMENSIONS SHOWN AND POST-INSTALLED ANCHORAGES ARE MINIMUM REQUIREMENTS AND CAN BE ADJUSTED TO SUIT EXISTING CONCRETE REINFORCEMENT LOCATIONS
125x180x8 THK GALVANIZED STEEL KNIFE ℘
TOP OF CONC PARAPET
GALVANIZED HSS48ø x 4.8 GUARD POST. SEE ARCH DWGS FOR DETAILS.
200x180x10 THK GALVANIZED STEEL BACK ℘
4-16ø HILTI KWIK HUS-EZ GALVANIZED BOLTS (MIN 125 mm EMBEDMENT) OR APPROVED EQUIVALENT
u/s CONC SLAB

3 PARAPET GUARD ELEVATION
SCALE 1 : 10



1800 ASSUMED MAX HEIGHT
200
CONFIRM ON SITE
200 MIN
EXISTING CONCRETE PARAPET
ALUMINUM POST & CONNECTION DESIGNED BY SECURITY SCREEN SUPPLIER. REFER TO SHOP DRAWINGS
ALUMINUM SECURITY SCREEN & CONNECTION SHALL BE DESIGNED FOR NBCC PART 4 GUARD LOADS

4 SECURITY SCREEN SECTION
SCALE 1 : 10



ALL DIMENSIONS AND POST-INSTALLED ANCHORAGES SHOWN ARE MINIMUM REQUIREMENTS AND TO BE CONFIRMED BY THE SECURITY SCREEN SUPPLIER
TOP OF CONC PARAPET
ALUMINUM POST & CONNECTION DESIGNED BY SECURITY SCREEN SUPPLIER. REFER TO SHOP DRAWINGS
4-16ø HILTI KWIK HUS-EZ GALVANIZED BOLTS (MIN 125 mm EMBEDMENT) OR APPROVED EQUIVALENT

5 SECURITY SCREEN ELEVATION
SCALE 1 : 10

DNA
project managers
planners
engineers
architects
David Nairne + Associates Ltd
Suite 250
171 West Esplanade
North Vancouver BC
CANADA V7M 3J9
T 604.984.3503
F 604.984.0627
E dna@davidnairne.com
W davidnairne.com

7
6
5
4
3
2
ISSUED FOR TENDER 2015.12.18 1
REVISIONS

DESIGNED BY: EW
CHECKED BY: LUM
DRAWN BY: SAL
DRAWING DATE: 2015-12-17
SCALE: AS SHOWN
CONSULTANT:

PROJECT NAME
Centre for Aquaculture and Environmental Research
ROOF REPLACEMENT

CLIENT
DEPARTMENT OF FISHERIES AND OCEANS
West Vancouver Lab

PROJECT ADDRESS
4160 Marine Drive
WEST VANCOUVER, BC

DRAWING TITLE
GENERAL STRUCTURAL NOTES, KEY PLAN & DETAILS

REVISION No. 1

PROJECT NUMBER 5437

S1.1

GENERAL STRUCTURAL NOTES

GENERAL

1. The following notes are minimum requirements unless noted otherwise on the structural drawings prepared by DAVID NAIRNE & ASSOCIATES LTD [DNA].
2. Read structural drawings in conjunction with all other consultants' drawings, contract documents and specifications.
3. Check and verify all dimensions, quantities and site conditions with architectural drawings before commencing with any work. Notify architect of any discrepancies.
4. The latest edition of the standards and codes referenced in these notes and on the Structural Drawings shall apply.
5. Do not construct from these drawings unless marked "Issued for Construction".
6. In the event of discrepancies in the specifications, drawings or contract documents, the more stringent requirement shall apply.
7. Notes and details specified on the plans and details take precedence over those in General Structural Notes, except for minimum requirements.
8. For conditions not explicitly shown, Contractor shall immediately request clarifications from the Structural Engineer.
9. Contractor to submit to DNA in writing all proposed alternate products, materials and structural systems for review at least 4 weeks prior to the start of construction.

FIELD REVIEW

1. Contractor is responsible for pre-inspecting the work and confirming completeness and conformity with the Structural Contract Documents prior to field review by DNA.
2. Notify DNA at least 48 hours in advance for field review of the following:
   a) Structural steel & connections — Prior to concealment
   b) Post installed anchorages: — Prior to adhesive installation
   c) Steel decking connections: — Prior to roofing
3. Work found to be incomplete or deficient may require additional field reviews at additional cost to the Contractor.
4. Our field review consists of a periodic review of the structural work only. It is not carried out for the Contractor's benefit, and it does not make DNA guarantors of the Contractor's work. The Contractor is responsible for his own quality control and shall perform the work with good workmanship in the conformance with the Contract Documents.

SUBMITTALS AND SHOP DRAWINGS

1. Contractor is responsible for overall coordination of sub-trades.
2. Submittals are items required by the Contract Documents to be submitted by the General Contractor, such as (but not limited to) request for payment, progress reports, shop drawings, manufacturer's literature on equipment, concrete mix designs, concrete test results, aggregate gradation reports, schedules, etc.
3. Suppliers shall prepare for DNA and submit to the General Contractor 4 complete sets of Shop Drawings for general compliance review prior to fabrication.
4. DNA will NOT review or assume responsibility for such matters as dimensions or quantities or the Contractor's safety measures or methods of construction.
5. Incomplete sets of Shop Drawings, or Shop Drawings prepared using reproductions of DNA Structural Drawings will NOT be accepted.
6. Submittal must be reviewed by the General Contractor prior to DNA's review.
7. Refer to the following sections for specific Shop Drawing requirements.

CONSTRUCTION

1. Drawings show completed structures only. Contractor is responsible for temporary bracing for all building elements against construction loading conditions and for construction erection procedures. Temporary support to be designed by a Professional Engineer registered in the Province of British Columbia in accordance with WorkSafeBC regulations and as required by local building authorities.
2. It is the sole responsibility of the Contractor to ensure that no part of the work is subjected to a load which will endanger the safety of the building or workers.
3. Protect structural work from adverse weather conditions and moisture prior to, during and after installation.
4. Contractor to compare all design drawings, dimensions and site conditions and notify DNA of any discrepancies prior to proceeding with the work.

STRUCTURAL DESIGN

1. The scope of work undertaken is a voluntary seismic upgrade of the structural roof diaphragm only for the existing workshop building, limited to the areas shown on the structural drawings. This is not a full seismic upgrade to the workshop building.

   Renovation work is limited to the seismic upgrade work, and other elements directly affected by the seismic work. In the completed structure it is expected that the existing building will be returned to its existing configuration with no revisions to any existing systems or function, including the following:

   - Building area — Plumbing, mechanical & sprinkler
   - Building occupancy — Electrical
   - Occupancy load — Fire rating systems
   - Existing — Exterior grades

   Seismic structural analysis and the proposed retrofit for this project are in accordance with the Seismic Retrofit Guidelines, 2nd Edition (SRG2), endorsed by APEGBC as good engineering practice.
   Upgrading design has been done as far as practical given the limitations of the available existing drawings information and limited knowledge of the actual construction.
   Modification of structural framing and/or details may be required if existing conditions are different from those shown on drawings. The contractor is to confirm all existing construction details shown on the drawings prior to fabrication or construction. The ductility and resistance of the building to seismic forces may be less than expected of a new buildings.
   Seismic upgrade of non structural components is also not included in the scope of work defined by these drawings.

2. Climatic Data:
   a) Ground Snow Load (1 in 50 year) Ss (1/50) = 2.4 kPa (50 psf)
   b) Rain Load (1 in 50 year) Sr (1/30) = 0.2 kPa (4.2 psf)
   c) 24-Hour Rain 150 mm (5.9 inch)

3. Seismic Data (for reference only, not used in design):
   a) Ground Motions Sa(0.2) = 0.889 Sa(0.5) = 0.624 Sa(1.0) = 0.329 Sa(2.0) = 0.171
   b) Peak Ground Acceleration PGA = 0.434
   c) Site Class D (Assumed)
   d) Roof Diaphragm Upgrade Prototype: D-4 Ductile Steel Deck Rmd=31.2%Wd

ROOF STEEL DECK

1. The existing steel roof deck shall remain, except where noted on the structural details. Upgrade existing steel deck fasteners as noted in the drawings.
2. Carry out work in accordance with CSA S136, CAN3-S16, CSSBI and Hilti standards.
3. Existing Roof Steel Deck Properties:
   a) Roof Decking 38mm (1 1/2") DP x 0.76 mm (22 Ga) Steel Roof Deck
   b) Sheet coverage: 900mm (36").
   c) Sheet span: 3-span continuous minimum
   d) Frame fastening: Screwed at 36/7
   e) Side lap fastening: Button punched at 300 mm o/c
   f) Perimeter fastening Welded at 300 mm o/c
4. New Roof Steel Deck Fastening – Refer to Steel Deck Diaphragm Schedule.
5. Installation and Training:
   a) Prior to the start of fastening the deck to the steel substrate, the decking contractor shall arrange for a Hilti representative to visit the site and provide applicable training to all installers.
   b) All installers that will be using the tools to attach the deck fasteners shall be trained and certified by a Hilti representative on the general use of powder actuated technology and fastening guidelines and be issued a Hilti training certificate confirming their completion of the training.
   c) The decking contractor shall arrange for the Hilti representative to visit the site at the midpoint and end of decking installation to review and confirm that decking fastening has been installed in accordance with Hilti Installation guidelines. The Hilti representative shall submit a letter to DNA after each review confirming that deck fasteners have been installed in general conformance with Hilti Specifications.
6. Submittals: Supplier shall provide the following submittals (refer to the Submittals section):
   g) Hilti training certificate for all installers
   h) Hilti field review letters

POST INSTALLED ANCHORAGES

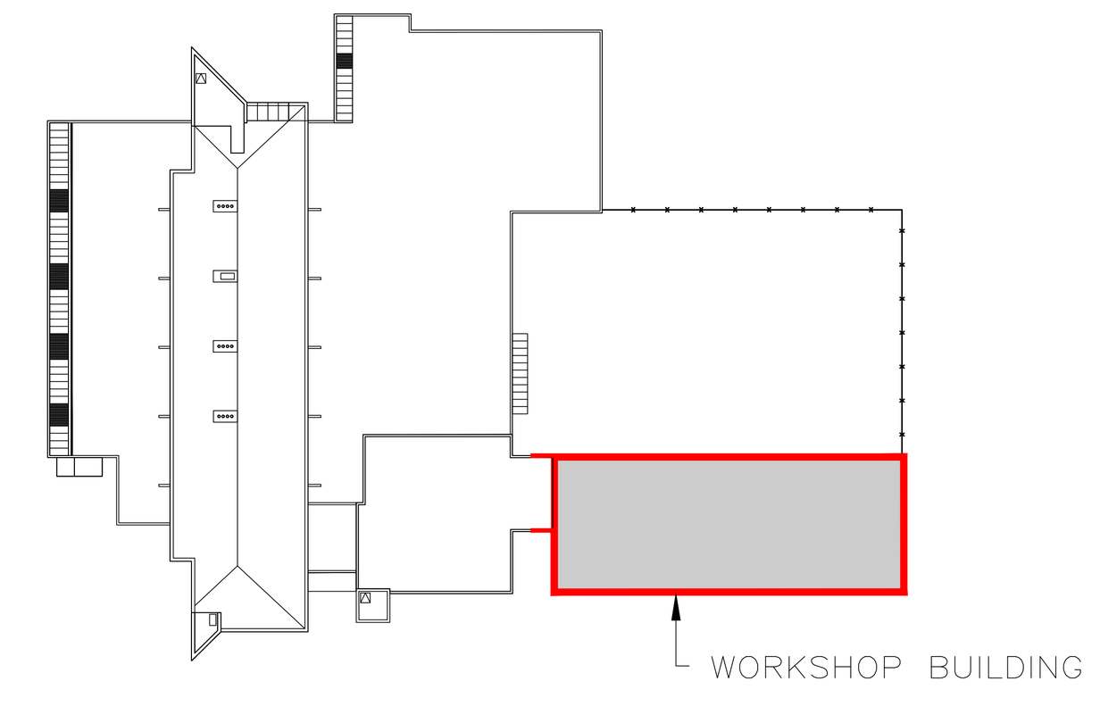
1. Provide adhesive at all drilled anchor and reinforcing steel locations indicated on structural drawings to depths of embedment indicated on drawings.
2. Products
   a) Adhesive used to install reinforcing steel and threaded rods in existing masonry shall be:
      i) Hilti HIT-HY 70 Adhesive System.
   b) Mechanical anchors to be as specified on drawings.
   c) A written request for the use of alternate products, with applicable technical specifications, must be submitted to, and approved by DNA prior to construction.
3. Documentation & Training
   a) The Contractor shall have copies of product literature and installation guides on site.
   b) Prior to construction, the Contractor shall arrange for on-site training of all installers for all post-installed anchor types to be used.
4. Execution
   a) Installation shall be in strict accordance with manufacturer's recommendations. Special attention is drawn to the minimum temperature requirements.
   b) Anchor capacity is dependant upon spacing between adjacent anchors and proximity of anchors to edge of concrete. Install anchors in accordance with spacing and edge clearances indicated on the drawings.
   c) Drilling of holes through existing reinforced steel in concrete block is prohibited. If encountered, abandon hole location and start a new hole away from reinforcing steel locations. Patch all unused holes.
5. Field Review by Consultant:
   a) For adhesive anchors, Contractor shall notify DNA for field review of drilled holes prior to installing adhesive.
   b) Installing adhesive without notifying DNA for field review may result in the implementation of an anchor testing program at DNA's discretion. The cost for the anchor testing program would be at the cost of the Contractor.
6. Submittals
   a) Submit to DNA copies of all installers' training certificates prior to installation of post-installed anchors.

STRUCTURAL STEEL, MISCELLANEOUS STEEL & CONNECTIONS

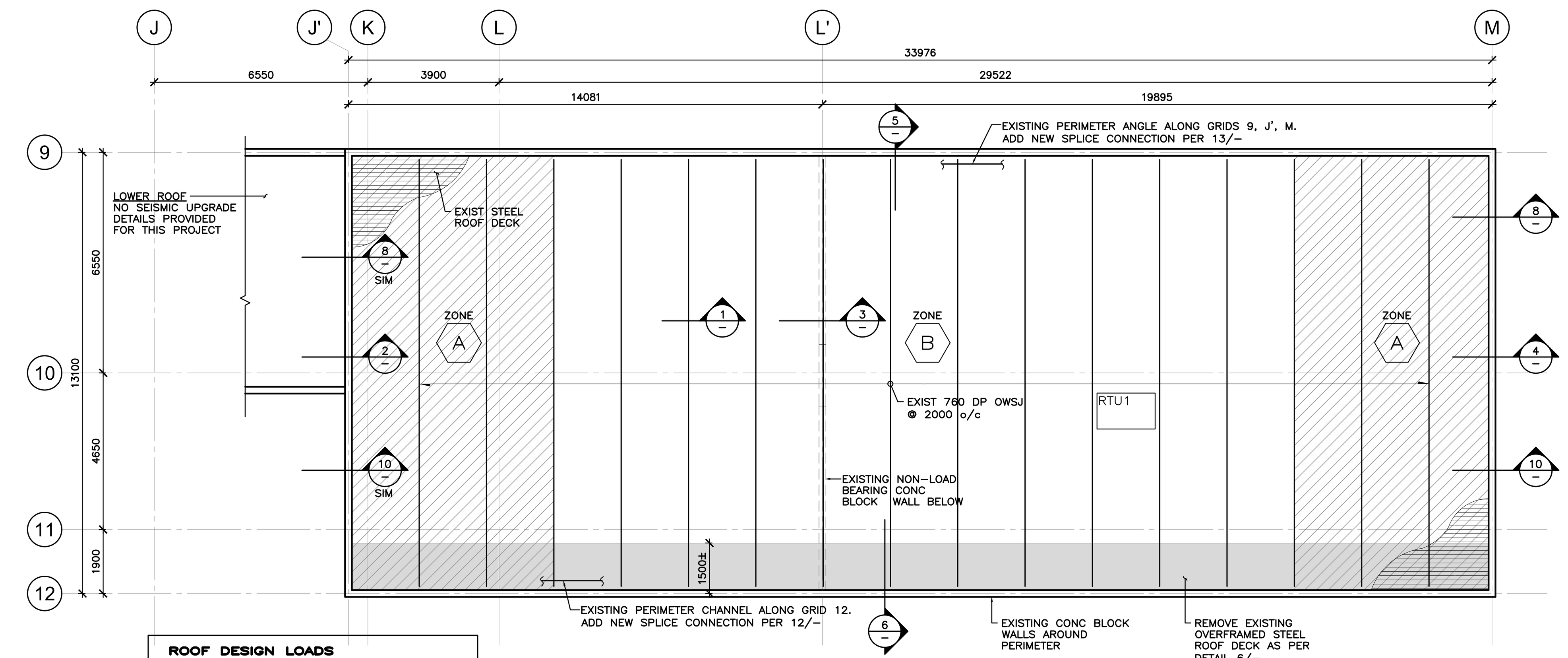
1. Fabricate and erect structural steel to CSA S-16 Division 2 certification or better.
2. Structural steel shall conform to CSA G40.21 with the following grades:
   a) Angles & Channels: Grade 300W
   b) Plates & Miscellaneous steel: Grade 300W
   c) Connection Bolts: i) Steel to steel connections: ASTM A325; ii) Steel to concrete block Hilti HAS ROD
   d) Finish: Primed & painted
3. All welding shall conform to CSA W59, W55.3 and W186 – Reinforcing Bars and shall be performed by fabricators fully certified by the Canadian Welding Bureau to the requirements of CSA W47.1.
5. Supplier to confirm all dimensions and site conditions of structure prior to fabrication.
6. Submittals: Supplier shall provide the following submittals (refer to the Submittals section):
   a) Shop Drawings.
   b) Certificates showing that the fabricator & field welders are fully certified by the Canadian Welding Bureau.

ABBREVIATIONS

ABBREV.	DENOTES	ABBREV.	DENOTES
ø	DIAMETER	INT	'INTERIOR'
±	PLUS OR MINUS	KD	'KILN DRIED'
>	'GREATER THAN'	LAT	'LATERAL'
<	'LESS THAN'	LG	'LONG'
#	'NUMBER'	LL	'LIVE LOAD'
AB	'ANCHOR BOLTS'	LLH	STEEL ANGLE 'LONG LEG HORIZONTAL'
ALT	'ALTERNATE'	LLV	STEEL ANGLE 'LONG LEG VERTICAL'
ARCH	'ARCHITECT(URAL)'	LONGIT	'LONGITUDINAL'
BCE	'BOTTOM CHORD EXTENSION'	LS	'LEFT SIDE'
BL or BL	'BAY LINE'	LSL	'LAMINATED STRAND LUMBER'
BLDG	'BUILDING'	LVL	'LAMINATED VENEER LUMBER'
BLK	'BLOCK(ING)'	LW	'LONG WAY'
BLL	'BOTTOM LOWER LAYER'	M	'METRE(S)'
BOT	'BOTTOM'	MECH	'MECHANICAL'
BP or BPL	'BASE PLATE'	MEZZ	'MEZZANINE'
BRG	'BEARING'	mm	'MILLIMETRE(S)'
B/S	'BOTH SIDES'	N/F	'NEAR FACE'
BTWN	'BETWEEN'	N/S	'NEAR SIDE'
B/U	'BUILT UP'	NTS	'NOT TO SCALE'
BUL	'BOTTOM UPPER LAYER'	o/c	'ON CENTER'
B/W	'BOTH WAYS'	OD	'OUTSIDE DIAMETER'
CANT	'CANTILEVER(ED)'	OF	'OUTSIDE FACE'
c/c	'CENTRE TO CENTRE'	O.H.	'OPPOSITE HAND'
C.J.	SLAB 'CONTROL/ /CONSTRUCTION JOINT'	OSB	'ORIENTED STRAND BOARD'
CL	'CLEAR(ANCE)'	OPP	'OPPOSITE'
℄	'CENTRELINE'	OWSJ	'OPEN WEB STEEL JOIST'
COL	'COLUMN'	PERP	'PERPENDICULAR'
CONC	'CONCRETE'	PL or PL	'PLATE'
CONT	'CONTINUOUS'	PLL	'PARALLEL'
C/S	'COUNTERSINK'	PLY	'PLYWOOD'
c/w	'COMPLETE WITH'	PSL	'PARALLEL STRAND LUMBER'
DBL	'DOUBLE'	P.T.	'PRESSURE TREATED'
DET	'DETAIL'	RD	'ROOF DRAIN'
DIAG	'DIAGONAL'	REINF	'REINFORCE(MENT)' or 'REINFORCING'
DIM	'DIMENSION'	REQ'D	'REQUIRED'
DL	'DEAD LOAD'	REV	'REVISION'
DP	'DEEP'	RS	'RIGHT SIDE'
DS	'DRAG STRUT'	r/w	'REINFORCED WITH'
DWG	'DRAWING(S)'	RWL	'RAIN WATER LEADER'
EA	'EACH'	SIM	'SIMILAR'
E/E	'EACH END'	S.O.G.	'SLAB-ON-GRADE'
E/F	'EACH FACE'	SQ	'SQUARE'
EL	'ELEVATION'	STAG	'STAGGERED'
EQ	'EQUAL(LY)'	STD	'STANDARD'
E/S	'EACH SIDE'	STIFF	'STIFFENER'
E/W	'EACH WAY'	STIRR	'STIRRUP(S)'
EXIST	'EXISTING'	SW	'SHORT WAY'
EXT	'EXTERIOR'	SYM	'SYMMETRY' or 'SYMMETRICAL'
FD	'FLOOR DRAIN'	T&B	'TOP AND BOTTOM'
FDN	'FOUNDATION'	T&G	'TONGUE AND GROOVE'
F/F	'FAR FACE'	TEMP	'TEMPORARY'
F/H	'FULL HEIGHT'	THK	'THICK'
F/S	'FAR SIDE'	TL	'TOTAL LOAD'
FT	'FEET'	TLL	'TOP LOWER LAYER'
FTG	'FOOTING(S)'	T.O.	'TOP OF'
GA	'GAUGE'	TRANS	'TRANSVERSE'
GALV	'GALVANIZE(D)'	THRU	'THROUGH'
GC	'GENERAL CONTRACTOR'	TUL	'TOP UPPER LAYER'
GL	'GLULAM' or 'GLUE LAMINATED'	TYP	'TYPICAL'
GRID	'GRIDLINE'	UNO	'UNLESS NOTED OTHERWISE'
H	'HIGH'	U/S	'UNDERSIDE OF'
H1E	REINFORCING BAR WITH 90° BEND ONE END	VERT	'VERTICAL'
H2E	REINFORCING BAR WITH 90° BEND BOTH ENDS	W	'WIDE'
HD	'HOLDOWN(S)'	w/	'WITH'
HORIZ	'HORIZONTAL'	w/o	'WITHOUT'
HSS	'HOLLOW STEEL SECTION'	WWM	'WELDED WIRE MESH'
HT	'HEIGHT'		
IF	'INSIDE FACE'		
ID	'INSIDE DIAMETER'		



A KEY PLAN
S2.1 N.T.S.



J
J'
K
L
L'
M
33976
6550
3900
29522
14081
19895
9
10
11
12
LOWER ROOF
NO SEISMIC UPGRADE
DETAILS PROVIDED
FOR THIS PROJECT
EXISTING PERIMETER ANGLE ALONG GRIDS 9, J', M.
ADD NEW SPLICE CONNECTION PER 13/-
EXIST STEEL ROOF DECK
ZONE A
ZONE B
ZONE A
EXIST 760 DP OWSJ @ 2000 o/c
RTU1
EXISTING NON-LOAD BEARING CONC BLOCK WALL BELOW
EXISTING PERIMETER CHANNEL ALONG GRID 12.
ADD NEW SPLICE CONNECTION PER 12/-
EXISTING CONC BLOCK WALLS AROUND PERIMETER
REMOVE EXISTING OVERFRAMED STEEL ROOF DECK AS PER DETAIL 6/-
ROOF DESIGN LOADS
SPECIFIED ROOF DL=1.25 kPa (INCLUDING OWSJ)
SPECIFIED ROOF SL=2.12 kPa
JOIST SPACING = 2000mm

B ROOF FRAMING PLAN
S2.1 SCALE 1 : 100

STEEL ROOF DECK DIAPHRAGM SCHEDULE

ZONE	EXIST DECK THICKNESS (GAUGE)	NEW FRAME FASTENER	FASTENING PATTERNS	NEW SIDE LAP FASTENER SPACING	MIN FACTORED DECK SHEAR CAPACITY REQ'D
A	22 ga	X-HSN24	36/9 (914/9)	75mm	28 kN/m
B	22 ga	X-HSN24	36/7 (914/7)	125mm	22 kN/m

ROOF DECK FASTENING PATTERNS

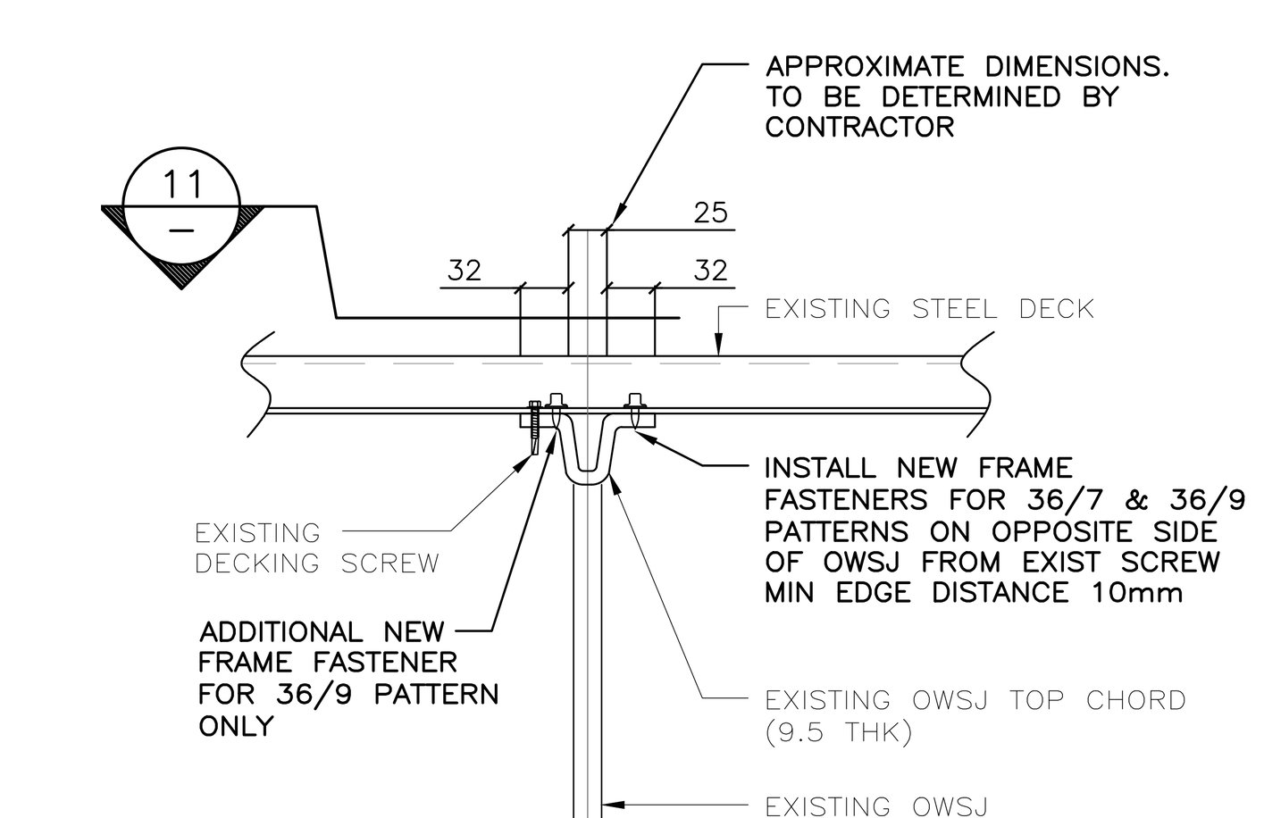
DECK SHEET LENGTH = 914 (36")

36/9 PATTERN — SEE DETAILS 1/- & 11/-

36/7 PATTERN

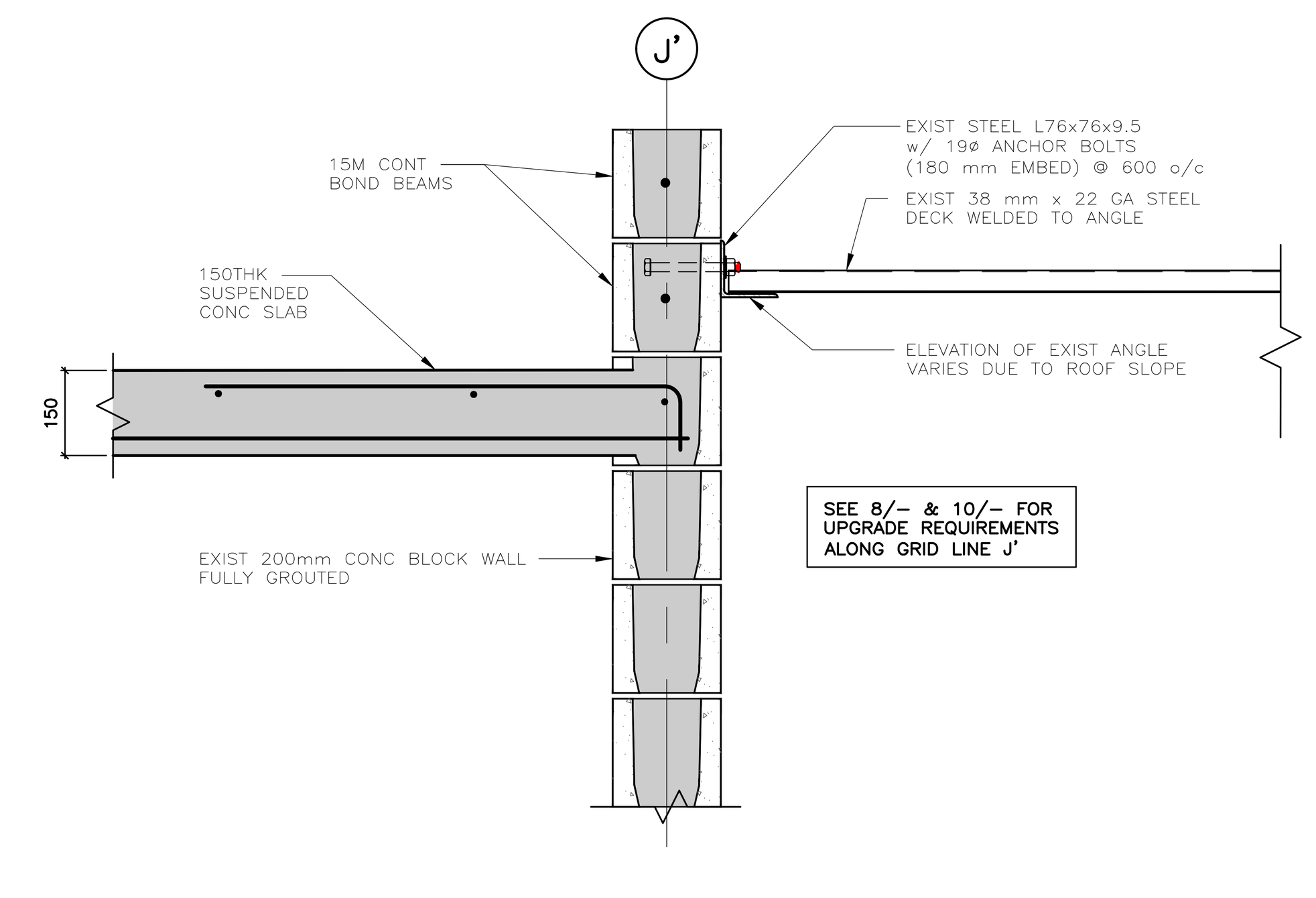
NOTES:

1. STEEL ROOF DECK: EXISTING 38mm DPx 0.76mm (22 ga)
2. FRAME CONNECTION: HILTI POWDER ACTUATED DRIVE PINS: HILTI X-HSN 24. CONTRACTOR TO VERIFY THICKNESS OF STEEL SUBSTRATES ON SITE PRIOR TO CONSTRUCTION. FOR SUBSTRATE THICKNESS >10mm, USE HILTI X-ENP-19
3. SIDELAP CONNECTION: HILTI S-SLC 01 M HWH. SEE 7/-
4. PERIMETER FASTENING: PERPENDICULAR TO FLUTE — HILTI DRIVE PINS 36/9 FASTENING PATTERN; PARALLEL TO FLUTE — HILTI DRIVE PINS @ 75 o/c; OWSJ AT GRID L' — 2 ROWS HILTI DRIVE PINS @ 36/7 FASTENING PATTERN
5. STEEL DECK DIAPHRAGM HAS BEEN DESIGNED WITH PROTOTYPE D-4, Rmd=31.2%Wd
6. MIN. FACTORED DECK SHEAR CAPACITY TO BE NO LESS THAN 22 kN/m U.N.O.
7. SEE ADDITIONAL NOTES FOR ROOF STEEL DECK.

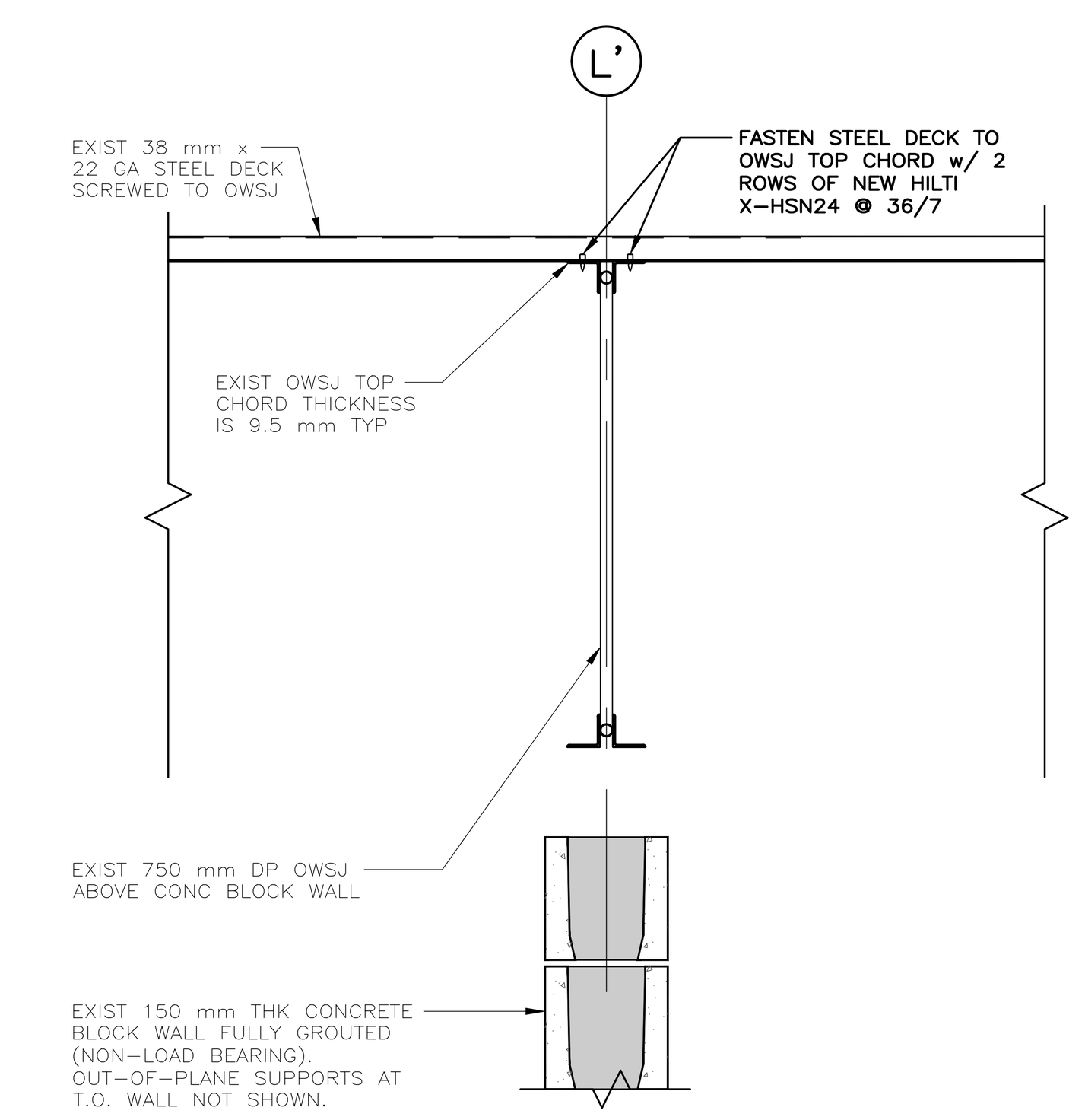


APPROXIMATE DIMENSIONS. TO BE DETERMINED BY CONTRACTOR
EXISTING STEEL DECK
INSTALL NEW FRAME FASTENERS FOR 36/7 & 36/9 PATTERNS ON OPPOSITE SIDE OF OWSJ FROM EXIST SCREW MIN EDGE DISTANCE 10mm
EXISTING DECKING SCREW
ADDITIONAL NEW FRAME FASTENER FOR 36/9 PATTERN ONLY
EXISTING OWSJ TOP CHORD (9.5 THK)
EXISTING OWSJ

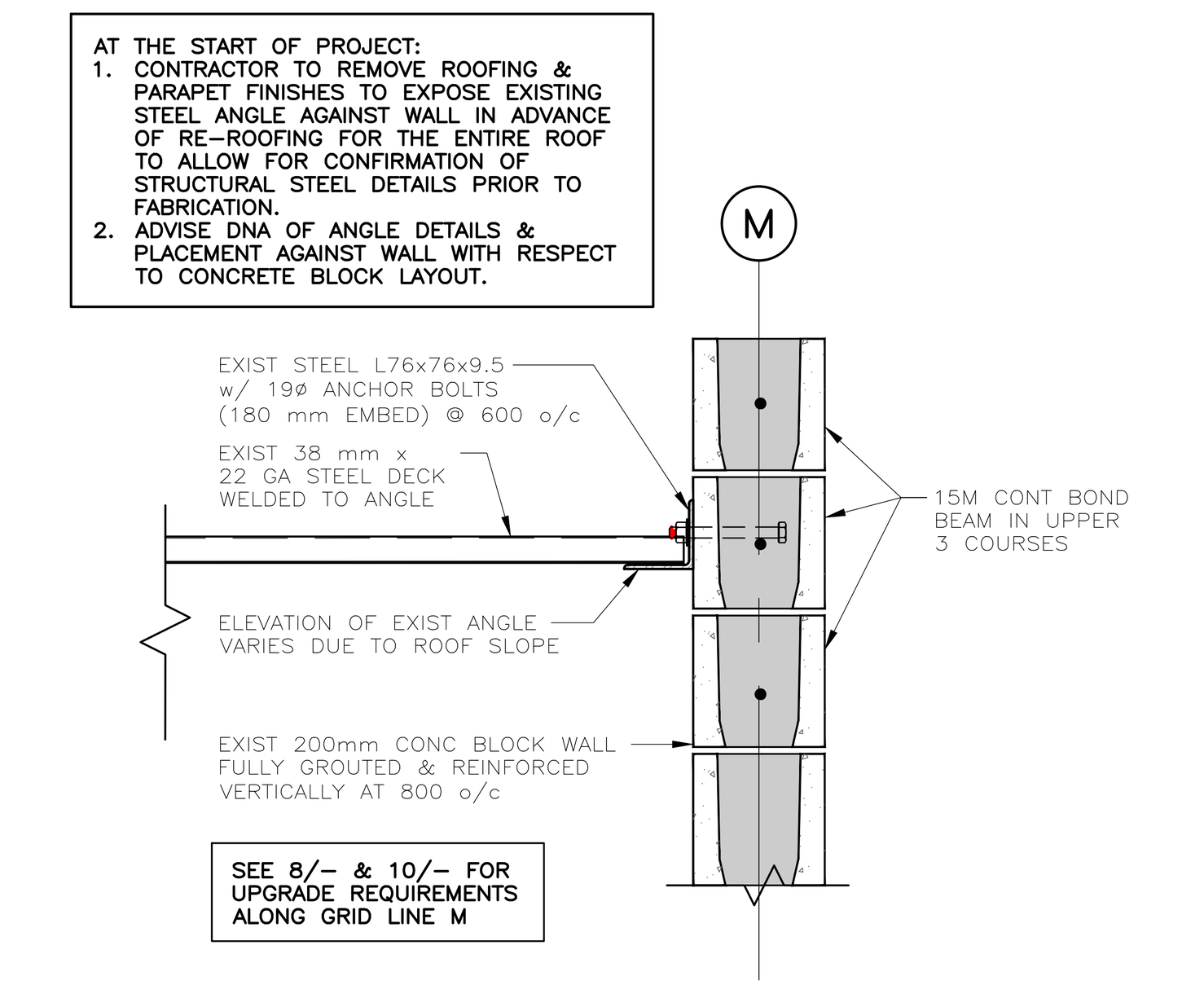
1 SECTION
TYP SCALE 1 : 5



2 EXIST SECTION AT GRID J'
SCALE 1 : 10

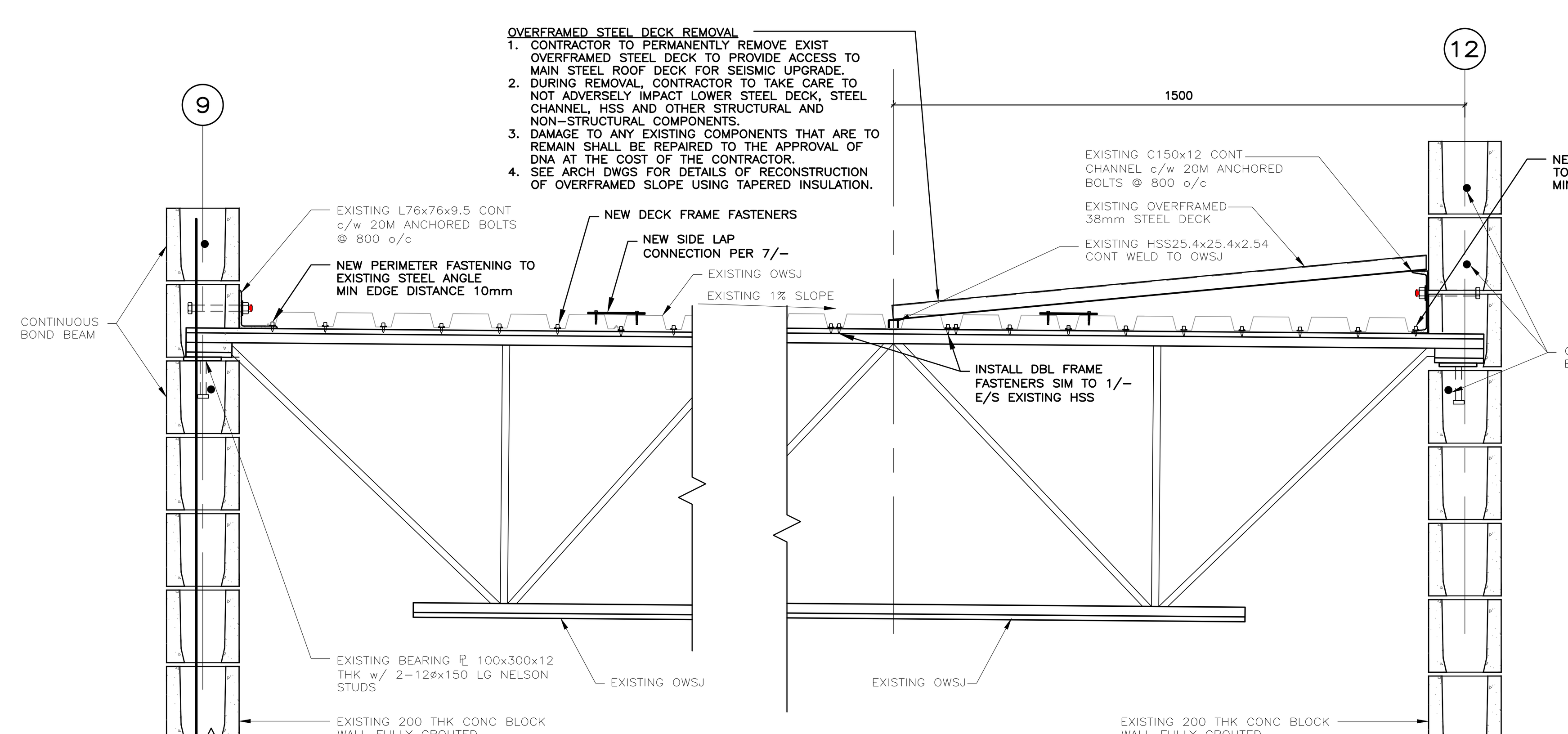


3 STEEL DECK AT NON-LOAD BEARING MASONRY WALL
SCALE 1 : 10



AT THE START OF PROJECT:
1. CONTRACTOR TO REMOVE ROOFING & PARAPET FINISHES TO EXPOSE EXISTING STEEL ANGLE AGAINST WALL IN ADVANCE OF RE-ROOFING FOR THE ENTIRE ROOF TO ALLOW FOR CONFIRMATION OF STRUCTURAL STEEL DETAILS PRIOR TO FABRICATION.
2. ADVISE DNA OF ANGLE DETAILS & PLACEMENT AGAINST WALL WITH RESPECT TO CONCRETE BLOCK LAYOUT.
M
SEE 8/- & 10/- FOR UPGRADE REQUIREMENTS ALONG GRID LINE M

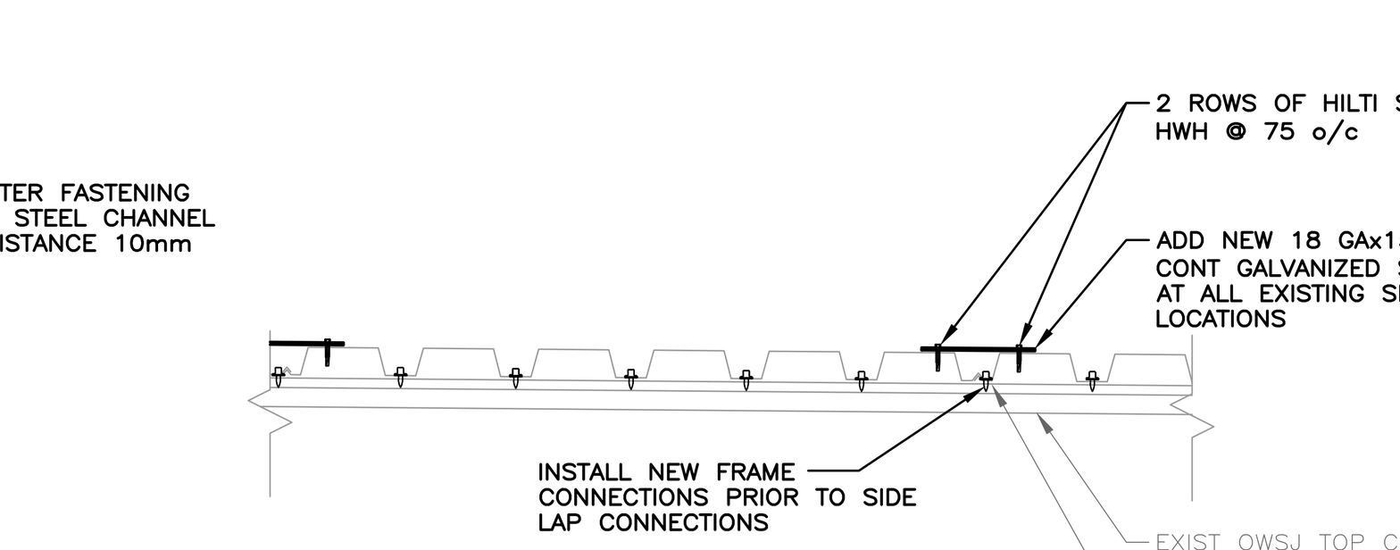
4 EXIST SECTION AT GRID M
SCALE 1 : 10



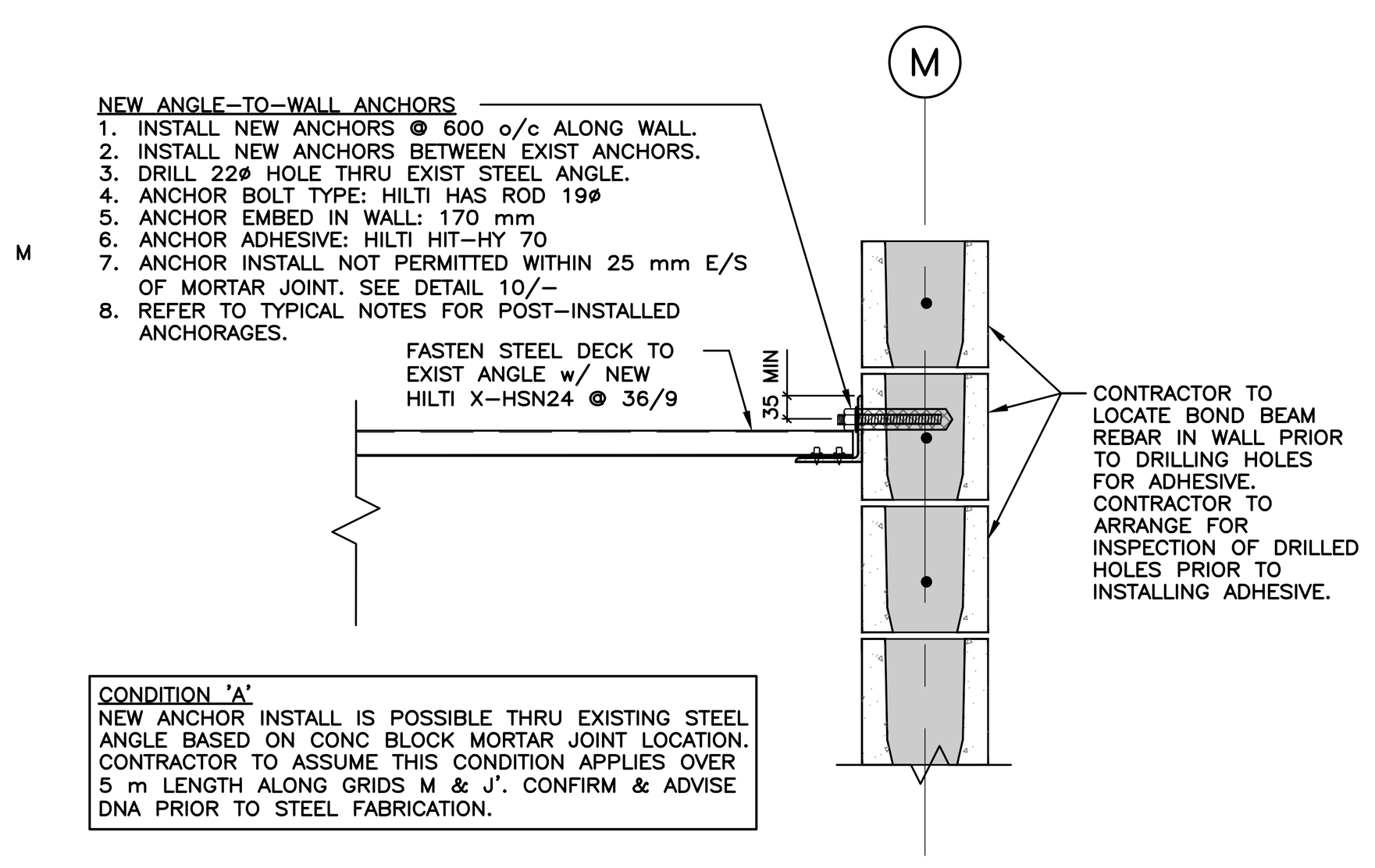
9
12
1500
NEW PERIMETER FASTENING TO EXISTING STEEL CHANNEL MIN EDGE DISTANCE 10mm
NEW PERIMETER FASTENING TO EXISTING STEEL ANGLE MIN EDGE DISTANCE 10mm
NEW DECK FRAME FASTENERS
NEW SIDE LAP CONNECTION PER 7/-
INSTALL DBL FRAME FASTENERS SIM TO 1/- E/S EXISTING HSS
OVERFRAMED STEEL DECK REMOVAL
1. CONTRACTOR TO PERMANENTLY REMOVE EXIST OVERFRAMED STEEL DECK TO PROVIDE ACCESS TO MAIN STEEL ROOF DECK FOR SEISMIC UPGRADE.
2. DURING REMOVAL, CONTRACTOR TO TAKE CARE TO NOT ADVERSELY IMPACT LOWER STEEL DECK, STEEL CHANNEL, HSS AND OTHER STRUCTURAL AND NON-STRUCTURAL COMPONENTS.
3. DAMAGE TO ANY EXISTING COMPONENTS THAT ARE TO REMAIN SHALL BE REPAIRED TO THE APPROVAL OF DNA AT THE COST OF THE CONTRACTOR.
4. SEE ARCH DWGS FOR DETAILS OF RECONSTRUCTION OF OVERFRAMED SLOPE USING TAPERED INSULATION.

5 SECTION
SCALE 1 : 10

6 SECTION
SCALE 1 : 10

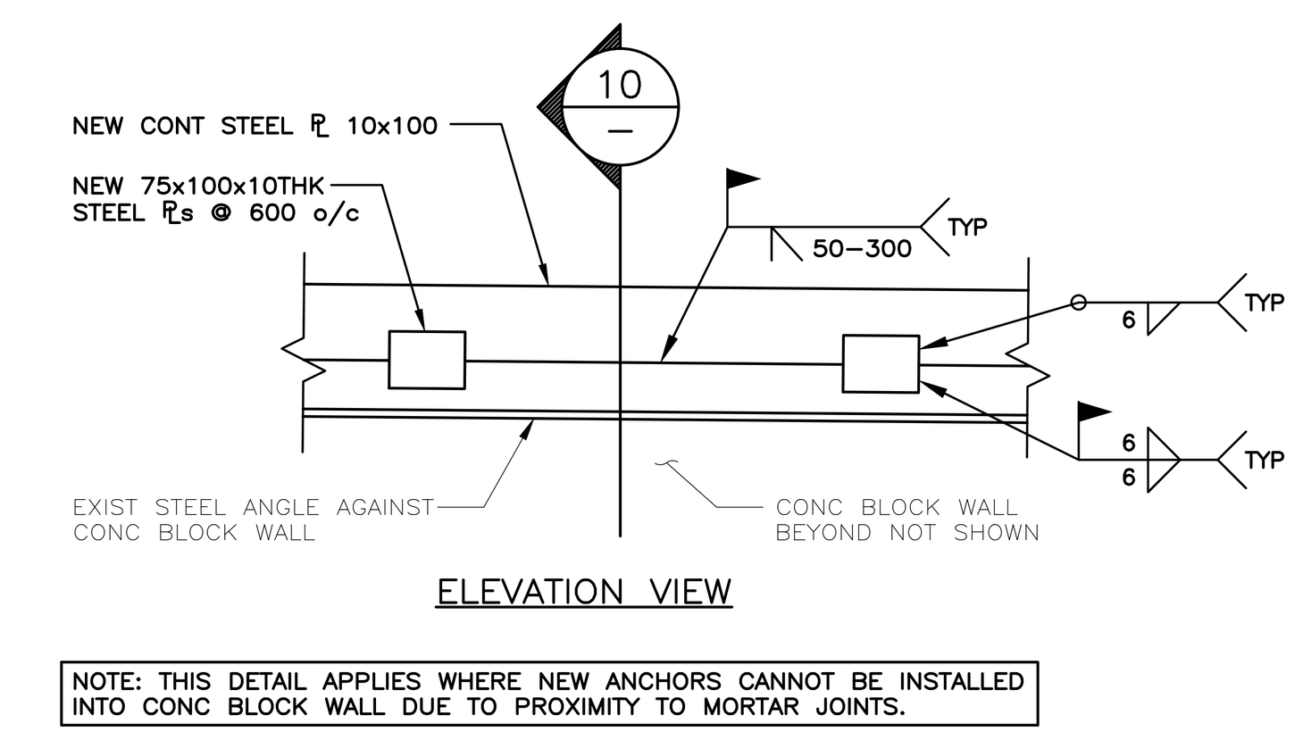


7 DECK SIDE LAP CONNECTION
SCALE 1 : 10

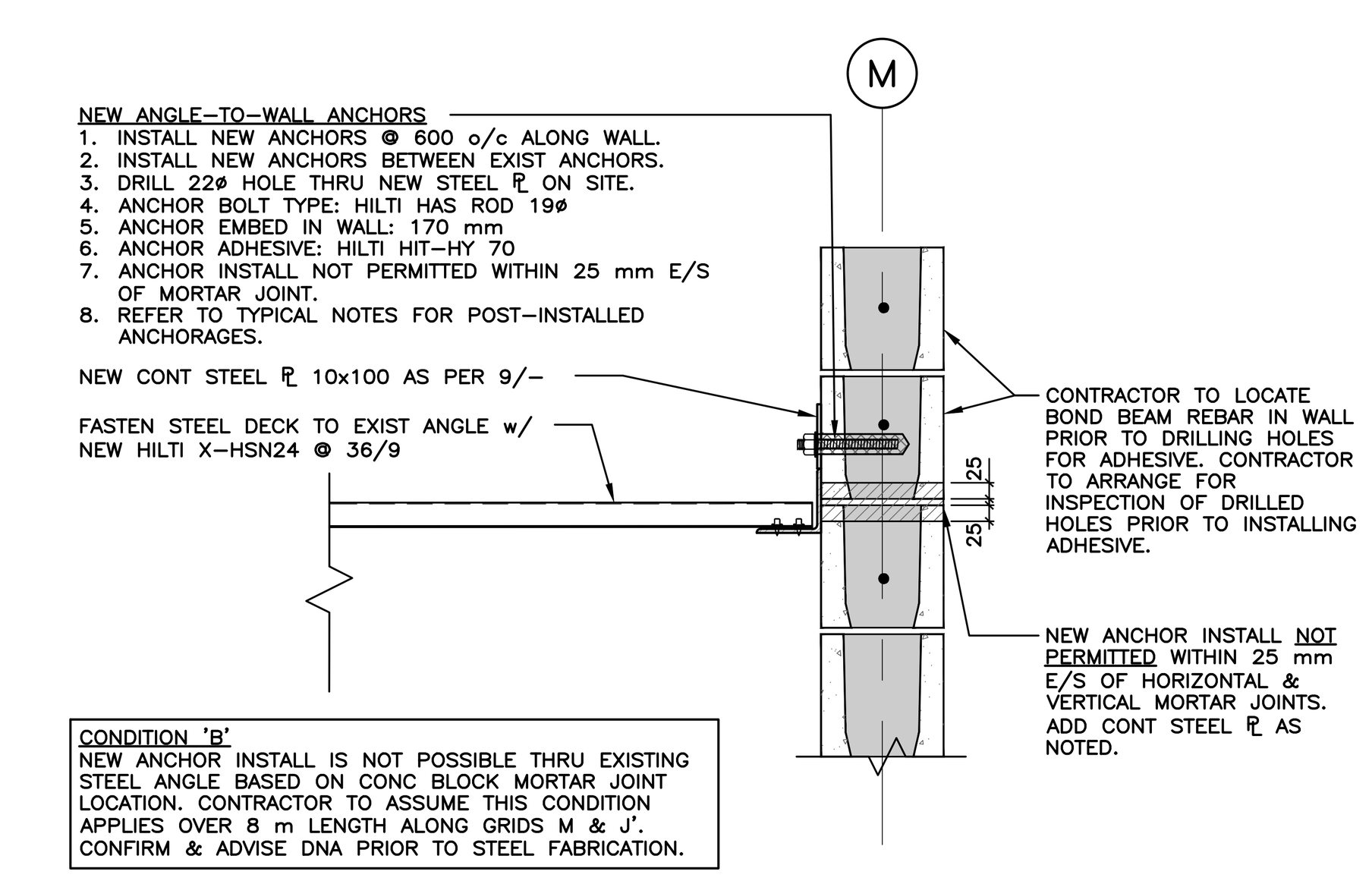


M
NEW ANGLE-TO-WALL ANCHORS
1. INSTALL NEW ANCHORS @ 600 o/c ALONG WALL.
2. INSTALL NEW ANCHORS BETWEEN EXIST ANCHORS.
3. DRILL 22ø HOLE THRU EXIST STEEL ANGLE.
4. ANCHOR BOLT TYPE: HILTI HAS ROD 19ø
5. ANCHOR EMBED IN WALL: 170 mm
6. ANCHOR ADHESIVE: HILTI HIT-HY 70
7. ANCHOR INSTALL NOT PERMITTED WITHIN 25 mm E/S OF MORTAR JOINT. SEE DETAIL 10/-
8. REFER TO TYPICAL NOTES FOR POST-INSTALLED ANCHORAGES.
FASTEN STEEL DECK TO EXIST ANGLE w/ NEW HILTI X-HSN24 @ 36/9
CONTRACTOR TO LOCATE BOND BEAM REBAR IN WALL PRIOR TO DRILLING HOLES FOR ADHESIVE. CONTRACTOR TO ARRANGE FOR INSPECTION OF DRILLED HOLES PRIOR TO INSTALLING ADHESIVE.
CONDITION 'A'
NEW ANCHOR INSTALL IS POSSIBLE THRU EXISTING STEEL ANGLE BASED ON CONC BLOCK MORTAR JOINT LOCATION. CONTRACTOR TO ASSUME THIS CONDITION APPLIES OVER 5 m LENGTH ALONG GRIDS M & J'. CONFIRM & ADVISE DNA PRIOR TO STEEL FABRICATION.

8 NEW SECTION AT GRID M
SCALE 1 : 10

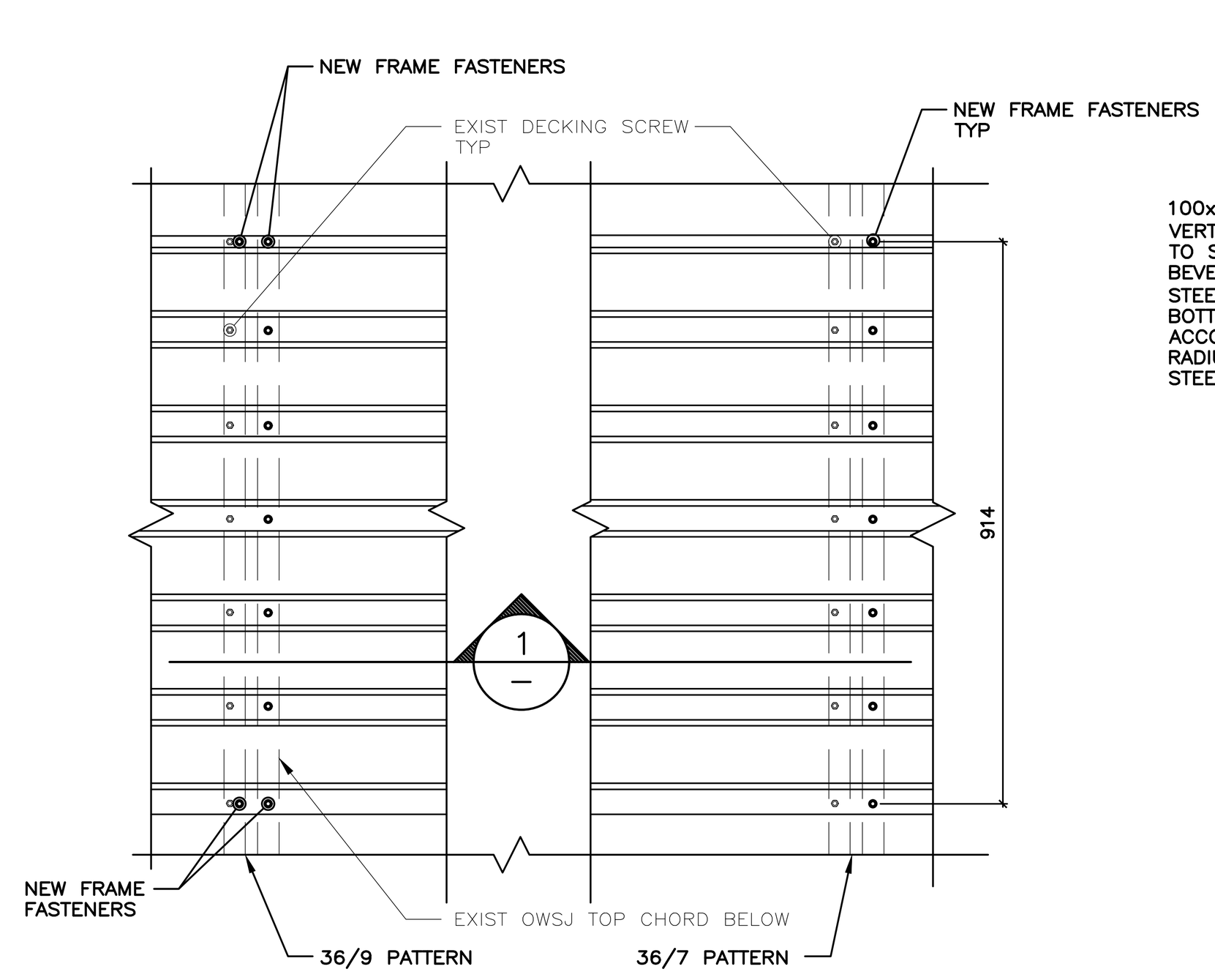


9 NEW STEEL ANGLE SPLICE PLATE
SCALE 1 : 10

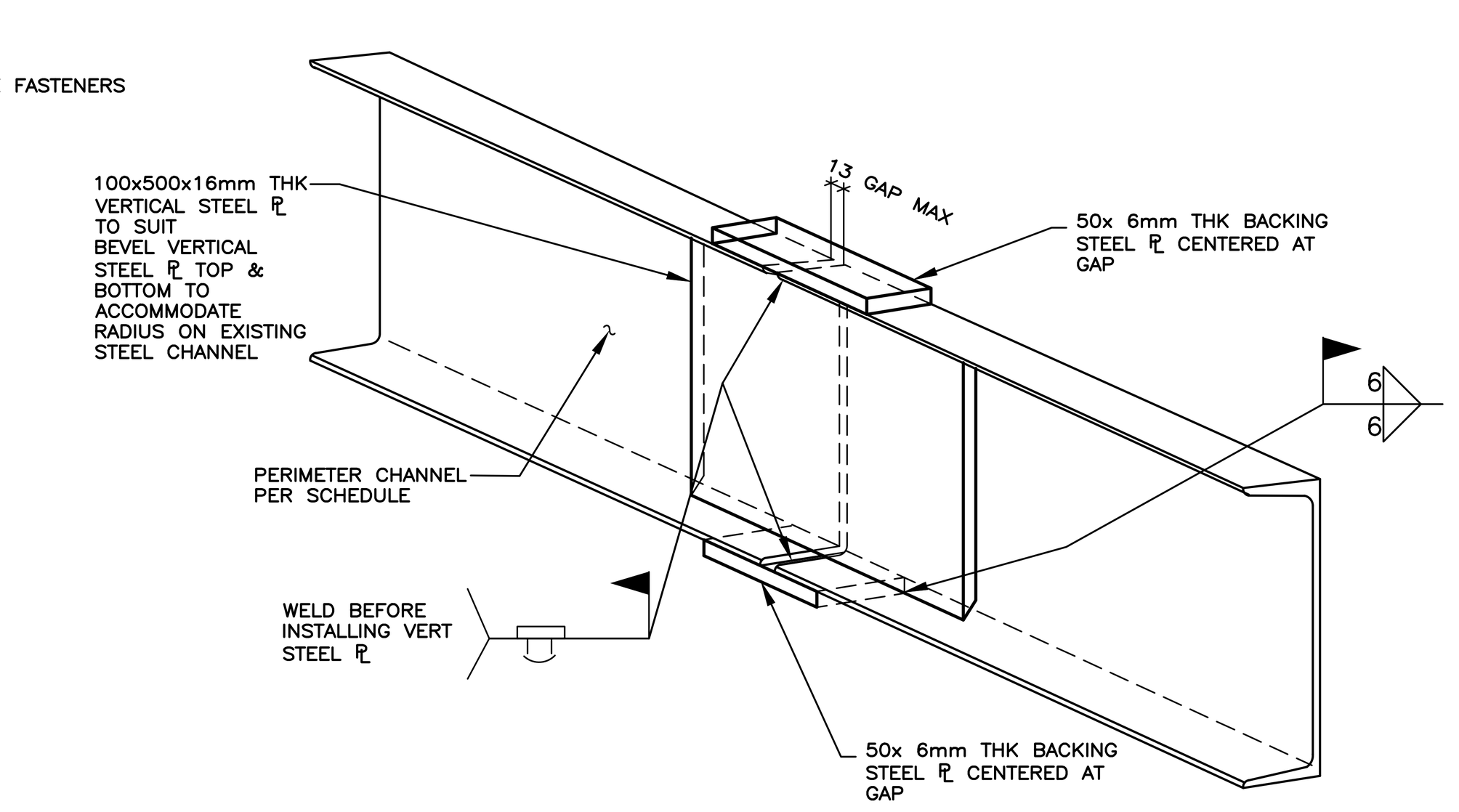


M
NEW ANGLE-TO-WALL ANCHORS
1. INSTALL NEW ANCHORS @ 600 o/c ALONG WALL.
2. INSTALL NEW ANCHORS BETWEEN EXIST ANCHORS.
3. DRILL 22ø HOLE THRU NEW STEEL PL ON SITE.
4. ANCHOR BOLT TYPE: HILTI HAS ROD 19ø
5. ANCHOR EMBED IN WALL: 170 mm
6. ANCHOR ADHESIVE: HILTI HIT-HY 70
7. ANCHOR INSTALL NOT PERMITTED WITHIN 25 mm E/S OF MORTAR JOINT.
8. REFER TO TYPICAL NOTES FOR POST-INSTALLED ANCHORAGES.
NEW CONT STEEL PL 10x100 AS PER 9/-
FASTEN STEEL DECK TO EXIST ANGLE w/ NEW HILTI X-HSN24 @ 36/9
CONTRACTOR TO LOCATE BOND BEAM REBAR IN WALL PRIOR TO DRILLING HOLES FOR ADHESIVE. CONTRACTOR TO ARRANGE FOR INSPECTION OF DRILLED HOLES PRIOR TO INSTALLING ADHESIVE.
NEW ANCHOR INSTALL NOT PERMITTED WITHIN 25 mm E/S OF HORIZONTAL & VERTICAL MORTAR JOINTS. ADD CONT STEEL PL AS NOTED.
CONDITION 'B'
NEW ANCHOR INSTALL IS NOT POSSIBLE THRU EXISTING STEEL ANGLE BASED ON CONC BLOCK MORTAR JOINT LOCATION. CONTRACTOR TO ASSUME THIS CONDITION APPLIES OVER 8 m LENGTH ALONG GRIDS M & J'. CONFIRM & ADVISE DNA PRIOR TO STEEL FABRICATION.

10 NEW SECTION AT GRID M
SCALE 1 : 10



11 PLAN SECTION
TYP SCALE 1 : 10



100x500x16mm THK VERTICAL STEEL PL TO SUIT BEVEL VERTICAL STEEL PL TOP & BOTTOM TO ACCOMMODATE RADIUS ON EXISTING STEEL CHANNEL
13 GAP MAX
50x 6mm THK BACKING STEEL PL CENTERED AT GAP
PERIMETER CHANNEL PER SCHEDULE
WELD BEFORE INSTALLING VERT STEEL PL
50x 6mm THK BACKING STEEL PL CENTERED AT GAP

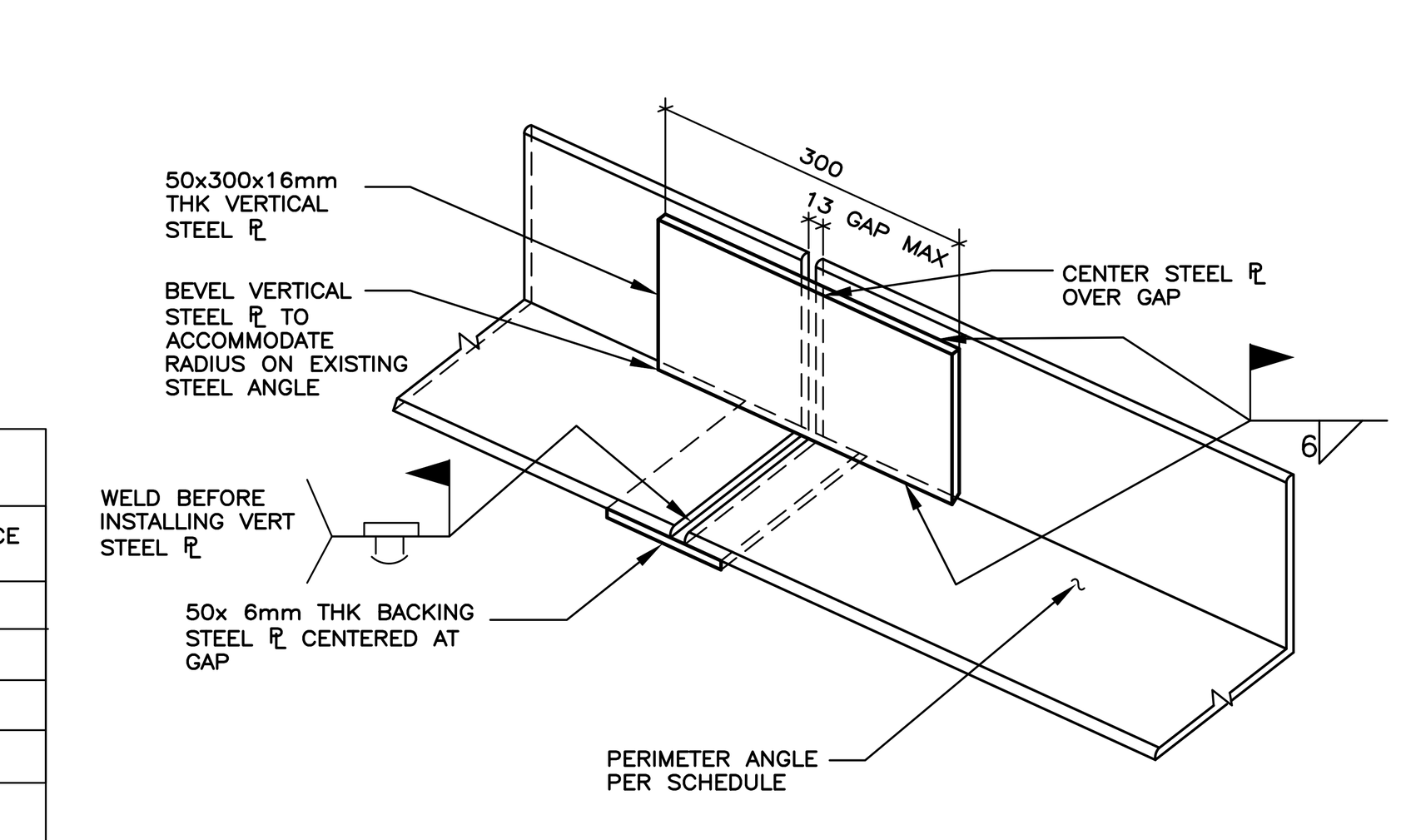
12 PERIMETER CHANNEL SPLICE DETAIL
TYP N.T.S.

PERIMETER MEMBER SPLICE SCHEDULE

GRID	PERIMETER MEMBER	SPLICE DETAIL	NEW SPLICE QUANTITY
9	L76x76x9.5	13/-	3
12	C150x12	12/-	3
J'	L76x76x9.5	13/-	1
M	L76x76x9.5	13/-	1

NOTES:

1. EXISTING SPLICE DETAILS OF PERIMETER ANGLES & CHANNELS ARE UNKNOWN.
2. CONTRACTOR TO CONFIRM EXISTING SPLICE DETAILS & QUANTITIES ON SITE & ADVISE DNA.
3. CONTRACTOR TO ALLOW FOR UPGRADE OF EXISTING SPLICE CONNECTORS AS NOTED.



50x300x16mm THK VERTICAL STEEL PL
BEVEL VERTICAL STEEL PL TO ACCOMMODATE RADIUS ON EXISTING STEEL ANGLE
300
13 GAP MAX
CENTER STEEL PL OVER GAP
WELD BEFORE INSTALLING VERT STEEL PL
50x 6mm THK BACKING STEEL PL CENTERED AT GAP
PERIMETER ANGLE PER SCHEDULE

13 PERIMETER ANGLE SPLICE DETAIL
TYP N.T.S.

DNA
project managers
planners
engineers
architects
David Nairne + Associates Ltd
Suite 250
171 West Esplanade
North Vancouver BC
CANADA V7M 3J9
T 604.984.3503
F 604.984.0627
E dna@davidnairne.com
W davidnairne.com

REVISION	
7	
6	
5	
4	
3	
2	
1	ISSUED FOR TENDER ADDENDUM 01 2016-01-15

REVISIONS

DESIGNED BY: BF/EW
CHECKED BY: LUM
DRAWN BY: SAL
DRAWING DATE: 2016.01.08
SCALE: AS NOTED
CONSULTANT:

PROJECT NAME: Centre for Aquaculture and Environmental Research ROOF REPLACEMENT
CLIENT: DEPARTMENT OF FISHERIES AND OCEANS West Vancouver Lab.
PROJECT ADDRESS: 4160 Marine Drive WEST VANCOUVER, BC
DRAWING TITLE: WORKSHOP BUILDING ROOF DIAPHRAGM SEISMIC UPGRADE
REVISION No. 1

PROJECT NUMBER 5437

S2.1

PART 1 - GENERAL

1.1 General

.1 The "General Conditions" and "Supplementary General Conditions" shall form part of this section.

1.2 Reference Standards

.1 Conform to the RCABC Current Standards and to the appropriate CCMC, CSA, CGSB, FM and ASTM Standards for the materials used in the roofing system specified; materials to be listed on RCABC Accepted Materials List (Section 2.2, Roofing Practices Manual).

.2 Design of cladding system in accordance to the latest edition of CSA-S136 for the design of Cold Formed Steel Structural Members.

1.3 Submittals

.1 Submit shop drawings in accordance with Section 01340.

.1 Indicate arrangement of roofing, including dimensions, location of joints, profiles, types and locations of supports, fasteners, flashing, closures and all metal components related to the cladding installation.

.2 Submit samples of prefinished metal cladding for review by the consultant, prior to fabrication.

1.4 Delivery, Storage and Handling

.1 Deliver and store materials in original containers with manufacturer's labels and seals intact.

.2 Store cladding products in accordance with manufacturer’s recommendations, and protected from elements.

.3 Store bundles on wood blocks, clear of the ground and slightly tilted to ensure water run off. Do not allow materials to become twisted or distorted during handling operations. Protect cladding materials against discoloration.

.4 Exercise care in storing, handling and placing the metal cladding to prevent damage likely to impair the adequacy or appearance of the cladding.

1.5 Inspection and Warranty

.1 Provide a manufacturer’s written warranty covering failure of factory-applied exterior finish within the warranty period of 20 years after date of Substantial Completion.

.2 Perform using an independent inspection company acceptable to RCABC.

.3 Inspection costs paid for directly by the Roofing Contractor.

.4 Provide to the Owner the “Roofing System Record” and “Material Safety Data Sheets” upon completion of this contract.

.5 Roofing Contractor to provide a ten (10) year RCABC Guarantee.

PART 2 - PRODUCTS

2.1 Materials

.1 Standing Seam Metal Roof Cladding:
- .1 LMC Manufacturing Ltd, profile: Lam Nu-Tech 450 with ribs @ 450 o.c., Thickness: .024" (0.61mm) 24 ga., rib height 1 7/16", Prefinished, Consultant to confirm colour from manufacturer's standard colour range.
- .2 Tradition 150-4 by Vicwest. Profile: Tradition 150-4 with ribs @ 400o.c., Thickness: .024" (0.61mm) 24 ga., rib height 1 1/2", Prefinished, Consultant to confirm colour from manufacturer's standard colour range.
- .3 New Tech Machinery Panel Machine: Standing Seam Metal Roof System (Mechanical Lock and Seam Lock) SS100 and SS150 Panels with ribs @ 450 o/c. Thickness: .024" (0.61mm) 24 ga., rib height 1"/1-1/2", Prefinished, Consultant to confirm colour from manufacturer's standard colour range.
- .4 Or approved alternate.

.2 Roofing Membranes and Underlayments:
- .1 Self Adhesive Air/Vapour Barrier under insulation: Lastobond ~~Shield HT~~ 240 or 195 by Soprema, or approved alternate.
- .2 Slip Sheet: InterWrap Titanium UDL – 30, or approved alternate.
- .3 Store membranes and underlayment in accordance with manufacturer's recommendations; dry and protected from the elements.
- .4 Prepare roof deck in accordance with manufacturer's requirements

.3 Roof Insulation:
- .1 Polyisocyanurate Insulation: Closed cell polyisocyanurate rigid board, both faces finished with glass reinforcing mat, staggered. Minimum R-20, 2 layers of 50mm SopraIso Plus by Soprema, or approval alternate.

.4 Fasteners with Bearing Plates: 18ga galvanized steel, with exposed fasteners colour matched to cladding. Fasteners and bearing plates to resist wind uplift, drag, and sliding snow forces.

.5 Flashing, Trim and Closures: Fabricate to profiles indicated on shop drawings, or as required to meet performance requirements. Use pre-formed corner pieces only. Double back exposed edges. Material to match cladding in exposed locations, galvanized material in concealed locations. See also Flashings and Sheet Metal Section 07600.

.6 Sealants:

.1 Concealed: Tape or compound, non-skinning, non-drying, butyl rubber.
.2 Exposed: (Acrylic co-polymer to CGSB 19GP-5M) (One part silicone to CGSB CAN2-19.13).
.3 See also Sealants and Caulking Section 07920.

.7 All components and accessories shall be acceptable to the manufacturer.

.8 Refer to Materials and Equipment 01600 for procedures and submission requirements for substitutions.

.9 Fabrication:
.1 Fabricate roof components to comply with dimensions, profiles, gauges and details as shown on the shop drawings, including fascia and soffit panels and all companion flashing.
.1 Fabricate all components of the system in the factory, ready for field installation.
.2 Provide roof sheet and all accessories in longest practicable length to minimize field lapping of joints.

PART 3 - EXECUTION

3.1 Preparation

.1 Ensure substrate is rigid, dry, smooth, compatible, free of fins and sharp edges, and clean of all debris and foreign matter.

.2 Ensure all openings, walls, projections through the roof are firmly affixed and cant strips, reglets and nailing strips are in place.

.3 Satisfy the manufacturer's specifications for substrate preparation prior to system’s application.

3.2 Installation

.1 Installation shall be in strict accordance with manufacturer’s specifications and details.

.2 Support clips and bearing plates are to be applied as per manufacturer’s standard. Provide all fastenings to completely install cladding system. Note: Fastening methods must be adequate to withstand all wind uplift pressures, drag, and snow forces.

.3 Install cladding with provisions for expansion and contraction.

.4 Install exterior prefinished roof panels on panel support clips and bearing plates, using manufacturer's proper construction procedure. Ensure batten is positively locked for full length of roof. Close interlocking side joints by using a purpose-made seaming machine, as supplied by the manufacturer.

.5 Where indicated on approved shop drawings, secure the end-lap of metal roofing sheets in accordance with the manufacturers specifications and details to provide a weather-tight seal. Exposed fasteners to match colour of the roof sheet.

.6 Provide notched and formed closures, sealed against weather penetration, at changes in pitch, and at ridges and eaves, where required.

.7 Install all companion flashing gutters as shown on the shop drawings. Use concealed fasteners when possible. Exposed fasteners to match colour of roof sheet.

.8 Cut and flash all roof penetrations such as plumbing, vents, B-Vents, exhaust ducts, etc to provide watertight installation.

.9 Finish appearance to be free of oil canning or distorted appearance.

3.3 Clean-Up

.1 Remove protective film from panels.

.2 Clean exposed panel surfaces in accordance with manufacturer's instructions.

.3 Repair and touch up with colour matching high grade enamel minor surface damage, only where permitted by the Consltant and only where appearance after touch-up is acceptable to Consultant.

.4 Replace damaged panels and components that, in opinion of the Consultant, cannot be satisfactorily repaired.

.5 Carefully collect all roofing debris and dispose of in accordance with Section 01355.

END of SECTION

PART 1 - GENERAL

1.1 GENERAL

.1 The "General Conditions" and "Supplementary General Conditions" shall form part of this section.

.2 Standards:
Conform to the latest "Minimum Standards" of the Roofing Contractors Association of British Columbia (RCABC) as published in the "RCABC Roofing Practices Manual" for a five (5) year guarantee.

.3 Employ skilled applicators approved by membrane manufacturer.

1.2 INSPECTION AND GUARANTEE

.1 Perform using an independent inspection company acceptable to RCABC.

.2 Perform as required by RCABC under the five (5) year guarantee program.

.3 Inspection costs paid for directly by the Roofing Contractor.

.4 Provide to the Owner the "RCABC Roofing System Record" upon completion of this contract.

.5 Provide the standard Roofing Contractors Association of British Columbia (RCABC) five (5) year guarantee.

.6 Metal fastenings form a part of the RCABC 3rd party guarantee.

1.3 SUBMITTALS

.1 Shop drawings showing layout, details of construction and identification materials.

.2 Sample of the manufacturer's Total Systems Warranty covering all components of the roofing system.

.3 Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.

.4 Certification of the manufacturer's warranty reserve.

.5 Upon completion of the installed work, submit copies of the manufacturer's final inspection report to the specifier prior to the issuance of the manufacturer's warranty.

.6 Submit Material Safety Data Sheets (MSDS).

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.

.2 Comply with the manufacturer's written instructions for proper material storage.

1. Store materials between 16° C and 26° C in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 16° C minimum before using.
2. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.

.3 Insulation and underlayment products must be on pallets, off the ground and tightly covered with waterproof materials. Manufacturer's wrap does not provide sufficient waterproofing. Insulatino and underlayment products that become wet or saturated are to be discarded.

.4 Any materials which are found to be damaged shall be reomoved and replaced at the applicator's expense.

1.5 WORK SEQUENCE

.1 Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrance system.

.2 Do not disrupt activities in occupied spaces.

1.6 USE OF THE PREMISES

.1 Before beginning the work, the roofing contractor must secure approval from the building owner's representative for the following:

1. Areas permitted for personnel parking.
2. Access to the site.
3. Areas permitted for storage of materials and debris.
4. Areas permitted for the location of cranes, hoists and chutes for the loading and unloading of materials to and from the roof.

.2 Interior stairs of elevators may not be used for removing debris or delivering amterials, exept as authorized by the building superintendent.

1.7 EXISTING CONDITIONS

.1 If discrepancies are discovered between the existing conditions and those noted on the drawings, immediately notify the owner's representative by phone and solicit the manufacturer's approval prior to commencing with the work. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.8 TEMPORARY FACILITIES AND CONTROLS

.1 Temporary Utilities:

1. Water, power for construction purposes and lighting will be available to the roofing contractor.
2. The roofing contractor shall use reasonable care and responsibility to protect the building and site against damages. The contractor shall be responsible for the

correction of any damage incurred as a result of the performance of the contract.

3. The roofing contractor shall remove all construction debris from the job site in a timely and legally acceptable lmanner so as to not detract from the aesthetics of the fucntions of the building.

1.9 JOB SITE PROTECTION

.1 The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards, sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repqir or be responsible for costs to repair all property damaged during the roofing application.

.2 During the roofing contractor's performance of the work, the building owner will continue to occupy the existing building. The contractor shall take precautions ot prevent the spread of dust and debris particularly where such material may sift into the building. The roofing contractor shall provide labour and materials to construct, maintain and remove necessary temporary enclusres to prevent dust or debris in the construction area(s) from entering the remainder of the building.

.3 Do not overload any portion of the building, either by use of or placement of equipment, storage of debris, or storage of materials.

.4 Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.

.5 Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progess. Install flags or other telltales on plugs. Remove plugs each night and screen drain.

.6 Store moisture susceptible materials above ground and protect with waterproof coverings.

.7 Remove all traces of piled bulk materials and return the job site to its original condition upon completion of the work.

1.10 SAFETY

.1 The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, requirements related to safety. Safety shall be the responsibility of the roofing contractor. All related personnel shall be instructed daily to be mindful of the full-time requirements to maintain a safe environment for the facitlity's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

1.11 WORKMANSHIP

.1 Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.

.2 All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.

.3 There shall be a supervisor on the job site at all times while work is in progress.

.4 All field seams and flashing details are to be completed according ot the manufacturer's specifications and details at the end of each work day.

1.12 QUALITY ASSURANCE

.1 The specified roofing assembly must have been successfully tested by a qualified testing agency to resist the design uplift pressures calculated to conform with the requirements of the current edition of the NBC.

.2 Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

.3 The roofing system must be installed by an applicator authorized and trained by the manufacturer in complinance with shop drawings as approved by the manufacturer. The roofin applicator shall be thoroughly experience and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply EPDM roofing systems and having installed at least one (1) EPDM roofing application or several similar systems of equal or greater size within one year.

.4 Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced superintendent on the job at all times roofing work is in progress.

.5 There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviationfrom the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.

.6 Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to identify any needed corrective repairs that will be required for warranty issuance. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

.7 Inspector shall be employed and trained by the manufacturer and have received product specific training from the manufacturer of the products.

.8 EPDM Membrane exceeds 41,580 kJ/m² under Xenon-Arc UV Light testing used for testing "Resistance to Outdoor (Ultraviolet) Weathering (ASTM D 4637 Specification requires a 7,560 kJ/m² minimum total radiant exposure at 70 W/m² irradiance at 80° C black panel temperature to pass.) The membrane shows no visible signs of cracking or crazing.

1.13 JOB CONDITIONS, CAUTIONS AND WARNINGS

.1 Material Safety Data Sheets (MSDS) must be on location at all times during transportation, storage & application of materials.

.2 When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

.3 When loadingmaterials onto the roof, the authorized roofing applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.

.4 Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements.

.5 Proceed with work so new roofing materials are not subject to construction traffic. When necessary, roof sections shall be protected and inspected upon completion for possible damage.

.6 Provide protection, such as 19mm (3/4") thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.

.7 The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

.8 Roofing shall be complete and weathertight at the end of the work day.

.9 Contaminants such as grease, fats and oils shall not be permitted to come in direct contact with the roofing membrane. An overlay of Epichlrohydrin membrane must be adhered around units with the potential to emit solvents, grease or oil.

1.14 WARRANTY

.1 Provide manufacturer's standard warranty covering both labour and materials with no dollar limitation.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Unless otherwise approved by the specifier and accepted by the manufacturer, all products must be manufactured and supplied by the roofing system manufacturer and covered by the warranty.

2.2 MEMBRANE

.1 Sure-Seal (black) 60-mil thick non-reinforced EPDM membrane; conforms to ASTM D4637, Type I (non-reinforced).

.2 Accepted Alternates: Firestone RubberGard™ EPDM low slope 1.5 mm (0.060")

2.3 INSULATION / UNDERLAYMENT

.1 Not applicable.

2.4 FASTENING COMPONENTS

.1 Fasteners, Plates and Bars as required for roof system installation by the manufacturer.

2.5 ADHESIVES, CLEANERS AND SEALANTS

.1 Fasteners, Plates and Bars as required for roof system installation by the manufacturer.

2.6 EDGING AND MEMBRANE TERMINATIONS

.1 General: If applicable, all metal edgings shall be tested and meet ANSI/SPRI ES-1 standards and comply with the British Columbia Building Code of Canada, current edition. All metal work is to be supplied and warranted by the manufacturer.

.2 Concrete External Gutter should be flashed with separate strips of EPDM membrane. The flashing membrane should be fully adhered onto the substrate over the full extent of the gutter. Make sure that the flashing strips for the gutter extend a minimum of 200 mm at the internal edge of the gutter, so as to provide sufficient overlap for a batten-in-the-seam detail. The external edge of the gutter must be terminated with a wall termination detail.

PART 3 - EXECUTION

3.1 GENERAL

.1 Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.

.2 Position sheets to accommodate contours of the roof deck and shigle splices to avoid bucking water.

3.2 MEMBRANE PLACEMENT AND BONDING

.1 Unroll and position membrane without stretching. Allow the membrane to relax for approximately 30 minutes prior to bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.

.2 Apply the Bonding Adhesive in accordance with the manufacturer's instructions and coverage rates, to both the underside of the membrane and the sub-strate. Allow the adhesive to dry until it is itacky but will not string or stick to a dry finger touch:

1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
2. Fold back the unbounded half of the membrane sheet and repeat the bonding procedure.

.3 Install adjoining membrane sheets in the same manner, overlapping edges approximately 100mm (4”). Do not apply bonding adhexive to the splice area.

3.5 MEMBRANE SPLICING

.1 Position membrane sheet to allow for required splice overlap. Mark the bottom sheets with an indelible marker approximately 6mm (1/4”) to 13mm (1/2”) from the top sheet edge. The pre-marked line on the membrane edge can also be used as a guide for positioning splice tape.

.2 When the membrane is contaminated with dirt, fold the top sheet back and clean the dry splice area (minimum 76mm wide (3”)) of both membrane sheets by scrubbing with clean natural fibre rags saturated with Sure-Seal Weathered Membrane Cleaner. When using Sure-Seal (black) PRE-KLEENED membrane, cleaning the splice area is not required unless contaminated with field dirt or other residue.

.3 Apply Low VOC EPDM Primer to splice and permit to flash off.

.4 When adhering Factory Applied Tape (FAT), pull the poly backing from FAT beneath the top sheet and allow the top sheet to fall freely onto the exposed primed surface. Press top sheet on to the bottom sheet using firm even hand pressure across the splice towards the splice edge.

.5 For end laps, apply 76mm or 150mm (3” or 6”) wide SecurTAPE to the primed membrane surface in accordance with the manufacturer’s specifications. Remove the poly backing and roll the top sheet onto the mating surface.

.6 Tape splices must be a minimum of 70mm (2 ½”) wide using 76mm (3”) wide SecurTAPE extending 3mm (1?8”) minumu to 13mm (1/2”) maximum behynd the splice edge. Field splices at roof drains must be located outside the drain sump.

Note: For projects where a 90mil membrane or 20 year or longer System Warranty is specified, splice enhancements are required. Refer to manufacturer’s specification.

.7 Immediately roll the splice using positive pressure when using a 50mm (2”) wide steel roller. Roll across the splice edge, not parallel to it. When FAT is used, the manufacturer’s recommended roller system can be used to roll parallel to the splice edge.

.8 At all field splice intersections, apply Lap Sealant along the edge of the membrane splice to cover the exposed SecurTAPE 50mm (2”) in each direction from the splice intersection. Install the manufacturer’s Pressure Sensitive “T” Joint Covers at

150mm (6”) wide section (with rounded corners) of Sure-Seal Sensitive Flashing over the field splice intersection.

3.6 FLASHING

.1 Wall and curb flashing shall be cured EPDM membrane. Continue the deck membrane to run up wall/parapet/gutter to under flashing where practicable. Use Pressure Sensitive Curb Wrap where possible to flash curb units.

3.7 DAILY SEAL

.1 On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed.

3.8 CLEAN UP

.1 Perform daily clean up to collect all wrappings, empty containers, paper, and other debirs from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

.2 Prior to the manufacturer’s inspection for warranty, the applicator must performa pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

PART 4 – RESTORATION PROCEDURES

3.1 GENERAL

.1 When possible on multiple level roofs, begin the restoration work on the highest level to avoid or minimize construction traffic on completed roof sections.

.2 On projects at high altitudes (6,000' and above), rapid flash off (drying) of Bonding Adhesive and Splicing Cement will occur due to low atmospheric pressure.

.3 Lifted Adhesive Seams: If the seam is open or has lifted, pull back the overlapping membrane to remove any debris and apply Weathered Membrane Cleaner. Apply Splicing Cement to the open or lifted seam area and re-adhere the overlapping membrane.

.4 All adhesive seams must be overlaid with 6" wide Pressure-Sensitive Cured Cover Strip or 9" wide Pressure-Sensitive Uncured Elastoform Flashing and Lap Sealant must be applied to all edges.

.5 Taped seams need not be overlaid unless a deficiency has been reported. For seam deficiencies, overlay the seam with 6" wide Pressure-Sensitive Cured Cover Strip or 9" wide Pressure-Sensitive Uncured Elastoform Flashing and apply Lap Sealant to all edges.

.6 For taped seams T-Joints, overlay with 12" x 12" T-Joint Overlayment and apply Lap Sealant to all edges.

3.2 MEMBRANE CLEANING AND

PRIMING

.1 Prior to completing any repairs, the existing membrane surface must be cleaned and primed as follows:

1. Remove heavy deposits of dirt, leaves, pine needles, and other debris using a broom or air blower. Any rocks, branches, or other large foreign objects should also be removed.
2. Scrub the membrane with a scrub brush using warm water and a low sudsing soap such as Spic And Span, Tide, or Lestoil (approximately 1/4 to 1/2 cup of cleaner to one gallon of water).
3. Rinse with clean water and allow to dry.
4. To prepare the membrane surface for splicing, clean the area with Weathered Membrane Cleaner and allow to dry.
5. Prior to the application of Pressure-Sensitive Cured Cover Strips, the surface of aged EPDM membrane must be primed with Splicing Cement applied at 1/2 the normal coverage rate.

3.3 DRAINS

.1 Identify areas of repairs.

.2 Install a new section of EPDM membrane that extends 3' on all sides of the roof drain and complete the membrane splice using 6" wide SecurTAPE. Note: Clean and prime the membrane splice area. The surface of aged EPDM membrane must be primed with Splicing Cement applied at 1/2 the normal coverage rate and the underside of the new EPDM membrane shall be primed with HP-250 Primer.

3.4 DELAMINATED MEMBRANE

.1 For large areas, adhere 6" wide Reinforced Universal Securement Strip to the membrane and fasten with Sure-Seal Seam Fastening Plates and Fasteners spaced 12" on center.

.2 Overlay the Reinforced Universal Securement Strip with 12" wide Pressure-Sensitive Cured Cover Strip and apply Lap Sealant to all edges. Note: Clean and prime the membrane. The surface of aged EPDM membrane must be primed with Splicing Cement applied at 1/2 the normal coverage rate and the underside of the new EPDM membrane shall be primed with HP-250 Primer.

.3 For small areas, fasten directly through the membrane using Sure-Seal Seam Fastening Plates and Fasteners spaced 12" on center.

.4 Overlay fasteners with 6" wide Pressure-Sensitive Cured Cover Strip and apply Lap Sealant to all edges. Note: Clean and prime the membrane.

END of SECTION

PART 1 - GENERAL

1.1 GENERAL

.1 The "General Conditions" and "Supplementary General Conditions" shall form part of this section.

.2 Employ skilled applicators approved by membrane manufacturer.

1.2 REFERENCE STANDARDS

.1 Roofing and sheet metal work will be performed in conformance with the roofing manufacturer's written recommendations as well as the requirements of the ULC.

.2 Submit a document issued by the CSA certifying that the roofing system offered meets the requirements of CAN/ULC-S107-03 “Standard Methods of Fire Tests of Roof Coverings Class C

.3 CSA A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.

.4 Prefabricated membrane, complies with CAN/CGSB 37-GP-56M (9th draft)-1985, Membrane Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.5 CAN/ULC-S702-97 Thermal Insulation, Mineral Fibre, Boards for Buildings.

.6 CAN/ULC-S704-2001 Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Fixed.

.7 All membrane roofing systems installed shall conform to the CSA A123.21-14 Standard test method for the dynamic wind uplift resistance of membrane roofing systems.

.8 Conform to the latest "Minimum Standards" of the Roofing Contractors Association of British Columbia (RCABC) as published in the "RCABC Roofing Practices Manual" for a ten (10) year guarantee. Conform to the appropriate CCMC, CSA, CGSB, FM and ASTM Standards for the materials used in the roofing system specified; materials to be listed on RCABC Accepted Materials List (Section 2.2, Roofing Practices Manual) Submit a report, issued by a certified materials testing laboratory, attesting that the specified roofing system was tested in accordance with CSA A123.21-14, *Standard test method for the dynamic wind uplift resistance of membrane-roofing systems*.

1.3 COMPATIBILITY

.1 All waterproofing materials will be provided by the same manufacturer.

1.4 INSPECTION AND GUARANTEE

.1 Perform using an independent inspection company acceptable to RCABC and Roofing Manufacturer.

.2 Inspection costs paid for directly by the Roofing Contractor.

.3 Provide to the Owner the “RCABC Roofing System Record” upon completion of this contract.

.4 Provide the standard Roofing Contractors Association of British Columbia (RCABC) ten (10) year guarantee.

.5 The product manufacturer to issue a written and signed document in the owner's name, certifying that the roofing membranes are free of manufacturing defects for a period of ten (10) years, starting from the date of acceptance. This warranty will cover the removal and replacement of defective roof membrane products, including labour. The warranty must remain a full warranty for the duration of the period specified. No letter amending the manufacturer's standard warranty will be accepted and the warranty certificate must reflect these requirements.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in conformance with Section 01330 requirements.

.2 Provide details of flashing, penetration, parapet wall, and around atrium walls.

.3 Submit drawings locating and identifying sloped insulation blocks.

1.6 CONTRACTOR QUALIFICATION

.1 Roofing contractors and sub-contractors must, when tendering or performing work, possess a roofing contractor operating license.

.2 Only qualified, certified installers employed by a company with the appropriate equipment may execute the roofing work.

.3 Roofing contractors and sub-contractors must also be members of RCABC and provide the architect with a certificate to this effect before beginning any roofing work.

1.7 MANUFACTURER'S REPRESENTATIVE

.1 The roofing product manufacturer can delegate a representative to visit the work site at the start of roofing installation.

.2 The contractor must at all times enable and facilitate access to the work site by said representative.

1.8 STORAGE AND DELIVERY

.1 All materials will be delivered and stored in conformance with the requirements described in the manufacturer's manual; they must remain in their original packaging, displaying the manufacturer's name, product name, weight, and reference standards, as well as all other indications or references considered standard.

.2 At all times, materials will be adequately protected and stored in a dry and properly ventilated area, away from any welding flame or spark and sheltered from the elements or any harmful substance. Only materials destined for same-day use can be

removed from this storage area. In cold weather, these materials should be stored in a heated area at a minimum temperature of +100C and removed prior to application. If rolls cannot be stored in a heated environment, they may be pre-conditioned before installation. For precise description, please consult manufacturer's "Roofers' Guide" on membrane application procedures.

.3 Store adhesives and emulsion-based waterproofing mastics at a minimum +50C. Store adhesives and solvent-based mastics at sufficient temperatures to ensure ease of application.

.4 Materials delivered in rolls will be carefully stored upright; flashing will be stored to avoid creasing, buckling, scratches or any other possible damage.

.5 Avoid material overloads which may affect the structural integrity of specific roof areas.

1.9 FIRE PROTECTION

.1 Prior to the start of work, conduct a site inspection to establish safe working practices and make sure that all procedures and proposed changes are approved to minimize the risk of fires.

.2 Respect safety measures described in the manufacturer's Specifications Manual as well as R.C.A.B.C. recommendations.

.3 At the end of each workday, use a heat detector gun to spot any smouldering or concealed fire. Job planning must be organized to ensure workers are still on location at least one hour after torch application.

.4 Never apply the torch directly to old and wood surfaces.

.5 Throughout roofing installation, maintain a clean site and have one approved ABC fire extinguisher within 6 metres of each roofing torch. Respect all safety measures described in technical data sheets. Torches must never be placed near combustible or flammable products. Torches should never be used where the flame is not visible or cannot be easily controlled.

PART 2 - PRODUCTS

2.1 INSULATION

.1 Extruded Polystyrene Insulation Minimum R-20:

.1 Description: Type IV extruded polystyrene foam insulation board, staggered, in conformance with CAN/ULC-S701-11.

.2 Specified product: 2 layers of 51mm STYROFOAM ROOFMATE by DOW or approved equal extruded polystyrene.

.3 Tapered slope package as required.

.1 Description: Tapered insulation package made of Type IV extruded polystyrene insulation designed to create a two percent (2%) slope to the roof system.

2.2 MEMBRANES

.1 Roof membrane Base Sheet:
- .1 Description: Roofing membrane with heavy-duty polyester reinforcement covered by ASTM 6164. Both the top and bottom surfaces have a thermofusible plastic film.
- .2 Prefabricated membrane, complies with CAN/CGSB 37.56-M (9th draft).
- .3 Specified product: SOPRALENE FLAM 180 by SOPREMA or approved alternate.

.2 Roof membrane base sheet flashing / parapet:
- .1 Description: Roofing membrane with glass reinforcement and SBS modified bitumen covered by ASTM 6163. The top face is covered with a thermofusible plastic film. The underface is self-adhesive. The top face must be marked with three (3) distinctive chalk lines to ensure proper roll alignment.
- .2 Prefabricated membrane, complies with CAN/CGSB 37.56-M (9th draft).
- .3 Specified products: SOPRAFLASH FLAM STICK by SOPREMA or approved alternate.

.3 Roofing membrane Cap Sheet, Cap Sheet Stripping, Parapet Cap Sheet:
- .1 Description: Roofing membrane with heavy-duty polyester reinforcement covered by ASTM 6164. The top face is protected by coloured granules. The under face is covered with a thermofusible plastic film.
- .2 Specified product: SOPRALENE FLAM 180GR by SOPREMA or approved alternate.
- .3 Prefabricated membrane, complies with CAN/CGSB 37.56-M (9th draft).
- .4 ULC certifications, Class C.

.4 Gutters:
- .1 Description: Non-woven, polyester fabric coated with a two-component (PMMA) methyl methacrylate-based liquid membrane.
- .2 Specified product: ALSAN RS FLEECE and ALSAN RS 230 FLASH

.5 Colour choices:
- .1 Roofing membrane granular finishes will be of the following colour(s): For regular surfaces: grey.

2.3 ACCESSORY MEMBRANES

.1 Reinforcement membrane:
- .1 SOPRALENE FLAM 180 by SOPREMA or approved alternate.

2.4 PRIMER

.1 Primer for heat welded membranes:
- .1 Description: A blend of elastomeric bitumen, volatile solvents and adhesive enhancing additives used to prime

concrete or metal substrates to enhance the adhesion of torch-applied waterproofing membranes.

.2 Specified product: ELASTOCOL 500 by SOPREMA or approved alternate.

.2 Primer for self-adhesive membranes

.1 Description: ELASTOCOL STICK: Composed of SBS synthetic rubber, volatile solvents, adhesive enhancing resins and volatile solvent used to prime porous substrates and non-porous substrates such as wood, concrete or metal to enhance the adhesion of self-adhesive membranes at temperatures above - 10°C.

.2 Specified product: ELASTOCOL STICK by SOPREMA or approved alternate.

2.5 FLAME-STOP MEMBRANE

.1 Description: Self-adhesive membrane composed of a reinforced glass mat and SBS modified bitumen designed to prevent flames from penetrating into empty spaces and openings while installing heat-welded membranes.

.2 Specified products: SOPRAGUARD tape by SOPREMA or approved alternate.

2.6 COMPLEMENTARY WATERPROOFING PRODUCTS

.1 Waterproofing mastic:

.1 Description: Mastic made of synthetic rubbers, plasticized with bitumen and solvents. Aluminum pigments are added to SOPRAMASTIC ALU to provide greater resistance to U.-V.

.2 Specified product: SOPRAMASTIC [ALU] by SOPREMA or approved alternate.

.2 Pitch pocket filler:

.1 Description: An aluminum coloured solvent-based mastic containing superior grade bitumen modified with SBS synthetic rubber and fibres. Designed for pitch box filling.

.2 Specified product: INTERCLIP SYSTEM by SOPREMA or approved alternate.

.3 Sealing product

.1 Description: Composed of a bitumen/polyurethane waterproofing mono-component and polyester reinforcements. Designed to finish upstands and details. (no-flame installation).

.2 Specified product: ALSAN RS 230 by SOPREMA or approved alternate.

2.7 SUPPORT PANEL:

.1 Description: 12.7mm fiberglass mat faced gypsum support panel with water-resistant core.

.2 Specified Product: ½" DENSDECK ROOF BOARD by GEORGIA PACIFIC or approved equal.

.3 Accepted Alternate: ½" SECUROCK GYPSUM-FIBER ROOF BOARD by USG

2.8 DRAIN MAT

.1 Description: High-strength drainage panel consisting of a polypropylene core with a factory-laminated geotextile.

.2 Specified product: SOPRADRAIN 10G by SOPREMA or approved alternate.

2.9 GRAVEL BALLAST

.1 Gravel minimum 16 mm to maximum 35 mm diameter. Gravel shall be round, washed, and exempt of dust, humidity, ice, snow, and foreign objects.

.2 Thickness: 1 layer (to be confirmed by Contractor) intended to hold down drain mat and insulation layers. Thickness/weight of gravel ballast must be installed as required by CSA A123.21-14, standard test method for dynamic wind uplift resistance of membrane roofing systems.

2.10 ROOF GUARD

.1 See section 05520 Guardrails and Handrails.

2.11 CONCRETE RESTORATION (ROOF ASSEMBLY R4)

.1 Waterproofing for existing concrete canopy (R4):

.1 Description: A waterproofing one-component polyurethane / bitumen resin. Reinforcement mesh approved by manufacturer required for repair of cracks in existing concrete canopy.

.2 Specified product: ALSAN FLASHING by SOPREMA or approved alternate.

PART 3 – EXECUTION

3.1 SURFACE EXAMINATION AND PREPARATION

.1 Surface examination and preparation must be completed in conformance with recommendations in the SOPREMA Specifications Manual, particularly for fire safety precautions.

.2 Before roofing work begins, the owner's representative and roofing foreman will inspect and approve deck conditions (including slopes and wood blocking) as well as upstands and parapets, construction joints, roof drains, plumbing vents, ventilation outlets and others. If necessary, a non-conformity notice will be issued to the contractor so that required corrections can be made. The start of roofing work will mean roofing conditions are acceptable for work completion.

.3 Do not begin any work before surfaces are smooth, dry, and free of ice and debris. Use of calcium or salt is forbidden for ice or snow removal.

.4 Be sure plumbing, carpentry and all other work has been duly completed.

.5 No materials will be installed during rain or snowfall.

3.2 METHOD OF INSTALLATION

.1 Prepare surfaces and complete waterproofing work in conformance with SOPREMA'S requirements, and the "Roofers' Guide"

.2 Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.

.3 Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.

.4 It's preferable to seal all seams that are not covered by a cap sheet membrane in the same day. The cap sheet cannot be installed if any moisture is present at/in the base sheet seams.

.5 Whenever membranes are torch-applied, a continuous and even bead of molten bitumen must be visible as the membrane is unrolled and torched.

.6 Ensure waterproofing conditions for roofs at all times, including protection during installation work by other trades and progressive protection as work is completed (e.g. vents, drains, etc.).

3.3 SITE PROTECTION

.1 Protect finished work to avoid damage during roof installation and material transportation. Install protective boardwalks over installed roofing materials to enable passage of people and products. Assume full responsibility for any damage.

3.4 CLEANING

.1 The work site must be routinely cleared of rubbish and other materials which may hinder roof installation, performance, or present a fire hazard.

.2 Carefully collect all roofing debris and dispose of in accordance with Section 01355

3.5 EQUIPMENT FOR WORK EXECUTION

.1 Maintain all roofing equipment and tools in good working order.

.2 Use torches recommended by SOPREMA

3.6 PREPARATION WORK CONCRETE DECK

.1 Prepare surfaces according to [manufacturer's] [local authorities'] recommendations. Surfaces to be waterproofed with elastomeric bitumen membrane must have a Concrete Surface Profile (CSP) of 3 to 6 (CSP as per the International Concrete Repair Institute).

3.7 PREPARATION WORK METAL DECK

.1 Prepare surfaces according to [manufacturer's] [local authorities'] recommendations.

3.8 APPLICATION PRIMER

.1 Roofing substrates of wood, metal, concrete, masonry or gypsum board surfaces will receive a coat of asphalt primer at manufacturer approved rate. (none required for factory-painted metals). All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Cover primed surfaces with roofing membrane as soon as possible (same day coverage for self-adhesive membranes). [Application temperature limit of +5°C for ELASTOCOL STICK.]

3.10 INSTALLATION OF SUPPORT PANEL

.1 Support Panels to be mechanically fastened to steel decking as per manufacturer's recommendations to meet CSA A123.21-14, Standard test method for the dynamic wind uplift resistance of membrane-roofing systems.

.2 All boards must be in perfect connection, without any significant variances in level, and must be completely adhered to the surface.

.3 [All vertical joints between [flat boards and sloped modules] [the two rows of insulation boards] will be staggered.

.4 Install only as much insulation as can be covered in the same day.

3.11 INSTALLATION OF FLAME-STOP MEMBRANES

.1 [Adhere the membrane directly onto an approved substrate by peeling back the silicone release film. SOPRAGUARD TAPE is designed to prevent flames from penetrating into empty spaces and openings while installing heat-welded membranes.]

.2 [Unroll the flame-stop membrane onto the insulation without adhering, being careful to overlap adjacent strips to ensure that the flame will not come in contact with the insulation.]

3.12 INSTALLATION OF TORCH-APPLIED BASE SHEET

.1 Concrete/support panel surfaces to be primed with Elastocol 500 prior to installation of torch applied base sheet.

.2 Dry unroll the flame-stop membrane onto the concrete/support panel, being careful to overlap adjacent selvedges to ensure that the flame will not penetrate the decking.

.2 Dry unroll the base sheet membrane on the substrate, taking care to align the edge of the first selvedge with the centre of the drain (parallel to the edge of the roof).

.3 Base sheet to be torched applied (fully heat welded) to concrete/support panel. Base sheet must be installed as required by CSA A123.21-14, standard test method for dynamic wind uplift resistance of membrane roofing systems.

Corners and perimeters must be installed as per manufacturer's requirements.

.4 Each selvedge should overlap the previous one along the lines provided for this purpose.

.5 Adhere the first 60 mm (2.5 in) of the self-adhesive side laps using a roller, then heat-weld the last 40 mm (1.5 in) (combined self-adhesive and heat-welded side laps). Heat weld 100mm (4 in) of side laps.

.6 Seal end laps by welding a 330-mm (13-in) wide protection strip centered on the joint. End laps to be staggered, cover strips are not required.

.7 Avoid the formation of wrinkles, swellings or fishmouths.

3.13 INSTALLATION OF REINFORCED GUSSETS

.1 Install gussets at every angle, on inside and outside corners.

.2 [Heat-weld the gussets in place after installing the thermofusible base sheet membrane.]

.3 [Install the thermofusible gussets after installing the self-adhesive base sheet membrane.]

.4 [Install the self-adhesive gussets before installing the self-adhesive base sheet membrane.]

3.14 BASE SHEET FLASHING / PARAPET INSTALLATION (SELF ADHERED)

.1 Apply base sheet flashing only after primer coat is dry.

.2 Before applying membranes, always remove the plastic film on the section to be covered if there is an overlap (inside and outside corners and field surface). For sanded base sheet membranes, apply ELASTOCOL STICK to the area to be covered at the foot of the parapets.

.3 Position the pre-cut membrane piece. Peel back 100 to 150 mm. (4 to 6 in.) of the silicone release paper to hold the membrane in place at the top of the parapet.

.4 Then, gradually peel back the remaining silicone release paper, pressing down on the membrane with an aluminum applicator to ensure good adhesion. Use the aluminum applicator to ensure a perfect transition between the upstand and the field surface. Smooth the entire membrane surface with a roller for full adhesion.

.5 Cut off corners at end laps to be covered by the next roll.

.6 Install a reinforcing gusset in all inside and outside corners.

.7 Always seal overlaps at the end of the workday.

3.15 ROOFING CAP SHEET INSTALLATION (TORCH-APPLIED MEMBRANE)

.1 Once base sheet is applied and no defects are apparent, proceed with cap sheet installation.

.2 Begin with double-selvedge starter roll. If starter roll is not used, side laps covered in granules must be degranulated by

embedding side laps in torch-heated bitumen over a 75 mm. width.

.3 Unroll cap sheet at drain. Carefully align first side lap (parallel to roof edge).

.4 Weld cap sheet onto base sheet with torch recommended by membrane manufacturer. During application, simultaneously melt both designated contact surfaces so a bead of bitumen is apparent as cap sheet unrolls.

.5 Avoid overheating.

.6 Make sure joints between the two layers are staggered by at least 300 mm.

.7 Overlap cap sheet side laps by 75 mm. and end laps by 150 mm. Cut off corners at end laps to be covered by next roll. All overlap surfaces must be degranulated.

.8 Complete perfect welds between two membranes. Leave no zone unwelded. In cold weather, adjust welding time to obtain homogenous seam (it may be necessary to slow down in certain cases.)

.9 Once cap sheet is installed, carefully check all overlapped joints.

10 [During installation, take care to avoid excessive bitumen bleed-out at joints.]

3.16 INSTALLATION OF CAP SHEETS ON UPSTANDS AND PARAPETS (HEAT-WELDED)

.1 This cap sheet must be installed in one-metre-wide strips. The side joints must overlap by [75] - [100] mm. and must be staggered by at least 100 mm. with respect to the joints of the cap sheet on the field surface, to avoid areas of excessive membrane thickness. The overlaps on the field surface must be 50 mm. wider than those of the base sheet membrane on the upstands and parapets. At end laps, angle-cut the corners that will be covered by the following roll.

.2 Use a chalk line to draw a straight line on the field surface 150 mm. from the upstands and parapets.

.3 Use a propane torch and round-nose trowel to embed the surface granules in the layer of hot bitumen [starting from the chalk line on the field surface to the bottom edge of the upstand or parapet as well as] on the granulated vertical surfaces that are to be overlapped.

.4 This cap sheet will be heat-welded directly to the base sheet membrane, proceeding from bottom to top. This technique softens both membranes in order to obtain even, continuous weld.

.5 [During installation, be careful not to overheat the membrane or to create [excessive] [bitumen] bleeding at the joints.]

3.17 INSULATION INSTALLATION

.1 Loose laid insulation on roofing membranes.
.2 All vertical joints between two rows of insulation board will be staggered.
.3 Install only as much insulation as can be covered in the same

3.16 INSTALLATION OF DRAIN MAT

.1 Place drain mat on insulation, staggered.

3.17 INSTALLATION OF GRAVEL BALLAST

.1 Once drain mat is installed, spread gravel in a uniform fashion in conformance with manufacturers requirements listed in PLPDS 1-29. Thickness: 1 layer (to be confirmed by Contractor) intended to hold down drain mat and insulation layers. Thickness/weight of gravel ballast must be installed as required by CSA A123.21-14, standard test method for dynamic wind uplift resistance of membrane roofing systems.

3.18 WATERPROOFING FOR VARIOUS DETAILS

.1 Install waterproofing membranes in conformance with various roofing details illustrated in the manufacturer's manual.

3.19 INSTALLATION OF WATERPROOFING FOR CONCRETE RESTORATION (ROOF ASSEMBLY R4)

.1 Prepare existing concrete canopy as per manufacturer's recommendations.
.2 Fill cracks with waterproofing one-component polyurethane//bitumen resin (1 layer) with reinforcement mesh. This layer mush be thick enough to completely immerse the reinforcement. Reinforcement to be immediately covered with a second layer of waterproofing resin until saturation. Third layer of waterproofing resin to be applied when the second layer is dry and tack free.
.3 Apply waterproofing resin in two layers to existing concrete surfaces.

END OF SECTION