

# Addendum 4

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Project No	<b>5437</b>	Date	<b>January 28, 2016</b>
Project	<b>Centre for Aquaculture and Environmental Research ROOF REPLACEMENT</b> 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 3 dated January 26, 2016

## **Enclosure:**

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

## **ARCHITECTURAL DRAWINGS**

### **A101 General Notes & Assemblies**

#### **Revise: Roof Type R2 Assembly**

- Limit maximum weight due to gravel ballast to 0.57 kPa (12 PSF).
- 1 layer loose laid 2" XPS Insulation (R-10 c.i.).  
Tapered slope package as required to provide slope of min. 2%

### **A201 Main Laboratory Roof Plan**

#### **Revise: - Roof 3.1:**

- Roof Type R2
- Limit maximum weight due to gravel ballast to 0.57 kPa (12 PSF).
- 1 layer loose laid 2" XPS Insulation (R-10 c.i.).  
Tapered slope package as required to provide slope of min. 2%

#### **Add: - Roof 3.10:**

- Existing EPDM membrane is to be removed/replaced/repared at gutter location all along its perimeter.

### **A301 Main Laboratory Details**

#### **Revise: Detail 4**

- Roof type R2
- Limit maximum weight due to gravel ballast to 0.57 kPa (12 PSF).

### **A302 Main Laboratory Details**

#### **Clarify: Detail 4**

- Existing EPDM membrane is to be removed/replaced/repared at gutter location all along its perimeter.

**ARCHITECTURAL SPECIFICATIONS****07540 SBS MODIFIED BITUMEN MEMBRANE**

## 2.2 Membranes

**Delete:**~~.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~~**NOTE**

For perimeter gutter repair on roof 3.10 refer to Specification Section 07530 EPDM Roofing Membrane issued in Addendum # 3.



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

ISSUED FOR TENDER  
Addendum #4  
2016.01.28

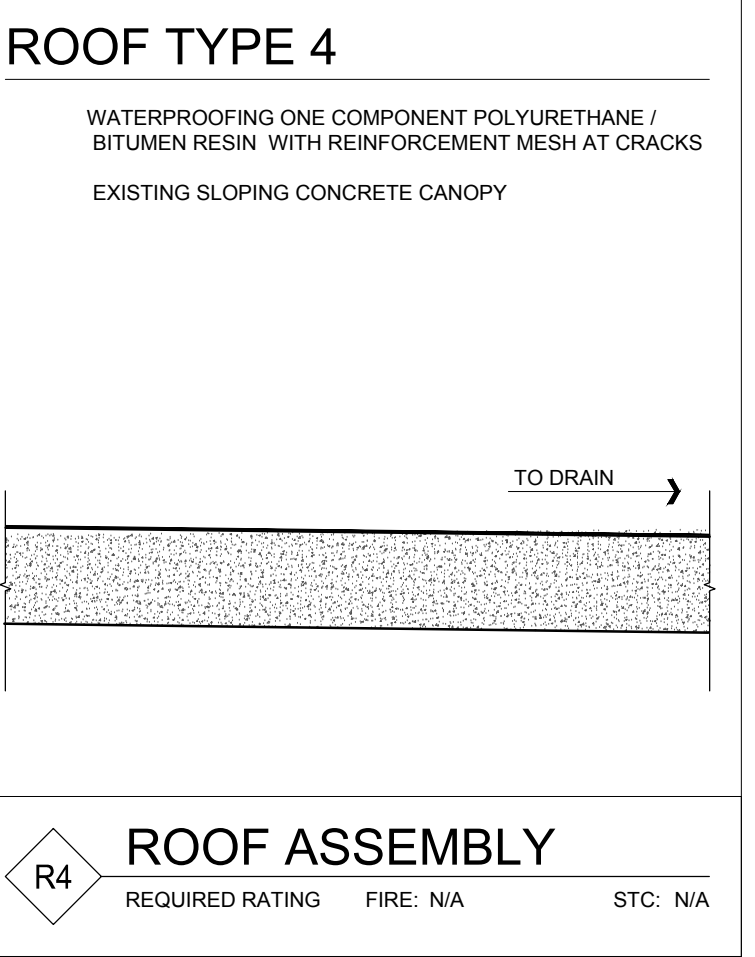
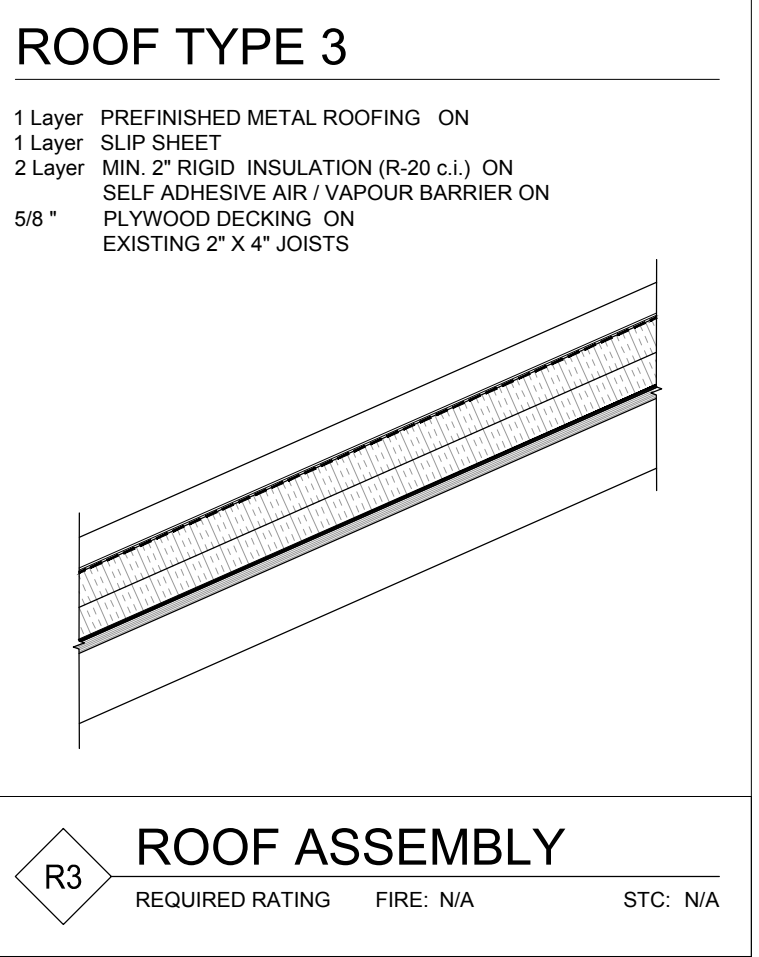
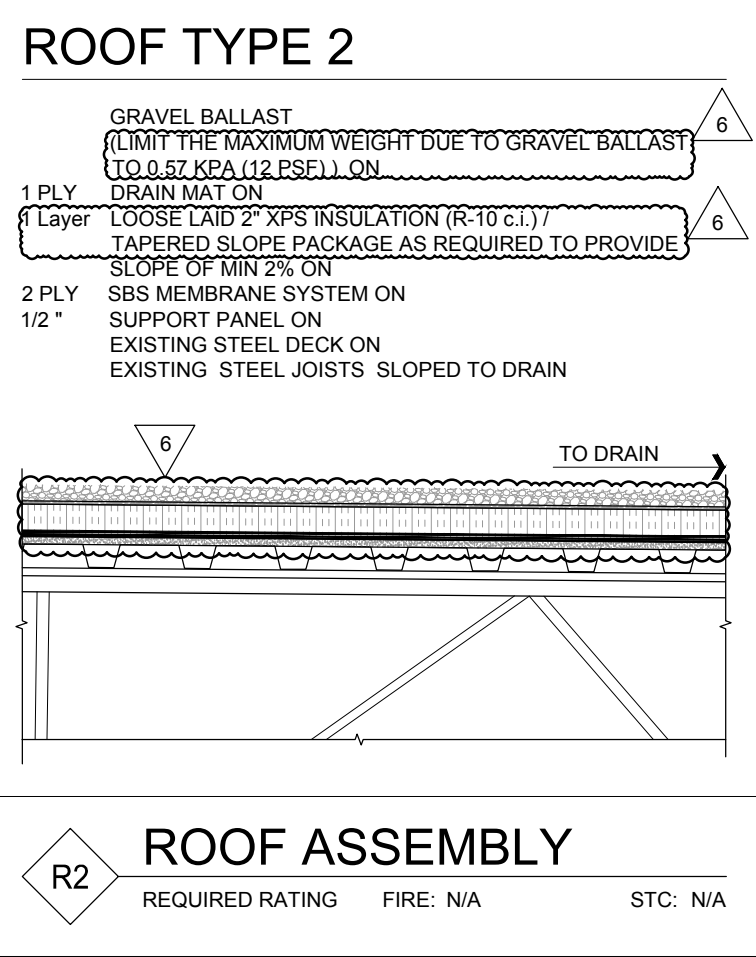
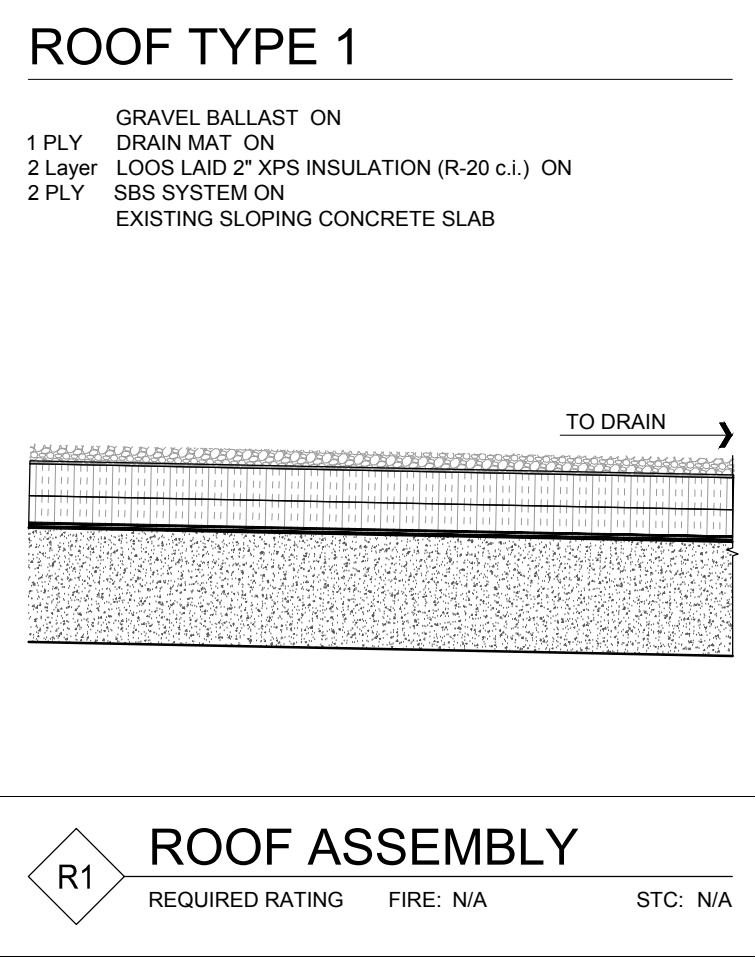


ARCHITECTURAL  
David Nairne + Associates Ltd.

STRUCTURAL  
David Nairne + Associates Ltd.

A101 COVER PAGE: ASSEMBLIES & GENERAL NOTES  
A201 MAIN LABORATORY - ROOF PLAN  
A202 PUMP HOUSE - ROOF PLAN AND DETAILS  
A301 MAIN LABORATORY - DETAILS  
A302 MAIN LABORATORY - DETAILS

S1.1 GENERAL NOTES: KEY PLAN AND DETAILS  
S2.1 WORKSHOP BUILDING ROOF DIAPHRAGM SEISMIC UPGRADE



**INSULATION REQUIREMENTS**

ASHRAE STANDARD 90.1-2010  
West Vanc., BC: **Zone 5**  
HDD5 = 8054 | CDD50 = 1469

	REQUIRED			PROPOSED		
	Assembly Max	R-Value	RSI-Value	Assembly Max	R-Value	RSI-Value
Non-Residential	U-0.048	20 c.i.	3.52 c.i.	U-0.048	20 c.i.	3.52 c.i.

Roof Insulation: Above Deck:

**MATERIAL / FINISH SCHEDULE**

- FLASHING TO BE PREFINISHED METAL TO MATCH EXISTING COLOR.
- 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.
- OWNER/TENANT TO SIGN-OFF/APPROVE MATERIALS, FINISHES AND SPECIFICATIONS BEFORE INSTALLATION.

**GENERAL NOTES**

- ALL LABOUR, MATERIALS, AND PRODUCTS TO COMPLY WITH THE REQUIREMENTS OF BCBC 2012, THE LOCAL BYLAWS AND ALL OTHER APPLICABLE CODES, STANDARDS AND REGULATIONS.
- ALL DIMENSIONS ARE TO FACE OF CONCRETE, FACE OR CENTRE OF STUDS FOR EXTERIOR WALLS, OR CENTRE OF STUDS FOR GIBB FACED WALLS UNLESS NOTED OTHERWISE.
- PROVIDE CLASS A, B, OR C ROOFING AS REQUIRED, TO MEET STANDARDS.
- BUILDING CODE, SAFETY STANDARDS, AND REGULATORY STATUTE REFERENCES ON DRAWINGS 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.
- 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.
- 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 BOLS BEFORE CASTING CONCRETE. CONTRACTOR IS TO NOTIFY DNA OF ANY CONFLICTS OR DISCREPANCIES ENCOUNTERED ON THE PLANS IN REGARDS TO ACTUAL SITE CONDITIONS.
- 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.
- STRUCTURAL AND NON-STRUCTURAL ELEMENTS:  
8.1.1. 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:  
8.1.1.1. ALL GLAZED CURTAIN WALL SYSTEMS INCLUDING WINDOW & SKYLIGHT UNITS, STOREFRONT AND CURTAIN WALL SYSTEMS, CANOPIES AND GUARDRAILS.

**GENERAL NOTES**

- 8.1.2. ATTACHED AND FREE-STANDING STORAGE 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 SPECIALTY (STRUCTURAL ENGINEERS) RETAINED BY THE CONTRACTOR AND/OR SUPPLIERS) 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. SPECIALTY ENGINEERS TO SUBMIT LETTERS OF ASSURANCE BY 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 SPECIALTY (ENGINEERS) RETAINED BY THE CONTRACTOR AND/OR SUPPLIERS) IN ACCORDANCE WITH PART 4 OF THE BCBC 2012. SUBMIT SHOP DRAWINGS AND LETTERS OF ASSURANCE BY 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.

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ISSUED FOR ADDENDUM #3 2016.01.28
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ISSUED FOR ADDENDUM #2 2016.01.28
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ISSUED FOR ADDENDUM #1 2016.01.15
3
ISSUED FOR TENDER 2015.12.18
2
ISSUED FOR TENDER PRELIMINARY REVIEW 2015.12.18
1
REVISIONS

DESIGNED BY: DNA
CHECKED BY: DM
DRAWN BY: JTT/TJ
DRAWING DATE: 2016.01.28
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

PROJECT TITLE  
GENERAL NOTES  
AND ASSEMBLIES  
PROJECT NO.  
6

PROJECT NUMBER  
5437



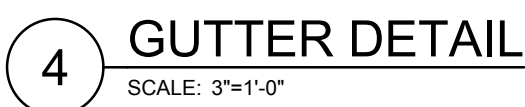
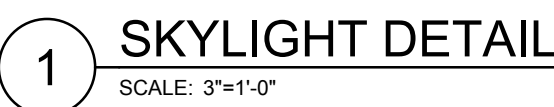










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ED FOR ACCENDUM #3 .01.28	6
ED FOR ACCENDUM #2 .01.21	5
ED FOR ACCENDUM #1 .01.15	4
ED FOR TENDER 12.22	3
ED FOR TENDER LIMINARY REVIEW 12.18	2
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 RUN BY: \_\_\_\_\_  
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 PRINTING DATE: \_\_\_\_\_  
**6.01.26** \_\_\_\_\_  
 RE: \_\_\_\_\_  
**NOTED** \_\_\_\_\_  
 SUBSTANT: \_\_\_\_\_

PROJECT NAME: Centre for Aquaculture and Environmental Research  
PROJECT ADDRESS: 100 OF REPLACEMENT  
PROJECT CONTACT: DEPARTMENT OF FISHERIES AND OCEANS  
PROJECT PHONE: West Vancouver Laboratory  
PROJECT FAX: 60 Marine Drive  
PROJECT CITY: WEST VANCOUVER, BC

## MAIN LABORATORY DETAILS



## GENERAL

- FIELD REVIEW

- ## SUBMITTALS AND SHOP DRAWINGS

- ## CONSTRUCTION

- ## STRUCTURAL DESIGN

1. Fabricate and erect structural steel to CSA S-16 Division 2 certification or better.

- ## POST INSTALLED CONCRETE ANCHORAGES

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









# Questions & Answers

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Project No	<b>5437</b>	Date	<b>January 28, 2016</b>
Project	<b>Centre for Aquaculture and Environmental Research ROOF REPLACEMENT</b> 4160 Marine Drive West Vancouver, BC Department of Fisheries and Oceans - West Vancouver Laboratory		

**1. RE: Section 07540 2.2.4 & Detail 4/A302**

- 1.1. It describes Alsan RS 230 to be used in the gutters whereas Detail 4/A302 shows the EPDM gutter to be repaired. As Alsan RS 230 is not compatible with EPDM can you please confirm if we are to remove the EPDM gutter liner and install Alsan RS 230 or are we to make minor repairs to the EPDM gutter liner with products that are compatible with the EPDM. Also, in order to price this portion of the work accurately, we will need parameters of the work required as the description in Detail 4/A302 is too vague.**

See Addendum 4 drawing A201 for extent of work. EPDM membrane at gutter location is to be removed / replaced / repaired as required. Refer to Specification Section 07530 EPDM Roofing Membrane issued in Addendum # 3.

**2. Could a set of structural drawings that are readable be issued please, the print is too small and blurry to read.**

High definition drawings are included in this Addendum # 4

**3. Item 3.6 - Preparation work concrete deck - This item is much too ambiguous, the surface of the concrete must be ascertained by the consultant, otherwise the pricing will be inconsistent. If the concrete deck is too smooth to accept the torch down vapour barrier, this would be extremely expensive to rough up the surface. Either a test cut should be done or a cash allowance put in the tender.**

The condition of the existing concrete surface is unknown during the tender process. The concrete deck would not be required to be shot blasted. Simply removing the supposedly adhered EPDM would require some scrapping of the deck to remove any residual glue, prime the deck and torch the SBS membrane to it. As the roof is older this adhesive is easier to remove and what little residual glue that is left on the deck would be destroyed by the heat of the torch. Priming the concrete deck will provide good adhesion of the membrane.

**4. Exactly where do you want the tapered insulation....steel deck area? Concrete deck area? Or both? And if it is only on the steel deck area, please explain the new roof assembly in detail. Can we just install a conventional SBS system (the same that is**



**currently on the roof now). Thus eliminating the ballast which is completely unnecessary.**

OWSJ and steel deck is sloping to drain from north to south. Tapered insulation will be required from south side to roof drains as shown in Main Laboratory Roof Plan 1/A201 Roof 3.1. This type of roof assembly was requested instead of the SBS membrane system because of degradation and maintenance concerns.

- 5. Could a wall detail please be issued for the tie-in between roof 3.10 and 3.4/3.6 please. Also a wall detail where roof 3.2 ties into roof 3.1....do we get rid of the concrete tiles?**

All information required is included in the tender documents. Existing drawings and details will be issued to the successful bidder.

- 6. The Bid and Acceptance Form (BA) under BA06 Construction time indicates the work shall be perform and complete by 31 March 2016, is there a special consideration for this accelerated construction schedule? Contract time seems a little short considering current weather conditions and the season.**

Work shall be performed and completed by March 31, 2016.

- 7. Under Section 07540 SBS Modified Bitumen Membrane, execution part 3.6 requires that the concrete must have a Concrete Surface Profile (CSP) of 3 to 6. This requirement seems high for the type of required as grinding and removing foreign and an asphalt residue is often what is required. Can we have a relaxation on this CSP finish as per ICRI.**

See answer to question # 3.

- 8. Addendum 1 calls for the maximum weight of gravel ballast for Roof Type 2 to be 10 lbs. per square foot. The RCABC requirement for a ballasted system with 4" of insulation is 22 lbs. per square foot (RCABC Manual Section 3.13.2). Please clarify.**

Roof type R2 assembly has been revised. Limit the maximum weight due to gravel ballast to 0.57 KPA (12 PSF).

- 9. I would like to request an update on the alternate skylight system evaluation. I have looked over the three addenda and couldn't find any information regarding the dismissal or acceptance of it.**

See Addendum # 3, under the Requests for Alternates section. The Skylite Glazing Solution 400 Series is not accepted.

- 10. We suggest breaking the concrete surface profile off the base price and have it as a separate item or as an allowance. Without providing specific surface preparation requirements, the surface preparation price range will be fairly large and it will not necessarily match the services contractors include.**

See answer to question # 3



**11. Can the mechanical downtime be increased? A 4 day period is quite tight to allow for all the work to be properly completed.**

A maximum of 5 (five) working days of interruption of the unit is allowed. The contractor needs to provide DFO with 1 (one) week of notice before interrupting operation of any mechanical equipment.

**12. Addendum 3, 2.3 states that we are to contact the manufacturer for their recommended Concrete Surface Profile. They require CSP of 2 - 5. As nobody appears to know the condition of the concrete substrate nor whether or not the existing EPDM is fully bonded, which would require the adhesive to be removed with a grinder prior to shot blasting, would the design authority consider adhering, with Duo Tack adhesive, a layer of 3/16 Sopraboard thereby creating a new substrate to which the new membrane could be applied. It should also be taken into consideration that as this project has a finite time line, it would be far quicker and less costly to install a layer of Sopraboard than it would to grind and shot blast 20,000 square feet of concrete.**

See answer to question # 3. No, it would not be necessary to adhere a dens deck overlay board. This is not a RCABC requirement.



**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 +10°C 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 +5°C. 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.



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- .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.

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|            |                                       | .4 | Be sure plumbing, carpentry and all other work has been duly completed.   |
|            |                                       | .5 | No materials will be installed during rain or snowfall.   |
| <b>3.2</b> | <b>METHOD OF INSTALLATION</b>         |    |   |
|            |                                       | .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.).   |
| <b>3.3</b> | <b>SITE PROTECTION</b>                | .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.                   |
| <b>3.4</b> | <b>CLEANING</b>                       | .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  |
| <b>3.5</b> | <b>EQUIPMENT FOR WORK EXECUTION</b>   | .1 | Maintain all roofing equipment and tools in good working order.   |
|            |                                       | .2 | Use torches recommended by SOPREMA  |
| <b>3.6</b> | <b>PREPARATION WORK CONCRETE DECK</b> | .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). |
| <b>3.7</b> | <b>PREPARATION WORK METAL DECK</b>    | .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 selvages 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 must 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